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# What's New

- Version Highlights
- Pre-built Integration Patterns
- New Point-and-Click Use Case: Code Traceability
- New Product Support: Trello
- Also in Version 18.4

## Version Highlights

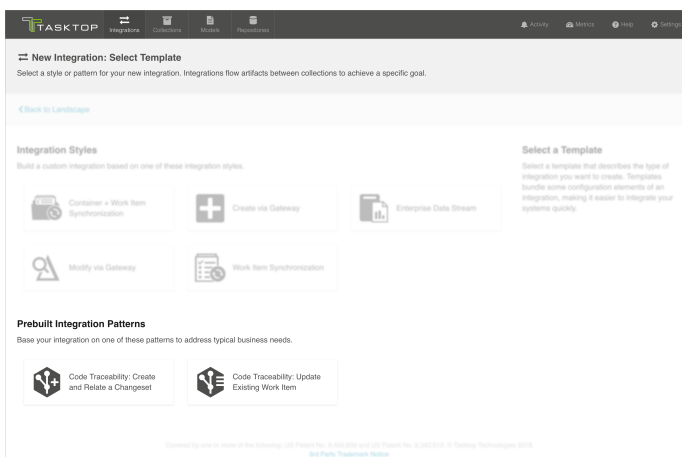
Version 18.4 includes new prebuilt integration patterns for faster integration, point-and-click configuration of code traceability use cases for Git-based repositories, and support for Trello, a project management and collaboration tool from Atlassian. 18.4 also includes features that further minimize repository load when Tasktop scans for new and updated artifacts.

## Pre-built Integration Patterns

For over a decade, Tasktop has been working with some of the largest enterprises in the world to integrate their best-of-breed DevOps Toolchains. We've compiled and published a [library of integration patterns](#) that application delivery teams commonly implement to accelerate time-to-market and remove waste from their processes.

Now, we're starting to make those integration patterns available from within Tasktop Integration Hub, to speed up integration setup. If you know the use case you're trying to achieve, starting from an integration pattern can save you some steps.

Version 18.4 includes two new prebuilt integration patterns for code traceability use cases, detailed in the following section.



We'll be adding additional pre-built integration patterns to future product releases.

## New Point-and-Click Use Case: Code Traceability

When dealing with millions of lines of code, it's very important to know why the code was written in the first place. In fact, when developing safety critical products or products designed for decades of use and maintenance, this is absolutely critical. However, manually linking code changes to the originating feature or defect is both tedious and error prone.

Tasktop Integration Hub 18.4 introduces point-and-click configuration for implementing code traceability for Git-based repositories. Tasktop automatically links requirements and defects to the lines of source code that implement them.

Two flavors exist for this pattern:

1. Create and Relate a Changeset: Upon code commit, create a new artifact for the changeset and link it to an existing artifact (requirement, user story, defect or task).
2. Update Existing Work Item: Upon code commit, update an existing artifact (requirement, user story, defect or task) with the link to the changeset.

Tasktop supports code traceability through our new Git repository support, which can connect to Git-based repositories including Git, GitHub, GitLab, Bitbucket, Gitea, Gerrit, Gitweb and Azure Repos. The following video demos a typical code traceability integration:

Note: If your organization has hundreds or thousands of Git repositories, Tasktop recommends implementing Code Traceability using our Gateway integration style.

## New Product Support: Trello

Trello is a project management tool that uses boards, lists, and cards to help organize and prioritize projects. Thanks to Trello's simplicity, many software delivery organizations adopt it as the project command center. That said, the detailed work to complete the project is often carried out by many practitioners working in several purpose-fit tools to maximize their own productivity.

For that reason, Tasktop now flows new cards and updates to cards between Trello and all the other tools in your software delivery toolchain. The seamless flow of data eliminates the waste and overhead endemic in project management and cross-team collaboration, including duplicate data entry, status meetings and chasing down information.

Trello is commonly integrated with "downstream" tools used by product managers, developers, testers and release managers to implement the details of a project. Here's a short demo video for a sample use case integrating Trello with GitLab:

## Also in Version 18.4

- Tasktop Integration Hub comes with an embedded database for demo and evaluation purposes. Starting with 18.4, a new warning banner appears when a proper operational database has not been configured. The message will disappear once Tasktop Integration Hub is configured with an operational database like Microsoft SQL Server, MySQL, PostgreSQL or Oracle.
- Periodically, Tasktop runs full scans on repositories to detect changes that did not cause the artifact's 'last modified date' to change. In version 18.4, Tasktop can now determine whether these full scans are required and conduct them only if necessary based on the repository's known behavior and the fields you are synchronizing. [Read more here](#).
- ServiceNow's London release provides a richer Agile Development product (previously called SDLC), which also supports SAFe. Tasktop Integration Hub supports this new SAFe module since its release in September. Check out our [demo video and blog](#).
- Version 18.4 supports Jira's new authentication method for Jira Cloud, which uses API Tokens. Upgrading to version 18.4 now means you will experience no disruption of service when the old authentication method will be deprecated.

# User Guide

## Welcome to User Guide

### 18.4 Release (October 23, 2018)

#### New to Hub? You can:

- Learn about our product's [key concepts](#)
- Read about [hardware requirements and installation](#)
- Explore our [Quick Start Guide](#)
- Learn about our [Connectors](#)
- Check out our [Release Notes](#)





Need help? [Contact support here](#)

## Tasktop Editions

Tasktop Integration Hub is available in three editions.

We've included the table below to help you understand which features are included in your edition.








If you are interested in learning more about other editions, please [contact us](#)

	Pro	Enterprise	Ultimate
<b>Lifecycle Connectors</b>			
Included Lifecycle Connectors	Connect Any 2 Lifecycle Tools	Connect up to 5 Lifecycle Tools	Unlimited
<b>Automation</b>			
Gateway Integration Style  (Create via Gateway Template; Modify via Gateway Template)	Available as  add-on	Available as  add-on	Unlimited
Integration Metrics Dashboard	Basic	Advanced	Advanced
<b>Visibility</b>			
Enterprise Data Stream  (Enterprise Data Stream Template)		Available as  add-on	Unlimited
Integration Landscape View			

## Key Concepts

Tasktop is a powerful tool for **connecting your software delivery systems to empower teams, enhance communication, and improve the process of software development as a whole**. Below is a look at some of the concepts Tasktop utilizes to facilitate integration.

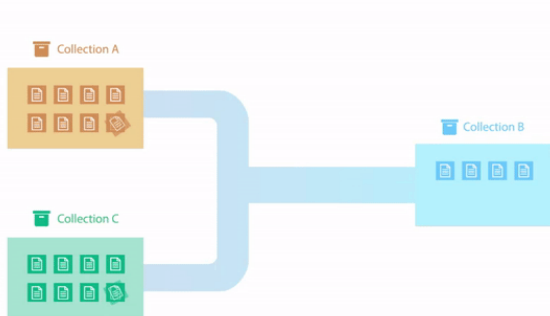
The key concepts to understand are:

-  **Integration**
-  **Repository**
-  **Artifact**
-  **Collection**
-  **Model**
-  **Flow Specification**
-  **Template**

You can learn more about these concepts in the short video below:

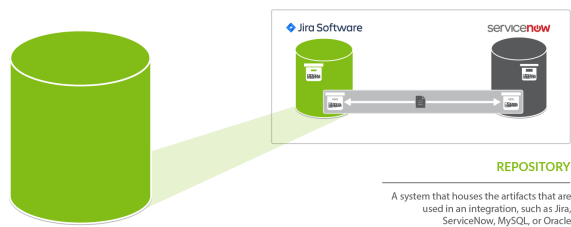
## Integration

At the highest level, the definition of an integration is simply the flow of information between 2 or more tools. If you dig a little bit deeper, the definition of an integration is the flow of information, defined by the flow specification, between two or more collections. And collections are sets of artifacts. But that is probably too much to swallow right at the beginning – so don't try to! Take a look at a conceptual picture of what an integration looks like in the figure below, and just keep that in mind as we walk through all of the other concepts – then when you come back to this it will make a lot more sense!



So let's first talk about the underpinnings of how Tasktop communicates with end systems, which we call *Repositories*. For all repositories Tasktop connects to, we create what we call a *Repository Connection*. Once we've introduced those concepts we'll talk about *Artifacts* and *Collections* and then we will come back to *Integrations* and talk more about the *flow specification*.

# Repository



A *repository* is **any system that houses the artifacts that can be used in an integration**. Repositories can be systems used as part of the software delivery process, like *Micro Focus (HPE ALM)*, *CA Agile Central*, *Jira*, etc., or repositories can be more generic databases, like *MySQL* or *Oracle*.

A *repository connection* is a **connection to a specific instance of a given repository that permits Tasktop to communicate with that repository**. To configure a *repository connection*, users will need to provide base credentials such as a server URL, a username, and a password. You can learn how to set up a *repository connection* [here](#).

## Artifact

An *artifact* is **any object containing metadata that resides within your repository**. There are two main types of artifacts: *work items* and *containers*. *Work items* and *containers* have some similarities, and some key differences, with regard to how they behave within Tasktop Integration Hub.



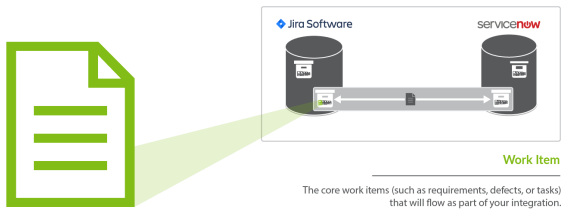
## Work Item

Some examples of common work items are defects, stories, requirements, test cases, and help tickets, to name just a few. *Work items* are the **artifacts that are produced by different teams during software development. They are the core items that will flow as part of your integration**. Serving as the core currency of communication, work items are the means by which all the work around software production is recorded and tracked. Work items are at the core of any integration and are the entities that Tasktop can create or modify as a part of an integration.

Within Tasktop, you will primarily use work items to:

- Serve as the entity that flows from one repository to the other as part of your integration. For example, you can flow requirements in your source repository to your target repository, where they will create corresponding requirements.





## Container

Some examples of common containers are projects, folders, modules, workspaces, and sets. *Containers* are **artifacts that are used to group work items. They define where, within the repository, each work item resides.** The main purpose of a container is to define a set of work items.

Within Tasktop, you primarily use containers to:

- Define the scope of your collection. For example, you could add Project A and Project B to your collection, which would mean only artifacts within those projects would be eligible to flow in your integration (we'll explain this more in the 'Collection' section, below).
- Define routing for your collection. Routing defines *where* artifacts will be created within your target collection. For example, if you route Project A in Jira to Project B in Jama, that will tell Tasktop to flow artifacts in Project A in Jira over to Project B in Jama, where they will create corresponding artifacts.
- For specific low-level container types, you can create a *Container Collection*, which will allow you to flow Containers from a source Collection to a Target Collection - allowing you to recreate your container (i.e. folder, module, component) structure, as well as the work items contained within them in the target repository.

### High-Level Containers vs. Low-Level Containers

Some repositories contain *high level containers*, such as workspaces, which are then broken into *low level containers*, such as projects.

### Container types



Containers are a key component of creating your collection, as each collection is defined by its artifact type (i.e. defect, requirement, test case, etc), by the model it is mapped to, and by the *high level containers* it includes. In this way, containers are essential for how you define which artifacts can flow as part of your integration.

You can learn more about how to select the containers included in your collection [here](#).

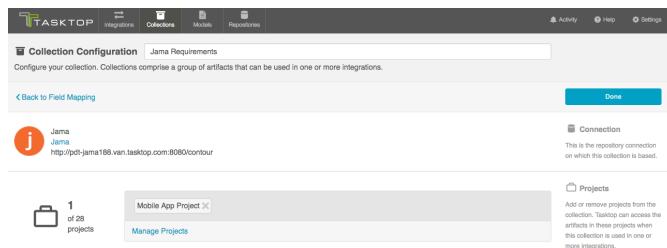
Your containers also become important during the Artifact Routing stage of configuring your integration. On the Artifact Routing Screen, you are able to determine how artifacts should flow from one collection's containers to the other's. Some repositories allow you to route at only the *low level container* level, some allow you to route at the *high level container* level, and others allow a mixed approach.

You can learn more about how to configure artifact routing [here](#).

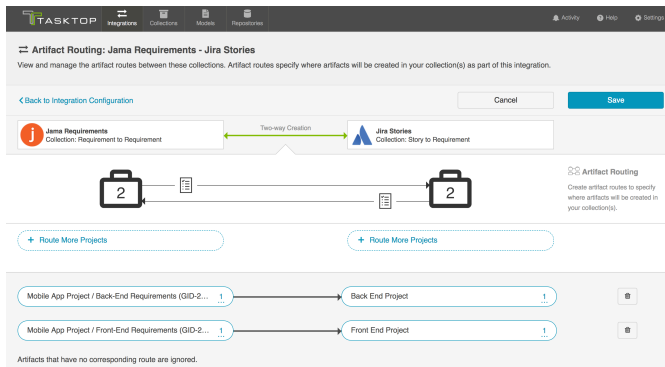
To understand this better, let's look at an example in Jama. Jama contains *high-level containers* (projects) which are then divided into several *low-level containers* (sets), which contain *work items* (requirements, in this case). Here, our *high-level container* is the Mobile App Project, which is then divided into two *low-level containers*: the Back-End Requirements set and the Front-End Requirements set.



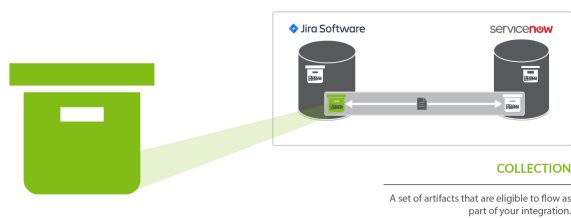
When we configure our Jama collection, we will define that collection at the *high-level container* level: this means that we can define the collection based on projects. Here, we have selected the Mobile App Project for use in our collection.



However, when routing artifacts, we will utilize *low-level containers* (sets) to determine which container Jama artifacts will flow to in our target repository. In the example below, the Back-End Requirements set in Jama will flow to the Back End Project in Jira, and the Front-End Requirements set in Jama will flow to the Front End Project in Jira. Both the Front End Requirements set and the Back End Requirements set are contained within the high level Mobile App Project, within Jama.

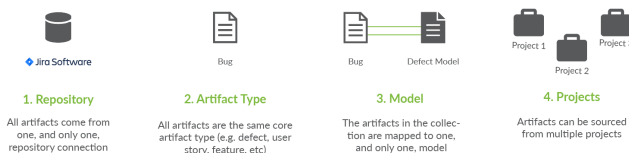


## Collection



A *collection* is the **set of artifacts that are eligible to flow as part of your integration**. They have the following characteristics:

1. All artifacts in the collection are the same core artifact type (e.g. defect, user story, feature, etc)
2. The artifacts in the collection are mapped to one model
3. Artifacts can be sourced from multiple projects (containers)



A concrete example of a collection would be a set of defects from an organization's *Jira* instance.

The artifacts in a collection can come from one or more projects from a given repository connection. Getting back to the example provided, if your *Jira* instance had 50 projects, you could include artifacts from any or all of those projects. Once projects are added to a collection, those artifacts are eligible for inclusion in an integration.

(Note: The term “project” is used here generically– sometimes repositories have different names for “project”, or may not have more granular projects at all, but let’s stick with this for simplicity’s sake.)

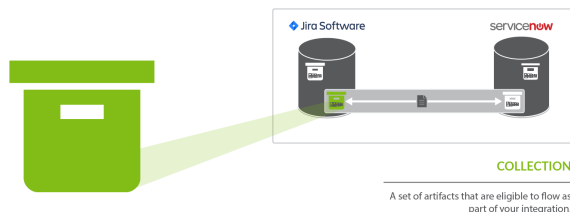
The artifacts in a collection share a set of fields that have repository-specific names and values. Part of creating a collection involves choosing a model on which to base the collection and then mapping these repository specific fields and values to those defined in the model. The concept of models will be discussed in the next section.

There are four types of collections in Tasktop:

- **Work Item Collections**, which typically include work items, such as requirements or defects, from typical repositories, such as *Jira* or *Micro Focus (HPE) Octane*. Work Item Collections can also be utilized to connect to a Database, such as *MySQL*, for use in an Enterprise Data Stream Integration
- **Container Collections**, which include certain container types from external repositories (such as *Jama Components* and *Micro Focus/HPE ALM Folders*)
- **Gateway Collections**, which contain information sent via an inbound webhook, from an external tool. Oftentimes this information is generated based on an event, such as a failed test or a code review.
- **Outbound Only Collections**, which contains artifacts like code commits or changesets, where you may want to only flow out of your repository, but which would not receive updates into your repository.

You can learn how to create your collection(s) [here](#).

### Repository Collections (Work Item Collections and Container Collections)



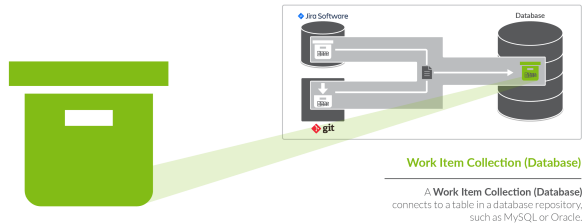
**Repository Collections (meaning either a Work Item Collection or a Container Collection that connects to a repository) comprise artifacts from an ALM, PPM, or ITSM repository like *Atlassian Jira*, *ServiceNow*, *CA Clarity*, or *Zendesk*.** When used in an integration, artifacts in a repository collection can be created, can be updated, and/or can trigger the creation of artifacts in another collection.

What can Tasktop do to artifacts in a repository collection?

Action	Permissible
Create artifacts in collection	✓
	✓

Update artifacts in collection	—
Detect additions or updates to artifacts in collection in order to create or update artifacts in another collection	✓

### Database Collections (a type of Work Item Collection)



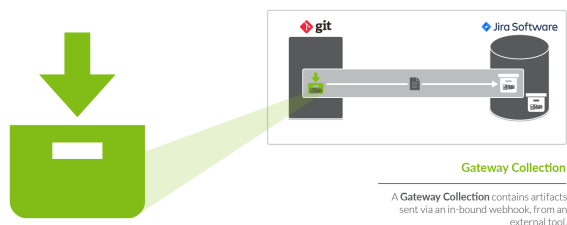
**Databases collections (a type of Work Item Collection) connect to a table in a database repository, such as MySQL or Oracle.** Artifacts in the source repository will flow data to the fields in that table.

When used in an integration, artifacts in a database collection can be created, but cannot be updated nor trigger the creation of artifacts in another collection.

#### What can Tasktop do to artifacts in a database collection?

Action	Permissible
Create artifacts in collection	✓
Update artifacts in collection	✗
Detect additions or updates to artifacts in collection in order to create or update artifacts in another collection	✗

### Gateway Collection



Unlike repository collections and database collections, which rely on Tasktop actively making various API calls to communicate with a given repository, **artifacts in a Gateway collection are sent to Tasktop via our own REST API.** This means that you don't need to create a repository connection to create a

gateway collection--as long as you can send Tasktop a simple REST call, those artifacts can then be used to achieve a specific goal within the context of an integration.

Gateway collections are particularly useful when the artifacts you want to integrate come from smaller, purpose-built systems for practitioners in various disciplines, such as Selenium for QA; when the artifacts you want to integrate come from systems that are largely event-driven, such as an application performance monitoring repositories; when artifacts come from home-grown tools your organization might have developed on their own; or when you'd like to pull information that is not considered a standard artifact from a repository supported by Tasktop, like capacity information from a PPM tool. When creating a gateway collection, you'll specify a path to generate a webservice to which you'll post information. You'll also choose the model to which you would like incoming artifacts from this collection to conform. You'll then be given an example payload and script that can be used to send artifacts to Tasktop:

**Gateway Collection** Build Failures  
View your existing collections and create new ones. Collections comprise a group of artifacts that can be used in one or more integrations.

[Back to Collections](#) [Done](#)

Path:

Token: none

Model: Default

**Relationship Field Configuration**

Parent Artifact: Choose an existing repository connection

**Access Details**

URI: http://ales3-platform-product.van.tasktop.com/api/v1/artifacts/build-failure

Method: POST

Content-Type: application/json

**Example Payload**

```
{
  "severity": "Urgent",
  "status": "Closed",
  "summary": "String",
  "description": "String",
  "release": "1.0",
  "sprint/iteration": "Sprint 1",
  "owner/assignee": "userID",
  "priority": "Low"
}
```

**Example Script**

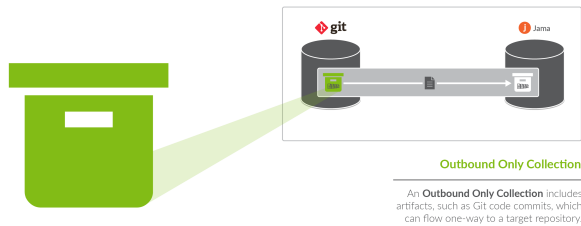
```
curl -H 'Content-Type: application/json' --data-binary '{"severity":"Urgent","status":"Closed","summary":"String","d
```

When used in an integration, artifacts in a gateway collection can trigger the creation or modification of artifacts in another collection.

What can Tasktop do to artifacts in a gateway collection?

Action	Permissable
Create artifacts in collection	
Update artifacts in collection	
Detect additions or updates to artifacts in collection in order to create or update artifacts in another collection	

## Outbound Only Collections



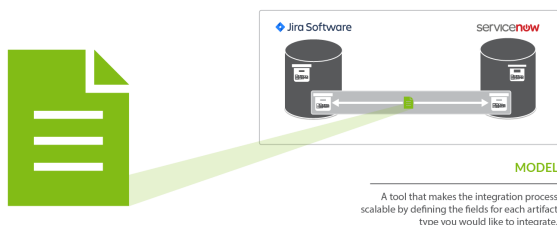
**Outbound Only Collections** contain artifacts like code commits or changesets from Source Code Management repositories like *Git*, which you may want to flow out of your repository, but which would not receive updates into your repository. When used in an integration, artifacts and information will be sent to a target repository. For example, you can create a Git commit in an ALM tool like *Atlassian Jira*. You can also update existing artifacts with information from the Git commit or changeset. While you can use this collection to flow artifacts or information out of a repository, the artifacts in this collection will not receive any updates.

**Note:** Outbound Only collections can connect to the Git repository only. You can learn more about configuring that repository in our [Connector Docs](#).

What can Tasktop do to artifacts in an Outbound Only collection?

Action	Permissable
Create artifacts in collection	✗
Update artifacts in collection	✗
Detect additions or updates to artifacts in collection in order to create or update artifacts in another collection	✓

## Model



When integrating data from multiple collections, there are three factors that are critical to success:

1. The ability to normalize disparate definitions of artifacts between different collections

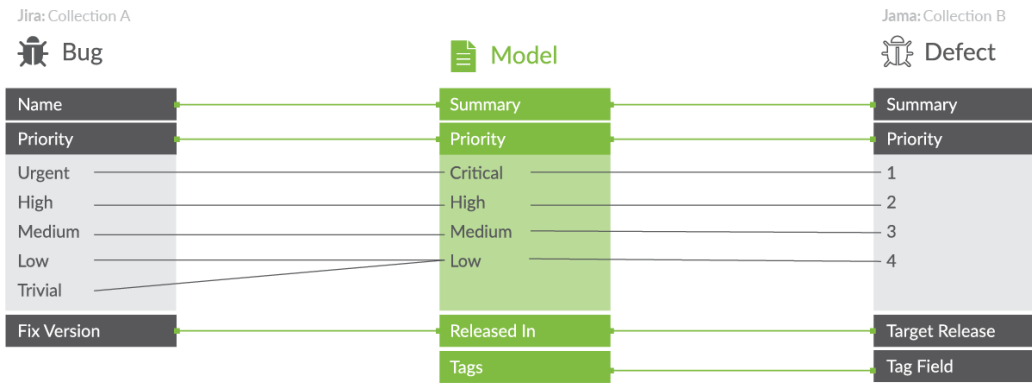
2. The ability to scale the integrations to support many collections with hundreds or even thousands of projects and artifacts.
3. Efficient flow of data – meaning, only flow information that is necessary between collections

These three critical success factors are met with our usage of “models”. In very basic terms, **a model is simply a list of fields or attributes that define a certain artifact that you want to integrate.** For example, below is a very basic defect model:

Defect Model	
Field	Field Type
Description	String
Priority	Single Select: <ul style="list-style-type: none"> <li>• High</li> <li>• Medium</li> <li>• Low</li> </ul>
Status	Single Select: <ul style="list-style-type: none"> <li>• New</li> <li>• In Progress</li> <li>• Complete</li> </ul>

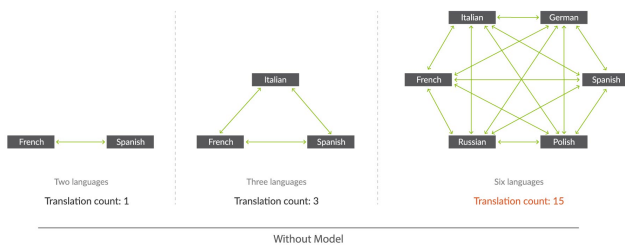
Let’s talk about the first critical success factor – the ability to normalize disparate definitions of artifacts between different collections. Or, another way of thinking of it, the classic “you say tomato, I say tomahto” conundrum. In the diagram below it is apparent that the Jira bug is similar, but not the same, as the Jama defect. The solution to this problem is to be able to “map” each defect to a common definition of a defect and “normalize” the fields and field values. Then, when you are communicating about “defects”, everyone is speaking the same language via the “model” definition. Like this:



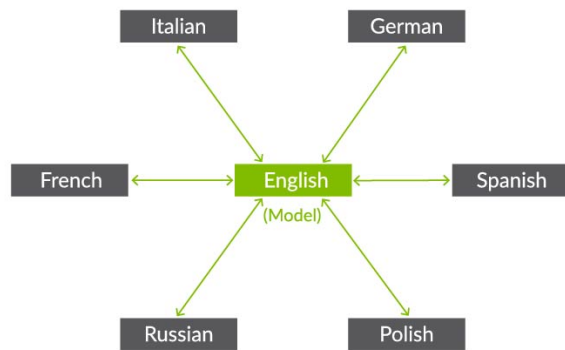


A good analogy to help understand why models are so important is the act of translating between people who speak different languages. If you have two people that speak two different languages, you need to translate only between those two points. If, however, you have three different languages, you have three points of disconnect in communication that need to be translated. But, as you add more and more languages, the number of disconnects blocking communication does not grow linearly – even if you have just 6 languages, you have 15 points of disconnect to translate between! And if you have 10 languages you will have 45! As you can see, resolving these point-to-point disconnects individually quickly becomes unsustainable given the sheer number of them that can arise. **It is in this way that models save the day, acting as a “universal translator,” overcoming all of the communication disconnects that are present by translating between all of the points at once.** Now that we have the ability to solve the “you say tomato, I say tomahto” problem, the second critical success factor comes into play, which is the desire to *scale your integration landscape* to support many collections with hundreds or even thousands of projects and artifacts.

### Integrating Without Models



### Integrating With Models



Six languages

Translation count: 6

---

With Model

Now that we've solved the first two critical success factors, there is one more that might not seem as obvious but is actually quite important to your overall success. When flowing large volumes of data, you need *efficient flow of data*, not the 'drink from the firehose' approach where all fields of all artifacts are flowing everywhere. There is no business value in that and, worse, you will end up with significant performance issues. Instead, by using *models*, you can limit, or target, the exact data that you need to flow between collections – nothing more, and nothing less, than what is necessary.

In summary, models solve the critical three success factors for large scale integration landscapes – giving users the ultimate in flexibility, scalability, and consistency at the same time.

You can learn how to create a model [here](#).

## Flow Specification and Templates

Now that we have introduced the concepts of *artifacts*, *collections*, and *models*, we can come back to the concept of an *integration*. As discussed earlier, the basic concept of an integration is the **flow of information between two or more collections**.

The last two concepts to introduce relate to integrations as a whole. First, the *flow specification*. This is probably the trickiest aspect of an integration, which is why we also have introduced another concept, called *templates*, to help.

Defining how you'd like data to flow between collections requires a lot of nuance and forethought. For instance, would you like to create new artifacts, or modify existing artifacts? Would you like artifacts and fields to flow in both directions or just one direction? What types of collections (and how many of them) would you like to integrate?

**Picking a template jump-starts your integration, bundling many of the flow specification elements to facilitate quicker configuration.**

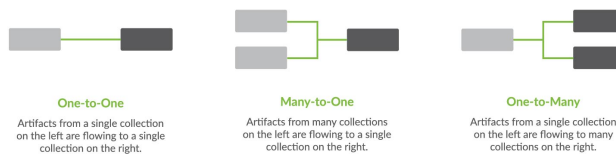
You can learn how to configure your integration using a template [here](#).

## Integration Style

Each *template* is based on an underlying style that defines whether you want to *create new artifacts* in collections or *modify already existing artifacts* in collections.

## Canvas Layout

Each template follows a certain canvas layout, determining the quantity and types of collections that can be added to the canvas. The canvas will either follow a many-to-one, one-to-many, or one-to-one layout.



By picking a given template, you are, in essence, also picking the style of integration and canvas layout, which in turn influences other configuration options such as the artifact flow directionality, field flow directionality, and routing directionality, making the act of integrating your collections quick and painless.

## Artifact Relationship Management (ARM)

Artifact Relationship Management refers to the ability to maintain relationships between artifacts when they flow from one collection to another. By utilizing the Relationship Specification Screen when configuring your collection, you can ensure that relationships are preserved between your artifacts. You'll learn more about how to configure Artifact Relationship Management in the [Quick Start Guide](#).

### Internal ARM

When using Tasktop, it is important to understand the distinction between Internal ARM and External ARM.

Internal ARM refers to the ability to flow multiple artifacts between two (or more) repositories, and to maintain relationships between them.

In the example below, you can see an example of an Integration from Microsoft TFS to Jira which utilizes Artifact Relationship Management (ARM) to do the following:

- Flow Microsoft TFS Features to Jira Epics
- Flow Microsoft TFS Defects to Jira Bugs
- Utilizes Artifact Relationship Management (ARM) to preserve the relationships between the artifacts internally within each repository



#### Internal Artifact Relationship Management (ARM)

The ability to maintain relationships between artifacts by flowing artifacts, along with their associated relationships, from one collection to another.

## External ARM

External ARM is a more light-weight approach, compared to internal ARM. Rather than flowing the related artifacts themselves to the target repository, you can flow a link to those artifacts to a string or weblink field.

For example, you could:

- Flow Microsoft TFS Features to Jira Epics
  - The Microsoft TFS Features are 'affected by' defects within TFS
- Instead of flowing the TFS Defects to Jira, we can flow a link to those TFS defects to a string or web link field on the Jira Epic



#### External Artifact Relationship Management (ARM)

The ability to maintain relationships between artifacts by flowing a URL for the related artifact to a string or weblink field.

## Installation Primer

### Overview

The Installation Primer describes how to install Tasktop Integration Hub and covers some basic information you should know before proceeding with the installation. If you are working on a deployment with Tasktop, your Solutions Architect will assist you with the installation.

### System Requirements

On the [System Requirements](#) page, you can learn about:

- Supported Operating Systems
- Supported Browsers

- Supported Databases
- Java Runtime Environment
- Hardware Sizing for Deployment Scenarios

## Installation

On the [Installation](#) page, you can learn about:

- Sandbox Environment
- Where to download Tasktop
- Installation on Windows
- Installation on Linux
- Default File Locations
- Repository Preparations

## Advanced Configuration

On the [Advanced Configuration](#) page, you can learn about:

- Container Configuration
- Port Configuration
- HTTPS Configuration
- Increasing Available Memory
- Logging

## Upgrading

On the [Upgrading](#) page, you can learn about:

- Performing Tasktop Integration Hub version upgrades
- Back up and Restore practices

## Business Continuity

On the [Business Continuity](#) page, you can learn about:

- Best practices for data loss prevention
- Impacts of Tasktop downtime
- Failover strategy/high availability guidelines

## System Requirements

### General Requirements

Tasktop Integration Hub must be installed in a server environment.

 Note: Only one instance of Tasktop should be installed on each server.

## User Requirements

You will need an account with administrative privileges on your server to install and configure Tasktop Integration Hub. That account must have read/write access to the [default file locations](#).


## Supported Operating Systems


The following 64-bit operating systems and versions are supported:

- Windows 7 SP1
- Windows 10
- Windows Server 2008 R2 SP1
- Windows Server 2012 R2
- Windows Server 2012
- Windows Server 2016
- Red Hat Enterprise Linux 6.x
- Red Hat Enterprise Linux 7.x
- Ubuntu Linux 12.04 LTS
- Ubuntu Linux 14.04 LTS
- Ubuntu Linux 16.04 LTS
- SUSE Linux Enterprise Server 11.x
- SUSE Linux Enterprise Server 12.x


## Supported Browsers

The Tasktop Integration Hub web interface is supported on the following browsers:

- Firefox 46.0.1 and up
- Google Chrome 50.0.2661.102 and up
- Internet Explorer 11 and up
  -  Note: Internet Explorer is not a recommended browser for using Tasktop Integration Hub. We recommend using the latest Google Chrome or Firefox browsers.

 Tasktop Integration Hub has been developed to run with a minimum screen resolution of 1280 pixels by 800 pixels.

## Supported Databases for storing Tasktop Operational Data


 Tasktop automatically stores operational data to a pre-configured Derby database. This is suitable for evaluation purposes only, and is not supported for production environments. Configuring Tasktop to utilize an external database will enable you to perform frequent back-ups without having to stop Tasktop Integration Hub, and ensure that your Tasktop Integration Hub practices are consistent with your existing disaster and recovery process.

For details on how to store your operational data to an external database, rather than Tasktop's built-in database, please refer to the [Settings page](#).

You can also learn more about Disaster Recovery on Tasktop Integration Hub [here](#).

Note: For all supported databases, the user must have sufficient permissions to connect, create, alter and drop tables and indexes and create temporary tables. Users must also have sufficient permissions to select, insert, update, delete, and truncate tables.

Please see guidelines regarding external database sizing [here](#).

 Note: A separate database must be used for Tasktop Operational Data and [Enterprise Data Stream](#) integrations.

The following databases and versions are supported for storing Tasktop operational data:

#### Microsoft SQL Server

##### Supported Versions:

- 2008 (including SP1, SP2, SP3, SP4)
- 2008 R2 (including SP1, SP2, SP3)
- 2012 (including SP1, SP2)
- 2014 (including SP1)
- 2016

##### Configuration Settings

- Database must be configured to be case sensitive
  - This can be configured using the following command (replacing 'dbName' with the name of your database):

```
ALTER DATABASE dbName COLLATE SQL_Latin1_General_CP1_CS_AS ;
```

##### Necessary User Permissions

Granting the following roles is sufficient:

- db\_datareader
- db\_datawriter
- db\_ddladmin

#### MySQL

##### Supported Versions:

- 5.7 (5.7.7 and above)

## Configuration Settings

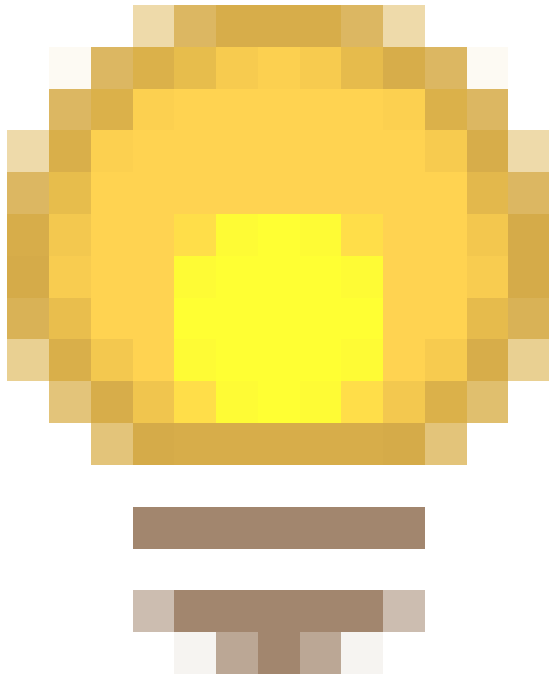
The following settings must be applied before connecting to MySQL with Tasktop:

- Database must be configured to be case sensitive
  - This can be configured using the following command (replacing 'dbName' with the name of your database):

```
ALTER DATABASE dbName COLLATE = 'utf8_bin'
```

- Database default charset must be UTF-8, `ALTER DATABASE dbName CHARACTER SET = 'utf8'`
  - Can also create database with these settings: `CREATE DATABASE dbName CHARACTER SET = 'utf8'`
- `innodb_default_row_format` must be `DYNAMIC`
- `innodb_file_format` must be `Barracuda`
- `innodb_file_per_table` must be `ON`
- `innodb_large_prefix` must be `ON`
- `max_allowed_packet` property must be minimum 64M
  - If this is set too low, you will see a "Packet for query is too large" error on the Activity screen
- `max_connections` property should be minimum 500
  - Note: the number of connections Tasktop uses is highly dependent on customer configuration, hardware, and load. The number above is a recommendation. Please consult Tasktop Support if you have any questions.





Note: `innodb` settings are the default setting for MySQL, so you will not need to make any changes to those settings unless they have been changed previously. The `innodb` settings apply globally to all MySQL databases on the server, while the `character set` is specific to the database.

**⚠** Configuring Tasktop Integration Hub with the MySQL external operational database will prohibit the synchronization of 4-byte characters due to MySQL's default UTF8 encoding being limited to 3 bytes. Examples of 4-byte characters include but are not limited to some emojis and some Chinese characters. If you may be synchronizing 4-byte characters, consider using another supported database.

### Necessary User Permissions

The following provides sufficient permissions for the `tasktop_hub` user on the `tasktop_hub` database:

```
REVOKE ALL PRIVILEGES, GRANT OPTION FROM tasktop_hub;  
  
GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, ALTER, INDEX,  
LOCK TABLES ON tasktop_hub.* TO tasktop_hub
```

### Oracle

### Supported Versions:

- 11g
- 12c

### Configuration Settings

- Database must be configured to be case sensitive (this is the default configuration)

## Necessary User Permissions:

User must have CREATE SEQUENCE, CREATE TABLE, CREATE SESSION permissions, as well as sufficient tablespace quota. Typical user creation might look as follows:

```
CREATE USER tasktop_hub IDENTIFIED BY a_password DEFAULT TABLESPACE
tasktop_hub;

GRANT CREATE SESSION TO tasktop_hub;

GRANT CREATE SEQUENCE, CREATE TABLE TO tasktop_hub;
GRANT UNLIMITED TABLESPACE TO tasktop_hub;
```

## PostgreSQL

### Supported Versions:

- 9.5.2 - 9.5.12
- 9.6 - 9.6.9
- 10.1
- 10.2
- 10.3

### Configuration Settings

- Database must be configured to be case sensitive (this is the default configuration)

### Necessary User Permissions

The following provides sufficient permissions for the tasktop\_hub user on the tasktop\_hub database:

```
REVOKE ALL PRIVILEGES ON DATABASE tasktop_hub
FROM tasktop_hub;

GRANT CONNECT, TEMP ON DATABASE tasktop_hub
TO tasktop_hub;

GRANT CREATE ON SCHEMA public
TO tasktop_hub;

GRANT SELECT, INSERT, UPDATE, DELETE, TRUNCATE
ON ALL TABLES IN SCHEMA public
TO tasktop_hub;
```

## Supported Databases for use in Enterprise Data Stream Integrations

The Tasktop Database add-on allows you to create integrations that send artifact information to one central database.

 Note: A separate database must be used for [Tasktop Operational Data](#) and Enterprise Data Stream integrations.

If your license includes the Tasktop Database add-on and you would like to configure an [Enterprise Data Stream Integration](#), the following databases and versions are supported:

### Microsoft SQL Server

- 2008 (including SP1, SP2, SP3, SP4)
- 2008 R2 (including SP1, SP2, SP3)
- 2012 (including SP1, SP2)
- 2014 (including SP1)
- 2016

### MySQL

- 5.5
- 5.6
- 5.7

### Oracle

- 11g
- 12c

### Java Runtime Environment

Tasktop Integration Hub is packaged with a JRE; there is no need to install a JRE separately. Tasktop Integration Hub uses and ships with Oracle Java.

## Hardware Sizing for Deployment Scenarios

### General Notes and Considerations

Below are recommendations on sizing hardware and virtual machine capacity to meet the needs of typical deployment scenarios.

Tasktop Integration Hub is a web application which runs centrally on a server. Users interact with it through a web browser from any computer that has network access to the server. These sizing recommendations apply to the server machine running Tasktop Integration Hub.

These recommendations are guidelines intended to provide a starting point when deciding on hardware allocation for a specific deployment. We recommend monitoring system load including CPU usage, memory pressure, and disk queue length, and adjusting the system sizing accordingly.

For best results, Tasktop Integration Hub should be deployed in an environment that has good network throughput and low latency to all repositories and databases involved in an integration.

Based on real-life metrics, we approximate database sizing at about 40 KB per artifact. For 100,000 artifacts total (including artifacts on both sides of an integration), that equates to about 4 GB of database storage, not including log files, rollback space, etc.

This is a rough estimate, and will depend on customer-specific configuration and usage. For example, artifacts that have hundreds of fields and many large comments will require more space. For this reason, our sizing estimates are on the high side to account for future growth and variance between customers and their configurations.

### **External Database Sizing**

Disk space usage for configurations using an external database should have roughly 50-100 GB for the system running Tasktop, and the external database should have whatever is recommended for the size category, minus approximately 50 GB. For example, the medium size would be about 100 GB (150 GB recommended minus 50 GB).

### **Sizing Recommendations**

#### ***Small Deployment***

A deployment managing up to 20,000 artifacts and up to 200 active users.

- 4 GB system memory
- 3 GHz processor, 2 cores
- 50 GB free disk space

Small deployment system sizing is roughly equivalent to an EC2 T2 Medium instance.

#### ***Medium Deployment***

A deployment managing up to 100,000 artifacts and up to 1,000 active users.

- 8 GB system memory
- 3 GHz processor, 2 cores
- 150 GB free disk space

Medium deployment system sizing is roughly equivalent to an EC2 T2 Large Instance.

#### ***Large Deployment***

A deployment managing many repositories and 200,000+ artifacts and over 2,000 active users.

- 8 GB system memory
- 2 x 3 GHz processors, 4 cores
- 250 GB free disk space

Large deployment system sizing is roughly equivalent to an EC2 M4 Large or M3 Large Instance.

## Installation

### Sandbox Environment

It is recommended that you prepare a sandbox environment to test your Tasktop Integration Hub configuration before deploying it in production. This sandbox environment should include a sandbox server to install Tasktop Integration Hub on, and sandbox instances of all ALM systems you will be integrating, with the same project structure and customizations as, and a comparable number of artifacts to, your production ALM systems.

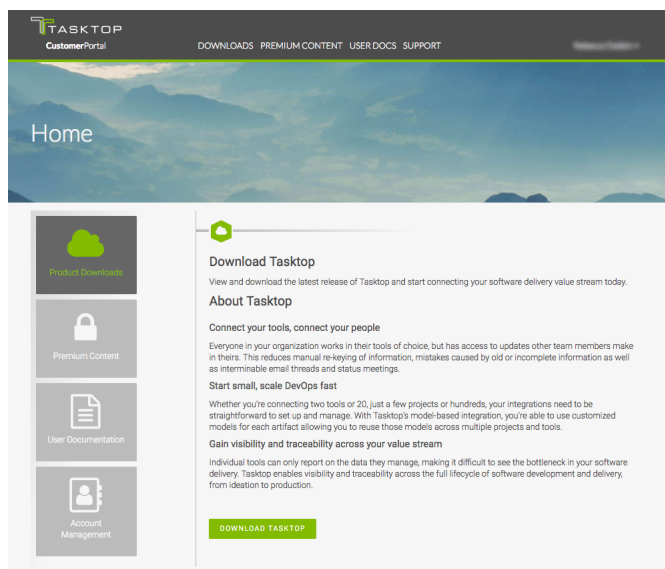
After you have configured Tasktop Integration Hub on the sandbox server and are happy with the way it is running against your sandbox ALM systems, you can install Tasktop Integration Hub on your production server and recreate the configuration against your production ALM systems.

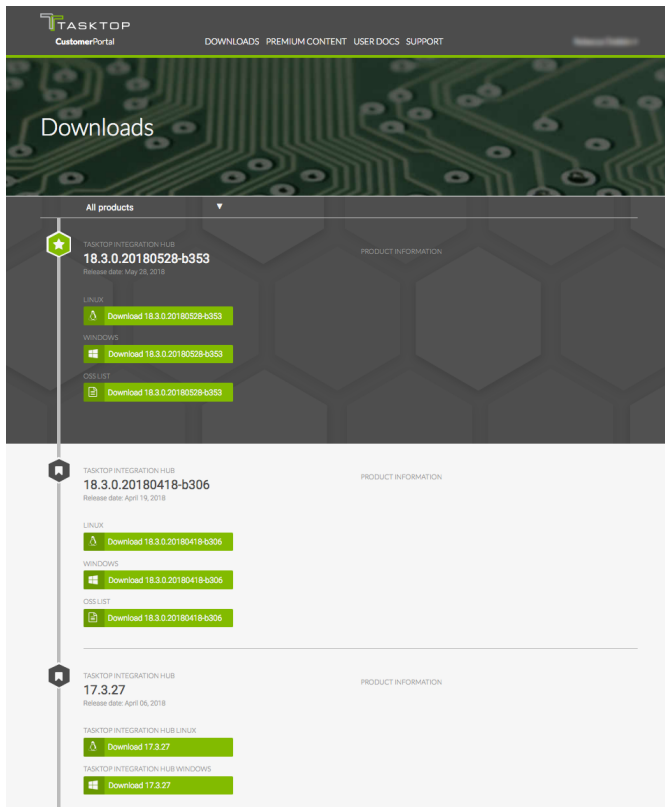
### Installation

#### Where to Download Tasktop Integration Hub

To get the latest version of Tasktop Integration Hub, first create an account on our [Customer Portal](#), then contact your Solutions Architect or [Tasktop Support](#) to be enabled for the latest Tasktop Integration Hub download for your account.

Once logged in to the Customer Portal, click the 'Product Downloads' button. This will lead you to the Downloads section, where you will be able to download the latest version of Tasktop Integration Hub.

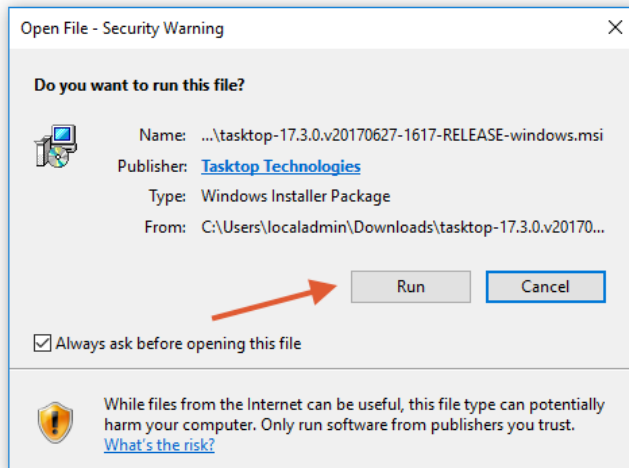


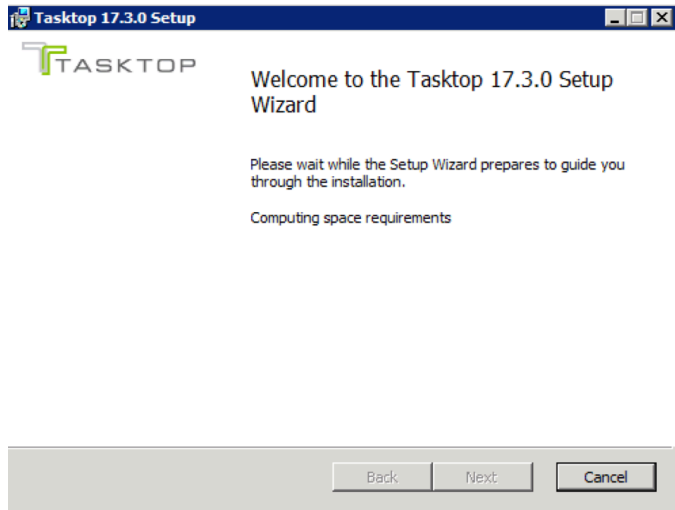


## Installation on Windows

Click on the 'Windows' download link on the Product Downloads page of the [Customer Portal](#).

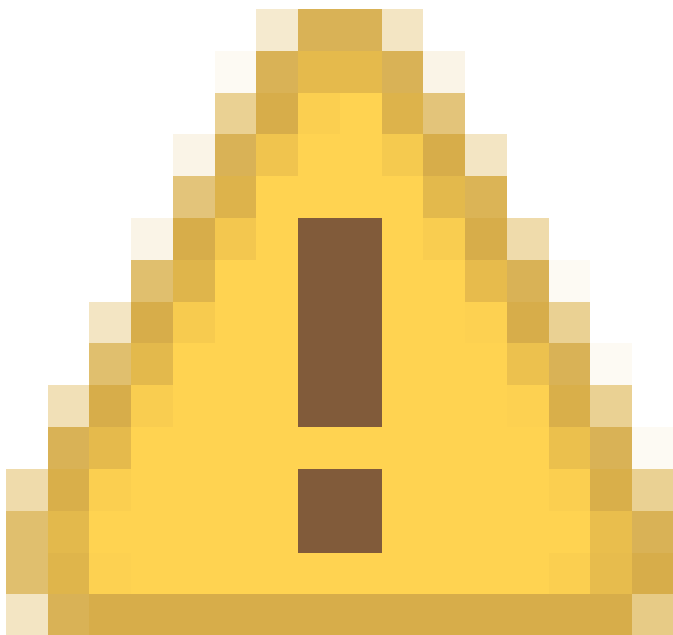
You will be provided with an installation package for Tasktop Integration Hub as a standard Windows MSI installer. If prompted, click 'Save File,' and then open the file once it downloads.






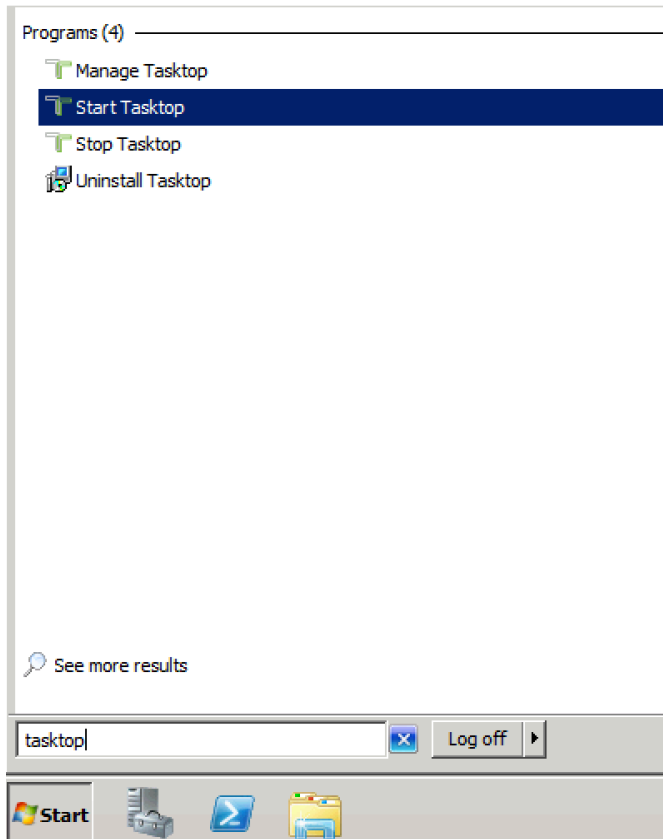
You will then be lead through the installation wizard. Follow the prompts to install Tasktop.

To start Tasktop, click the 'Start' menu, and select 'Start Tasktop'. This will start both Tasktop and User Management services. To stop both services click on the 'Stop Tasktop' shortcut.



The Tasktop application is available via HTTPS on port 8443. A default SSL certificate is provided for testing purposes, however this SSL certificate is insecure. **Before use in a production environment, the provided SSL certificate must be replaced.** Please see details in the [SSL Certificate Installation](#) section below.

 Please make sure you follow the steps in the [Getting Started](#) section upon starting up Tasktop Integration Hub for the first time.



## Installation on Linux

### *For Direct Customers*

Click on the 'Linux' download link on the Product Downloads page of the [Customer Portal](#).

You will be provided with an installation package for Tasktop Integration Hub as a `.tar.gz` archive.

To extract this archive to your desired location, copy the archive to the correct location on your Linux system and use following command to extract:

```
$ tar -xzvf tasktop-linux-x64-<version>.tar.gz
```

To start Tasktop Integration Hub, run the `start-tasktop.sh` script from the installation directory. This will start both Tasktop and User Management services. To stop both services, use the `stop-tasktop.sh` script in the same folder.

💡 Please make sure you follow the steps in the [Getting Started](#) section upon starting up Tasktop Integration Hub for the first time.

### *For OEM Customers*



You will be provided with an installation package for Tasktop Integration Hub with no file extension in the name.

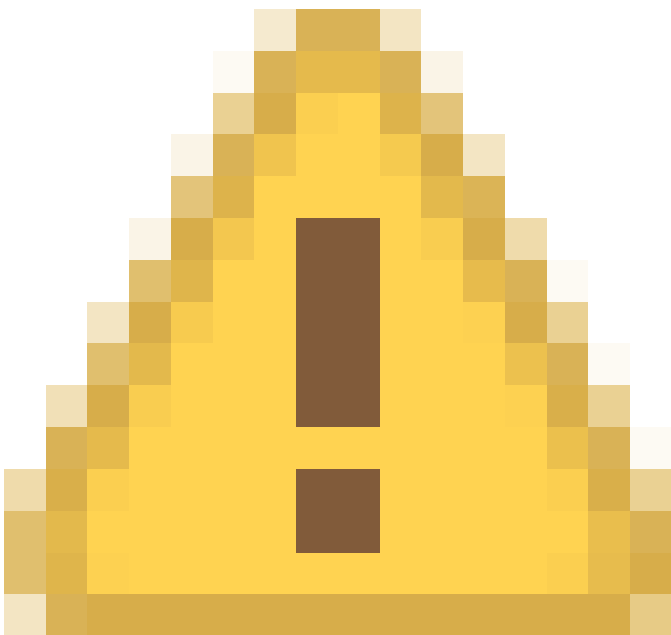
To execute the file, run these commands:

```
chmod +x tasktop-linux-x64-<version>
```


```
./tasktop-linux-x64-<version>
```

Once you approve the End User License Agreement that pops up, the file will automatically unzip, allowing you to run Tasktop Integration Hub.

To start Tasktop Integration Hub, run the `start-tasktop.sh` script from the installation directory. This will start both Tasktop and Keycloak User Management services. To stop both services, use the `stop-tasktop.sh` script in the same folder.



The Tasktop application is available via HTTPS on port 8443. A default SSL certificate is provided for testing purposes, however this SSL certificate is insecure. **Before use in a production environment, the provided SSL certificate must be replaced.** Please see details in the [SSL Certificate Installation](#) section below.

 Please make sure you follow the steps in the [Getting Started](#) section upon starting up Tasktop Integration Hub for the first time.

#### ***Tasktop Integration Hub Service on Linux***

There are multiple ways to configure a Tasktop Service that starts automatically on system startup. It is recommended to use a dedicated account for running Tasktop Integration Hub. Here are examples for SysVinit and Systemd.

## Tasktop Integration Hub Service with Systemd

1. Navigate to `/etc/systemd/system`
2. Create a new file named `tasktop.service`
3. Paste the following into that file

```
# Systemd unit file for tasktop
[Unit]
Description=Tasktop Integration Hub
After=syslog.target network.target

[Service]
Type=forking

ExecStart=/path/to/tasktop/start-tasktop.sh
ExecStop=/path/to/tasktop/stop-tasktop.sh

User=user
Group=group

[Install]
WantedBy=multi-user.target
```

- a. Be sure to change both instances of `'/path/to/tasktop'` to the full path to your Tasktop Integration Hub installation directory
- b. Be sure to change the `User` and `Group` variables to the username and group of the account you want to run the Tasktop Integration Hub service

4. Reload Systemd

```
$ systemctl daemon-reload
```

5. Enable the new Tasktop Integration Hub service to start on system startup

```
$ systemctl enable tasktop
```

To manually start and stop the Tasktop Integration Hub Service, use the following commands:

```
$ systemctl start tasktop
$ systemctl stop tasktop
```

## Tasktop Integration Hub Service with SysVinit

1. Navigate to `/etc/init.d`
2. Create a new file named `tasktop`
3. Paste the following into that file:

```
#!/bin/bash
# description: Tasktop Start Stop Restart
# processname: tasktop
# chkconfig: 2345 20 80
TASKTOP_HOME=/path/to/tasktop
case $1 in
start)
sh $TASKTOP_HOME/start-tasktop.sh
;;
stop)
sh $TASKTOP_HOME/stop-tasktop.sh
;;
restart)
sh $TASKTOP_HOME/stop-tasktop.sh
sh $TASKTOP_HOME/start-tasktop.sh
;;
esac
exit 0
```

- a. Be sure to change the `TASKTOP_HOME` variable to the full path to your Tasktop Integration Hub installation directory
  - b. You may also wish to change the `chkconfig` run levels and start and stop priorities
4. Set the permissions of Tasktop to make it executable

```
$ chmod 755 tasktop
```

5. Use the `chkconfig` utility to make Tasktop Integration Hub start at system startup (you may wish to change the run levels in this command)

```
$ chkconfig --add tasktop
$ chkconfig --level 2345 tasktop on
```

To manually start and stop the Tasktop Integration Hub Service, use the following commands:

```
$ service tasktop start
$ service tasktop stop
$ service tasktop restart
```

## SSL Certificate Installation

**⚠** The Tasktop application is available via HTTPS on port 8443. **A default SSL certificate is provided for testing purposes and should be replaced after installation.**

Replacing the default SSL certificate used by Tasktop Integration Hub involves the following:

- **Prepare a Java keystore file with all the keys and certificates:**
  - Create a Java keystore file and generate a new key pair.
  - Generate a certificate request file.
  - Submit the file to a Certificate Authority (CA) and obtain the certificate and CA certificate trust chain.
  - Import the certificates to the keystore file.
- **Configure Tasktop to use the keystore** (i.e., new key and certificate).

The SSL certificate should contain DNS names that the Tasktop server is accessible at. The user's browser will verify that the name in the address bar matches one of the names in the certificate. Certificate Authority may be your internal corporate service, or you may use a public CA, such as Comodo or Let's Encrypt. If you are planning to use a certificate from a public CA, your Tasktop instance must have a publicly recognizable DNS name that is owned by your organization.

Your Certificate Authority will have more detailed instructions on creating and importing certificates. SSL-related instructions on this page are provided as a reference only. These instructions are based on the use of a GUI tool Portecle, which can be downloaded from: <http://portecle.sourceforge.net/>. Tasktop does not provide support for this third party tool beyond the instructions below. You can create the Java keystore file on any machine and move the file to the server running Tasktop software; there is no need to install Portecle on the server running Tasktop.

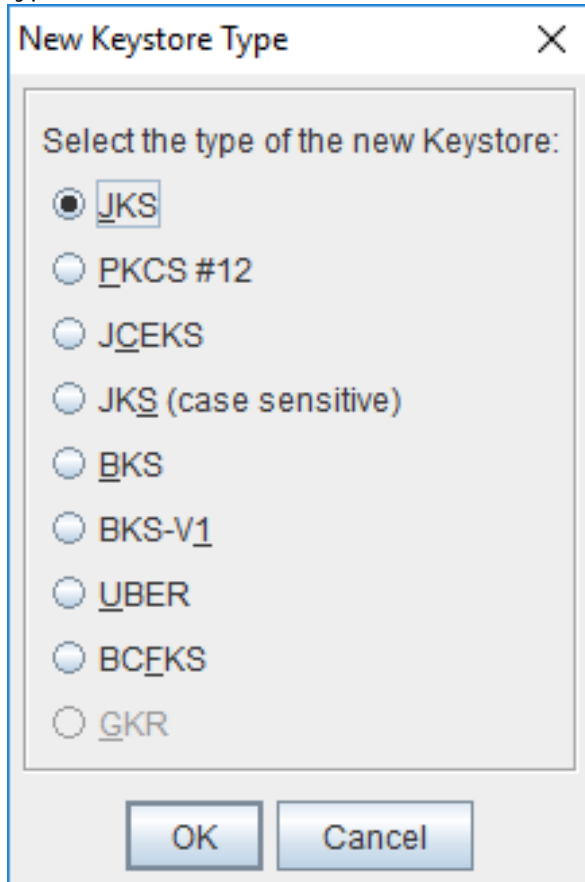
If you cannot use Portecle and need to utilize standard Java command line utility keytool, please refer to Tomcat documentation here: <https://tomcat.apache.org/tomcat-8.5-doc/ssl-howto.html>. When following the documentation, use JRE installed together with Tasktop software in the Tasktop installation directory (default C:\Program Files\Tasktop). Tasktop's server.xml file is located in Tasktop data directory (default: C:\ProgramData\Tasktop, or the location where Tasktop is installed on Linux) under `container/conf/server.xml`

### ***Prepare a Java keystore file with all the keys and certificates***

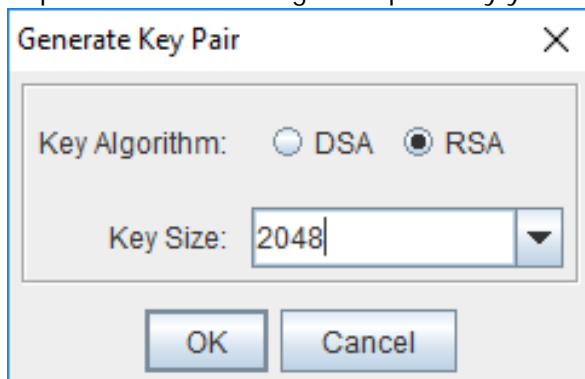
To replace Tasktop's default SSL certificate using Portecle, follow the instructions below. Details on accessing Portecle can be found in the section above.

1. Create a new key pair and a keystore:

- a. Start Portecle and click New Keystore button in the toolbar. Select JKS as the keystore type:



- b. Click Generate Key Pair in the toolbar. And leave the default settings for 2048 bit RSA key, or pick different settings if required by your company's security policy:



- c. In the Generate Certificate Dialog, enter the Fully Qualified Domain Name (FQDN) of your Tasktop server, and fill in other fields as appropriate. Your certificate should include all DNS names that your users might use to connect to Tasktop. For internal corporate CA you can also use "short" names (i.e., tasktop, in addition to tasktop.acme.corp). In CA lingo, these additional DNS names are called Subject Alternative Names, or SAN. You can specify

one SAN at this point, and can usually add more names later when submitting your request to the CA:

Generate Certificate

Signature Algorithm: SHA256withRSA

Validity (days): 365

Common Name (CN): tasktop.acme.corp

Organisation Unit (OU): Information Technology

Organisation Name (O): Acme Corporation

Locality Name (L): Vancouver

State Name (ST): BC

Country (C): CA

Email (E):

Subject Alternative DNS Name: tasktop

OK Cancel

d. Enter "tomcat" as alias:

Key Pair Entry Alias

Enter Alias: tomcat

OK Cancel

e. Create a new password for the key pair (you will need it later when configuring Tomcat):

Key Pair Entry Password

Enter New Password: .....

Confirm New Password: .....

OK Cancel

f. You should see your newly created key pair in the list:

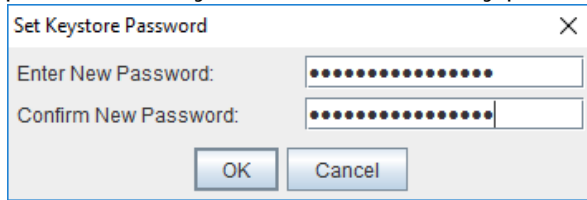
[Untitled] - Portecle

File Tools Examine Help

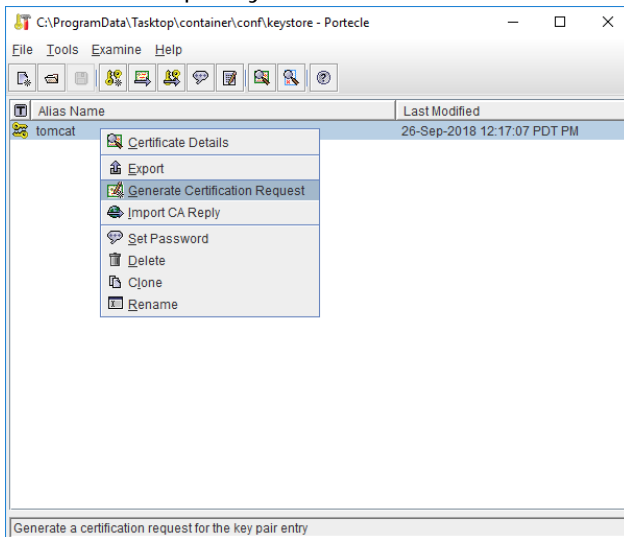
Alias Name	Last Modified
tomcat	26-Sep-2018 12:17:07 PDT PM

Keystore type: JKS, provider: SUN, size: 1 entry

- g. Click Save Keystore in the toolbar to save the newly created keystore file, use the same password that you entered for the key pair earlier:



2. To generate certificate request file, also known as Certificate Signing Request or CSR, right click on the "tasktop" key, select Generate Certification Request and save it to a file:

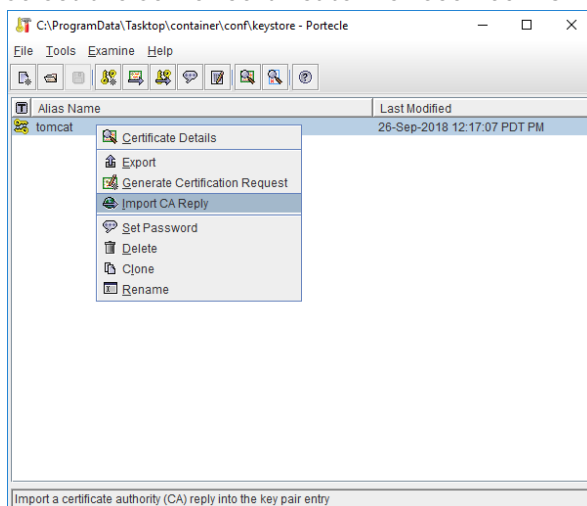


3. Submit your CSR to a CA to obtain a Certificate. For some CAs you will need to provide the list of all DNS names for your Tasktop server separately as they will ignore the SAN values in the certificate request. See your CA's documentation for detailed instructions.

4. Import the certificates to the keystore file.

- a. Import the CA certificates, also known as trust chain - select Import Trusted Certificate in the toolbar.

- b. Import the server certificate - right click on the "tasktop" key, select Import CA Reply and select the server certificate file received from the CA:

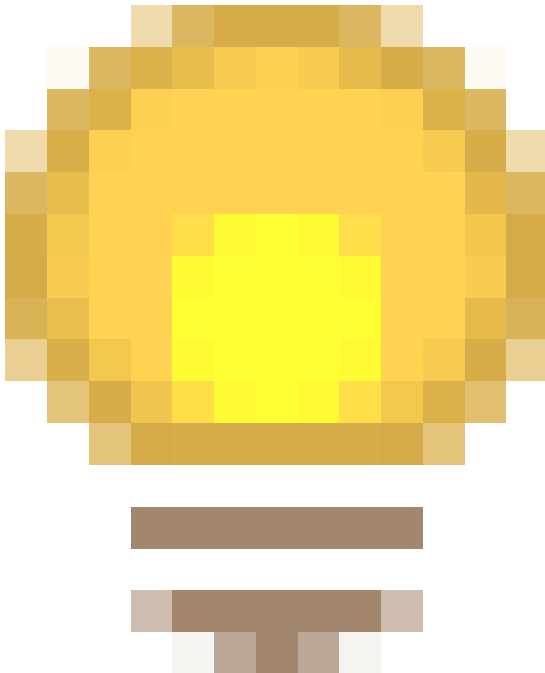


- c. You can verify the certificate chain by selecting menu Tools -> Keystore Report.

1. Place your keystore file in a protected location that will not be wiped on Tasktop upgrade. We suggest using Tasktop data directory (default C:\ProgramData\Tasktop, or the home directory of the user that Tasktop service is running as on Linux).
2. In the Tasktop data directory (default: C:\ProgramData\Tasktop, or the location where Tasktop is installed on Linux), open `container/conf/server.xml`
  1. Find the SSL HTTP connector configuration(the `<Connector>` element with `protocol="org.apache.coyote.http11.Http11NioProtocol"`)
  2. Change the `keystoreFile` attribute to have the full filesystem path of the new keystore file
  3. Change the `keystorePass` attribute to the password you entered when generating the new keystore file
3. Restart Tasktop Integration Hub Service

By default the SSL configuration has been configured to disable known weak ciphers. As new security information becomes available, the list of enabled ciphers should be updated accordingly.

### Port Configuration



To view a list of all ports being used on your system, you can use the [netstat-a command](#). This will help you determine which available ports you would like to use for Tasktop.

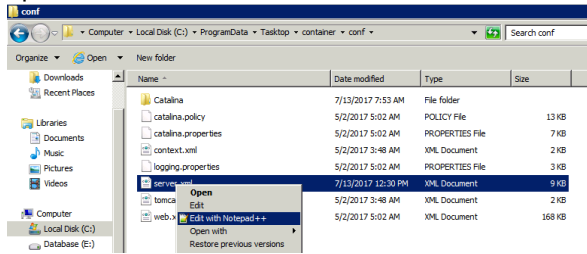
### *Tasktop Integration Hub*

The default port Tasktop uses is 8443 for HTTPS and 8080 for HTTP which redirects to HTTPS. You may wish to change these ports to ease access for your users, or to accommodate a proxy. To change these ports, follow these instructions:

1. In the Tasktop workspace (default: C:\ProgramData\Tasktop), open `container/conf/server.xml`

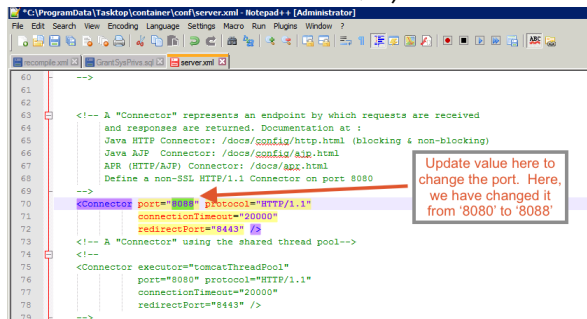


1. Note: You may need to right click and select 'Edit with Notepad,' or some other similar option in order to edit the file



2. To change the HTTP port:

1. Find the HTTP connector configuration (the <Connector> element with protocol="HTTP/1.1")
2. Change the port attribute to the port you wish to use (e.g. to use port 8888: <Connector port="8888" protocol="HTTP/1.1" connectionTimeout="20000" redirectPort="8443" />)



3. Save the file

3. To change the HTTPS port

1. Find the HTTP connector configuration (the <Connector> element with protocol="HTTP/1.1")
2. Change the redirectPort attribute to the port you wish to use (e.g. to use port 9443: <Connector port="8080" protocol="HTTP/1.1" connectionTimeout="20000" redirectPort="9443" />)
3. Find the SSL HTTP connector configuration (the <Connector> element with protocol="org.apache.coyote.http11.Http11NioProtocol")
4. Change the port attribute to the port you wish to use (e.g. to use port 9443: <Connector port="9443" protocol="org.apache.coyote.http11.Http11NioProtocol" ... />)

If you change the port, the address used to access Tasktop (i.e. <http://localhost:8080>) will need to be updated with the new port number in place of '8080.'

Please refer to the official documentation for additional configuration options: <http://tomcat.apache.org/tomcat-8.5-doc/config/http.html>

### User Management

The default port for User Management is 8081. To change this port, follow these instructions:

1. In the Tasktop workspace (default: C:\ProgramData\Tasktop), open `container/webapps/ROOT/WEB-INF/web.xml`
  1. Find the `targetURI` parameter for the `KeycloakProxy` servlet (`<param-name>targetUri</param-name>`)
  2. Change the `param-value` attribute to the port you wish to use (e.g. to use port 9081 : `<param-value>http://127.0.0.1:9081/auth</param-value>`)
2. In the Tasktop workspace (default: C:\ProgramData\Tasktop), open `keycloak/standalone/configuration/standalone.xml`
  1. Find the socket-binding for http configuration (`<socket-binding name="http" port="{jboss.http.port:8081}"/>`)
  2. Change the port attribute to the port you wish to use (e.g. to use port 9081: `<socket-binding name="http" port="{jboss.http.port:9081}"/>`)

## Getting Started

Once installation is complete, you can begin using Tasktop Integration Hub by opening <https://localhost:8443> in any of our [supported browsers](#).

Before logging on to Tasktop, you must log into the **User Administration Console** in order to create your admin user(s). The Tasktop User Administration Console can be accessed via the 'User Administration Console' link, at the bottom of the Tasktop Integration Hub sign-in page. Please review the [User Management](#) section for detailed instructions on how to create a user, log in, and manage your user accounts.

Once logged in, you will be prompted to set a [Master Password](#), which will be used to encrypt your repository credentials.

You will also need to apply your license before configuring your integrations. You can learn how to apply your license [here](#).

## Default File Locations

### Default File Locations on Windows

When Tasktop Integration Hub is installed on Windows using the MSI installer, the program files (i.e. the executable files and binaries) are located in `C:\Program Files\Tasktop`, and the configuration files and logs are located in `C:\ProgramData\Tasktop` (ProgramData may be a hidden folder, so you will need to change your Windows Explorer settings to show hidden files and folders to find it).

### Default File Locations on Linux

When Tasktop Integration Hub is installed on Linux, the program files (i.e. the executable files and binaries), configuration files, and logs are all located in the installation directory where you extracted the distribution archive.

## Repository Preparations

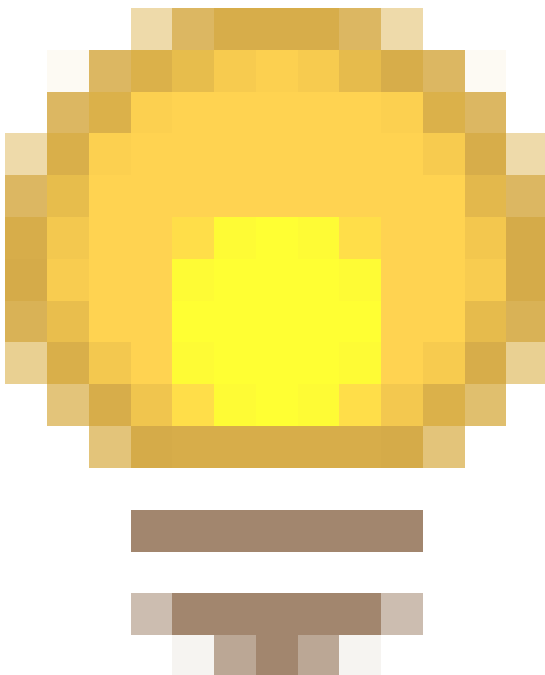
### Preparing Your Repositories

In Tasktop, the term, 'repository,' is used to refer to the external tools Tasktop connects to, such as Atlassian Jira, ServiceNow, or BMC Remedy.

Before connecting Tasktop Integration Hub to your external repositories, you will need to perform some simple preparation on each repository you will be integrating. This preparation includes creating a user account for Tasktop Integration Hub with the appropriate permissions. Please refer to our [Connect](#) or [Docs](#) for detailed instructions for each repository.

### Firewalls and Proxies

If Tasktop is installed behind a firewall, you may need to connect to external repositories (e.g. hosted or cloud ALM tools) through a proxy. To create a connection to such external repositories in Tasktop, you can make Tasktop connect through your proxy by configuring the proxy settings when creating a new repository connection. It is recommended to create login credentials specifically for Tasktop on the proxy server.



Note that the Proxy Location must be a URL in order for the proxy connection to work. If a .pac script is used in your browser, you will need to open the script and find the URL/port to enter in the Location field.

To use a proxy server, check the 'user proxy server' box and fill in your proxy details in the 'Proxy Server' section on the New Repository Screen:

Proxy Server  Use proxy server

Proxy Host Address	<input type="text" value="https://proxy.example.com:8080"/>
Username	<input type="text" value="TasktopUser"/>
Password	<input type="password" value="*****"/>

Proxy Server  
If your organization uses a proxy server to access the above repository, please provide the proxy server credentials.

# Advanced Configuration

## Container Configuration

Tasktop is distributed with the Apache Tomcat Servlet Container.

For information on configuring the container, please refer to the Apache Tomcat documentation at <http://tomcat.apache.org/tomcat-8.5-doc/>.

On Windows, configuration and log files are installed under `C:\ProgramData\Tasktop` while program files are located under `C:\Program Files\Tasktop`.

For information on configuring the service, please refer to the Apache Tomcat Service Howto at <http://tomcat.apache.org/tomcat-8.5-doc/windows-service-howto.html>.

Further configuration, including JVM options and memory allocation, can be performed for the Windows service by launching "Tasktop Properties" located at `C:\Program Files\Tasktop\container\bin\tasktopw.exe`.

## Increasing Available Memory

On Linux, Tasktop runs with the default JRE memory settings. This is typically a 1/4th of the physical memory or 1 GB whichever is less. To change the available memory, edit `container/bin/setenv.sh` and add the following line replacing 1536 with the desired amount of heap memory:

```
JAVA_OPTS=-Xmx1536m
```

On Windows, the available memory defaults to 512 MB and can be changed through the Manage Tasktop application. The desired amount of memory is specified on the Java tab under "Maximum memory pool".

## Logging

Logging is configured with log4j. See the included "`log4j.xml`" to configure log levels, location, and rolling policy.

The included "`log4j-troubleshooting.xml`" configures log4j for the troubleshooting log level when set via the settings page of the application.

# Upgrading

## Backup

A working backup strategy is a critical element of disaster recovery, since only backups can mitigate complete hardware failure and user error. A strategy that ensures correct and current backups is essential. Backups of the Tasktop database include both configuration and operational data.

Backup frequency should mirror your practices for all software tools your organization utilizes. Backup frequency should be daily, ideally with incremental backups performed more frequently.


## General Application Configuration

The recommended practice is to back up the entire installation/program data directory to cover all customizations (excluding logs)

- Back up Tomcat customizations (in Linux install directory or Windows Program Data)
  - container/conf/server.xml
  - Any keystores for certificates
  - For Linux: bin/setenv.sh
  - For Windows: any changes to the Java section of the Manage Tasktop application (e.g. memory, command line parameters, etc)
- Back up keycloak data and customizations
  - keycloak/standalone/data
  - keycloak/standalone/configuration/standalone.xml

## Operational Data

### *Default Derby Database*

 Tasktop automatically stores operational data to a built-in database. However, for production environments, we strongly recommend that operational data is stored to an external database for improved maintainability. This will enable you to perform frequent back-ups without having to stop Tasktop Integration Hub, and ensure that your Tasktop Integration Hub practices are consistent with your existing disaster and recovery process. For details on how to store your operational data to an external database, rather than Tasktop's built-in database, please refer to the [Settings page](#).

If you have chosen to utilize Tasktop's built-in Derby Database, ensure you've backed up the following:


- File backup of db directory (in Linux install directory or Windows Program Data)

### *External Database*

In order to back up Tasktop Integration Hub, follow the instructions below:

1. Ensure that you have migrated your operational data to an external database. For details on how to set up your external database, please see our [Settings page](#).
2. Back up the following folders
  - a. on Linux:
    - i. /tasktop/db
    - ii. /tasktop/drivers
    - iii. /tasktop/libraries
  - b. on Windows:
    - i. The Tasktop data folder, typically C:\ProgramData\Tasktop
3. Back up the external database using that database's backup tools.
4. Back up the Tomcat and Catalina configuration (Note: this only needs to occur if/when changes are made to the Tomcat and Catalina configuration).

## Restore from Backup

 Care should be taken whenever restoring from a backup as the state of the integration is maintained in the database and restoring to an older copy could result in duplicated items and data (e.g. comments and attachments). It is recommended to only restore when directed by Tasktop support or after a failed upgrade where no items were processed.

Stop Tasktop before restoring.

#### General Application Configuration

- Restore any changes identified in the backup

#### Operational Data

##### *Default Derby Database*

- Copy the database directory from backup to the Tasktop data folder

##### *External Database*

In order to restore Tasktop Integration Hub, follow the instructions below:

1. Restore the external database backup using the tools from that database.
2. Restore the backed up Tomcat and Catalina configuration files from part 4 of the backup instructions.

## Upgrading

 Before upgrading Tasktop, be sure to do the following:

1. Shut down Tasktop and afterwards follow the [backup instructions](#) outlined above. The first time that Tasktop restarts after an upgrade, the internal database will be migrated to the new version and it will no longer be possible to return to the prior version without the backup.
2. Additionally, ensure that backups are made of the Tomcat, Catalina, and Keycloak configuration files that have been customized. The upgrade process will overwrite these configuration files and customizations will need to be re-applied.
3. When Tasktop is upgraded, a service-downtime for the Tasktop service is required in order to upgrade the database. Note that a second instance cannot be running while the first instance is attempting to upgrade the database.
  1. To understand implications of Tasktop downtime, please see [here](#).
4. Please review the [release notes](#) for all Tasktop versions that have been released after the version you are upgrading from. Ensure that any upgrade steps outlined in the release notes are followed.

## Linux

1. Shut down Tasktop and Keycloak.
2. Back up as described in [section above](#).
3. Move the old Tasktop installation folder to an archive folder.

4. Unzip the new Tasktop distribution archive.
5. Restore drivers, copy the /tasktop/drivers directory from the old installation into the new installation folder <install-location>/tasktop.
6. Restore DB.
  - a. If you are using Tasktop's internal configuration database, copy the tasktop/db folder from the old installation into the new installation folder <install-location>/tasktop.
  - b. If you are using an external database for Tasktop's configuration, copy the tasktop-db.json file, and the /tasktop/db, from the old installation into the new installation folder <install-location>/tasktop.
7. Re-apply any customizations to the Tomcat and Catalina configuration.
  - a. After installation, open the default file provided by installation.
  - b. Compare the previous file with customization to the new default file and add the customization to the new file line by line.
8. Re-apply any customizations to the Keycloak configuration.
  - a. After installation, open the default file provided by installation.
  - b. Compare the previous file with customization to the new default file and add the customization to the new file line by line.
9. Restore Keycloak configuration.
  - a. If you are using Keycloak's internal configuration database, restore the database (<install-location>/keycloak/standalone/data/keycloak.h2.db) after installation.
  - b. If you are using an external database for Keycloak's configuration, reconfigure the external database as described in [https://keycloak.gitbooks.io/documentation/server\\_installation/topics/database.html](https://keycloak.gitbooks.io/documentation/server_installation/topics/database.html).
10. Start Tasktop.
11. Navigate to the Activity screen.
  1. Review the 'Background Jobs' tab to review status on Integration Data Migration jobs.
    1. Resolve any associated issues shown here. These issues will need to be resolved and their associated data migration jobs completed before the affected integrations can run (unrelated integrations should continue to process).
    2. Once the associated issue is resolved, failed Integration Data Migration processes can be prioritized using the 'prioritize' button on the Background Jobs tab. Ensure that these jobs complete successfully.
  2. Review the 'Issues' tab to resolve any configuration issues.
    1. If there are configuration migration issues, those will be shown in the Issues tab. They will block affected integrations from running (but unrelated integrations should continue to process). Once the source of the issue is resolved, configuration migration issues can be retried using the 'retry' button on the Issues tab.
    2. If using TFS, you may see issues related to unsatisfied connector requirements since you may need to upload new versions of the TFS SDK and CLC zip files.
  3. Review the 'Errors' tab to resolve any errors related to specific integration activities.
  4. Once all issues and errors are resolved, the internal upgrade will complete and information will begin processing for those affected integrations.

## Windows

1. Ensure a copy of the old installer is available in case a roll-back is required.
2. Click the 'Stop Tasktop' button on your desktop, and make sure services are stopped:




3. Backup as described in [section above](#).
4. Run the installer of the new version of Tasktop.
5. Re-apply any customizations to the Tomcat and Catalina configuration.
  - a. After installation, open the default file provided by installation.
  - b. Compare the previous file with customization to the new default file and add the customization to the new file line by line.
6. Re-apply any customizations to the Keycloak configuration.
  - a. After installation, open the default file provided by installation.
  - b. Compare the previous file with customization to the new default file and add the customization to the new file line by line.
7. If you have connected to the Microsoft TFS repository in the past, remove all files and folders, except for the com.tasktop files, under <install-location>\Tasktop\libraries\microsoft-tfs and <program-data>\Tasktop\libraries\microsoft-tfs. Note that you will need to upload new SDK and CLC zip files in the TFS repository settings once Tasktop is started back up.
8. Start Tasktop.
9. Navigate to the Activity screen.
  1. Review the '[Background Jobs](#)' tab to review status on Integration Data Migration jobs.
    1. Resolve any associated issues shown here. These issues will need to be resolved and their associated data migration jobs completed before the affected integrations can run (unrelated integrations should continue to process).
    2. Once the associated issue is resolved, failed Integration Data Migration processes can be prioritized using the 'prioritize' button on the Background Jobs tab. Ensure that these jobs complete successfully.
  2. Review the '[Issues](#)' tab to resolve any configuration issues.
    1. If there are configuration migration issues, those will be shown in the Issues tab. They will block affected integrations from running (but unrelated integrations should continue to process). Once the source of the issue is resolved, configuration migration issues can be retried using the 'retry' button on the Issues tab.
    2. If using TFS, you may see issues related to unsatisfied connector requirements since you may need to upload new versions of the TFS SDK and CLC zip files.
  3. Review the '[Errors](#)' tab to resolve any errors related to specific integration activities.
  4. Once all issues and errors are resolved, the internal upgrade will complete and information will begin processing for those affected integrations.

## Recovering from an error during upgrade

If Tasktop fails to restart after an upgrade or there are unresolvable errors preventing your integrations from running, Tasktop may need to be returned to the previous version.



 Care should be taken whenever restoring from a backup as the state of the integration is maintained in the database and restoring to an older copy can result in duplicated items and data (e.g. comments and attachments). It is recommended to only restore when directed by support or after a failed upgrade where no items were processed.

#### Linux

1. Shut down Tasktop.
2. Remove the new Tasktop installation folder and restore the old Tasktop installation folder from step 3 of the upgrade steps.
3. If you are using an external database for Tasktop's configuration, restore the external database as described in [section above](#).
4. Restart Tasktop.

#### Windows

1. Shut down Tasktop.
2. Uninstall Tasktop, then run the previous installer.
3. Restore from backup as described in [section above](#).
4. Restart Tasktop.

## Business Continuity

### Overview

Tasktop Integration Hub maintains information critical to organizational business processes, and therefore should be included in a comprehensive business continuity plan that safeguards data and ensures business continuity in hardware and operational failure scenarios.

 For additional information, please contact Tasktop Support or your Sales Rep to access our Business Continuity & Disaster Recovery materials.

### Data Loss Prevention

An important aspect of disaster avoidance is avoidance of data loss. Tasktop Integration Hub should be configured to use a reliable external database such as Oracle or Microsoft SQL Server. Please see our '[Supported Databases for storing Tasktop Operational Data](#)' section to see which databases are supported.

External databases should be set up with sufficient redundancy to maximize uptime and to reduce the probability of data loss due to hardware failure. For details on how to set up your external database, please see our [Settings page](#).

### Downtime

When Tasktop service is unavailable, changes may be taking place in integrated repositories. Normal Tasktop operation ensures that data flows between these repositories in a timely manner. When the server is unavailable, however, information is no longer propagating between integrated systems.

This has the following impacts:

1. Synchronization integrations will not create or update artifacts in synchronized repositories
2. Enterprise Data Stream integrations will not record artifact changes from their integrated source repositories to their target databases, which may cause a loss of fidelity in reporting data
3. Gateway integrations cannot accept payloads from integrated gateway collections; this can result in data loss if the integrated tools cannot handle the downtime

Upon restarting Tasktop Integration Hub, integrations will resume with the following effects:

1. All Synchronization integrations will begin processing where they left off when the server became unavailable; there may be a backlog of changes to process, but no synchronizations will be lost
2. Enterprise Data Stream integrations will begin detecting artifact changes; any changes that occurred when service was unavailable will be detected, but multiple changes to the same field will have lost fidelity (only one change to that field will be reported)
3. Tasktop will begin accepting Gateway collection payloads, and if the integrated repositories are configured correctly to retry payloads, they will be processed as usual without data loss

## Backup

A working backup strategy is a critical element of disaster recovery, since only backups can mitigate complete hardware failure and user error. A backup strategy that ensures correct and current backups is essential. Backups of the Tasktop database include both configuration and operational data.

See details on Backup procedures in the [Upgrading](#) section.

### Restore

In order to restore Tasktop Integration Hub, follow the instructions outlined in the [Upgrading](#) section.

### High Availability

To learn more about Tasktop High Availability strategies, please reach out to Tasktop Support or your Sales Rep to access our Business Continuity & Disaster Recover materials.

## User Management

### Getting Started

Once installation is complete, you can begin using Tasktop Integration Hub by opening <http://localhost:8080/> or <https://localhost:8443> in any of our supported browsers.

Before logging on to Tasktop, you must log into the **User Administration Console** in order to create your admin user(s). The Tasktop User Administration Console can be accessed via the 'User Administration Console' link, at the bottom of the Tasktop Integration Hub sign-in page.



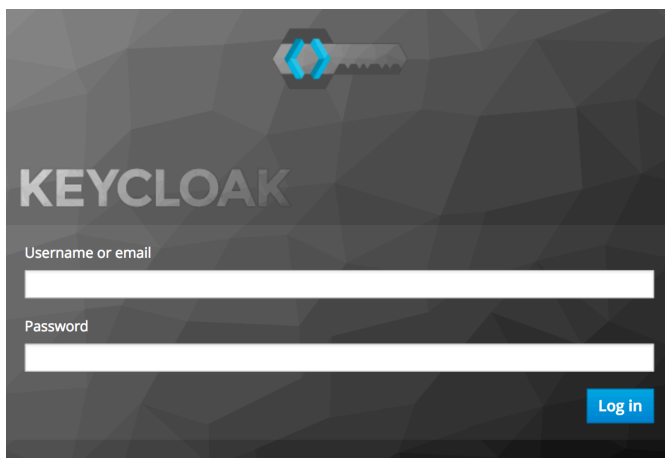
Connecting the World of Software Delivery

Sign in to continue to Tasktop

A sign-in form with two input fields: 'Username' containing 'admin' and 'Password' which is empty. Below the fields is a checked 'Remember me' checkbox and a blue 'Sign In' button. An orange arrow points from the bottom of the form to the link in the footer below.

Visit the [User Administration Console](#) to add and configure users.

This will lead you to the Keycloak log-in screen:




The Tasktop User Administration Console comes pre-configured with a root user. Use those credentials to log into Keycloak.

**Username:** root

**Password:** Tasktop123

You will be prompted to change your root password.

 **WARNING:** There is only one initial root user. If the credentials for this user are lost, access to the [advanced User Management features](#) will be lost. All functionality of Tasktop Integration Hub, however, will continue uninterrupted. You can learn how to create additional root users and manage existing root users [here](#).

After logging in, you will need to make at least ONE new Tasktop Admin user for Tasktop Integration Hub. After this first user is created, you can create additional users directly from the Tasktop Integration Hub interface.

To create a Tasktop Admin, ensure the "Tasktop" realm is selected in the upper left:



Tasktop



Configure



Realm Settings



Clients



Client

Templates



Roles



Identity

Providers



User

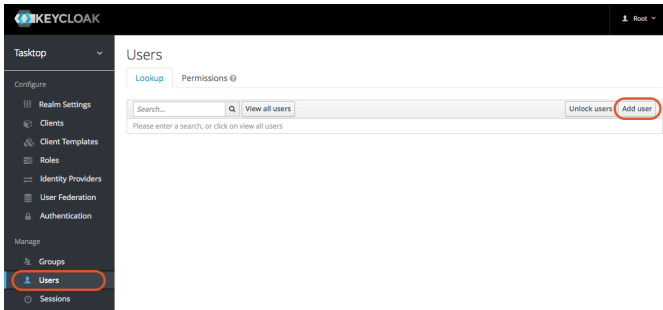
Federation



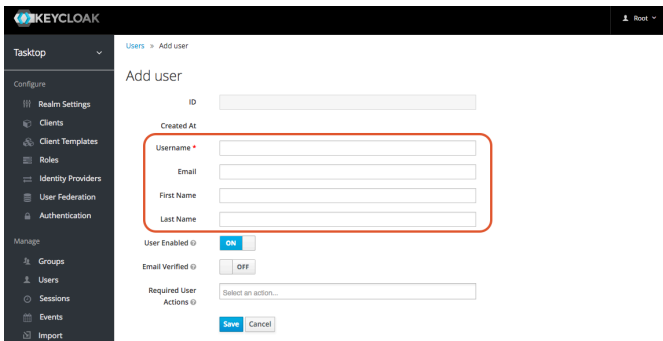
Authentication

**⚠ Note:** Do not re-name the realm ('Tasktop'), as this will result in errors upon Tasktop log-in. If you must re-name it, please also edit `{tasktop workspace}/webapps/ROOT/WEB-INF/keycloak.json`, change the "realm" parameter, then restart Tasktop.

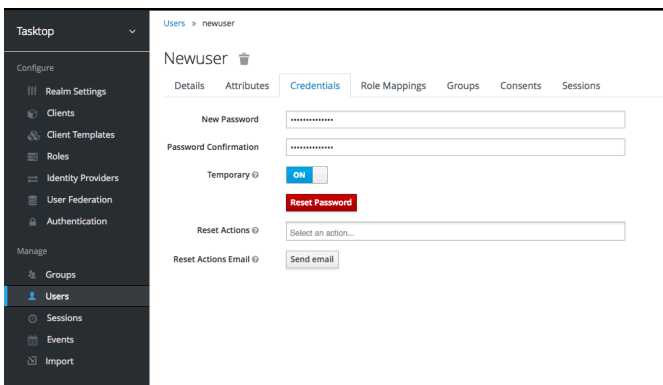
Select the 'User' section in the left column and click on the 'Add user' button on the upper right.



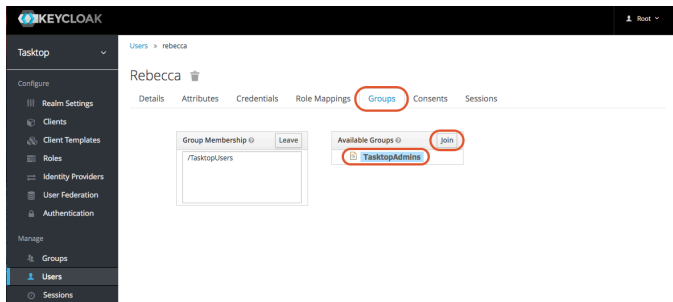
On the Add User screen, populate the Username, E-mail, First Name, and Last Name sections. The rest of the sections can be ignored.



After clicking 'Save', select the 'Credentials' tab and give the user a temporary password. Make sure 'temporary' is set to 'on'. This will allow them to set a new password upon their first log-in. Then click 'Reset Password'.



Next, select the 'Groups' tab to assign the user as a Tasktop Admin. Highlight 'TasktopAdmins' and click 'Join'. By becoming a Tasktop Admin, this user will be able to add new users directly from the Tasktop Integration Hub interface.



Ignore the Attributes, Role Mappings, Consents and Sessions tabs.

Your Tasktop Admin user has been added.

Now, sign out of the User Administration console and go to <http://<server>:8080>. You will be able to log in with the user account you just created. Once the admin user has been created, you generally will not need to log into the User Administration Console.

## Types of Users

There are two types of users: Admins and Users

The only differences between the two user types are regarding user management. An admin can create new users, update users' passwords, and change users' group membership (from user to admin or vice-versa). A user cannot. Both user types have the same permissions with regard to Tasktop functionality (meaning that both have all permissions needed to create, modify, and run integrations).

💡 We recommend configuring **at least two admin users**. This way, if one admin forgets their password, the other admin will be able to log in and re-set the other admin user's password.

We also recommend changing the default password of the Advanced User Administration console. Please see the [Getting Started](#) section above for information on how to reset passwords.

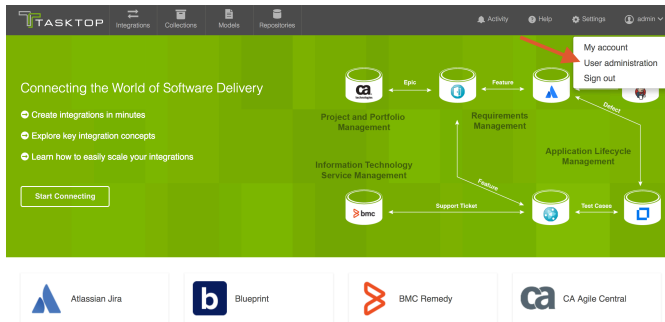
Capability	Admin	User
Create New User	✓	✗
Reset Any User's Password	✓	✗
View and Modify Any User's Group Membership	✓	✗
Reset Own Password, Name, or E-mail	✓	✓
Create and Modify Repository Connections	✓	✓
Create and Modify Models	✓	✓
Create and Modify Collections	✓	✓

Create, Modify, and Run Integrations

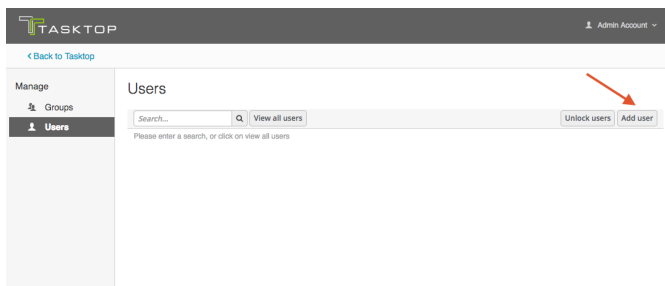


## Creating Additional Users

To create an additional user, you must have **admin** capabilities. To create a user, select 'User Administration' from the upper right corner of the application.



From the User Administration screen, select 'Add user'



On the Add User screen, populate the Username, Email, First Name, and Last Name sections. The rest of the sections can be ignored.

Users > Add user

Add user

ID

Created At

Username \*

Email

First Name

Last Name

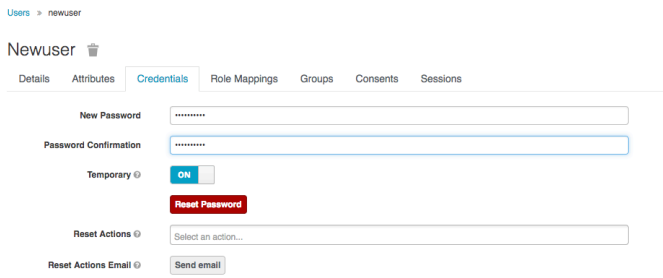
User Enabled

Email Verified

Required User Actions

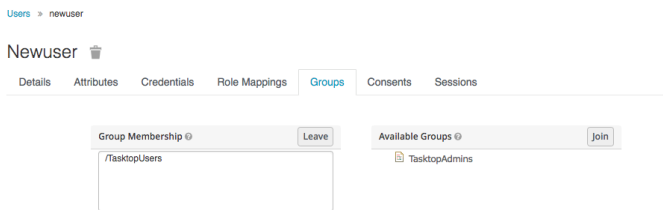
Click the 'Credentials' tab and give the user a temporary password. Make sure 'temporary' is set to 'on'. This will allow them to set a new password upon their first log-in. Then click 'Reset Password.'





Click on the 'Groups' tab. Add the user to a group - either TasktopUsers or TasktopAdmins, depending on the permissions you'd like the user to have.

**!** If the new user is not added to a group, they will not be able to successfully access Tasktop Integration Hub.



You can ignore the following tabs: Attributes, Role Mappings, Consents, and Sessions.

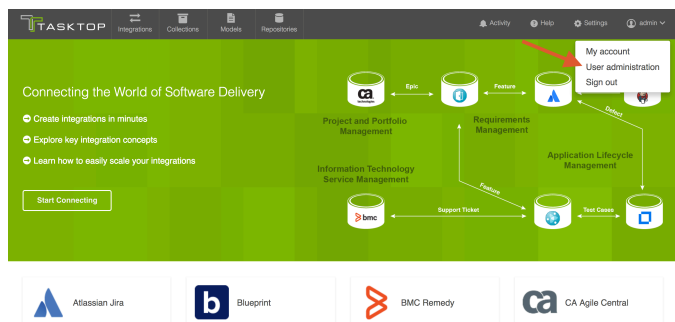
Your user has been added, and can log in with their temporary password.

**!** Note that Tasktop will not send the new user an e-mail notification. The admin must notify the user of the new account and password.

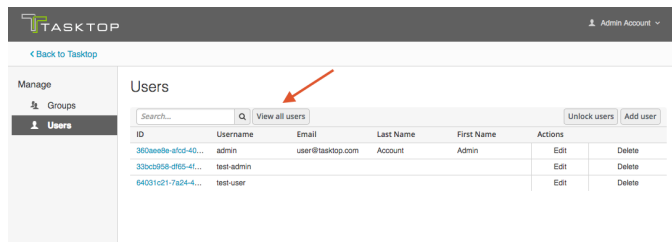
## Resetting a User's Password

To reset a user's password, you must have **admin** capabilities.

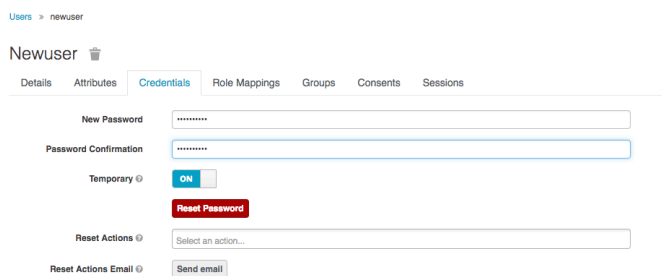
To reset a user's password, select 'User Administration' from the upper right corner of the application.



Click 'View all Users.'



Click on the ID for the user whose password you would like to reset. Then, click on the 'Credentials' tab and give the user a new temporary password. Make sure 'temporary' is set to 'on'. This will allow them to set a new password upon their first log-in. Then click 'Reset Password.'



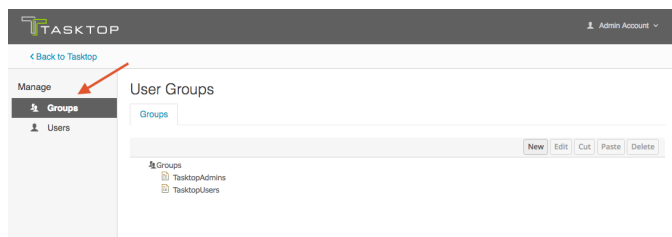
⚠️ Note that Tasktop will not send the user an e-mail notification. The admin must notify the user of the new temporary password. The user will be prompted to set a new password upon their next log-in.

## Managing Groups

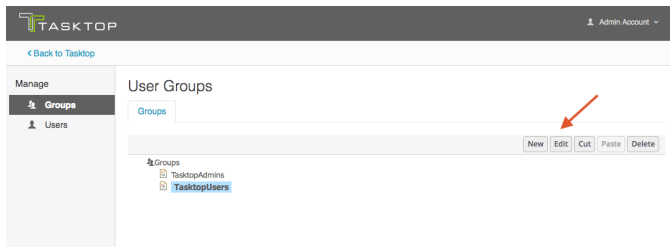
### Viewing Members of a Group

To view members of a group, you must have **admin** capabilities.

To view the members of a group, click 'Groups' on the left pane of the User Management screen.

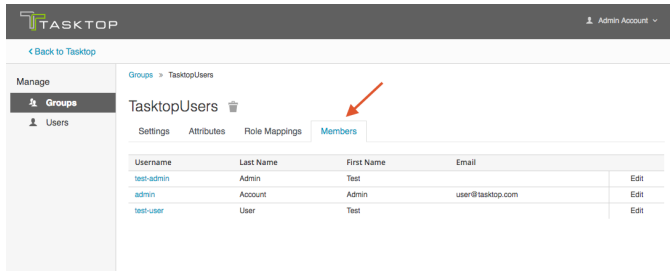


Select the user group you'd like to review, and click 'edit.'



Click the 'Members' tab to view current members.

💡 Remember that a user can be a member of multiple groups.



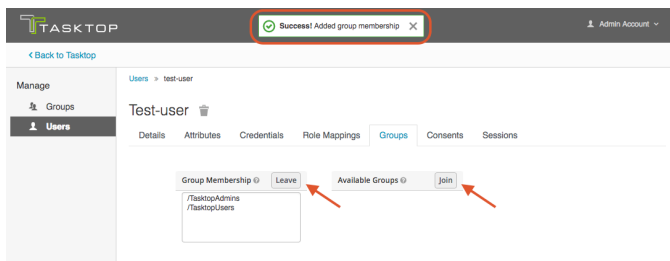
## Adding or Removing Users From a Group

To modify a user's group membership, you must have **admin** capabilities.

Select 'Users' from the left pane of the User Administration screen. Click 'View all Users' and select the ID of the user you would like to modify.

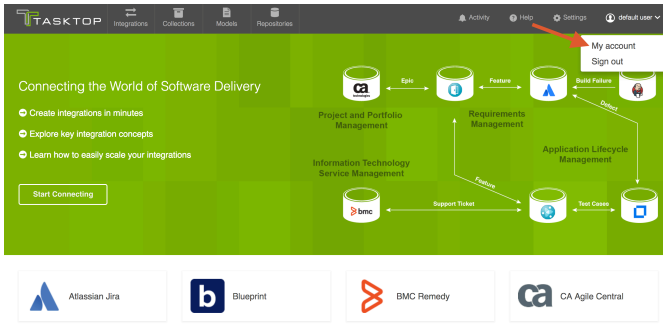
Click on the 'Groups' tab, select the group whose membership you'd like to modify, and use the 'leave' and 'join' buttons to modify their group membership. There is no saving necessary here; once you click the 'leave' and/or 'join' button, you will see a notification at the top of the screen letting you know that your change has been made.

⚠️ Note that a user must be a member of at least one group in order to be able to log into Tasktop successfully.

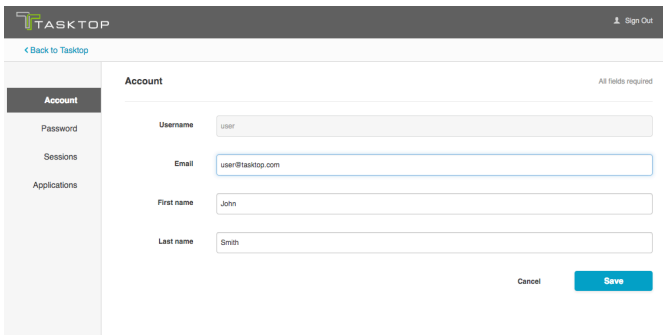


## Modifying Your Own User Information

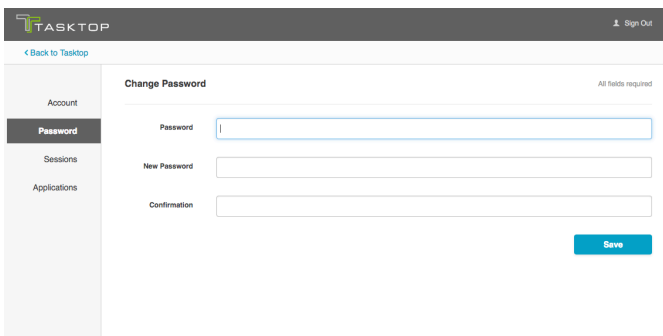
Both Users and Admins can modify their own account information. To change your own password or other user information, click your username at the upper right corner of the screen, and select 'My Account.'



This will bring you to the Account Info screen, where you can update your name or e-mail address:



You can also click 'Password' on the left sidebar in order to change your password:



The 'Sessions' and 'Applications' sections can be ignored.

## Advanced User Management

Tasktop Integration Hub has some advanced user management capabilities not accessible via the Tasktop Integration Hub interface.

To access advanced user management capabilities, please click the 'User Administration Console' link at the bottom of the Tasktop Integration Hub sign-in screen.



Connecting the World of Software Delivery

Sign in to continue to Tasktop

Username

Password

Remember me

Visit the [User Administration Console](#) to add and configure users.

You can log in using the credentials you set when you [first installed and began using Tasktop](#).

**⚠ WARNING:** there is only one initial root user. If the credentials for this user are lost, access to the advanced User Management features will be lost. All functionality of Tasktop Integration Hub, however, will continue uninterrupted.

Some of the advanced features include:

- User Federation Configuration for:
  - LDAP
  - Kerberos
- Identity Provider login for:
  - SAML v2.0
  - OpenID Connect v1.0
- Enforcing custom password policies such as:
  - Set password expiration
  - Require special characters
  - Setting minimum password length

**⚠ Note:** While Tasktop officially supports LDAP, other advanced features (including but not limited to Kerberos Federation and IDP) are not supported or tested by Tasktop.

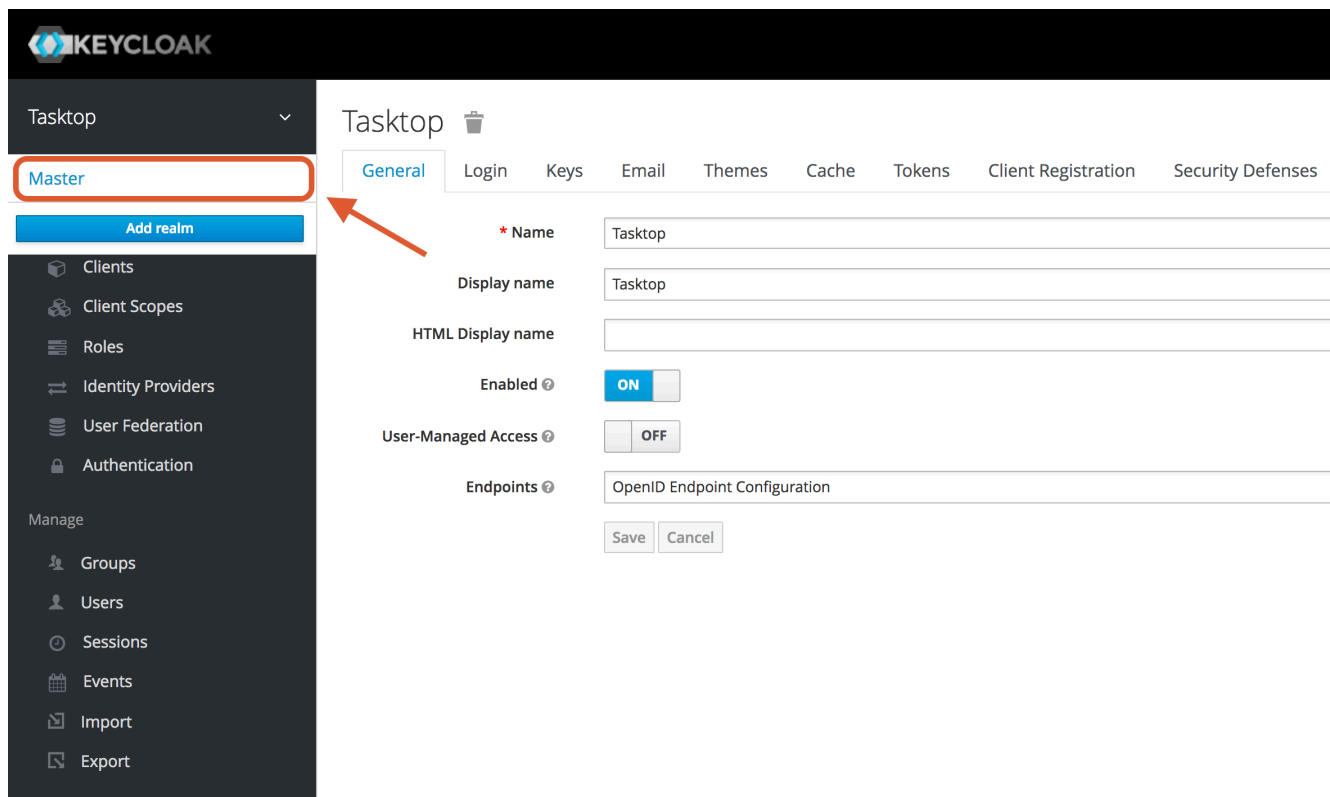
To learn more about these advanced features, see <http://www.keycloak.org/documentation.html>.

**⚠ WARNING:** Do not make changes or updates to the Roles or Groups section. Altering these settings may prevent your Tasktop Integration Hub users from accessing the tool.

## Creating and Managing Root Users

A 'root user' refers to a user who is able to log in to the User Administration Console. Tasktop comes with one root user, but if you'd like to create additional root users or to manage existing users, you can do so from the User Administration Console.

Once logged in, click the arrow next to 'Tasktop' (in the upper left panel), and select 'Master'



Next click 'Users' in the left panel. From here, you can follow the [same instructions used to create Tasktop users](#) to create and manage root users (ignoring the 'Groups' section).

## Configuring LDAP User Management

### Required Directory Information

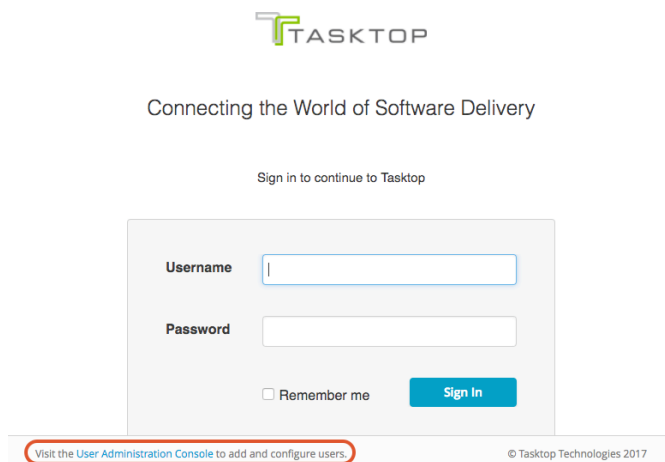
Before configuring LDAP, please check you have the following required pieces of information available for your specific Active Directory (AD) domain.

- The **fully qualified domain name** (FQDN) for the AD service,
  - *example: 'demo.tasktop.com'*
- An AD **user** account and credentials; The user will need read / view access to Users, Groups and Organizational Units (OU). We suggest a specific restricted account be setup in AD for this purpose.
  - *example: 'service\_tasktop'*
- An AD user **group**; The group(s) will be used to store specific users, who will have access to Tasktop.

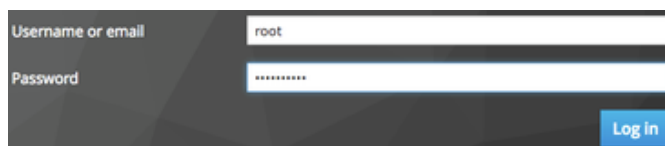
- example: 'Tasktop Users'
- A tool such as **ADSIEdit**, which is able to give your the specific information about the structure of your AD domain setup.
  - **ADSIEdit** is part of Microsoft Windows Remote Server Administration Toolset (RSAT). This can be downloaded from [Microsoft RSAT page](#), or enabled on a server by adding the RSAT feature.
  - Alternatively ask your Domain Administrators for all of the following information:
    - CN/DN for Tasktop User (mentioned above)
    - CN/DN for the Tasktop User Group (mentioned above)
    - User, mail; username and name attributes (the specific name for each attribute)
    - OU root for all users
    - LDAP FQDN server URL

### Accessing Keycloak Configuration Tool

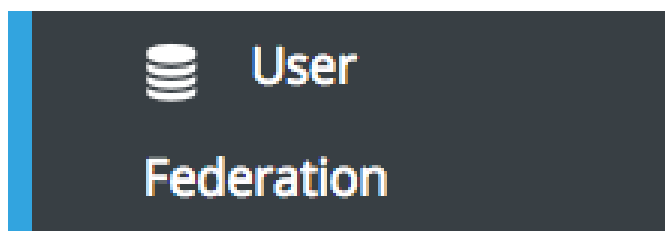
1. To access advanced user management capabilities, please click the 'User Administration Console' link at the bottom of the Tasktop Integration Hub sign-in screen.



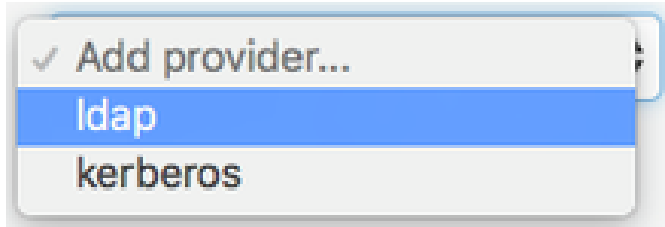
2. Log in using the default credentials listed in the [Getting Started](#) section above.



3. Select the 'User Federation' link from the side-menu




4. Choose the 'ldap' option from the dropdown for 'Add provider ...'



You are now on the LDAP configuration screen.


### Configuring LDAP for Active Directory

This section will guide you through creating a connection to an LDAP authentication server.

 Note that images provided are only a sample of settings; please ensure that you enter information specific for your environment.

#### Required Settings

1. Follow steps above to access the LDAP configuration page.
2. **Console Display name:** This is any label you would like to give your connection.

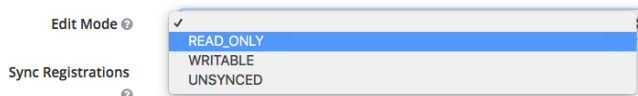
Console Display Name 

3. **Priority:** If you have more than a single User Federation configured, the priority specifies which order to search each user federation service, **0** is first.

#### 4. Edit Mode:

- **READ\_ONLY:** This will read the attributes from Active Directory. It will not attempt to modify the AD service or store any local changes to user information.
- **WRITABLE:** This may enable some changes to be written back to AD. The user account communication with AD will need access to modify the specific objects attribute
- **UNSYNCED:** This will read the attributes from AD and synchronise them to a local store in the internal Keycloak database. Users and Administrators can make changes to the user objects, but those changes will only be stored for the local Tasktop instance. This will not write back to Active Directory.

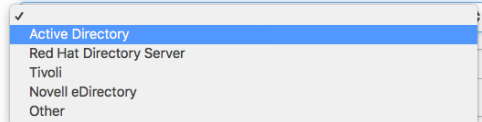
The recommend mode is **READ\_ONLY**.






5. **Sync registrations:** If a new user is created in Tasktop, this will allow that user to also be created in AD, if you have WRITABLE selected and access to create user objects in the AD domain. The default setting is 'OFF'.


6. **Vendor:** Specify which vendor software to use for this LDAP configuration. If you are using something other than Active Directory, then the attributes and locations may be different. This will also pre-fill some default values.




\* Vendor 

- Active Directory
- Red Hat Directory Server
- Tivoli
- Novell eDirectory
- Other

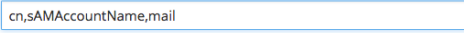
7. **Username LDAP attribute:** This should be the default username attribute as specified in your domain. The default for Microsoft AD is 'sAMAccountName'.




\* Username LDAP attribute 

8. **RDN LDAP attribute:** This is the Relative Distinguished Name LDAP attribute. This is a list of attributes which will be searched when a user attempts to authenticate to Tasktop. The attributes listed here should be unique within an OU level or better-yet unique within a domain. The following options are a good base to use:

- **cn** (conical name), also known as the full name; *example "John Doe"*
- **sAMAccountName**, also known as the username; *example john.doe*
- **mail**, also known as email-address; *example john.doe@demo.tasktop.com*




\* RDN LDAP attribute 


9. **UUID LDAP attribute:** This is the User Unique IDentification attribute. It is a complicated long string of characters which will always uniquely identify a single object within AD. For unix based LDAP this is often 'uid'. The default for Microsoft AD is 'objectGUID'.



\* UUID LDAP attribute 

10. **User Object Classes:** These are the 'types' of objects which can be used to authentication against. You can specify more if your organization has other specific identifiers such as 'staff' or 'contractor'. The default for Microsoft AD is: **person, organizationalPerson, user**.



\* User Object Classes 

11. **Connection URL:** This is the specific string which should be the FQDN of your LDAP service. It's default format for AD will be 'ldap://demo.tasktop.com'. If you have SSL configured then you can also use ldaps://demo.tasktop.com (SSL is not enabled by default in Microsoft AD).

\* Connection URL ⓘ

ldap://demo.tasktop.com

At this point, we recommend selecting the 'Test connection'

Test connection

button to check that Tasktop is able to communicate with your LDAP server. You should see a green message at the top of your screen indicating a successful connection to your LDAP server



Success! LDAP connection successful.



12. **Users DN:** This is the Distinguished Name for the location where you can find your users. You can find out the Users DN (and any other Distinguished Names via the ADSIEdit tool in Windows. Once the tool is open, you will need to connect to the AD domain for your company. Once connected, the domain will be presented in a tree-view on the left, where you can drill down to the specific branches until you find the specific OU or User object you want details for. We recommend using this utility as it will allow you to copy/paste the specific DN information directly (as typing mistakes will result in error when testing).

The format for this string will be a number of 'OU=' followed by a number of 'DC=' separated by a comma. Spaces are allowed in this string if they exist in your structure.

example: **OU=Users,OU=Tasktop,DC=demo,DC=tasktop,DC=com**

\* Users DN ⓘ

OU=Users,OU=Tasktop,DC=demo,DC=tasktop,DC=com

13. **Authentication Type:** If you are are using Microsoft Active Directory, you will be required to authenticate. Some non-Microsoft systems do not require authentication. If that is the cause for your LDAP, then select 'none'

14. **Bind DN:** This is the Distinguished Name for the user account which you will use to authenticate against your LDAP service in order to allow Tasktop to authenticate users. The Bind DN user account can be anywhere within the AD domain, however we suggest that you have a dedicated account specifically for Tasktop. The format for this sting will be a singular 'CN=' for the Conical Name of the user account, followed by possible 'OU=' which is followed by the 'DC=' items all separated by a comma. Spaces are allowed in this string if they exist in your structure

example: **CN=service\_tasktophub,OU=Service Accounts,OU=Tasktop Infrastructure,DC=demo,DC=tasktop,DC=com**

\* Bind DN ⓘ

tasktophub,OU=Service Accounts,OU=Tasktop Infrastructure,DC=demo,DC=tasktop,DC=com

\* Bind Credential ⓘ

CN=service\_tasktophub,OU=Service Accounts,OU=Tasktop Infrastructure,DC=demo,DC=tasktop,DC=com

15. **Bind Credential:** This the password for the user account configured in the Bind DN.

Once you have entered the password, press the 'Test authentication'

A blue rectangular button with the text "Test authentication" in white, bold, sans-serif font.

button to confirm that Tasktop is successful in authenticating itself against your Active Directory domain. You should see a green message at the top of your page as an indication of a successful authentication

A green-bordered message box containing a green checkmark icon, the text "Successful LDAP authentication successful.", and a red 'X' icon in the top right corner.

16. **LDAP Filter:** This is where you will configure a filter to specify which user accounts will have access to authenticate in Tasktop. If you leave this blank, all users within your 'Users DN' OU in the AD environment will have access. The structure of the string is as follows:

- () : braces to start and finish
- Either
  - &() : for performing an 'AND' operation (i.e. all items must match)
  - |() : for performing an 'OR' operation (i.e. where any items can match)
- Specific attribute related condition, for examples matching objects in a group
- Users in a specific group you can use "**memberOf=**" =>
  - *memberOf=CN=Tasktop Hub Users,OU=Resource Groups,OU=Groups,OU=Tasktop,DC=demo,DC=tasktop,DC=com*
- Users and (nested) Groups in a specific group, you specifically require "**memberOf:**  
**1.2.840.113556.1.4.1941:=**"
  - *memberOf:1.2.840.113556.1.4.1941:=CN=Tasktop Hub Users,OU=Resource Groups,OU=Groups,OU=Tasktop,DC=demo,DC=tasktop,DC=com*
- You can also specify that a particulate attribute is equal to some value, example
  - *objectCategory=Person*

Custom User LDAP Filter

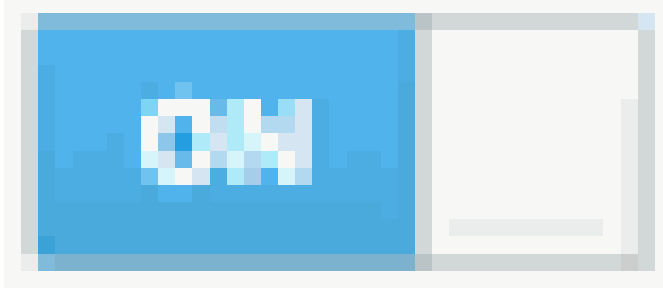
17. **Search Scope:** The Configuration of this depends on whether you have all of your AD users in a single OU, or if you would like to search through the OU hierarchy structure. If searching, then the Users DN field configured above will need to be the root or lowest-level OU.

- If all users are in a single OU, set this to 'One Level'
- If users are hierarchically organized in OUs, set this to 'Subtree'

Search Scope

18. **Use Trusted SPI:** This is used if your environment uses SSL and a client certificate is required. This is not a default AD configuration.

19. **Connection Pooling:** This will allow connections to your AD server to remain open if set to 'ON'



, (for specific timeframe) rather than creating a new connection each time a user authenticates.

20. **Pagination:** This allows you to page (or cache) information for active connections from your AD servers.

### **Kerberos**

Kerberos setup is not shown in this guide.

### **Sync Settings**


1. **Batch Size:** Indicates how many accounts will process at once
2. **Periodic Full Sync:** Allows for a sync of all users to occur between Tasktop and Active Directory. If you have a large number of users constantly authenticating into Tasktop, it may be useful to enable this. Default is set to OFF.
3. **Periodic Changed Users Sync:** Allows for newly created or updated users to be synced from Active Directory to Tasktop. If you have the Periodic Full Sync enabled, then you should also enable this. Default is set to OFF.



Save your configuration using the save button at the bottom of the page. A green message at the top will indicate that your save was successful.

### **Additional LDAP Information**

### **Testing**

 Note: The configuration utility for LDAP requires its own internal authentication. As such, when you test account access, it is recommended that you use a separate browser or select a 'private' or

'incognito' browser mode. If you are already logged into Tasktop, you will first need to logout before testing.

1. Direct your browser to the default web address of your Tasktop server, such as <https://demo.tasktop.com/>
2. Enter credentials which should be allowed access to authenticate from the LDAP connection you have just setup
3. Retry with a set of credentials which should not have access to Tasktop. If you are able to login then check the 'filter' settings again.

### **Default User Access**

By default, all LDAP users will be granted 'user' level access to Tasktop. If desired, you will be able to set all new accounts, including LDAP user accounts, to default into a specific group. You can also assign different 'members' to either of the TasktopUsers or TasktopAdmins groups.

To change the default group, follow these instructions:

1. Select 'Groups' (under the 'manage' section) of the right-side bar menu
2. Select the 'Default Groups' tab
3. Add or Remove the TasktopUsers and / or TasktopAdmins groups to the Default Groups list.

### **User Management and Security Constraints**

Tasktop with User Management uses Security Constraints as described in the Java Servlet Specification to limit access to authenticated users. Adding additional Security Constraints to the Apache Tomcat configuration can interfere with the Security Constraints provided by Tasktop and enable unauthenticated users to access Tasktop.

### **DNS Settings**

The server Tasktop is installed on must be able to resolve the hostname clients will use to access it. This can be accomplished through the DNS configuration. A less preferred option is to configure using the server's hosts file.

The hostname clients use to access Tasktop must be a valid hostname according to RFC 952. This means it may contain only letters, digits, hyphens, and periods, and may not contain underscores.

## **Alternative User Management**

By default, Tasktop comes with a user management solution. In the rare scenario where your company has decided to not use Tasktop's provided user management solution and you still need to ensure that only authorized users are able to access your Tasktop instance, you can set up Basic Authentication for the Tomcat web server.

Instructions for configuring Tomcat authentication can be found here: <http://www.avajava.com/tutorials/lessons/how-do-i-use-basic-authentication-with-tomcat.html>.

Please note, using this style of user management will mean that all of your users will have the exact same permissions within Tasktop. There will be no separate roles or permissions within the application.

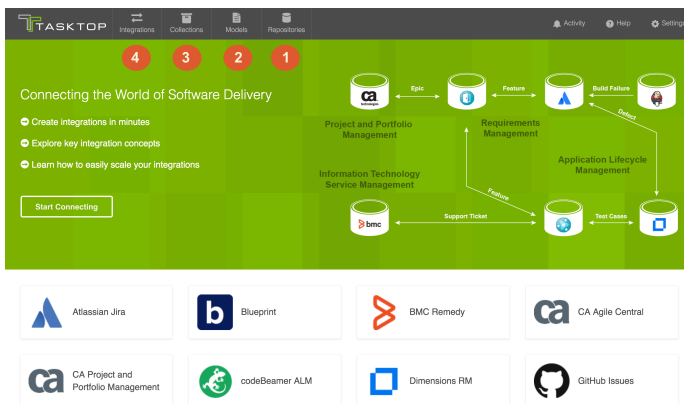
## Quick Start Guide

### Overview

Setting up a new integration takes four simple steps.

1. Connect to your **repository**
2. Set up your **model**
3. Create your **collection** and map it to the model
4. Configure your **integration** using one of our templates

Finally, once you've configured your integration, you can easily **expand or modify your integration**.



## Step 1: Connect to Your Repository


### Types of Repositories

The first step to take when configuring an integration is to connect to your repository. Your repositories refer to the external tools that Tasktop will flow information between.

You can create two types of repository connections:

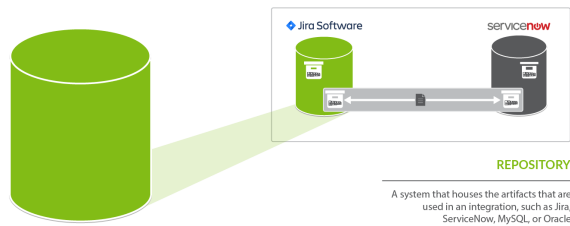
 <p><b>Standard Repository</b></p>	 <p><b>Database Repository</b></p>
<p><i>Standard Repositories are available in all Editions.</i></p>	<p><i>Database Repositories are only available in Editions that contain the Enterprise Data Stream add-</i></p>

	<i>on. See <a href="#">Tasktop Editions table</a> to determine if your edition contains this functionality.</i>
A 'standard repository' refers to an external tool, such as Jira or ServiceNow.  These are software lifecycle tools that contain artifacts, such as defects or requirements.	A 'database repository' refers to an external database, such as MySQL or Oracle.  Database repositories are used as part of the Enterprise Data Stream add-on.
<a href="#">Learn More</a>	<a href="#">Learn More</a>

 Note: If you are creating a Gateway collection, for use with our Gateway add-on, no step needs to be taken on the Repository screen.

## Standard Repository Connection

What is a Repository?



A *repository* is **any system that houses the artifacts that can be used in an integration**. Repositories can be systems used as part of the software delivery process, like *Micro Focus (HPE ALM)*, *CA Agile Central*, *Jira*, etc., or repositories can be more generic databases, like *MySQL* or *Oracle*.

A *repository connection* is a **connection to a specific instance of a given repository that permits Tasktop to communicate with that repository**. To configure a *repository connection*, users will need to provide base credentials such as a server URL, a username, and a password.

A **standard repository** is software lifecycle tool, such as Jira or Micro Focus (HPE) ALM, that contain artifacts such as defects or requirements.

### Video Tutorial

Check out the video below to learn how to create a new repository connection:

### Before You Begin

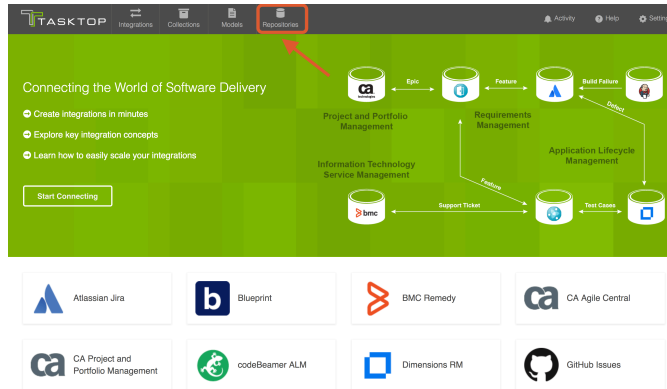
- When you start up Tasktop, you will be prompted to log in. Please review the [User Management](#) section for instructions on how to log in and manage your user accounts.

- Next, you will be prompted to set a **Master Password**, which will be used to encrypt your repository credentials.
- Before connecting to your repository, make sure that you have applied your license on the Settings screen. You can learn how to apply your license [here](#).

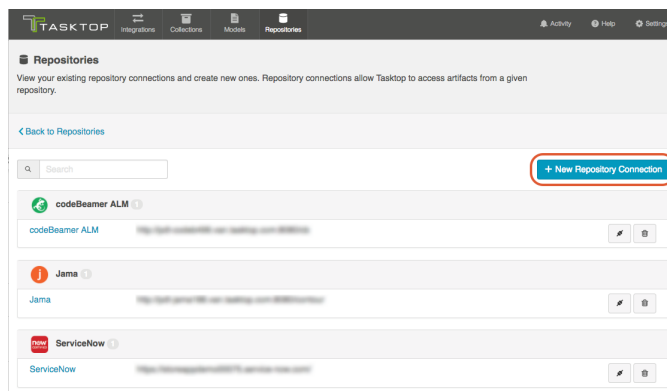
## How to Connect to a Standard Repository

### Creating a New Connection

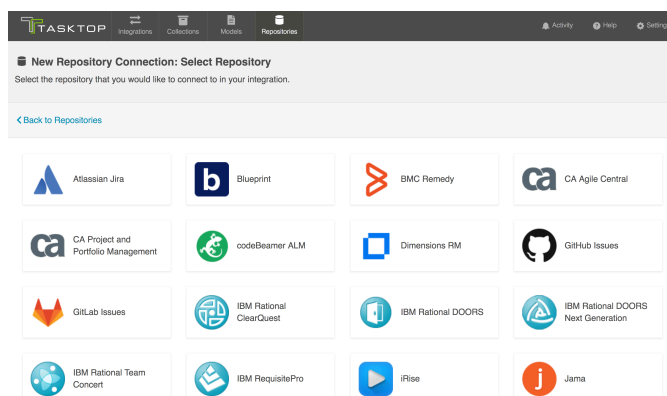
To create a repository connection, select 'Repositories' at the top of the screen



Click the '+ New Repository Connection' button



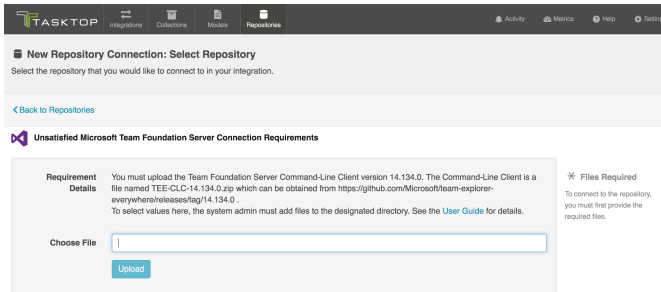
Click the logo of the repository you would like to connect to:





## Uploading External Files

For certain repositories, such as Microsoft Team Foundation Server, external files must be uploaded before navigating to the New Repository Connection screen. If so, you will see a screen similar to the one below. If you do not see this screen, proceed to the steps listed below in the 'New Repository Connection Screen' section.



To upload the files, a system administrator (a user with file system access to the machine that hosts Tasktop) must add the files to the designated directory:

- On Windows, the default folder is `C:\ProgramData\Tasktop\connector-requirements`
- On Linux, the connector-requirements can be found in the Tasktop installation directory
- If needed, the user can change the location in which Tasktop looks for the files. This is done by changing the system property `connector.requirements.path`

Once uploaded, select the file from the options available under the 'Choose File' field and click 'Upload.'

## New Repository Connection Screen

Next, you will be lead to the New Repository Connection screen.

To connect to a repository, you must populate the following fields:

- **Label:** This is the name you will give to your Repository Connection. This is how it will be referenced throughout the Tasktop Application
- **Location:** This is the URL used to access the repository.
- **Authentication Details** (see authentication section below for more details):

💡 You may see additional fields depending on which repository you are connecting to. See our [Connector Documentation](#) for repository-specific information.

**New Repository Connection** Test Connection

Create a new repository connection. Repository connections allow Tasktop to access artifacts from a given repository.

[Back to Repositories](#) Cancel Save

**New Blueprint Connection**

Label

Location

**Authentication**

Username

Password

**Repository**

The location of your artifact repository. Please provide a descriptive Label as this will be referenced in other places in Tasktop.

**Authentication**

Provide authentication credentials so that Tasktop can access the artifacts in the above repository. Multiple authentication styles are available, but some may not apply to your organization.

## Authentication

We recommend that you create a new user within your external tool, to be used only for your Tasktop integration. This is the user information you will enter when setting up your repository connection within Tasktop Integration Hub. By creating a new user, you will ensure that the correct permissions are granted, and allow for traceability of the modifications that are made by the synchronization.

In general, your Tasktop user account should have sufficient permissions to create, read, and update artifacts in your repository. However, depending on the use case, your user may need different permissions. For example, if you are only interested in flowing data out of your repository, your user may not need to have full CRUD access, as the 'create' and 'update' permissions may not be needed.

Please see our [Connector Documentation](#) for repository-specific information regarding user permissions.

Your user should have a secure password. Please be aware that Tasktop will not allow you to save a repository connection utilizing a weak password, such as 'tasktop.'

For most repositories, you will see a username and password field in the Authentication section. However, some repositories include additional Authentication options.

## Standard Authentication

For most scenarios, you will select 'Standard' Authentication.' This is where you will enter the username and password used to access the repository. We recommend creating login credentials specifically for Tasktop to access your repository.

Authentication Standard Authentication

Username

Password

**Authentication**

Provide authentication credentials so that Tasktop can access the artifacts in the above repository. Multiple authentication styles are available, but some may not apply to your organization.

## SSO Authentication

If you connect to a repository utilizing CA SSO authentication, you can select one of the additional authentication options offered.

Tasktop currently supports the following SSO implementations:

- CA Siteminder/CA Single Sign-On (HTTP POST)
- CA Siteminder/CA Single Sign-On (Login Form)
- Script (HTTP cookies)
- X.509 Certificate

## HTTP POST

The HTTP Post option, pictured below, will generate the authentication form for you to fill in. Only the first 3 fields are required.

The screenshot shows the 'Authentication' section with a dropdown menu open, highlighting 'CA Single Sign-On (HTTP POST)'. Below the menu, there are several input fields: 'Username', 'Password', 'Username Field Name', 'Password Field Name', and 'Target URL'. To the right, there is a help text block titled 'Authentication' explaining that it provides authentication credentials for Tasktop to access artifacts in the repository.

## Login Form

The 'Single Sign-On (Login Form)' option, pictured below, will allow you to enter the URL for your SSO log-in form.

The screenshot shows the 'Authentication' section with 'CA Single Sign-On (Login Form)' selected. A 'Form URL' input field is present, followed by a 'Connect' button. A tooltip above the field indicates it is the 'Location of the login form'. To the right, there is a help text block titled 'Authentication' explaining that it provides authentication credentials for Tasktop to access artifacts in the repository.

Once the URL is entered, Tasktop will auto-generate the fields that must be populated to connect to the repository.

The screenshot shows the 'Authentication' section with 'CA Single Sign-On (Login Form)' selected. The 'Form URL' field is populated with 'http://loginform.com/siteminderagent/forms/login.fcc'. Below it are 'USER' and 'PASSWORD' input fields, and a 'Reset' button. To the right, there is a help text block titled 'Authentication' explaining that it provides authentication credentials for Tasktop to access artifacts in the repository.

## Script (HTTP cookies)

To use the *Script (HTTP cookies)* authentication method, a system administrator (a user with file system access to the machine that hosts Tasktop) must add the script(s) to the designated directory:


- On Windows, the default folder is `C:\ProgramData\Tasktop\authentication-scripts`
- On Linux, the authentication-scripts can be found at the Tasktop installation directory
- If needed, the user can change the location in which Tasktop looks for the scripts. This is done by changing the system property `authentication.scripts.path`

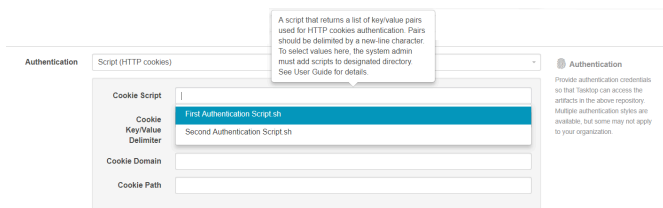
Once uploaded, select the script from the options available under the 'Cookie Script' field. The script will be executed by the machine that hosts Tasktop. The script is stored in the Tasktop database, but is written to disk upon Tasktop startup and deleted from disk upon Tasktop shutdown.

Since Tasktop supports both Windows and Linux, please ensure that your script is able to be executed on the appropriate operating system: .bat for windows or shell script for Linux.

The **Cookie Script** will be executed and the standard out (and standard error) must read as a \n separated list of key/value pairs themselves separated by Cookie Key/Value Delimiter (default is '=').

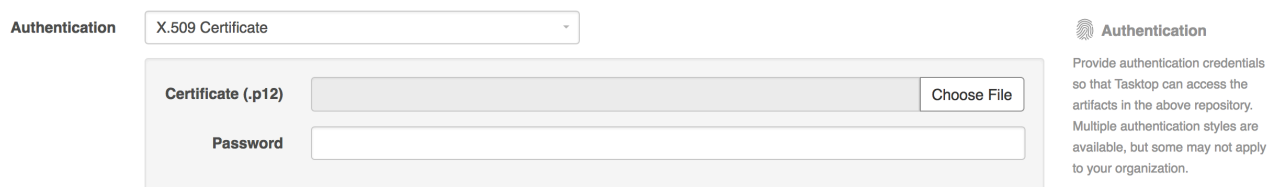
The **Cookie Domain** and **Cookie Path** arguments will then be used in the construction of a cookie for each of those key values pairs.

 **Note:** Since Tasktop creates a copy of the script when the repository configuration is saved, this means that changing the script in the directory will have no direct effect on existing repositories. For changes to a script to take effect, the user must go to the target repository connection and update the configuration.



## X.509 Certificate

To use the *X.509 Certificate* authentication method, select the X.509 Certificate to upload from your local machine. The certificate is stored in the Tasktop database, but is written to disk upon Tasktop startup and deleted from disk upon Tasktop shutdown.

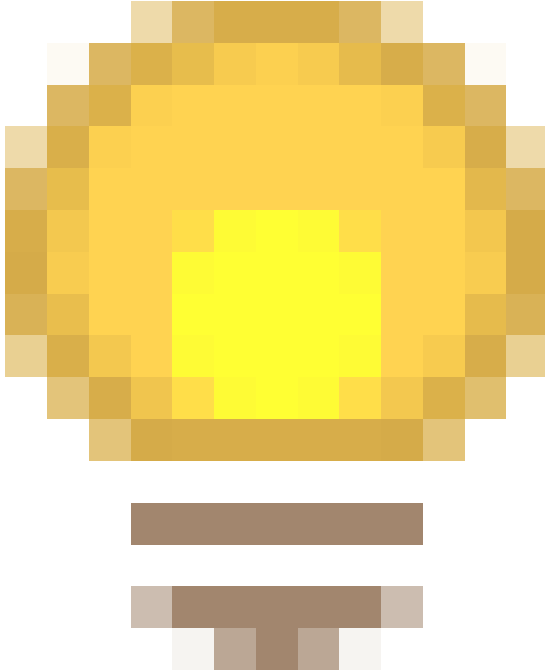


## Custom Authentication

Some repositories allow for additional authentication methods. Please see our [Connector Documentation](#) for repository-specific information regarding authentication methods.

## Proxy Server

If Tasktop is installed behind a firewall, you may need to connect to external repositories (e.g. hosted or cloud ALM tools) through a proxy. To create a connection to such external repositories in Tasktop, you can make Tasktop connect through your proxy by configuring the proxy settings when creating a new repository connection. It is recommended to create login credentials specifically for Tasktop on the proxy server.



Note that the Proxy Location must be a URL in order for the proxy connection to work. If a .pac script is used in your browser, you will need to open the script and find the URL/port to enter in the Location field.

To use a proxy server, check the 'user proxy server' box and fill in your proxy details in the 'Proxy Server' section on the New Repository Screen:

Proxy Server  Use proxy server

Proxy Server


If your organization uses a proxy server to access the above repository, please provide the proxy server credentials.

Proxy Host Address:

Username:

Password:

### Additional Settings

 In general, it is recommended that you do not configure the Additional Settings unless you have consulted with Tasktop Support.

Repository Query  Enable collections to be refined by setting a repository query

Event Rate Limit  Enable repository processing rate limiting

Note: Setting the rate too low could block Tasktop from processing artifact changes.

Event Type  All events  Only full scan events

Rate:  Events per Minute

Concurrency Limit


Note: Setting the concurrency limit too low could block Tasktop from processing artifact changes.

Additional Settings

In general, it's recommended that you do not configure the Additional Settings unless you have consulted with Tasktop Support.

## Repository Query

If you plan to utilize a repository query, select the checkbox here.

 Repository Queries are advanced functionality, and should only be used when you are truly unable to filter as desired using the built-in Tasktop functionality of Repositories, Collections, and Artifact Filtering. You can learn more about repository queries [here](#).

## Event Rate Limit


The **Event Rate Limit** can be used to mitigate scenarios where an external repository is temporarily receiving an excessive API call rate over short periods of time. It does this by limiting the number of events processed per minute by Tasktop for that repository. Events include Tasktop processes such as artifact retrieval, artifact update, and change detection queries. On average, an event consists of about 3-10+ API calls, but this is highly dependent on the specific repository.

When setting an Event Rate Limit, you can choose to limit:

- **All events**
- **Only full scan events:** if this is selected, only low priority events occurring during a full scan will be limited. High priority events, such as artifact updates, will continue without impact.

Note that the rate set is a maximum rate; Tasktop may process items at a lower rate depending on the event load.


Tasktop's default event rate limit is applied to full scan (observe) events only, at 200 events per minute.

 Caution should be used when setting this value. The ideal Event Rate Limit is highly dependent on each customer's unique environment. Determining the appropriate value is best achieved through experimentation, using feedback from performance monitoring to tune the value, and making adjustments as necessary. Setting the value too low when there is a large number of projects configured in your collections and a low Change Detection Polling Interval setting can potentially cause Tasktop to be unable to process artifact changes.

## Concurrency Limit

The **Concurrency Limit** is set at the Repository level, and it limits how much work Tasktop can do in parallel in that repository. It does this by limiting the number of concurrent tasks where the connection is used. We recommend leaving this field blank/set to the default (having no specified limit).

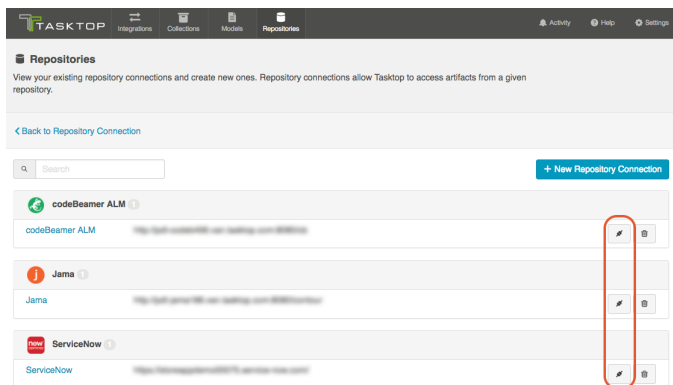
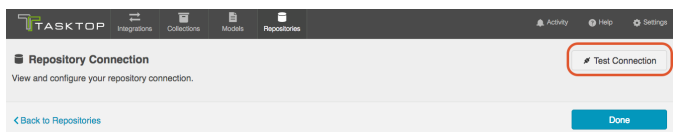
If customers notice that Tasktop is placing too high a load on their repository, we recommend first modifying the [Event Rate Limit](#). If that is insufficient, or if the source of the high server load is specifically due to having too many open connections on the external repository, the Concurrency Limit can be modified. We recommend starting with a value between 3-10 and engaging with support to determine an appropriate value for your unique environment.

 Caution should be used when setting this value. The ideal Concurrency Limit is highly dependent on each customer's unique environment. Determining the appropriate value is best achieved through experimentation, using feedback from performance monitoring to tune the value, and making

adjustments as necessary. Setting the value too low when there is a large number of projects configured in your collections and a low Change Detection Polling Interval setting can potentially cause Tasktop to be unable to process artifact changes.

### Testing Your Repository Connection

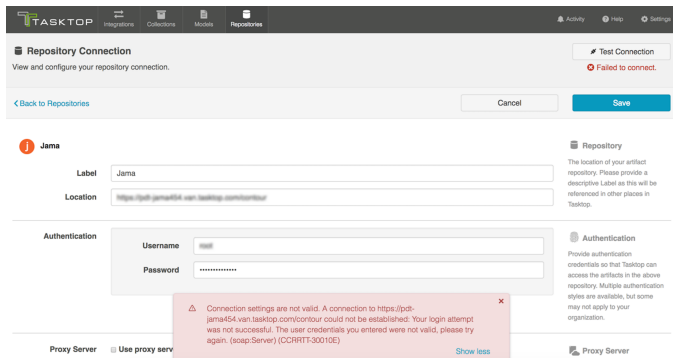
To test your repository connection, click the 'Test Connection' button on the Repository Connection screen, or click the icon on the Repositories screen.



You will see a success or failure message to confirm whether Tasktop was able to connect to your repository.



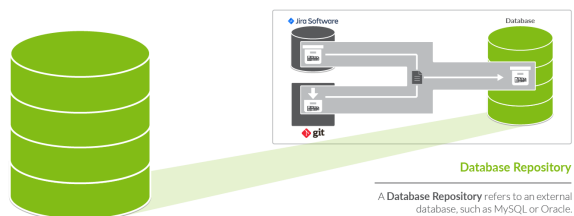
When your repository fails to connect, you will also see an error message at the bottom of the screen with additional details on the source of the failure:



## Database Repository Connection

What is a Database Repository Connection?

*Database Connections are only available in Editions that contain the Enterprise Data Stream add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality.*



A **database repository**, is a tool such as MySQL or Oracle, which allows you to flow data to a central database. Database repositories are used as part of the Enterprise Data Stream add-on.

In order to configure an Enterprise Data Stream Integration, you must first connect to the database that will be used by that integration. Creating a new database connection is similar to creating a [standard repository connection](#), with a few extra considerations. To create a new database connection, follow the steps below.

### Before You Begin

- When you start up Tasktop, you will be prompted to log in. Please review the [User Management](#) section for instructions on how to log in and manage your user accounts.
- Next, you will be prompted to set a [Master Password](#), which will be used to encrypt your repository credentials.
- Before connecting to your repository, make sure that you have applied your license on the Settings screen. You can learn how to apply your license [here](#).

### Supported Databases

The following databases and versions are supported for use with the Enterprise Data Stream add-on:

#### Microsoft SQL Server



- 2008 (including SP1, SP2, SP3, SP4)
- 2008 R2 (including SP1, SP2, SP3)
- 2012 (including SP1, SP2)
- 2014 (including SP1)
- 2016

### MySQL

- 5.5
- 5.6
- 5.7

### Oracle

- 11g
- 12c

### Step 1: Download the JDBC Driver

#### Microsoft SQL Server

The JDBC driver for Microsoft SQL Server can be downloaded from the [Microsoft support site](#). The SQL Driver Location should reference the directory containing the sqljdbc42.jar file. This file should be the only .jar file in that directory, or you may end up with errors upon configuring your collection.

Tasktop currently supports use of the 7.0.0.jre8 driver version.

#### MySQL

The JDBC driver for MySQL can be downloaded from the [MySQL download site](#). The SQL Driver Location should reference the directory containing the mysql-connector-java-<version>-bin.jar file.

#### Oracle

The JDBC driver for Oracle can be downloaded from the [Oracle support site](#). Note that it is best if the Oracle JDBC driver that is used matches the version of the Oracle server that you are connecting to. Additionally, the ojdbc6.jar file is the only file that should be in the directory that is used for the SQL Driver Location or you may end up with errors upon configuring your collection.

### Step 2: Upload the JDBC driver

The SQL driver files must be put on the file system of the same server where Tasktop is installed. When setting up a connection to your database with the SQL connector, the SQL Driver Location field should reference the location of the SQL driver files on the server.

#### Microsoft SQL Server

The SQL Driver Location should reference the directory containing the sqljdbc42.jar file. This file should be the only .jar file in that directory, or you may end up with errors upon configuring your collection.

## MySQL

The SQL Driver Location should reference the directory containing the mysql-connector-java-<version>-bin.jar file.

## Oracle

The SQL Driver Location should reference the directory containing the ojdbc6.jar file. The ojdbc6.jar file should be the only file in that directory, or you may end up with errors upon configuring your collection. Note that it is best if the Oracle JDBC driver that is used matches the version of the Oracle server that you are connecting to.

### Step 3: Connect to your Database

1. In Tasktop, click 'Repositories' at the top of the screen, and click 'New Repository Connection.'
2. Select 'Tasktop SQL' as the repository.
3. Enter a label for your connection. This is how it will be referenced through the Tasktop application.
4. Enter the URL of your database. The protocol should be "jdbc:sqlserver://" for a MS SQL database, "jdbc:mysql://" for a MySQL database or "jdbc:oracle://" for an Oracle database.
5. Select the appropriate JDBC driver (SQL Server, MySQL, or Oracle).
6. Enter the SQL driver location, which is the location of the SQL driver files on the Tasktop server. See steps 1 and 2 above for more information on the SQL driver files.
7. Enter a username and password for your database.
8. If you'd like, you can test your connection by clicking the 'Test Connection' button in the upper right corner.
9. In general, we recommend that users do not edit the Concurrency Limit or Event Rate Limit fields. You can learn more about these fields [here](#).
10. Click 'Save' and then 'Done' to save the connection

**New Repository Connection**

Create a new repository connection. Repository connections allow Tasktop to access artifacts from a given repository.

[Back to Repositories](#) Cancel Save Test Connection

**New Tasktop SQL Connection**

Label

JDBC URL

JDBC Driver

SQL Driver Location

**Authentication**

Username

Password

**Repository**

The location of your artifact repository. Please provide a descriptive Label as this will be referenced in other places in Tasktop.

**Authentication**

Provide authentication credentials so that Tasktop can access the artifacts in the above repository. Multiple authentication styles are available, but some may not apply to your organization.

**Concurrency Limit**

Note: Setting the concurrency limit too low could block Tasktop from processing artifact changes.

**Event Rate Limit**

Enable repository processing rate limiting

Note: Setting the rate too low could block Tasktop from processing artifact changes.

Event Type  All events  Only full scan events

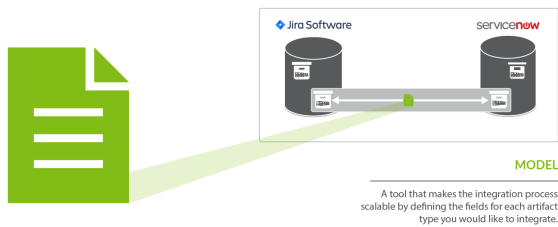
Rate  Events per Minute

**Additional Settings**

In general, it's recommended that you do not configure the Additional Settings unless you have consulted with Tasktop Support.

## Step 2: Create or Reuse a Model

### What is a Model?



A **model** is a tool that makes the integration process scalable by defining the fields for each artifact type you would like to integrate. By mapping collections to the same model, you will be able to easily add new repositories and new projects within those repositories to your integration landscape. You can learn more models in the [Key Concepts](#).

To access your models, click on the 'Models' button at the top of the screen:

**Connecting the World of Software Delivery**

- Create integrations in minutes
- Explore key integration concepts
- Learn how to easily scale your integrations

Start Connecting

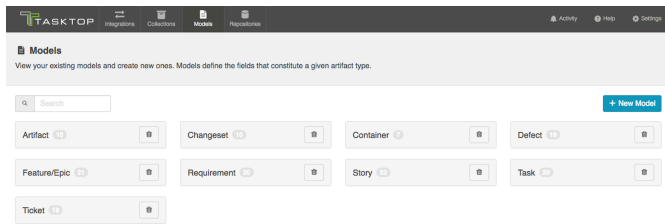
**Out of the Box Models**

- Atlassian Jira
- Blueprint
- BMC Remedy
- CA Agile Central
- CA Project and Portfolio Management
- codeBearing ALM
- Dimensions RM
- GitHub Issues

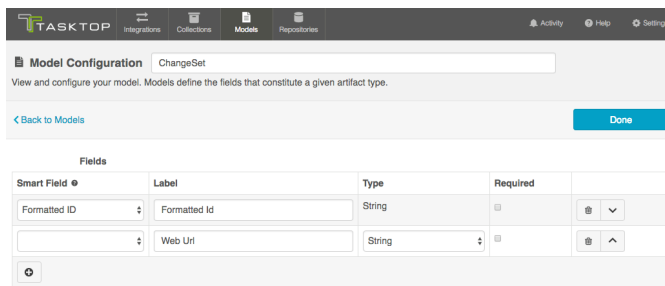
### Out of the Box Models

Tasktop comes pre-packaged with several out-of-the-box models that are ready for you to use!

On the Models screen, you will see the name of each model, with a number identifying how many fields are included in that model:



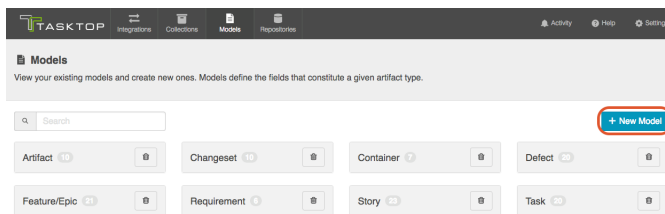
To view a model, simply click on its title. You will be brought to the Model Configuration screen, which will show the fields included in that model:



## Custom Models

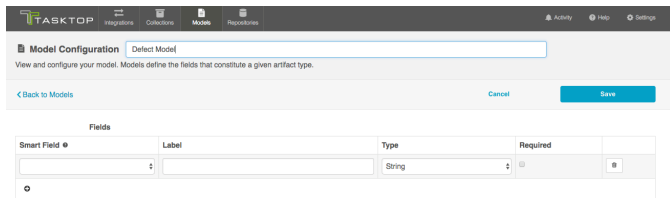
Check out the video below to learn how to create a new custom model:

To create a new custom model, click the '+ New Model' button at the top of the screen.



## Add Fields to Your Model

You can start configuring your first model immediately – just name it and start entering metadata into the first line. To add additional fields to your model, simply click on the plus sign at the bottom left of the model box.



## Smart Field Designation

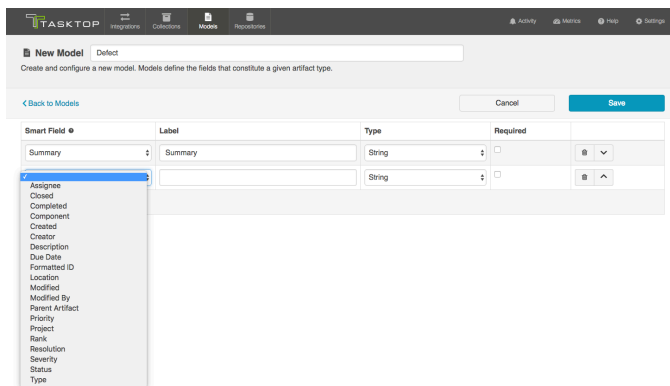
For each field you add to your model, you have the option of identifying its corresponding smart field type. *Smart fields* are a set of fields commonly available in the connectors for all of the repositories Tasktop connects to. By designating a smart field to your model field, Tasktop will be able to more easily match fields from your repositories to your models when you are creating and editing collections.

Selecting a Smart Field will also give Tasktop the power to suggest the proper field type for your model field.

You do not have to select a smart field for all model fields. If you cannot find a smart field that corresponds to a model field, just leave the smart field drop down empty for that field.

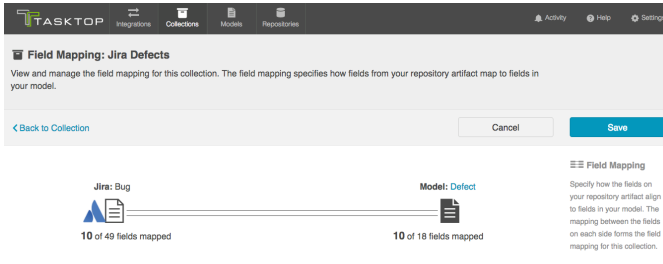
Some examples of smart fields are:

- Formatted ID: the human-readable ID of an artifact
- Location: the field that holds the URL of an artifact
- Modified: a date-time field showing when changes were last made to an artifact



## Field Label

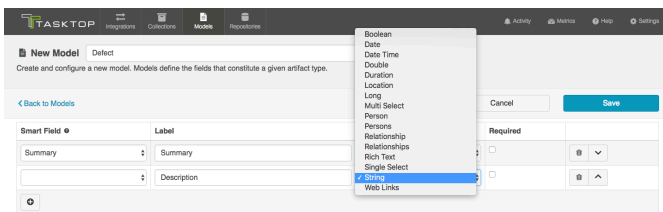
The *label* is the name of the field in your model that you will see throughout the Tasktop application, from the collection-to-model field mapping screen to the field flow screen in an integration.



## Field Type

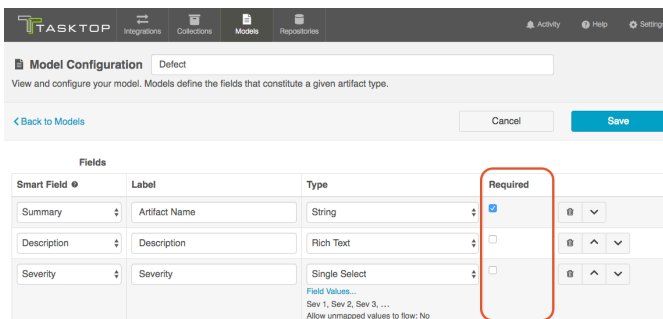
Tasktop supports a number of field types, such as *string*, *multi-select*, *relationship*, and more, for use in your model. Identify the field type that most closely aligns with the type of information you expect to flow through this model field.

Review the sections below for best practices and additional configuration steps for each field type.



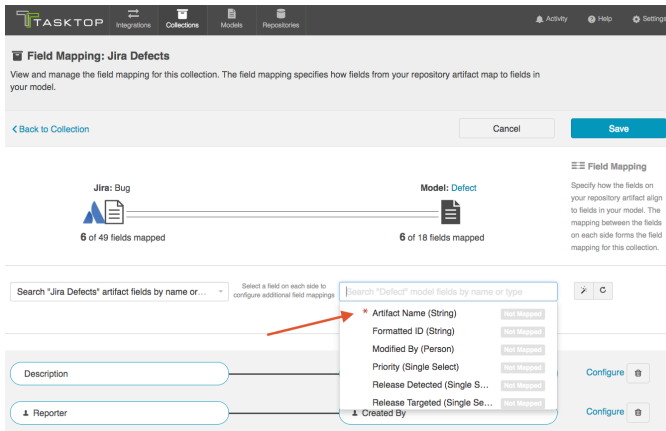
## Required Designation

For each field, you can configure whether or not that field requires a value.



Marking a field as required has implications for all collection types:

- For repository collections, any required model field will be shown with a red asterisk in the collection to model mapping:



- For gateway collections, you will need to pass in a value in the payload for any required field in order for Tasktop to accept the payload.
- For database collections, the suggested DDL will mark the field as required ("not null"); this means that if you use that suggested DDL to create your database tables, the field will be required by your database table to create a new record about an artifact:

#### Data Description Language Generator

Database: MySQL

Model: Defect

Suggested DDL

```
CREATE TABLE DEFECT (  
  ID BIGINT (19) AUTO_INCREMENT,  
  FORMATTED_ID VARCHAR (1000),  
  ARTIFACT_NAME VARCHAR (1000) NOT NULL,  
  DESCRIPTION VARCHAR (1000),  
  SEVERITY VARCHAR (255),  
  PRIORITY VARCHAR (255),  
  STATUS VARCHAR (255),  
  RESOLUTION VARCHAR (255),  
  RELEASE_DETECTED VARCHAR (255),  
  SPRINT_DETECTED VARCHAR (255),  
  RELEASE_TARGETED VARCHAR (255),  
  SPRINT_TARGETED VARCHAR (255),  
  CREATED_BY VARCHAR (64),  
  MODIFIED_BY VARCHAR (64),  
  OWNER VARCHAR (64)
```

Execute the DDL and Close to refresh the list of tables. Close

#### Best Practices for Models

- Generally, the fewer models, the better. Create one model per primary artifact type. The model should have the greatest number of fields needed to accommodate all of your integrations for that artifact type. Then, at the collection- and integration-level, you can configure your field flow to only flow whichever fields are relevant for that integration. By utilizing fewer models, you'll see benefits in improved governance and standardization, and greater ease of scalability, data collection, self-service, and maintenance.
- The model field, by definition, sits in the middle of two fields: one from each repository you are integrating. Those two fields in your end systems may have different levels of detail, but by definition, they must map to the same model field. We recommend that your model field match the 'richer' of your two fields. This will ensure you preserve as much information as possible for as long as possible in your integrations. This allows your model to be more reusable and to support more scenarios.

For example, when mapping between text fields, it's often good practice to use a rich text field in your model. That way, you preserve the rich text from the source. If you map a rich text field to a text (string) field in the model, you'll lose the formatting information immediately.

- If you are mapping a single- or multi-select field in your repository that contains a large look-up list (i.e. which has hundreds or thousands of possible values):
  - If the list of values match between your source and target repositories, make the model field a string field. This will allow the values to flow between the repositories without the need to maintain a field mapping.
  - If you only need to map a small sub-set of the values, make the model field a single- or multi-select field, and check 'Allow unmapped values to flow.'
- Whenever possible, utilize the smart fields available. For example, if you would like to add a 'status' field to your model, use the 'status' smart field, rather than entering 'status' as the field label, and selecting a field type manually. This will enable Tasktop to auto-map the model field to the appropriate fields within each repository.
- If you would like to use a field for artifact filtering, make sure to include that field in your model.

## Glossary of Field Types

### Fields that Require Additional Configuration

#### Single-Select and Multi-Select

Single-selects and multi-selects fields refer to fields in which the user selects one or many options from a list of values. These fields could refer to drop down menus, checkboxes, or radio buttons within the end repository, to name a few examples.

When utilizing single-select and multi-select fields in your model, there are a couple of additional configuration steps to be aware of.

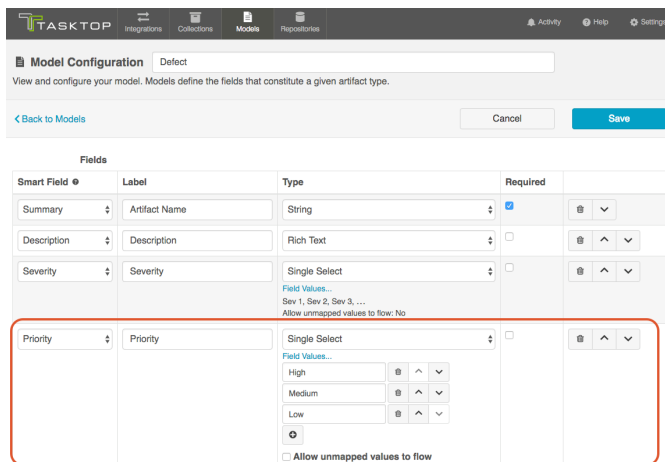


First, click the 'Field Values' link to add values to your model. These will be the available field values that you will then map to fields within each end repository. If you'd like to add additional field values to your model, you can use the '+' button to do so.

Second, decide whether or not you'd like to allow unmapped values to flow.

If you **do not allow unmapped values to flow** (the default setting), the server will reject any value that is not specified in the model. In general, this is the recommended approach. If you select this approach, you will need to map all possible values for the repository field to the specific values for the model field on the Field Configuration screen during Collection configuration.

If you **do allow unmapped values to flow**, field values not specified in the model will be able to flow while the integration is running. This can make sense in a few specific scenarios, such as an Enterprise Data Stream integration or in single select to string transforms, where there are many options available and you don't desire any normalization of the data flowing through. In most cases, however, you will not want to allow unmapped values to flow.



In the image above, you have added 3 specific values for the field "Priority" but have not allowed unmapped values to flow, meaning that any field values sent from the collection will need to be mapped to these 3 model values in order for your artifact to flow successfully.

### Fields that Do Not Require Additional Configuration

#### Boolean

Boolean fields are typically represented by checkboxes in the end repository. These fields are often useful for filtering integrations. As an example, you could create a custom boolean field titled "Participate in Tasktop Integration". If you filter by that field (on the [Artifact Filtering](#) screen of your integration), only artifacts that your users have checked will participate in the integration.

#### Date

These identify a specific date.

#### Date Time

These are fields that identify something more specific than a date. For example, January 1, 2017 9:35am. A 'Created' field is often a Date Time field.

### Double

Use this field for number fields - either integers or decimals. For example, a double could include both values "2" and "2.5." The *Long* field type can also be used for integers.

### Duration

This field holds a length of time. This is typically used for worklogs and time estimations on tasks.

### Location

This model field holds a URL.

There is also a Smart Field called Location which is specifically for the URL of a given artifact. The Location Smart Field is often used when you want to [synchronize a URL reference field to your target artifact](#) (sometimes referred to as 'backlinking'). This allows for bi-directional traceability. It can also be used to report the location of an artifact in an [Enterprise Data Stream integration](#).

The 'Location' *model field type*, on the other hand, can be for any URL.

In addition to 'Location,' you will also see that there is a 'Web Links' field type available. The 'Web Links' field type includes the URL as well as additional information such as label, creator, and time of creation (depending on what the repository supports), while 'Location' includes only the URL.


### Long

This field is for integer or whole numbers, only. An example of a *Long* field value is "2," but *not* "2.5." The *Double* field type can be used if you will also need to cover decimal values. Story points are a good example of a *Long* field.

### Person and Person(s)


You'll notice that you are able to create both 'person' and 'persons' field types in your model. 'Person' refers to fields that contain one, and only one, Person object. Examples of this type of field are: Assignee, Owner, Reviewer, etc. Person objects contain more information than just the display name of the person. For example, they may also utilize the user's e-mail address or username in order to reconcile 'persons' between different repositories. You can learn more about person reconciliation strategies [here](#).

The Person(s) field type refers to fields that contain more than one Person. A 'Watchers' field is a good example. There can be one or more Persons in a single Watchers field.

 In general, we recommend using the 'persons' field type in your model, rather than 'person,' especially in cases where you may want to map a 'person' field in one repository to a 'persons' field in your other repository.

## Relationship and Relationship(s)

You'll notice that you are able to create both 'relationship' and 'relationships' field types in your model. 'Relationship' refers to scenarios where your artifact can be related to one, and only, one artifact. An example of a 'relationship,' is 'parent,' as oftentimes an artifact can only have one parent artifact. 'Relationships' refers to scenarios where your artifact can be related to many artifacts. An example of 'relationships' is 'child,' as one parent-artifact can often have many child artifacts.

 In general, we recommend using the 'relationships' field type in your model, rather than 'relationship,' especially in cases where you may want to map a 'relationship' field in one repository to a 'relationships' field in your other repository.

## Rich Text

This is for fields that can contain rich text. These are fields that can contain html and/or wiki markup, such as bold, italics, or colored fonts. These are often Description fields.

## String

String fields are used for text input. These model fields will not transmit rich text information.

## Web Links

*Web Links* fields are intended to point to URLs outside of a given tool. They can contain information in addition to the URL, such as label, time of creation, and creator (depending on what the repository supports). They could also be considered a hyperlink field.





In addition to 'Web Links,' you will also see that there is a 'Location' field type available. The 'Web Links' field type includes the URL as well as additional information such as label, creator, and time of creation (depending on what the repository supports), while 'Location' includes only the URL.

# Step 3: Create Your Collection(s)

## Types of Collections

Your collections define which artifacts are eligible to flow as part of your integration.

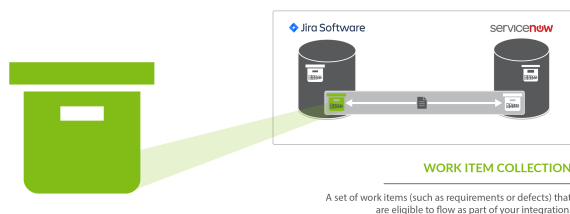
You can create five types of collections:

 Work Item Collection (Repository)	 Work Item Collection (Database)	 Gateway Collection	 Outbound Only Collection
---	---	---	--

	Container Collection (Repository)			
<i>Work Item Collections (Repository) are available in all Editions.</i>	<i>Container Collections (Repository) are available in all Editions.</i>	<i>Work Item Collections (Database) are only available in Editions that contain the Enterprise Data Stream add-on. See <a href="#">Tasktop Editions table</a> to determine if your edition contains this functionality.</i>	<i>Gateway Collections are only available in Editions that contain the Gateway add-on. See <a href="#">Tasktop Editions table</a> to determine if your edition contains this functionality.</i>	<i>Outbound Only Collections are only available in editions that have access to the Git repository.</i>
A <b>work item collection (repository)</b> contains work items, such as defects or requirements, from repositories, such as Jira or ServiceNow.	A <b>container collection</b> contains containers, such as folders or modules, from repositories such as DOORS Next Generation or Jama.	A <b>work item (database) collection</b> connects to a database, such as MySQL or Oracle.	A <b>gateway collection</b> contains artifacts sent via an in-bound webhook, from an external tool.	An <b>outbound only collection</b> contains artifacts like code commits or changesets, which you may want to flow out of your repository, but which would not receive updates into your repository.
<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>

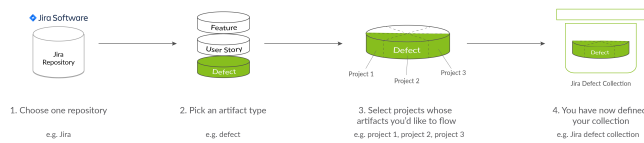
## Work Item Collection (Repository)

What is a Collection?



You can think of a *collection* as the set of artifacts that are eligible to flow as part of your integration. The process of creating a collection consists of a few steps which whittle down your repository into a smaller subset of artifacts. To create your collection, you will specify:

1. The repository the artifacts live in
  1. Each collection can only come from *one* repository
2. The artifact type (i.e. defect, requirement, test case, etc)
  1. Each collection can only contain *one* artifact type
3. The projects within the repository that those artifacts live in
  1. Each collection can contain one or more projects
4. The model you would like your collection to be mapped to (not pictured)
  1. Each collection can be mapped to one and only one model



You can learn more about collections in the [Key Concepts](#).

### Types of Work Item Collections

There are two types of Work Item Collections:

- Work Item (Repository) Collections, which connect to repositories like *Jira*, *Jama*, and *ServiceNow*
- [Work Item \(Database\) Collections](#), which connect to databases, such as *MySQL*.

On this page, we will be teaching you how to configure a Work Item (Repository) Collection.

💡 Note: SCM repositories, such as Git, are not available for Work Item collections. To configure an SCM collection, please see [Outbound Only Collection](#) instructions.

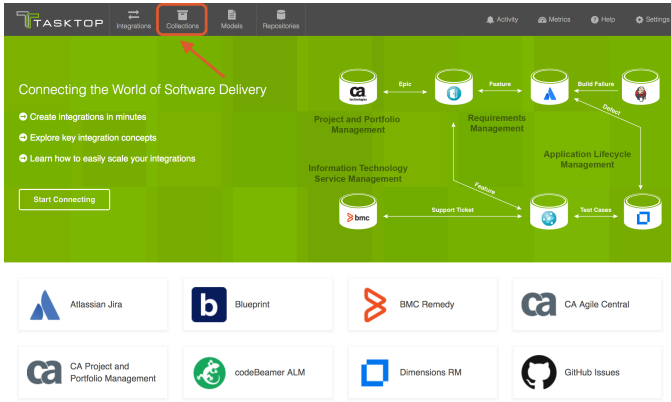
### Video Tutorial

Check out the video below to learn how to create a new work item (repository) collection:

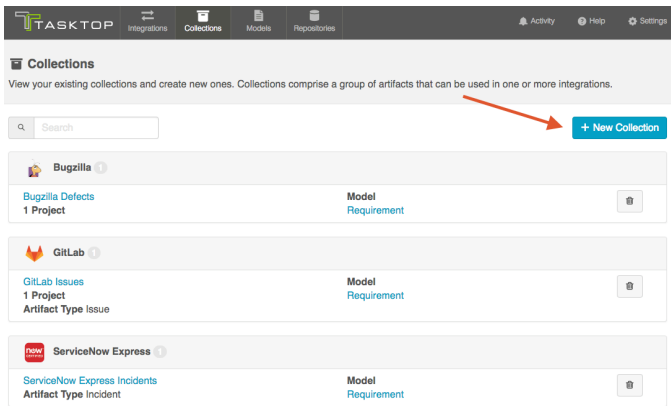
### How to Create a Work Item (Repository) Collection

To create a work item (repository) collection, follow the steps below:

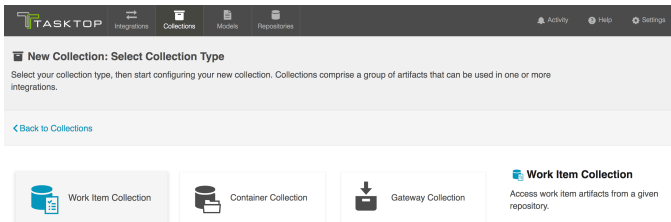
Select 'Collections' at the top of the screen:



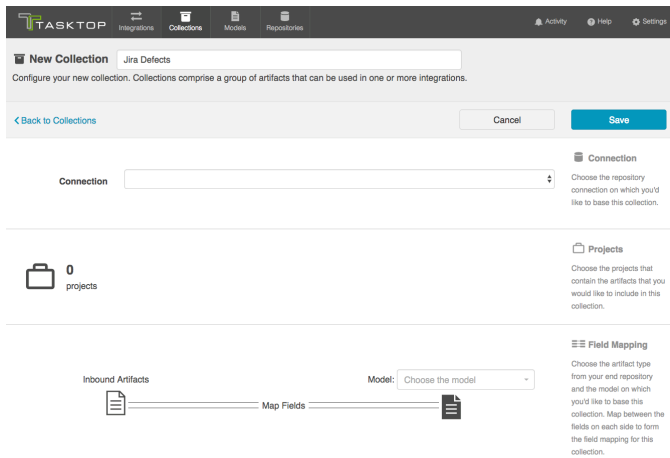
Click 'New Collection':



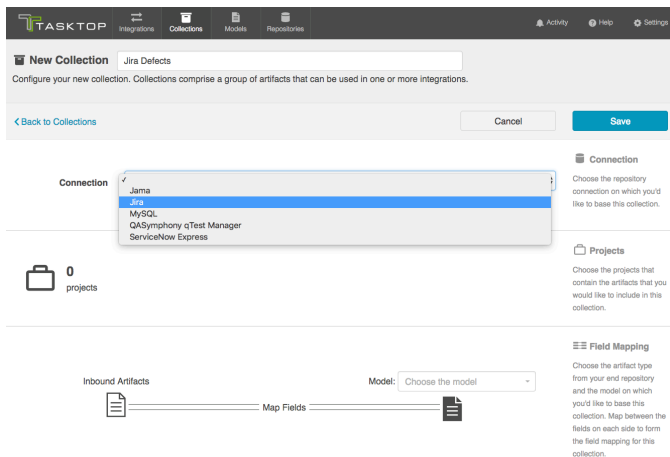
Select "Work Item Collection" as the collection type.



Enter a name for your collection,

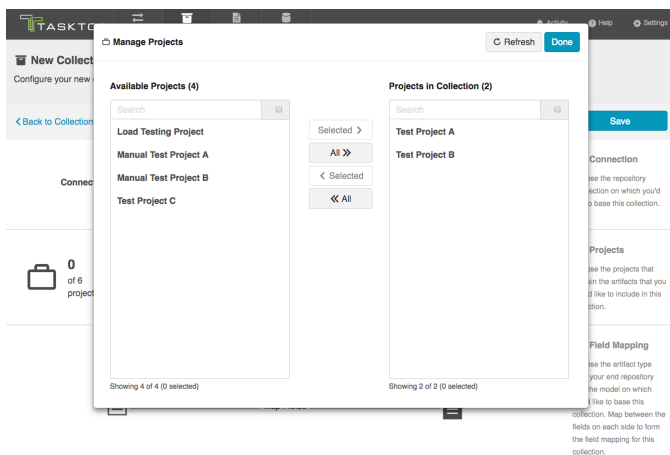


Select the repository that you would like to connect to. The collection will include artifacts from the repository you have selected.

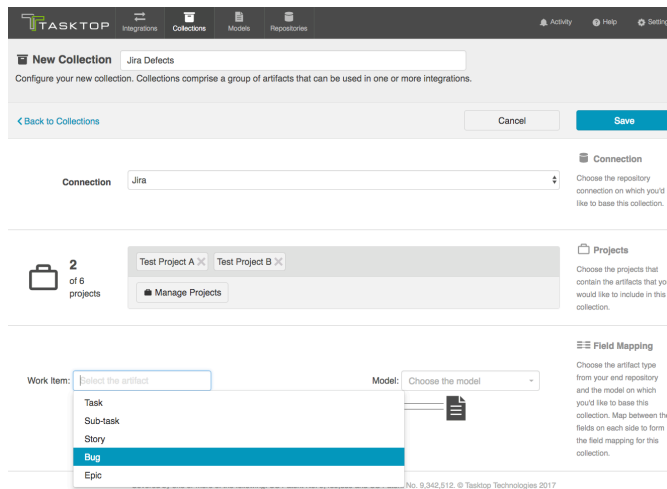


Add projects to your collection by selecting 'Manage Projects'. These are the projects from which Tasktop will be able to create, retrieve, and update artifacts.

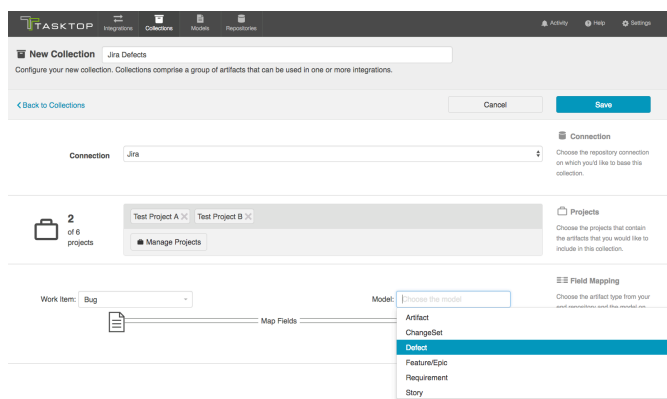
Note: In some cases, the word 'Project' is used loosely. You may be selecting workspaces or some other organizational structure, depending on the repository you've connected to. You can review our [Connector Docs](#) to see which containers are supported for each repository.



Select the artifact type from the repository that you would like to include in this collection. Remember, a single collection can only contain artifacts of a single type.

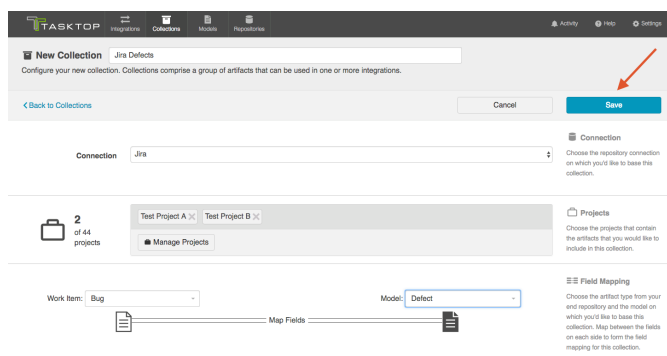


Select the model you'd like to use for this collection.



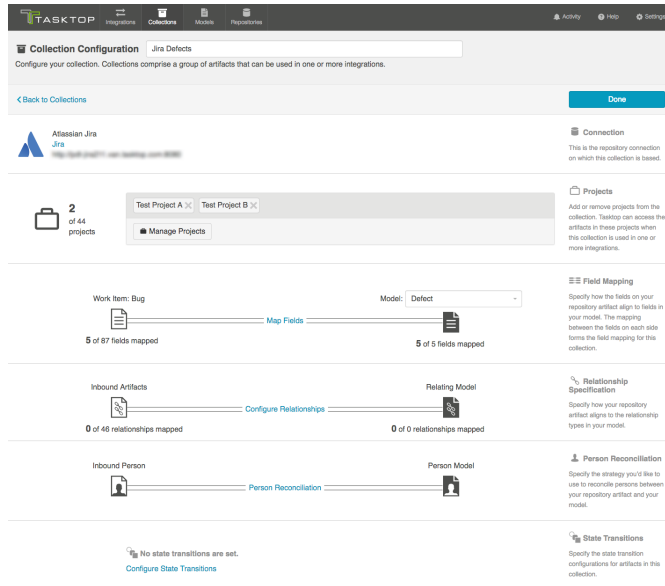
⚠ Note that the projects included in your collection must contain at least one artifact of the type selected. For example, in the image above, there must be at least one bug in Test Project A in Jira in order for your collection to save.

Click 'Save.'





Once you save, you'll see a number of configuration panels appear:



💡 Each configuration panel is an important part of configuring your collection. Make sure you review the links below to ensure you've configured each section appropriately.

### **Map Fields**

Clicking 'Map Fields' will take you to the Field Mapping screen. On this screen, you will be able to specify how fields in your repository are mapped to fields in your model. This mapping will determine how information flows between fields in your source and target collection.

You can learn more about this process on the [Field Mapping](#) page.

### **Configure Relationships**

Clicking 'Configure Relationships' will take you to the Relationship Specification screen. On this screen, you will be able to specify how **relationship** fields in your repository are mapped to fields in your model. Relationship fields, such as 'blocked by,' 'is related to,' and 'parent,' enable you to preserve the relationship structure between artifacts as you flow information from one collection to the other.

You can learn more about this process on the [Relationship Specification](#) page.

### **Person Reconciliation**

Clicking 'Person Reconciliation' will take you to the Person Reconciliation screen. On this screen, you will be able to specify the strategy you'd like to use to reconcile person fields between your repositories.

You can learn more about this process on the [Person Reconciliation](#) page.

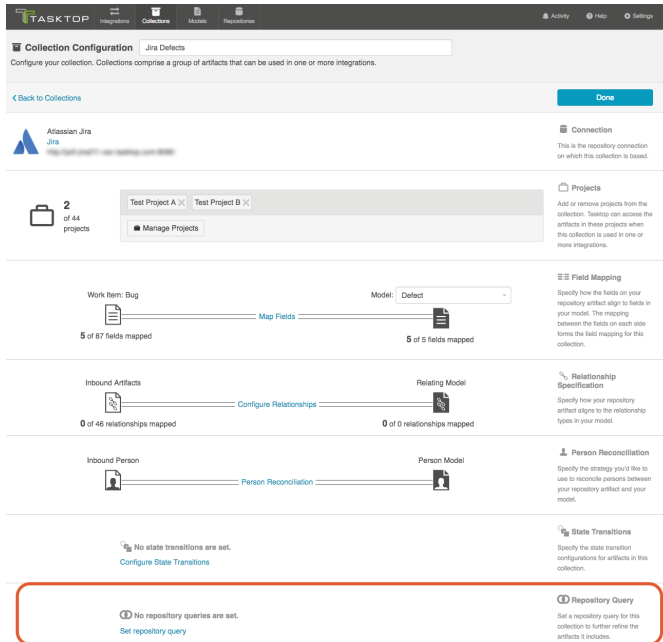
### **State Transitions**

Clicking 'Configure State Transitions' will take you to the State Transition screen. On this screen, you will be able to configure state transitions to successfully flow field updates for fields that require defined workflows within your repository.

You can learn more about this process on the [State Transitions](#) page.

### Optional: Set a Repository Query

If you have enabled repository queries for the repository that you have connected to, you will also see a 'Repository Query' sash at the bottom of the screen:



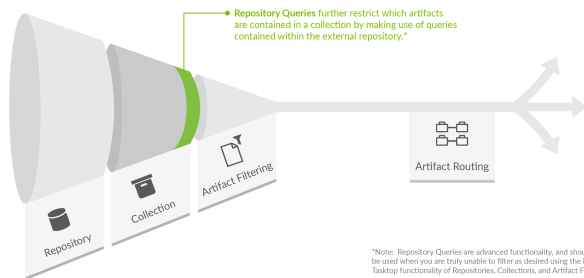
**⚠️ Note that Repository Queries are advanced functionality, and should only be used when you are truly unable to filter as desired using the built-in Tasktop functionality of Repositories, Collections, and Artifact Filtering.**

When configuring your integration, you have several options available to refine which artifacts are eligible to flow.

- First, by defining your **repository** (for example, Jira)
- Next, when creating your **collection**, you further refine which artifacts are eligible to flow by selecting only one **artifact type** (for example, defects), and **one or more projects** within your repository.
- Next, by configuring **artifact filtering** at the *integration* level, you further refine which artifacts can flow, based on **fields on those artifacts**,
- And finally, by configuring **artifact routing**, you determine which projects from your collection will participate in the integration, as well as where new artifacts will be created and updated, based on the projects they originated in.

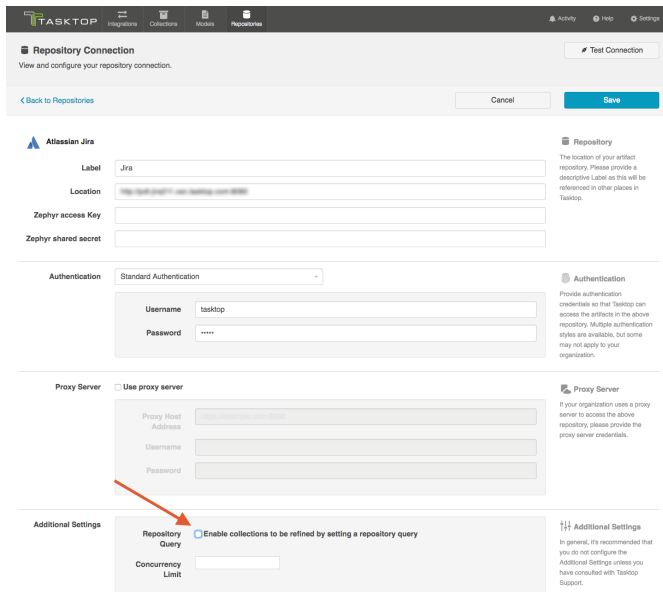
In general, the options outlined above should allow you the flexibility to create collections that are broad enough to be reusable in a range of integrations, while still having fine-grained control at the integration-level to ensure that only desired artifacts are flowing within the context of that integration.

In rare cases, however, you may find that the best option to restrict the artifacts eligible to flow is by setting a query within the repository itself.

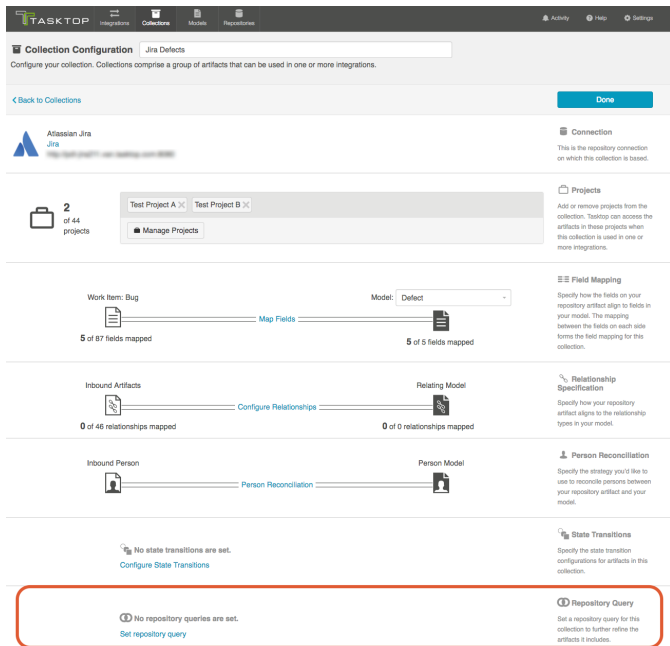


\*Note: Repository Queries are advanced functionality, and should only be used when you are truly unable to filter as desired using the built-in Tasktop functionality of Repositories, Collections, and Artifact Filtering.

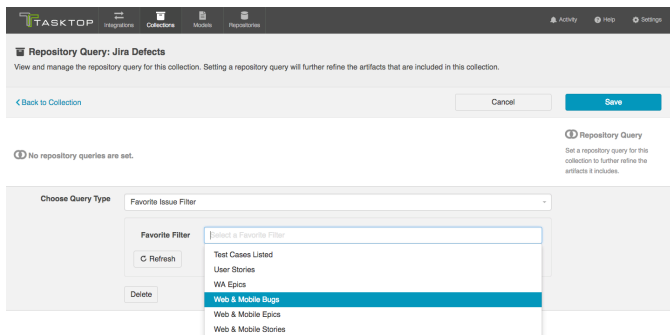
If you plan to utilize repository queries, check the box next to 'Enable collections to be refined by setting a repository query,' on the [Repository Connection](#) screen.



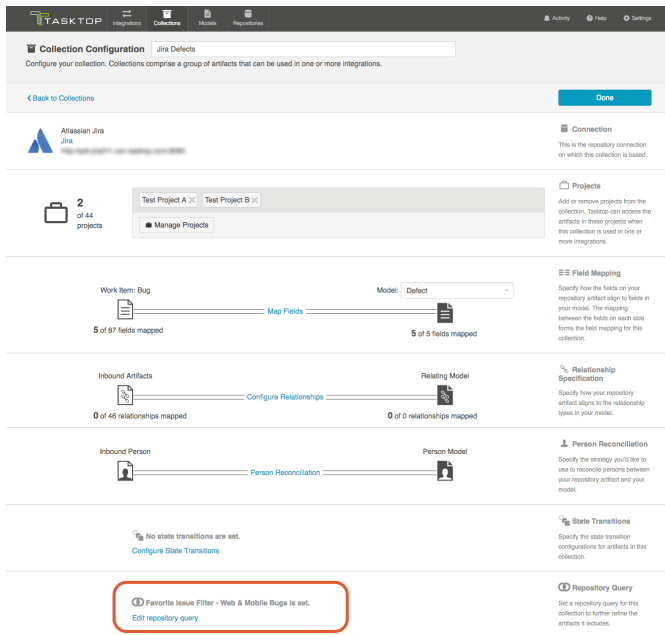
Once this is selected, you will be able to select a repository query at the Collection level for any collections utilizing this repository.



On the Repository Query screen, you'll be able to search for your desired repository query. Select the query you'd like to use, and click 'Save,' and then 'Done.'



You will then see the selected repository query on the Collection Configuration screen:



Remember, applying a repository query to a collection will only further refine the artifacts included in that collection. If you select a query that encompasses artifacts in projects not in your collection, these artifacts will not be added to the collection unless you also add those projects to your collection as you normally would.

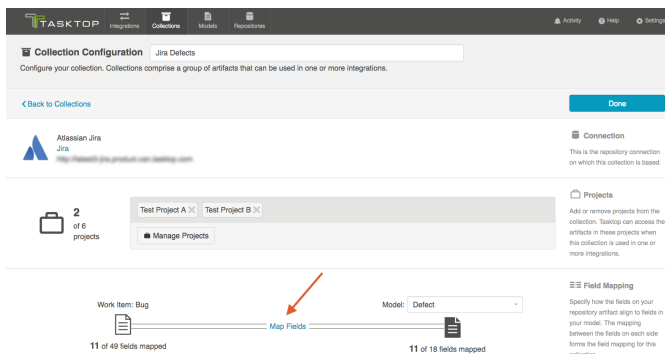
## Field Mapping

### Introduction


After saving your **Work Item Collection (Repository)**, the next step is to map fields from your collection to your model. This will tell Tasktop how to flow information to and from your collection.

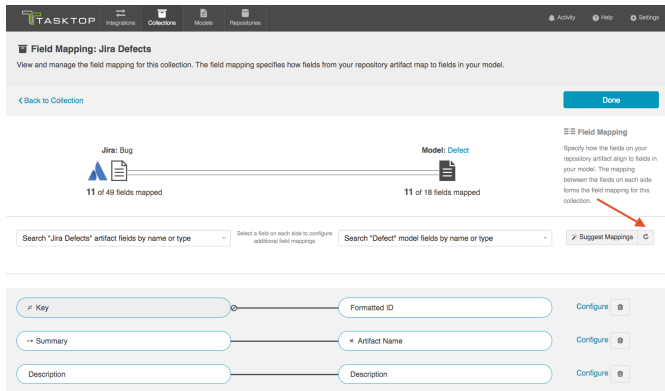
### How to Map Fields

After saving your **Work Item Collection (Repository)**, you'll see that the 'Map Fields' link becomes active.

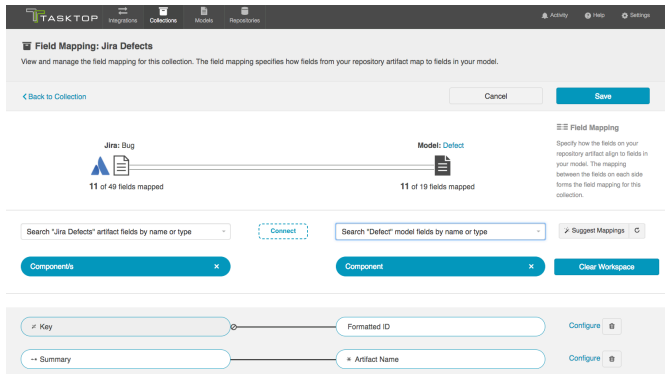


Clicking this link will take you to a drill in page where you can specify how the fields in your model will map to the fields available on the artifact within your repository. Tasktop will auto-map fields when possible based on the names of fields and the smart field designations that have been set in a given model.

 **Tip:** If you need to refresh the fields available for the collection, use the refresh button to the right of 'Suggest Mappings,' rather than your browser's 'refresh' button.



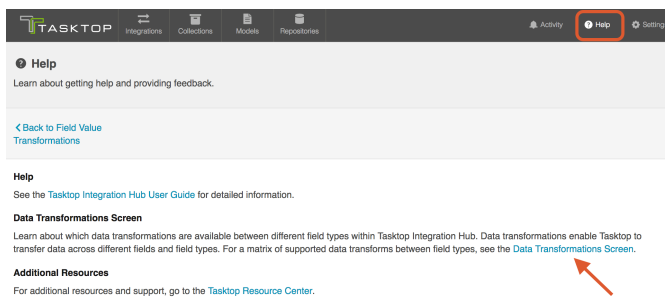
You can map additional fields by using the two drop down boxes:



## Transforms

When you map a collection field to a model field, it is necessary to **transform** the data from the source field to the target field. Depending on the field types, that transform may or may not be possible within Tasktop Integration Hub.

You can see a table of the available transforms by clicking the 'Data Transformations Screen' link on the Help page.



This will lead you to the Field Value Transformations screen. Here, you can see which collection-to-model field type transformations are available.



**Field Value Transformations**  
See the transformations available between different field types within Tasktop Integration Hub

Filter table by collection  
Jira Defects Clear

Displaying transformations for field types from repository collection Jira Defects

Supported Collection Field Types	Field Labels	Supported Model Field Types								
		Date Time	Location	Person	Relationship	Relationships	Rich Text	Single Select	String	
Boolean	<ul style="list-style-type: none"> <li>Closed</li> </ul>							●	●	
Date	<ul style="list-style-type: none"> <li>Due Date</li> <li>Finish Date</li> <li>Start Date</li> </ul>	●							●	
Date Time	<ul style="list-style-type: none"> <li>Created</li> <li>Resolved</li> <li>Updated</li> </ul>	●							●	
Double	<ul style="list-style-type: none"> <li>Fraction Complete</li> </ul>								●	
Duration	<ul style="list-style-type: none"> <li>Original Estimate</li> <li>Remaining Estimate</li> <li>Time Spent</li> </ul>								●	
Location	<ul style="list-style-type: none"> <li>Custom URL</li> <li>url</li> <li>URL</li> </ul>		●				●		●	
Multi Select	<ul style="list-style-type: none"> <li>Affects Version/s</li> <li>Components</li> <li>Custom nFeed field</li> </ul> <a href="#">Show More (7)</a>				●	●		●	●	
Person	<ul style="list-style-type: none"> <li>Assignee</li> <li>Reporter</li> </ul>			●					●	
Persons	<ul style="list-style-type: none"> <li>Watchers</li> </ul>			●					●	
Relationship	<ul style="list-style-type: none"> <li>Epic Link</li> </ul>		●		●	●	●	●	●	
Relationships	<ul style="list-style-type: none"> <li>blocks</li> <li>clones</li> <li>duplicates</li> </ul> <a href="#">Show More (5)</a>				●	●	●	●	●	
Rich Text	<ul style="list-style-type: none"> <li>Affects Requirement</li> <li>Affects Test Result</li> <li>Change Set List</li> </ul> <a href="#">Show More (10)</a>						●		●	
Single Select	<ul style="list-style-type: none"> <li>Boolean/fake</li> <li>Company</li> <li>Direct Cover Status</li> </ul> <a href="#">Show More (15)</a>				●	●		●	●	
String	<ul style="list-style-type: none"> <li>Alternate URL</li> <li>API ID</li> <li>Design URL</li> </ul> <a href="#">Show More (17)</a>	●	●	●			●	●	●	
Web Links	<ul style="list-style-type: none"> <li>Web Links</li> </ul>								●	

On the Field Mapping screen, if you attempt to map fields that do not have a valid transform between one another (for example, if you map 'due date,' a date field, to 'status,' a single-select field), you will get an 'invalid mapping' warning, and the mapping will not be saved.

**Field Mapping: Jira Defects**  
View and manage the field mapping for this collection. The field mapping specifies how fields from your repository artifact map to fields in your model.

← Back to Collection Cancel Save

Jira: Bug 12 of 49 fields mapped Model: Defect 11 of 19 fields mapped

Field Mapping: Specify how the fields on your repository artifact map to fields in your model. The mapping between the fields on each side forms the field mapping for this collection.

Search "Jira Defects" artifact fields by name or type Select a field on each side to configure additional field mappings Search "Defect" model fields by name or type Suggest Mappings

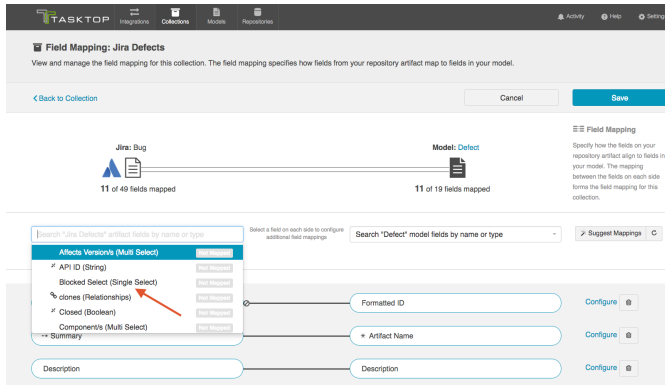
Due Date Invalid mapping Status Configure

Key Formatted ID Configure

Summary Artifact Name Configure




To help troubleshoot, you can review the field type when selecting each value from the drop down menu. This will enable you to ensure that the transform between the two field types is supported.





## Field Mapping Icons

On the Field Mapping screen, you will see a number of icons which will help you understand any special properties or requirements for each field. If you hover your mouse over an icon, you will see a pop-up explaining what the icon means. You can also review their meanings in the legend below:

Icon	Meaning
	<p>A constant value will be sent. Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a constant value will be sent to your model. This means that any time this collection is integrated with another collection, the <i>other</i> collection will receive this constant value for the field in question.</li> <li>• If the icon is on the side of the model, this means a constant value will be sent to your collection. This means that any time this collection is integrated with another collection, that <i>this</i> collection will receive the constant value for the field in question.</li> </ul>
	<p>A state transition will be utilized. Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a <a href="#">state transition graph</a> is being utilized.</li> <li>• If the icon is on the side of the model, this means that a <a href="#">state transition extension</a> is being utilized.</li> </ul>
	<p>Repository field is read-only and cannot receive data.</p>

←***→	To create artifacts in your repository, this field must be mapped to your model.
*	This is a required field in your model; it must be mapped to your collection.
⊘	This field will not be updated as part of your integration because the mapping would be invalid. You do not have the option of changing this.

### **Constant Value Mapping**

In some scenarios, either the collection artifact or the model might require that a value be provided for a given field. This value is usually provided by mapping it to the equivalent field in the collection or model. However, sometimes your collection artifact has a field that needs a value that doesn't align with any fields in your model, and sometimes your model might have a required field that doesn't have an equivalent field from the collection artifact. In these cases, you can set a constant value. By doing so, you'll specify the value that you would like to provide for that field.

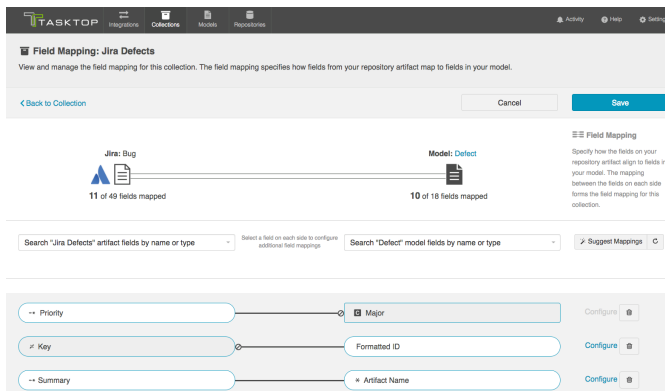
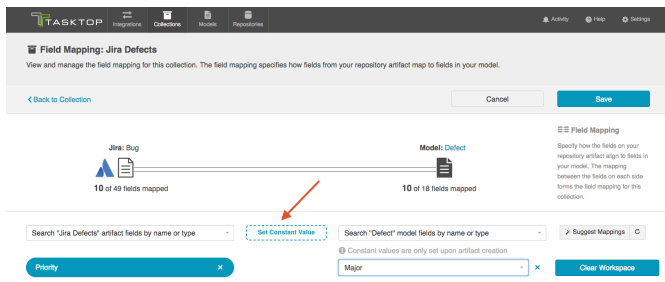
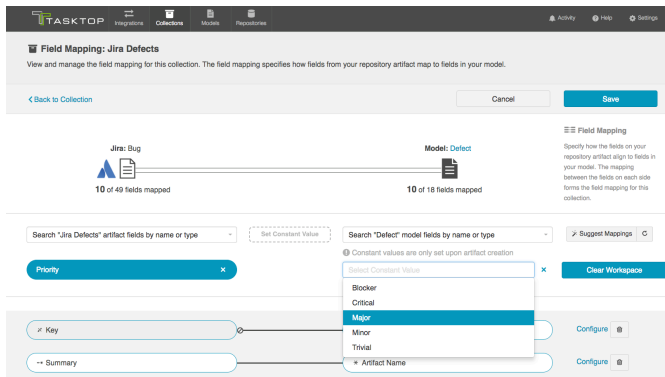
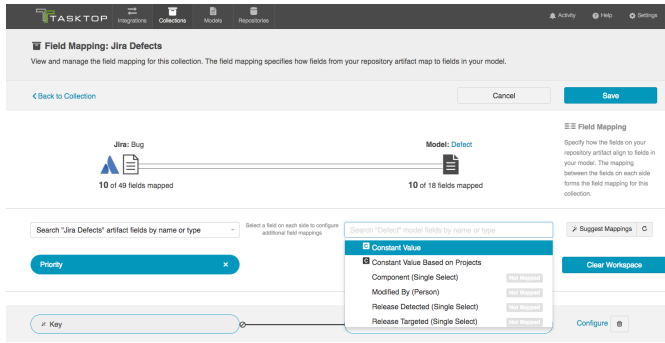
Constant values can be set for the following field types:

- Boolean
- Date/DateTime
- Double
- Location
- Long
- Multi-Select
- Person
- Rich Text
- Single-Select
- String

**Scenario 1: If your repository requires a field for artifact creation, but that field is *not* a part of your model:**

Solution: Set a constant value on the side of the model, to send to your collection.

To set a constant value for a field, select 'Constant Value' from the drop down menu on the model side. Enter the value, and then click the 'Set Constant Value' box.



Once the constant value is set, you will notice a few things:

- The pill will be rectangular and grey: this denotes that a constant value has been set.
- The Constant Value icon will be displayed inside the pill.
- The 'prohibited' icon will appear next to the pill. This indicates that no values can be sent to the Constant Value field. The constant value is essentially a dead end, and cannot be linked to a repository or model on the other side.

In the scenario above, any time a new defect is created in Jira, the priority will be set to 'Major.' Jira will not send 'priority' data to any other collections, as 'priority' is not mapped to the model.

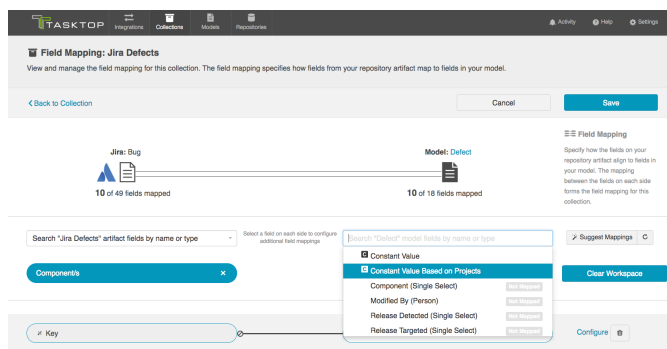
### Constant Values per Project

If desired, you can also set constant values per project.

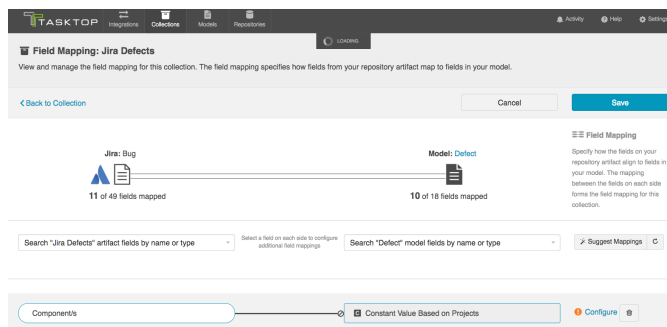
You may wish to set a constant value based on project in the following scenarios:

- In order to set a unique value for a specific field, such as release or iteration, depending on the project
- If the values for a single-select field vary across projects

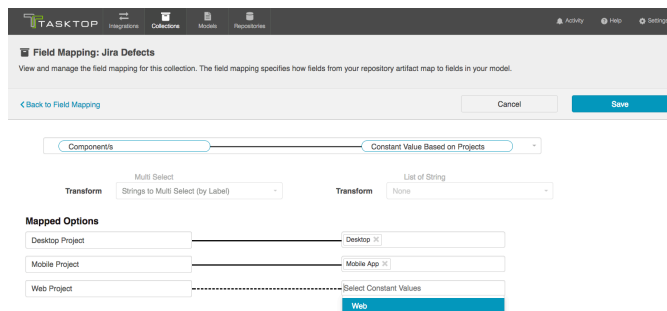
To do this, select 'Constant Value Based on Projects':



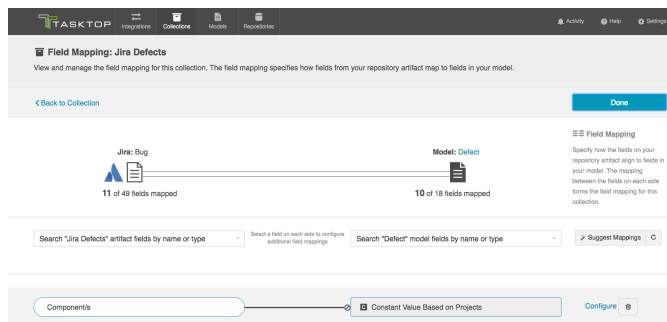
Once selected, you will see an orange exclamation point appear next to the 'Configure' link:



Click "Configure" to get to the Configuration Screen. On this screen, you will be able to set a distinct constant value for each project in your collection:



In the screenshot above, a bug created in the Desktop Project would have the value 'Desktop' applied to the Component(s) field, while a bug created in the 'Mobile Project' would have the value 'Mobile App' applied to the Component(s) field, and finally a bug created in the Web project would have the value 'Web' applied to the Component(s) field.



Once the constant value is set, you will notice a few things:

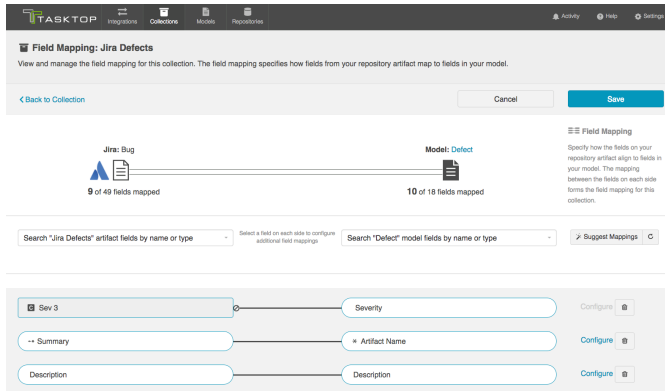
- The pill will be rectangular and grey: this denotes that a constant value has been set.
- The Constant Value icon will be displayed inside the pill.
- The 'prohibited' icon will appear next to the pill. This indicates that no values can be sent to the Constant Value field. The constant value is essentially a dead end, and cannot be linked to a repository or model on the other side.

Note: Sometimes, a single-select field in your collection will not return any values to be selected in in the UI. In cases when this is true, and when the artifact will accept new values for that field, you will see a text input in which you can configure a constant string value (instead of the traditional drop-down list for a single-select).

**Scenario 2: If your model requires a field, but the repository utilized in your collection does not have that field:**

Solution: Set a constant value on the collection side to send to your model. This means that any time your source collection creates a corresponding artifact in a target collection, the field will automatically be set to the constant value in the target repository.

To set a constant value for a field, select 'Constant Value' from the drop down menu on the collection side. Enter the value, and then click the 'Set Constant Value' box.



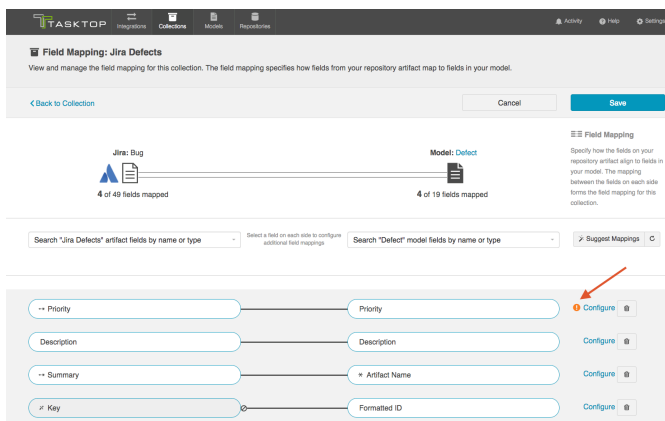
Once the constant value is set, you will notice a couple of things:

- The pill will be rectangular and grey: this denotes that a constant value has been set.
- The Constant Value icon will be displayed inside the pill.
- The 'prohibited' icon will appear next to the pill. This indicates that no values can be sent to the Constant Value field. This makes sense, because in this example your repository did not have a 'severity' field to begin with.

In the example above, any defects that flow from Jira to a target repository will populate the 'Severity' field in the target repository with a value of 'Sev 3.'

### Field Configuration

Once your collection-to-model field mapping is complete, your next step is to configure each field. Tasktop will generally auto-configure these for you, but in certain cases (such as single-selects and multi-selects), additional configuration may be needed. In scenarios where the integration cannot run successfully without additional configuration, you will see an orange configuration warning next to that field.

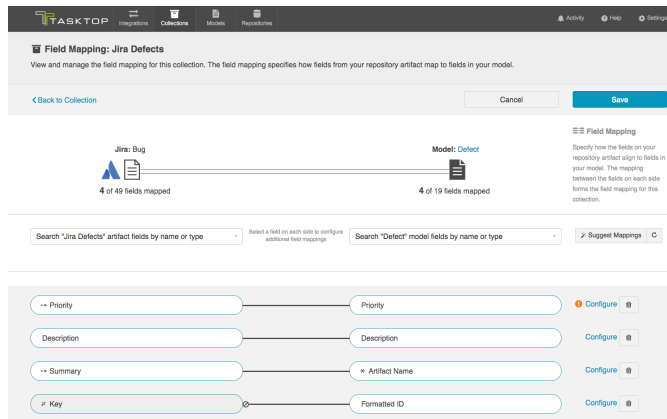


To review and update an individual field's configuration, click the 'Configure' link to its right. You can learn more about Field Configuration on the [Field Configuration](#) page of our User Guide.

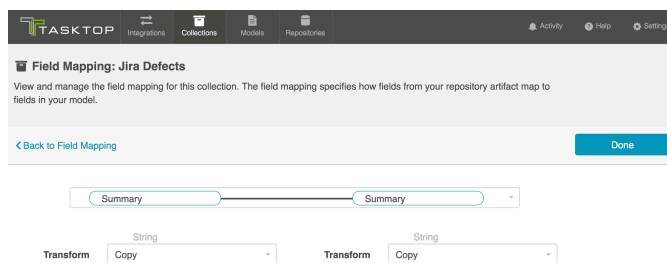
## Field Configuration

### Introduction

Once your [collection-to-model field mapping](#) is complete, your next step is to configure each field. Tasktop will generally auto-configure these for you, but in certain cases (such as single-selects and multi-selects), additional configuration may be needed. In scenarios where the integration cannot run successfully without additional configuration, you will see an orange configuration warning next to that field.



To review and update an individual field's configuration, click the 'Configure' link to its right. This will lead you to the Field Configuration Screen:

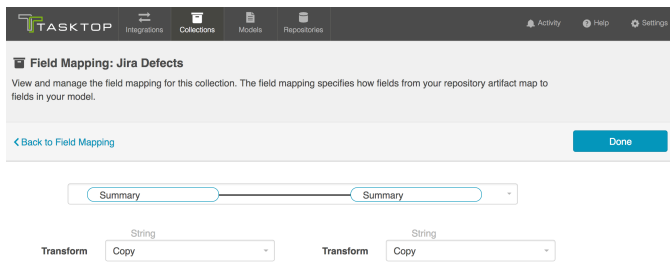


## Transforms

The Field Configuration screen will allow you to configure your transforms and value mappings.

Similar fields in different repositories often come in different formats, resulting in the need for values to be transformed to the proper format for a given repository. This screen allows you to configure how different types of fields will translate from one to the other.

You can learn more about Supported Transforms on the [Field Mapping](#) page.

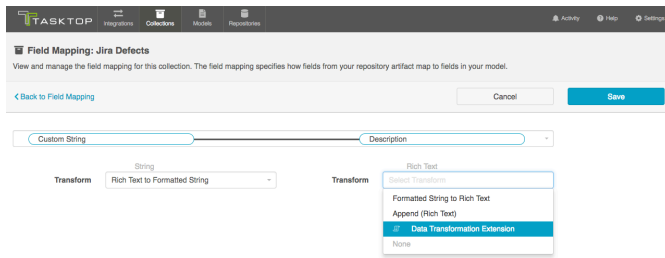


The transform on the left will impact how data flows into your repository (from your model), and the transform on the right will impact how data flows out of your repository (into your model).

Here are some examples of available transforms:

- **Copy:** A copy of the value from the source field will flow to this field. The value sent will overwrite whatever was previously held in that field.
- **Append:** A copy of the value from the source field will flow to this field. Values that existed previously will remain, with the new value appended to the end. This transform is typically utilized within the context of a [Modify via Gateway Integration](#).
- **None:** No value will flow from the source field to this field.
- **(Field Type) to (Field Type), for example 'Formatted String to Rich Text':** In some cases, you may need to transform the data from one field type (such as a Formatted String) to another field type (such as Rich Text). In this scenario, your transform will function similarly to the 'copy' transform: It will overwrite whatever values were previously held in that field with the new (transformed) value sent from the source field.
  - Note that for transforms for multi- field types (i.e. multi-select, containers, relationships, etc), where appropriate, the values will be listed out and separated by a comma. For example, a "Containers to ID" transform will flow all container IDs, each separated by a comma, to a string field.
- **Location to Web Link (Summary as Label):** Some transforms allow Tasktop to perform some behind-the-scenes 'magic.' For example, the 'Location to Web Link (Summary as Label)' transform will flow a location (i.e. the URL for an artifact) to a Web Link field, using the Summary field on that source artifact as the label for that hyperlink.
- **Custom Data Transformations:** If you have configured a [Custom Data Transformation extension](#), you can apply it on this screen:

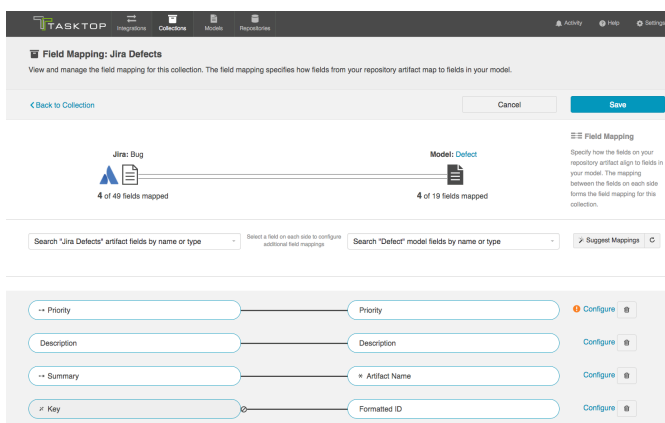




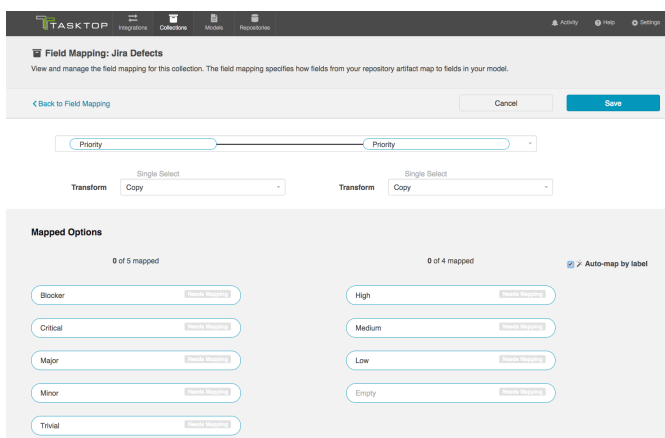
In most scenarios, the default setting will be appropriate, and you will not need to modify anything here.

### Single- and Multi-Select Fields

When flowing single- and multi-select fields, it is important to map your field values to the model on the Field Configuration screen. You will see an alert next to any mappings that require additional configuration on the Field Mapping screen:



Once you click 'Configure,' you will be lead to the Field Mapping Screen:



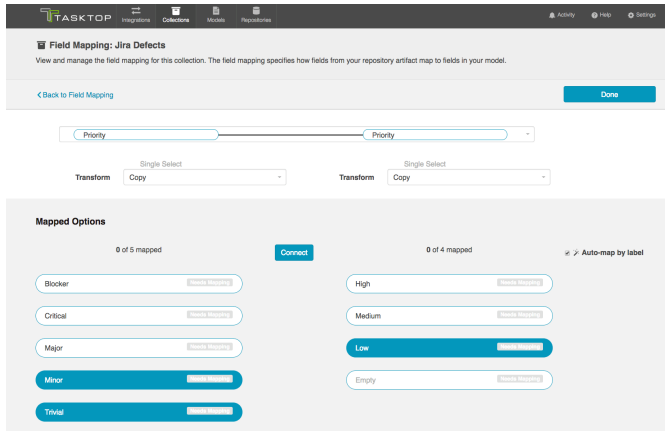
### Transforms

In most single- and multi-select field scenarios, you will configure your transform as 'copy' on both the collection and on the model side. This means that the model will pass an identical copy of its value to the collection, and vice versa. This should be the default setting.

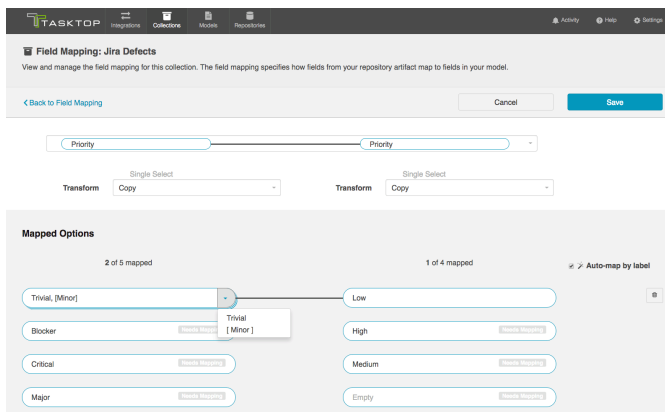
## Field Value Mapping

If the 'Auto-map by label' magic wand box is checked, it means that Tasktop will use its built-in smarts to pre-map some of the field values for you, based on their labels. If you'd like, you can click the trash can icon next to each mapping to remove the mapping, and then manually re-map it.

To complete the field value mapping, select the values in the collection and in the model that you would like to map to one another, and then click 'connect.' This process enables to the model to act as a 'translator' between two different collections which may have different sets of values for a single- or multi-select field.



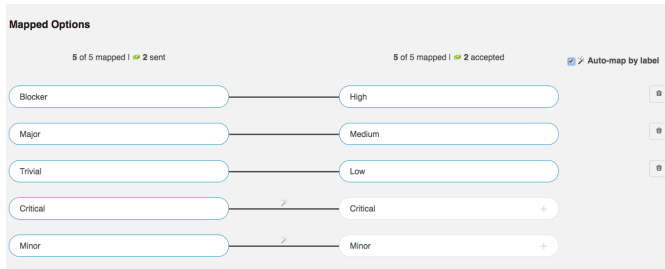
💡 When you map multiple collection values to a single model value, you will find that one value on the collection side is listed in brackets. This indicates which value will be utilized when the mapped model value is flowed to that field. In the scenario below, if the model passes a 'low' priority value to your collection, that artifact will default to a priority status of 'minor,' rather than 'trivial.' You can modify the default value by clicking the arrow icon on the collection field pill.



You can also map many model fields to a single collection field. The brackets on the model side similarly indicate which value will be set in the model when either of the mapped collection values are passed in.

💡 Note: If your model allows unmapped values to flow for the field you are configuring, you will see an indication of both the number of values that are explicitly mapped to your model, and the number of values that have been 'accepted' by your model. The values that have been 'accepted' are those

unmapped values which have been allowed to flow as part of your integration. Note that in most scenarios, the recommended setting is **not** to allow unmapped values to flow. However, allowing unmapped values to flow can make sense in a few specific scenarios, such as an Enterprise Data Stream integration or in single select to string transforms, where there are many options available and you don't desire any normalization of the data flowing through.



### Specific Use Cases

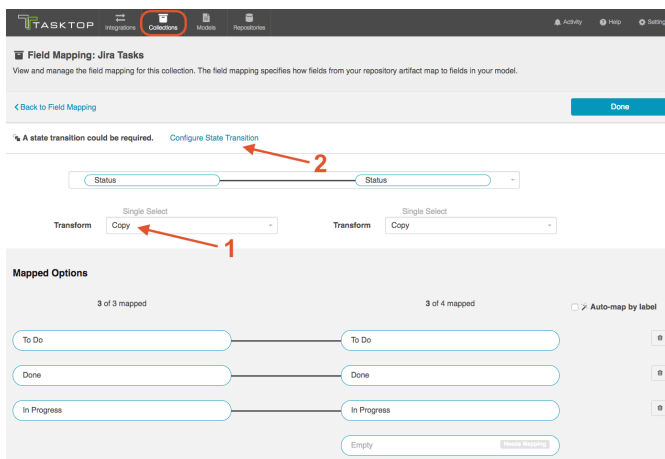
There are a few specific scenarios that will require additional configuration

### State Transitions

Some repositories require that a state transition be performed in order to update the value of certain fields (for example, when an artifact must move from a status of *New* to *In Progress* to *Closed*, but cannot move directly from *New* to *Closed*). If this is the case, you'll notice that the transform on the left for this field defaults to 'None.' that is because Tasktop is unable to update that field, unless a state transition has been configured in Tasktop.

If you'd like to configure state transitions for that field, make sure that the field is mapped to the model, and then manually update the transform on the repository side (on the left) to 'Copy.' Once the transform is updated, you'll see that the 'Configure State Transition' link appears.

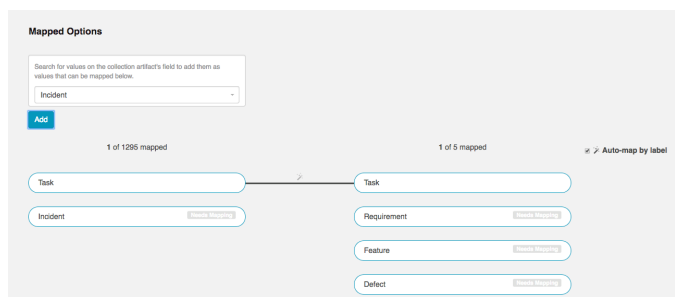
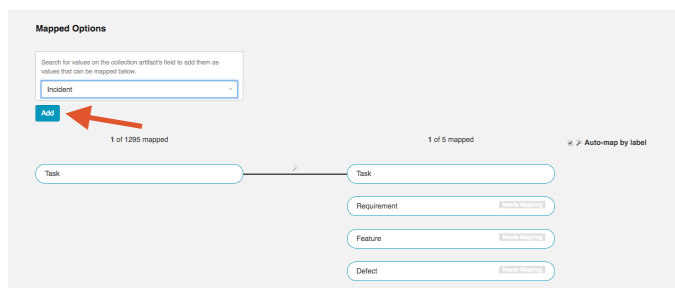
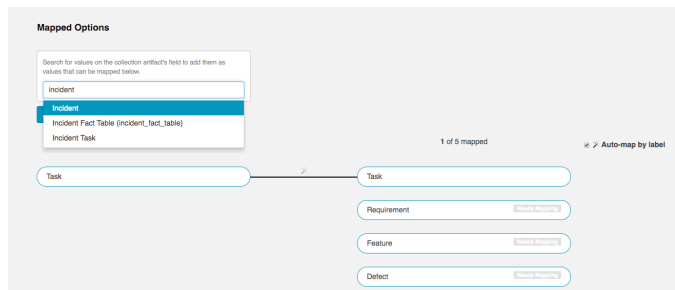
You can learn more about how to configure the state transition on the [State Transitions](#) page.



### Single- or Multi-Select Fields with 25+ Possible Values

If you are mapping a single- or multi-select field that contains over 25 values, you will notice that a search box appears. This is to aid in performance and usability of the Field Configuration screen when mapping a large number of values.

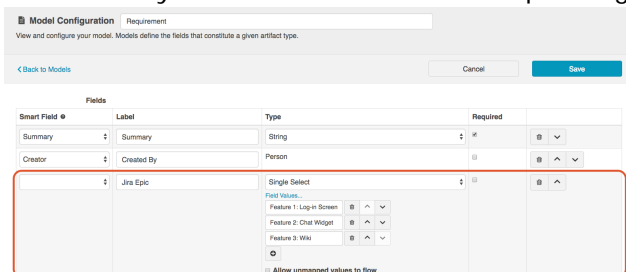
Simply search for the field value you would like to map, and then click 'Add.' This will add it to the mapping canvas, so that you can map those fields as you normally would.



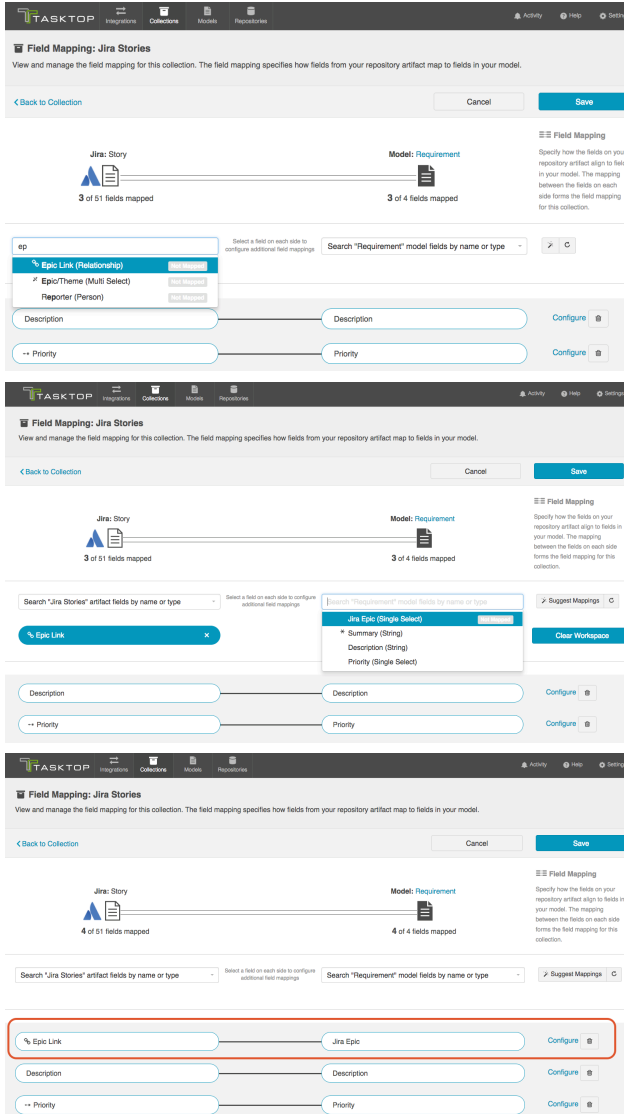
## Relationship to Single-Select Transform

If desired, you can map a relationship on your source artifact to a single-select field on your target artifact. For example, you may wish to write the Jira Epic-link (relationship) to a custom single-select field in QASymphony qTest Manager. In order to do that, you will need to map a relationship field in your source collection to a single-select field in your model.

1. Ensure that your model includes a corresponding single-select field for the mapping



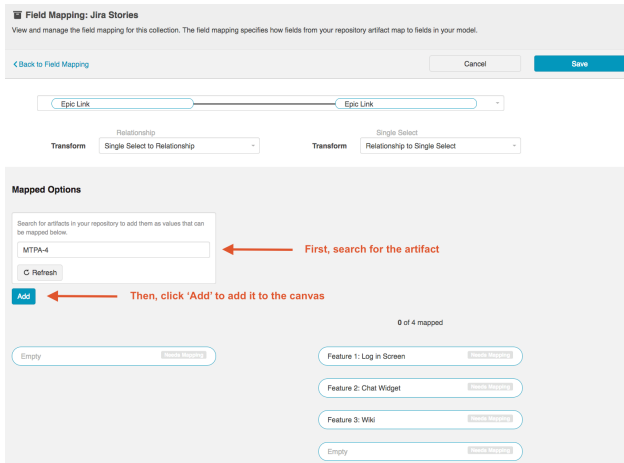
2. In the source collection, click on 'Map Fields,' and create a mapping from the collection's relationship field (Epic-Link in this example) to your model's single-select field.



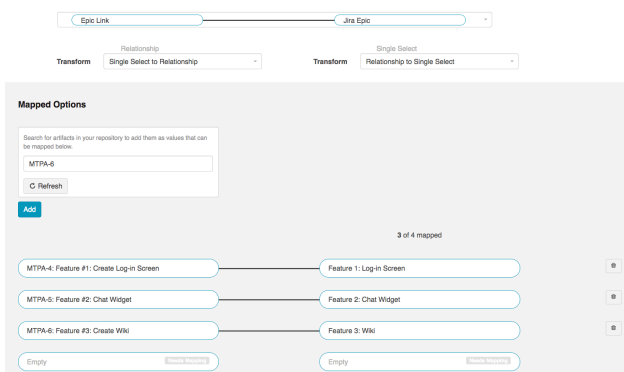
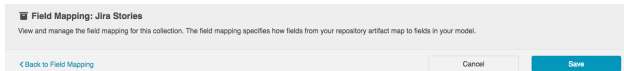
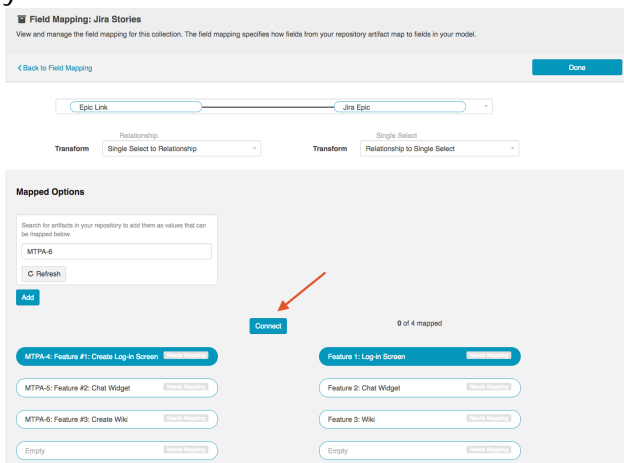
3. Once the fields are mapped, click the 'Configure' link on the right side
4. Here you can search for the related Epics by their **formatted ID**, and click 'Add' to add them to your canvas.

Note: if the artifact you are looking for has recently been created in your repository, click the

'Refresh' button to refresh the artifacts that Tasktop is aware of. This will enable Tasktop to find that artifact.



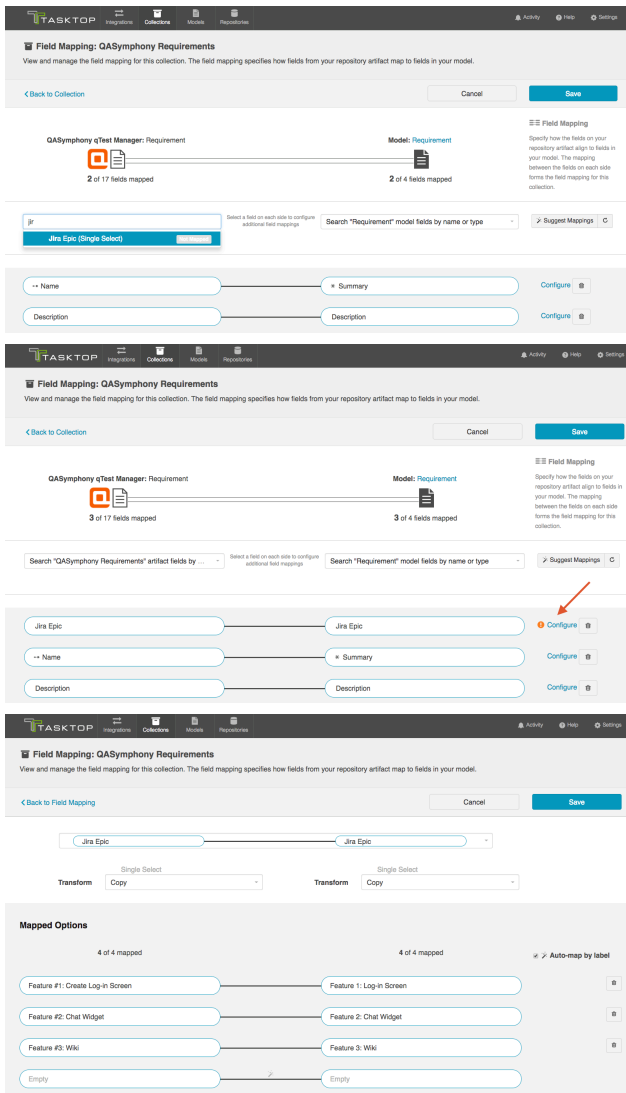
5. Once the related Epics are added to the canvas, map them to the available single-select fields in your model.



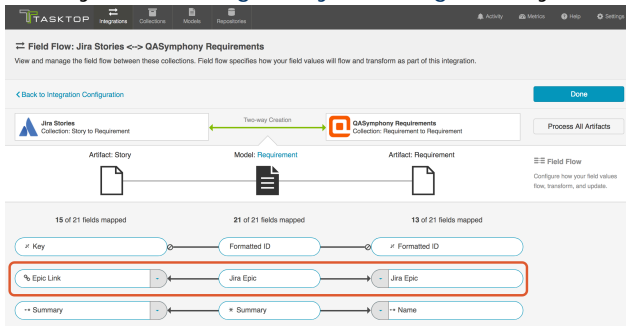
6. Click 'Save' and 'Done.'

7. Navigate to your target collection

8. Map the target collection field to the single-select field in your model. Click configure to map the field options.



9. Once you've configured your integration, your completed Integration Field Flow will look like this:



10. When you run your integration, the single-select in your target repository will be updated based on the epic link (relationship) in your source repository.

11. Here's the original user story in Jira. You can see that its Epic Link (a relationship to an associated Epic artifact) has flowed to the 'JIRA Epic' field (a single-select field) on the QASymphony qTest Manager requirement:

The screenshot shows a JIRA issue page for 'Manual Test Project A / MTPA-7' with the title 'Create Main Log-in Screen'. The 'Details' section includes: Type: Story, Priority: Major, Labels: None, Epic Link: Feature #1: Create Log-in Screen (circled in red), Status: TODO (View Workflow), and Resolution: Unresolved. The 'Description' section lists acceptance criteria: 'User can log-in', 'User can re-set password', 'User can register', and 'Page conforms to branding specifications'. The 'Properties' section shows: Status: New, Priority: Must have, Type: Functional, Target: Release/Built, Assigned to: (empty), and a description field. At the bottom, a 'JIRA Epic' field is linked to 'Feature #1: Create Log-in Screen' (circled in red).

## Next Steps

Once you have completed your [Field Mapping](#) and [Field Configuration](#), your next step will be to review your collection's [Relationship Specification](#).


## Relationship Specification

### Introduction

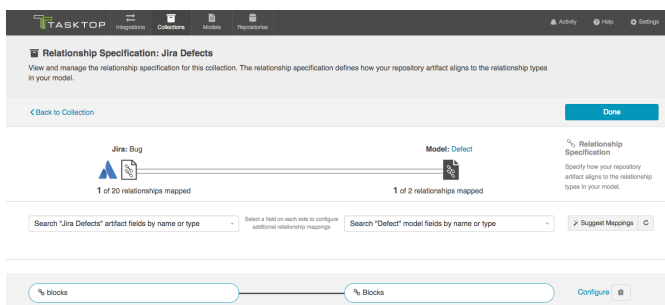
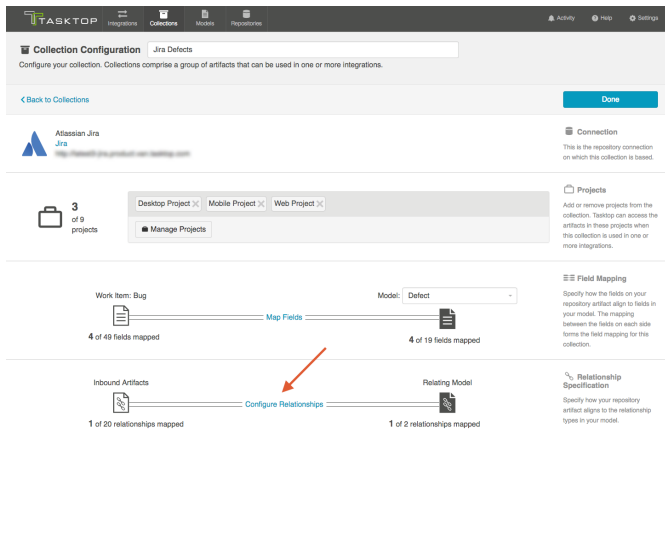
Once you've completed your [Field Mapping](#) and [Field Configuration](#), your next step is to configure your Relationship Specification. The Relationship Specification screen will allow you to specify how **relationships** **hip** fields in your repository are mapped to fields in your model. Relationship fields, such as 'blocked by,' 'is related to,' and 'parent,' enable you to preserve the relationship structure between artifacts as you flow information from one collection to the other.

### Instructions

If you have any relationship(s) fields in your model, you can map those to your collection by clicking the "Configure Relationships" link on the Collection Configuration screen.

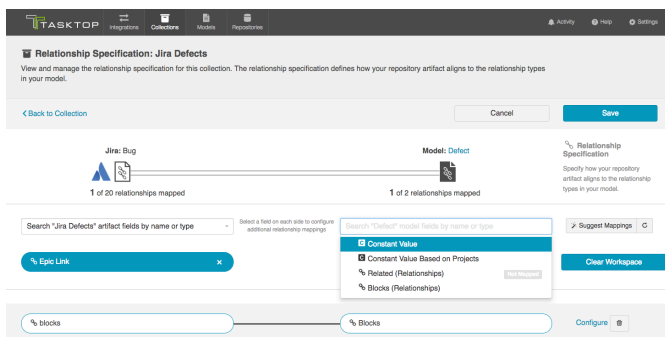
 Note that any relationship(s) types you'd like to flow as part of your integration must be mapped to **each** collection involved in the integration.





## Constant Values

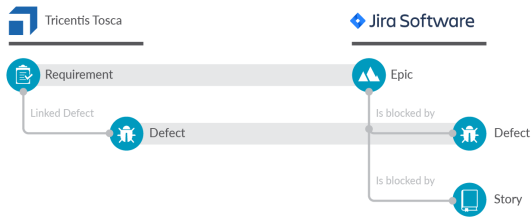
For 'relationship' type fields, you also have the option of configuring constant values. To learn more about constant values, please reference the [constant value section](#) of the Field Mapping page.



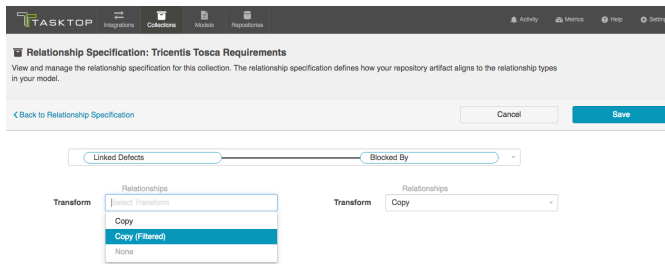
You can learn more about Artifact Relationship Management (ARM) [here](#).

## Filtered Transform

Consider this example scenario: You've mapped the Tricentis Tosca 'linked defect' relationship type to the Jira 'is blocked by' relationship type. In Tosca, the 'linked defect' relationship type can *only* link artifacts to defects. In contrast, Jira's 'is blocked by' relationship type can link artifacts to many different artifact types, such as defects, stories, or epics.



Using the Copy (Filtered) transform on the Tosca side will proactively validate the relationships so that only relationships that will be accepted by the target repository will flow. This can reduce errors in scenarios such as the one described above.



### Additional Information

You can learn more about configuring Artifact Relationship Management (ARM) within the context of a synchronization integration here:

- [Synchronizing Relationships](#)

### Next Steps

Once you have completed your Relationship Specification configuration, your next step will be to review your collection's [Person Reconciliation](#) strategy.

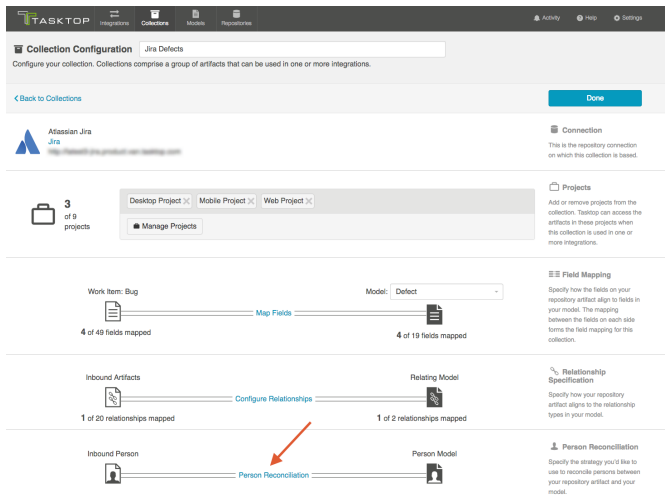
## Person Reconciliation

### Introduction

Once you have completed your [Relationship Specification](#) configuration, your next step will be to review your collection's Person Reconciliation strategy. On this screen, you will be able to specify the strategy you'd like to use to reconcile person fields between your repositories.

### Instructions

To configure Person Reconciliation, click the 'Person Reconciliation' link.



Tasktop comes with a default person reconciliation strategy ("Copy with Default Matching"), which matches based on name, ID, and/or e-mail.

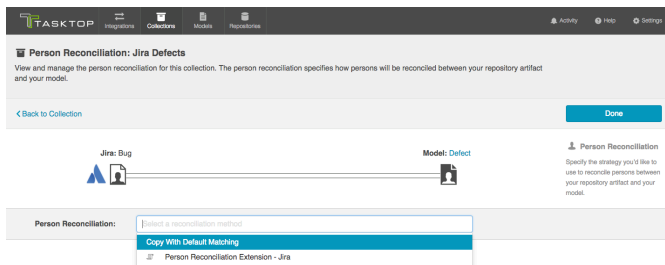
More specifically, the algorithm will compare the metadata from each side as follows:

- Username from source to username on target
- Username from source to ID on target
- ID from source to username on target
- ID from source to ID on target
- Email from source to email from target

Note that 'ID' in the steps above refers to what we refer to as the 'default' in the [Connector Docs](#).

If the default strategy does not cover your needs, you can also configure a [Person Reconciliation extension](#) on the settings screen, and select that extension here.

We recommend reviewing our [Connector Docs](#) to see each specific connector's unique fields available for Person Reconciliation so that you can better understand your specific use case.



## Next Steps

Once Person Reconciliation is complete, your next step will be to configure [State Transitions](#), if your repository utilizes state transitions or workflows. If not, your collection configuration is complete, and you can move on to [Step 4: Configure your Integration](#).

# State Transitions

## Introduction

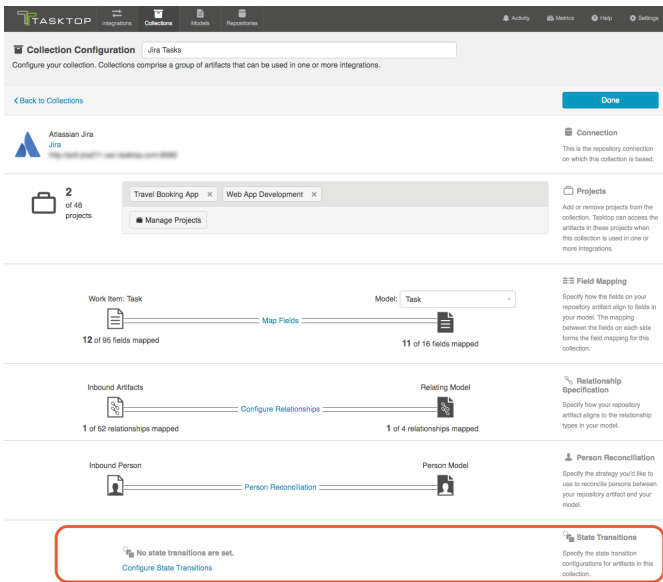
Once you've configured your [Person Reconciliation](#) strategy, your next step will be to configure State Transitions, if your repository utilizes state transitions or workflows.

Some repositories require that a state transition be performed in order to update the value of certain fields (for example, when an artifact must move from a status of *New* to *In Progress* to *Closed*, but cannot move directly from *New* to *Closed*). If state transitions are supported for your repository, you will see a State Transition sash at the bottom of the Collection Configuration screen.

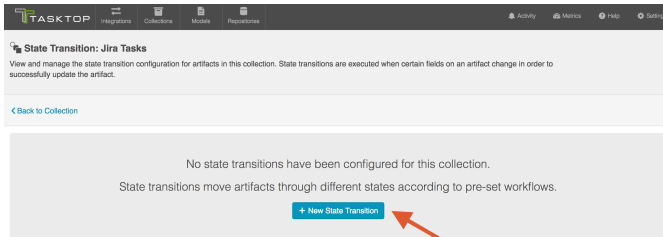
You can also review our [Connector Docs](#) to see if state transitions are supported for the repository you are connecting to.

## Instructions

If state transitions are supported for your repository, you will see a State Transition sash at the bottom of the Collection Configuration screen:



To set a state transition, click 'Configure State Transitions.' This will lead you to the State Transition screen. Click '+New State Transition.'

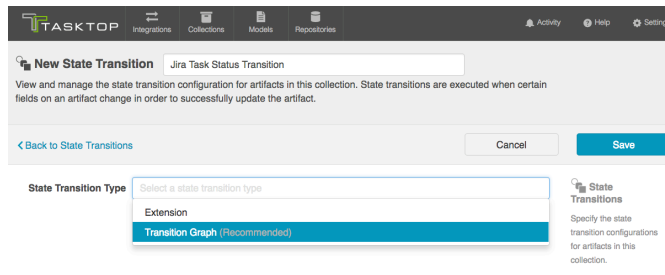


This will lead you to the New State Transition Screen. Here you can name your transition and choose between two State Transition Types:

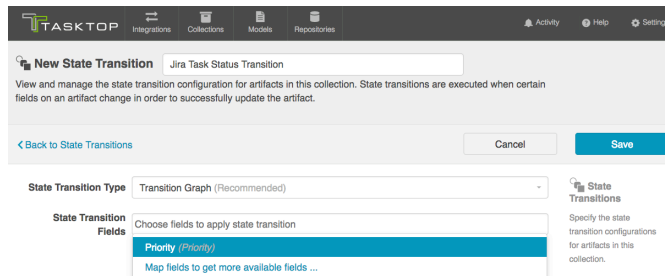
- Transition Graph (Recommended)
- Extension

### Transition Graph

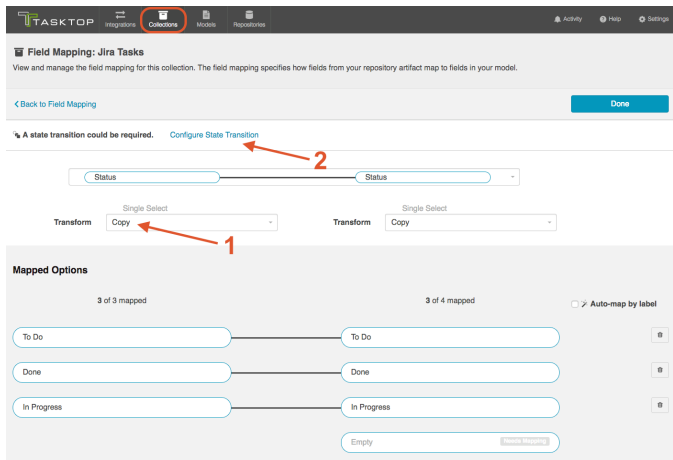
To configure state transitions within Tasktop's UI, select 'Transition Graph' as your State Transition Type.



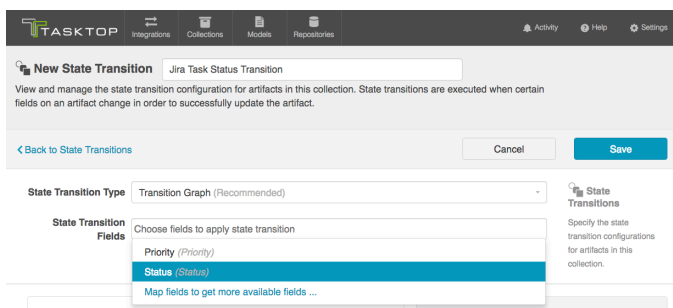
Next, you'll select the repository field you'd like to apply the transition to.



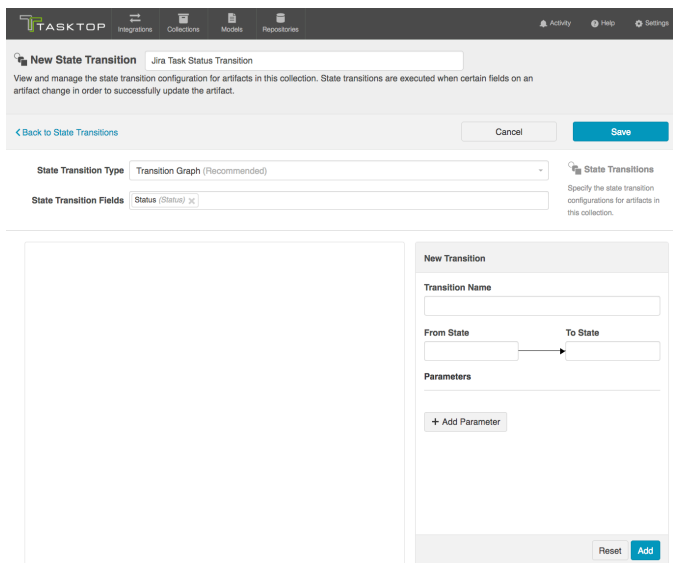
💡 If you don't see the field you'd like to utilize, make sure that the field is mapped and that its transform is set to 'copy' on the repository side. Once you set the transform to 'Copy,' you will see a 'Configure State Transition' link. Click that to return to the State Transition screen.



Now you can select that field on the New State Transition screen:



Now that you've selected your field, you'll see the Transition Configuration Panel on your screen:

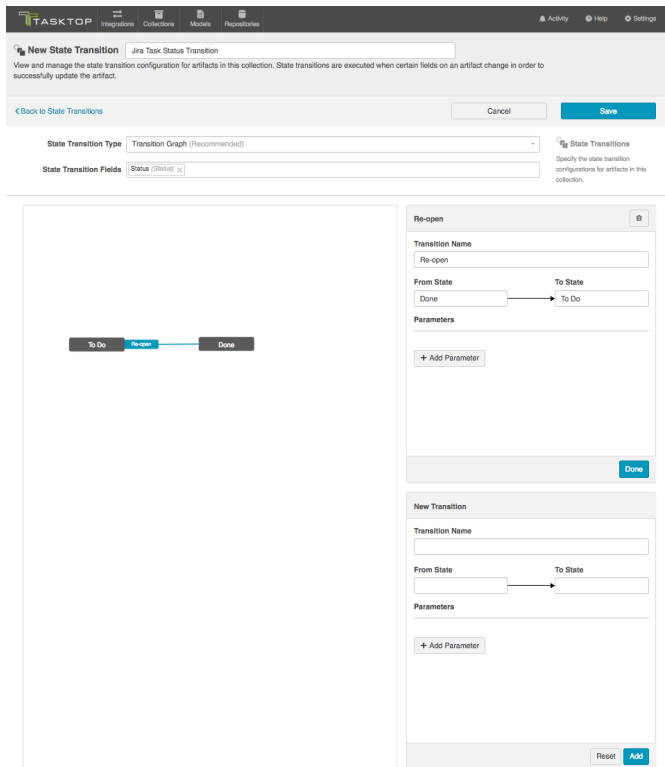


You can use the 'New Transition' pane to configure your state transitions within Tasktop's UI. In order for your integration to work, these must be configured to match the configuration within the repository itself exactly.

When entering values in the 'From State' and 'To State' fields, the values should match the values within the repository (not the model). They must be entered exactly as they appear in the repository,

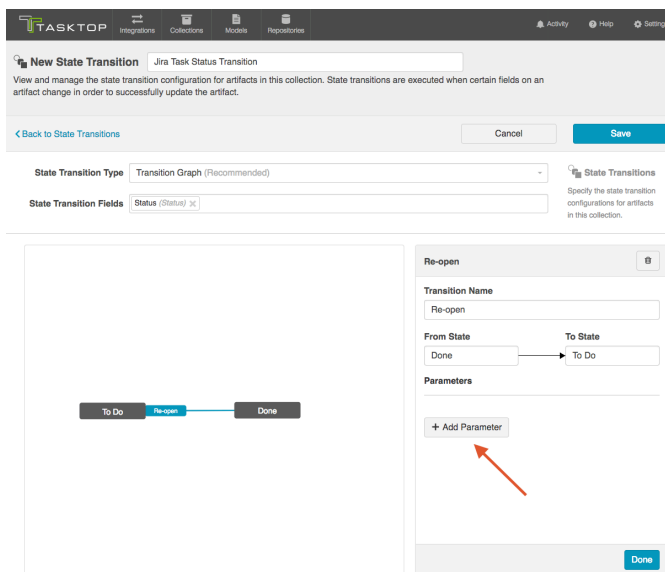
and are both case sensitive and space sensitive. The 'Transition Name' must also match the transition name that is configured within the repository exactly.

Here is an example of a transition that has been configured. Note that when you view a transition (by clicking on it in the graph), you'll see its configuration on the right so that you can make any needed modifications. You'll also see a 'New Transition' pane immediately underneath, so that you can add additional transitions.



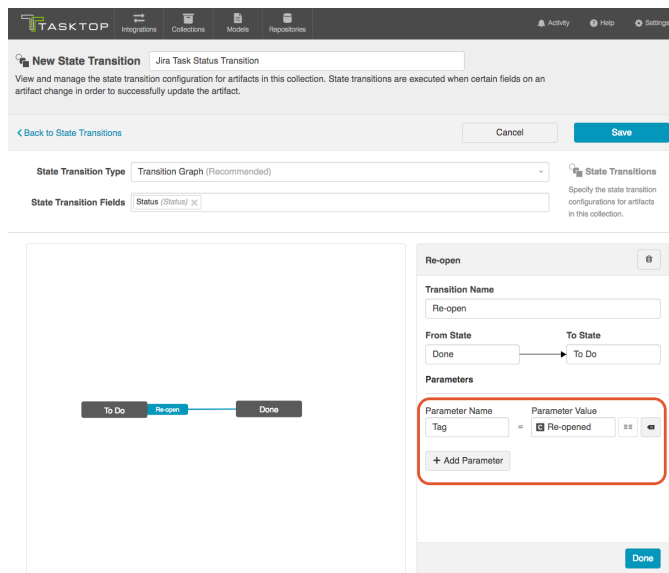
## Parameters

If your transition requires a parameter, you can add it by clicking 'Add Parameter.'

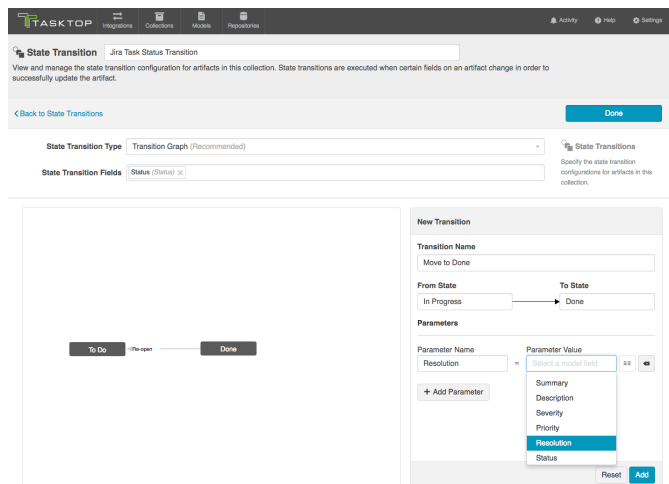


The Parameter name must match the field name within the repository exactly. You can either set a constant value for your parameter, or configure the transition to flow a value based on your field mappings.

In the image below, we've set a constant value, which will tell Tasktop to add a "Re-opened" tag to the artifact when it moves through the 'Re-open' transition:



You can also set a Parameter that is set based on a field in the model:



To map the field, you can click the 'map' icon:



**New Transition**

**Transition Name**  
Move to Done

**From State** In Progress → **To State** Done

**Parameters**

Parameter Name: Resolution = Parameter Value: Resolution

+ Add Parameter

Reset Add

This will bring you to the Parameter Option Mappings pop-up:

Parameter Name: Resolution = Parameter Value: Resolution

**Option Mappings**

Parameter Field Value:  Add

Connect

Model Field Values:

- Done
- Won't Do
- Duplicate
- Incomplete
- Cannot Reproduce

Cancel Apply

From State

Here you can manually enter the parameter field values on the left that exist within your repository, and map them to the model fields on the right. The field values entered must match the field values that exist in the repository exactly (they are case- and space-sensitive).

Parameter Name: Resolution = Parameter Value: Resolution

**Option Mappings**

Done Add  
Parameter Field Value

Connect

Model Field Values

- Done
- Won't Do
- Duplicate
- Incomplete
- Cannot Reproduce

Cancel Apply

Parameter Name: Resolution = Parameter Value: Resolution

**Option Mappings**

Parameter Field Value: Done

Connect

Model Field Values

- Done
- Won't Do
- Duplicate
- Incomplete
- Cannot Reproduce

Cancel Apply

Here's an example of a complete Parameter Option Mapping:

Parameter Name: Resolution = Parameter Value: Resolution

**Option Mappings**

Parameter Field Value: Done

Connect

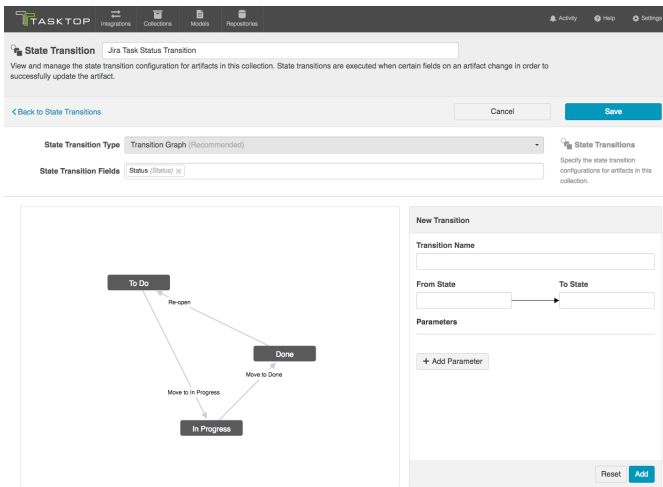
Model Field Values

- Done
- Won't Do
- Cannot Reproduce
- Incomplete
- Duplicate

Cancel Apply

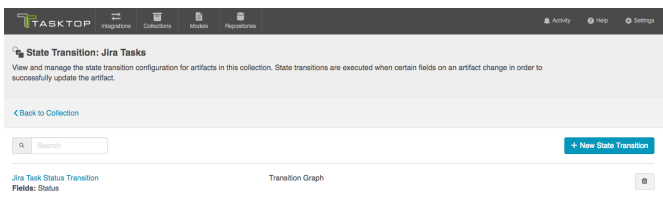
**Saving and Viewing**

Here's an example of a completed Transition Graph:

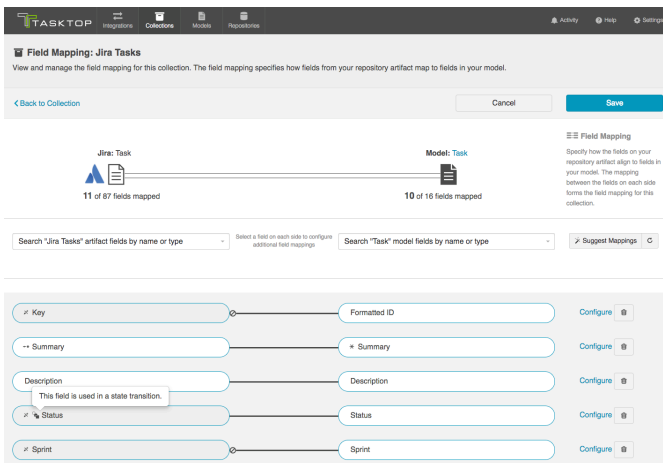


Make sure that your completed graph matches the state transition configuration in your repository exactly. If it does not match, you will see errors when running the integration. Once confirmed, click 'Save' and 'Done.'

You will then be able to see your State Transition on the State Transition screen:



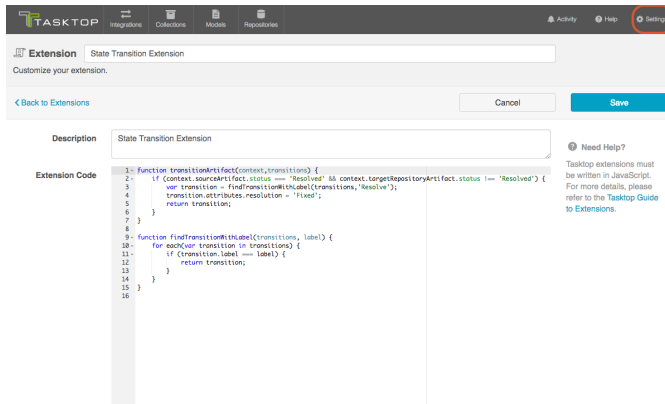
You will also notice a state transition icon on the collection pill on the Field Mapping screen, to denote that a transition graph is being utilized:



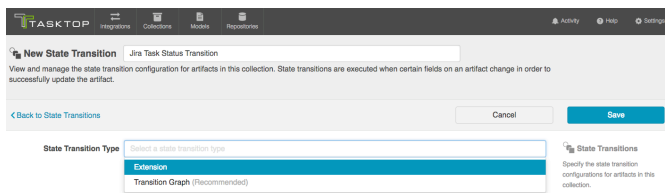
## Extensions

In order to successfully flow field values for fields that require state transitions, a state transition extension can also be set.

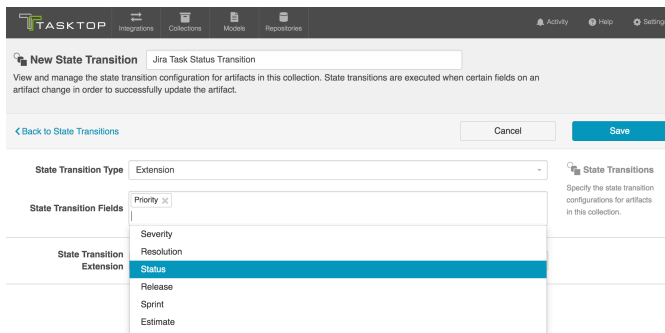
If you choose to configure state transitions via an extension, rather than utilizing the transition graph, your first step will be to create and save the extension itself from the [Settings](#) screen. If you need help creating the extension, you can find more information in the [Extensions](#) section.



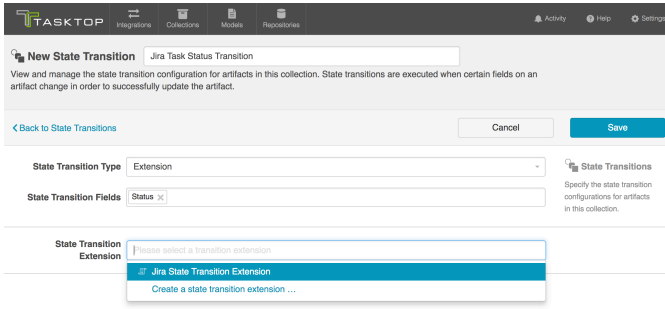
Once the extension is configured, you can select 'Extension' as the State Transition Type on the New Transition Screen:



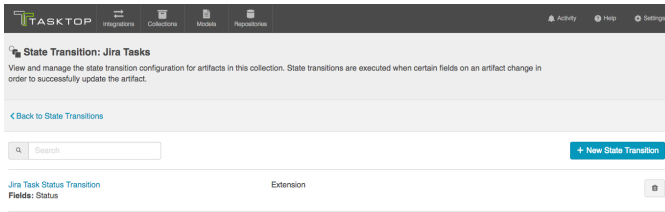
Next, select the model field(s) that you'd like to apply the extension to:



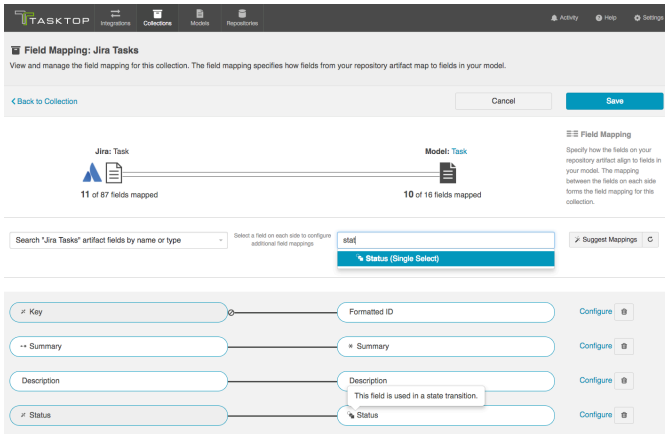
You can then select the extension you'd like to use:



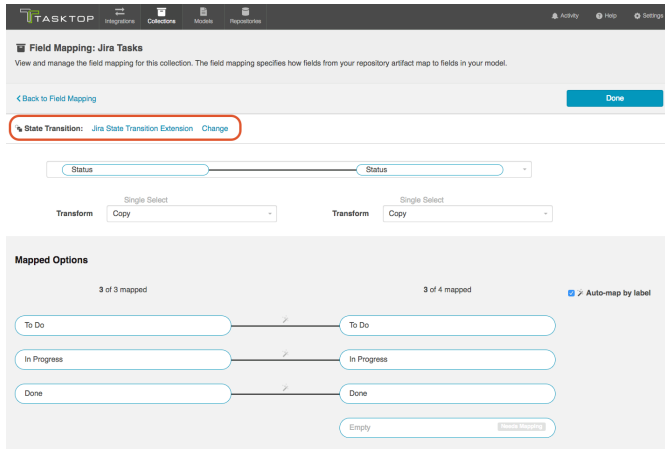
Click 'Save' and then 'Done.' You'll now see the State Transition Extension listed on the State Transition screen:



And you'll notice the state transition icon on the model pill and the model drop-down on the Field Flow page:



You'll also see it listed at the top of the screen when you view the Field Mapping Configuration screen for that field:



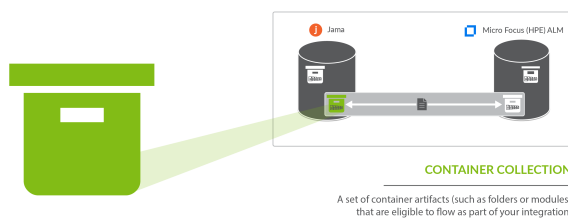
💡 Note that the extension will only impact how data flows *from* the model to the repository (Jira in this case). If you would like impact how data flows from the repository to the model (and then to whichever target collection is connected on the other side), you will need to [configure the field appropriately](#). If you would like to use a state transition extension on the other side, you must configure that on the corresponding collection's State Transition screen.

### Next Steps

Now that your State Transitions are configured, your collection configuration is complete. Once all the collections you'd like to utilize in your integration are set up, it's time to move on to [Step 4: Configure your Integration](#).

## Container Collection (Repository)

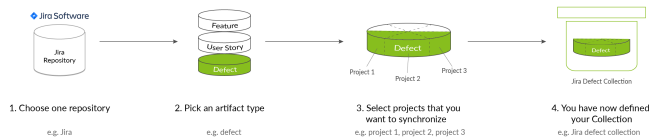
### What is a Collection?



You can think of a *collection* as the set of artifacts that are eligible to flow as part of your integration. The process of creating a collection consists of a few steps which whittle down your repository into a smaller subset of artifacts. To create your collection, you will specify:

1. The repository the artifacts live in
  1. Each collection can only come from *one* repository
2. The artifact type (i.e. defect, folder, etc)

1. Each collection can only contain *one* artifact type
3. The projects within the repository those artifacts live in
  1. Each collection can contain one or multiple projects
4. The model you would like your collection to be mapped to (not pictured)
  1. Each collection can be mapped to one and only one model



You can learn more about collections in the [Key Concepts](#).

### What is a Container Collection?

There are two types of repository collections:

- **Work Item Collections**, which include 'work items' used to track development work. These are artifacts such as defects, requirements, or test cases.
- **Container Collections**, which include 'containers' used to organize your work. These are artifacts such as folders, modules, and packages. Containers are used to organize work items into groups.

On this page, we will be showing you how to configure a **Container Collection**.

### Video Tutorial

Check out the video below to learn how to configure a Container Collection.

### How to Configure a Container Collection

The steps to configure a Container Collection are very similar to the steps to configure a [Work Item Collection \(Repository\)](#). Please refer to that page for in depth instructions.

You will, however, notice a few key differences:

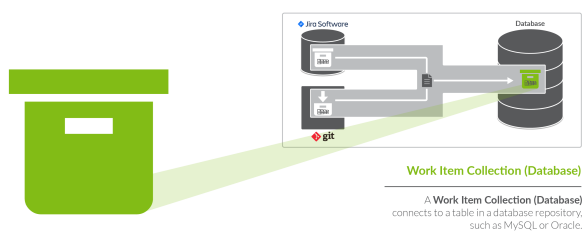
- After clicking "New Collection," you will select *Container Collection*, instead of *Work Item Collection*.
- The artifact type selected for a container collection, must be a **container**, such as a folder, module, or package. Some repositories may be ineligible for container collections, as they may not include the appropriate artifact types. Consult our [Connector Docs](#) to see which container types are supported for each repository.
- When you create a container collection, you'll notice that the model selected defaults to the out-of-the-box Container model. This will allow you to take advantage of built-in Smart Fields, which will auto-map to your collection.
- Container collections will typically have fewer fields to map than a work item collection.

- It is generally very important to map the 'parent' field for a container collection. This will enable you to preserve the correct hierarchical relationships between your containers when flowing them to a target repository. If you are using the out-of-the-box Container model, Tasktop will be able to auto-map this for you in most scenarios.
- Container collections typically will not contain a 'status' field, and therefore will not require state transition mappings.

## Work Item Collection (Database)

*Database Collections are only available in Editions that contain the Enterprise Data Stream add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality.*

What is a Work Item Collection (Database)?



There are two types of Work Item Collections: Repository Collections, which connect to repositories like *JIRA* or *HPE ALM* and Database Collections, which connect to databases, such as *MySQL*. On this page, we will be teaching you how to configure a database work item collection.

A Database Work Item Collection connects to a table in a database repository, such as *MySQL* or *Oracle*. Once your Database Work Item Collection is configured, you can flow information from artifacts in your source collections (either Repository or Gateway Collections) to that table, via an Enterprise Data Stream Integration.

You can learn more about collections in the [Key Concepts](#).

### Video Tutorial

Check out the video below to learn how to create a new collection for your database repository:

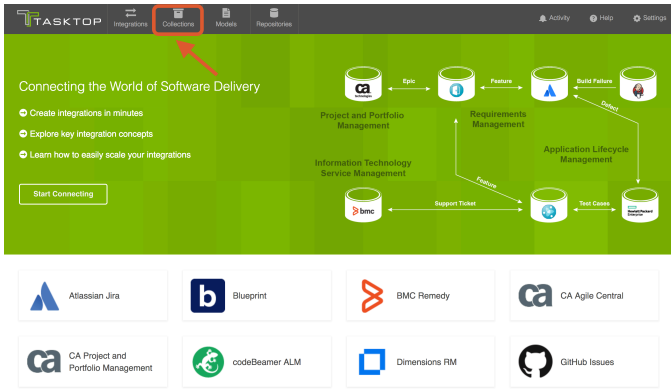
💡 *Note: In version 18.1 and later, you will select 'Work Item Collection' as your template, rather than 'Repository Collection' as shown in the video.*

### How to Create a Database Collection

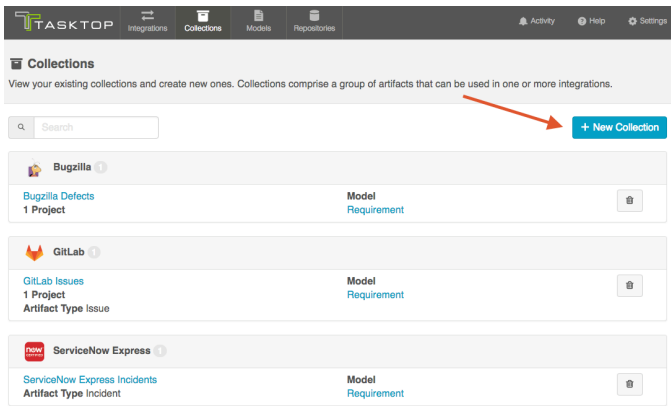
To create a database work item collection, follow the steps below:

Select 'Collections' at the top of the screen:

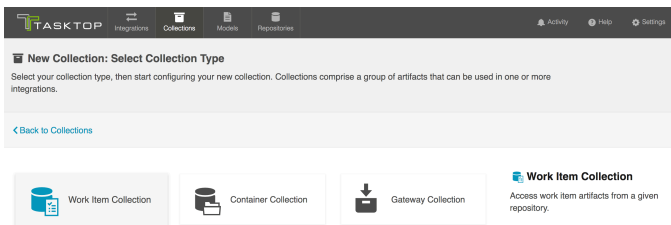




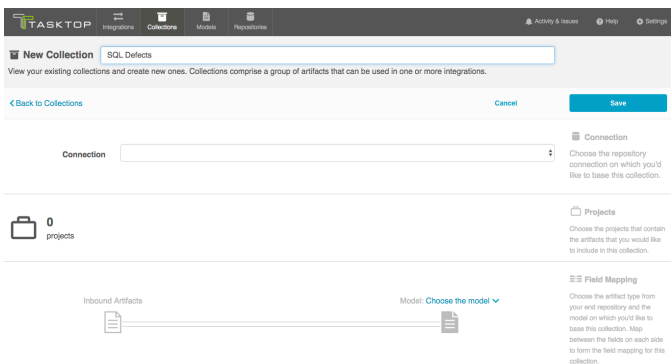
Click 'New Collection':



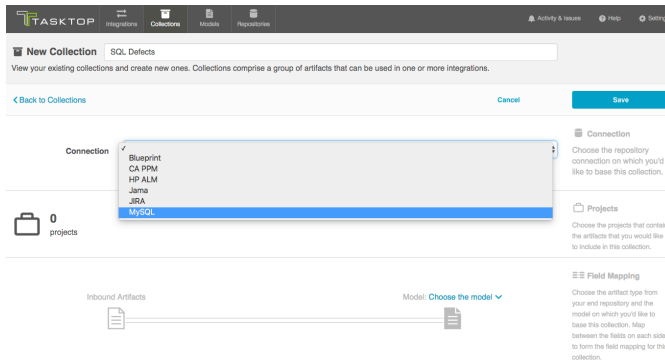
Select 'Work Item Collection' as the collection type:



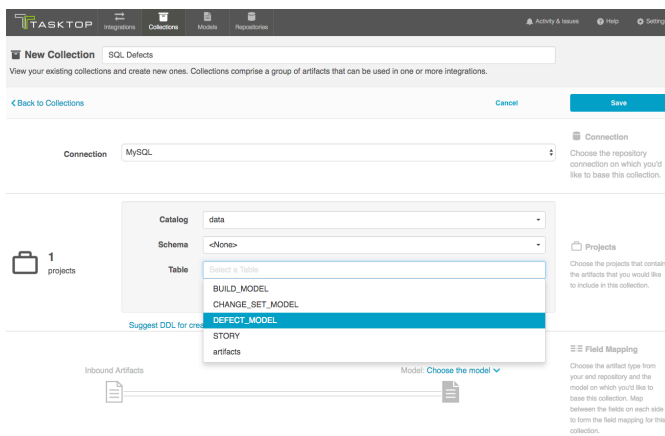
Enter a name for your collection:



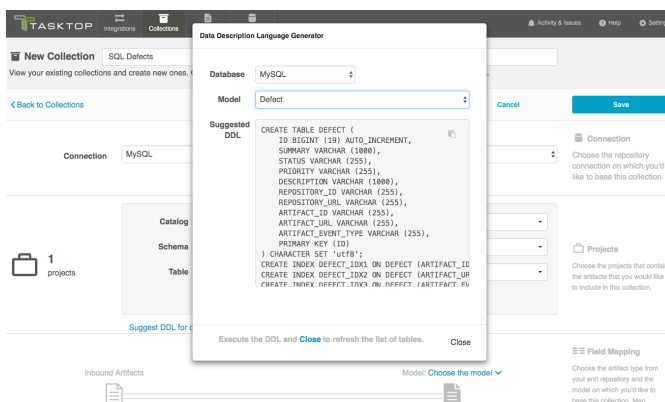
Select the Connection on which you'd like to base this collection. In our example, we are selecting MySQL, which is the 'Tasktop SQL' repository connection we have configured.



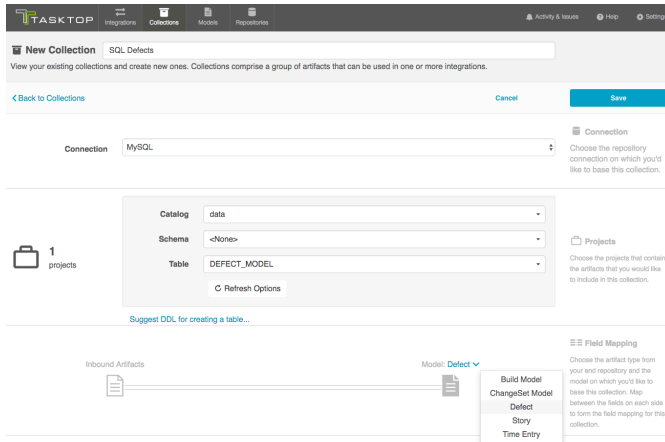
Select the database table that will receive artifacts that flow to this collection.



Note: if your table is not listed, you can use the "Suggest DDL" tool to generate a SQL command that can help you create a table that aligns with the model on which you'd like to base this collection.




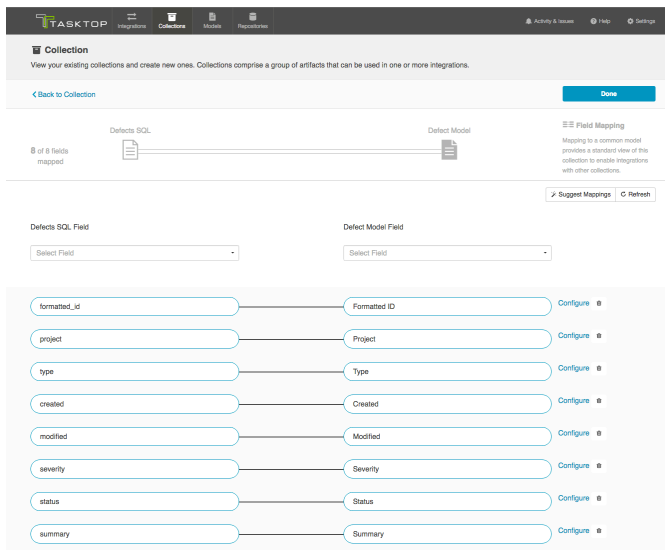
Select the model on which you'd like to base this collection.



## Map Fields

Now that you have identified the model, you can complete the collection-to-model field mapping by going into the "Map Fields" link.

 **Note:** If you used the Suggest DDL tool to create your database table, the mapping will be done automatically.



## Constant Value Mapping

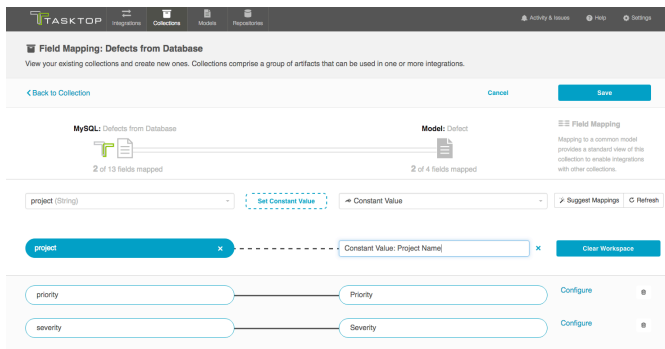
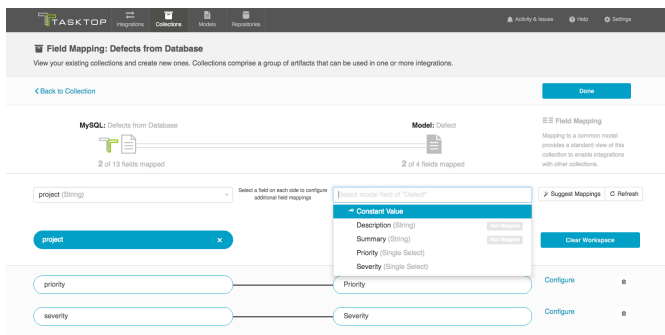
In some scenarios, the database might require that some of its columns/fields always have a value. This value is usually provided by mapping it to the equivalent model field. When there is no equivalent field in the model that can provide a value, you can set a constant value into your end-database column /field. The value you configure will then always get written out.

To set a constant value for a field, select the 'Constant Value' option from the drop down menu on the model side. This will tell the integration to *always* flow that value to the database collection. Enter the value, and then click the 'Set Constant Value' box.

Note: Constant values can be set for the following fields types:

- Boolean
- Date/DateTime
- Double
- Location
- Long
- Multi Select
- Person
- Rich Text
- Single Select
- String

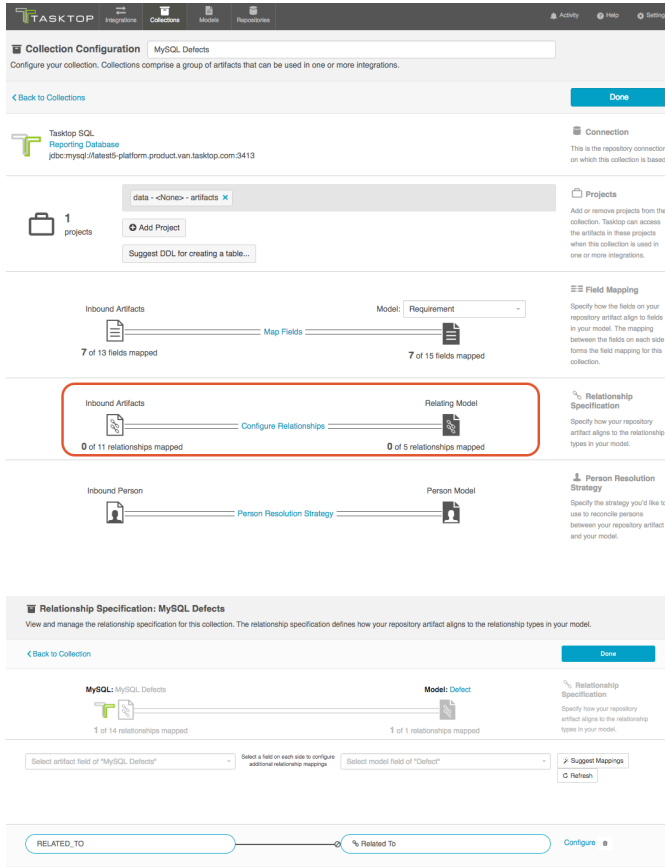
Only some of these types are relevant for your database collection, however, given the field types that can be configured in the database itself.



## Configure Relationships

If you have any relationship(s) fields in your model, you can map those on the "Configure Relationship Types" screen of a given collection.

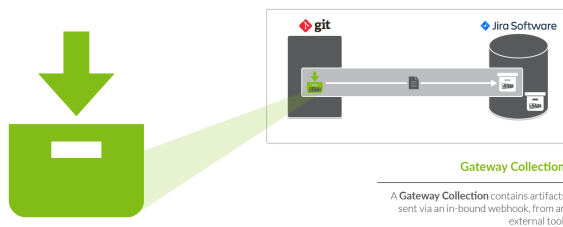
Note: if you used the Suggested DDL tool to create your database table, the mapping should be done generally.



## Gateway Collection

What is a Gateway Collection?

*Gateway Collections are only available in Editions that contain the Gateway add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality.*



You can think of a *collection* as the set of artifacts that are eligible to flow as part of your integration. A **gateway collection** contains artifacts sent via an in-bound webhook, from a DevOps tool.

You can learn more about collections in the [Key Concepts](#).

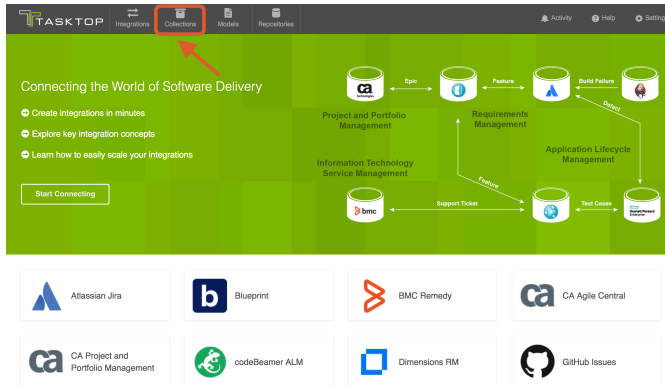
### Video Tutorial

Check out the video below to learn how to create a new gateway collection:

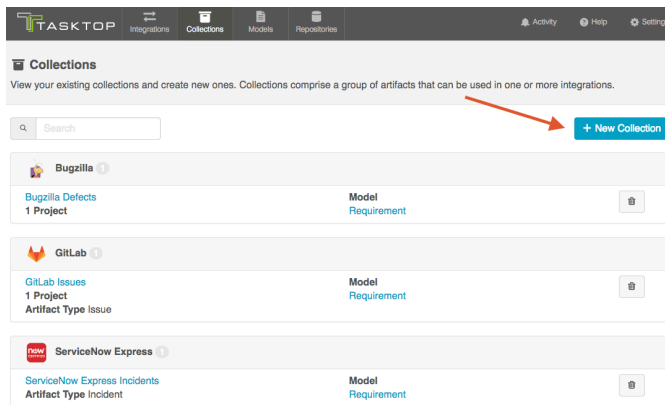
## How to Create a Gateway Collection

To create a gateway collection, follow the steps below:

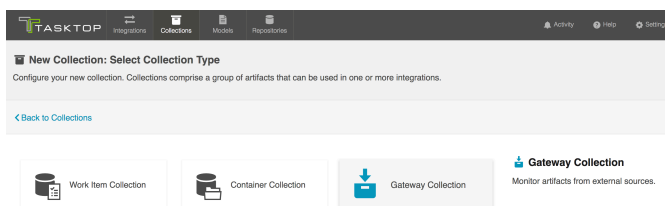
Select 'Collections' at the top of the screen:



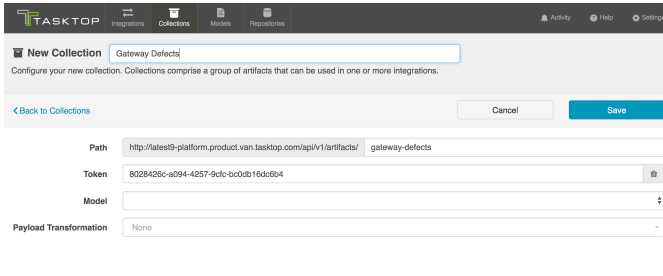
Click 'New Collection':



Select "Gateway Collection" as the collection type.

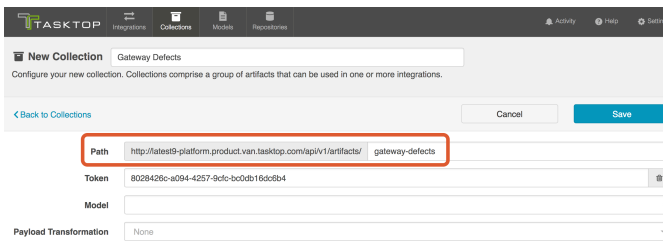


Enter a name for your collection.



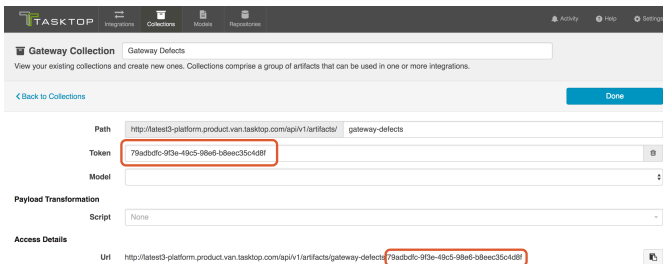
Next, specify the *path* for your collection. These characters will form the REST endpoint to which you can send artifacts to Tasktop via this gateway collection.

💡 Upon first creating your gateway collection, Tasktop will populate path with the name that you have given to your collection. You can change this if desired.

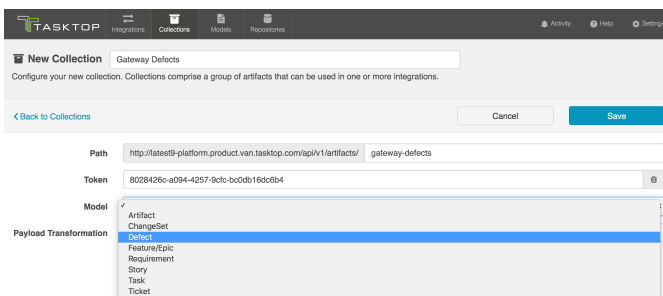


To **secure your gateway collection**, Tasktop automatically appends a token (a universally unique identifier) to the path of a gateway collection. This token will be incorporated into your gateway URL and will help ensure that only users that know the full path with its token can access your gateway collection.

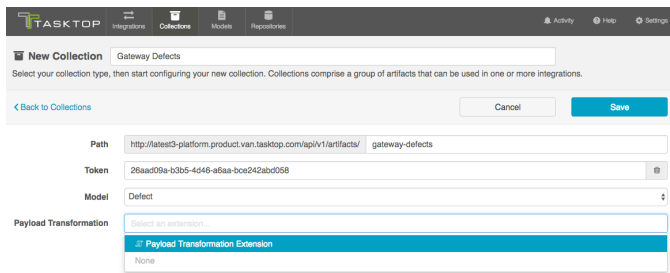
You can remove the token by clicking the trash can icon to the right, and refresh it by hitting the magic wand icon that appears in its place. Once refreshed, click 'save,' and the URL will be updated.



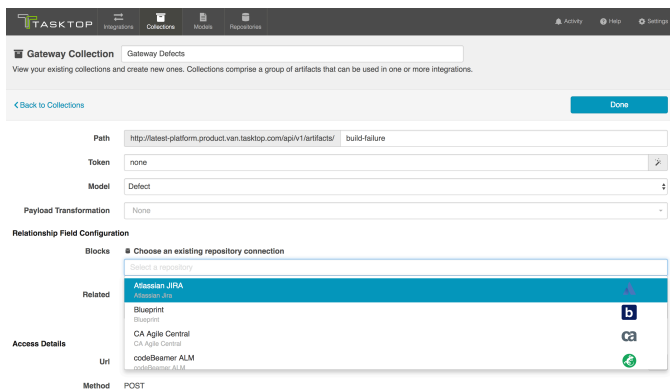
Select the model on which you'd like to base the collection:



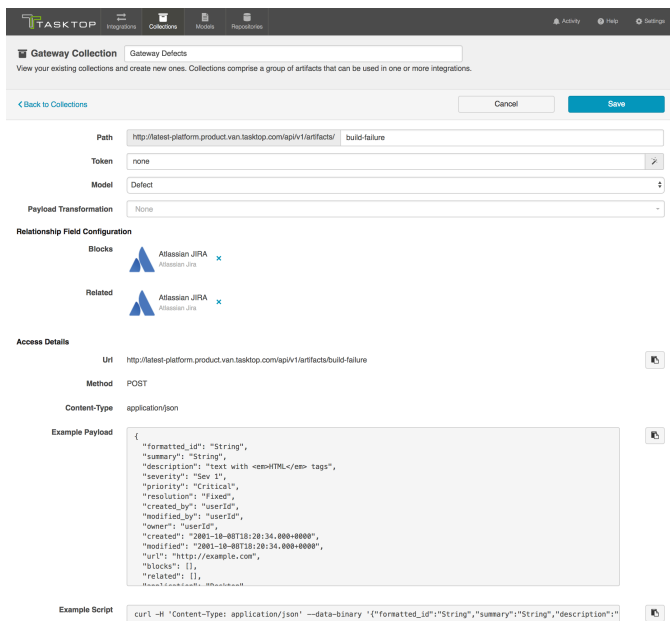
If you have configured a [payload transformation extension](#) for your gateway collection on the Settings screen, you can select it here.



Once you click 'Save,' you'll notice that some additional fields appear. If you have any relationship(s) fields in your model, you'll need to identify a target repository for each. This will ensure that enough information is being sent in via the gateway to uniquely locate the artifact you'd like to relate to.



Once you've saved your collection, you will be able to observe the access details given for this gateway collection:



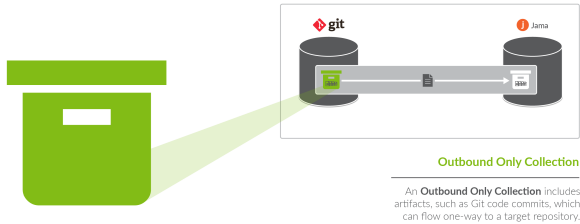


# Outbound Only Collection

What is an Outbound Only Collection?


*Outbound Only Collections are only available in editions that have access to the Git repository.*

Step 3: Create Your Collection(s)



You can think of a *collection* as the set of artifacts that are eligible to flow as part of your integration. An **outbound only collection** contains artifacts like code commits or changesets, which you may want to flow out of your repository, but which would not receive updates into your repository.

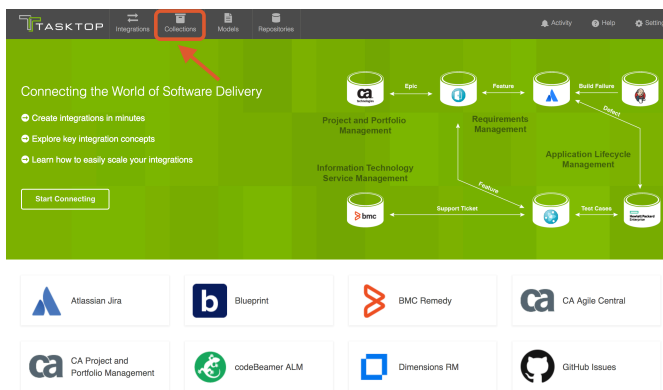
You can learn more about collections in the [Key Concepts](#).

 Note: Outbound Only collections can connect to the Git repository only. You can learn more about configuring that repository in our [Connector Docs](#).

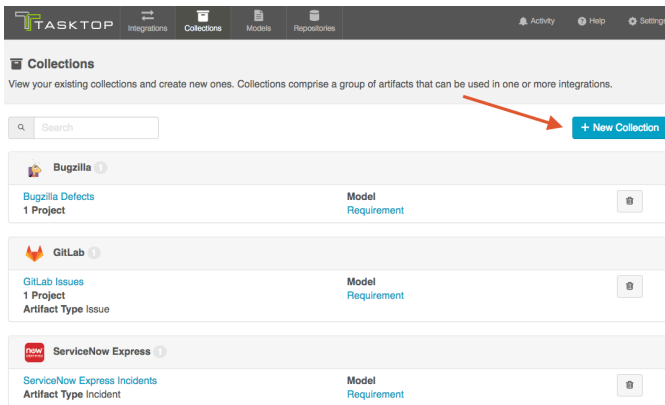
## How to Create an Outbound Only Collection

To create an outbound only collection, follow the steps below:

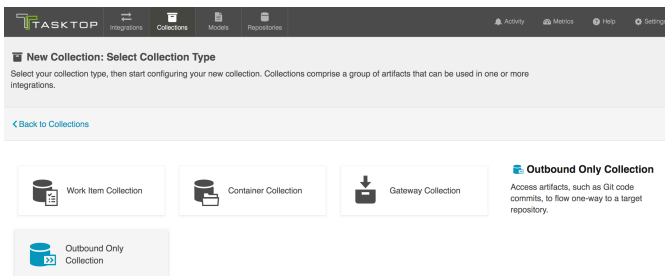
Select 'Collections' at the top of the screen:



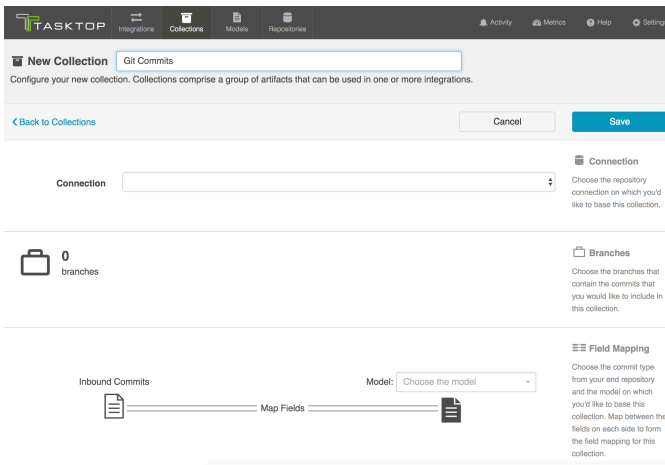
Click 'New Collection':



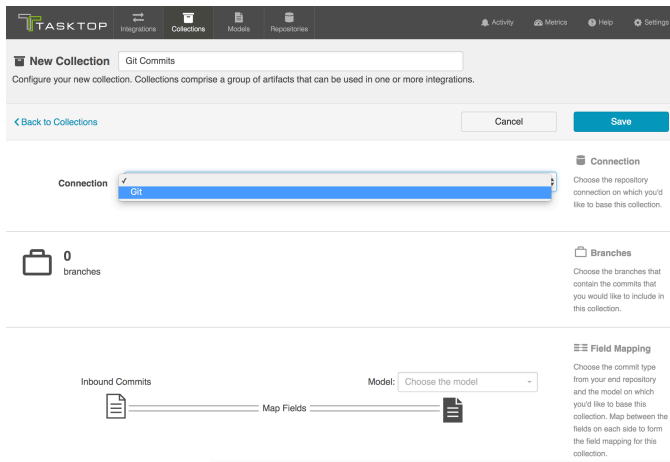
Select "Outbound Only Collection" as the collection type



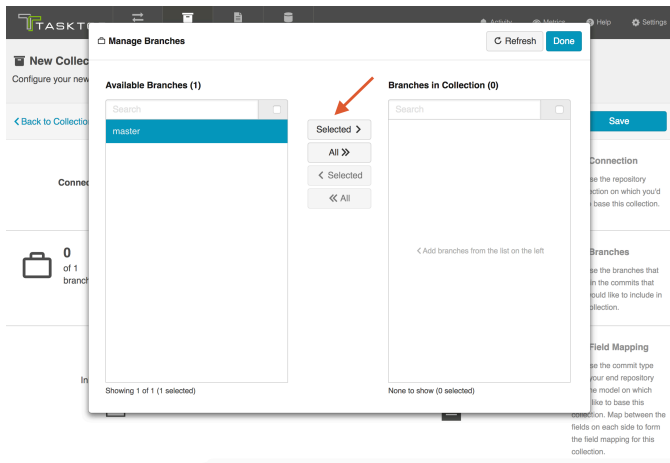
Enter a name for your collection.



Select the repository that you would like to connect to. The Outbound Only collection type can only connect to the Git repository. The collection will include artifacts from the repository you have selected.



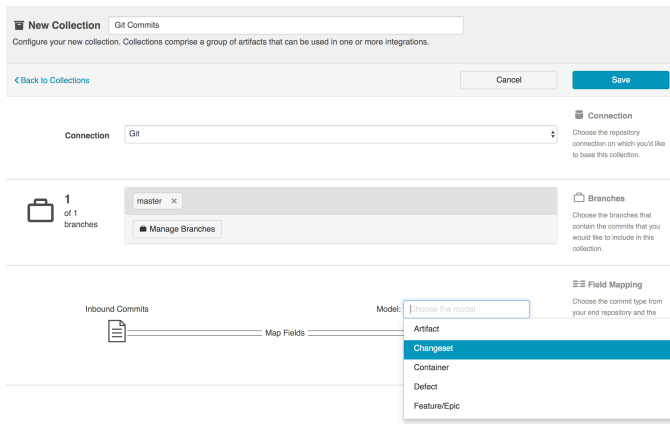
Add branches to your collection by selecting 'Manage Branches'. These are the branches from which Tasktop will be flow code commits, changesets, or other artifacts.



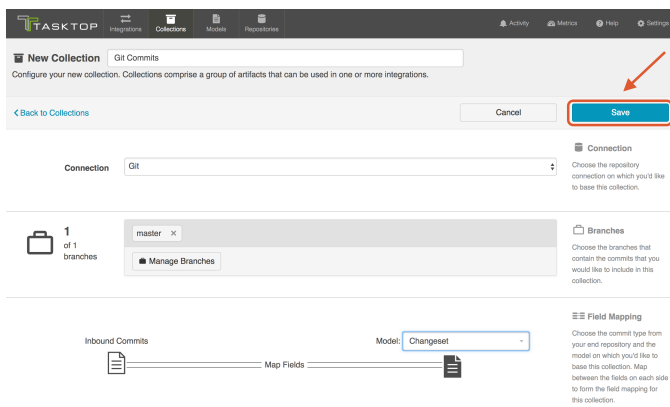
Select the model you'd like to use for this collection. If available, choose the Changeset model. We recommend ensuring that your model contains the following fields:

The screenshot shows the 'Model Configuration' page for the 'ChangeSet' model. It features a table with the following columns: Smart Field, Label, Type, and Required. The table lists various fields used in the model configuration.

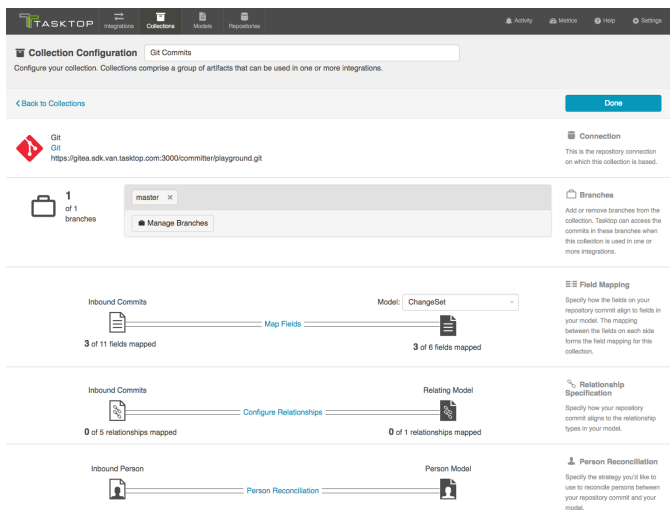
Smart Field	Label	Type	Required
Formatted ID	Formatted Id	String	<input type="checkbox"/>
Created	Created	Date Time	<input type="checkbox"/>
Creator	Created By	Person	<input type="checkbox"/>
Summary	Summary	String	<input type="checkbox"/>
	Commit Message	String	<input type="checkbox"/>
	Short Commit Message	String	<input type="checkbox"/>
	Version	String	<input type="checkbox"/>
	FileNames	String	<input type="checkbox"/>
	Diff	String	<input type="checkbox"/>
Location	URL	Location	<input type="checkbox"/>
	Issue ID	String	<input type="checkbox"/>



Click 'Save.'



Once you save, you'll see a number of configuration panels appear.



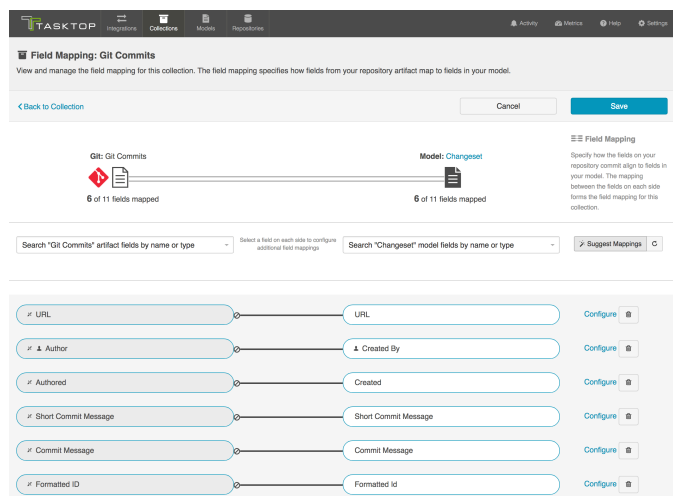
## Map Fields

Clicking 'Map Fields' will take you to the Field Mapping screen. On this screen, you will be able to specify how fields in your repository are mapped to fields in your model. You'll notice that for an

Outbound Only collection, fields can only flow in one direction: out of your collection, and into your model. This mapping will determine how information flows from fields in your source collection to fields in your target collection.

You can learn more about the Field Mapping screen [here](#).

Here's an example field mapping configuration for a Git Commit collection:



### **Configure Relationships**

Clicking 'Configure Relationships' will take you to the Relationship Specification screen. On this screen, you will be able to specify how **relationship** fields in your repository are mapped to fields in your model. Relationship fields, such as 'blocked by,' 'is related to,' and 'parent,' enable you to preserve the relationship structure between artifacts as you flow information from one collection to the other.

You can learn more about this process on the [Relationship Specification](#) page.

### **Person Reconciliation**

Clicking 'Person Reconciliation' will take you to the Person Reconciliation screen. On this screen, you will be able to specify the strategy you'd like to use to reconcile person fields between your repositories.

You can learn more about this process on the [Person Reconciliation](#) page.

### **Optional: Set a Repository Query**

If you have enabled repository queries for the repository that you have connected to, you will also see a 'Repository Query' sash at the bottom of the screen.

**⚠** Note that Repository Queries are advanced functionality, and should only be used when you are truly unable to filter as desired using the built-in Tasktop functionality of Repositories, Collections, and Artifact Filtering.

You can learn more about Repository Queries [here](#).






# Step 4: Configure your Integration

## Types of Integration Templates

Tasktop offers a range of integration templates to enable you to achieve a diverse set of goals:

## Integration Styles



Build a custom integration based on one of these integration styles.

 <p>Work Item Synchronization</p>	 <p>Container + Work Item Synchronization</p>	 <p>Create via Gateway</p>	 <p>Modify via Gateway</p>	 <p>Enterprise Data Stream</p>
<p><i>The Work Item Synchronization template is available in all Editions.</i></p>	<p><i>The Container + Work Item Synchronization template is available in all Editions.</i></p>	<p><i>The Create via Gateway template is only available in Editions that contain the Gateway add-on. See <a href="#">Tasktop Editions table</a> to determine if your edition contains this functionality.</i></p>	<p><i>The Modify via Gateway template is only available in Editions that contain the Gateway add-on. See <a href="#">Tasktop Editions table</a> to determine if your edition contains this functionality.</i></p>	<p><i>The Enterprise Data Stream template is only available in Editions that contain the Enterprise Data Stream add-on. See <a href="#">Tasktop Editions table</a> to determine if your edition contains this functionality.</i></p>
<p>This integration connects teams working in different tools as they fulfill their roles in the software development lifecycle.</p>	<p>This integration connects teams working in different tools as they fulfill their roles in the software development lifecycle.</p>	<p>This integration creates traceability between artifacts across the software development lifecycle. New artifacts will be created in a</p>	<p>This integration creates traceability between artifacts across the software development lifecycle. Already existing artifacts in a repository</p>	<p>This integration simplifies enterprise reporting by unlocking software lifecycle data from its application tool silos and providing a rich</p>

As part of this integration, work items will flow between separate repository collections.	As part of this integration, work items will flow between separate repository collections.  Additionally, the containers in which your work items reside will be mirrored across the collections according to your specification.	repository collection when artifacts are sent to Tasktop via a Gateway collection, through an inbound webhook.	collection will be located and modified in a specified way when artifacts are sent to Tasktop via a Gateway collection, through an inbound webhook.	data repository for near real-time analytics. Records will be created in a single database when artifacts from one or more collections are created or changed.
<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>	<a href="#">Learn More</a>

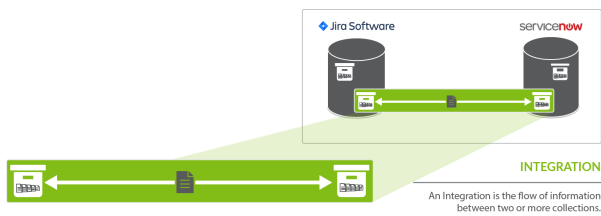
## Prebuilt Integration Patterns

Base your integration on one of these patterns to address typical business needs.

	
<b>Code Traceability: Create and Relate a Changeset</b>	<b>Code Traceability: Update an Existing Work Item</b>
<i>This integration template is only available in editions that have access to the Git repository.</i>	<i>This integration template is only available in editions that have access to the Git repository.</i>
<p>This integration creates new work items such as changesets or code commits in a repository such as Jama, when they are sent to Tasktop via a read only collection connecting to a repository such as Git.</p> <p>These types of events are “fire and forget” - they create something new in your repository, but they don’t expect anything back. As such, they don’t mandate a full-blown two way synchronization; a lighter one-way integration can do the trick.</p>	<p>This integration flows information from an outbound only collection (such as Git Commits) to a field on an existing artifact in a work item collection (such as Jama Codes).</p> <p>These types of events are “fire and forget” - they create something new in your repository, but they don’t expect anything back. As such, they don’t mandate a full-blown two way synchronization; a lighter one-way integration can do the trick.</p>
<a href="#">Learn More</a>	<a href="#">Learn More</a>

## Work Item Synchronization

## What is an Integration?




An *integration* is quite simply **the flow of information between two or more collections**.

A *work item synchronization* is a specific type of integration that flows **work items** (such as defects, requirements, or stories) between two **repositories**.

When you configure your work item synchronization, you can customize the field flow, artifact routing, artifact filtering, as well as enable or disable comment flow or attachment flow.

### Video Tutorial

Check out the video below to learn how to configure a Work Item Synchronization.

 This video assumes that you have already configured your repositories, models, and collections as outlined in the [Quick Start Guide](#).

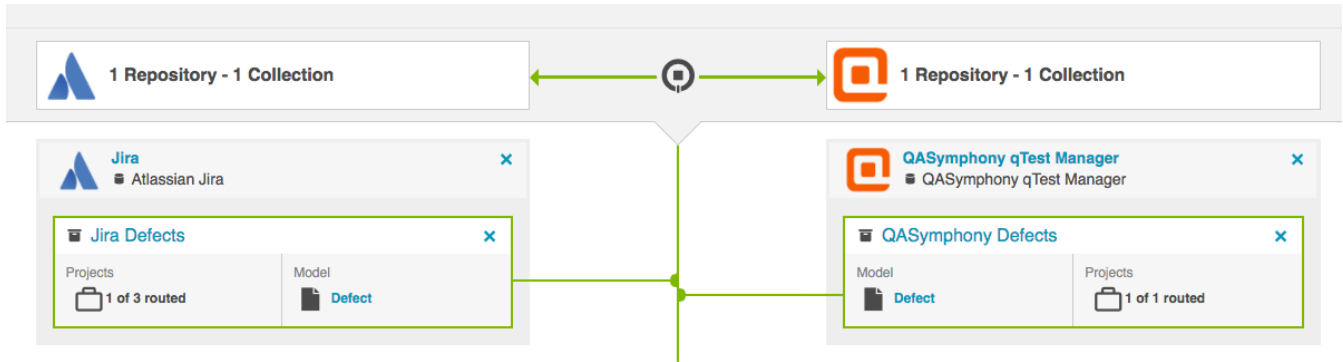
### Use Case and Business Value

The Work Item Synchronization Template connects teams working in different tools as they fulfill their roles in the software development lifecycle. It allows you to flow work items (such as defects or requirements) from one repository to the other.

As part of this integration,

- Work Items, such as defects or requirements, will flow between two work item (repository) collections.
- Artifact Creation Flow can be configured either one-way or two-way
- You'll also configure the direction and frequency in which each field on those artifacts, as well as comments and attachments, should be updated.





## Template Affordances

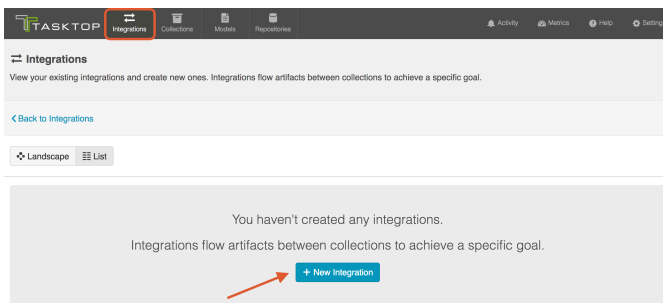
The Work Item Synchronization Template allows you to flow artifacts between two work item (repository) collections.



## How to Configure a Work Item Synchronization

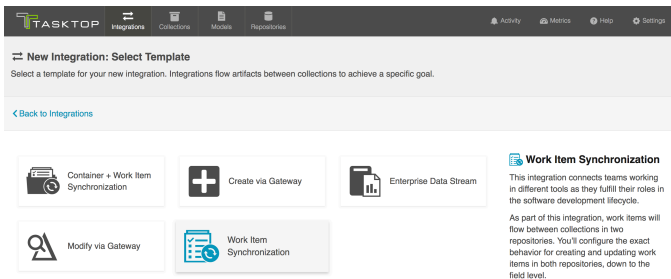
Now that you have all of your base components (i.e. repositories, models, and collections) set up, you can configure an integration to synchronize the artifacts in your collections.

To configure your integration, select 'Integrations' at the top of the screen, then click '+ New Integration.'

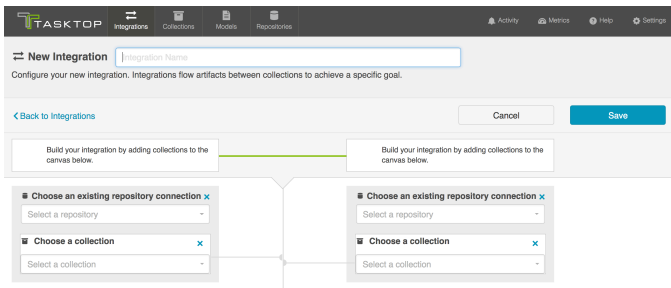


Select the Work Item Synchronization template.

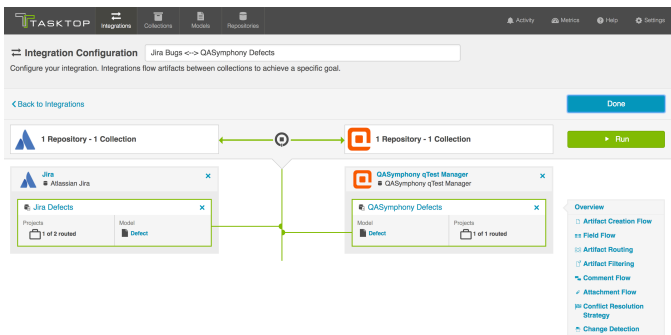
💡 Depending on the edition of Tasktop you are utilizing, you may not have all options available.



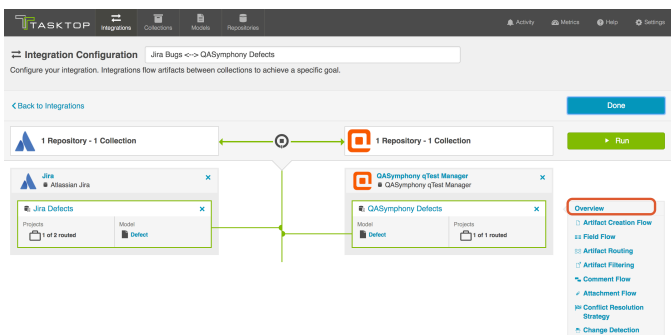
This will bring you to the New Integration Screen:

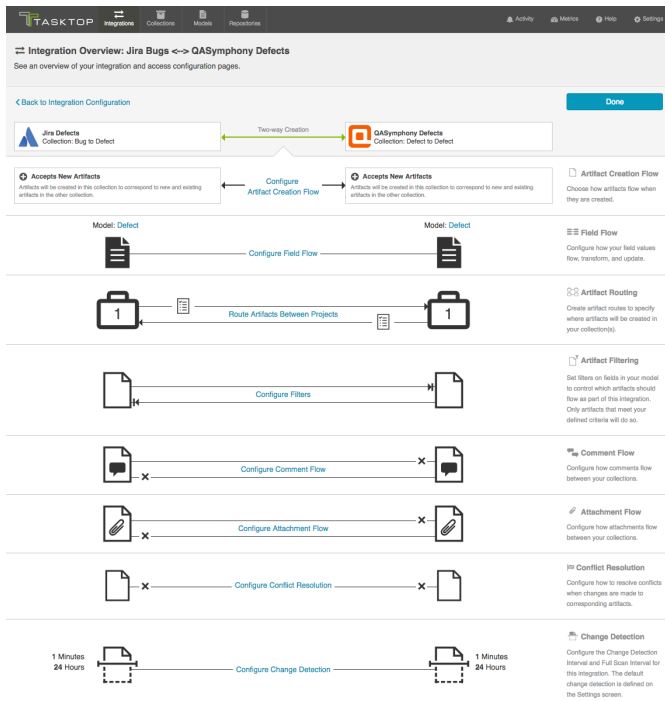


Name your integration and select your repositories and collections:



You can click the 'Overview' link on the right side of the Integration Page to get to the main display page (shown in the second screen shot).





From this page, you can configure many different components of your work item synchronization.

### **Artifact Creation Flow**

On the Artifact Creation Flow screen, you can specify whether new artifacts will be created in one collection or both. You can learn more on the [Artifact Creation Flow](#) page.

### **Field Flow**

On the Field Flow screen, you can configure how your field values will flow, transform, and update between each collection. Each field can be configured individually. You can learn more on the [Field Flow](#) page.

### **Artifact Routing**

On the Artifact Routing screen, you can specify where (in which projects) new artifacts will be created, based on the projects they originate from in the source collection. You can learn more on the [Artifact Routing](#) page.

### **Artifact Filtering**

On the Artifact Filtering screen, you can set filters on fields in your model to control which artifacts will flow as part of the integration. Only artifacts that meet your defined filter criteria will be eligible to flow. You can learn more on the [Artifact Filtering](#) page.

### **Comment Flow**

On the Comment Flow screen, you can enable or disable comment flow. You can learn more on the [Comment Flow](#) page.

## Attachment Flow

On the Attachment Flow screen, you can enable or disable attachment flow. You can also set a maximum attachment size limit. You can learn more on the [Attachment Flow](#) page.

## Conflict Resolution Strategy

On the Conflict Resolution screen, you can set a strategy to determine how to resolve conflicts when changes are made to both the source and target artifact. You can learn more on the [Conflict Resolution Strategy](#) page.

## Change Detection

On the Change Detection screen, you can set custom change detection and full scan intervals for your integration. Change Detection and Full Scan intervals define how frequently Tasktop will search for updates made to artifacts in each repository. The settings configured here will override the default global change detection settings configured on the [Settings](#) screen. You can learn more on the [Change Detection](#) page.

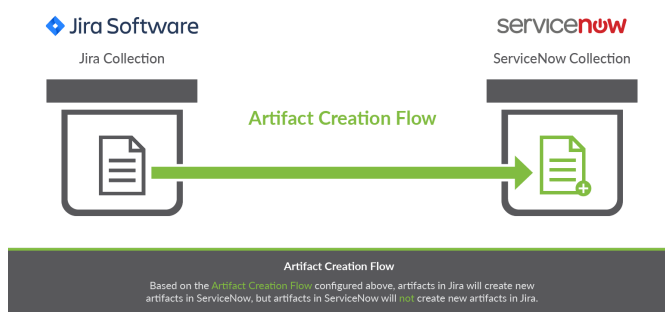
## Artifact Creation Flow

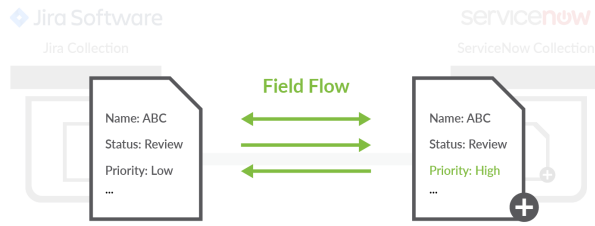
### Introduction

After saving your [Work Item Synchronization](#), the next step is to configure Artifact Creation Flow. Artifact Creation Flow specifies whether new artifacts will be created in one repository or in both.

Note that Artifact Creation Flow relates only to the **creation** of artifacts (as opposed to the updating of fields on those artifacts). So for example, if you set up one-way *artifact creation flow* from Jira to ServiceNow, this means that when the integration is run, new or existing artifacts from Jira will create new artifacts in ServiceNow, but new or existing artifacts from ServiceNow will **not** create new artifacts in Jira.

However, once a Jira artifact creates a target artifact in ServiceNow, if any updates are made to fields on the target artifact in ServiceNow, that update **could** flow back over to Jira, based on the integration's [field flow configuration](#). So while the integration is not **creating** new artifacts in Jira, it can **modify** existing artifacts in Jira based on updates made to the corresponding artifacts in ServiceNow.





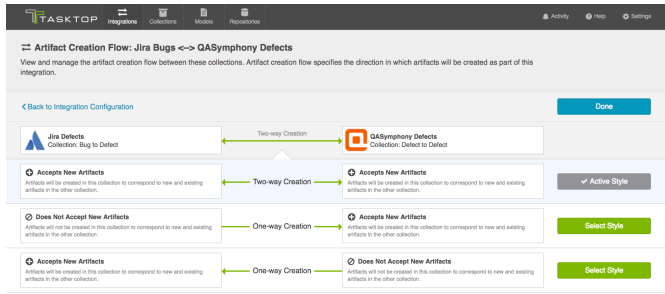
**Field Flow**

Note that **Field Flow** is set independently for each field pair, and does not need to match the configuration for **Artifact Creation Flow**. In the example above, if the priority on our ServiceNow artifact is changed from Low to High, that updated field value will flow back to Jira.

**Instructions**

To configure Artifact Creation Flow, click the 'Artifact Creation Flow' link on the Integration Configuration screen:

This will lead you to the Artifact Creation Flow screen, where you will be able to select Two-way Creation (artifacts will be created in both collections to correspond to new and existing artifacts in the other collection), or One-way Creation (only one of the two repositories will have new artifacts created to correspond to new and existing artifacts in the other collection).



Click 'Save,' and 'Done.' You will be brought back to the Integration Configuration screen.

### Next Steps

Once you have completed your Artifact Creation Flow configuration, your next step will be to review your [Field Flow](#).

## Field Flow

### Introduction

Once you've configured your [Artifact Creation Flow](#), your next step is to configure your Field Flow.

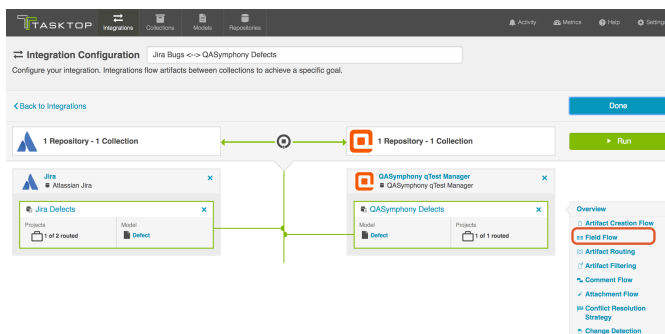
On the Field Flow screen, you can configure:

- the direction fields flow in
- the frequency with which they flow (i.e. only upon creation vs. always updating)

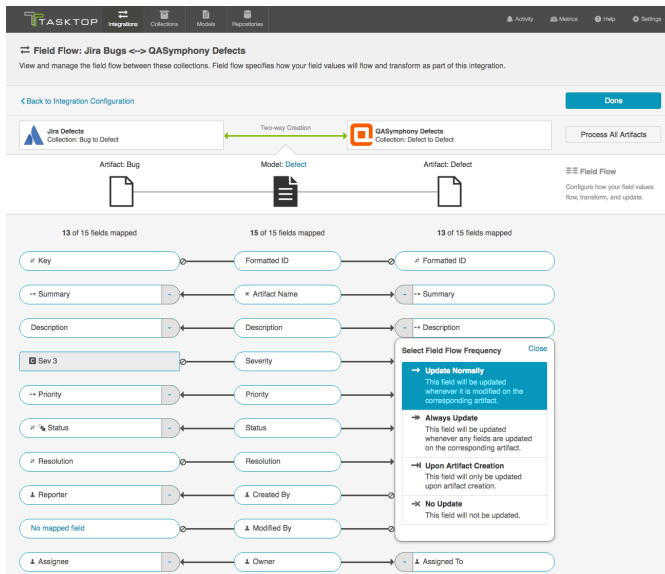
Each field can be configured individually.

### Instructions

To get to the Field Flow screen, click the 'Field Flow' link on the Integration Configuration screen:



You will be directed to the Field Flow screen:



Here, you can see the names of the mapped repository fields for each collection on the far left and right, with the model fields displayed in the middle. Constant values will be identified by a grey box and the constant value icon.

Once you're done updating your field flow, click 'Save' and 'Done.'

### Field Flow Direction and Frequency

When configuring field flow for a synchronization integration, you have several options available to specify the direction and frequency of field updates:





Icon	Meaning
→	<b>Update Normally:</b> This field will be updated whenever it is modified on the corresponding artifact
⇒	<b>Always Update:</b> This field will be updated whenever <u>any</u> fields are updated on the corresponding artifact
→	<b>Upon Artifact Creation:</b> This field will only be updated upon artifact creation
→X	<b>No Update:</b> This field will not be updated

💡 Note: The field flow settings behave a bit differently for Constant Values. This is because constant values exist as part of your Tasktop configuration, and not on the artifact itself. Therefore, changes in constant values are not detected in the same way that updates made on the actual artifact are detected. If you change the constant value that is linked to your model, your integration will not automatically detect this update and sync it over. The value will only update if another field on that artifact is updated. Because of this, for constant values, "update normally" and "always update" will

behave identically: meaning that the constant value will update whenever any other field is updated on that artifact.

### Field Flow Icons

On the Integration Field Flow screen, you will see a number of icons, which will help you understand any special properties or requirements for each field. If you hover your mouse over an icon, you will see a pop-up explaining what that icon means. You can also review their meanings in the legend below:

Icon	Meaning
	<p>A constant value will be sent.</p> <p>Note that:</p> <ul style="list-style-type: none"><li>• If the icon is on the side of the collection, this means that a constant value will be sent to your model. This means that any time this collection is integrated with another collection, the <i>other</i> collection will receive this constant value for the field in question.</li><li>• If the icon is on the side of the model, this means a constant value will be sent to your collection. This means that any time this collection is integrated with another collection, that <i>this</i> collection will receive this constant value for the field in question.</li></ul>
	<p>A state transition will be utilized. Note that:</p> <ul style="list-style-type: none"><li>• If the icon is on the side of the collection, this means that a <a href="#">state transition graph</a> is being utilized.</li><li>• If the icon is on the side of the model, this means that a <a href="#">state transition extension</a> is being utilized.</li></ul> <p> Note that Tasktop will update the field flow frequency for fields utilizing state transitions to 'no update.' This is because they are updated via the transition and not via normal 'field flow.' Do not modify the field flow frequency for this field.</p>
	<p>Collection field is read-only and cannot receive data</p>



←*	To create artifacts in your collection, this field must be mapped to your model.
*→	
✱	This is a required field in your model; it must be mapped to your collection.
✕	This field will not be updated as part of your integration, due to how you have configured it. This field flow configuration can be changed if you'd like.
⊘	This field will not be updated as part of your integration because the mapping would be invalid. You do not have the option of changing this.
→	This field will update normally as part of your integration; this means it will be updated whenever it is modified on the corresponding artifact.
→→	This field will always update as part of your integration; this means that it will be updated whenever any fields are modified on the corresponding artifact.
→	This field will only be updated upon initial artifact creation.

### Process All Artifacts

The '**Process All Artifacts**' button will prompt Tasktop to process all artifacts in the integration. Any changes or additions you've made to your collection-to-model mappings will be applied to all artifacts participating in the integration upon the next change detection interval. This functionality can be useful when adding a new field to your field flow configuration. You can learn more about this process [here](#).

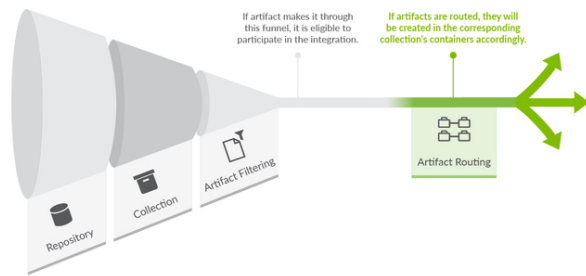
### Next Steps

Once you have completed your Field Flow configuration, your next step will be to review your [Artifact Routing](#).


## Artifact Routing


### Introduction

Once you've configured your [Field Flow](#), your next step will be to configure Artifact Routing.



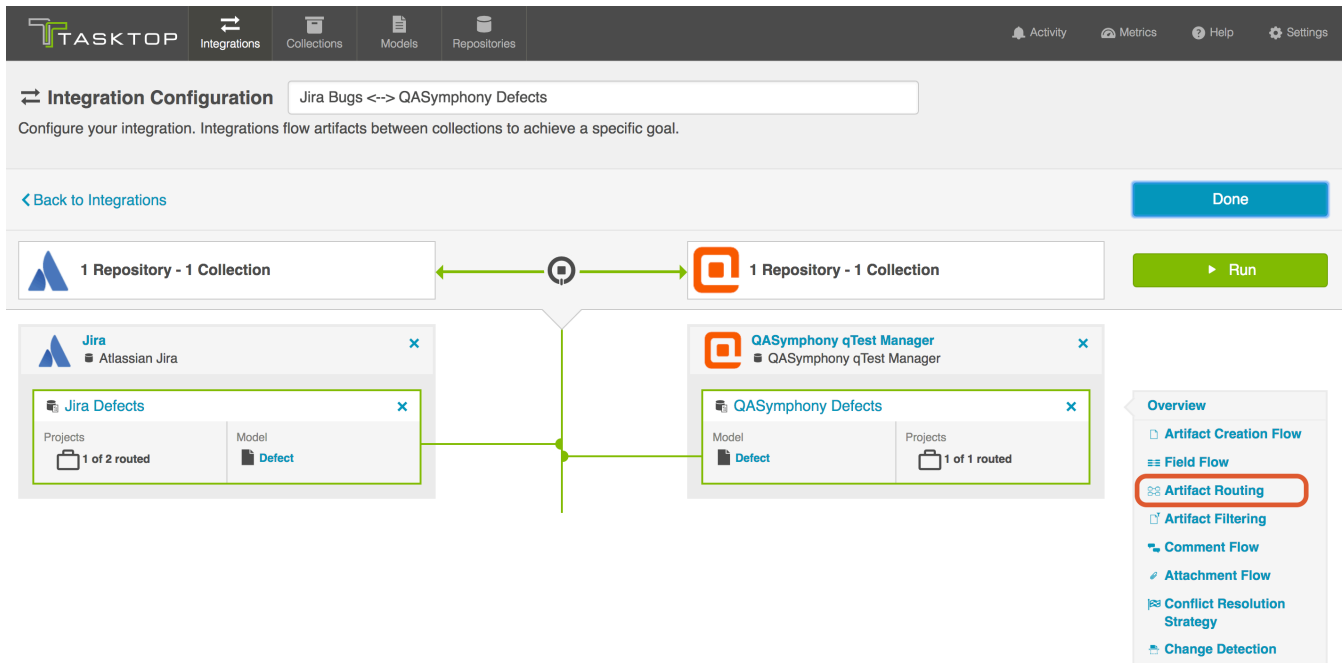
Artifact Routing is needed when artifacts are being created as part of an integration. In addition to knowing the repository in which artifacts should be created, Tasktop also needs to know which container (i.e. project, module, folder, etc) a given artifact should be created in. Specifying the artifact routing does this.

 Initially, the artifact routing will determine where an artifact gets created. Over time, if an artifact on either side moves, Tasktop will move the artifact to the corresponding container of the new route, if this is allowed in your repository. If you are moving between lower-level containers, such as sets or folders, this is generally possible. However, Tasktop will not do so if the move on one side crosses the bounds of the top-level container (generally the high-level container, added at the collection level).

 **Note:** If you update the artifact routing on a running integration to include additional lower-level containers, such as sets or folders, please click the ['process all artifacts'](#) button on the Field Flow screen to ensure that all relevant updates are processed.

### ***Instructions***

To configure Artifact Routing, click the 'Artifact Routing' link on the right pane of the Integration Configuration screen:

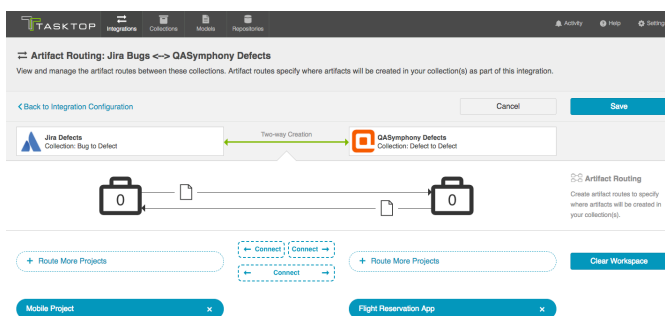


## Static Artifact Routing

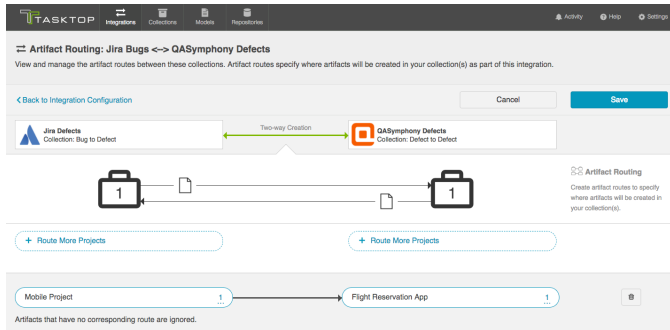
In some cases, the project an artifact resides in in the source collection can sufficiently determine which project an artifact should be created in in the target collection. In these instances, you can configure what is known as 'static artifact routing' (also known as 'explicit artifact routing').

Static artifact routes can have one or more source projects, but only a single target project.

To configure a static artifact route, use the "Route More Projects" buttons to add projects from your collections to your working space and connect them using the "Connect" button. The directionality on the connect button refers to artifact creation.



In the example shown below, artifacts from the Jira Mobile Project will be created in the Flight Reservation App project in QASymphony.



## Conditional Artifact Routing

Check out the video below to learn more about Conditional Artifact Routing:

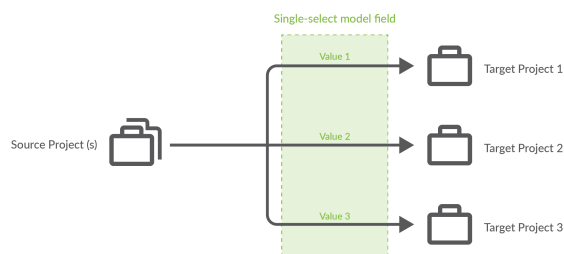
**⚠ Note:** The video above demonstrates Conditional Artifact Routing within the context of a Create via Gateway Integration. Create via Gateway Integrations are only available in editions that contain the Gateway add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality. Though the video is for a Gateway Integration, the core concepts outlined in the video can be applied to any integration template.

In some cases, the project an artifact is in within the source repository does not provide enough information to determine which project the artifact should be created in within its target repository.

Oftentimes, in fact, some unique characteristic of an artifact, such as a specific field value, is the factor that should be used to determine which project an artifact should be created in within the target repository.

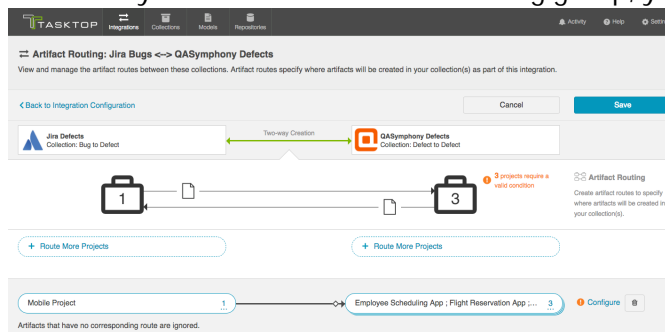
In these instances, you will configure what is known as **conditional artifact routing** to determine which project each artifact is created in within your target repository. Conditional artifact routing (also known as 'dynamic artifact routing') can be used to inspect a single-select field of an artifact and, depending on its value, to route that artifact to the appropriate project in the target collection.

Conditional artifact routes can have one or more source projects, and always have multiple target projects.




To create a conditional artifact route, use the "Route More Projects" buttons to add projects from your collections to your workspace and connect them using the "Connect" button.

Notice that after you've created your conditional artifact routing group, you'll be prompted to

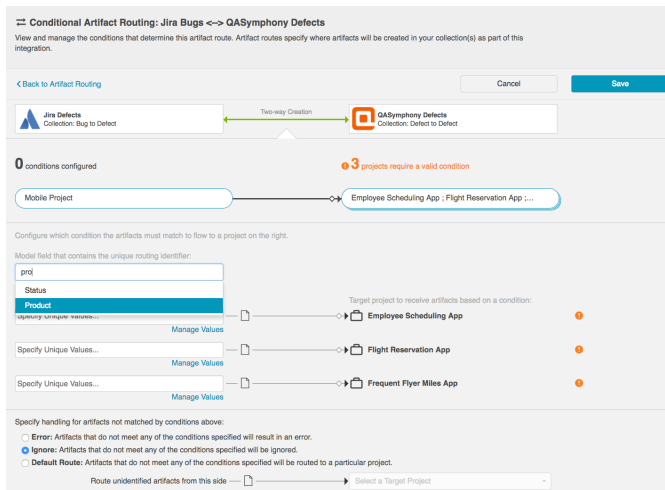


configure your route.

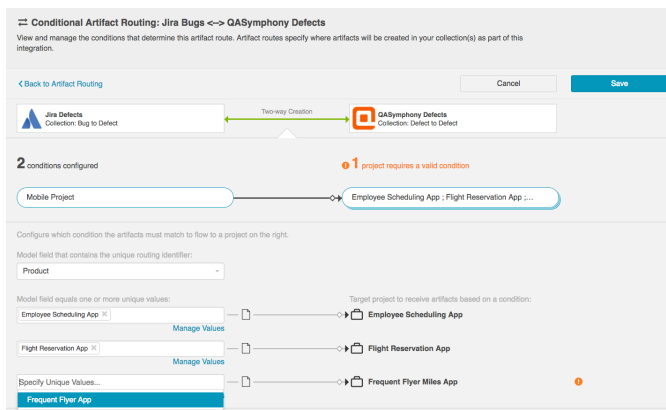
Click 'Save,' and then click 'Configure.' You'll be brought to the Conditional Artifact Routing screen. Here you'll start by selecting the model field that you would like to use to determine your artifact route.

 Note: Conditional Artifact Routes can only be configured based on **single-select fields** in your model.

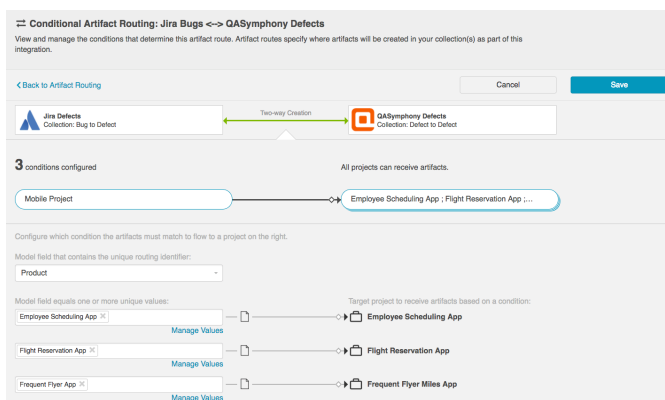
In the example below, the field "Product" contains the unique values that should determine the project an artifact will be created in in QASymphony.



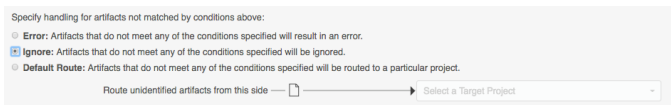
After you select the model field, you can identify one or more value to correspond to each target project. You can also use the 'Manage Values' link to select from a list of values.



Once you've done this, you'll see your full conditional artifact routing group:



You can specify how you'd like to handle artifacts that do not meet any of the conditions specified by selecting one of the options provided at the bottom of the screen:



## Next Steps

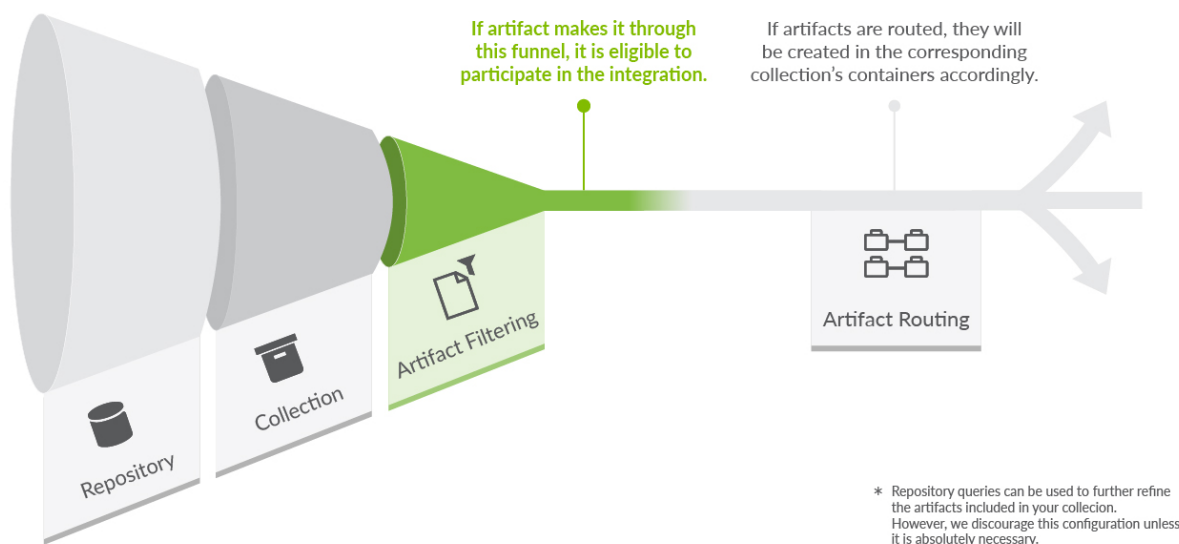
Once you've configured your Artifact Routing configuration, your next step will be to review your [Artifact Filtering](#).

## Artifact Filtering

### Introduction

Once you have completed your [Artifact Routing](#) configuration, your next step will be to review and configure Artifact Filtering.

When configuring your integration, you have several options available to refine which artifacts are eligible to flow. The final mechanism available is *artifact filtering*, which is configured at the Integration level.



*Artifact Filtering* enables you to set filters on an integration in order to limit which artifacts are eligible to flow in your integration.

To use a field for artifact filtering, it must:

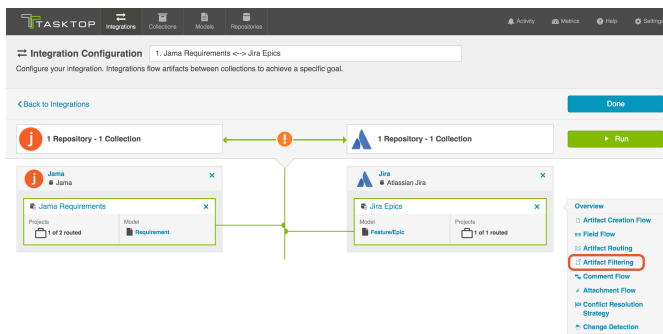
- Be a part of your model, and be mapped to the collection you are filtering from
- Be one of the following field types:

- Single Select
  - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
- Multi-Select
  - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
- Date
- Date/Time
- Duration
- String

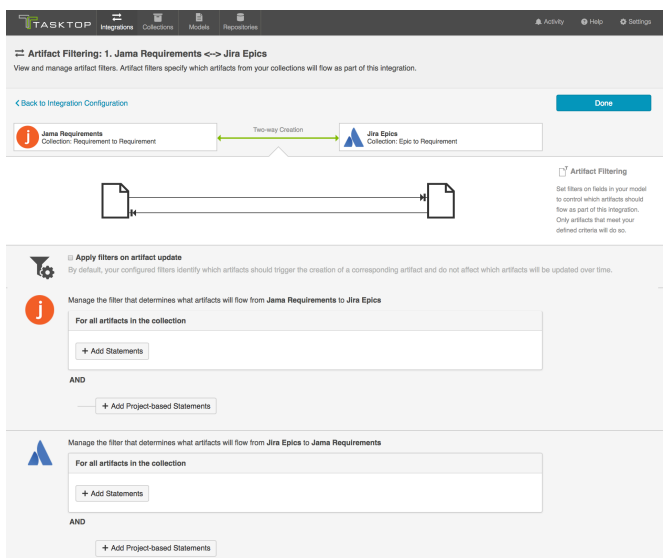
💡 Note that you can utilize our transforms to filter based on an 'unsupported' collection field type, if that field is mapped to a supported field type in your model. For example, you could filter based on a boolean field in your repository, if that boolean field is mapped to a single select field in your model.

### Instructions

To configure Artifact Filtering, click the 'Artifact Filtering' link on the Integration Configuration screen:



This will lead you to the Artifact Filtering screen, where you can configure your artifact filters.



### Artifact Creation vs. Artifact Update




First, determine whether you'd like your filter to apply to **artifact creation**, or to **artifact creation and artifact update**. By default, your filter will apply only to artifact creation. This means that once artifacts are synchronized, updates will continue to flow between them, even if values are changed that make it such that they no longer meet your filtering criteria. In most scenarios, this will be the desired outcome, as it ensures that your source and target artifacts will stay in sync with one another.



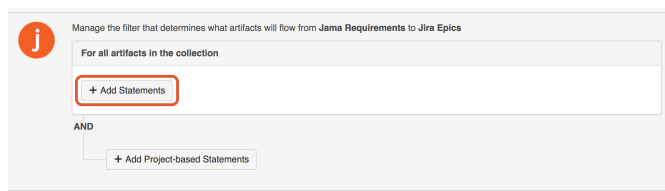
## Configure Artifact Filter Statements

Next, you can begin configuring your artifact filtering statements. You can add statements for **all artifacts in both collections**, **all artifacts in one collection**, or to **artifacts in specific projects within your collection**.

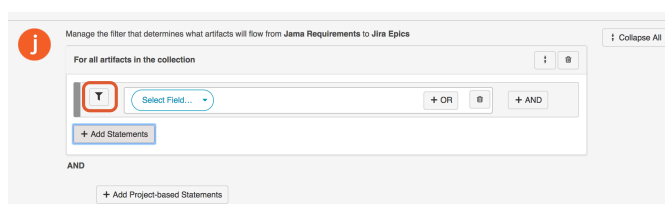
 **Note:** If you update your previously saved artifact filter criteria to broaden the scope of your running integration, click the **'process all artifacts'** button on the Field Flow screen to ensure that all relevant updates are processed.

### *Apply Filter to All Artifacts in Both Collections*

To apply a filter to all artifacts in both collections, click '+Add Statements' for all artifacts in your first collection.



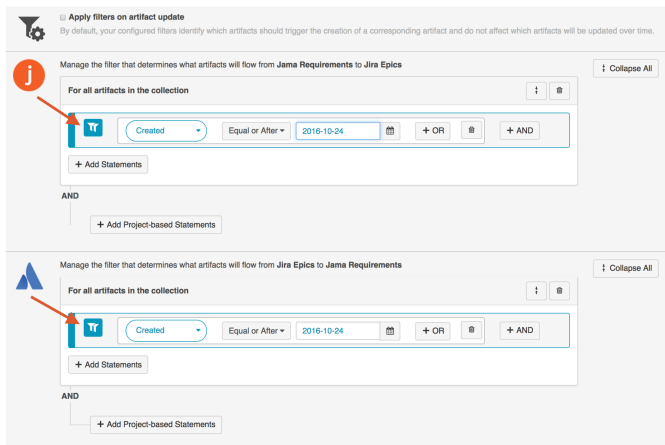
Then, click the filter button. This will apply your filter to the other collection participating in your integration.



You will notice that the button changes to show two filters, indicating that your filter will apply to both collections.

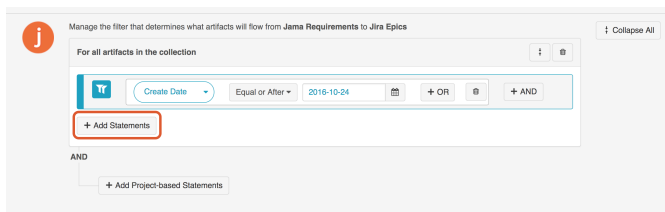
You'll also notice that any modifications you make to that filter statement will automatically be reflected in the other collection. If you'd like to disconnect the filter from both collections, simply click the double-filter button again, and you will be able to edit each filter individually.

Here we are filtering both collections to only create target artifacts that were created on or after October 24th, 2016.

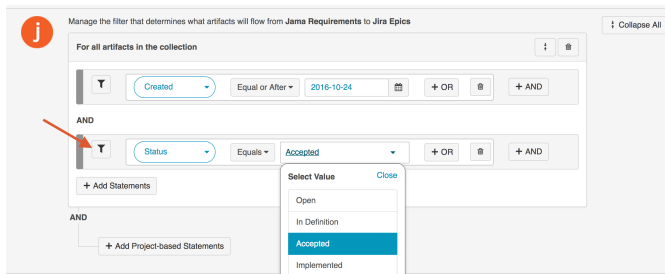


### Apply Filter to All Artifacts in One Collection

To apply a filter to all artifacts in one collection, simply click the '+Add Statements' button in the desired collection:

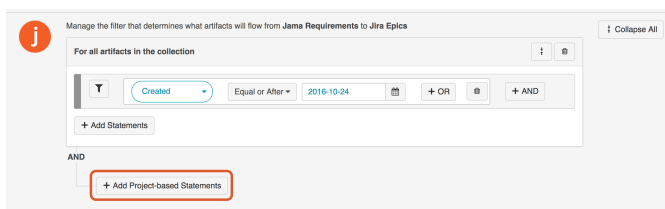


Select your artifact filtering fields and values. You'll see that there is only one filter displayed on the left, which tells you that this filter only applies to one collection in your integration.

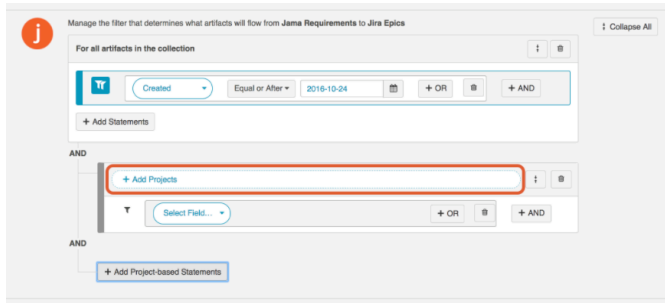


### Apply Filter to Artifacts within Certain Projects in a Collection

To apply a filter to artifacts within certain projects in a collection, click '+Add Project Based Statements'

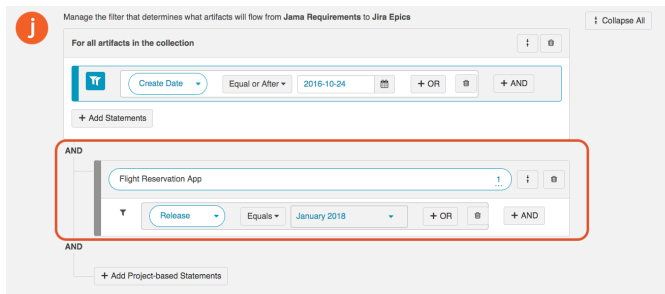


Click '+Add Projects' to select your project.



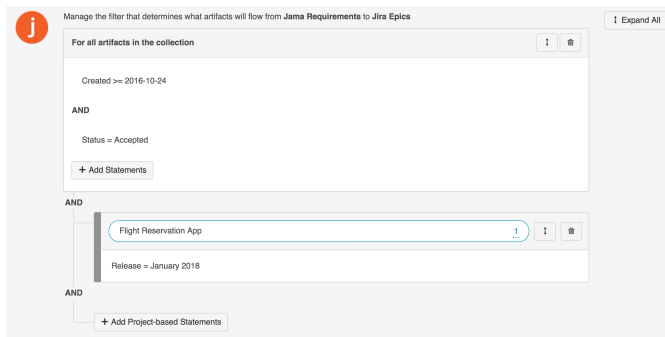
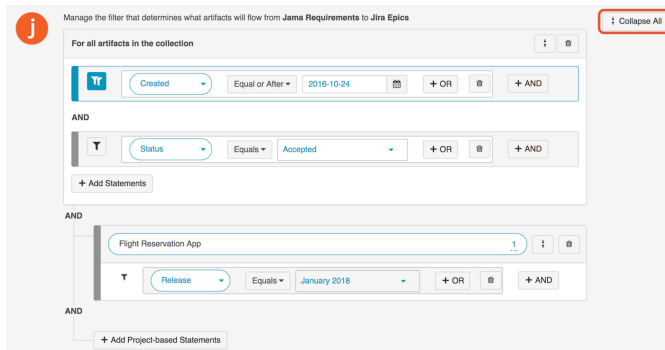
Select the project(s) you'd like your filter to apply to.

Then click 'Select Field...' to begin configuring your filtering statement.



## Viewing Artifact Filter Statements

You can click the 'Collapse All' button to view an easy-to-read version of your artifact filtering statements.



## Next Steps

Once Artifact Filtering is configured, your next step will be to review and configure Comment Flow.

## Comment Flow

### Introduction

Once you've configured [Artifact Filtering](#), your next step will be to review and update Comment Flow.

### Instructions

To enable and configure Comment Flow, click the 'Comment Flow' link on the Integration Configuration screen.

**Integration Configuration** Jira Bugs <-> QASymphony Defects  
Configure your integration. Integrations flow artifacts between collections to achieve a specific goal.

< Back to Integrations Done

1 Repository - 1 Collection 1 Repository - 1 Collection Run

**Jira** Atlassian Jira  
Jira Defects  
Projects: 1 of 2 routed Model: Defect

**QASymphony qTest Manager** QASymphony qTest Manager  
QASymphony Defects  
Model: Defect Projects: 1 of 1 routed

**Overview**  
Artifact Creation Flow  
Field Flow  
Artifact Routing  
Artifact Filtering  
**Comment Flow**  
Attachment Flow  
Conflict Resolution Strategy  
Change Detection

This will bring you to the Comment Flow screen:

**Comment Flow: Jira Bugs <-> QASymphony Defects**  
View and manage the flow of comments between these collections. Comment Flow specifies how comments will flow as part of this integration.


< Back to Integration Configuration Cancel Save

Jira Defects Collection: Bug to Defect Two-way Creation QASymphony Defects Collection: Defect to Defect

**Comment Flow**  
Configure how comments flow between your collections.

Flow comments from Jira Defects to QASymphony Defects  
 Flow comments from QASymphony Defects to Jira Defects

If your collection enables comment flow, you will be able to use the check-boxes to flow, or not flow, comments as part of your integration. You can choose to flow comments bi-directionally or in a single direction.

 **Note:** Tasktop will not process deletions of comments that have already flowed. When comments that have already flowed are edited in the source repository, a new comment will be created in the target repository containing the updated text. The original comment in the target repository will be unchanged.

### Comment Impersonation

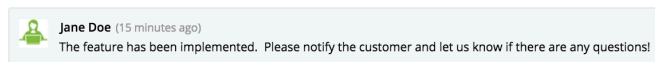
Comment Impersonation refers to Tasktop's ability to assign a specific user to a given artifact or artifact entity. You can learn if your repository supports impersonation by viewing our Connector Documentation [here](#).

Depending on whether or not impersonation is supported, your comments may flow over to your target repository in one of two ways:

- When your target repository supports impersonation, Tasktop will assign the comment to the proper user if it is possible to locate the user with the information provided on the source artifact.

In cases like this, your comment will appear as though it were created by the corresponding user, as seen in the comment below:

#### Comments



On the other hand,

- When your target repository supports impersonation, but Tasktop cannot locate the person with the information provided from the artifact in the source repository,

Or,

- When your target repository does not support impersonation,

The comment will appear in your target repository as though it were created by the default user associated with your repository configuration in Tasktop, and the name of the user who truly recorded the comment will be listed at the beginning of the comment text.

In cases like the final two outlined above, your comment will look like this:



## Tasktop Marketing



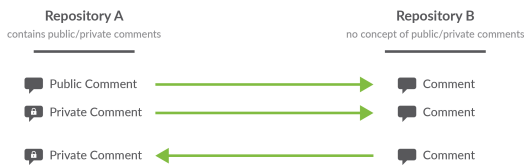
(Comment from Jane Doe):

The feature has been implemented. Please notify the customer and let us know if there are any questions!

[Comment](#) · [Like](#) · Today at 1:47 PM via Field API Access

### Public and Private Comments

If the repository being integrated has the notion of public vs. private comments, Tasktop will flow all comments, and any comment created in that repository will default to 'private.'



If Repository A has concept of public/private comments, and Repository B does not.



If Repository A and Repository B both have concept of public/private comments.

### Next Steps

Once you've completed your Comment Flow configuration, your next step will be to review and update your [Attachment Flow](#).

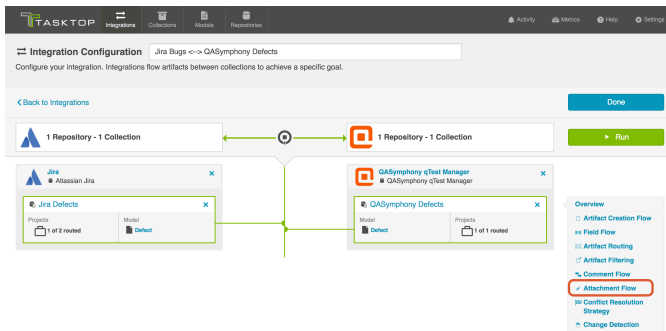
## Attachment Flow

### Introduction

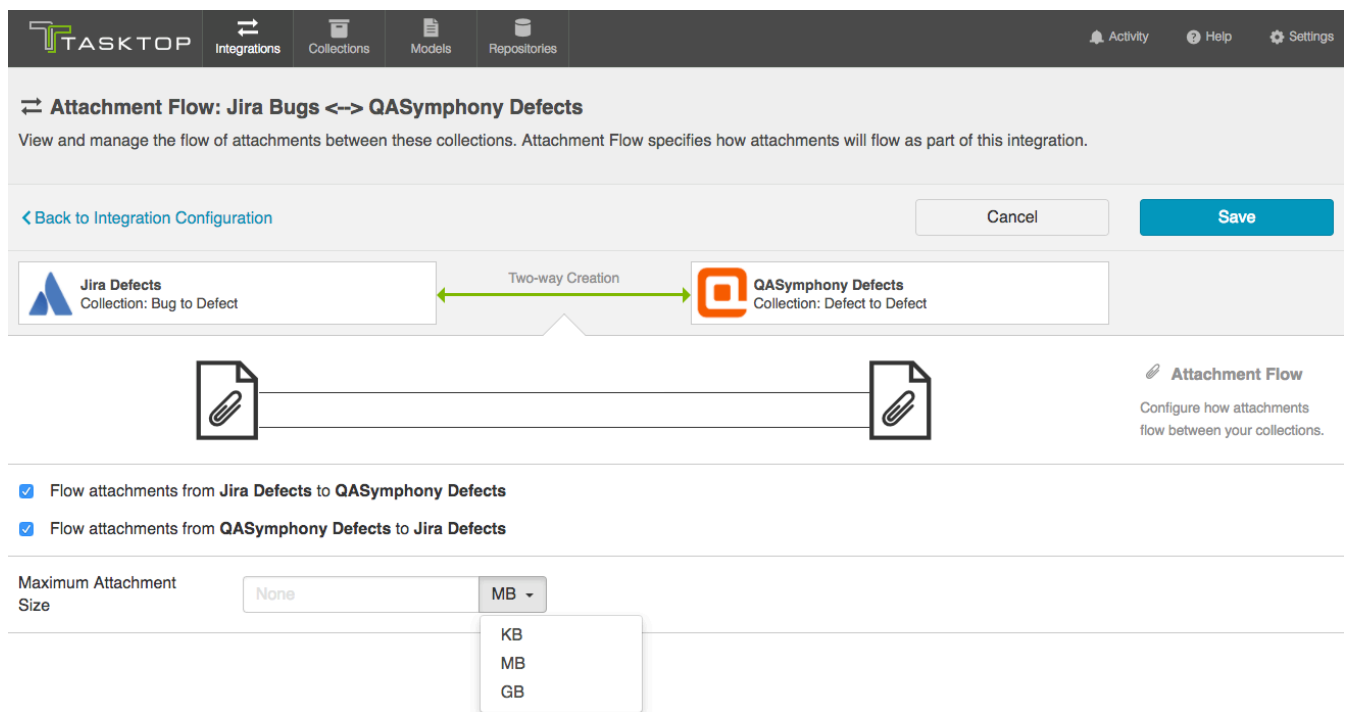
Once you've configured [Comment Flow](#), your next step will be to configure Attachment Flow.

### Instructions

To enable and configure Attachment Flow, click the 'Attachment Flow' link on the Integration Configuration screen.



This will bring you to the Attachment Flow screen:



If your collection supports attachment flow, you will be able to use the check-boxes to flow, or not flow, attachments as part of your integration. You can also configure the **maximum attachment size**. If attachments are larger than this size, they will be ignored by your integration.

💡 If you are unsure of the maximum attachment size allowed in your repository or if you leave this field blank and it turns out that the attachment is, in fact, larger than the maximum size the repository allows, you will see an error message in Tasktop for that attachment. You can then deduce, based on the error message in Tasktop, what the maximum size is, and use that data to populate the field on the Attachment Flow screen.

💡 Note: Attachment Flow only flows new attachments. Deletions of existing attachments will not flow.

## Attachment Impersonation

Attachment Impersonation refers to Tasktop's ability to assign a specific user to a given artifact or artifact entity. You can learn if your repository supports impersonation by viewing our Connector Documentation [here](#).

Depending on whether or not impersonation is supported, your comments may flow over to your target repository in one of two ways:

- When your target repository supports impersonation, Tasktop will assign the attachment to the proper user if it is possible to locate the user with the information provided on the source artifact.

On the other hand,

- When your target repository supports impersonation, but Tasktop cannot locate the person with the information provided from the artifact in the source repository,  
Or,
- When your target repository does not support impersonation,

The attachment will appear in your target repository as though it were created by the default user associated with your repository configuration in Tasktop, and the name of the user who truly recorded the comment will be listed at the beginning of the comment text.

#### **Next Steps**

Once you've completed your Attachment Flow configuration, your next step will be to review and update your [Conflict Resolution Strategy](#).

## **Conflict Resolution Strategy**

### **Introduction**

Once you've configured your [Attachment Flow](#), your next step will be to review and update your Conflict Resolution Strategy

When two-way field flow is configured, data conflicts become possible. A data conflict will occur if a field on an artifact is modified on both the source artifact and target artifact during the same [Change Detection Polling Interval](#). The Change Detection Polling Interval refers to how often Tasktop checks repositories for changes to artifacts.

The Conflict Resolution Strategy screen allows you to control how data conflicts will be resolved:

- 1. Error upon Conflict:** An error will be generated, and no updates will be made to the conflicted field, or to any other fields on the artifact. The error message will notify you that the conflict occurred and will provide steps on how to resolve the conflict. Note that once a conflict is detected, no subsequent updates will be made to the artifact pair until the conflict is resolved.
- 2. Left Collection Artifact Value Dominates:** Values from the artifact in the left collection will over-write the values in the right collection.
- 3. Right Collection Artifact Value Dominates:** Values from the artifact in the right collection will over-write the values in the left collection.



## Instructions

To select your Conflict Resolution Strategy, click the 'Conflict Resolution Strategy' link on the right side of the Integration configuration screen:

The screenshot shows the 'Integration Configuration' screen for 'Jira Bugs <-> QASymphony Defects'. The interface includes a top navigation bar with 'TASKTOP' and various menu items. The main content area shows two collections connected by a bidirectional arrow. A sidebar on the right contains a list of configuration options, with 'Conflict Resolution Strategy' highlighted. A 'Run' button is located at the bottom right of the configuration area.

This will lead you to the Conflict Resolution Screen, where you can select your desired policy:

The screenshot shows the 'Conflict Resolution Strategy' screen for 'Jira Bugs <-> QASymphony Defects'. The interface includes a top navigation bar with 'TASKTOP' and various menu items. The main content area shows two collections connected by a bidirectional arrow labeled 'Two-way Creation'. Below the collections, there is a section titled 'Select a conflict resolution policy to specify what should happen when a field value that is set to flow bidirectionally conflicts across your collections.' Three policy options are listed: 'Error Upon Conflict' (marked as the active policy), 'Left Collection Artifact Value Dominates', and 'Right Collection Artifact Value Dominates'. Each option has a 'Select Policy' button.

Once selected, click 'Save' and 'Done.' This will bring you back to the integration configuration screen.

## Next Steps

Once you've selected your Conflict Resolution Strategy, your next step will be to review and update your [Change Detection settings](#) for this integration.

## Change Detection

### Introduction

Once you've configured your [Conflict Resolution Strategy](#), your next step will be to configure your Change Detection settings.

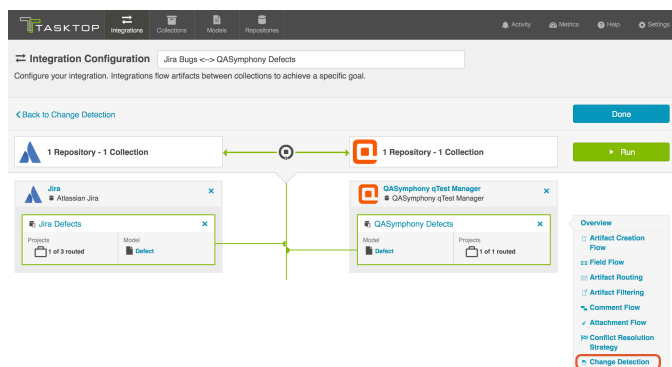
Tasktop's default global change detection settings can be found on the [Settings](#) screen. However, if you'd like to override the global defaults, you can configure integration-specific change detection and full scan intervals on this screen.

The **Change Detection Interval** is the time between polling requests to detect *only changed artifacts*. This defaults to 1 minute on the Settings screen, but can be customized as desired.

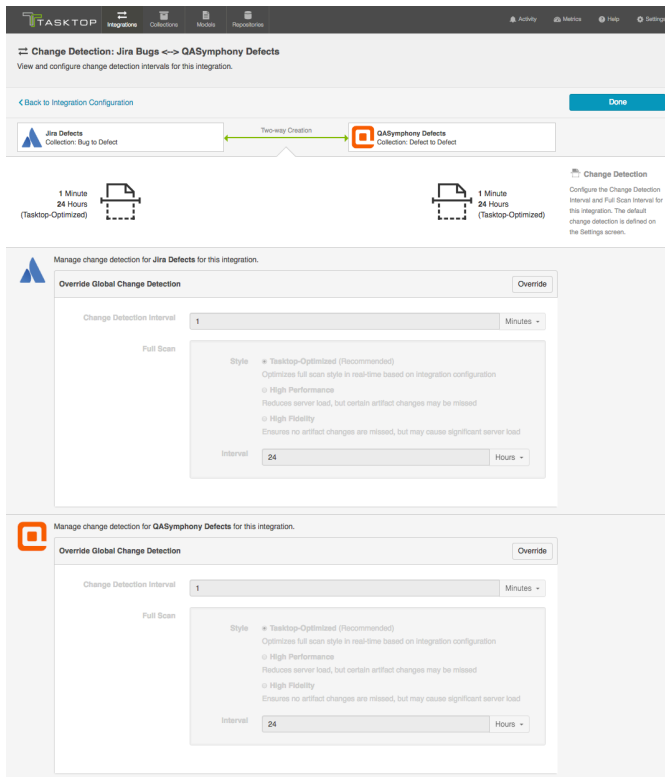
The **Full Scan Interval** is the time between polling requests to detect changed artifacts, in which *all* artifacts of a collection are scanned. Not all changes to an artifact will register as a change. Some repositories do not mark items as changed when (for example) a relationship is added or an attachment has changed. These may not be picked up by regular Change Detection, but will be picked up by a Full Scan. The Full Scan Interval defaults to 24 hours on the Settings screen, but can be customized as desired.

### Instructions

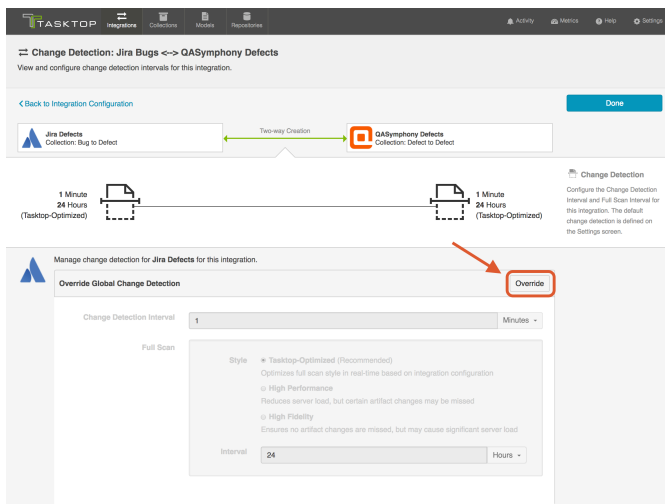
To configure integration-specific change detection, click the 'Change Detection' link on the Integration Configuration screen.



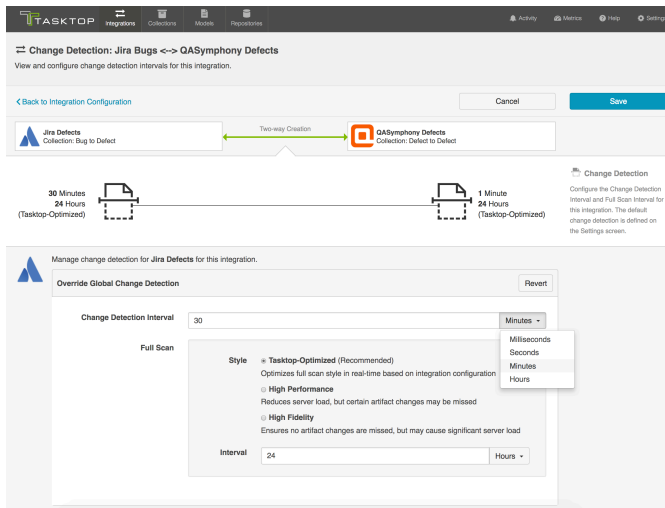
This will bring you to the Change Detection screen, where you can view the current change detection and full scan intervals configured for each collection in this integration. These will default to the global intervals configured on the Settings screen.



To override the current settings, click the 'Override' button on your desired collection. This will allow you to set a custom change detection and/or full scan interval for each collection within the context of this integration. Note that these custom settings will only impact *this* integration; they will not impact other integrations that make use of the same collections.



Once you click 'Override,' you will be able to configure custom change detection and full scan intervals for that collection within the context of this integration:



## Full Scan Style and Interval

In addition to customizing the full scan interval, you can also select your desired full scan style in order to best meet your specific performance and server load needs.

The following full scan styles are available:

- **Tasktop-Optimized (Recommended):** This is the default selection. It optimizes your full scan style in real-time based on your integration configuration.
- **High Performance:** This full scan style reduces server load, but certain artifact changes may be missed.
- **High Fidelity:** This full scan style ensures no artifact changes are missed, but may cause significant server load.

If High Performance style is selected, Tasktop will provide a warning identifying any specific artifact changes which may be missed:

**⚠ You are about to apply High Performance Full Scan to Jira Defects in this integration**

Please read the following message carefully before proceeding.

The following 1 configured fields in Jira Defects require the High Fidelity Full Scan style to detect changes. The High Performance Full Scan style may cause changes to these fields to be missed.

- Watchers (watches)

The following 4 unconfigured fields in Jira Defects require the High Fidelity Full Scan style to detect changes. Please be aware of this when modifying your configuration.

- Time Spent (timespent)
- Remaining Estimate (timeestimate)
- Original Estimate (timeoriginalestimate)
- Web Links (web-links)

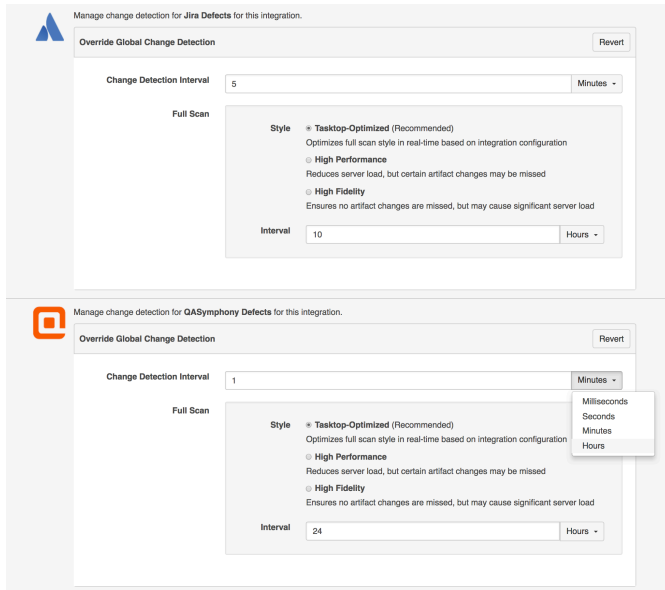
[Show Fewer](#)

Are you sure that you would like to apply the High Performance Full Scan style?

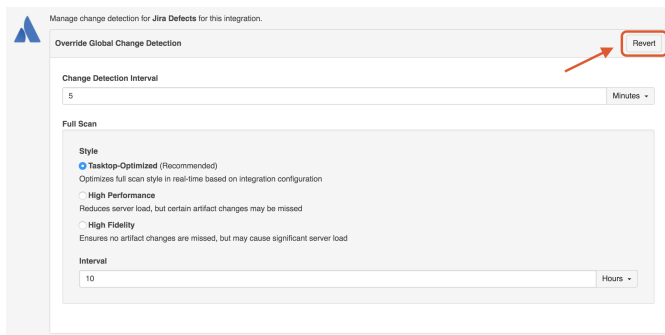
- I understand that applying the High Performance Full Scan style may cause some artifact changes to be missed.

Cancel Apply

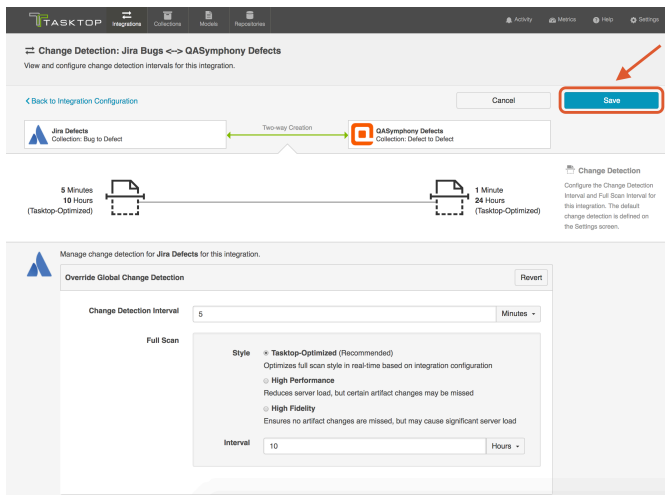
Once you have configured your change detection and full scan intervals for your first collection, you can update the settings for the remaining collection, if desired.



If you'd like to restore the global change detection settings, simply click the 'Revert' button to remove the custom settings:



Once you've updated the change detection settings as desired, click 'Save' and 'Done' to save your changes.



Next Steps

Congratulations! Configuring Change Detection is the final step in configuring your Work Item Synchronization! You are now ready to [run your integration](#).

## Running Your Integration(s)

### Introduction

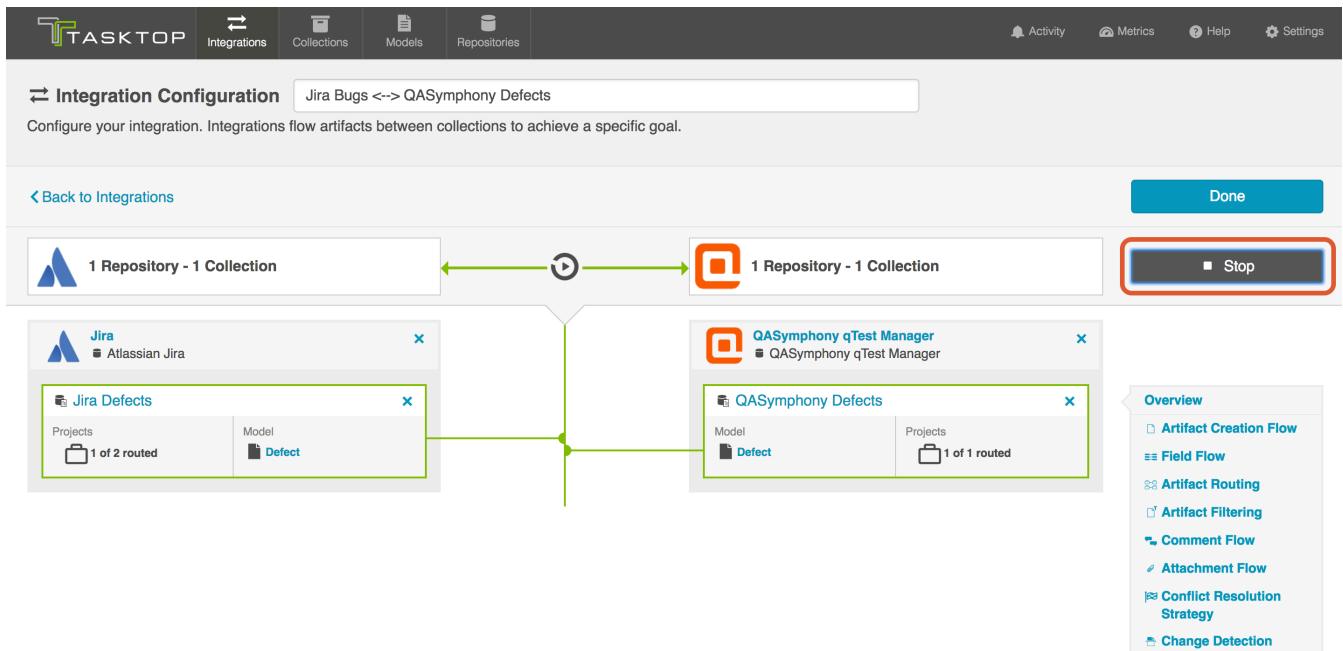
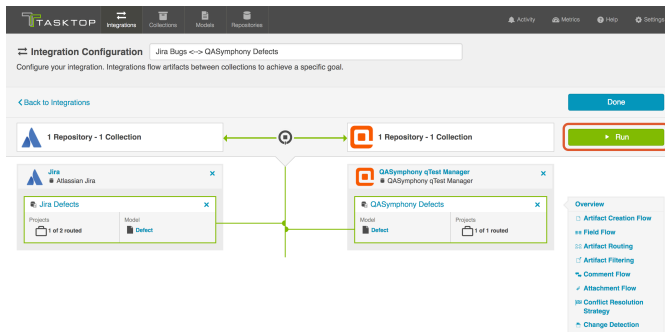
Once you've completed your [Work Item Synchronization](#) configuration, it's time to run your integration!

### Running your Integration

There are two ways to start or stop your integration:

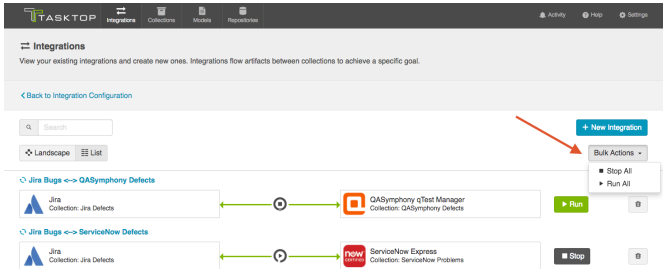
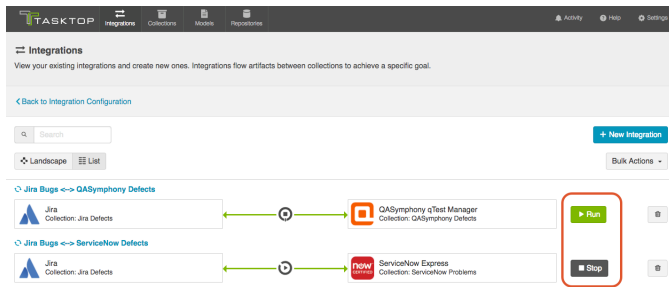
#### From the Integration Configuration Screen

Simply click 'Run' to run the integration, and 'Stop' to stop the integration.



#### From the Integrations List Page

Click 'Run' or 'Stop' next to each integration you would like to update. You can also use the 'Bulk Actions' button to run or stop all integrations.



## Next Steps

You can learn how to view and visualize your integrations [here](#).

## Viewing Your Integration(s)

### Viewing Your Integrations

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

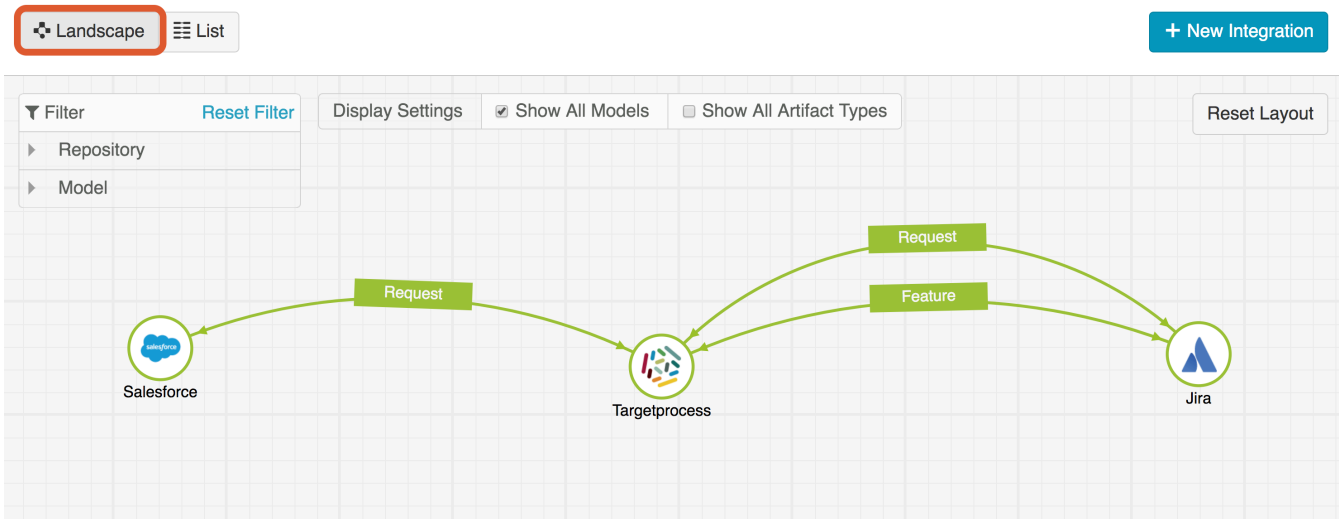
When viewing your integrations, you have the option of viewing them in either Landscape or List mode.

**TASKTOP** Integrations Collections Models Repositories Activity Help Settings

## ↔ Integration Landscape

View your organization's integration landscape to get an overview of artifact types flowing between your repositories via integrations.

[← Back to Collections](#)



**TASKTOP** Integrations Collections Models Repositories Activity Help Settings

## Integrations

View your existing integrations and create new ones. Integrations flow artifacts between collections to achieve a specific goal.

[← Back to Integration Configuration](#)

Search + New Integration

**Landscape** List Bulk Actions

- Salesforce Cases -> Targetprocess Request**

Salesforce Work Item Collection: Salesforce Cases → Targetprocess Work Item Collection: Targetprocess Requests ▶ Run
- Targetprocess Features -> Jira Epics**

Targetprocess Work Item Collection: Targetprocess Features → Jira Work Item Collection: Jira Epics ▶ Run
- Targetprocess Requests -> Jira Tasks**

Targetprocess Work Item Collection: Targetprocess Requests → Jira Work Item Collection: Jira Tasks ▶ Run

### Landscape View

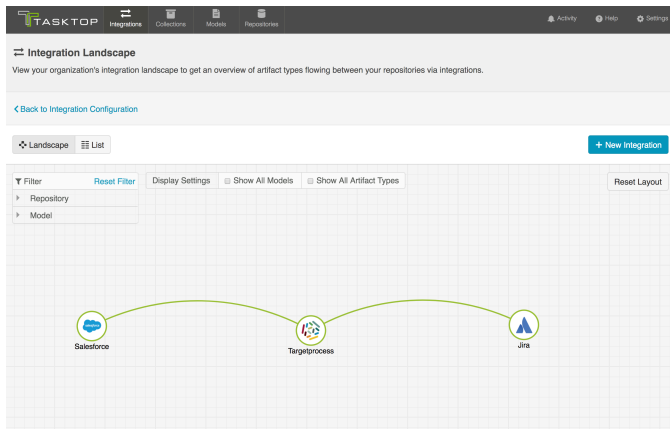
See *Tasktop Editions table* to determine if your edition contains Integration Landscape View functionality.

Learn more about the Integration Landscape View in the video below:

Tasktop will default to the Landscape View, which enables you to visualize your entire integration landscape and see how your integrations relate to one another. Use our built-in filters to see as little or as much information as you'd like!

Here's a simplified view:



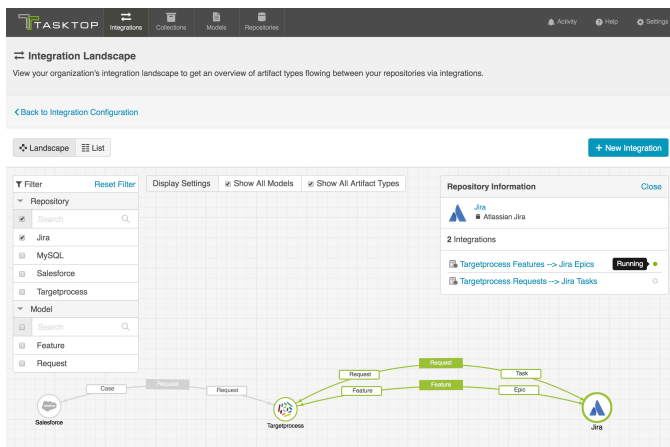


If you'd like to see additional information, you can utilize the filters, or click on a repository node to modify which information is shown.

Some examples of additional information you can see are:

- Models
- Artifact Types
- Artifact Creation Arrows
- List of all relevant integrations (see this by clicking on the repository node)
  - Indicator of whether each integration is running or not

Here's an example of a more detailed view:



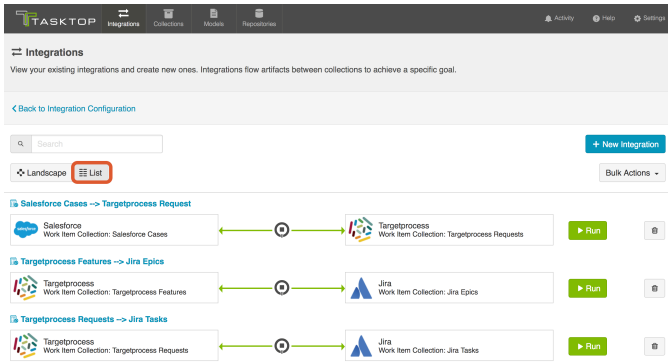
### List View

If you'd like, you can toggle to List View, which will show you a list of all integrations you have created.

You can use this view to:

- Start an Integration
- Stop an Integration
- Delete an Integration

- Click into an Integration and modify its configuration



## Tips and Tricks

The following pages contain information and best practices for common Work Item Synchronization use cases:

- **Synchronizing Relationships:** Tasktop affords you the ability to not only flow various artifacts between your collections, but also to mirror the relationships between those artifacts. This page will explain how to configure both Internal Artifact Relationship Management (ARM) and External Artifact Relationship Management (ARM). Internal ARM refers to the ability to flow artifacts, along with their internal relationships from your source repository to your target repository. External ARM refers to a more lightweight approach that allows you to flow links to related artifacts in your source repository to a string or weblink field on your target artifact.
- **Synchronizing an Artifact ID or URL Reference:** In order to provide traceability, Tasktop affords you the ability to flow the ID or URL for the source artifact to a string or web link field on the target artifact, thus enabling you to easily navigate between the two. This page explains how to configure that scenario.

## Synchronizing Relationships

### Synchronizing Relationships

Tasktop affords you the ability to not only flow various artifacts between your collections, but also to mirror the relationships between those artifacts. This is referred to as Artifact Relationship Management (ARM). There are two types of ARM: Internal ARM and External ARM. We will outline both types below.

### *Synchronizing Internal Relationships*

Below, we'll outline an **Internal ARM** scenario where we flow Microsoft TFS features to Jira epics, in addition to the defects that block them, all while preserving the relationships between the artifacts within each internal system.



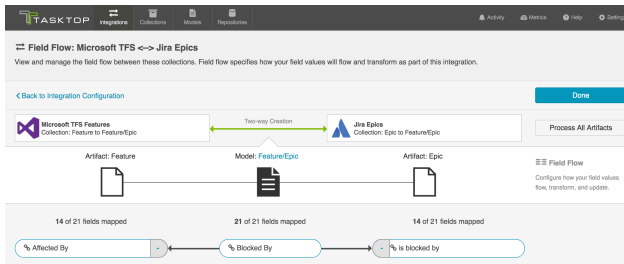
#### Internal Artifact Relationship Management (ARM)

The ability to maintain relationships between artifacts by flowing artifacts, along with their associated relationships, from one collection to another.

Here's how to configure this scenario in Tasktop:

💡 First, confirm that both repositories support relationships in our [Connector Documentation](#).

1. To flow these artifacts along with their relationships, we will need to configure two integrations (and four collections):
  1. Microsoft TFS Features Jira Epics, with 'blocked by' relationship field mapping
  2. Microsoft TFS Defects Jira Defects
2. First, configure your Feature Epics Synchronize Integration
  1. Ensure that your model includes a 'blocked by' relationships field
  2. On each Collection, click 'configure relationship types,' and map the 'blocked by' model field to the appropriate relationship field ('affected by' in TFS and 'is blocked by' in Jira).
  3. On your Integration Field Flow page, you will see the two relationship types mapped to one another.

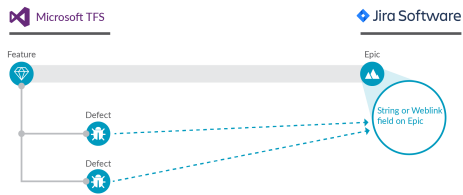


3. Next, configure your Defect Defect Synchronize Integration as you normally would.
4. Run both integrations. You will see your epics and features, and your defects, as well as *their relationships to one another* successfully flow as part of your integration.

💡 Note: If you are configuring an integration between different collections of the same repository (i.e. to flow artifacts from one project in Jira to another project in Jira), the best practice is to create two separate repository connections in Tasktop for the source repository and the target repository. This will eliminate errors encountered in Tasktop related to relationship fields.

#### Synchronizing External Relationships

If you'd like a more lightweight approach, you can configure the scenario below to flow the URL of the related artifact in the source repository to a weblink or string field in the target repository. This is what we refer to as **External ARM** (Artifact Relationship Management).



**External Artifact Relationship Management (ARM)**

The ability to maintain relationships between artifacts by flowing a URL for the related artifact to a string or weblink field.

Both internal ARM and external ARM are configured the same way with regard to the source collection: A relationship field in the source collection is mapped to a relationship field in the model.

The crucial difference is how the target collection is configured:

- For internal ARM, that relationship field in the model is then mapped to a relationship field in the target collection.
- For external ARM, that relationship field in the model is then mapped to a string field or weblink field in the target collection.

	Source Repository Field	Model Field	Target Repository Field
<b>Internal</b> Artifact Relationship Management (ARM)	Relationship Field	Relationship Field	Relationship Field
<b>External</b> Artifact Relationship Management (ARM)	Relationship Field	Relationship Field	String / Weblink Field

To configure External ARM in Tasktop, follow the instructions below:

💡 First, confirm that both repositories support the following in our [Connector Documentation](#):

For the source repository:

- Relationship field types are supported
- The related artifact type (whose URL you would like to flow) is supported, and provides a unique URL

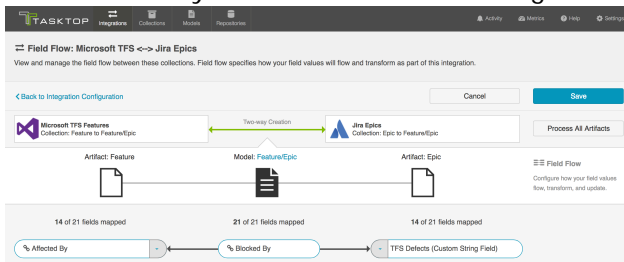
For the target repository:

- String fields or weblink fields are supported

*Instructions*

1. Here, our goal will be similar to the goal in the Internal ARM section: to flow Microsoft TFS Features to JIRA Epics. For any TFS Features that have related TFS Defects, instead of creating a related defect in Jira, we'd like to flow the URL for each defect to a custom string field on the Jira Epic.
2. In this scenario, we will only configure 2 collections (Microsoft TFS Features and Jira Epics), and 1 integration (Microsoft TFS Features Jira Epics), in contrast to the internal ARM scenario, which required two integrations. A second integration is not needed here, because we are not **creating** target defects in Jira. Rather, we are flowing the URL of the source defect to a custom field on the JIRA Epic.

3. To configure this scenario, create a synchronize integration for your main artifact type.
  1. In this example, we will flow Microsoft TFS Features to Jira Epics.
4. On the source collection (Microsoft TFS Features), configure a relationship mapping for the relationship type you'd like to flow.
  1. In this example, we will map "Affected by" relationship field to our 'blocked by' relationship field in the model.
5. On the target collection (Jira Epics), configure a mapping between the string or weblink field that you'd like to receive the URL, and the relationship field in the model that was mapped in the prior step.
  1. In this example, we will map the Jira custom string field, "TFS Defects" to the "blocked" relationship field in the model.
6. You'll see that your field flow for the integration looks like this:



7. When we run our integration, we will see that Microsoft TFS Features create Epics in Jira, AND that the related defects in Microsoft TFS flow their URLs to the Web Links field on the Jira Epic.

### Synchronizing an Artifact ID or URL Reference

### Synchronizing an Artifact ID or URL Reference

Imagine this scenario: You are flowing defects between two repositories: Jira and Jama. You'd like to have a way to know the ID, or URL, of the source artifact in Jira when viewing its target artifact in Jama (and vice versa). This will provide traceability between the source artifacts and the artifacts that have been created in your target repositories via your integration.

To set this up, you will need to configure two different field mappings in each collection:

- You will need to specify which field to pull the source artifact's ID (or URL) from
- You will need to specify which field to use to store the source artifact's ID (or URL), in your target repository



In the diagram above, you can see that Jira is flowing its ID field to a custom field in Jama, and that Jama is flowing its ID field to a custom field in Jira. In order to set up this integration, you will need to configure your model to accept that ID field. We'll walk through how to do that below.

The instructions below will walk you through how to set up this configuration for the ID field, but the same instructions will also apply for location/URL:

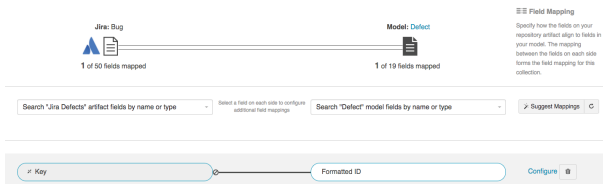
1. Go to the **Model** that you are utilizing in the integration. Ensure that your model includes the Formatted ID field.

We've also shown the 'Location' field below, for reference, as a similar process can be followed to flow the source artifact's URL to a field on the target artifact, for traceability.

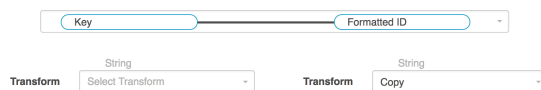


2. Go to the **Collections** screen for each of your repositories, and set up mapping to tell the integration where to pull the ID from:

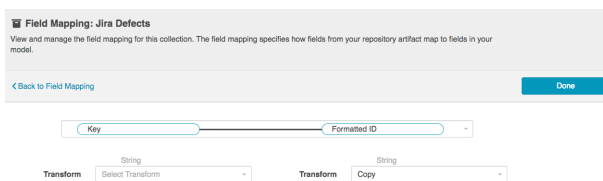
1. Map the Formatted ID model field to the corresponding field in your repository. This is the field that the collection will take the ID data from. Note that Formatted ID is called 'Key' in Jira, but may be referred to using a different name in a different repository (i.e. 'issue ID')

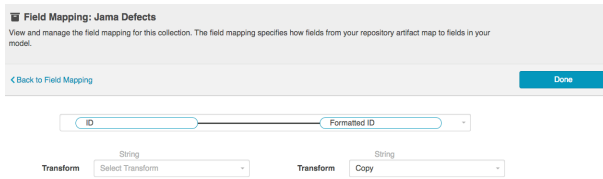


2. Click 'Configure' next to your mapping, and confirm that your Transforms are configured as shown below. The transform on the left should be 'None' (will display as 'Select Transform') and the transform on the right should be 'Copy.' This will tell the collection to *send* data from the Key field in your repository to the model, but not vice versa.



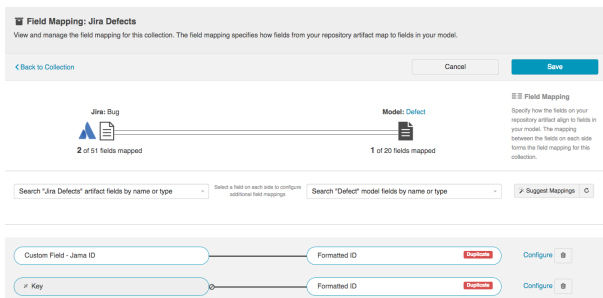
3. Repeat these steps in your other repository.
4. Here is how the mappings should look in each repository, for your source fields:





3. Now that our model is able to acquire ID data from each source repository, let's tell it where to store that data in the corresponding target repository. To do this, you will set up an additional mapping in each **Collection**:

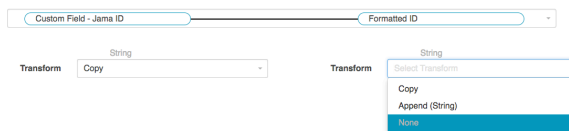
1. Navigate to one of your **Collections**.
2. Map the Formatted ID model field to your repository once more, this time to determine where you would like to **store** this data in your target repository. The field mapping page will tell you that this is a 'duplicate,' but that is ok!



In the image above, we have mapped 'formatted ID' to a custom field in Jira called 'Custom Field - Jama ID'. This is the field that the Jama Formatted ID data will flow to in Jira.

💡 Note: Do not click 'Save' yet. If you do, you will get an error. Continue to the next step below.

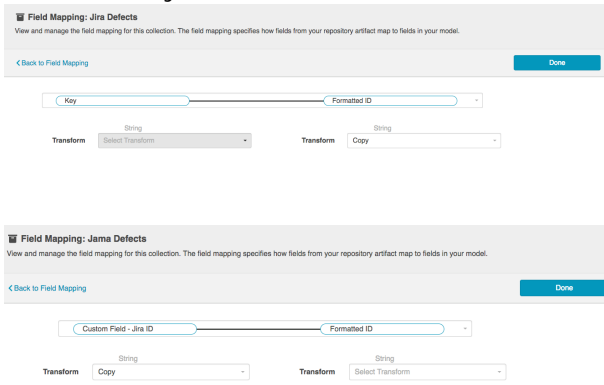
3. Click 'Configure' on the new mapping, and configure as shown below. This will tell the collection to take data from the model and send it to the 'Description' field, but not vice versa.



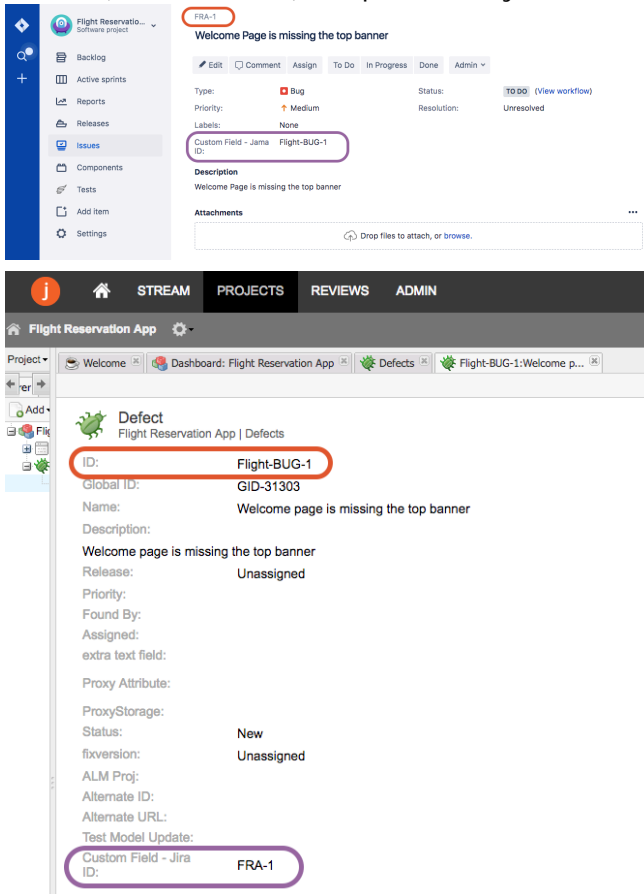
💡 Note: The transform on the left may be 'Copy,' 'Formatted String to Rich Text,' or some other transform depending on the field types of the repository field and model field. However, the important thing is that the transform on the right (on the model side) be set to 'None.' This ensures that data will only flow *into* the repository field, rather than *out* of it.

4. Save your mapping and collection.
5. Repeat these steps on your other collection.

6. Here is how your transforms should look in each collection, for your *target* fields:



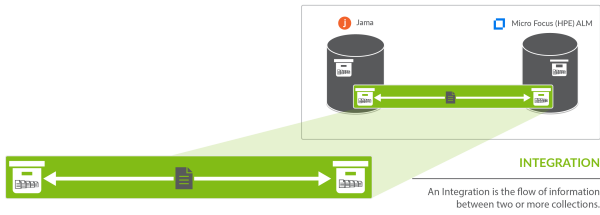
4. When you run the integration, the ID of the source artifact will now flow to a field on the target artifact (and vice versa), as specified in your field mapping:



## Container + Work Item Synchronization

What is an Integration?





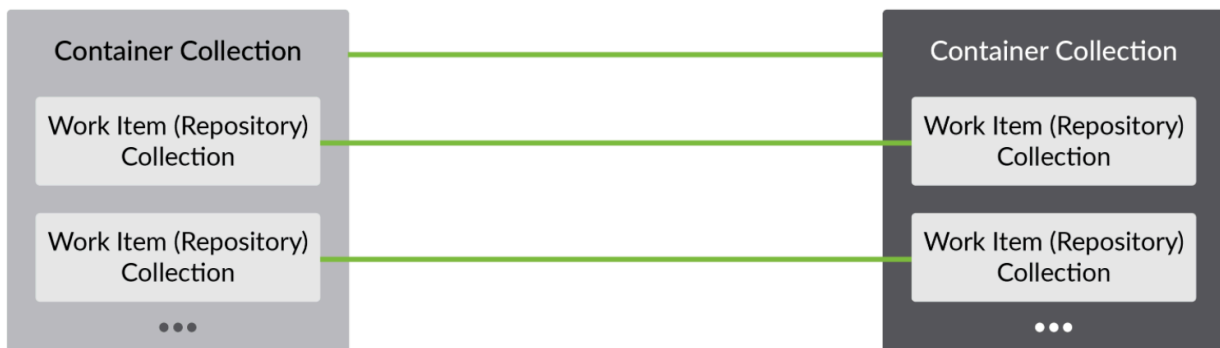
An *integration* is quite simply **the flow of information between two or more collections**. When you configure your integration, you can customize the field flow, artifact routing, artifact filtering, as well as enable or disable comment flow or attachment flow.

### What is a Container + Work Item Synchronization?

The Container + Work Item Synchronization template enables you to flow your folder structure from one repository to the other, along with any corresponding work items (such as defects, requirements, etc) that are contained within that structure. The term "folder" is used loosely, and can refer to many container types, such as folders, modules, or packages.

### Template Affordances

The Container + Work Item Synchronization template allows you to flow containers and their contained work items between two repositories. The integration will consist of two container collections and two (or more) work item collections from the same repositories.



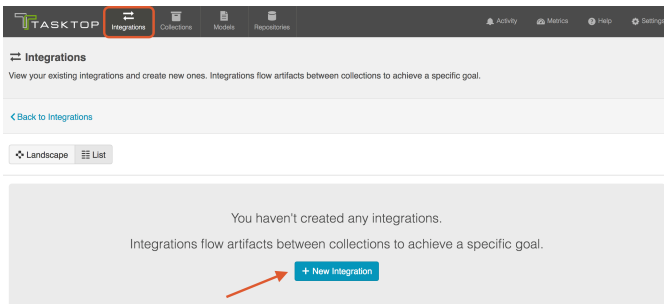
### How to Configure a Container + Work Item Synchronization Integration

#### Getting Started

Once you have your base repositories and collections set up, you can configure integrations to synchronize the artifacts in those collections.

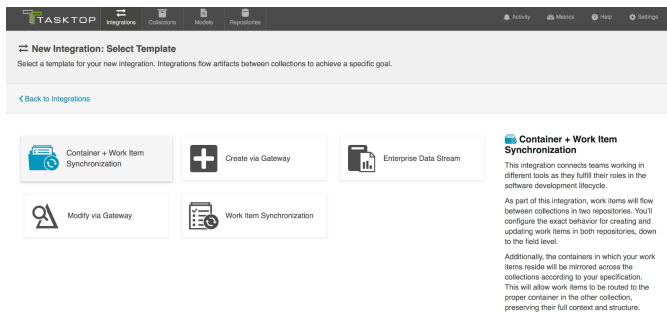
In this scenario, we'll show you how to configure an integration that flows containers (folders) along with the work items (requirements) contained within them, from a source repository to a target repository.

To configure your integration, select 'Integrations' at the top of the screen, then click '+ New Integration.'

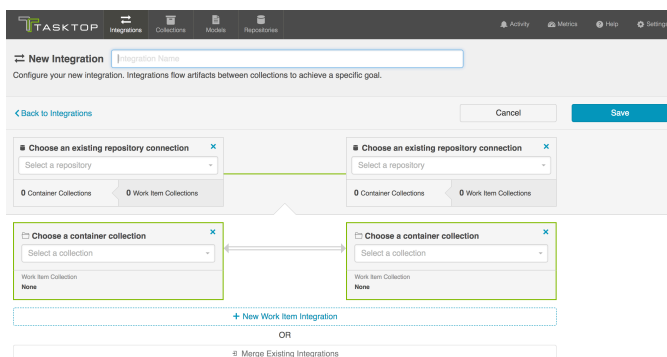


Select the 'Container + Work Item Synchronization' integration template.

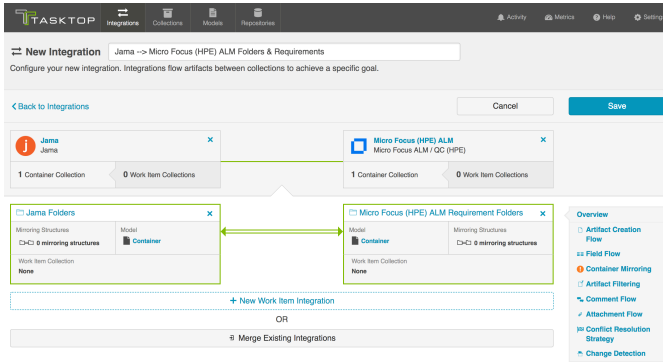
💡 Depending on the edition of Tasktop you are utilizing, you may not have all options shown here.



This will bring you to the New Integration Screen:



Name your integration and select your repositories and container collections, and then click 'Save.'



## Configuring your Container Integration

Configuring your Container Integration is very similar to configuring a [Work Item Synchronization](#). Please refer to that page for details, while taking note of the key differences outlined below.

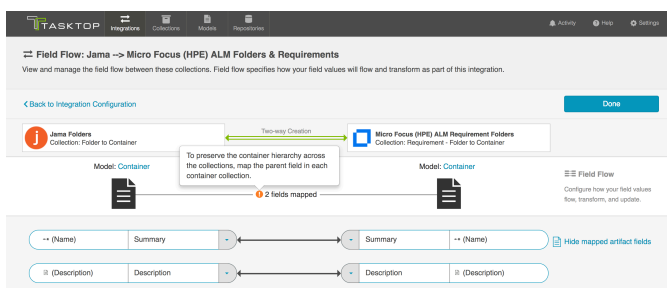
### Artifact Creation Flow

This process is the same as it is for a Work Item Synchronization. Refer to the [Artifact Creation Flow](#) page for details.

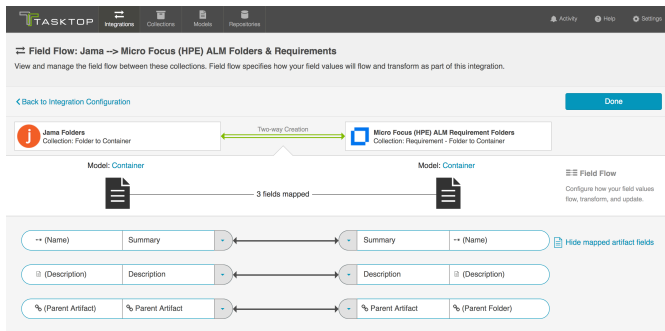
### Field Flow

Similar to a Work Item Synchronization, you can click 'Field Flow' to configure how fields will flow in your Container Integration. Typically, container integrations will flow significantly fewer fields than a work item integration.

You will also notice a warning reminding you to map the parent field in each container collection. Doing so will ensure that nested containers flow to your target collection along with the appropriate hierarchical structure.



Once we map the Parent field in each collection appropriately, you'll see that the warning disappears:



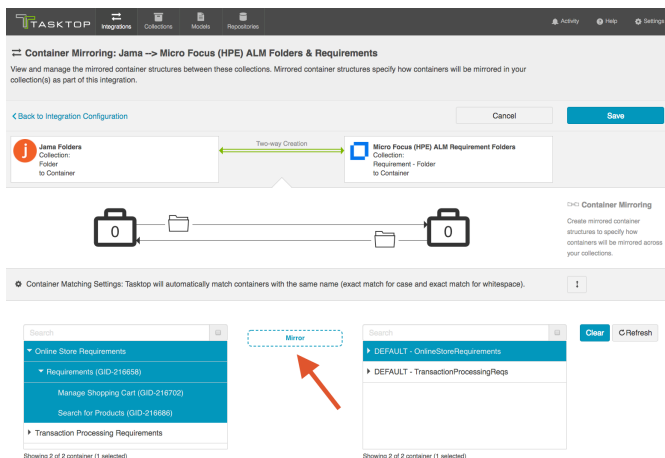
## Container Mirroring

Container Mirroring is similar to the concept of Artifact Routing (within a Work Item Synchronization), but it has some key differences.

On the Container Mirroring screen, you'll see the hierarchical organizational structure contained within each collection. Select the desired top level container on each side. Once joined, Tasktop will know to mirror the container structure underneath in the target collection.

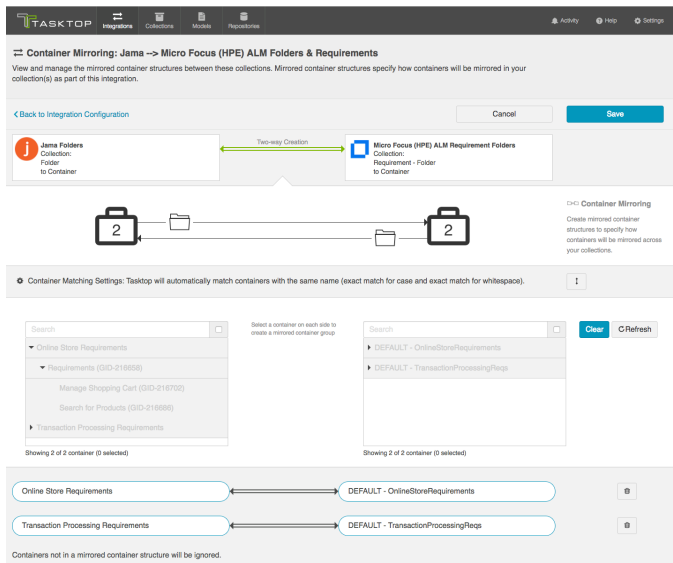
💡 Note that the container structure underneath the top level container will not display in Tasktop unless those container levels can also serve as 'top level containers' for the purposes of mirroring.

Unlike Artifact Routing, Container Mirroring pairs must be one-to-one.



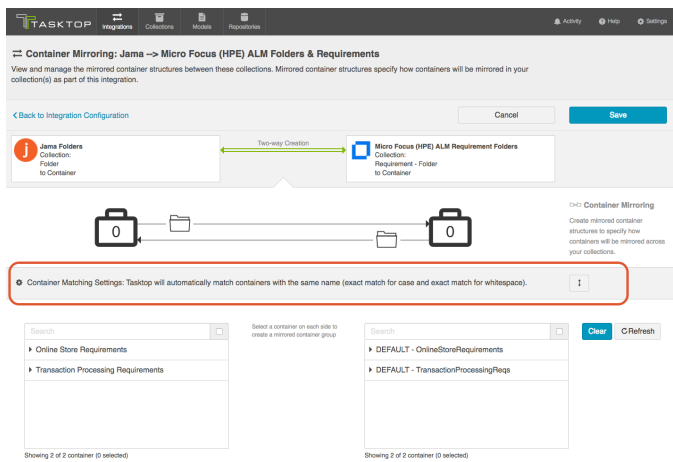
In the example above, any folders contained within the Online Store Requirements project in Jama will create corresponding folders in the Online Store Requirements project in Micro Focus ALM, and vice versa.

Once you've completed mapping your mirrored pairs, you'll see them in the grey sash below:

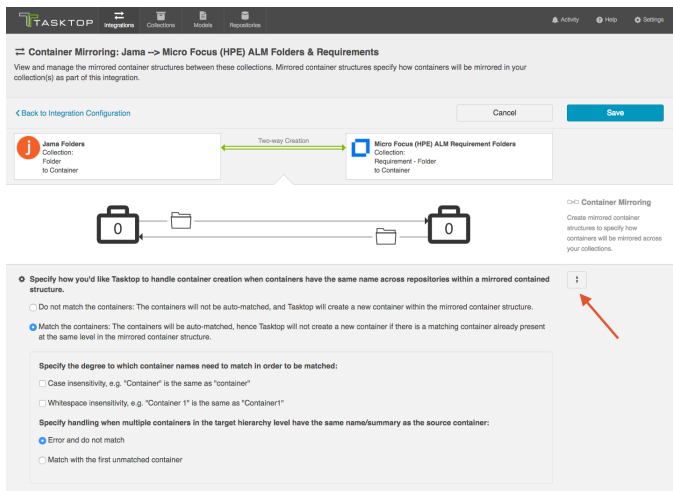


## Container Matching Settings

You'll also notice a Container Matching Settings sash:



Click the 'expand' button in order to configure your Container Matching settings



If you choose to 'match the containers,' Tasktop will proactively find any existing containers that have the same name (summary) across collections (so long as they are in the same level of the mirrored container structure) and match them. When Tasktop 'matches' two containers:

- No new container will be created in the target repository, as a 'matched' container already exists.
- Any work items contained within the matched containers will route to one another, unless the corresponding work item integration's artifact routing overrides that route.
- Any sub-containers beneath the matched containers will mirror one another.
- An event of type, 'associated artifacts,' will be displayed on the Activity screen indicating that the two containers were matched.

You will also be able to specify whether you'd like your matching strategy to be case sensitive or whitespace sensitive, and to specify how Tasktop should handle situations where there are multiple containers in the target hierarchy level that have the same name/summary as the source container.

When configuring a new integration, the container matching settings will default to 'match the containers' with 'error and do not match' selected.

#### **Artifact Filtering**

This process is the same as it is for a Work Item Synchronization. Refer to the [Artifact Filtering](#) page for details.

#### **Comment Flow**

This process is the same as it is for a Work Item Synchronization. Refer to the [Comment Flow](#) page for details.

#### **Attachment Flow**

This process is the same as it is for a Work Item Synchronization. Refer to the [Attachment Flow](#) page for details.

#### **Conflict Resolution Strategy**

This process is the same as it is for a Work Item Synchronization. Refer to the [Conflict Resolution Strategy](#) page for details.

#### **Change Detection**

This process is the same as it is for a Work Item Synchronization. Refer to the [Change Detection](#) page for details.

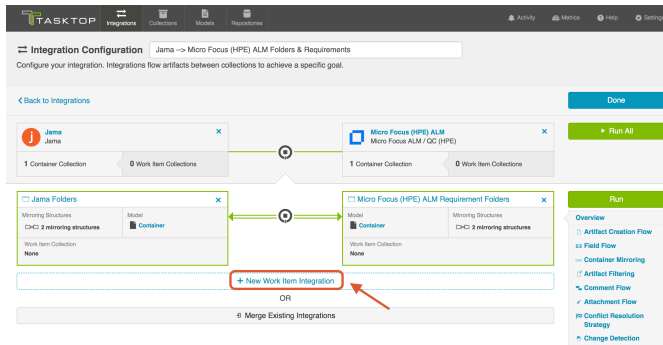
#### ***Configuring your Work Item Integration(s)***

To add your Work Item Integration(s), you have two options:

1. Creating a new Work Item Integration from this screen
2. Importing an existing Work Item Integration

## Creating a New Work Item Integration

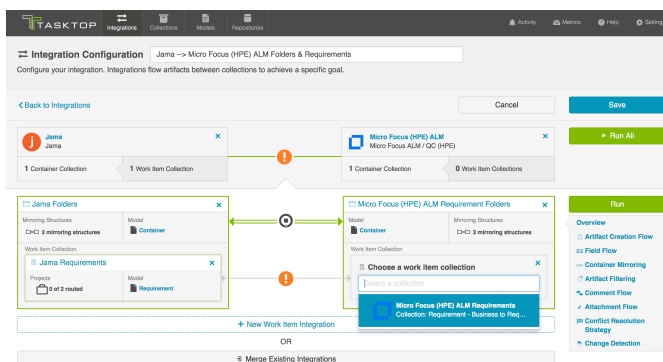
To create a new Work Item Integration, click '+ New Work Item Integration'



You will be prompted to select the existing work item collections you'd like to add to the integration.

To add a work item collection to the integration, it must:

- be from the same repositories as the container integration above
- include work item types that can take advantage of container mirroring (for example, in the scenario below, we will not be able to add a Micro Focus Defects collection, since only requirements can be routed to Micro Focus requirements folders.)



Once added, click 'Save.'

In general, you will configure this in the exact same way you configure a normal [Work Item Synchronization](#), with just a couple of key differences with regard to Artifact Routing outlined in the [Artifact Routing](#) Section, below. Please refer to the [Work Item Synchronization](#) page for details on all other aspects of configuration.

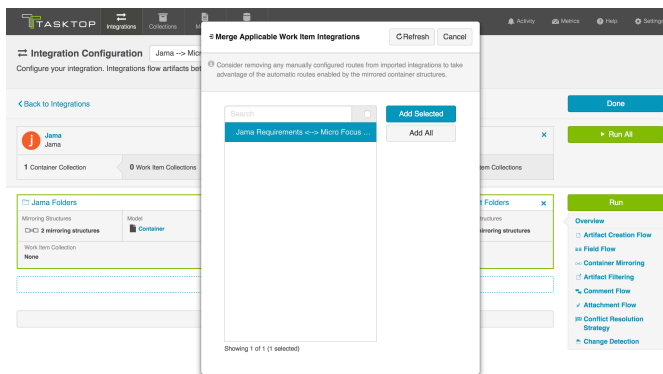
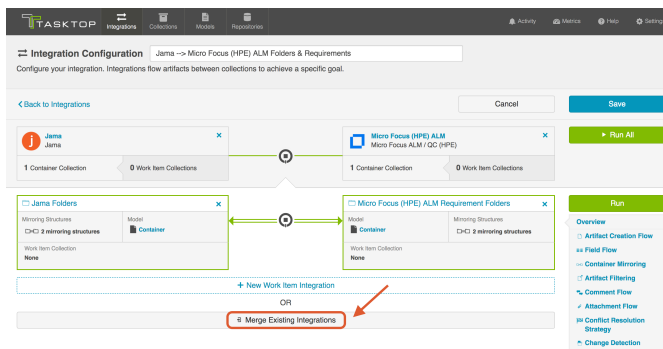
## Merging an Existing Work Item Integration

If you've already configured a Work Item Synchronization that you'd like to run as part of this integration, you can add it by clicking 'Merge Existing Integrations.'

⚠️ Note that once you merge your integration, it will cease to exist as an independent integration. You will only be able to access and configure it from this Work Item + Container Mirroring Integration.

To merge an existing integration, it must:

- be from the same repositories as the container integration above
  - 🌟 Note that the order matters – i.e. if the work item integration reverses which repository is on the left vs. right side, an error will occur. For this reason, it is very important to ensure that integrations are created consistently with regard to which repository is on each side.
- include work item types that can take advantage of container mirroring (for example, in the scenario below, we will not be able to add a Micro Focus Defects integration, since only requirements can be routed to Micro Focus requirements folders.)



When merging an existing integration, consider removing any manually configured routes from that imported integration to allow it to take advantage of the automatic routes enabled by the mirrored container structures.

After clicking 'Add Selected,' you'll see that integration added to the Integration Configuration screen.

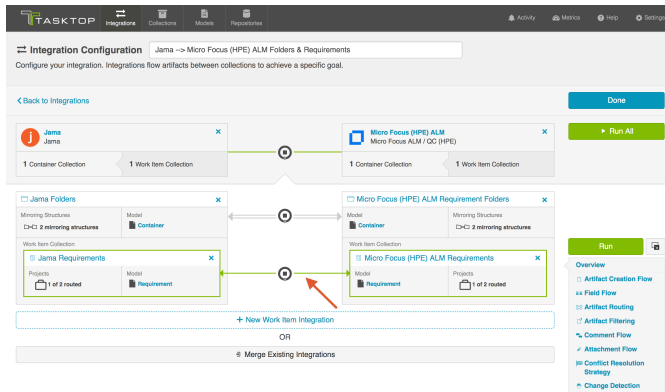
⚠️ If you'd like to detach the integration, follow the steps outlined in the 'Detaching a Work Item Integration' section below. Do not click the 'x's in the upper right corner of each collection, as this will remove those collections (along with any associated configuration, such as Artifact Routing) from the



integration permanently. Since the merged Work Item Synchronization only exists as part of the Container + Work Item Synchronization, any changes you make to that integration here will be permanent.

### Activating the Configuration Pane

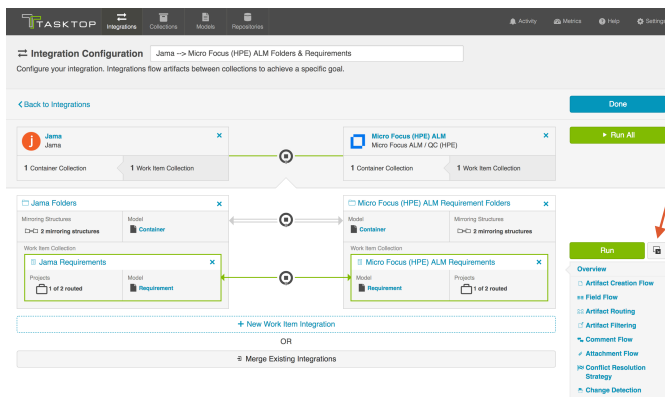
To activate the configuration pane for the integration you'd like to modify, highlight the integration by clicking its arrow. This will enable the configuration links for that particular integration.



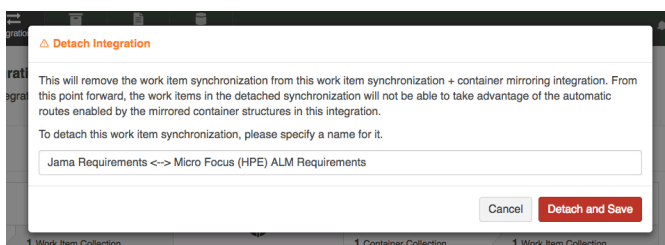
### Detaching a Work Item Integration

If you'd like to detach a Work Item Integration (so that it exists as an independent integration, accessible from the Integrations List page, rather than as part of this Work Item + Container Mirroring Integration), make sure the configuration pane for that integration is enabled (see steps above).

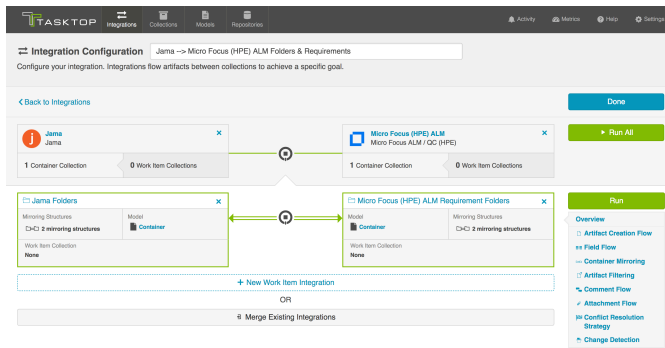
Next, click the 'Detach' button



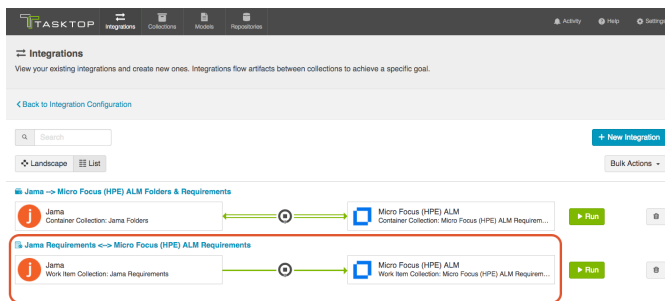
You will be prompted to name your integration:



You'll notice that the integration is no longer included as part of this Container + Work Item Synchronization:



You'll also notice that you can now access that integration from the Integration List view:

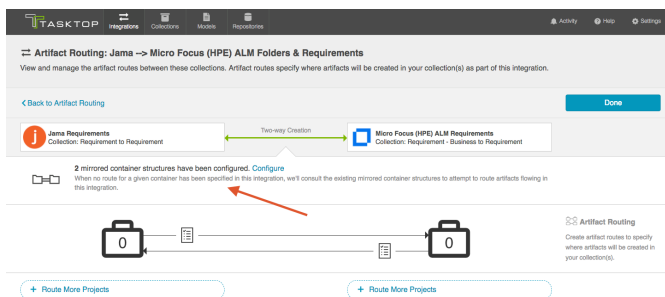


### Configuring Your Work Item Integration

In general, configuration for the Work Item Integration contained within your Container + Work Item Synchronization will be very similar to configuration for a typical [Work Item Synchronization](#), with the exception of a few key differences, outlined below. Please refer to the [Work Item Synchronization](#) page for details on all other aspects of configuration.


### Artifact Routing

On the Artifact Routing screen for your Work Item Integration, you will see a reference to the existing Container Mirroring configuration that was set up as part of the Container Integration.



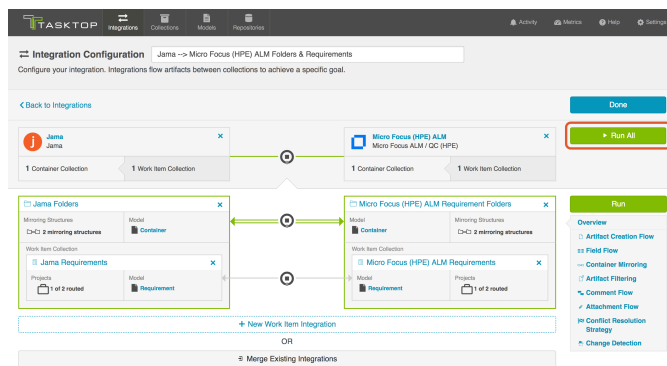
Where applicable, your work items will flow in accordance with the Container Mirroring that has been configured. In addition to the routing that is inherited based on Container Mirroring, Artifact Routing

can be configured on this page to determine where work items will flow with regard to containers not included in the Container Mirroring structure. If you configure Artifact Routing that contradicts the Container Mirroring configuration, the Artifact Routing configuration will take precedence when determining how work items will flow.

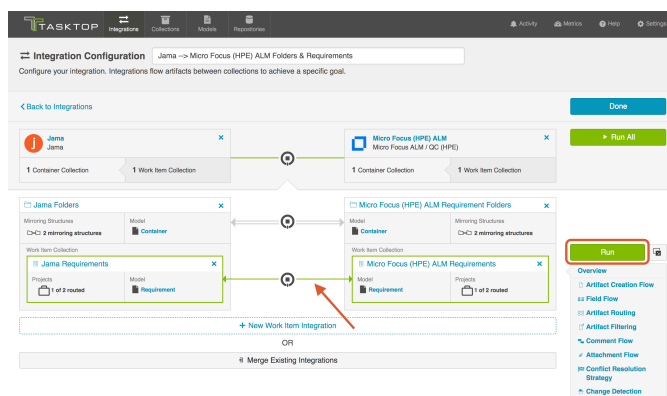
 **Note:** If you would like your artifact routing to match your container mirroring, but to only flow artifacts from a subset of those containers, that use case cannot be accommodated from the Artifact Routing screen here. To satisfy this use case, you will need to detach your work item integration from the Container + Work Item Synchronization. Once detached, you can configure Artifact Routing for the independent work item integration to successfully limit the containers utilized.

### Running your Integration

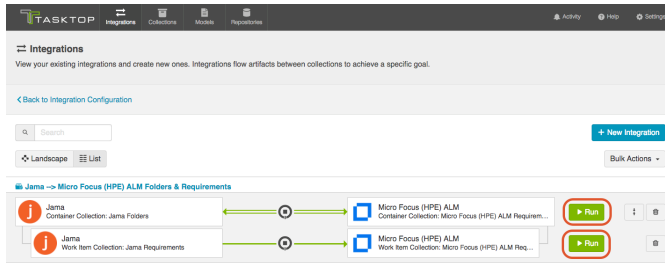
Since your Container + Work Item Synchronization technically consists of several independent, but interconnected integrations, you can select 'Run All' to run all integrations at once, or choose to run integrations independently.



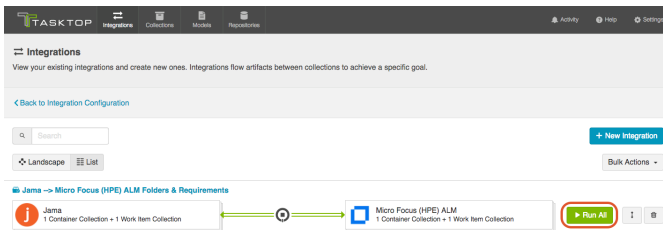
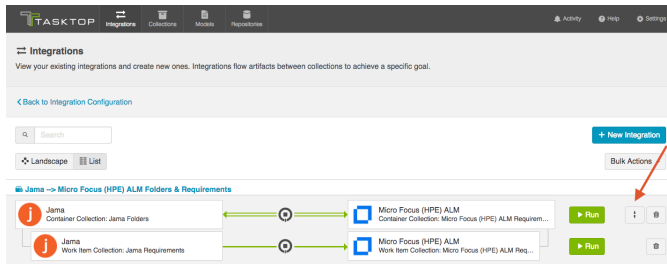
If for any reason you'd like to run an integration individually, activate that integration's configuration pane by clicking on it's arrows, and then click 'Run'



You can also view and run your integration(s) from the Integration List screen. On this screen, your integration will default to the expanded view, where you can run each integration individually:



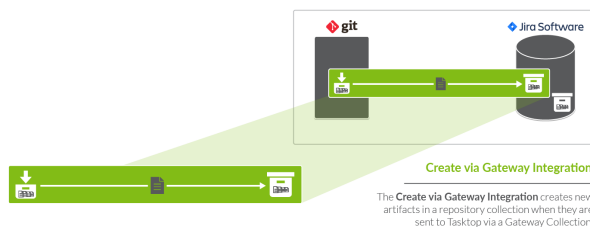
If you'd like to 'Run All,' you can collapse the view and then click 'Run All':



## Create via Gateway

*The Create via Gateway Integration Template is only available in Editions that contain the Gateway add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality.*

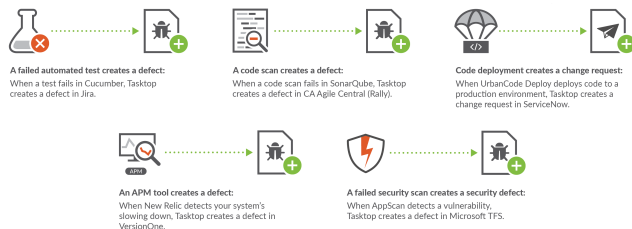
What is a Create via Gateway Integration?



An *integration* is quite simply **the flow of information between two or more collections**. A *Create via Gateway Integration*, specifically, creates new artifacts in a work item collection or a container collection that connects to a repository, such as Jira, when they are sent to Tasktop via a Gateway Collection. The Gateway Collection uses an inbound webhook to access event-based information in an external DevOps tool, such as Git or Jenkins.

These types of events are “fire and forget” - they create something new in your repository, but they don’t expect anything back. As such, they don’t mandate a full-blown two way synchronization; a lighter one-way integration can do the trick.

Here are some examples of what you can do with the Create via Gateway integration template:



When you configure a Create via Gateway Integration, you can customize the field flow, artifact routing, and artifact filtering of your integration.

## Video Tutorial

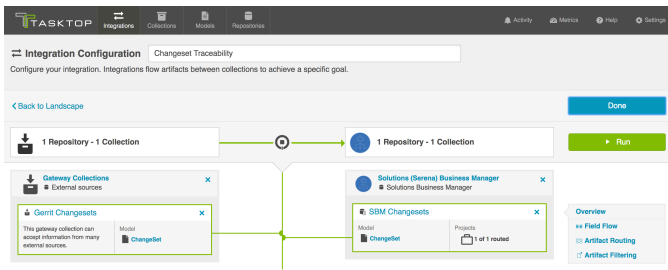
Check out the video below to learn how to configure the Create via Gateway Integration Template.

⚠️ This video assumes that you have already configured your repositories, models, and collections as outlined in the [Quick Start Guide](#).

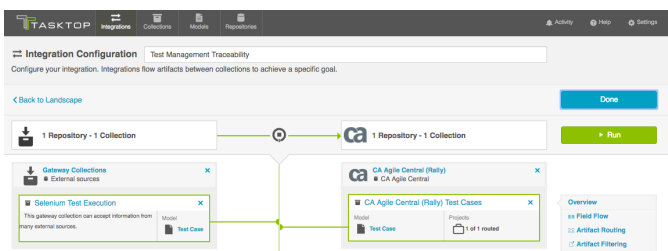
## Use Case and Business Value

The Create via Gateway integration creates traceability between artifacts across the software development lifecycle. New artifacts will be created in a work item (repository) collection or container (repository) collection when artifacts are sent to Tasktop via a gateway collection. Optionally, these newly-created artifacts can be related to already-existing artifacts in the same repository.

For example, if your development team uses Gerrit for source code management and Solutions Business Manager (formerly Serena Business Manager) for Agile story management, you can set up an integration that would trigger the creation of changesets in SBM whenever changesets were created in Gerrit. And if the changesets in Gerrit identify the stories in SBM to which they pertain, Tasktop would find the already-existing story in SBM and create a relationship between that story and the newly created changeset in SBM.



Additionally, if your QA team uses a tool like Selenium for test execution, and a tool like CA Agile Central (Rally) for test management, you can set up an integration that would trigger the creation of test results in CA Agile Central (Rally) when test results are created in Selenium. And if the test results from Selenium identify the tests in CA Agile Central (Rally) which they cover, Tasktop would find the already-existing test and create a relationship between the two artifacts.



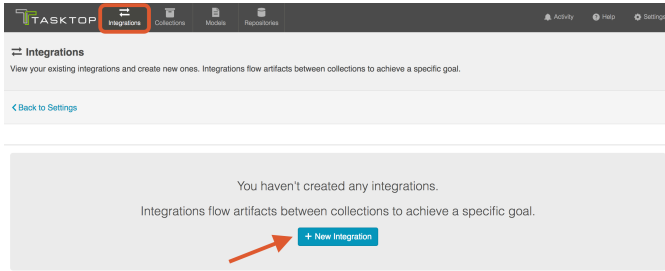
### Template Affordances

The Create via Gateway Integration Template allows you to flow artifacts from a single gateway collection into a single work item or container collection that connects to a repository. When a new artifact is sent to Tasktop via our REST API, an artifact will be created in the target work item or container collection.



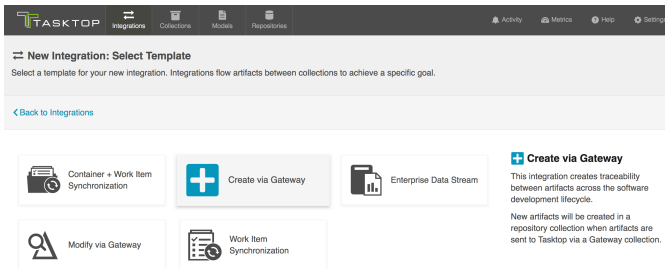
### How to Configure a Create via Gateway Integration

To configure your integration, select 'Integrations' at the top of the screen, then click 'New Integration.'

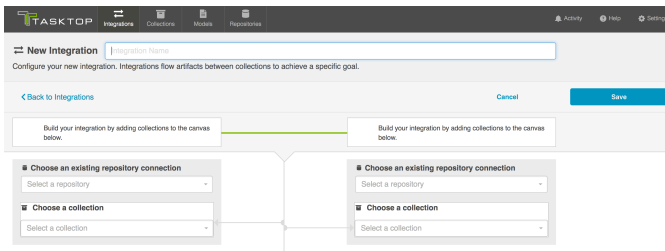


Select the 'Create via Gateway' template.

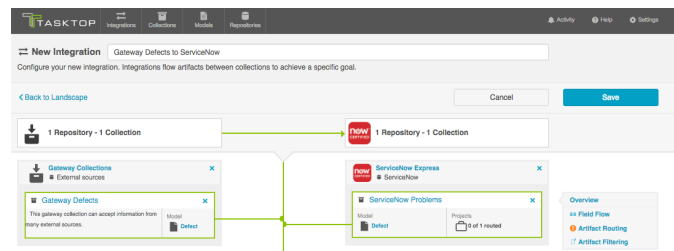
💡 Depending on the edition of Tasktop you are utilizing, you may not see all options shown below.



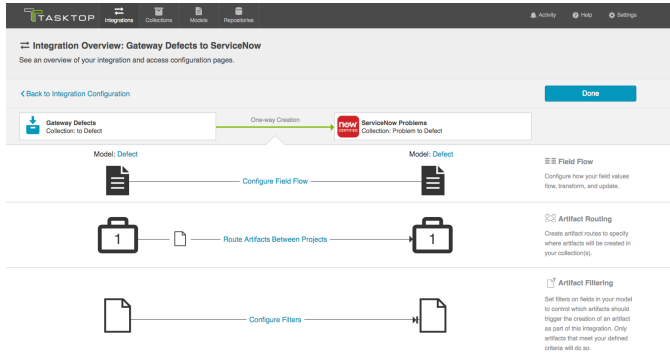
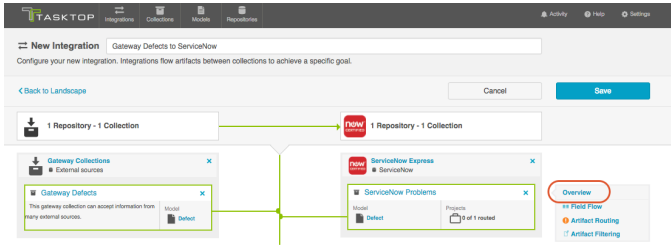
This will bring you to the New Integration Screen:



Name your integration and select your repositories and collections:



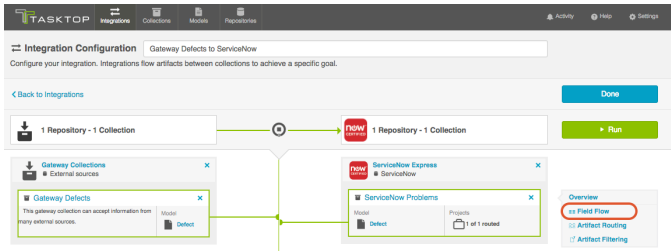
You can click the 'Overview' link on the right side of the Integration Page to get to the main display page (shown in the second screen shot):



## Field Flow

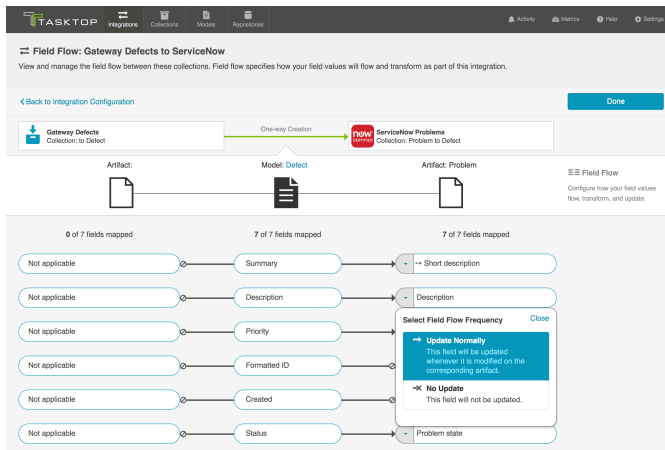
The field flow configured for a given integration specifies which fields should flow in that integration. For Create via Gateway integrations, you can choose to flow a given field (Update Normally) or to not flow a given field (No Update).

To get to the Field Flow screen, click 'Field Flow' on the right pane of the Integration Configuration screen:



You will be directed to the Field Flow Screen:













You can choose to flow a field ('update normally') or not flow it ('no update'). You'll notice that field flow goes in one direction only - from the gateway collection *into* the repository or database collection.

You can see the names of the mapped artifact fields for each collection on the far left and far right, with the model fields displayed in the middle.

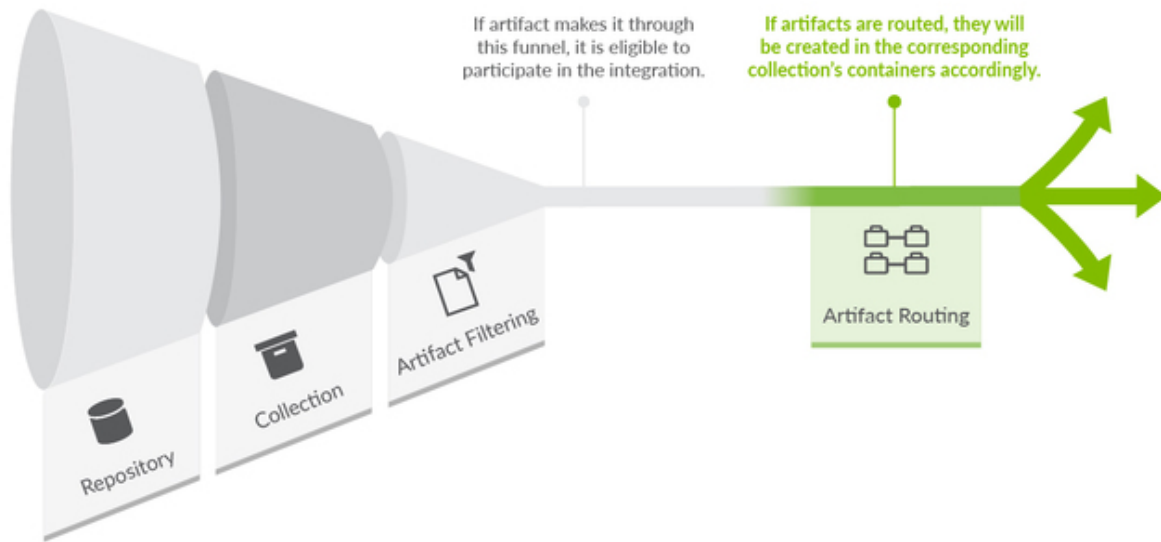
### Field Flow Icons

On the Field Flow page, you will see a number of icons, which will help you understand any special properties or requirements for each field. If you hover your mouse over an icon, you will see a pop-up explaining what the icon means. You can also review their meanings in the legend below:

Icon	Meaning
	<p>A constant value will be sent.</p> <p>Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a constant value will be sent to your model. This means that any time this collection is integrated with another collection, the <i>other</i> collection will receive this constant value for the field in question.</li> <li>• If the icon is on the side of the model, this means a constant value will be sent to your collection. This means that any time this collection is integrated with another collection, that <i>this</i> collection will receive this constant value for the field in question.</li> </ul>
	<p>A state transition will be utilized. Note that:</p>

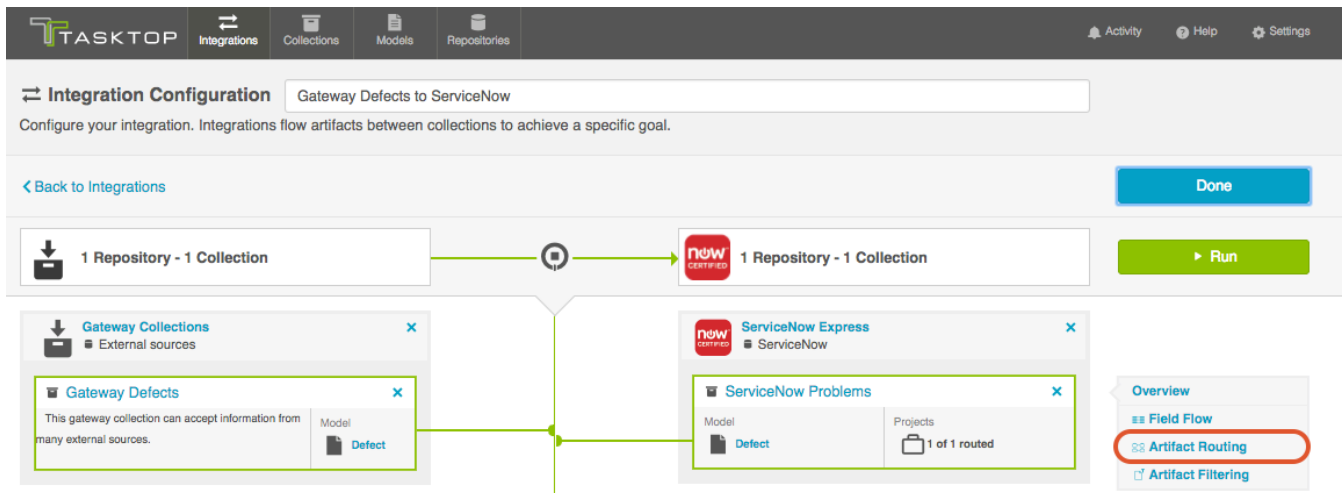
	<ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a <b>state transition graph</b> is being utilized.</li> <li>• If the icon is on the side of the model, this means that a <b>state transition extension</b> is being utilized.</li> </ul> <p> Note that Tasktop will update the field flow frequency for fields utilizing state transitions to 'no update.' This is because they are updated via the transition and not via normal 'field flow.' Do not modify the field flow frequency for this field.</p>
	Collection field is read-only and cannot receive data
<p style="text-align: center;">← *</p> <p style="text-align: center;">* →</p>	To create artifacts in your collection, this field must be mapped to your model.
	This is a required field in your model; it must be mapped to your collection.
	This field will not be updated as part of your integration, due to how you have configured it. This field flow configuration can be changed if you'd like.
	This field will not be updated as part of your integration because the mapping would be invalid. You do not have the option of changing this.
	This field will update normally as part of your synchronize integration; this means it will be updated whenever it is modified on the corresponding artifact.

### Artifact Routing



Artifact Routing is needed when artifacts are being created as part of an integration. In addition to knowing the repository in which artifacts should be created, Tasktop also needs to know which container (i.e. project, module, folder, etc) a given artifact should be created in. Specifying the artifact routing does this.

To configure Artifact Routing, select 'Artifact Routing' on the right pane of the Integration Configuration screen.

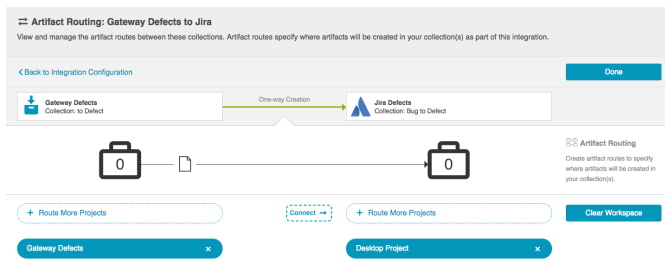


### Static Artifact Routing

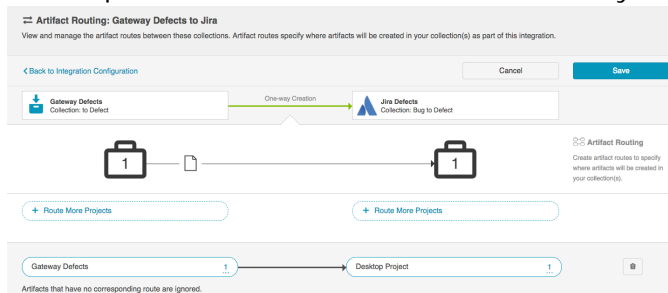
In some cases, all artifacts in a gateway collection are routed to just one project in the target collection. In these instances, you can configure what is known as 'static artifact routing' (also known as 'explicit artifact routing').

To configure a static artifact route, use the "Route More Projects" buttons to add projects from your collections to your workspace and connect them using the "Connect" button.

Note: Static artifact routes can have one or more source projects, but only a single target project.



In the example shown below, artifacts from Gateway Defects will be created in the Desktop Project in



Jira.

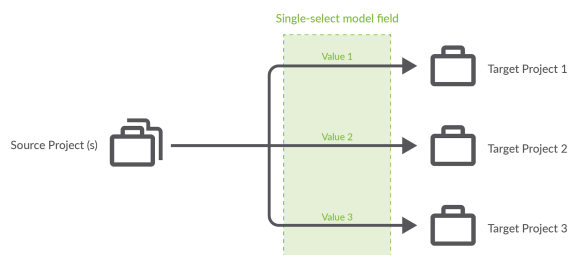
### Conditional Artifact Routing

Check out the video below to learn more about Conditional Artifact Routing:

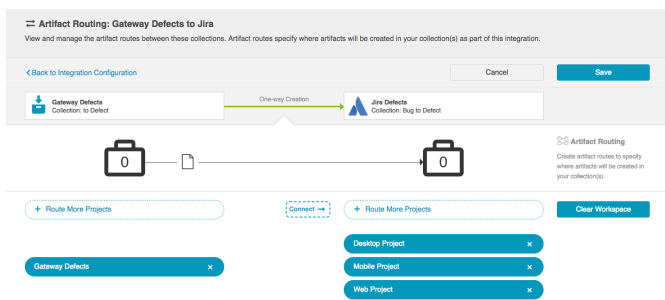
In other cases, you may wish to route your gateway artifacts to multiple projects in the target collection. In this scenario, a field value on the artifact is used to determine which project in the target collection the artifact should route to.

In these instances, you will configure what is known as **conditional artifact routing** to determine which project each artifact is created in within your target repository. Conditional artifact routing (also known as 'dynamic artifact routing') can be used to inspect a single-select field of an artifact and, depending on its value, to route that artifact to the appropriate project in the target collection.

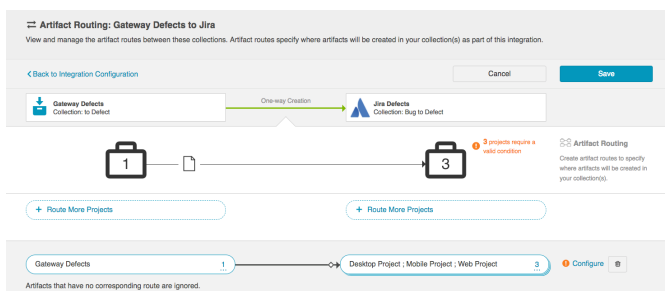
Conditional artifact routes can have one or more source projects, and always have multiple target projects.




To create a conditional artifact route, use the "Route More Projects" buttons to add projects from your collections to your working space and connect them using the "Connect" button.



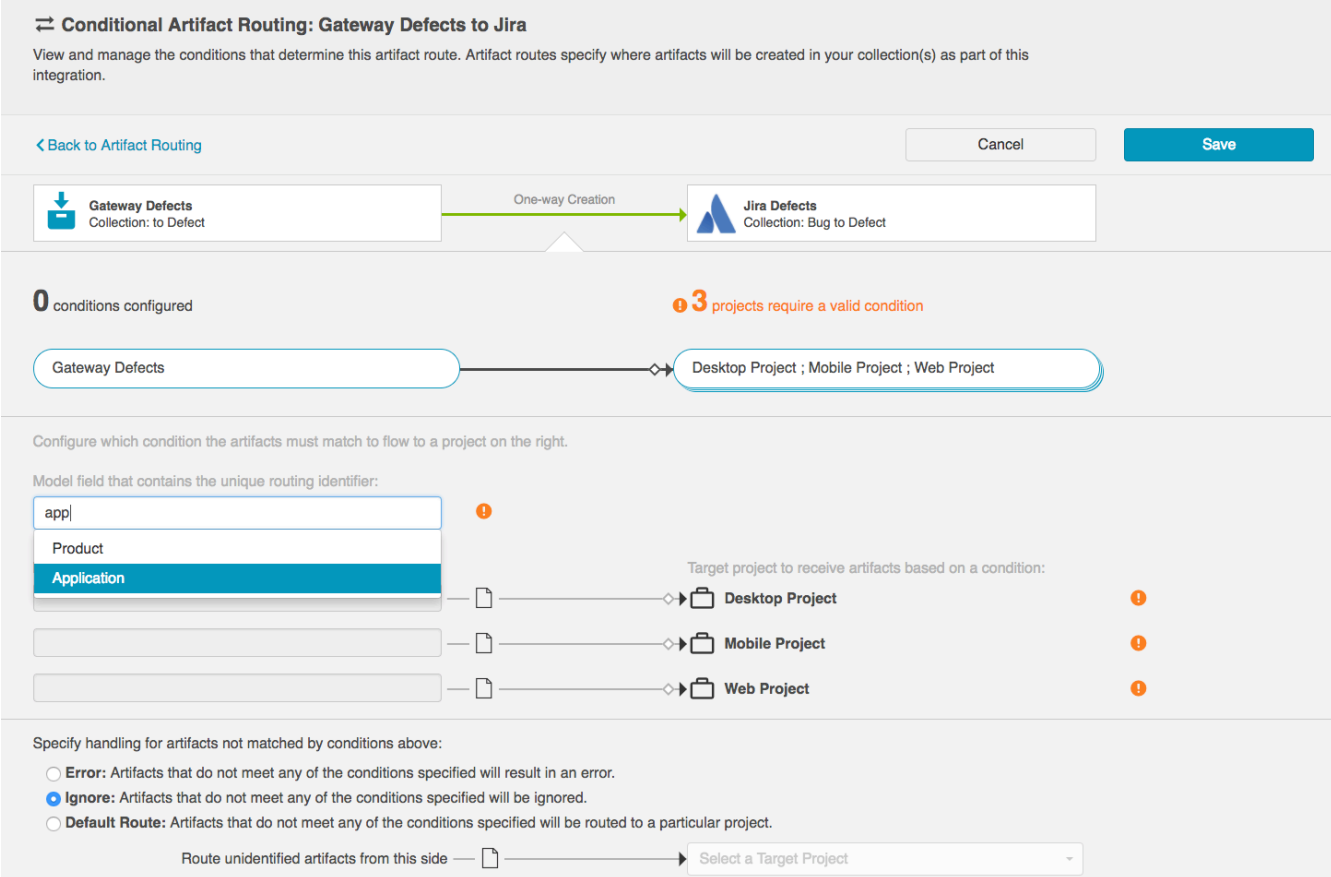
Notice that after you've created your conditional artifact routing group, you'll be prompted to set the conditions that will define that route.



Click 'Save,' and then click 'Configure.' You'll be brought to the Conditional Artifact Routing screen. Here you'll start by selecting the model field on the artifact that you would like to use to determine your artifact route.

 Note: Conditional Artifact Routes can only be configured based on **single-select fields** in your model.

In the example below, the field "Application" contains the unique values that should determine the project an artifact will be created in in Jira.



**Conditional Artifact Routing: Gateway Defects to Jira**  
View and manage the conditions that determine this artifact route. Artifact routes specify where artifacts will be created in your collection(s) as part of this integration.

[Back to Artifact Routing](#) Cancel Save

Gateway Defects Collection: to Defect → One-way Creation → Jira Defects Collection: Bug to Defect

0 conditions configured 3 projects require a valid condition

Gateway Defects → Desktop Project ; Mobile Project ; Web Project

Configure which condition the artifacts must match to flow to a project on the right.

Model field that contains the unique routing identifier:

app	!
Product	
<b>Application</b>	

Target project to receive artifacts based on a condition:

	Desktop Project	!
	Mobile Project	!
	Web Project	!

Specify handling for artifacts not matched by conditions above:

- Error:** Artifacts that do not meet any of the conditions specified will result in an error.
- Ignore:** Artifacts that do not meet any of the conditions specified will be ignored.
- Default Route:** Artifacts that do not meet any of the conditions specified will be routed to a particular project.

Route unidentified artifacts from this side —

After you select the model field, you can identify one or more value to correspond to each target project. You can also use the 'Manage Values' link to select from a list of values.

### Conditional Artifact Routing: Gateway Defects to Jira

View and manage the conditions that determine this artifact route. Artifact routes specify where artifacts will be created in your collection(s) as part of this integration.

[Back to Artifact Routing](#) Cancel Save

Gateway Defects Collection: to Defect → One-way Creation → Jira Defects Collection: Bug to Defect

2 conditions configured 1 project requires a valid condition

Gateway Defects → Desktop Project ; Mobile Project ; Web Project

Configure which condition the artifacts must match to flow to a project on the right.

Model field that contains the unique routing identifier: Application

Model field equals one or more unique values: Desktop | Mobile | Specify Unique Values... | Web

Target project to receive artifacts based on a condition: Desktop Project | Mobile Project | Web Project

Once you've done this, you'll see your full conditional artifact routing group:

### Conditional Artifact Routing: Gateway Defects to Jira

View and manage the conditions that determine this artifact route. Artifact routes specify where artifacts will be created in your collection(s) as part of this integration.

[Back to Artifact Routing](#) Cancel Save

Gateway Defects Collection: to Defect → One-way Creation → Jira Defects Collection: Bug to Defect

3 conditions configured All projects can receive artifacts.

Gateway Defects → Desktop Project ; Mobile Project ; Web Project

Configure which condition the artifacts must match to flow to a project on the right.

Model field that contains the unique routing identifier: Application

Model field equals one or more unique values: Desktop | Mobile | Web

Target project to receive artifacts based on a condition: Desktop Project | Mobile Project | Web Project

You can also specify how you'd like to handle artifacts that do not meet any of the conditions specified by selecting one of the options provided at the bottom of the screen:

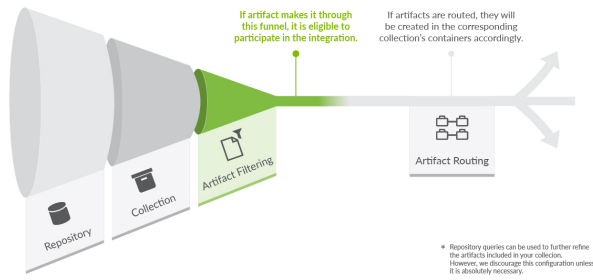
Specify handling for artifacts not matched by conditions above:

- Error: Artifacts that do not meet any of the conditions specified will result in an error.
- Ignore: Artifacts that do not meet any of the conditions specified will be ignored.
- Default Route: Artifacts that do not meet any of the conditions specified will be routed to a particular project.

Route unidentified artifacts from this side  → Select a Target Project

## Artifact Filtering

When configuring your integration, you have several options available to refine which artifacts are eligible to flow. The final mechanism available is *artifact filtering*, which is configured at the Integration level.



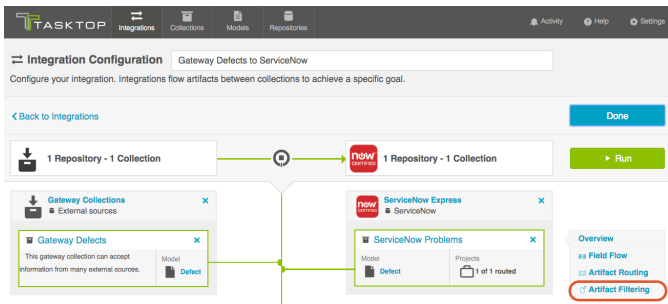
*Artifact Filtering* enables you to set filters in order to limit which artifacts are eligible to flow in an integration.

To use a field for artifact filtering, it must:


- Be a part of your model, and be mapped to the collection you are filtering from
- Be one of the following field types:
  - Single Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Multi-Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Date
  - Date/Time
  - Duration
  - String

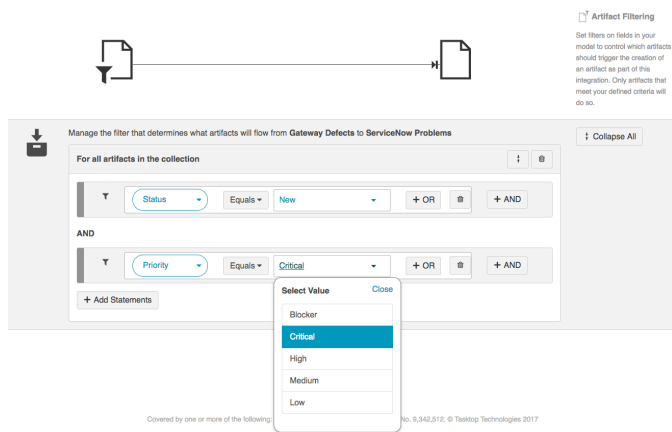
To configure *Artifact Filtering*, select 'Create filters (optional)' from the Integration Configuration Overview screen, or select 'Artifact Filtering' from the right pane of the Integration Configuration screen.:





This will lead you to the Artifact Filtering Configuration screen, where you can configure one or more criteria for artifact filtering.

 You can click the 'Collapse All' button to view an easier-to-read summary of your artifact filtering statements.



### ***Running your Integration***

There are two ways to start or stop your integration:

#### **From the Integration Configuration Screen**

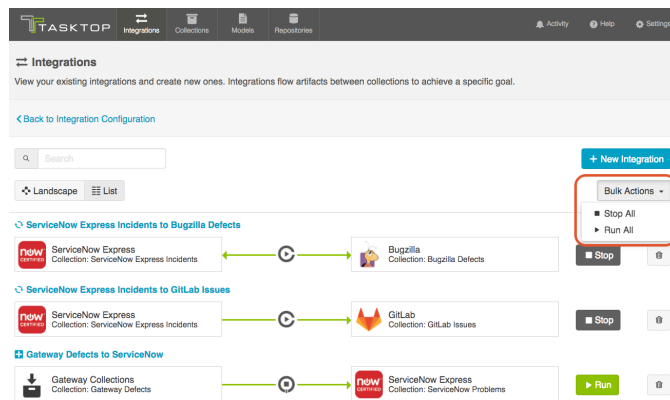
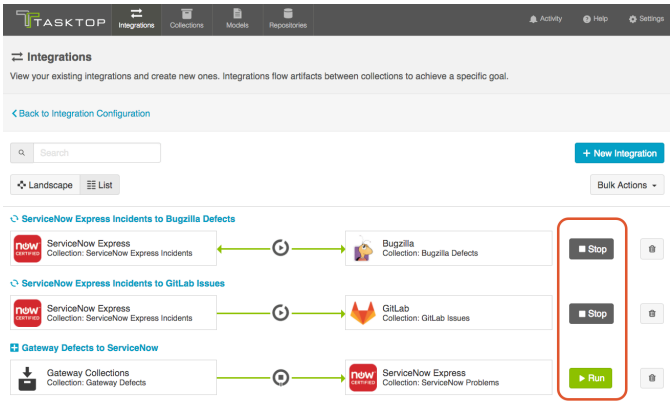
Simply click the 'Run' button to run the integration, and the 'Stop' button to stop the integration.

The screenshot shows the 'Integration Configuration' page for 'Gateway Defects to ServiceNow'. The top navigation bar includes 'TASKTOP', 'Integrations', 'Collections', 'Models', and 'Repositories'. The main header shows the integration name and a brief description: 'Configure your integration. Integrations flow artifacts between collections to achieve a specific goal.' Below this, there are navigation links for '< Back to Integrations' and a 'Done' button. The central part of the page features a flow diagram with two main components: '1 Repository - 1 Collection' on the left and '1 Repository - 1 Collection' on the right. The left component is connected to a 'Gateway Collections' panel containing 'Gateway Defects' (Model: Defect). The right component is connected to a 'ServiceNow Express' panel containing 'ServiceNow Problems' (Model: Defect, Projects: 1 of 1 routed). A green arrow points from the left to the right. On the far right, a 'Run' button is highlighted with a red border. A sidebar on the right contains 'Overview', 'Field Flow', 'Artifact Routing', and 'Artifact Filtering'.

This screenshot is identical to the one above, showing the 'Integration Configuration' page for 'Gateway Defects to ServiceNow'. The main difference is that the 'Run' button is now a grey 'Stop' button, which is highlighted with a red border. The rest of the interface, including the flow diagram and navigation elements, remains the same.

### From the Integrations List Page

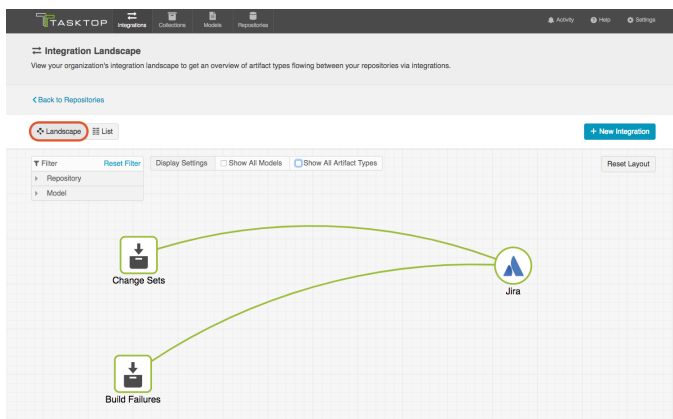
Click 'Run' or 'Stop' next to each integration you would like to update. You can also use the 'Bulk Actions' button to run or stop all integrations.

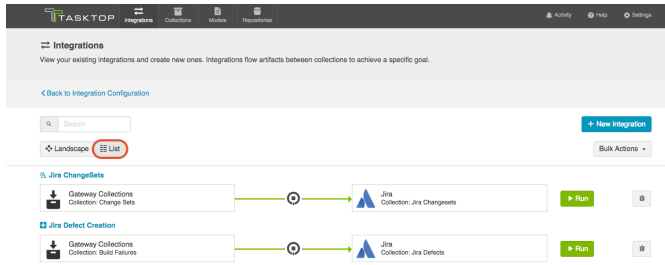


## Viewing Your Integrations

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

When viewing your integrations, you have the option of viewing them in either Landscape or List mode.





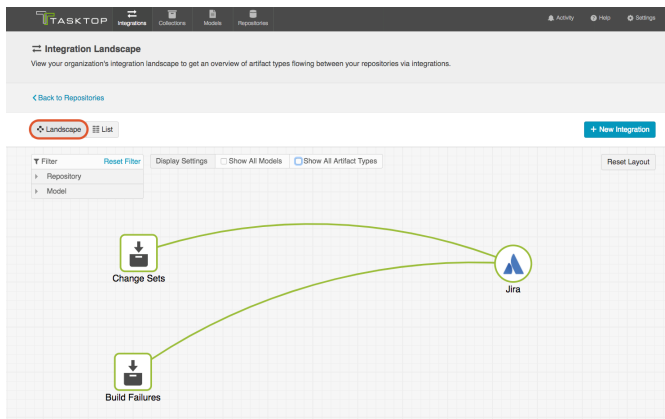
## Landscape View

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

Learn more about the Integration Landscape View in the video below:

Tasktop will default to the Landscape View, which enables you to visualize your entire integration landscape and see how your integrations relate to one another. Use our built-in filters to see as little or as much information as you'd like!

Here's a simplified view:

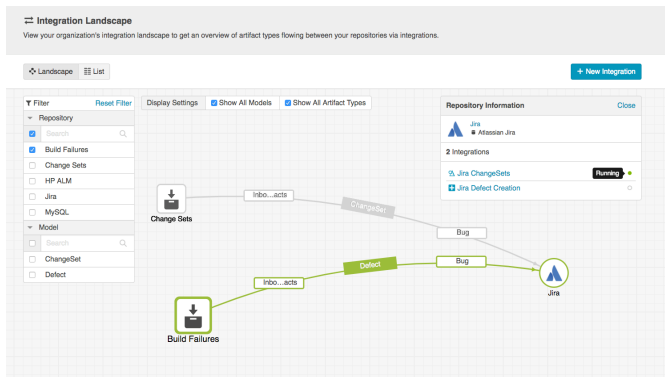


If you'd like to see additional information, you can utilize the filters, or click on a repository node to modify which information is shown.

Some examples of additional information you can see are:

- Models
- Artifact Types
- Artifact Creation Directionality Arrows
- List of all relevant integrations (see this by clicking on the repository node)
  - Indicator of whether each integration is running or not

Here's an example of a more detailed view:

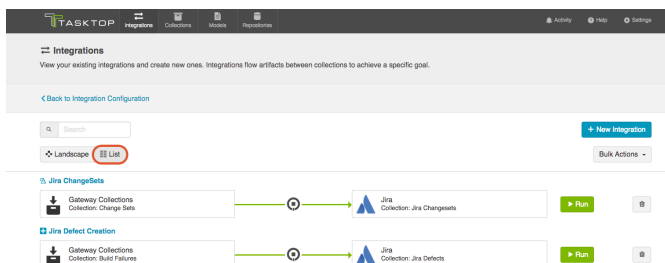


## List View

If you'd like, you can toggle to List View, which will show you a list of all integrations you have created.

You can use this view to:

- Start an Integration
- Stop an Integration
- Delete an Integration
- Click into an Integration and modify its configuration



## Tips and Tricks

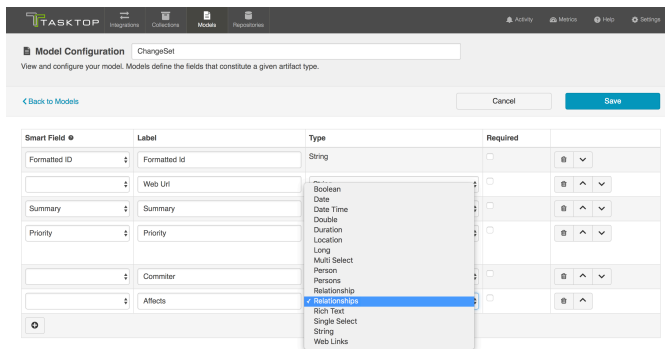
### Creating Relationships Between Newly Created Artifacts and Existing Artifacts

If you'd like to create relationships between your newly created artifacts and existing artifacts in the same repository, please follow the additional steps listed below:

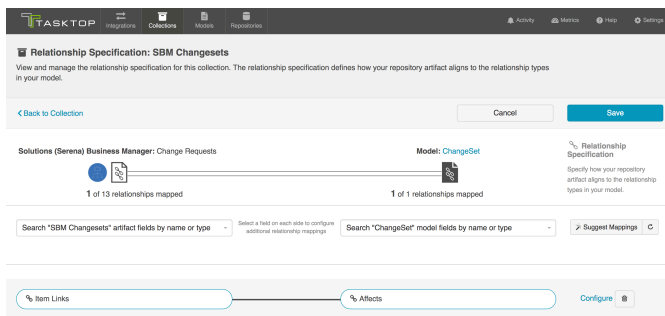
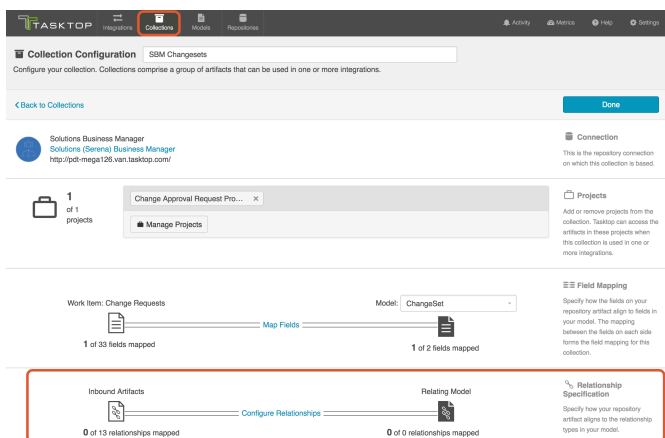
**At the Model level:** When creating your model, you can create a field that is of type "relationship" or "relationships". You should use "relationship" when the newly-created artifact can only relate to one other artifact and "relationships" when the newly-created artifact can relate to multiple artifacts.

For example, the relationship field type, "Parent," should generally be singular, as most artifacts usually only have a single parent. However, if the relationship field type is called "Blocks", it can likely be plural, as one artifact can block many artifacts.

In the use case example described at the top of this page, I want the relationship to be “Affects” because any incoming changeset can affect many stories. So I’ll configure a *relationships* field.



**At the Repository Collection level:** When creating your repository collection, you will need to map a field in your repository to the relationship(s) field in your model. So, in the same example, if you want the relationship between the new changeset and the existing story to be “affects”, but the relationship is actually called “items linked” in SBM, you would need to map those two fields. You’ll need to do this for each relationship type configured in your model.



**At the Gateway Collection Level:** When creating your gateway collection, you will see that for each model field that is of relationship(s) type, you must specify the target repository that contains the related artifact(s). Once this is selected, the information needed for Tasktop to successfully locate the artifact will be added to the example payload.

**Gateway Collection** Gerrit Changesets

View your existing collections and create new ones. Collections comprise a group of artifacts that can be used in one or more integrations.

[Back to Collections](#) Done

Path:

Token:

Model:

Payload Transformation:

Relationship Field Configuration

Affects:

Access Details

URI:

Method:

Content-Type:

Example Payload

```
{
  "formatted_id": "String",
  "web_url": "String",
  "summary": "String",
  "committer": "userId",
  "affects": []
}
```

**Gateway Collection** Gerrit Changesets

View your existing collections and create new ones. Collections comprise a group of artifacts that can be used in one or more integrations.

[Back to Collections](#) Done

Path:

Token:

Model:

Payload Transformation:

Relationship Field Configuration

Affects:

Access Details

URI:

Method:

Content-Type:

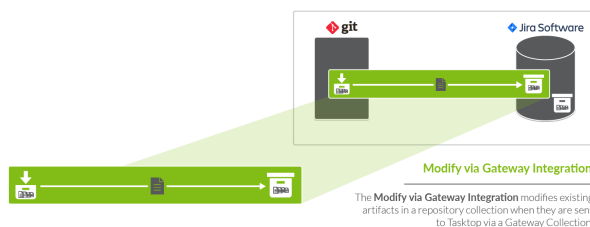
Example Payload

```
{
  "formatted_id": "String",
  "web_url": "String",
  "summary": "String",
  "committer": "userId",
  "affects": [
    {
      "formattedid": "String",
      "sttype": "Change Requests"
    }
  ]
}
```

## Modify via Gateway

*The Modify via Gateway Integration Template is only available in Editions that contain the Gateway add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality.*

What is a Modify via Gateway Integration?



An *integration* is quite simply **the flow of information between two or more collections**. A *Modify via Gateway Integration*, specifically, locates and modifies existing artifacts in a work item or container

collection that connects to a repository, when they are sent to Tasktop via a gateway collection. A gateway collection accesses event-based information in an external tool, such as Git or Jenkins, via an inbound webhook.

These types of events are “fire and forget” - they can modify something in your repository, but they don't expect anything back. As such, they don't mandate a full-blown two way synchronization; a lighter one-way integration can do the trick.

Here is an example of what you can do with the Modify via Gateway integration template:



**A code commit updates a story:**  
When a developer commits code in Git, Tasktop updates the Jira story with a link to the Git changeset.

When you configure a Modify via Gateway integration, you can customize the field flow and artifact filtering.

#### Video Tutorial

Check out the video below to learn how to configure the Modify via Gateway Integration Template.

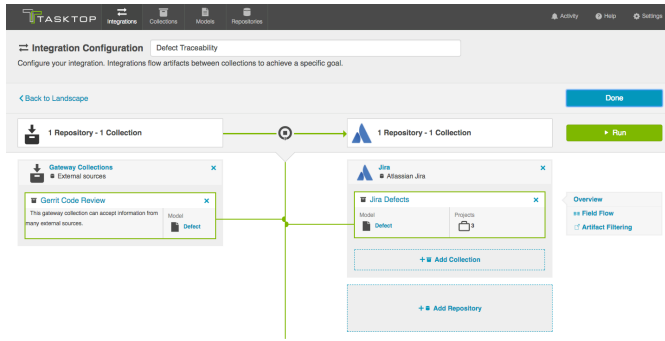
⚠ This video assumes that you have already configured your repositories, models, and collections as outlined in the [Quick Start Guide](#) .

#### Use Case and Business Value

The 'Modify via Gateway' integration creates traceability between artifacts across the software development lifecycle. Already existing artifacts in a repository collection will be located and modified in a specified way when artifacts are sent to Tasktop via a gateway collection.

For example, if your development team uses Gerrit for code review and Jira for its agile work management, but would like to know which defects in Jira a given code review affects, or conversely which code reviews are associated with a given defect, you could set up an integration that would find an already-existing defect in Jira anytime a code review is sent in and append one of its fields with that code review's URL. The integration can even include updating other Jira artifacts to which code reviews might pertain, such as stories and tech debt.





## Template Affordances

The Modify via Gateway Integration Template allows you to update already-existing artifacts in target work item (repository) or container (repository) collection when artifacts are sent to Tasktop via a gateway collection.



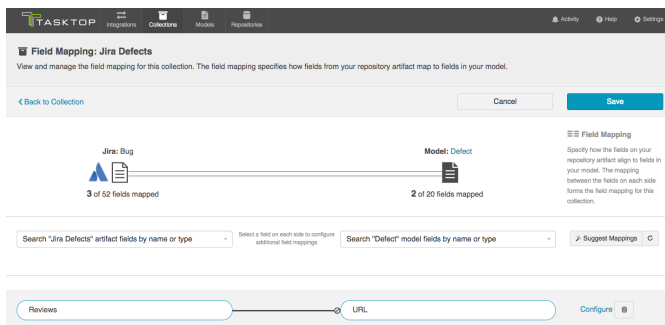
## How to Configure a Modify via Gateway Integration

### Configuring your Repository Collection

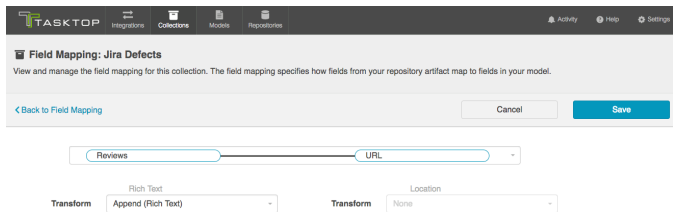
Before you begin configuring the integration itself, there are some steps that must be taken at the repository collection level:

To specify just how you would like incoming artifacts from your gateway collection to modify already existing artifacts in your repository collection, you need to identify which field(s) on your already-existing artifacts you would like to modify and then configure how the field(s) should be changed. In the example above, the URL to any incoming code reviews from a gateway collection is being added to the review field of the Jira defect.

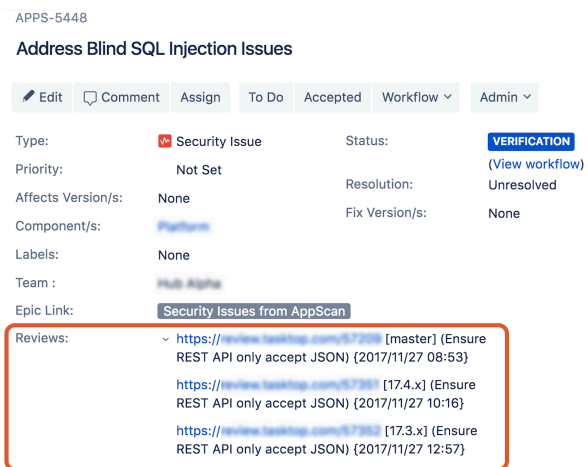
This means that the Jira collection-to-model mapping is configured as such:



And here are how the transformations are configured between these fields:

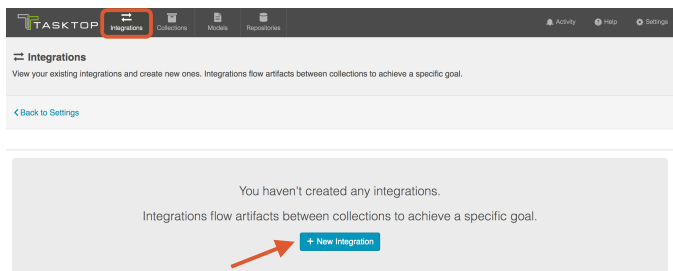


The **Append** transform means that new values will be added to the field value, rather than overwriting it, leaving the Jira artifact itself looking like this:



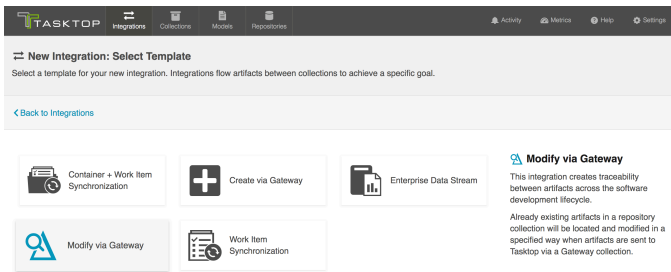
### Configuring Your Integration

To configure your integration, select 'Integrations' at the top of the screen, then click 'New Integration.'

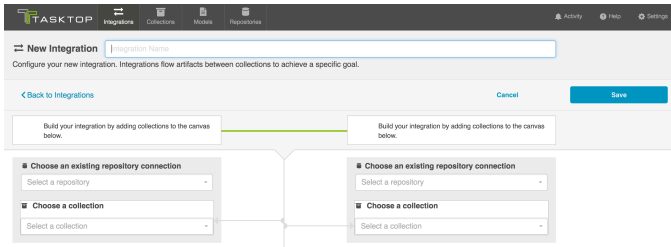


Select the 'Modify via Gateway' template.

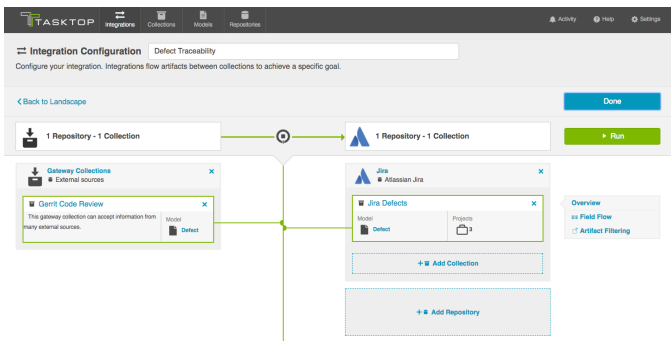
💡 Depending on the edition of Tasktop you are utilizing, you may not have all options shown here.



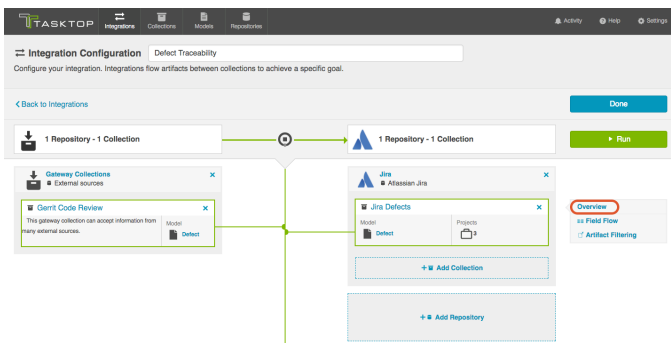
This will bring you to the New Integration Screen:

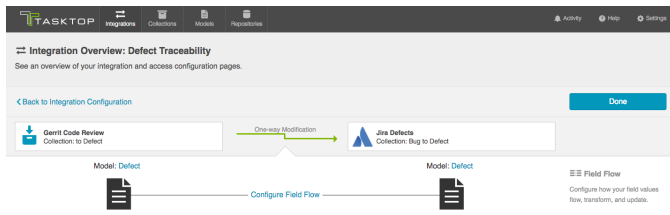


Name your integration and select your repositories and collections:



You can click the 'Overview' link on the right side of the Integration Page to get to the main display page (shown in the second screen shot):

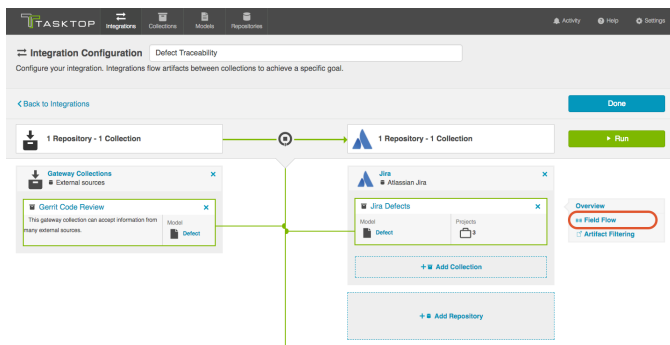




## Field Flow

The field flow configured for a given integration specifies which fields should flow in that integration. For Modify via Gateway integrations, you can choose to flow a given field (Update Normally) or to not flow a given field (No Update).

To get to the Field Flow screen, click 'Field Flow' on the right side of the Integration Configuration screen:



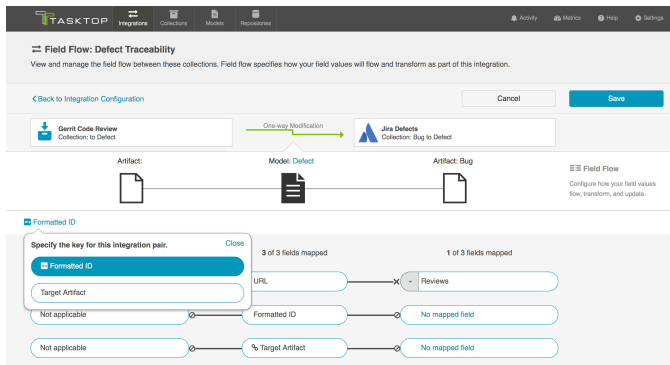
## Specifying Your Key

The first thing you will need to do when you get to the Field Flow screen is to specify your key.

Specifying a key will enable Tasktop to find the existing artifact in your repository collection that is to be modified by the incoming gateway payload(s). The key can be a string or relationship field from the model.

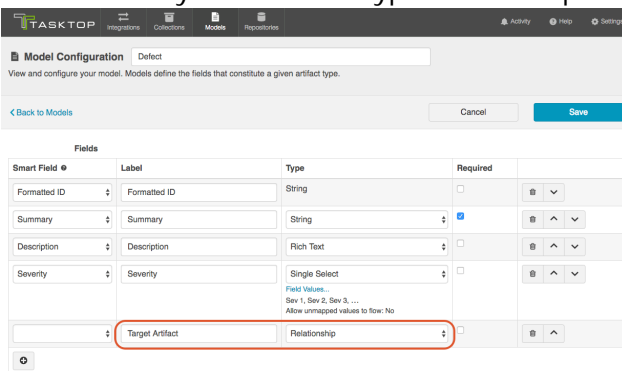
If the key is a string field, then the value sent to that model field from the gateway payload will be used to look up the target artifact by Formatted ID. For this reason, the recommended field to use is the Formatted ID field.

If the key is a relationship field, then the artifact it references in the gateway payload will be used as the target artifact.

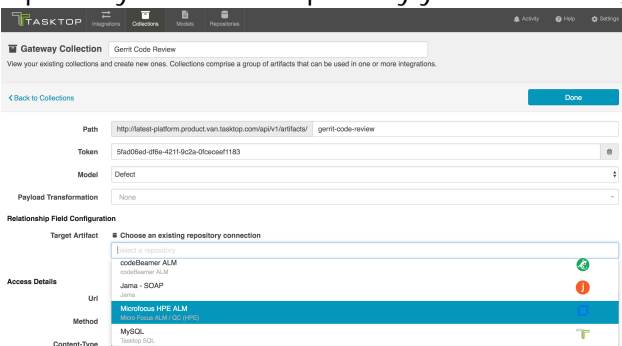


**Note:** Some repositories require extra information in order to uniquely identify a single artifact across multiple projects. One prime example is Micro Focus (formerly HPE). To ensure that enough information is sent in via your gateway collection to allow Tasktop to find the specific artifact you would like to modify, please take these steps:

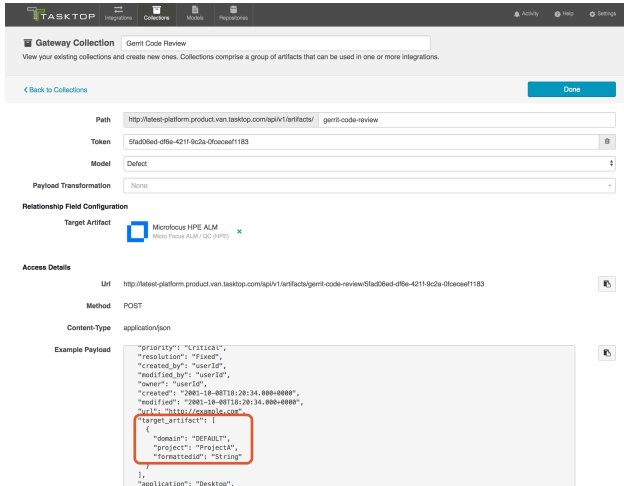
### 1. Add a field in your model of type relationship



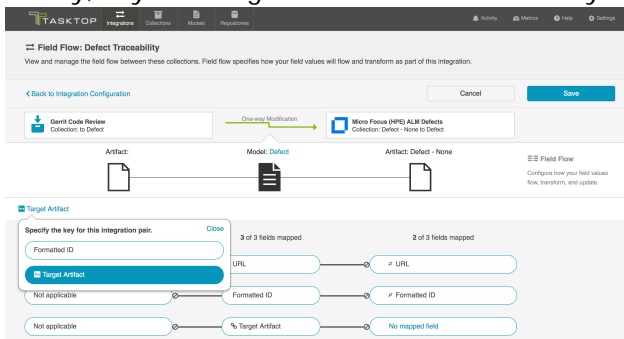
### 2. In your gateway collection, notice that for the new field you are prompted to pick a target repository. Select the repository you'd like to target in this gateway integration



- When you save, note that the example payload will be updated to include the pieces of information we need for that field to uniquely find artifacts



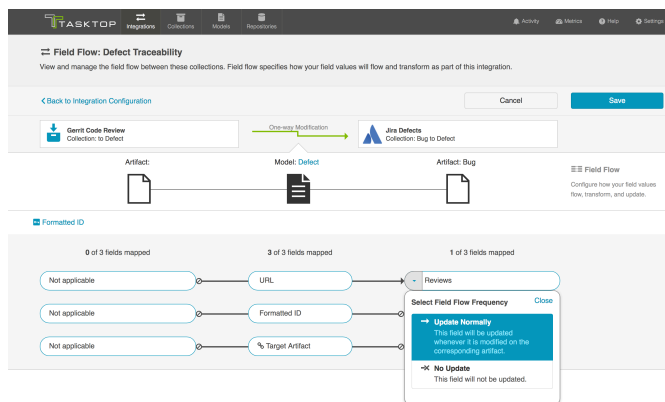
- Finally, in your integration select that field as your key on the Field Flow screen.



## Configure Field Flow






Once you have specified your key, you can configure your field flow. For each field, you can choose to flow information ('update normally') or not flow information ('no update'). You'll notice that field flow goes in one direction only - from the gateway collection *into* the repository or database collection.

You can see the names of the mapped artifact fields for each collection on the far left and far right, with the model fields displayed in the middle.



## Field Flow Icons

On the Field Flow page, you will see a number of icons, which will help you understand any special properties or requirements for each field. If you hover your mouse over an icon, you will see a pop-up explaining what the icon means. You can also review their meanings in the legend below:

Icon	Meaning
	<p>A constant value will be sent.</p> <p>Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a constant value will be sent to your model. This means that any time this collection is integrated with another collection, the <i>other</i> collection will receive this constant value for the field in question.</li> <li>• If the icon is on the side of the model, this means a constant value will be sent to your collection. This means that any time this collection is integrated with another collection, that <i>this</i> collection will receive this constant value for the field in question.</li> </ul>
	<p>A state transition will be utilized. Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a <a href="#">state transition graph</a> is being utilized.</li> <li>• If the icon is on the side of the model, this means that a <a href="#">state transition extension</a> is being utilized.</li> </ul> <p> Note that Tasktop will update the field flow frequency for fields utilizing state transitions to 'no update.' This is because they are updated via the transition and not via normal 'field flow.' Do not modify the field flow frequency for this field.</p>
	<p>Collection field is read-only and cannot receive data</p>
<p style="text-align: center;">←*</p> <p style="text-align: center;">*→</p>	<p>To create artifacts in your collection, this field must be mapped to your model.</p>
	<p>This is a required field in your model; it must be</p>

	mapped to your collection.
✘	This field will not be updated as part of your integration, due to how you have configured it. This field flow configuration can be changed if you'd like.
⊘	This field will not be updated as part of your integration because the mapping would be invalid. You do not have the option of changing this.
→	This field will update normally as part of your synchronize integration; this means it will be updated whenever it is modified on the corresponding artifact.

### **Artifact Filtering**

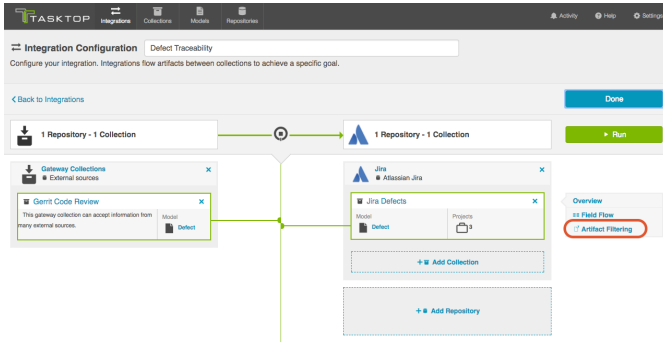
*Artifact Filtering* enables you to set filters on an integration in order to limit which artifacts are eligible to flow in your integration.

To use a field for artifact filtering, it must:


- Be a part of your model, and be mapped to the collection you are filtering from
- Be one of the following field types:
  - Single Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Multi-Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Date
  - Date/Time
  - Duration
  - String

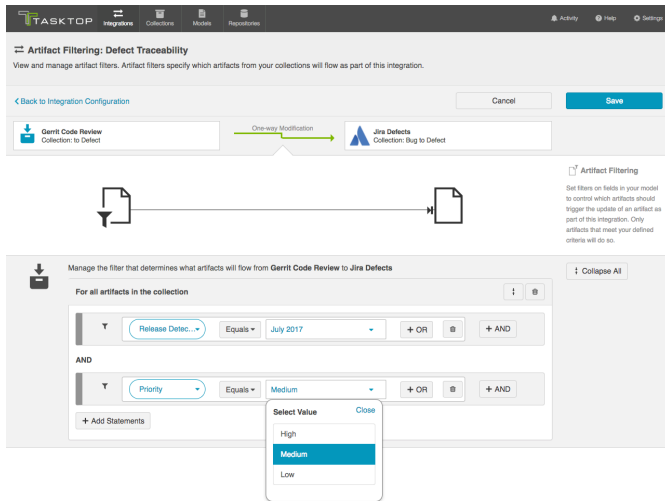
To configure *Artifact Filtering*, select 'Create filters (optional)' from the Integration Configuration Overview screen, or select 'Artifact Filtering' from the right pane of the Integration Configuration screen.





This will lead you to the Artifact Filtering Configuration screen, where you can configure one or more criteria for artifact filtering.

 You can click the 'Collapse All' button to view an easy-to-read summary of your artifact filtering statements.

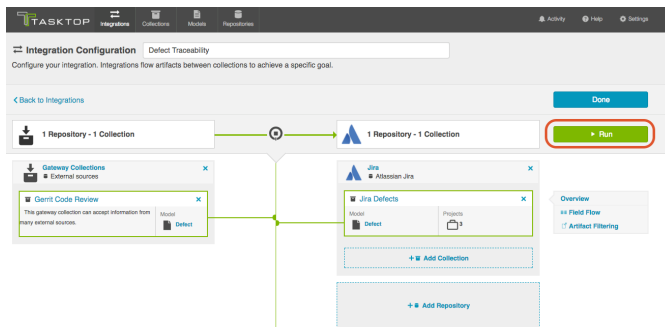


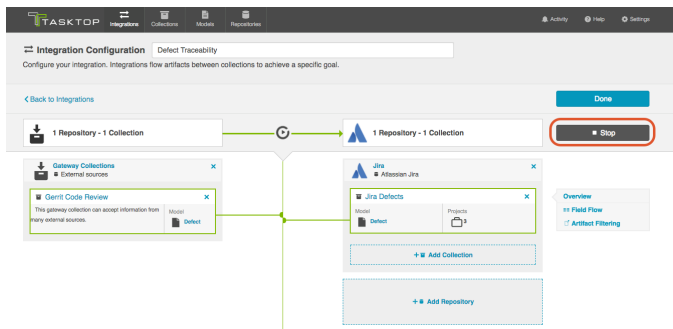
## Running your Integration

There are two ways to start or stop your integration:

### From the Integration Configuration Screen

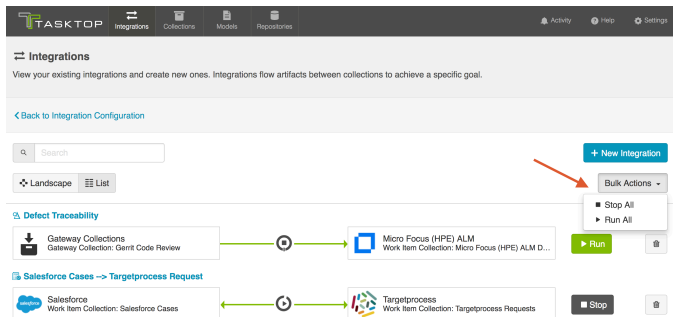
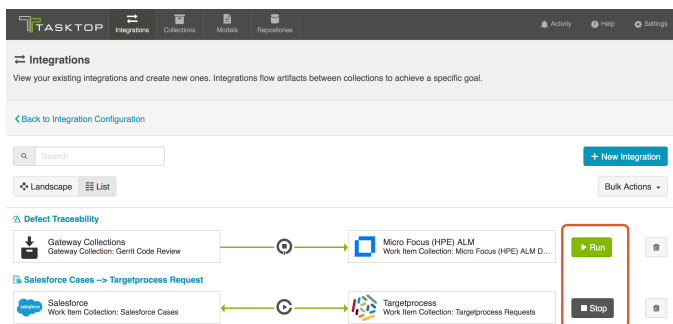
Simply click the 'Run' button to run the integration, and the 'Stop' button to stop the integration.





## From the Integrations List Page

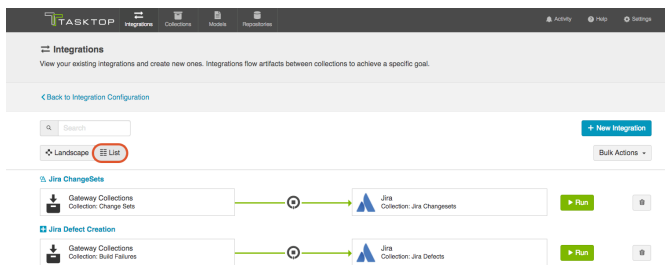
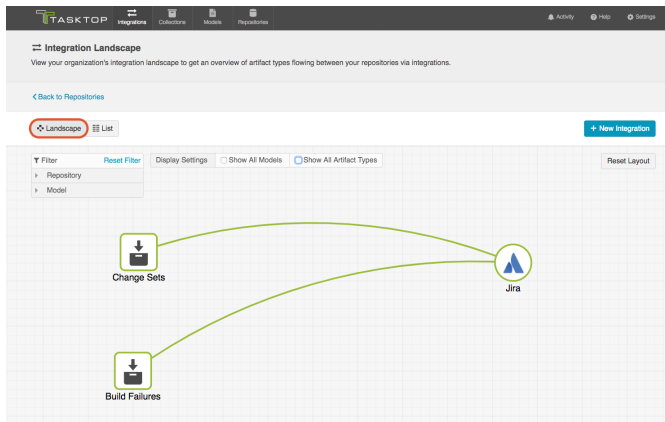
Click 'Run' or 'Stop' next to each integration you would like to update. You can also use the 'Bulk Actions' button to run or stop all integrations.



## Viewing Your Integrations

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

When viewing your integrations, you have the option of viewing them in either Landscape or List mode.



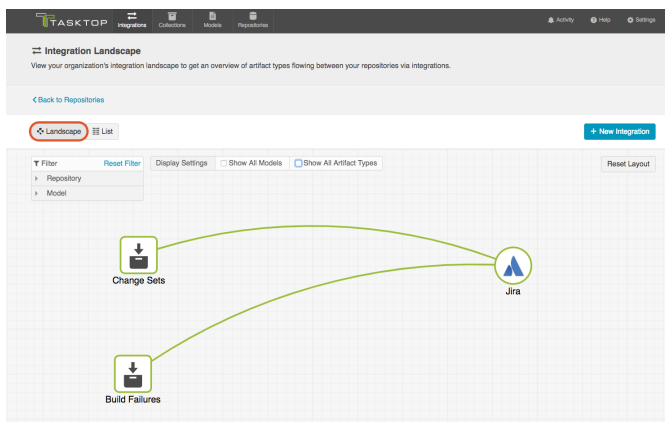
## Landscape View

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

Learn more about the Integration Landscape View in the video below:

Tasktop will default to the Landscape View, which enables you to visualize your entire integration landscape and see how your integrations relate to one another. Use our built-in filters to see as little or as much information as you'd like!

Here's a simplified view:

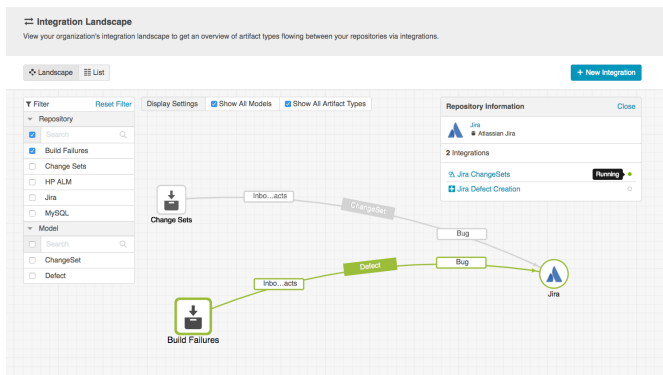


If you'd like to see additional information, you can utilize the filters, or click on a repository node to modify which information is shown.

Some examples of additional information you can see are:

- Models
- Artifact Types
- Artifact Creation Directionality Arrows
- List of all relevant integrations (see this by clicking on the repository node)
  - Indicator of whether each integration is running or not

Here's an example of a more detailed view:

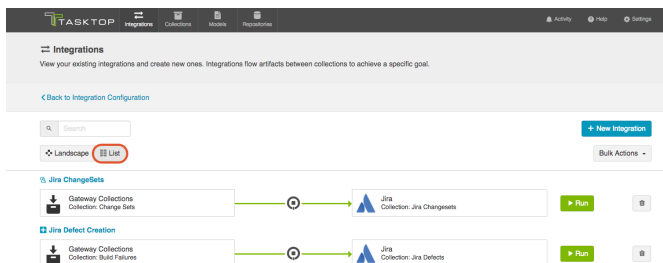


### List View

If you'd like, you can toggle to List View, which will show you a list of all integrations you have created.

You can use this view to:

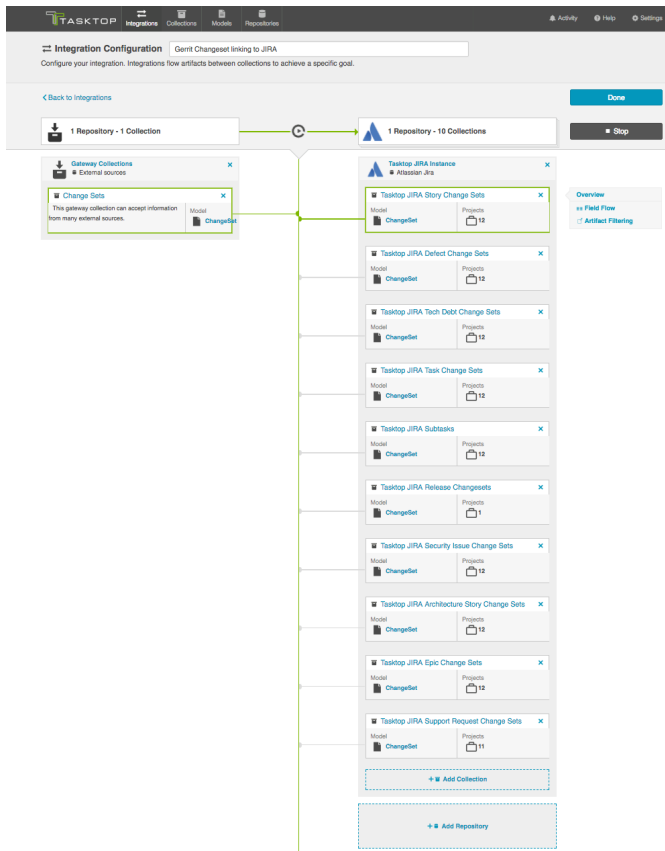
- Start an Integration
- Stop an Integration
- Delete an Integration
- Click into an Integration and modify its configuration



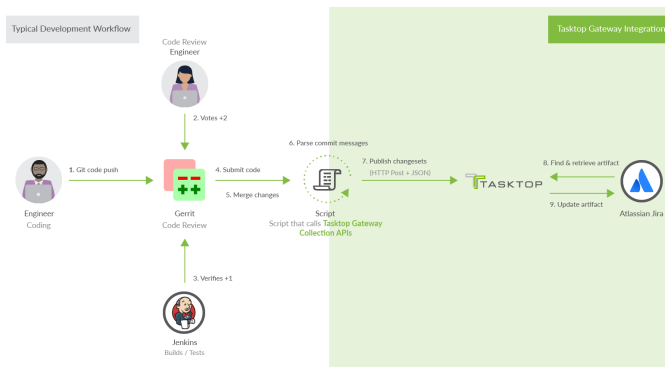
### Example Use Case

This is an example of how we at Tasktop utilize the Modify via Gateway template. Our integration flows changeset links and other information from Gerrit to a field on already-existing artifacts (such as stories, epics, and defects) in Jira.

Here's how the integration configuration screen looks for that integration:



The image below illustrates just how the changeset is sent to Tasktop after the developers' normal workflow, at which point they then participate in the integration show above.



This is an example of the script that we use to automate the changesets being sent to Tasktop:

```

Example Script

#!/usr/bin/ruby

require 'rubygems'
require 'logger'
require 'net/http'
require 'openssl'
require 'json'

```

```

def getOption(name)
  return ARGV[ARGV.index("--"+name)+1]
end

def sendToLink(data)
  request = Net::HTTP::Post.new(LINK_URL)
  request.body = JSON.generate(data)
  request.content_type = 'application/json'
  request.basic_auth "tasktop-platform", "tasktopSecret"
  uri = URI.parse(LINK_URL)
  response = Net::HTTP.start(uri.hostname, uri.port, :use_ssl => uri.
scheme == 'https', :verify_mode => OpenSSL::SSL::VERIFY_NONE) do
|http|
  http.request(request)
end
  if ! response.kind_of? Net::HTTPSuccess
    LOGGER.warn "Error sending to link: #{response.body}"
  end
end

LINK_URL = "https://tt-data350:8443/api/v1/artifacts/changesets"
TASK_ID_PATTERN = /Task-Url:\s*https:\/\/\tasktop.atlassian.net\
/browse\/([\s]*)/
REVIEW_URL_PATTERN = /. *Reviewed-on:\s+([\s]*)/m
LOGGER = Logger.new('/shared/gerrit/tasktop-site/logs/hook-change-
merged.log', 'monthly')
ENABLED_PROJECT_KEYS = ["APPS", "SYN", "SDK", "PLAT", "OPS", "CON",
"DEV", "QA", "RLIASE"]

project = getOption('project')
commit = getOption('commit')
branch = getOption('branch')

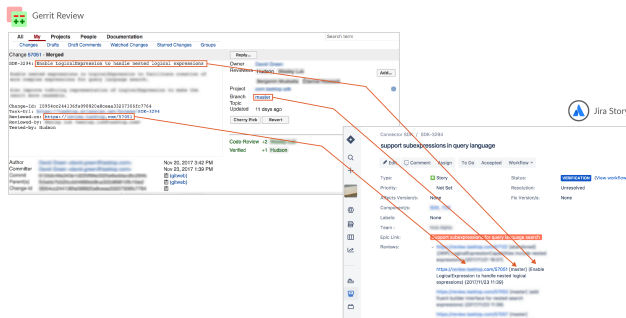
LOGGER.debug("Processing merge for commit #{commit} on project #
{project}")

gitPath = ENV['GIT_DIR']
message = `git --git-dir #{gitPath} show -s --format=%B #{commit}`
taskIdMatch = TASK_ID_PATTERN.match(message)
if taskIdMatch
  taskKey = taskIdMatch.captures[0]
  LOGGER.debug("Detected taskKey: #{taskKey}")
  taskKeyMatches = ENABLED_PROJECT_KEYS.any? { |project| taskKey.
start_with?(project + "-")}
  if ! taskKeyMatches
    LOGGER.info("#{taskKey} project not enabled, skipping");
    exit()
  end
  reviewUrlMatch = REVIEW_URL_PATTERN.match(message)
  webUrl = nil

```

```
if reviewUrlMatch
  webUrl = reviewUrlMatch.captures[0]
else
  LOGGER.error("Could not get webUrl from commit #{commit}")
  webUrl = "commit #{commit}"
end
firstLineOfMessage = message.lines.first.chomp
firstLineOfMessage = firstLineOfMessage.gsub(/#{taskKey}:? /, '')
sendToLink({"formatted_id" => taskKey, "info" => "#{webUrl} [#{branch}] (#{firstLineOfMessage)}")
else
  LOGGER.debug("No task key found")
end
```

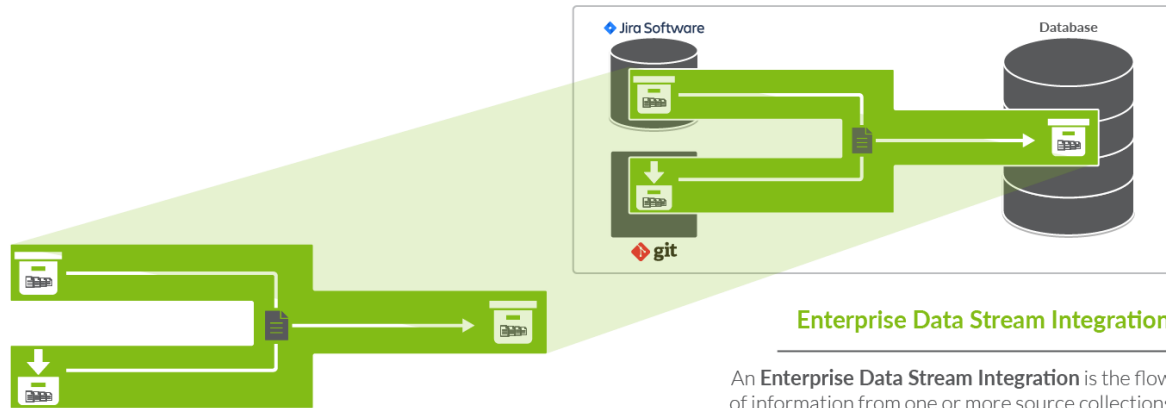
This image more clearly highlights how these changesets are reflected on the Jira artifacts:



## Enterprise Data Stream

*The Enterprise Data Stream Template is only available in Editions that contain the Enterprise Data Stream add-on. See [Tasktop Editions table](#) to determine if your edition contains this functionality.*

## What is an Enterprise Data Stream Integration?



### Enterprise Data Stream Integration

An **Enterprise Data Stream Integration** is the flow of information from one or more source collections to a Database Repository Collection.

An *integration* is quite simply **the flow of information between two or more collections**. An Enterprise Data Stream Integration, specifically, is the flow of information from one or more source collections (either Work Item (Repository) Collections, Container (Repository) Collections, or Gateway Collections) to one central table held in a Work Item (Database) Collection.

When you configure your Enterprise Data Stream Integration, you can customize the field flow, artifact routing, and artifact filtering.

#### Video Tutorial

Check out the video below to learn how to configure an Enterprise Data Stream Integration.

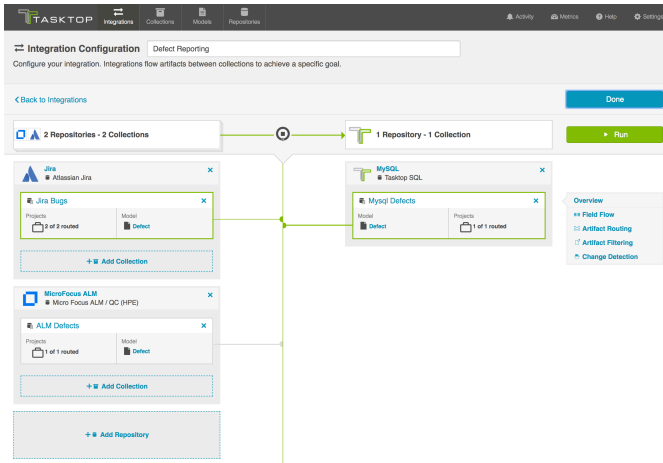
**⚠** This video assumes that you have already configured your repositories, models, and collections as outlined in the [Quick Start Guide](#).

#### Use Case and Business Value

This integration simplifies enterprise reporting by unlocking software lifecycle data from its application tool silos and providing a rich data repository for near real-time analytics. Records will be created in a single database when artifacts from one or more collections are created or changed.

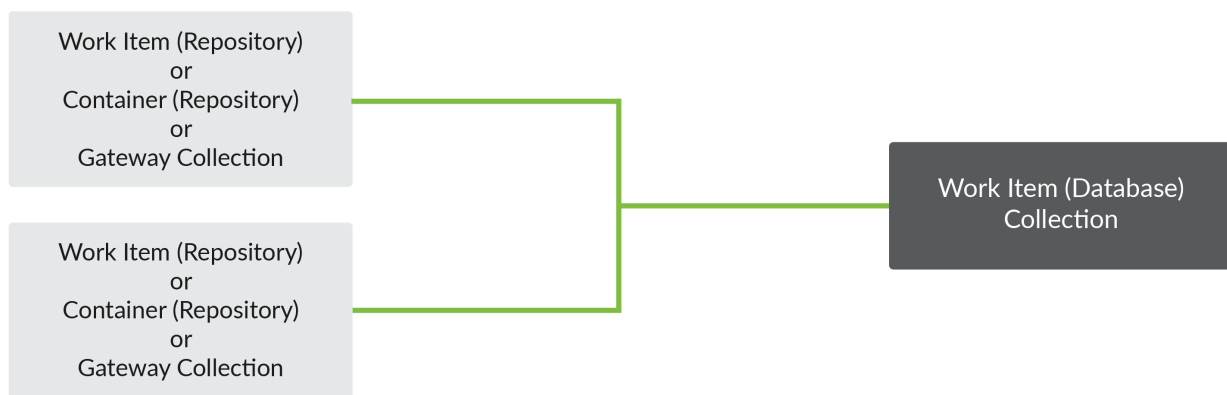
For example, if your organization uses multiple tools for defect discovery and resolution, such as Atlassian Jira and ALM, but would like to report on defects across both of the tools, you could set up an integration that would flow artifacts from your Jira and ALM collections into a single database table. You could then report directly from this aggregated table or, more likely, ETL it into your existing reporting infrastructure.





## Template Affordances

The Enterprise Data Stream Template allows you to flow artifacts from multiple repository collections and/or gateway collections into a single database collection.



**Gateway Collections are only available in editions that contain the Gateway add-on. See [Tasktop Editions table](#) to determine if your edition has this functionality.**

## Key Concepts

Before you begin, there are a few concepts it's important to understand when configuring an Enterprise Data Stream Integration.

### Data Structures

An Enterprise Data Stream Integration populates a table with rows corresponding to the state of artifacts at a specific point in time. As an artifact changes, new rows are inserted corresponding to the new state of the artifact. The result is that each artifact has a series of rows corresponding to the state of the artifact at each point in time. The rows for all artifacts in a table can be thought of as an event stream.

Please note: Tasktop will examine your repositories for changes as specified in the [change detection interval](#) that you have configured. This means that if you have configured the change detection interval to be 1 minute, and a given artifact is changed twice in that minute, you'll only get a single record that reflects both changes.

The database table populated by the Enterprise Data Stream Integration has columns corresponding to fields in the artifact model, as well as some built-in fields that are designed to facilitate reporting. The following is an example of a database table corresponding to a simple defect model:

```
CREATE TABLE `Defect` (  
  `id` BIGINT (19) AUTO_INCREMENT,  
  `formatted_id` VARCHAR (1000) NOT NULL,  
  `project` VARCHAR (255) NOT NULL,  
  `type` VARCHAR (255) NOT NULL,  
  `severity` VARCHAR (255) NOT NULL,  
  `status` VARCHAR (255) NOT NULL,  
  `summary` VARCHAR (1000) NOT NULL,  
  `repository_id` VARCHAR (255),  
  `repository_url` VARCHAR (255),  
  `artifact_id` VARCHAR (255),  
  `artifact_url` VARCHAR (255),  
  `artifact_event_type` VARCHAR (255),  
  PRIMARY KEY (`id`)  
);
```

### Database Output


#### Default Information that Tasktop will Flow

The following columns represent information that will automatically be flowed to your database table.

Column	Description
id*	A surrogate key, can be used in reports to uniquely identify a row.
repository_id*	The unique identifier of the connection, can be used in reports to identify a repository connection.
repository_url*	The URL of the repository, can be used in reports to identify a repository.
artifact_id*	An ID of an artifact that is globally unique, can be used in reports to uniquely identify an

	artifact across repositories and collections. The value of the <code>artifact_id</code> is an opaque value; assumptions should not be made about its structure or content. It should be noted that the <code>artifact_id</code> does not correspond to the id of the artifact as it is represented in the repository itself, but is useful for reporting since it is globally unique.
<code>artifact_url</code>	The URL of the artifact for browser access, can be used in reports to identify an artifact.
<code>artifact_event_type</code>	The type of event for the artifact that caused this entry. It can be used to see if the artifact has been added, changed or removed from the collection.

\*Denotes that this is a required field, meaning that your target database table will need to have a column to store this information.

 Note: If you use the Suggest DDL to create your table, all of the fields above will be included. If you are creating your table without that mechanism, you'll need to ensure that a column exists for the required pieces of information and, ideally, for the non-required fields as well. Your database table columns will need to be named as displayed above in either upper or lower case, but with the underscores as displayed.

### **Ordering of Rows**

Though it may appear that rows in the table are inserted an order corresponding to the point in time that changes occurred, the order of rows in the table is not guaranteed. Reports should use a mapped field from the model (such as `modified`) to determine when a change occurred.

### **Artifact Event Type**

In the artifact event type column of your database table, you'll see either "changed", "removed", or "filtered."

#### Changed

Changed indicates that either an existing artifact was changed or that a new artifact was added to your collection.

#### Removed

Removed indicates that a given artifact is in a project that has been removed from the collection. Here is a sample scenario to illustrate this event type:

In this Enterprise Data Stream Integration Project B and C are routed to the database table in my SQL collection at the start of an integration. Artifacts flow and records get written out:

id	formatted_id	project	type	created	modified	severity	status	summary	description	repository_id	repository_url	artifact_id	artifact_url	artifact_event_ty...
1	TPB-8	Test...	Bug	2016-...	2016-0...	Blocker	To Do	d33269d5e...	desc	c004d8cc-6...	http://ga-jira...	["com.ta...	http://ga-j...	changed
2	TPB-1	Test...	Bug	2015-...	2016-0...	Major	To Do	test bug B1	test bug B	c004d8cc-6...	http://ga-jira...	["com.ta...	http://ga-j...	changed
3	TPC-1	Test...	Bug	2015-...	2016-0...	Major	To Do	test bug C1	test bug C	c004d8cc-6...	http://ga-jira...	["com.ta...	http://ga-j...	changed

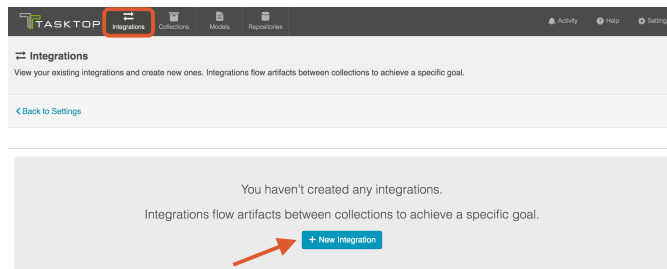
Project C is then removed from the source collection. At next full scan (one of the [change detection intervals configured on the Settings screen](#)), you'll see an event to denote that any artifacts in that collection have been removed:

id	formatted_id	project	type	created	modified	severity	status	summary	description	repository_id	repository_url	artifact_id	artifact_url	artifact_event_ty...
1	TPB-8	Test...	Bug	2016-...	2016-0...	Blocker	To Do	d33269d5e...	desc	c004d8cc-6...	http://ga-jira...	["com.ta...	http://ga-j...	changed
2	TPB-1	Test...	Bug	2015-...	2016-0...	Major	To Do	test bug B1	test bug B	c004d8cc-6...	http://ga-jira...	["com.ta...	http://ga-j...	changed
3	TPC-1	Test...	Bug	2015-...	2016-0...	Major	To Do	test bug C1	test bug C	c004d8cc-6...	http://ga-jira...	["com.ta...	http://ga-j...	changed
4	TPC-1	Test...	Bug	2015-...	2016-0...	Major	To Do	test bug C1	test bug C	c004d8cc-6...	http://ga-jira...	["com.ta...	NULL	removed
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

**⚠ Note:** If the project is added back to the collection and routed, records will not instantly be written out for all artifacts in that project; this will happen only when those artifacts change again.

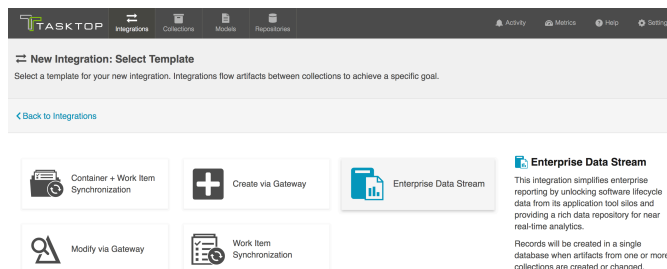
### How to Configure

To configure your integration, select 'Integrations' at the top of the screen, then click 'New Integration.'

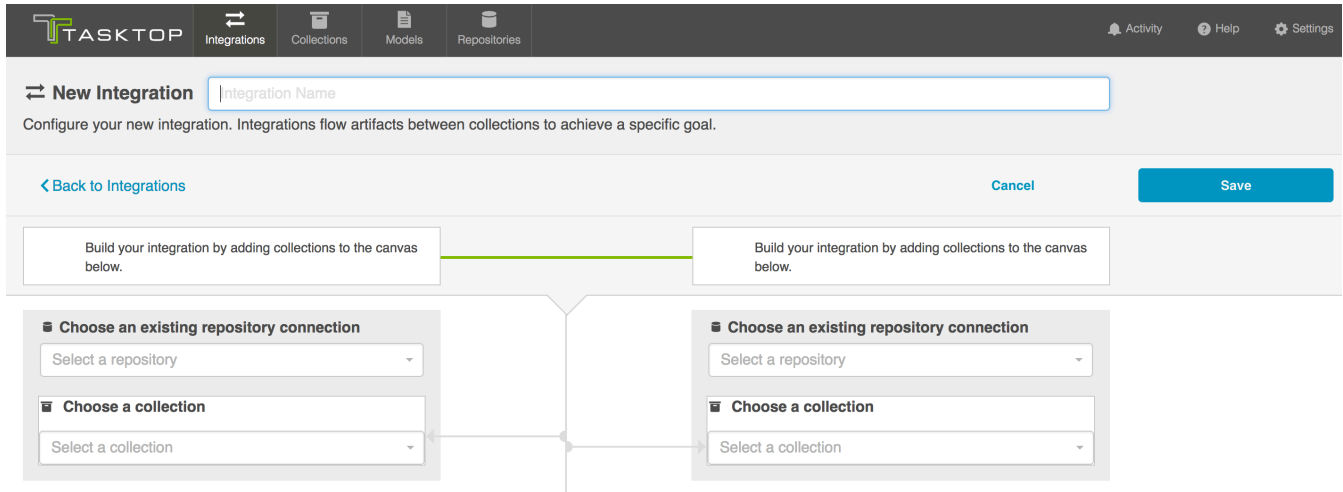


Select the 'Enterprise Data Stream' template.

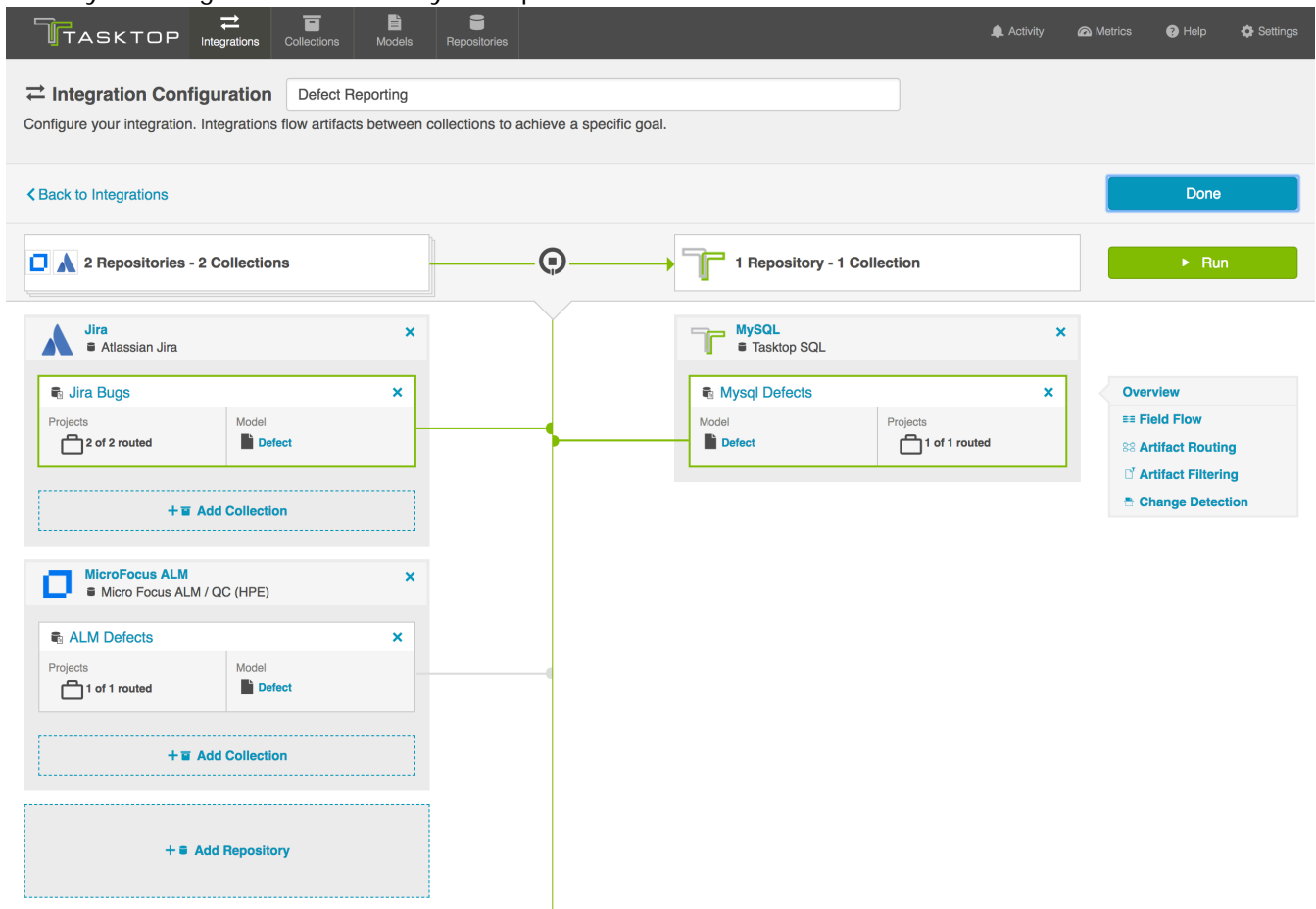
**💡** Depending on the [edition](#) of Tasktop you are utilizing, you may not see all options shown below.



This will bring you to the New Integration Screen:



Name your integration and select your repositories and collections:



You can click the 'Overview' link on the right side of the Integration Configuration screen to get to the main display screen (shown in the second screenshot).

💡 Note: The Overview screen will only show two repositories at a time - one source repository and one target repository. If there are multiple source repositories in your integration, make sure the one you are interested in is selected before clicking 'Overview.'

**Integration Configuration** Defect Reporting

Configure your integration. Integrations flow artifacts between collections to achieve a specific goal.

[Back to Integrations](#) Done Run

**2 Repositories - 2 Collections** → **1 Repository - 1 Collection**

- Jira** (Atlassian Jira)
  - Jira Bugs** (2 of 2 routed) | Model: Defect
  - + Add Collection
- MicroFocus ALM** (Micro Focus ALM / QC (HPE))
  - ALM Defects** (1 of 1 routed) | Model: Defect
  - + Add Collection
  - + Add Repository
- MySQL** (Tasktop SQL)
  - Mysql Defects** (1 of 1 routed) | Model: Defect

Overview (highlighted)  
Field Flow  
Artifact Routing  
Artifact Filtering  
Change Detection

**Integration Overview: Defect Reporting**

See an overview of your integration and access configuration pages.

[Back to Integration Configuration](#) Done

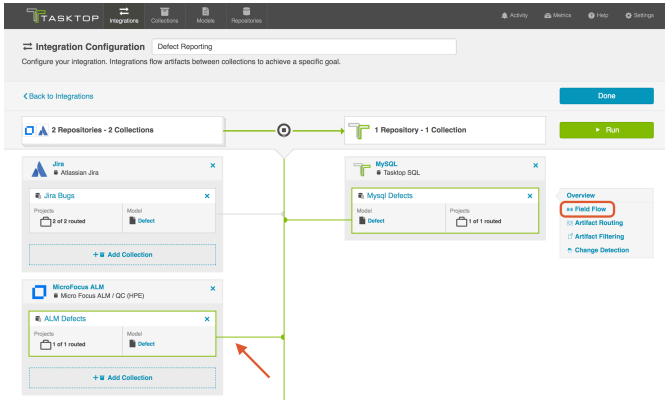
**Jira Bugs** (Collection: Bug to Defect) → One-way Creation → **Mysql Defects** (Collection: data ->None- artifacts to Defect)

- Field Flow**  
Configure how your field values flow, transform, and update.
- Artifact Routing**  
Create artifact nodes to specify where artifacts will be created in your collections.
- Artifact Filtering**  
Set filters on fields in your model to control which artifacts are included. Trigger the creation of database records as part of this integration. Only artifacts that meet your defined criteria will do so.
- Change Detection**  
Configure the Change Detection interval and Full Scan Interval for this integration. The default change detection is defined on the Settings screen.

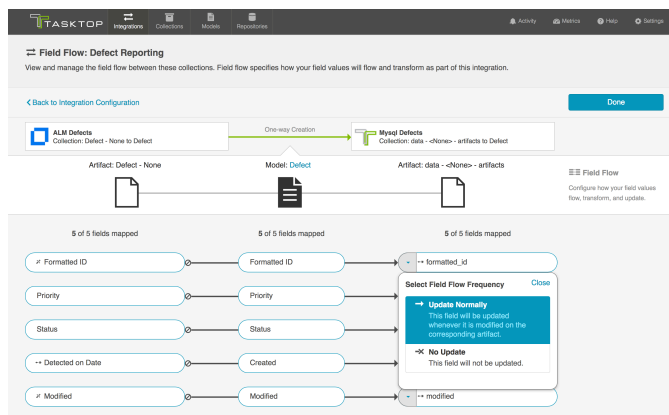
### Field Flow

The field flow configured for a given integration specifies which fields should flow in that integration. For Enterprise Data Stream integrations, you can choose to flow a given field (Update Normally) or to not flow a given field (No Update).

To view field flow, select the source repository you are interested in (you will see it highlighted in green once selected), and then click 'Field Flow'



You will be directed to the Field Flow screen:



You can choose to flow a field ('update normally') or not flow it ('no update'). You'll notice that field flow goes in one direction only - from the repository or gateway collection *into* the database collection.

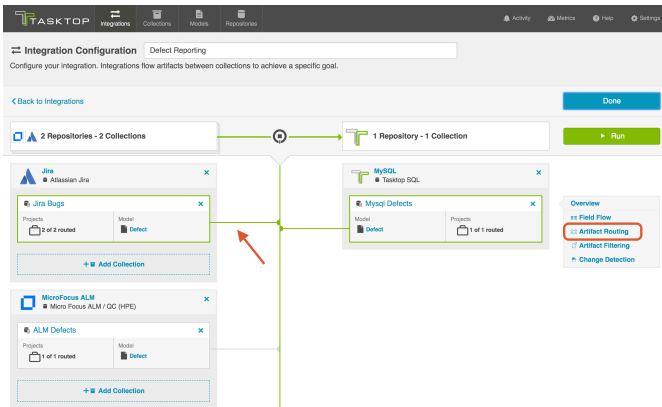
You can see the names of the mapped artifact fields for each collection on the far left and far right, with the model fields displayed in the middle.

**⚠ Note:** The field flow settings behave a bit differently for Constant Values. This is because constant values exist as part of your Tasktop configuration, and not on the artifact itself. Therefore, changes in constant values are not detected in the same way that updates made on the actual artifact are detected. If you change the constant value that is linked to your model, your integration will not automatically detect this update and sync it over. The new value will only flow if another field on that artifact is updated.

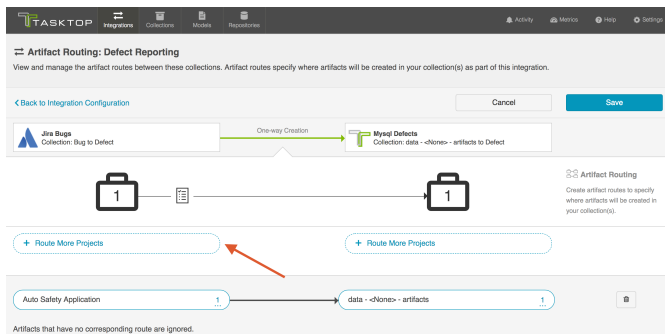
## Artifact Routing

For an Enterprise Data Stream Integration, Artifact Routing is used to specify which projects (or other containers) you would like to participate in your integration. For example, your Jira Bugs collection may contain 10 different projects which are utilized in various integrations. However, for the purpose of your Enterprise Data Stream Integration, you may want only one of those projects to participate. You can specify that project on the Artifact Routing Screen.

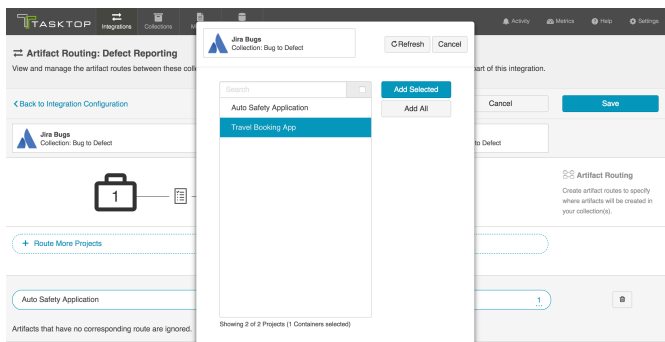
To configure Artifact Routing, select the relevant repositories and then click 'Artifact Routing':



This will bring you to the Artifact Routing screen. You can click 'Route More Projects' to add additional projects to your route:

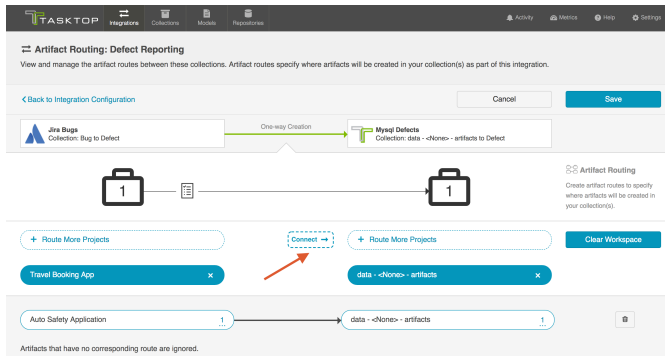


Select the projects you would like to participate in the integration and click 'Add Selected'

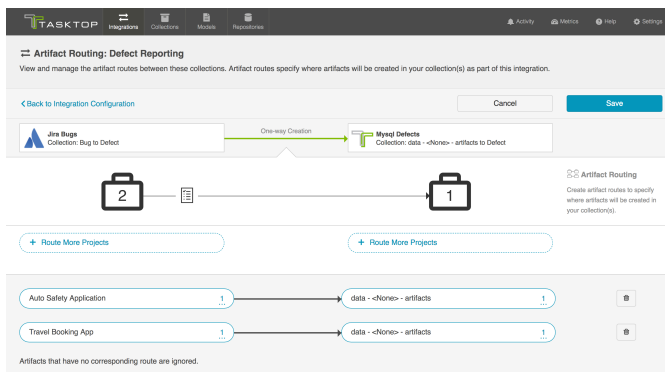




Click 'Connect'



You will see your artifact route on the pane below. Click 'Save' and 'Done.'



### Artifact Filtering

When configuring your integration, you have several options available to refine which artifacts are eligible to flow. The final mechanism available is *artifact filtering*, which is configured at the Integration level. Artifact Filtering allows you to filter which artifacts flow in your integration, based on a field value on that artifact.

To use a field for artifact filtering, it must:

- Be a part of your model, and be mapped to the collection you are filtering from
- Be one of the following field types:
  - Single Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Multi-Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Date
  - Date/Time
  - Duration
  - String

💡 Note that you can utilize our transforms to filter based on an 'unsupported' collection field type, if that field is mapped to a supported field type in your model. For example, you could filter based on a Boolean field in your repository, if that boolean field is mapped to a single select field in your model.

### Unique Behavior for Enterprise Data Stream

The filtering behavior is somewhat unique when using the Enterprise Data Stream Template:

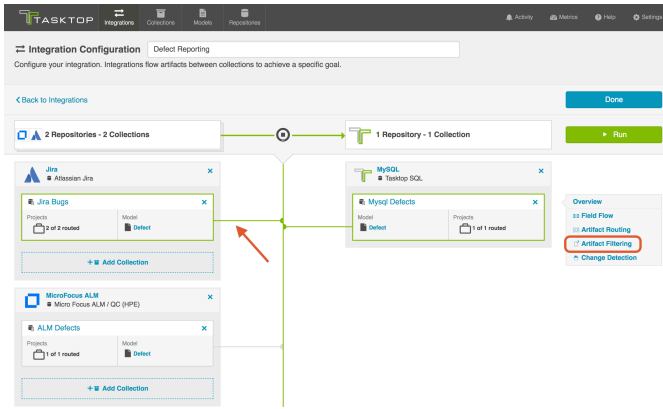
Though setting filters is meant to limit which artifacts flow in an integration, the impacts of setting filters on an Enterprise Data Stream Template are somewhat unique. Because it would not be ideal to have records in your database output that represent artifacts that have been filtered in an integration, given that these records would be stale and would not denote why a given artifact was not changing over time, it is the case that artifacts that are filtered on an Enterprise Data Stream Integration will still have records written out to the database but will have the "filtered" event type denoted.

Note the following:

- When you set a filter on an Enterprise Data Stream integration, records will not automatically be written out for artifacts that do not meet filtering criteria. When artifacts that should be filtered out change, we'll then write out a record with the "filtered" event type.
- When a once filtered artifact field changes such that it now meets the filter criteria set, records will be written out right away.
- If you relax the filter and more artifacts are now in scope, the now in scope artifacts will only flow when the artifacts themselves change again.
- If an artifact is filtered out of the Enterprise Data Stream Integration, and then its project is removed from the collection, records will be written out for all artifacts in that collection at next full scan and marked as "removed", whether or not they have been filtered out of the integration (This effectively means that the "removed" designation supersedes "filtered" designation.)
  - If you add the project back to the collection and routed in the integration, changes to artifacts will create a new record with either the "changed" or "filtered" event type, depending on whether or not the artifact meets the filter criteria.

### How to Configure Artifact Filtering

To configure *Artifact Filtering*, select the relevant repository, then click 'Artifact Filtering' from the right pane of the Integration Configuration screen.

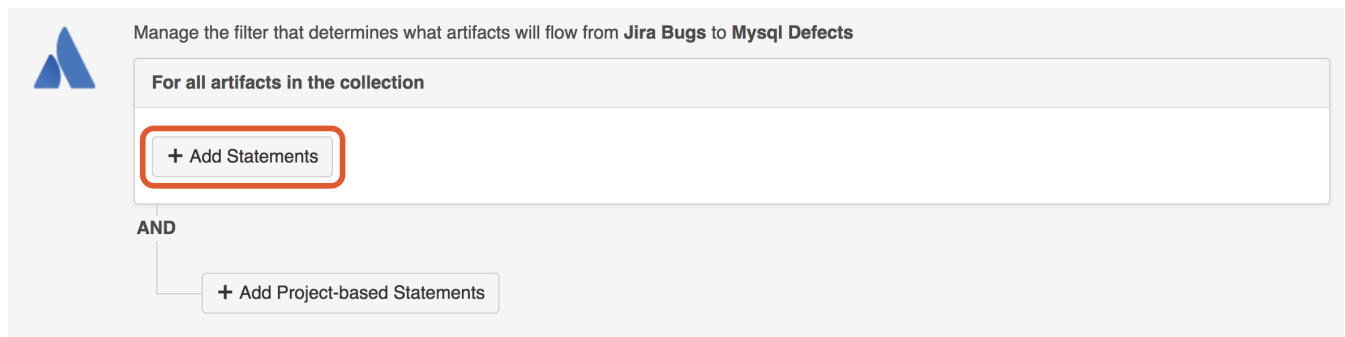


This will lead you to the Artifact Filtering Configuration screen, where you can configure your artifact filtering statement(s).

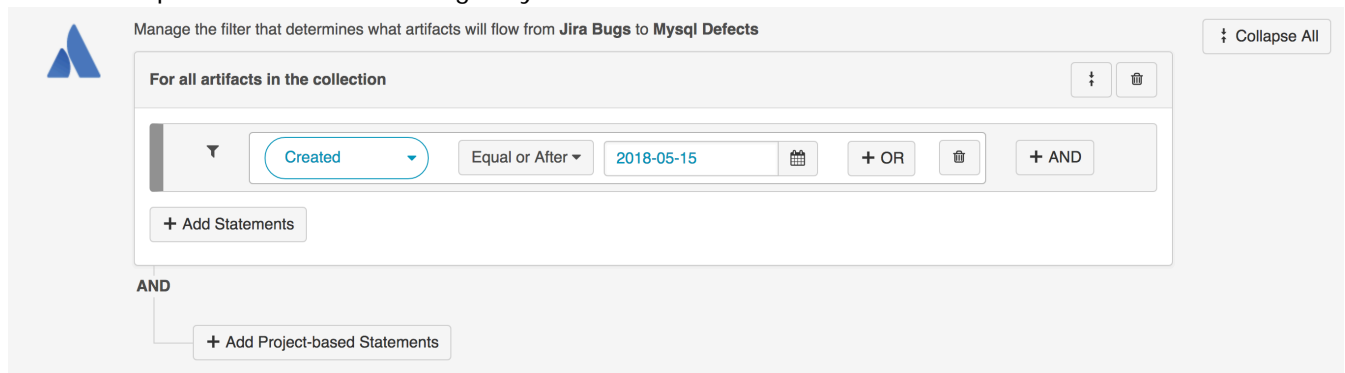
You can either add a statement that will apply to **all artifacts in your collection**, or to **all artifacts within certain projects of your collection**.

#### ***Apply Filter to All Artifacts in Collection***

To apply a filter to all artifacts in the collection, simply click the '+Add Statements' button

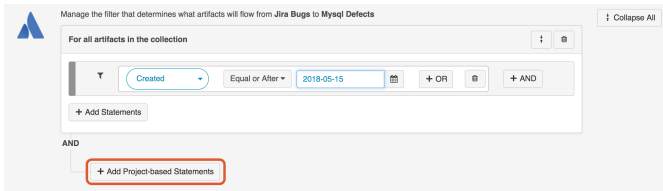


Use the drop-down menus to configure your filter fields and values:

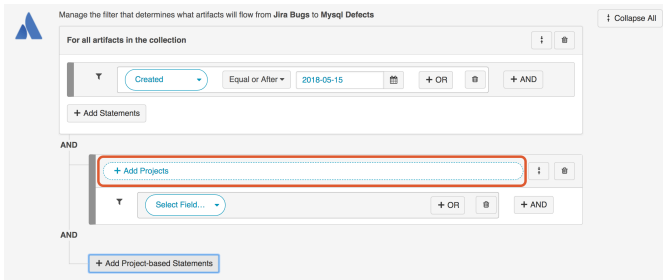


#### ***Apply Filter to Artifacts in Certain Projects***

To apply a filter to artifacts within a specific project, click the '+Add Project-based Statements' button.

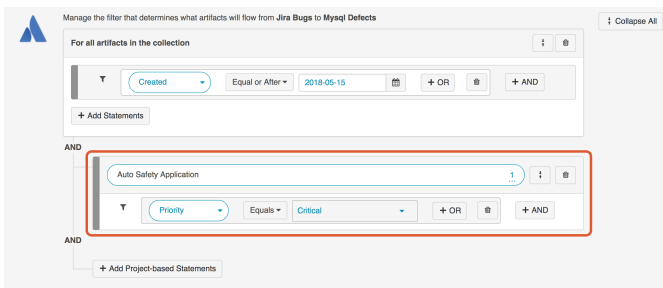


Click '+Add Projects' to select your project.



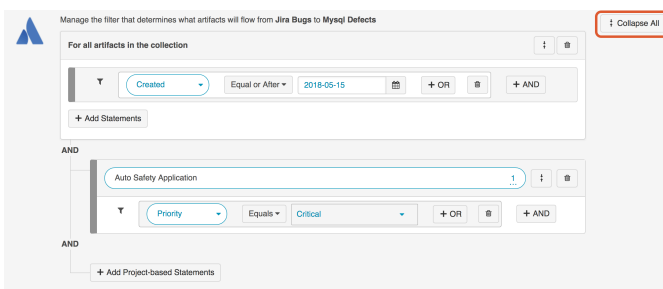
Select the project(s) you'd like your filter to apply to.

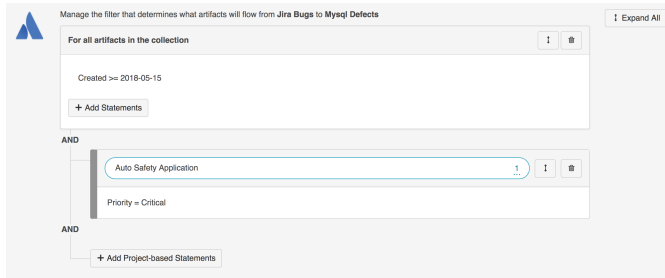
Then click 'Select Field...' to begin configuring your filtering statement.



### Viewing Artifact Filter Statements

You can click the 'Collapse All' button to view an easier-to-read version of your artifact filtering statements.





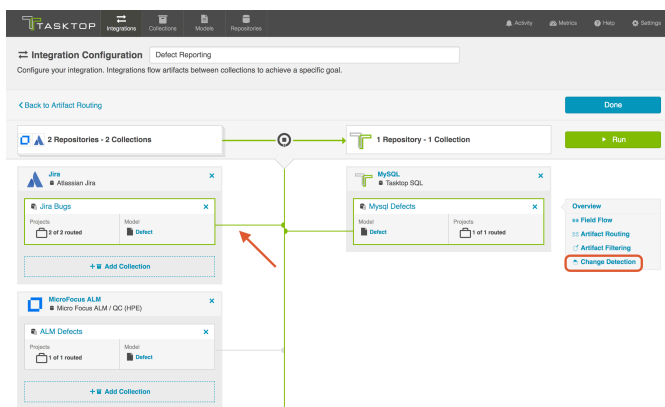
## Change Detection

Tasktop's default global change detection settings can be found on the [Settings](#) screen. However, if you'd like to override the global defaults, you can configure integration-specific change detection and full scan intervals by clicking the 'Change Detection' link.

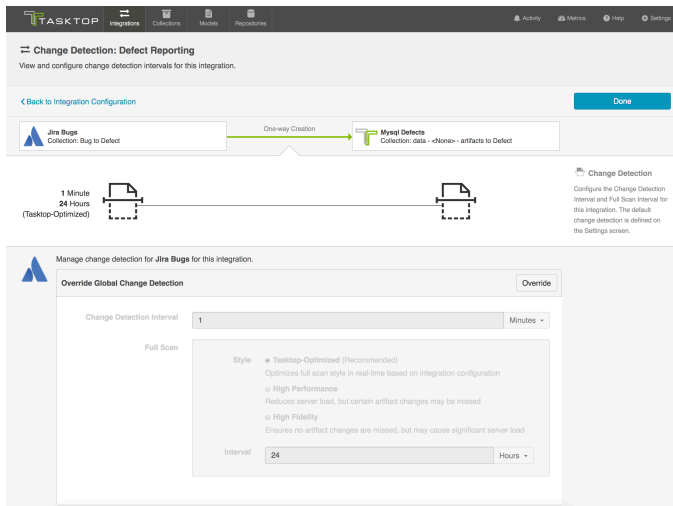
The **Change Detection Interval** is the time between polling requests to detect *only changed artifacts*. This defaults to 1 minute on the Settings screen, but can be customized as desired.

The **Full Scan Interval** is the time between polling requests to detect changed artifacts, in which *all* artifacts of a collection are scanned. Not all changes to an artifact will register as a change. Some repositories do not mark items as changed when (for example) a relationship is added or an attachment has changed. These may not be picked up by regular Change Detection, but will be picked up by a Full Scan. This defaults to 24 hours on the Settings screen, but can be customized as desired.

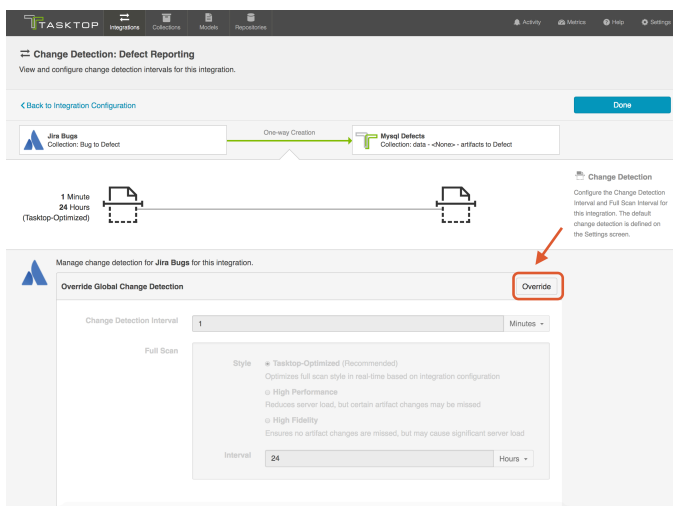
To configure integration-specific change detection, select the relevant repository, then click the 'Change Detection' link.



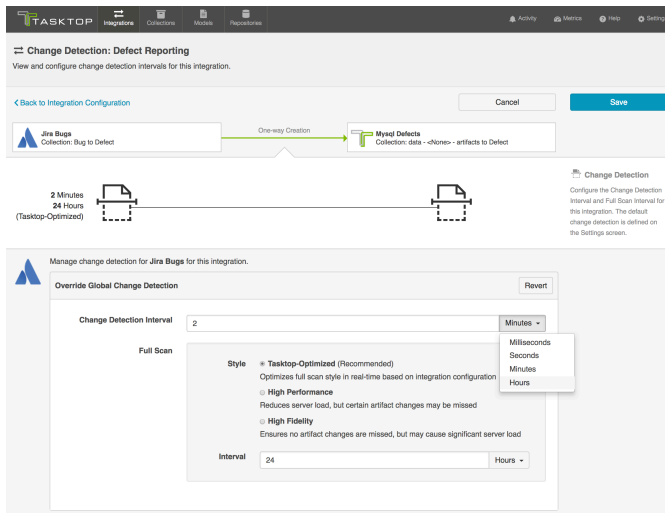
This will bring you to the Change Detection screen, where you can view the current change detection and full scan intervals configured for the selected collection in this integration. These will default to the global intervals configured on the Settings screen.



To override the current settings, click the 'Override' button. This will allow you to set a custom change detection and/or full scan interval for the collection within the context of this integration. Note that these custom settings will only impact *this* integration; they will not impact other integrations that make use of the same collections.



Once you click 'Override,' you will be able to configure custom change detection and full scan intervals for the collection within the context of this integration:



In addition to customizing the full scan interval, you can also select your desired full scan style in order to best meet your specific performance and server load needs.

The following full scan styles are available:

- **Tasktop-Optimized (Recommended):** This is the default selection. It optimizes your full scan style in real-time based on your integration configuration.
- **High Performance:** This full scan style reduces server load, but certain artifact changes may be missed.
- **High Fidelity:** This full scan style ensures no artifact changes are missed, but may cause significant server load.

If High Performance style is selected, Tasktop will provide a warning identifying any specific artifact changes which may be missed:

**⚠ You are about to apply High Performance Full Scan to Jira Bugs in this integration**

**Please read the following message carefully before proceeding.**

The following 5 unconfigured fields in Jira Bugs require the High Fidelity Full Scan style to detect changes. Please be aware of this when modifying your configuration.

- Time Spent (timespent)
- Watchers (watches)
- Remaining Estimate (timeestimate)
- Original Estimate (timeoriginalestimate)
- Web Links (web-links)

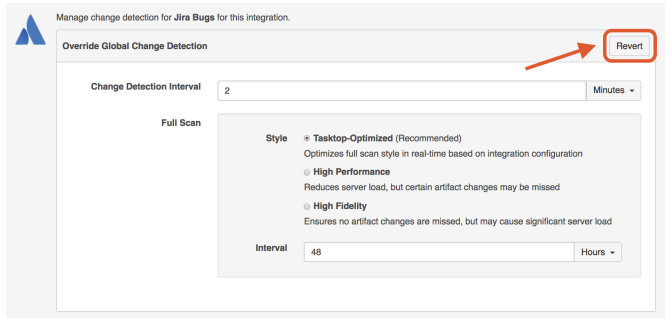
[Show Fewer](#)

Are you sure that you would like to apply the High Performance Full Scan style?

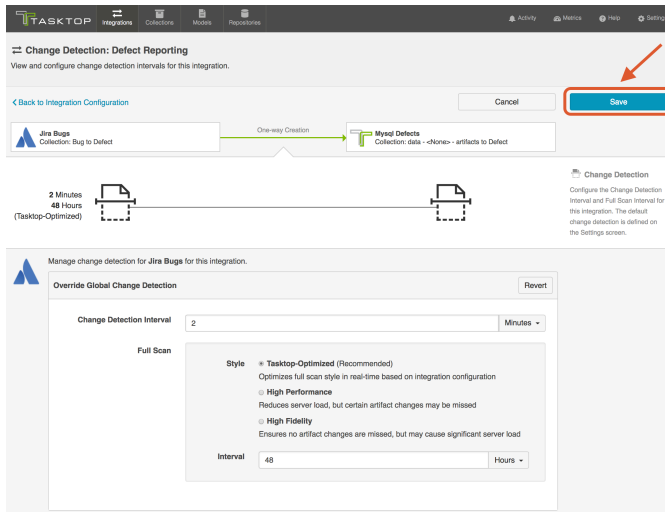
- I understand that applying the High Performance Full Scan style may cause some artifact changes to be missed.

Cancel Apply

If you'd like to restore the global change detection settings, simply click the 'Revert' button to remove the custom settings:



Once you've updated the change detection settings as desired, click 'Save' and 'Done' to save your changes.



### **Running your Integration**

There are two ways to start or stop your integration:

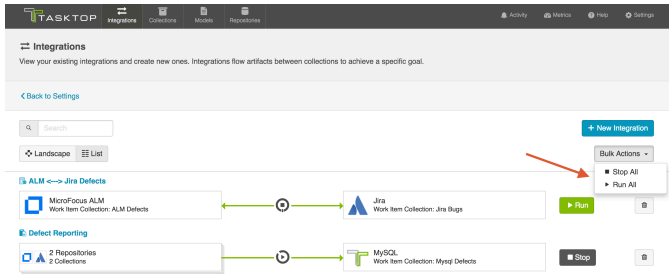
#### **From the Integration Configuration Screen**

Simply click the 'Run' to run the integration, and the 'Stop' button to stop the integration.



### From the Integrations List Page

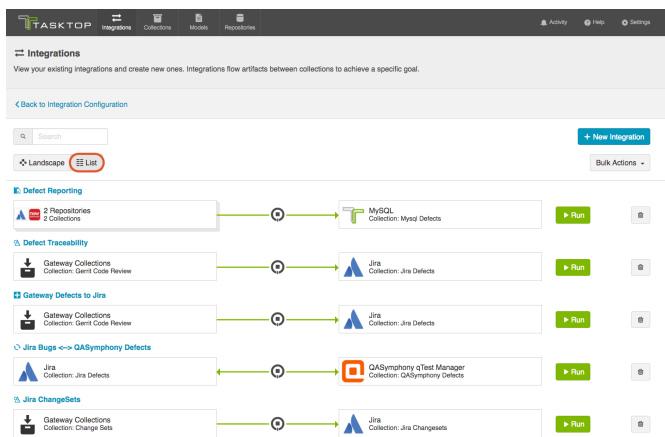
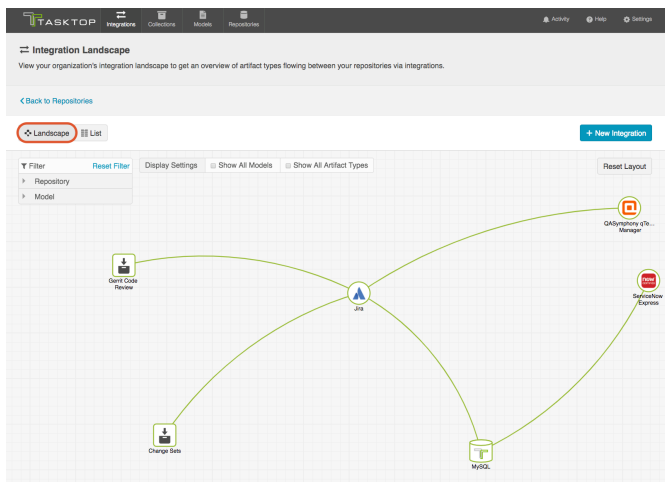
Click 'Run' or 'Stop' next to each integration you would like to update. You can also use the 'Bulk Actions' button to run or stop all integrations.



## Viewing Your Integrations

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

When viewing your integrations, you have the option of viewing them in either Landscape or List mode.



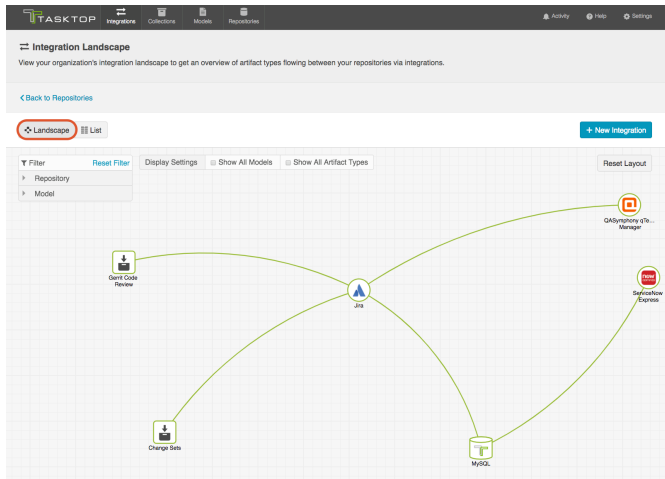
## Landscape View

See [Tasktop Editions table](#) to determine if your edition contains Integration Landscape View functionality.

Learn more about the Integration Landscape View in the video below:

Tasktop will default to the Landscape View, which enables you to visualize your entire integration landscape and see how your integrations relate to one another. Use our built-in filters to see as little or as much information as you'd like!

Here's a simplified view:

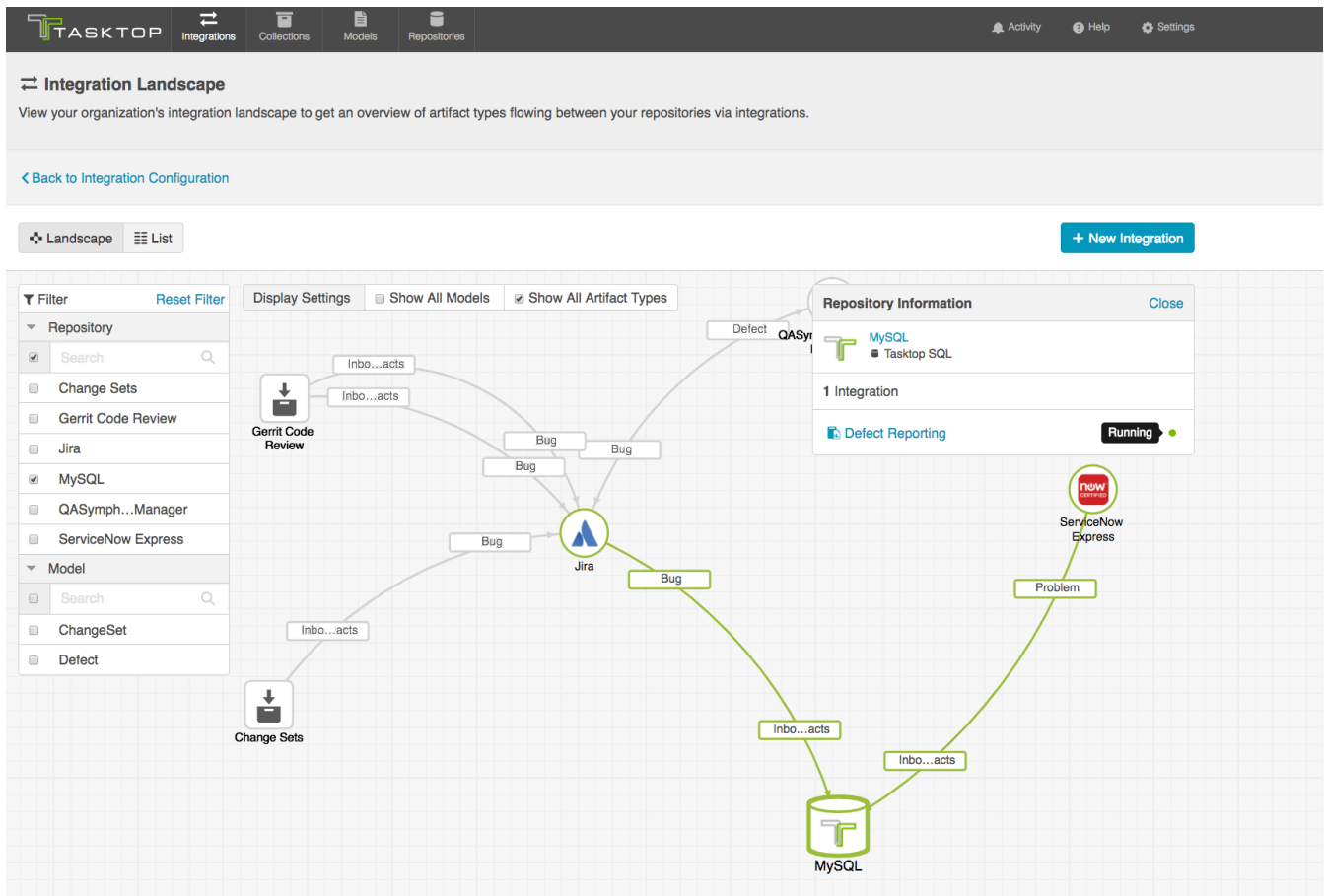


If you'd like to see additional information, you can utilize the filters, or click on a repository node to modify which information is shown.

Some examples of additional information you can see are:

- Models
- Artifact Types
- Artifact Creation Directionality Arrows
- List of all relevant integrations (see this by clicking on the repository node)
  - Indicator of whether each integration is running or not

Here's an example of a more detailed view:

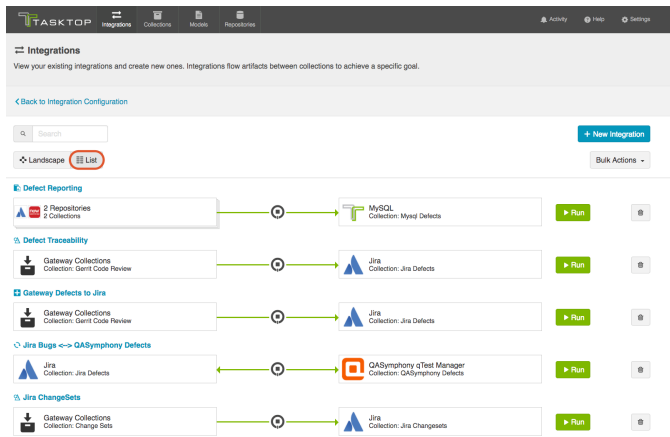


## List View

If you'd like, you can toggle to List View, which will show you a list of all integrations you have created.

You can use this view to:

- Start an Integration
- Stop an Integration
- Delete an Integration
- Click into an Integration and modify its configuration



## Reporting

### To ETL or Not To ETL?

ETL (Extract, Transform, Load) is a process where data is extracted from a database, transformed to be more suitable for reporting or analytics, and loaded into a database which is normally used for reporting.

The data structures populated directly by Tasktop are intended to be used as a source for ETL; Some kinds of reports are not easily produced without first performing an ETL process. ETL can also be beneficial for performance of reports.

Some reports are possible without first performing an ETL process. Examples of such reports include Artifact Cycle Time and Defect Count By State By Cycle Time.

### Example Reports

The following are examples of some reports that can be driven directly from the database tables populated by an Enterprise Data Stream Integration:

#### Artifact Cycle Time

Artifact Cycle Time is often a valuable metric to measure as it can help identify areas where efficiencies can be gained and ensure "lean flow". We have provided a model called "Artifact Cycle Time" and can be used to easily flow the necessary data to your database – enabling you to create a variety of metrics and visualizations based on the cycle time of any artifact type.

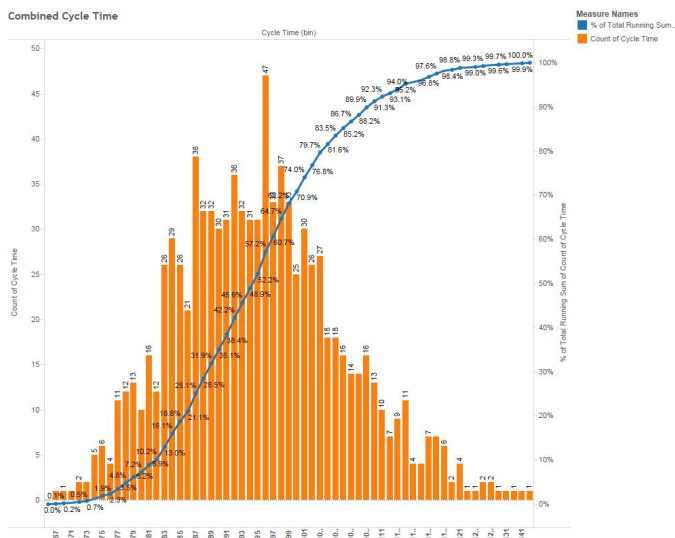
#### Artifact Cycle Time Model

Artifact Cycle Time
Formatted ID
Project
Type

Created
Modified
Severity
Status
Priority
Release
Assignee

If you use this model, you can easily produce visualizations such as a histogram that can identify the historical trend of cycle times.

### Artifact Cycle Time Histogram



### SQL

```

SELECT A.FORMATTED_ID, B.MODIFIED AS StatusOpen, C.MODIFIED AS
StatusInProgress, D.MODIFIED AS StatusReadyForTesting, E.MODIFIED AS
StatusReadyForVerification, F.MODIFIED AS StatusComplete, G.MODIFIED
AS StatusShipped, A.STATUS AS CurrentStatus FROM ARTIFACT A
LEFT OUTER JOIN ARTIFACT B
ON B.ARTIFACT_ID = A.ARTIFACT_ID
AND B.STATUS = 'Open'
AND NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED < B.MODIFIED OR (MODIFIED = B.MODIFIED AND
ID < B.ID)) AND STATUS = B.STATUS)
LEFT OUTER JOIN ARTIFACT C
ON C.ARTIFACT_ID = A.ARTIFACT_ID
AND C.STATUS = 'In Progress'

```

```

        AND NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED < C.MODIFIED OR (MODIFIED = C.MODIFIED AND
ID < C.ID)) AND STATUS = C.STATUS)
    LEFT OUTER JOIN ARTIFACT D
        ON D.ARTIFACT_ID = A.ARTIFACT_ID
        AND D.STATUS = 'Ready for Testing'
        AND D.MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'In Progress'))
        AND NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED < D.MODIFIED OR (MODIFIED = D.MODIFIED AND
ID < D.ID)) AND STATUS = D.STATUS
        AND MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'In Progress')))
    LEFT OUTER JOIN ARTIFACT E
        ON E.ARTIFACT_ID = A.ARTIFACT_ID
        AND E.STATUS = 'Ready for Verification'
        AND E.MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'In Progress',
'Ready for Testing'))
        AND NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED < E.MODIFIED OR (MODIFIED = E.MODIFIED AND
ID < E.ID)) AND STATUS = E.STATUS
        AND MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'In Progress',
'Ready for Testing')))
    LEFT OUTER JOIN ARTIFACT F
        ON F.ARTIFACT_ID = A.ARTIFACT_ID
        AND F.STATUS = 'Complete'
        AND F.MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'Ready for
Testing', 'Ready for Verification'))
        AND NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED < F.MODIFIED OR (MODIFIED = F.MODIFIED AND
ID < F.ID)) AND STATUS = F.STATUS
        AND MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'Ready for
Testing', 'Ready for Verification')))
    LEFT OUTER JOIN ARTIFACT G
        ON G.ARTIFACT_ID = A.ARTIFACT_ID
        AND G.STATUS = 'Shipped'
        AND G.MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'Ready for
Testing', 'Ready for Verification', 'Complete'))
        AND NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED < G.MODIFIED OR (MODIFIED = G.MODIFIED AND
ID < G.ID)) AND STATUS = G.STATUS
        AND MODIFIED > (SELECT MAX(MODIFIED) FROM ARTIFACT WHERE
ARTIFACT_ID = A.ARTIFACT_ID AND STATUS IN ('Open', 'Ready for
Testing', 'Ready for Verification', 'Complete')))
WHERE NOT EXISTS (SELECT * FROM ARTIFACT WHERE ARTIFACT_ID = A.
ARTIFACT_ID AND (MODIFIED > A.MODIFIED OR (MODIFIED = A.MODIFIED AND

```

```

ID > A.ID)))
    AND (A.ARTIFACT_EVENT_TYPE IS NULL OR NOT A.ARTIFACT_EVENT_TYPE =
'removed' )
ORDER BY A.FORMATTED_ID

```

The example above is designed to handle cases where an artifact is moved into a state more than once. For example, a defect that is moved to “Complete”, subsequently moved back into “In Progress”, then moved to “Complete” again is represented with a row having the second timestamp for the “Complete” status.

Formatted ID	priority	type	severity	repository_id	StatusOpen	StatusInProgress	StatusClosed	StatusCancelled	StatusShipped	Comments	
TODC-Test-Project1	Low	Defect	3	HP-ALM	2015-01-20 03:40:00	2015-01-28 10:10:00	2015-02-02 09:20:00	2015-04-07 09:00:00	2015-05-14 04:50:00	2015-05-25 08:37:00	Shipped
TODC-Test-Project1	Low	Defect	2	HP-ALM	2015-02-08 01:22:00	2015-02-12 17:41:00	2015-02-24 22:13:00	2015-03-17 01:12:00	2015-03-20 17:58:00	2015-04-05 17:46:00	Shipped
TODC-Test-Project1	High	Defect	1	HP-ALM	2015-02-08 09:46:00	2015-02-11 10:20:00	2015-02-26 15:28:00	2015-03-09 08:44:00	2015-03-18 11:00:00	2015-03-27 15:58:00	Shipped
TODC-Test-Project1	Low	Defect	3	JIRA	2015-02-08 14:09:00	2015-02-10 12:49:00	2015-02-27 12:28:00	2015-03-17 14:08:00	2015-03-28 11:28:00	2015-04-06 14:28:00	Shipped
TODC-Test-Project1	Medium	Defect	2	HP-ALM	2015-02-07 16:44:00	2015-02-11 21:30:00	2015-02-13 12:41:00	2015-04-15 16:54:00	2015-04-08 20:00:00	2015-05-07 18:50:00	Shipped
TODC-Test-Project1	High	Defect	1	HP-ALM	2015-02-07 18:43:00	2015-02-10 22:00:00	2015-02-18 22:23:00	2015-02-28 02:19:00	2015-03-07 01:31:00	2015-03-17 18:47:00	Shipped
TODC-Test-Project1	High	Defect	1	HP-ALM	2015-02-12 19:08:00	2015-04-06 18:22:00	2015-04-02 22:03:00	2015-04-01 12:26:00	2015-05-12 14:00:00	2015-05-20 19:48:00	Shipped
TODC-Test-Project1	High	Defect	1	HP-ALM	2015-02-15 19:00:00	2015-02-19 22:42:00	2015-03-14 03:20:00	2015-03-21 22:42:00	2015-04-04 17:16:00	2015-04-04 22:52:00	Shipped

Reports can be driven from the results of this SQL query, subtracting dates to produce cycle times for the desired transitions (e.g. “Open” to “Shipped”).

Status values in the SQL above correspond to the values present in the “Artifact” model; repository-specific status values can be mapped to the model values in the corresponding collection field mapping. If status values are added, removed, or changed in the artifact model, then the SQL will have to be modified accordingly.

### Defect Count By State By Cycle Time

Defect Count By State By Cycle Time provides a count of defects by cycle time for each status of an artifact.

In this example, the cycle time is measured in days. Cycle time is only measured for status state transitions; Cycle time is not measured for the end state of an artifact.

We provide a basic defect model packaged with our product:

#### Basic Defect Model

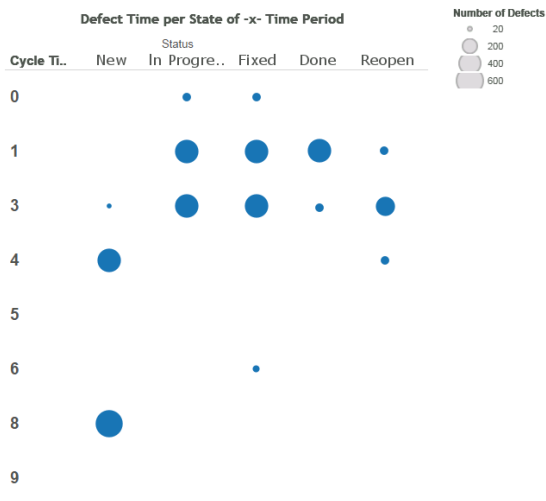
Defect Model
Formatted ID
Project
Type
Created
Modified
Severity
Status



Summary
Summary-to-Description
Related Defects
Description

If you use this model, you can easily produce visualizations such as a bubble chart that can identify the volume of defects in each cycle time measured in days. This is simply a slightly different view into your overall cycle time.

### Cycle Time Volume



### SQL

```

SELECT status, COUNT(artifact_id), cycleTime FROM (
  SELECT A.ARTIFACT_ID AS artifact_id, A.STATUS AS status, SUM(
    TIMESTAMPTDIFF(SQL_TSI_DAY,A.MODIFIED,B.MODIFIED) ) AS cycleTime FROM
  DEFECT A
    INNER JOIN DEFECT B ON A.ARTIFACT_ID = B.ARTIFACT_ID
      AND A.ID != B.ID
      AND A.STATUS != B.STATUS
      AND A.MODIFIED <= B.MODIFIED
      AND ((A.ARTIFACT_EVENT_TYPE IS NULL OR B.ARTIFACT_EVENT_TYPE
IS NULL)
        OR NOT (A.ARTIFACT_EVENT_TYPE = 'removed' OR B.
ARTIFACT_EVENT_TYPE = 'removed'))
    )
  WHERE NOT EXISTS (
    SELECT * FROM DEFECT C WHERE C.ARTIFACT_ID = A.ARTIFACT_ID AND
C.ID != A.ID AND C.ID != B.ID
  )

```

```

        AND C.MODIFIED >= A.MODIFIED AND C.MODIFIED <= B.MODIFIED
        AND ((C.STATUS = A.STATUS OR C.STATUS = B.STATUS) OR (C.
STATUS != A.STATUS AND C.STATUS != B.STATUS))
    )
    AND NOT EXISTS (
        SELECT * FROM DEFECT D WHERE D.ARTIFACT_ID = A.ARTIFACT_ID
AND B.MODIFIED <= (
        SELECT MAX(MODIFIED) FROM DEFECT D WHERE D.ARTIFACT_ID = A.
ARTIFACT_ID AND D.ARTIFACT_EVENT_TYPE = 'removed'
    )
    )
    GROUP BY A.ARTIFACT_ID, A.STATUS
) CT GROUP BY CT.status, CT.cycleTime
ORDER BY CT.status, CT.cycleTime

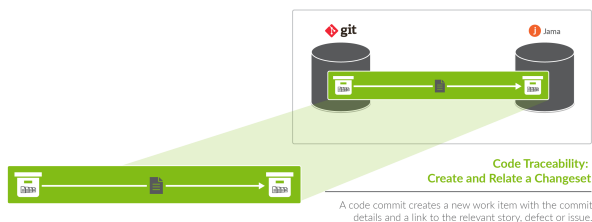
```

## Code Traceability: Create and Relate a Changeset

What is a Code Traceability: Create and Relate a Changeset Integration?

*This integration template is only available in editions that have access to the Git repository.*

<https://docs.tasktop.com/cd/user-guide/quick-start-guide/step-4-configure-your-integration>



An *integration* is quite simply **the flow of information between two or more collections**.

A *Code Traceability: Create and Relate a Changeset* integration, specifically, creates new work items such as changesets or code commits in a repository such as Jama, when they are sent to Tasktop via a read only collection connecting to a repository such as Git.

These types of events are “fire and forget” - they create something new in your repository, but they don’t expect anything back. As such, they don’t mandate a full-blown two way synchronization; a lighter one-way integration can do the trick.

Here is an example of what you can do with the Code Traceability: Create and Relate a Changeset integration:

- Flow a Git code commit to a repository such as Jama as a changeset, and relate that changeset to an existing requirement or defect

When you configure your Code Traceability: Create and Relate a Changeset integration, you can customize the field flow, artifact filtering, and change detection for your integration.

### Use Case and Business Value

The Code Traceability: Create and Relate a Changeset template allows developers working in Source Control Management tools, such as Git, to flow artifacts, such as code commits, to a Requirements Management tool, such as Jama.

As part of the integration,

- Changesets, commit messages, or code reviews from an SCM tool, such as Git, will create corresponding changesets in Requirements Management tools, such as Jama
- Optionally, those newly created changesets can be related to their associated features, defects, or other artifacts in the Requirements Management tool

### Template Affordances

The Code Traceability: Create and Relate a Changeset Template allows you to flow artifacts in one direction: from your outbound only collection (i.e. an SCM tool, such as Git) to your work item collection (i.e. your Requirements Management tool).



### Before You Begin

Before you begin configuring your integration, you must configure your repository, model, and collections. Please review instructions below for each step

#### *Repository Configuration*

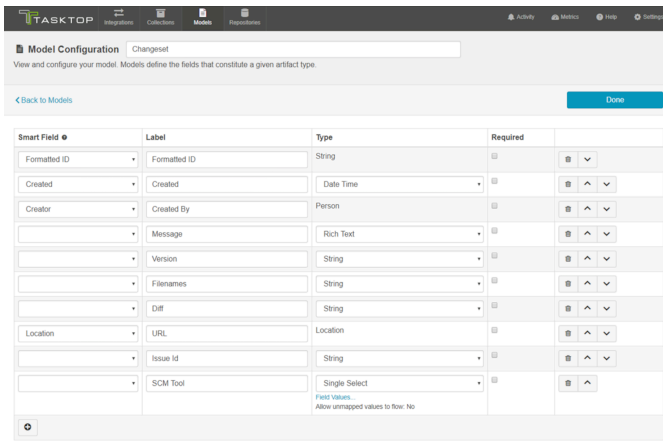
Please review the following pages to learn how to configure your repository:

- [Standard Repository Connection](#)
- Please review the Git Connector page in our [Connector Docs](#) for additional details on configuring the Git repository. This will serve as the source repository in your integration.

#### *Model Configuration*

You can learn more about configuring your model here: [Step 2: Create or Reuse a Model](#)

Below is our recommended Changeset model configuration:



### Collection Configuration

To configure your source and target collections, please review the instructions below.

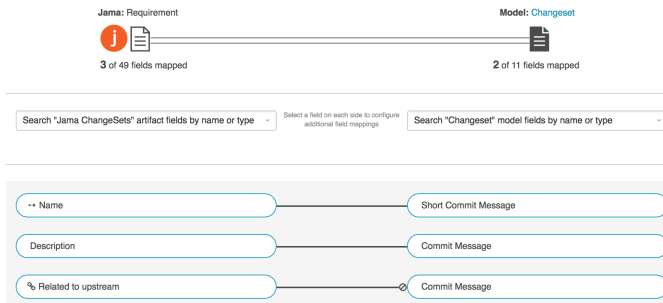
- To configure your source collection (i.e. your Git collection): [Outbound Only Collection](#)
- To configure your target collection (i.e. your Jama or Jira collection): [Work Item Collection \(Repository\)](#)
  - Please also review additional notes below

For your **target collection**,

- Ensure you are using the same model as your source collection (i.e. the Changeset model)

Configure the following mappings:

Source Repository (Git)	Model	Target Repository (i.e. Jama or Jira)
Short Commit Message (the first line of the commit message)	Short Commit Message (String or Rich text)	Summary/Name
Commit Message (the entire commit message)	Commit Message (String or Rich text)  <i>If also mapping Commit Message to description as shown below, ensure transform is set to 'none' for the model on the target collection field mapping</i>	Relationship of choice (i.e. 'relates to')  <i>see details below</i>
Commit Message (the entire commit message)	Commit Message (String or Rich text)	Description



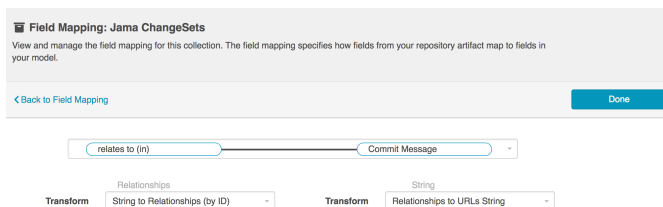
## Configuring Relationships for the Target Collection

**⚠** In order for your integration to run, there must be a mapping in your target collection that tells Tasktop how to handle relationships between artifacts. This must be done via a relationship-to-string (or relationship-to-rich text) field mapping in the target collection. If no such mapping exists, you will notice an issue on the [Activity Screen](#) that will block the integration from running.

To configure relationships for your target collection, go to the Field Mapping screen for that collection, and map the relationship type of choice (i.e. 'relates to') to the Commit Message string field in your model. The transform selected for this field mapping should be *String to Relationships (by ID)*. Tasktop will default to this transform.

Tasktop has built-in smarts to find any artifact IDs present in the commit message, and to then relate the newly created changeset in that target repository to the artifacts identified in that message. For example, if my Git code commit has 'ARTIFACT #123' listed in its commit message, if my relationship is mapped to the 'Commit Message' field in my model, when the corresponding changeset is created in my target repository, it will automatically include a relationship to the existing ARTIFACT #123 in that repository. This will use the *String to Relationships (by ID)* transformation.

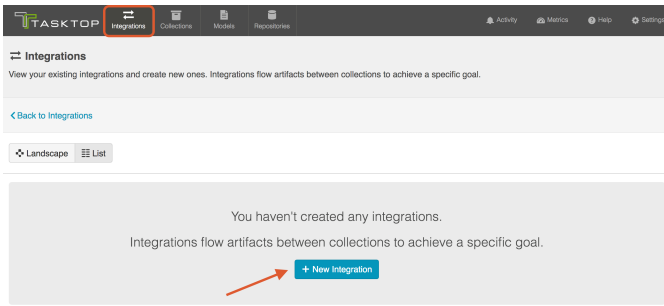
If a *relationship* field is mapped to the commit message, Tasktop will relate the newly created changeset to the first artifact ID it finds in the commit message (if there are multiple IDs). If a *relationships* field is mapped to the commit message, Tasktop will relate the newly created changeset to *all* artifact IDs it finds in the commit message.



## How to Configure a Code Traceability: Create and Relate a Changeset Integration

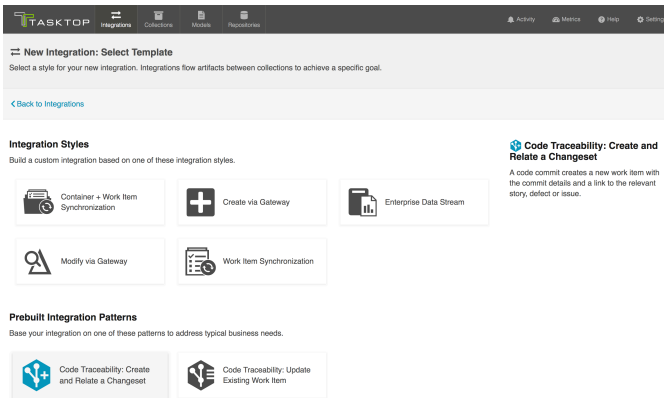
Now that you have all of your base components (i.e. repositories, models, and collections) set up, you can configure an integration to synchronize the artifacts in your collections.

To configure your integration, select 'Integrations' at the top of the screen, then click '+ New Integration.'

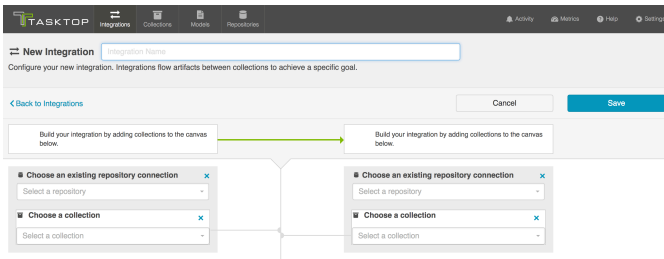


Select the Code Traceability: Create and Relate a Changeset template

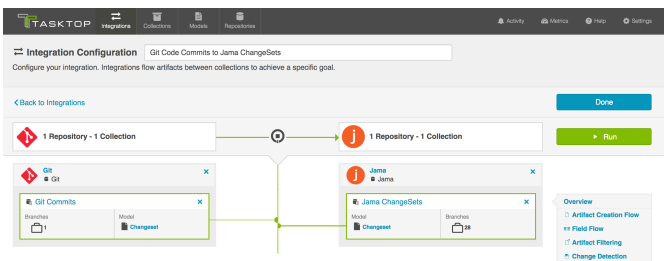
💡 Depending on the **edition** of Tasktop you are utilizing, you may not have all options available.



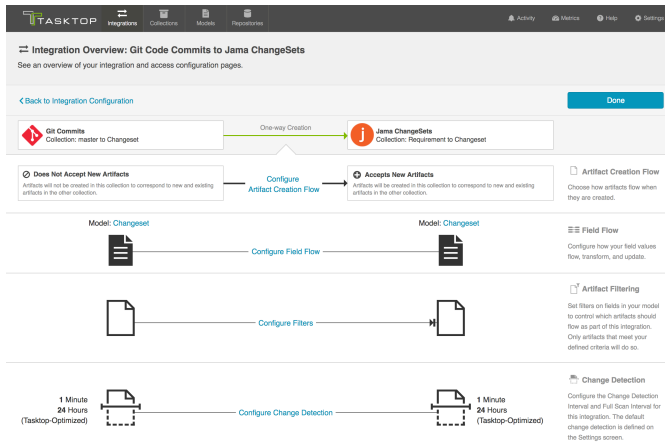
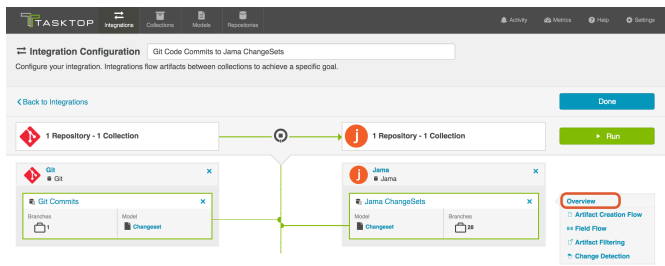
This will bring you to the New Integration screen:



Name your integration and select your repositories and collections

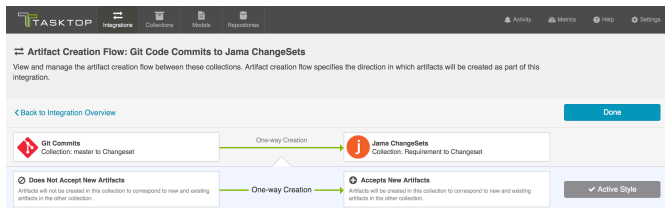


You can click the 'Overview' link on the right side of the integration screen to get to the main display screen (shown in the second screenshot).



## Artifact Creation Flow

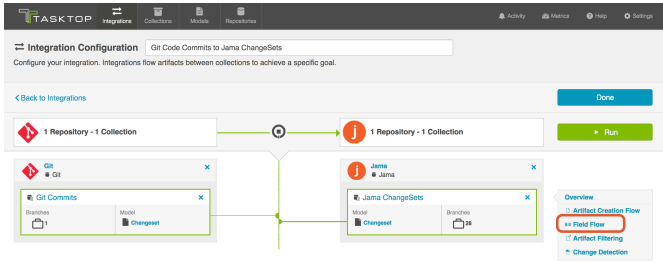
Artifacts will flow in one direction only: from the Git repository to the Work item repository. This cannot be modified.



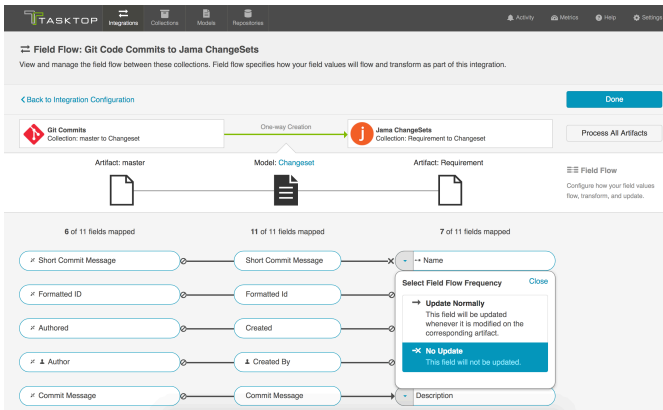
## Field Flow

The field flow configured for a given integration specifies which fields should flow in that integration. For *Code Traceability: Create and Relate a Changeset* integrations, you can choose to flow a given field (Update Normally) or to not flow a given field (No Update).

To get to the Field Flow screen, click 'Field Flow' on the right pane of the Integration Configuration screen:



You will be directed to the Field Flow Screen:



You can choose to flow a field ('update normally') or not flow it ('no update'). You'll notice that field flow goes in one direction only - from the outbound only collection *into* the repository collection.







You can see the names of the mapped artifact fields for each collection on the far left and far right, with the model fields displayed in the middle.

### Field Flow Icons

On the Field Flow screen, you will see a number of icons, which will help you understand any special properties or requirements for each field. If you hover your mouse over an icon, you will see a pop-up explaining what the icon means. You can also review their meanings in the legend below:

Icon	Meaning
	<p>A constant value will be sent.</p> <p>Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a constant value will be sent to your model. This means that any time this collection is integrated with another collection, the <i>other</i> collection will receive this constant value for the field in question.</li> <li>• If the icon is on the side of the model, this means a constant value will be sent to your collection. This means that any time this</li> </ul>



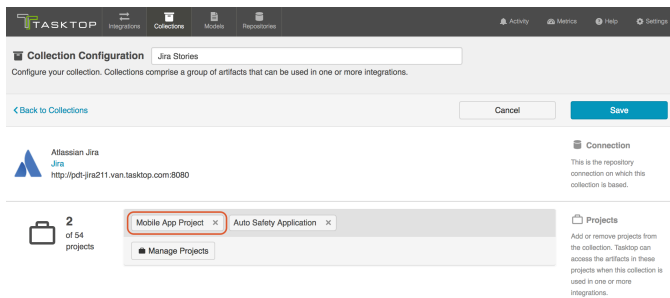
		collection is integrated with another collection, that <i>this</i> collection will receive this constant value for the field in question.
		<p>A state transition will be utilized. Note that:</p> <ul style="list-style-type: none"> <li>• If the icon is on the side of the collection, this means that a <b>state transition graph</b> is being utilized.</li> <li>• If the icon is on the side of the model, this means that a <b>state transition extension</b> is being utilized.</li> </ul> <p> Note that Tasktop will update the field flow frequency for fields utilizing state transitions to 'no update.' This is because they are updated via the transition and not via normal 'field flow.' Do not modify the field flow frequency for this field.</p>
		Collection field is read-only and cannot receive data
	<p>←*</p> <p>*→</p>	To create artifacts in your collection, this field must be mapped to your model.
		This is a required field in your model; it must be mapped to your collection.
		This field will not be updated as part of your integration, due to how you have configured it. This field flow configuration can be changed if you'd like.
		This field will not be updated as part of your integration because the mapping would be invalid. You do not have the option of changing this.
	→	This field will update normally as part of your synchronize integration; this means it will be updated whenever it is modified on the corresponding artifact.

### Artifact Routing

Artifact routing is applied based on the artifact IDs included in each commit message. It cannot be configured or modified in Tasktop.

- New code commits or changesets will route to the project containing the first related artifact. For example, if your code commit references ARTIFACT #123, which resides in Project A in Jama, your newly created Jama changeset will be created in Project A as well. If Project A is not a part of your collection, the artifact will either be created in the intended project (if the external repository allows this), or it will be created in the first project in the collection\*
- If your code commit or changeset does not reference an artifact in your target repository, it will be created in the first project listed in the collection\*

\*Here, by 'first' we mean the first project listed on the Collection Configuration screen. Tasktop will list all projects added at the same time alphabetically. Then once saved, it will add any new projects added under subsequent saves after the initial list of projects.



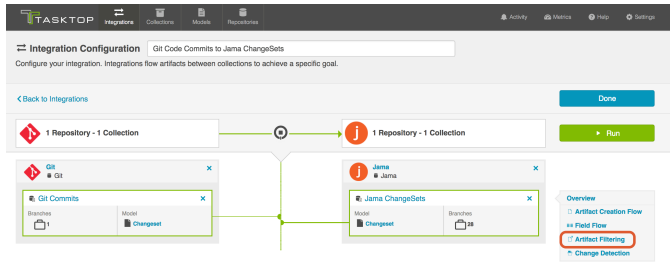
### Artifact Filtering

Artifact Filtering enables you to set filters in order to limit which artifacts are eligible to flow in an integration.

To use a field for artifact filtering, it must:

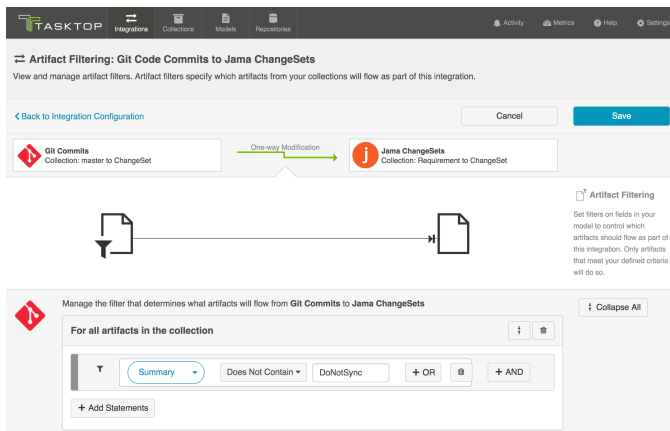
- Be a part of your model, and be mapped to the collection you are filtering from
- Be one of the following field types:
  - Single Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Multi-Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Date
  - Date/Time
  - Duration
  - String

To configure *Artifact Filtering*, select 'Artifact Filtering' from the right pane of the Integration Configuration screen:



This will lead you to the Artifact Filtering configuration screen, where you can configure one or more criteria for artifact filtering.

🟡 You can click the 'Collapse All' button to view an easier-to-read summary of your artifact filtering statements.



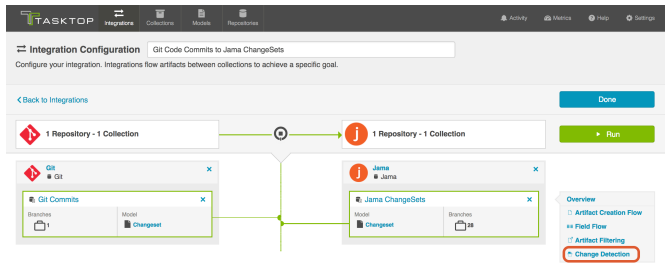
## Change Detection

Tasktop's default global change detection settings can be found on the [Settings](#) screen. However, if you'd like to override the global defaults, you can configure integration-specific change detection and full scan intervals by clicking the 'Change Detection' link.

The **Change Detection Interval** is the time between polling requests to detect *only changed artifacts*. This defaults to 1 minute on the Settings screen, but can be customized as desired.

The **Full Scan Interval** is the time between polling requests to detect changed artifacts, in which *all* artifacts of a collection are scanned. Not all changes to an artifact will register as a change. Some repositories do not mark items as changed when (for example) a relationship is added or an attachment has changed. These may not be picked up by regular Change Detection, but will be picked up by a Full Scan. This defaults to 24 hours on the Settings screen, but can be customized as desired. Users can also customize the full scan style for each integration to impact performance and server load, based on their integration and repository configuration.

To configure integration-specific change detection, click the 'Change Detection' link. You can find details on this process [here](#). Note that for a *Code Traceability: Create and Relate a Changeset*, change detection can only be updated for the source (Git) collection.



### Running Your Integration

To run your integration, please see details here: [Running Your Integration\(s\)](#)

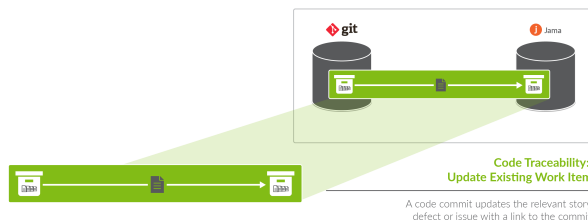
### Viewing Your Integration

To view your integration, please see details here: [Viewing Your Integration\(s\)](#)

## Code Traceability: Update Existing Work Item

What is a Code Traceability: Update Existing Work Item Integration?

*This integration template is only available in editions that have access to the Git repository.*



An *integration* is quite simply **the flow of information between two or more collections.**

A *Code Traceability: Update Existing Work Item* integration, specifically, flows information from an outbound only collection (such as Git Commits) to a field on an existing artifact in a work item collection (such as Jama Codes).

These types of events are “fire and forget” - they create something new in your repository, but they don't expect anything back. As such, they don't mandate a full-blown two way synchronization; a lighter one-way integration can do the trick.

Here are some examples of what you can do with the Code Traceability: Update Existing Work Item integration:

- Flow Git code commit information to a custom field on a Jama code artifact

- Flow code commit information from Git hosting services such as Bitbucket, Gerrit, and more to a custom field on an associated requirement, defect, or epic in an Agile Planning or Requirements Management tool

When you configure your Code Traceability: Update Existing Work Item integration, you can customize the field flow, artifact filtering, and change detection configuration of your integration.

### Use Case and Business Value

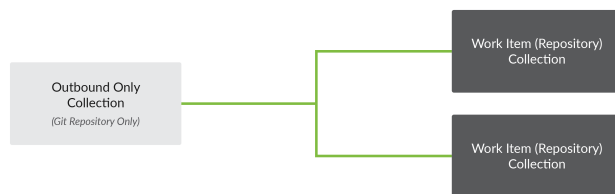
The Code Traceability: Update Existing Work Item template allows developers working in Source Control Management tools, such as Git, to flow data from code commits to an Agile Planning tool, such as Jira, to record information from the commit message directly on the related defect or feature.

As part of the integration,

- Changesets, commit messages, or code reviews from an SCM tool, such as Git, will flow information to a field on an artifact in a Requirements Management Planning tool, such as Jama

### Template Affordances

The Code Traceability: Update Existing Work Item template allows you to flow artifacts in one direction: from your outbound only collection (i.e. your Git Commits collection) to your work item collection (i.e. your Requirements Management artifacts).



### Before You Begin

Before you begin configuring your integration, you must configure your repository, model, and collections. Please review instructions below for each step

#### *Repository Configuration*

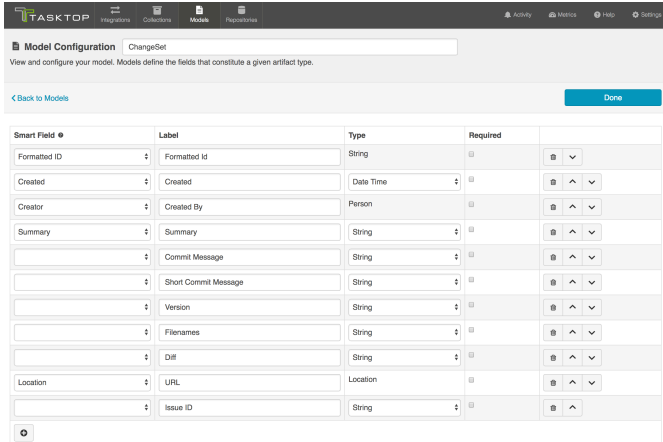
Please review the following pages to learn how to configure your repository:

- [Standard Repository Connection](#)
- Please review the Git Connector page in our [Connector Docs](#) for additional details on configuring the Git repository. This will serve as the source repository in your integration.

#### *Model Configuration*

You can learn more about configuring your model here: [Step 2: Create or Reuse a Model](#)

Below is our recommended Changeset model configuration:



### Collection Configuration

To configure your source and target collections, please review the instructions below.

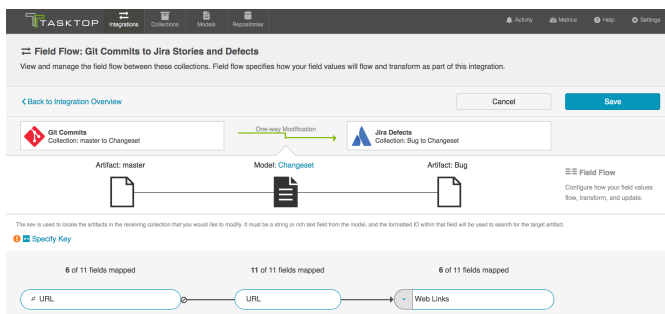
- To configure your source collection (i.e. your Git collection): [Outbound Only Collection](#)
- To configure your target collection (i.e. your Jama or Jira collection): [Work Item Collection \(Repository\)](#)
  - Please also review additional notes below

For your **target collection**,

- Ensure you are using the same model as your source collection (i.e. the Changeset model)

Configure the following mappings:

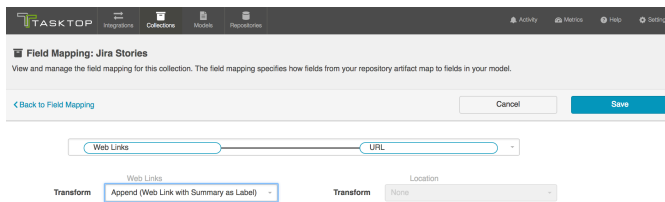
Source Repository (Git)	Model	Target Repository (i.e. Jama or Jira)
URL	URL	Web Link



### Configuring Commit Links

To flow a Git commit link to the artifact in the target repository, you must map the URL model field to the string, rich text, URL, or Web Link field in your target repository. If your target repository supports

web links with labels, you'll see that you can configure a 'Location to Web Link (Summary as Label)' or 'Append (Web Link with Summary as Label)' transform. In most cases, you will want to select 'Append (Web Link with Summary as Label),' as this will allow you to flow a link to each related commit, with each link using that commit's 'short commit message' (summary) as its label.



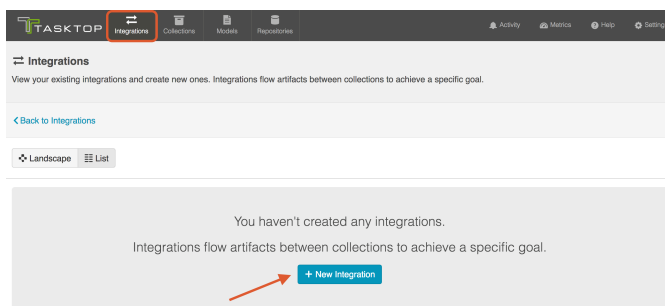
### Important Note about Field Updates

**⚠** Since this integration type will update existing artifacts in your target repository, be aware that any field mappings configured in your Field Flow will update fields on that existing artifact. As such, you should ensure that only fields that you'd like to update are set to flow. For example, you likely will not want to overwrite the summary or description fields in your target collection. Most likely, the only fields of concern will be the field that you are flowing the commit link to (i.e. the URL or Web Link field).

### How to Configure a Code Traceability: Update Existing Work Item Integration

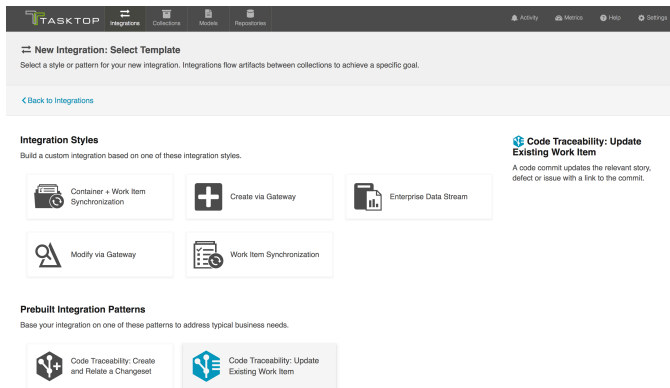
Now that you have all of your base components (i.e. repositories, models, and collections) set up, you can configure an integration to synchronize the artifacts in your collections.

To configure your integration, select 'Integrations' at the top of the screen, then click '+ New Integration.'

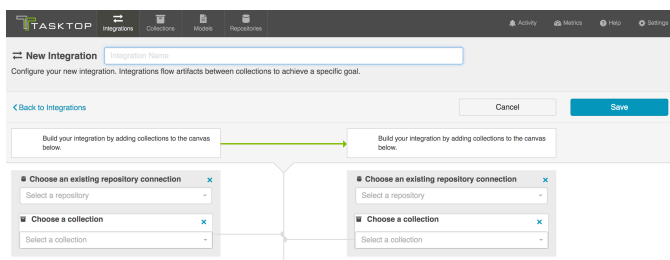


Select the 'Code Traceability: Update Existing Work Item' template

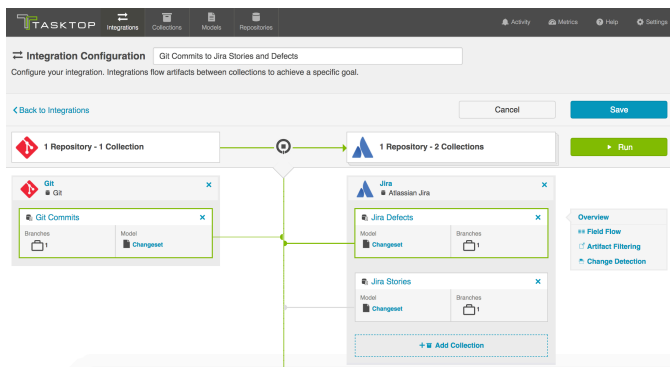
**💡** Depending on the [edition](#) of Tasktop you are utilizing, you may not have all options available.




This will bring you to the New Integration screen:



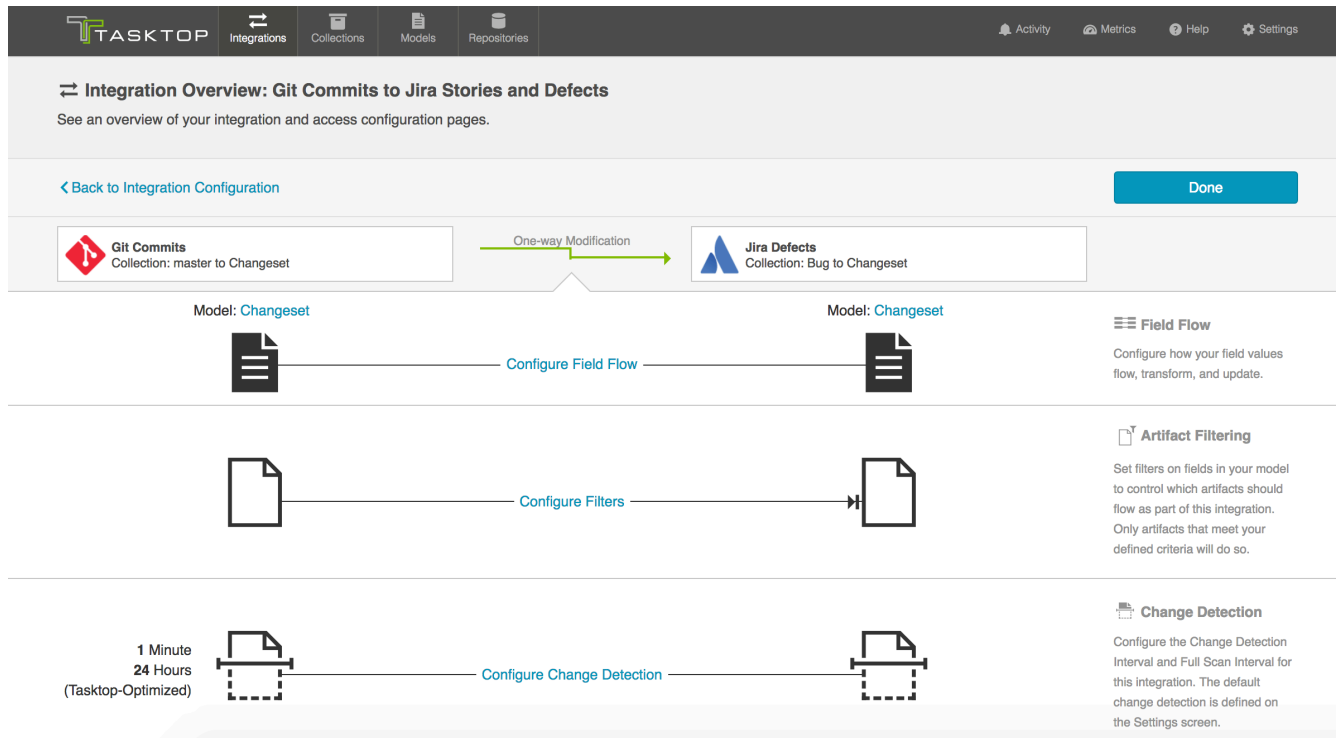
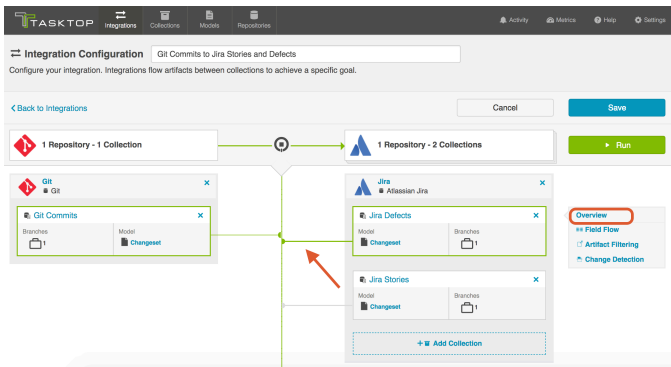
Name your integration and select your repositories and collections. Note that you can add multiple target collections within the same repository if you'd like to flow commit information to multiple artifact types. Click Save.



You can click the 'Overview' link on the right side of the Integration Configuration screen to get to the main display screen (shown in the second screenshot).

 Note: The Overview screen will only show two collections at a time - one source collection and one target collection. If there are multiple target collections in your integration, make sure the one you are interested in is selected before clicking 'Overview.'

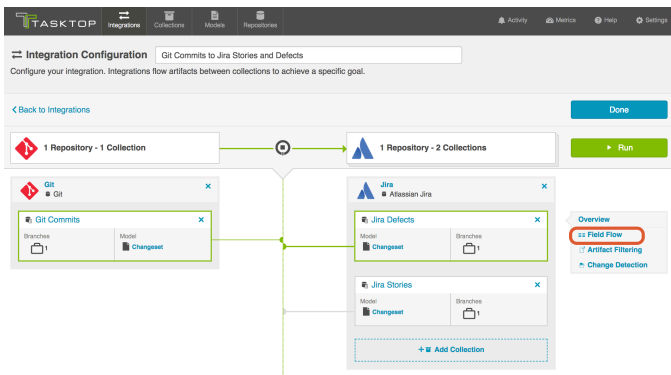




## Field Flow

The field flow configured for a given integration specifies which fields should flow in that integration. For *Code Traceability: Update Existing Work Item* integrations, you can choose to flow a given field (Update Normally) or to not flow a given field (No Update).

To get to the Field Flow screen, select your desired collections and click 'Field Flow' on the right side of the Integration Configuration screen:

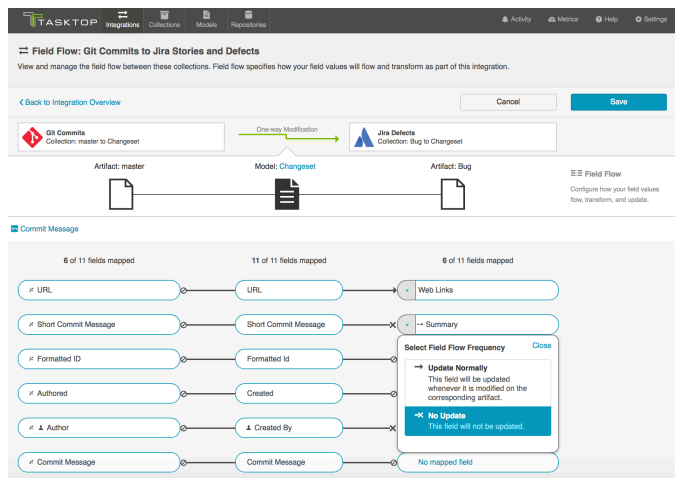


## Important Note about Field Updates

⚠ Since this integration type will update existing artifacts in your target repository, be aware that any field mappings configured in your Field Flow will update fields on that existing artifact. As such, you should ensure that only fields that you'd like to update are set to flow. For example, you likely will not want to overwrite the summary or description fields. Most likely, the only fields of concern will be the field that you are flowing the commit link to (i.e. the URL or Web Link field).

Note that in our example, only the URL field is set to flow into the target repository. Git will flow a web link for any related commits to a field on the Jira artifact, but will not overwrite any other Jira fields such as summary, description, etc.

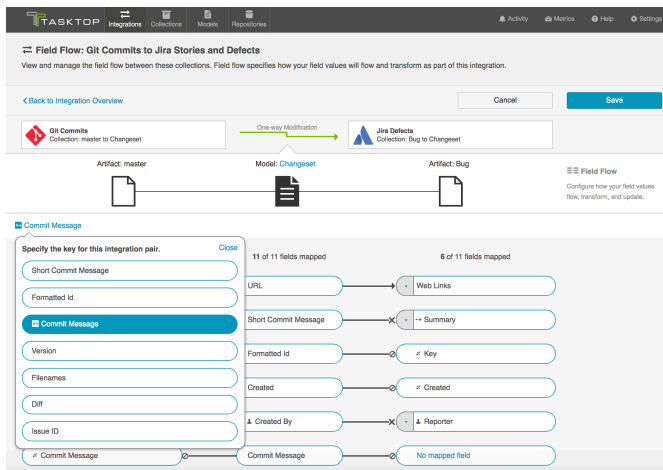
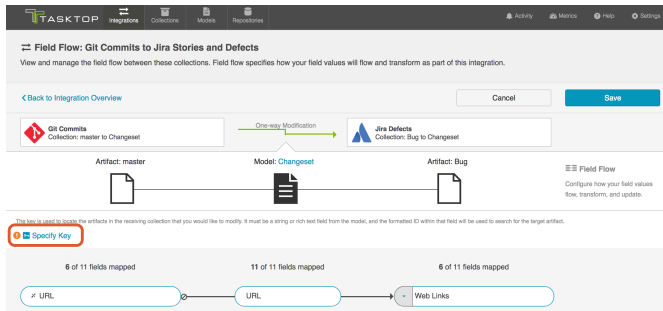
If needed, you can manually set other fields not to flow:



## Specifying Your Key

In order for your integration to run successfully, you will need to specify your key if one is not specified yet. If possible, Tasktop will set the key as the Commit Message field in Git. If that field is not mapped, Tasktop will set the key as the Summary field. If neither field is mapped, you will need to select a field to use as the key.

The key is used to locate the artifacts in the target collection that you would like to modify. It must be a string or rich text field from the model, and the formatted ID within that field will be used to search for the target artifact.



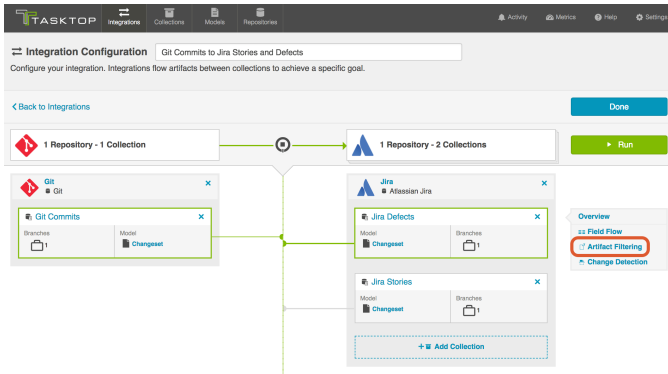
## Artifact Filtering

*Artifact Filtering* enables you to set filters in order to limit which artifacts are eligible to flow in an integration.

To use a field for artifact filtering, it must:

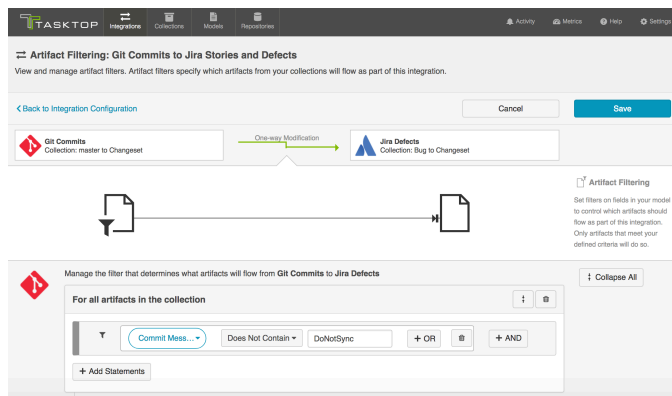
- Be a part of your model, and be mapped to the collection you are filtering from
- Be one of the following field types:
  - Single Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Multi-Select
    - Note that in cases where 'allow unmapped values to flow' is enabled in the model, **only** fields that are already a part of the model will be considered for artifact filtering
  - Date
  - Date/Time
  - Duration
  - String

To configure *Artifact Filtering*, select 'Artifact Filtering' from the right pane of the Integration Configuration screen:



This will lead you to the Artifact Filtering configuration screen, where you can configure one or more criteria for artifact filtering.

💡 You can click the 'Collapse All' button to view an easier-to-read summary of your artifact filtering statements.



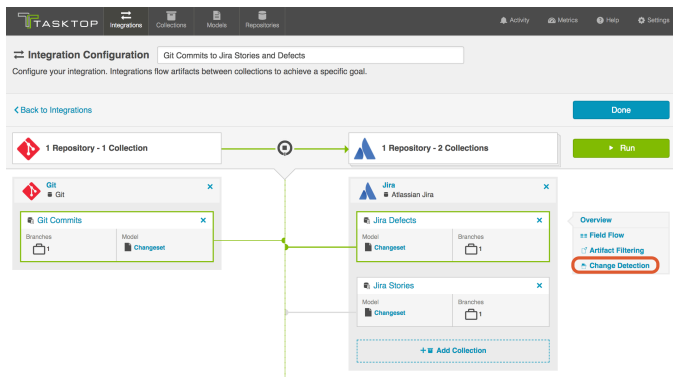
### Change Detection

Tasktop's default global change detection settings can be found on the [Settings](#) screen. However, if you'd like to override the global defaults, you can configure integration-specific change detection and full scan intervals by clicking the 'Change Detection' link.

The **Change Detection Interval** is the time between polling requests to detect *only changed artifacts*. This defaults to 1 minute on the Settings screen, but can be customized as desired.

The **Full Scan Interval** is the time between polling requests to detect changed artifacts, in which *all* artifacts of a collection are scanned. Not all changes to an artifact will register as a change. Some repositories do not mark items as changed when (for example) a relationship is added or an attachment has changed. These may not be picked up by regular Change Detection, but will be picked up by a Full Scan. This defaults to 24 hours on the Settings screen, but can be customized as desired. Users can also customize the full scan style for each integration to impact performance and server load, based on their integration and repository configuration.

To configure integration-specific change detection, click the 'Change Detection' link. You can find details on this process [here](#). Note that for a *Code Traceability: Create and Relate a Changeset*, change detection can only be updated for the source (Git) collection.



### Running Your Integration

To run your integration, please see details here: [Running Your Integration\(s\)](#)

### Viewing Your Integration

To view your integration, please see details here: [Viewing Your Integration\(s\)](#)

## Step 5: Expand or Modify your Integration

### Expanding the Scale of Your Integration

You've already configured your integration, and it's running great! Now you'd like to increase the scale by adding additional projects from each of your repositories to your integration landscape, or by adding additional fields to your mapping. No problem - you can make these updates in just a few clicks!

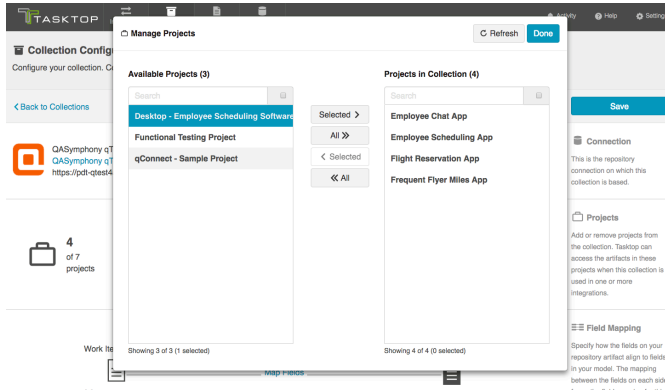
Below, we've included some tips and tricks on how to effectively scale your integration, as well as information on what to expect when you make modifications to your integration configuration after the integration has been activated.

### Adding Projects

In order to add additional projects from one or more of your repositories to your integration landscape, simply navigate to each collection, and add additional projects as desired. Once that's saved, navigate to the integration, click on 'Artifact Routing' and route the projects appropriately - either creating new routes or adding to existing routes.

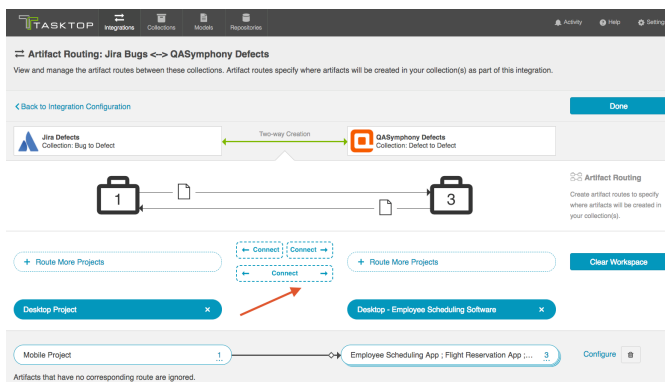
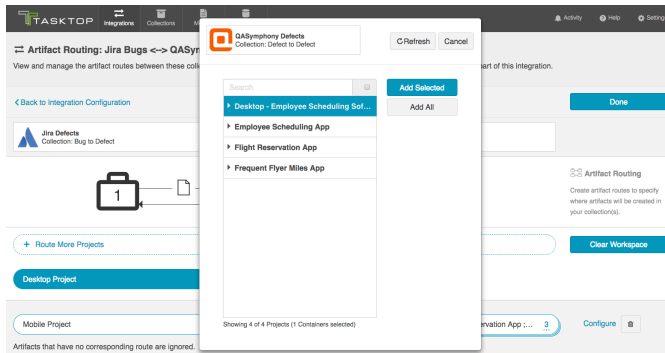
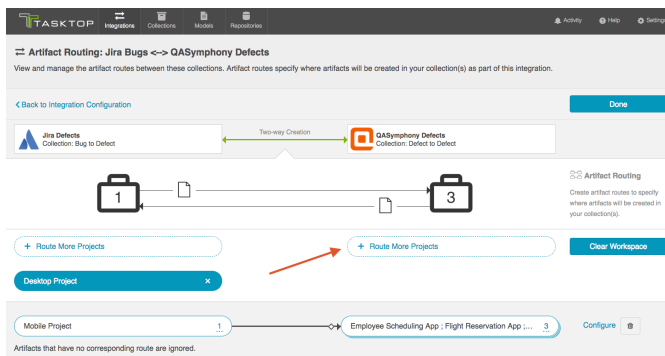
Once the new projects have been added and routed, Tasktop will detect the artifacts contained within the new project(s) at the change detection interval (configured on the Settings page) and flow data according to the configuration that you have already set.

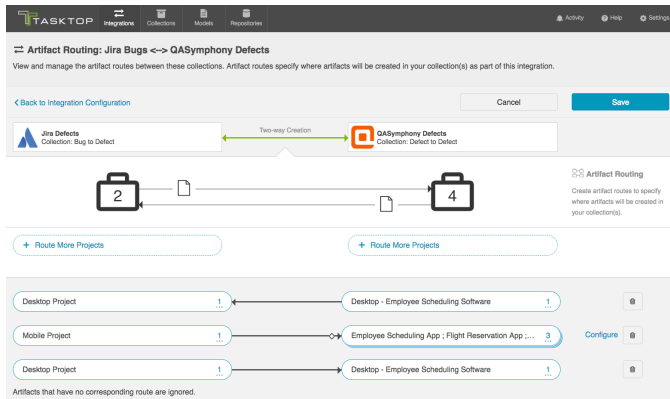
*On the Collection Configuration Screen:*



On the Artifact Routing Screen (in the Integrations section):

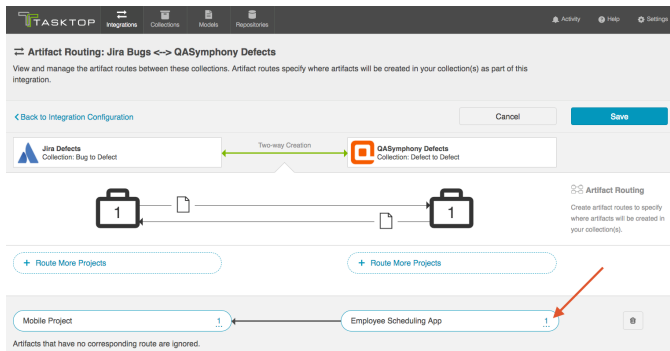
Add Projects to New Routes:



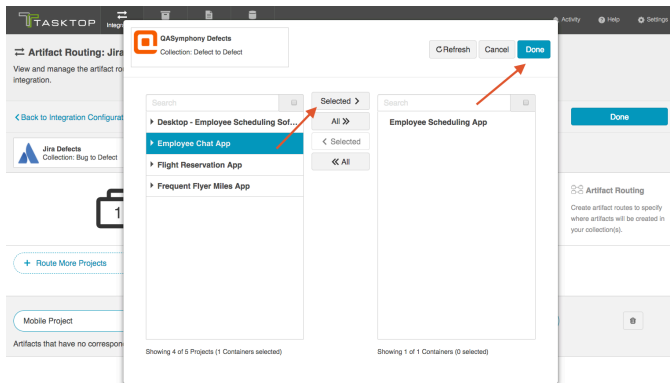


### Add Projects to Existing Routes:

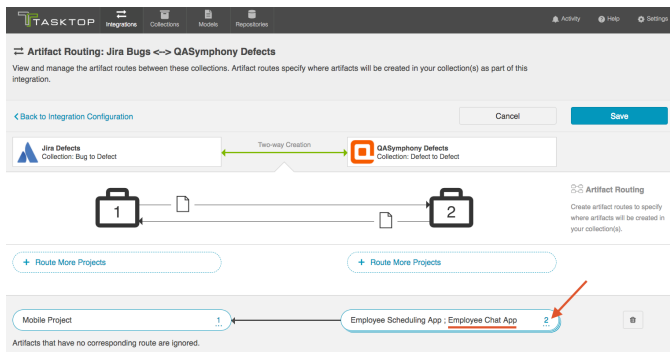
Click the numerical link on the right side of the pill to add additional projects to that route:



Highlight the project you'd like to add, click 'Selected>' and then 'Done.'



You will now see the updated number of projects, and the additional project's name listed in the pill:



**Note:** Depending on how you set up your artifact routing, you may need to configure conditional artifact routing. This will be relevant if you route to more than one target project (as you will need to identify criteria by which the integration can determine which project to flow the artifact to). You can learn more about conditional artifact routing [here](#).

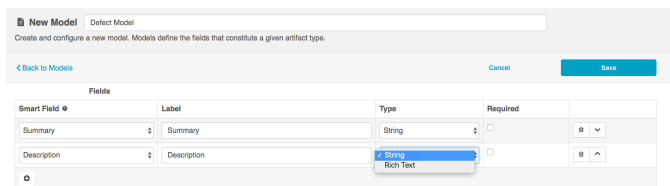
### Adding or Editing Fields

If you'd like to add, remove, or edit a field in your model, Tasktop allows you to do so even after the Integration has been run. Once the field has been added to your model, navigate to your relevant collections and map that field as needed. You can then edit the field flow frequency from the integration's field flow screen.

If you add a new field to your integration's field flow, the field will be synced automatically for **newly created artifacts**. Tasktop will detect these changes according to the change detection interval.

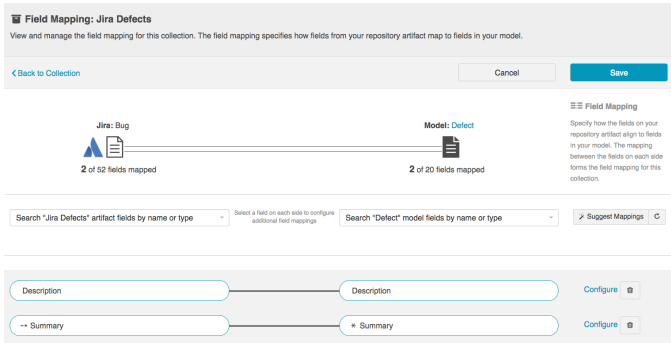
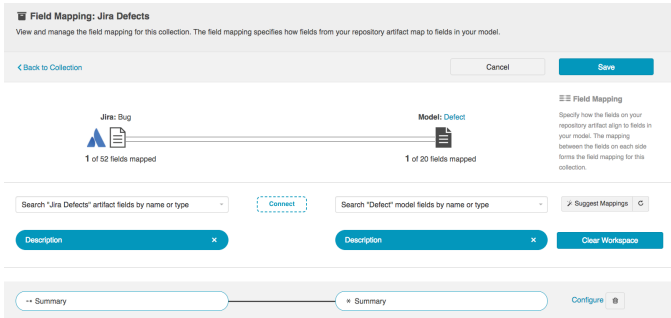
**!** Note that if you add or edit a new field mapping on an integration that has already begun running, Tasktop will **not** automatically apply those new field mappings to artifacts that had already been synced and that were created before that mapping had been added unless/until that field specifically changes on the artifacts. However, if you'd like to automatically sync the data in those fields for all artifacts, you can click the 'process all artifacts' button on the field flow page. This will make it such that upon the next change detection interval, a **full scan** will be run. This means that all artifacts in the collection will be scanned for synchronization, and any fields that are eligible based on your field flow configuration will be updated.

*On the New Model Screen:*

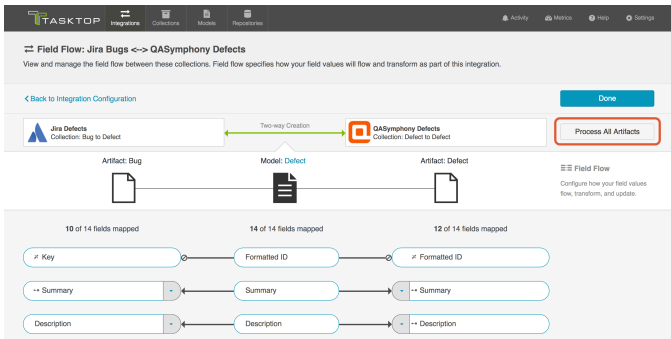


*On the Collection Field Mapping Screen:*

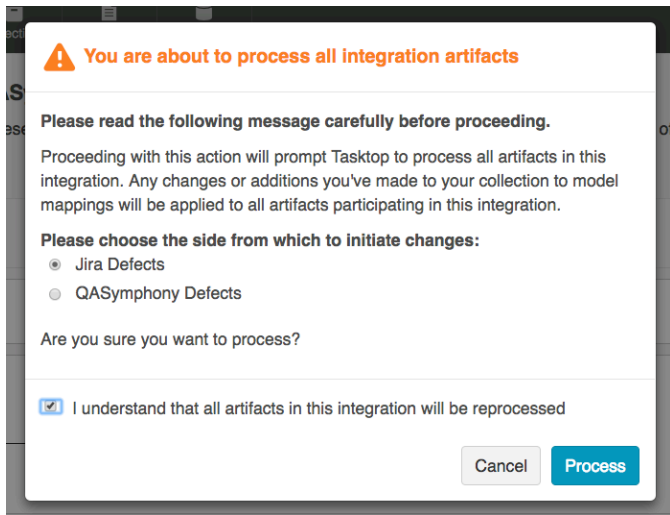




*On the Integration Field Flow Screen*



After clicking 'Process All Artifacts,' you will be prompted to choose the side from which to initiate changes:



This will process all artifacts in the source collection upon the next change detection interval, and flow any eligible field updates to the target collection.

## Troubleshooting

### Overview

Tasktop provides several methods for troubleshooting your integration - from our easy to use Activity screen which outlines errors, past activity, and more to our Support and Usage Reports which can be used to troubleshoot issues with our support team and to help track Tasktop usage.

### Activity Screen

On the [Activity Screen](#) page, you can learn about:

- Troubleshooting configuration and licensing issues
- Understanding pending and processing activity
- Reviewing and resolving errors
- Tracking past activity

### Specific Error Messages

On the [Specific Error Messages](#) page, you can:

- Search for specific errors and review the steps to resolve them
- Learn about in-application error messages

### Support and Usage Reports

On the [Support and Usage Reports](#) page, you can:

- Learn how to download Support and Usage Reports to help troubleshoot issues with Tasktop Support
- Understand the contents of the Support and Usage Reports
- Learn how Tasktop tracks usage information
- Learn how to update your logging settings

## Error Message Appendix

Our [Error Message Appendix](#) provides a complete list of error messages contained in Tasktop Integration Hub. For information on how to resolve specific errors, please see the [Specific Error Messages](#) page, our [AQ](#), and our [Connector Docs](#) (for connector-specific errors).

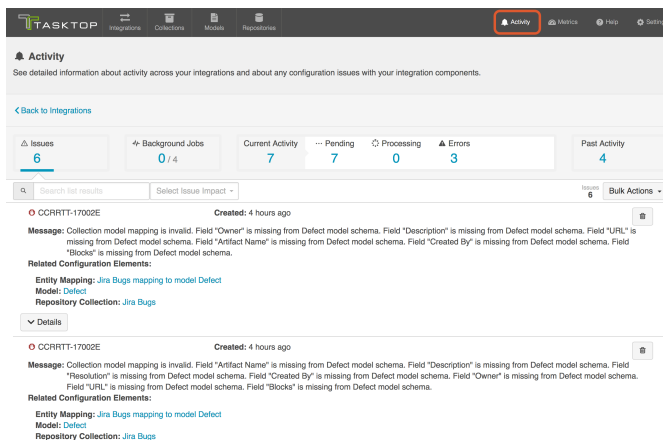
## Metrics

Our [Metrics Dashboard](#) provides information on total artifacts created by Tasktop and total artifacts updated by Tasktop, along with a graphical view of the data over time. The dashboard can be used to help troubleshoot Tasktop downtime.

## Activity Screen

### Activity Screen

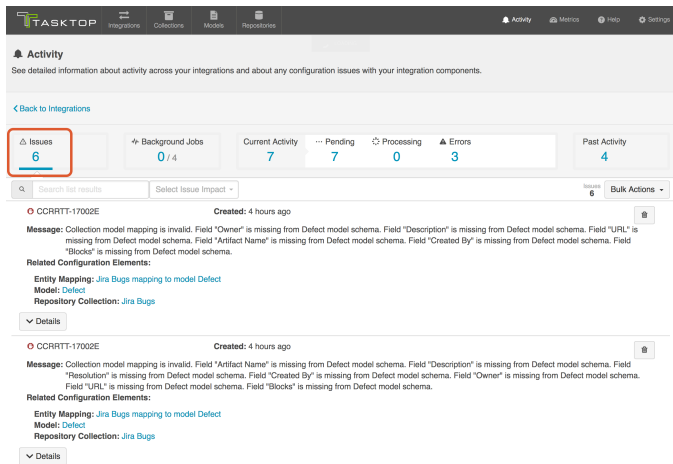
Most problems can be solved by looking at the Activity screen and following steps described on the errors displayed there. The Activity screen can be seen by clicking on 'Activity' in the top right corner of the web application menu bar:



### Issues

The *Issues* tab shows **issues** that arise from **invalid Tasktop configuration** or from **more global issues, such as having an invalid or expired license**. These are things that can generally be resolved within the Tasktop application itself.

🟡 Issues can block integrations from running, so it is recommended that users monitor the Issues tab regularly.






An additional warning icon appears when these issues are so fundamental that they will prevent integrations from running.

The hover message will indicate whether the issue will prevent all integrations from running (for example, licensing errors), or just affected integrations from running (for example, a configuration error that impacts just one integration).



You can use the search box to search for specific issues, or filter based on issue impact (blocks all integrations, blocks affected integrations, or other/unknown).

You can take the following actions on the Issues tab:

-  **Retry:** Retry an issue. This action is only available for configuration migration issues.
-  **Resolve:** Resolve an issue. This action is only available for certain issue types, and can be taken to acknowledge that the user has reviewed the issue and taken any required user actions.
-  **Remove:** Remove an issue. If that issue was blocking an integration, the integration will become unblocked. However, if the cause of the issue has not been resolved, the issue will return to the Issues tab the next time configuration validation occurs (once an hour). You can also **Remove All** issues from the Bulk Actions menu.

You can also take the following Bulk Actions:

- **Refresh:** Refresh the issues tab.
- **Remove All:** Remove all issues. If the issues were blocking an integration, the integration will become unblocked. However, if the cause of the issue has not been resolved, the issue will return to the Issues tab the next time configuration validation occurs (once an hour).

## Background Jobs

The Background Jobs tab shows progress on background Tasktop processes such as:

- Tasktop Upgrades
- Redeployments from Tasktop Sync (artifact pair import files)
- Project Replacements for invalid projects in Tasktop collections

While jobs are processing, you will see a progress bar to track progress. Jobs that are in progress cannot be canceled.

The screenshot shows the Tasktop Activity page. At the top, there is a navigation bar with icons for Integrations, Collections, Models, and Repositories. The main header is 'Activity' with a sub-header 'See detailed information about activity across your integrations and about any configuration issues with your integration components.' Below this, there is a 'Back to Settings' link. A summary bar shows 'Issues: 4', 'Background Jobs: 2/3' (highlighted with a red box), 'Current Activity: 313', 'Pending: 313', 'Processing: 0', 'Errors: 313', and 'Past Activity: 0'. Below the summary bar, there are search and filter options: 'Search list results', 'Select Job Status', and 'Select Job Type'. The main content area shows three job entries. The first entry is 'Artifact Pair Import: Importing artifact information from import-test.json' with a green progress bar. It includes details: Integration: ALM Defects --> Jira Bugs, Started: 3 minutes ago, Artifact Information Retrieved: 398/400, Artifact Pairs Imported: 200, File Name: import-test.json. The second entry is 'Integration Data Migration: Updating operational data due to Tasktop upgrade' with a pink background and a right arrow icon. It includes details: Integration: ALM Defects --> Jira Bugs, Associated Issue: View Issue, Started: 27 minutes ago, Last Tried: 20 minutes ago, and a message: 'An unexpected error occurred. Repository Unavailable.' The third entry is 'Project Replacement: Updating Tasktop artifact associations to reference correct project for collection: Jira Story' with a green background. It includes details: Repository Collection: Jira Story, Projects Updated: 1 Project, Started: 4 minutes ago, Last Tried: 4 minutes ago, Completed: 4 minutes ago. Below this entry is a table with two columns: 'New Project' and 'Old Project'. The table contains one row: 'Project 2' under 'New Project' and 'Project 1' under 'Old Project'. At the bottom, there are navigation links 'Previous', '1', and 'Next', and a page indicator 'Result 1 - 3 of 3'.

You can filter the Background Jobs tab by job status (pending, error, completed), by job type, or by typing in search terms

**Activity**  
See detailed information about activity across your integrations and about any configuration issues with your integration components.

[Back to Help](#)

Issues: 2 | 
 Background Jobs: 0 / 10 | 
 Current Activity: 16 | 
 Pending: 16 | 
 Processing: 0 | 
 Errors: 12 | 
 Past Activity: 4

Search list results | 
 Select Job Status | 
 Select Job Type

Previous 1 Next | 
 Result 1 - 10 of 10

Integration Data Migration: Updating operational data due to Tasktop upgrade  
 Integration: [Defect Reporting](#)  
 Started: 6 minutes ago  
 Last Tried: 6 minutes ago  
 Completed: 6 minutes ago

If a background job encounters an error, that error will show up on the Background Jobs tab color coded in red (and not on the Errors tab). If there is an associated issue, a link will be shown to navigate to that issue. These jobs will be re-tried automatically until they complete, and can be prioritized using the 'prioritize' button.

Integration Data Migration: Updating operational data due to Tasktop upgrade  
 Integration: [ALM Defects --> Jira Bugs](#)  
 Associated Issue: [View Issue](#)  
 An unexpected error occurred. Repository Unavailable.  
 Started: 27 minutes ago  
 Last Tried: 20 minutes ago

Similarly, once jobs complete, you will see them on the Background Jobs tab color coded in green (they will not show up in the 'Past Activity' tab, since Background Jobs are a different type of event from current activity). For Project Replacement jobs, you can expand the 'Projects Updated' section to see additional details:

Project Replacement: Updating Tasktop artifact associations to reference correct project for collection: Jira  
 Integration: [ALM Defects --> Jira Bugs](#)  
 Repository Collection: [Jira](#)  
 Associations Updated: 700/700  
 Projects Updated: 1 Project  
 Created: 6 days ago  
 Last Attempt: 6 days ago  
 Completed: 6 days ago

New Project	Old Project
Project2	Project1

Activity listed on the Background Jobs tab will be cleared after each Tasktop upgrade.

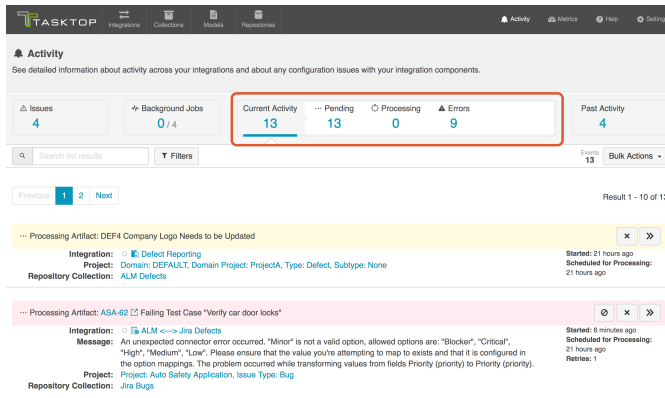
### Current Activity

The *Current Activity* tab shows **events that are active in an integration.**

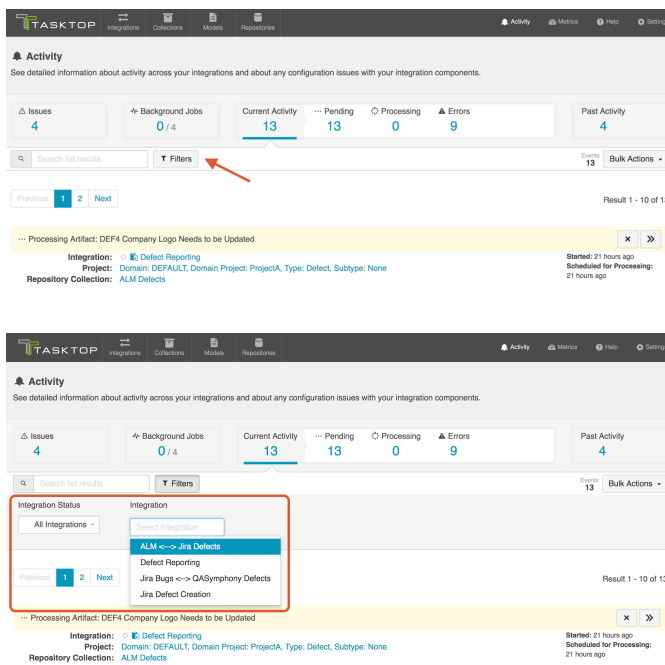
*Current Activity* encompasses the following:

- **Pending:** Events that are queued up to be processed.
- **Processing:** Events that are currently processing.
- **Error:** Events that Tasktop tried to process, but were not successful.

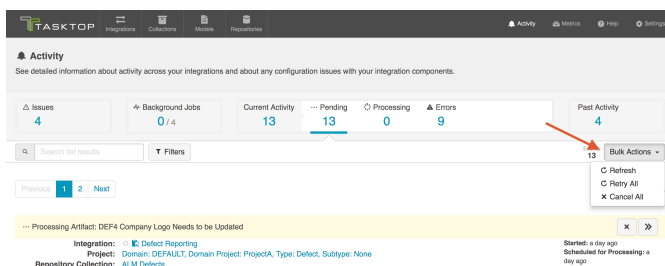
You can take different actions on the events in these subcategories, which are outlined in the sections below.




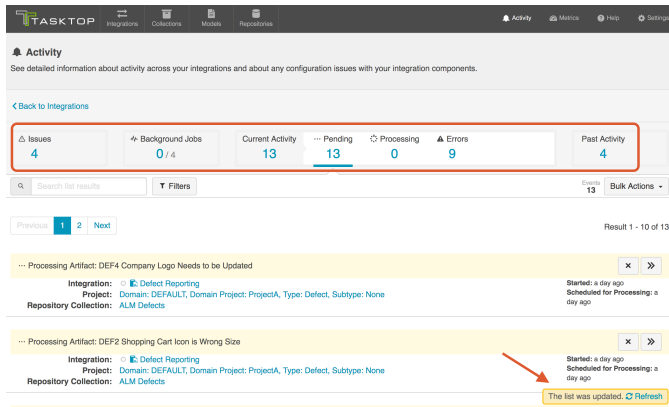
You can filter each type of current activity by entering search terms, by filtering on integration status (running or stopped), or by filtering on integration name. Click 'Filters' to expand your filter options.



Each category also allows you to take bulk actions:



 **Note:** The number of events in the summary banner will update regularly, but the list of events themselves will need to be refreshed to show new activity. This is to avoid items unexpectedly appearing and disappearing when you might be examining them.



## Pending

On *Pending* Activity, you can take the following actions:

- **»» Prioritize:** Prioritize this pending event in the queue.
- **✕ Cancel:** Remove this event from the pending queue. It will not be processed, though subsequent changes to artifacts will trigger another event.
- **⊘ Ignore:** If an error is pending, you have the option of moving it to the Ignored Errors tab. See Errors section for details.

## Processing

The *Processing* tab shows activity that is currently processing. There are no actions that can be taken here.



## Error

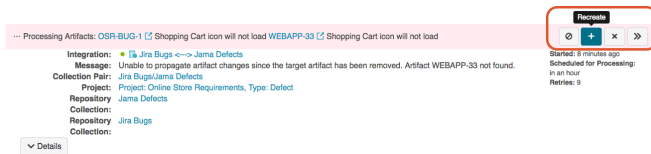
The *Error* tab shows any errors related to specific activities that have occurred. In contrast to the Issues tab, errors typically block individual artifacts (rather than entire integrations), and therefore are less severe.

You can take the following actions:

- **»» Prioritize:** Prioritize the retry of this error in the queue. This option is especially useful if you have made changes in your repository or in Tasktop that will likely clear up the error.
  - You will see this action if the event is already set to be retried, and is hence both in "error" and "pending" states simultaneously.
- **↻ Retry:** Retry this error.
  - You will see this action if the event is not already set to be retried.
- **✕ Cancel:** Remove this error from the list. It will not be retried, though subsequent changes to artifacts will trigger another event.



-  **Ignore:** Move the error to the 'Ignored Errors' list. Once ignored, it will no longer show up in the Errors list (or in Pending), and it will not be counted in the Error summary counts at the top of the screen.
-  **Recreate:** If a previously-sync'ed artifact has been deleted in one of your repositories, you have the option of recreating it from the Activity screen. This will keep the newly recreated artifact in sync with the source artifact.



★ Note: Most errors will automatically be retried on a gradually decreasing interval (granted that Tasktop can locate the artifact that is to be changed). Retryable errors will be retried approximately 30 seconds after they are first encountered, and then on a gradually decreasing interval over time.

You can see information about retries on the error itself. In the example below, you can see that the error has been retried 5 times, and that it has been scheduled for processing in 5 minutes. If an error will not be retried, this information will not be relevant and hence will not be displayed.

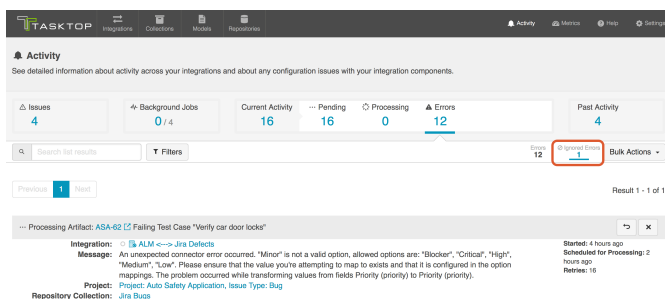


A complete listing of errors is available in [the appendix](#).

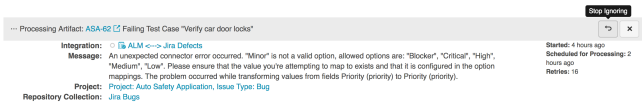
You can also find additional information on select errors in our [FAQ](#).

### Ignored Errors

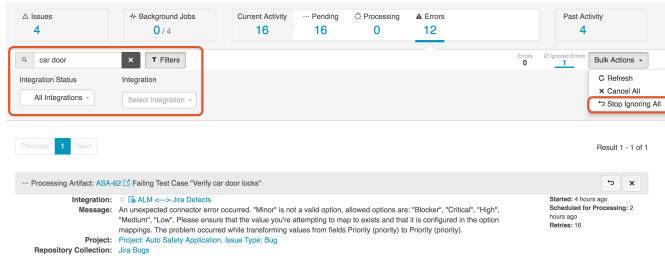
If you ignore an error, it will be moved to the Ignored Errors list, and no longer be counted in the Errors total at the top of the screen. Note that though ignored errors will no longer show up in the Errors or Pending tabs, ignored errors *will* still continue to process, so if the source of the error is resolved, the event will move to the Processing tab, and then to the Past Activity tab.



You can move an error back to the Errors list by clicking 'Stop Ignoring.'



If you'd like to use the bulk action, 'Stop Ignoring All,' you must first apply a filter to the Ignored Errors list. This will move all errors that meet your search filters back to the Errors list.

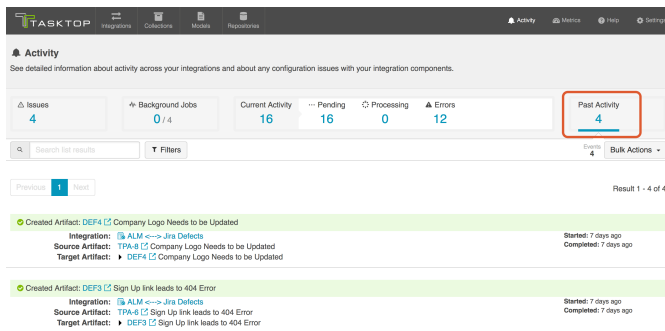


## Past Activity

The *Past Activity* tab allows you to view all past integration activity, so that you can understand **what** has successfully completed.

There are three types of Past Activity:

- **Created Artifact:** When a new target artifact is created in a repository
- **Updated Artifact:** When an existing artifact is updated in a repository
- **Associated Artifacts:** When existing artifacts are auto-matched, and therefore associated with one another. Currently this is only supported for containers, when utilizing [Container Matching](#) or a Work Item + Container Mirroring synchronization integration.



You can click the drop down arrow on each activity to see more details on the activity that has occurred



🕒 If past activity is indicating that a new artifact was created, you'll see that the Original Values listed are blank, and that the Activity type is 'Created Artifact' as opposed to 'Updated Artifact'

Created Artifact: PRB0041111 Bug B

Integration: JIRA Bugs -> ServiceNow Problems

Source Artifact: TRN-41 Bug B

Target Artifact: PRB0041111 Bug B

Items	New Value	Original Value
Artifact Type	Problem	
Priority	3 - Moderate	
Problem state	Pending Change	
Short description	Bug B	

Started: 26 minutes ago  
Completed: 26 minutes ago

If you'd like to filter your results, you can use the search box on this page to refine your results. Additionally, you can click 'Filters' to expand additional filtering options. You can use the integration filter to search by integration, or the date filter to search either by a fixed date range or by a set number of days in the past (which will dynamically update your results as days pass).

Activity

See detailed information about activity across your integrations and about any configuration issues with your integration components.

Issues: 4 | Background Jobs: 0 / 4 | Current Activity: 16 | Pending: 16 | Processing: 0 | Errors: 12 | Past Activity: 4

Search for results | Filters

Integration: Select Integration | Time: Select Date Filter

- ALM <-> Jira Defects
- Defect Reporting
- Jira Bugs <-> QASymphony Defects
- Jira Defect Creation

Result 1 - 4 of 4

Created Artifact: DEF4 Company Logo Needs to be Updated

Integration: ALM <-> Jira Defects

Source Artifact: TRN-41 Company Logo Needs to be Updated

Target Artifact: DEF4 Company Logo Needs to be Updated

Started: 7 days ago  
Completed: 7 days ago

You can also use the Bulk Actions to refresh, or remove all past activity that meets your current search filters. If you have not entered any search filters, all past activity will be refreshed or removed.

⚠ Note that Tasktop will store up to 100,000 entries on the Past Activity screen. Once 100,000 entries are met, older entries will be deleted as new entries come in. You can also opt to clear your entries when approaching 100,000 to have better visibility into more recent past activity.

## Specific Error Messages

### Errors on Activity Screen

You can find details on some specific error messages in our [FAQ](#) (in the Troubleshooting section) and in our [connector pages](#) (for connector-specific errors). We've also outlined errors below which require specific steps in the Tasktop UI.

### Repository collection project cannot be found

Created: 22 minutes ago

Message: Repository collection project cannot be found. "TransactionProcessingReq" (TransactionProcessingReq) is not a valid selection for Domain Project (project), available options are Data, TravelBookingApp.

Related Configuration Elements:

Project: Domain: TESTING, Domain Project: TransactionProcessingReq, Type: Defect, Subtype: None

Details

Description

The repository collection configuration is not valid. This problem is usually caused by a project and/or type being deleted or renamed in the repository, but can also be caused by other problems, such as a change in user permissions within the repository.

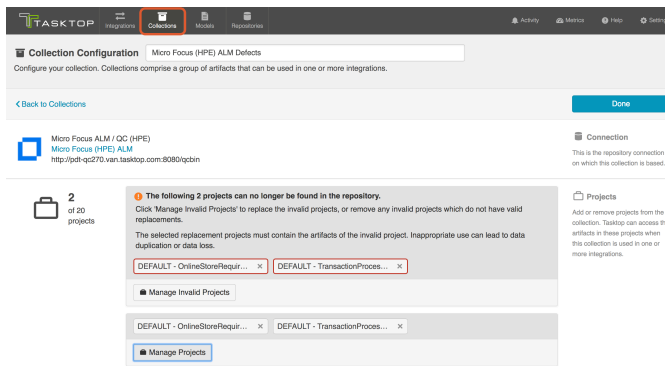
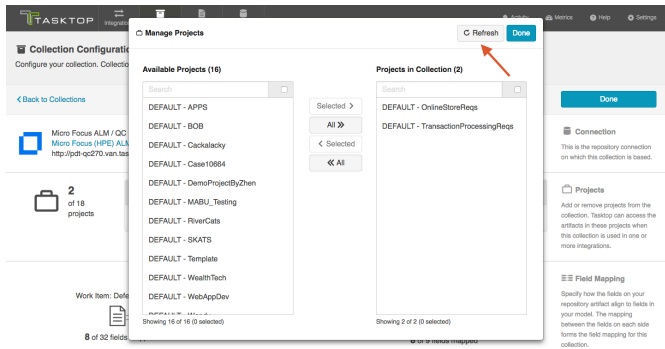
User Action

- Go to the affected repository collection configuration page
- If the project has been deleted, remove the referenced project from the repository collection
- If the project has been moved, click "Manage Invalid Projects" and select the project's replacement
- Ensure all related routing, filtering, and mapping configurations are valid and up to date

This error message is usually caused by a project type being deleted or renamed in the repository, but can also be caused by other problems, such as a change in user permissions within the repository, or moving the project to a new domain within that repository.

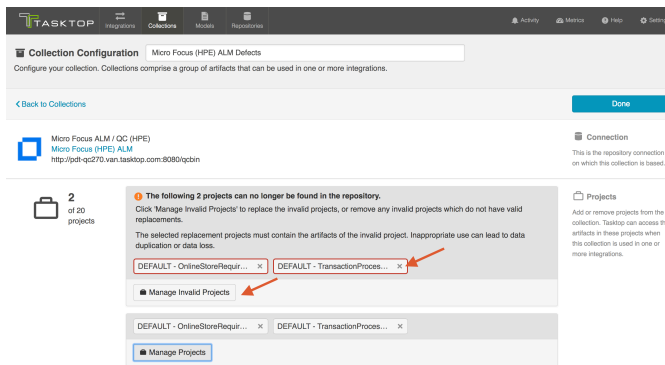
To resolve this error, go to the [Collection configuration](#) screen. Here, you will see a message alerting you to the fact that previously selected project(s) cannot be found in the repository.

💡 Note: You may not see the alert message on the Collections screen until Tasktop's cache refresh occurs. To 'force' the message to appear, click 'Manage Projects' and then refresh the project schema. This will cause the alert to appear.

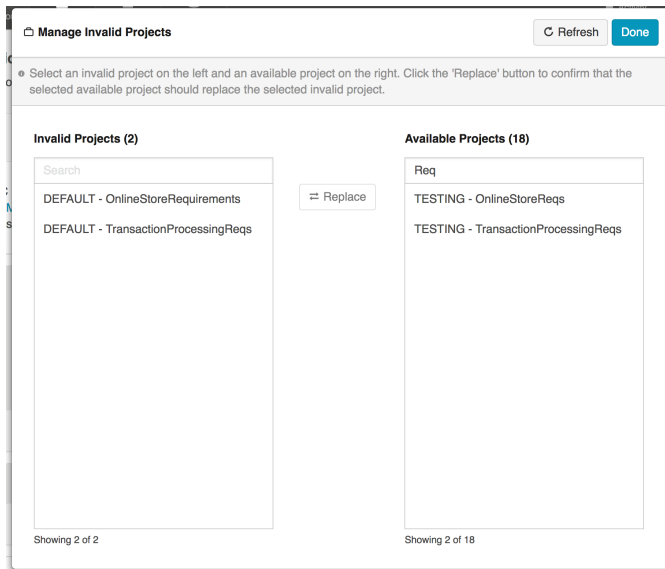


You can click the 'x' to remove any projects which do not have valid replacements, or click the 'Manage Invalid Projects' button to select replacement projects.

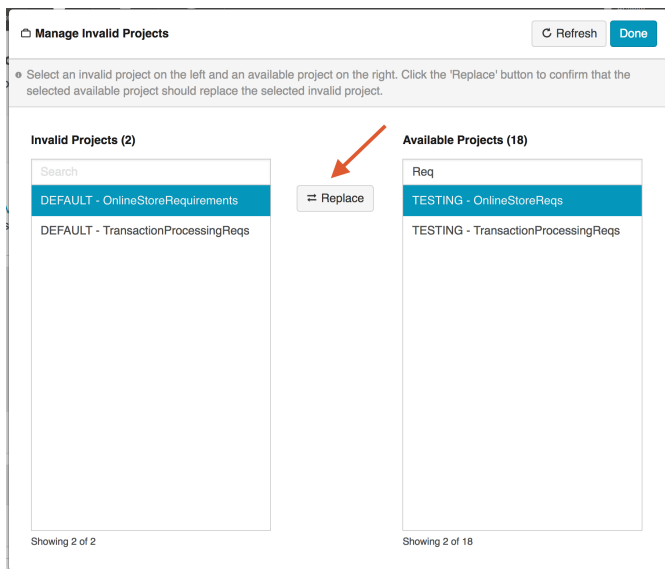
💡 Note: If you remove a invalid project (instead of replacing it via the 'Manage Invalid Projects' button) and then add its replacement to the collection later, you risk creating duplicate artifacts. Project replacements should always be executed via the 'Manage Invalid Projects' button, and all project replacements should be done at the same time.



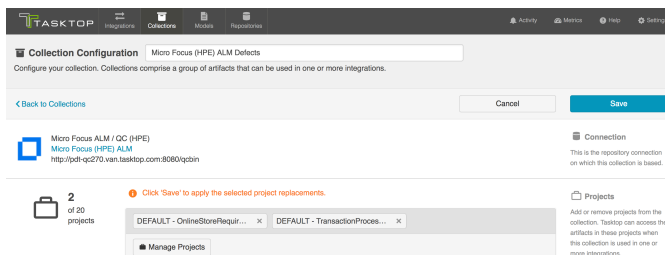
After clicking 'Manage Invalid Projects,' you will see the 'Manage Invalid Projects' picker, where you can search for available project replacements:



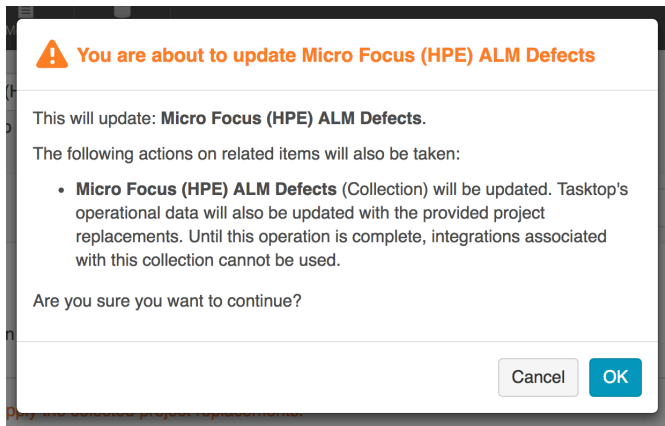
Highlight the invalid project on the left, and its replacement project on the right. Then click 'Replace.' Repeat the steps for any invalid projects you'd like to replace, and then click 'Done.'



You will be prompted to save your collection in order to apply the updates (note that until the collection is saved, the invalid project names may display).



You will get a pop-up message warning you that the integrations associated with this collection cannot be used until the project update is complete:



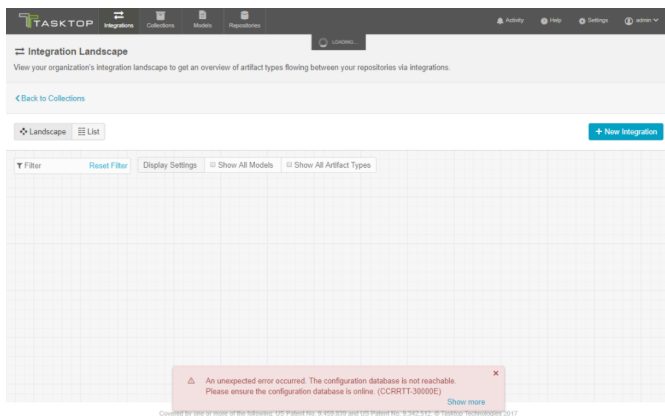
You can view progress for your project replacements on the [Background Jobs tab](#) of the Activity screen.

## In-Application Errors

There are some scenarios where you may see an error message within the application itself, rather than on the Activity Screen.

### External Database Error

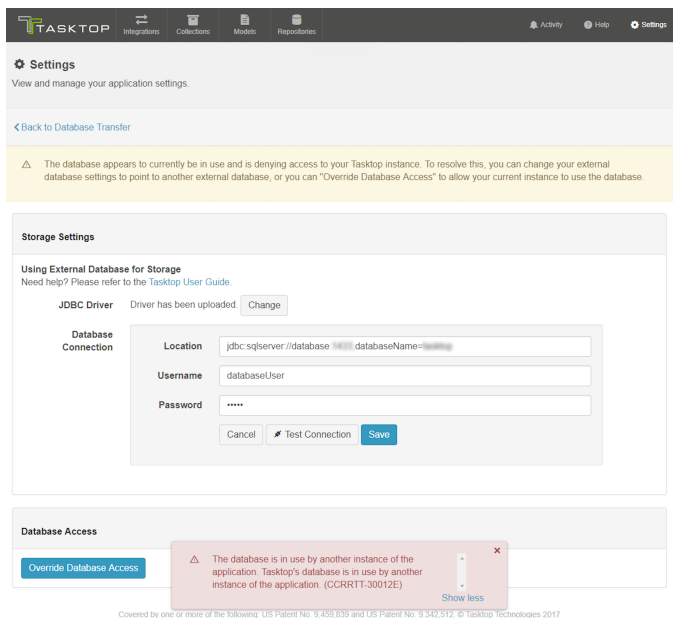
If you have exported your Tasktop configuration information to an external database (see information [here](#)), and your database is not reachable, you will notice that your configuration elements (i.e. repositories, collections, integrations, etc.) will not be visible, and an error message will appear. To resolve this error, please ensure that your external configuration database is online.



### Overriding Database Access

In order to prevent risk of collisions, duplicates, and other errors, Tasktop has functionality to ensure that multiple Tasktop instances are not able to run on the same operational database. If you connect your instance to a database that is already in use by Tasktop (note that this is not recommended), upon start-up of the new instance, the prior instance will lose database access and stop processing events. When you log on to the prior instance, you will see an error message prompting you to either update your credentials to connect to a different database, or to override database access. If you override database access, this means that the other instance of Tasktop will lose access to that database.

When overriding, be sure to confirm that no other Tasktop instance is using the database before moving forward. If another Tasktop instance is actively using the database, it is recommended that you shut down the other instance of Tasktop before proceeding.

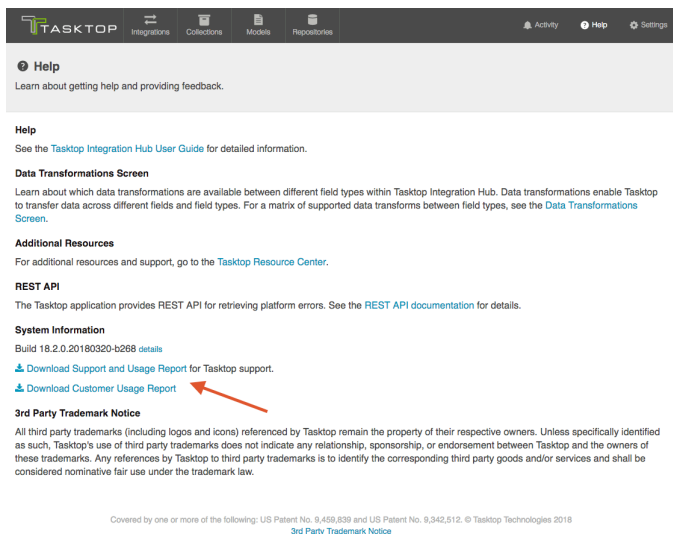


## Support and Usage Reports

### Overview

In cases where the Activity screen is not enough to resolve a problem, a Support and Usage Report is available to provide additional information.

The Support Report can be downloaded from the Help screen. To download, click the "Download Support and Usage Report" link in the System Information section on the Help screen.



### Report Contents

The downloaded report file is named tasktop-state-DATE-TIME.zip. Once unzipped, there will be five folders. The folders and contents are listed below.

1. configuration
  - configuration.json
  - platform-details.json
2. crash-reports
  - hs\_err\_pid\*.log
3. logs
  - logs by day for past 14 days
  - configuration-changes.log
  - extensions.log
  - thread-dump.log
4. metrics
  - metrics.json
5. usage
  1. usage report

File Name	Contents
configuration.json	Contains all the configuration of your application instance.
platform-details.json	Contains details about the specific build and license of the application
logs	A separate file is created for every day of logs. 14 days of logs are saved.
configuration-changes.log	Contains details on configuration changes made in Tasktop Integration Hub, broken out by user (if applicable) and date/time. Note that the user is identified by their user ID, which can be found in the <a href="#">user administration screen</a> (accessible by Tasktop admins only).
extensions.log	Contains any logs generated when an extension is called. The extension will write out a log whenever the console.log function is called.
thread-dump.log	Contains all Tasktop thread information at the point of time the Support and Usage report is downloaded. This file will only be included if your Tasktop instance has crashed or if you have forced Tasktop to close.
metrics.json	Contains various metrics of the application.



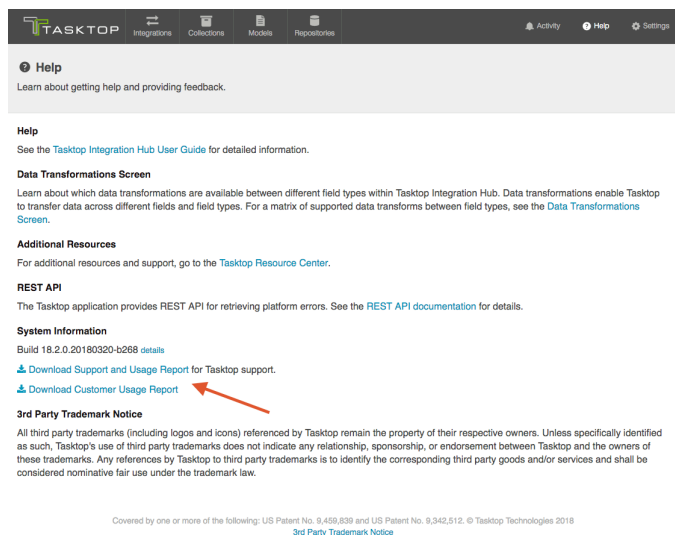
hs_err_pid*.log	Contains log files generated when the Java Virtual Machine crashes.
usage-report.csv	Contains details on Tasktop usage without any with personal information included (i.e. names, e-mail addresses, etc)

## Usage Reports

Tasktop supplies a Usage Report to enable customers to review and understand their Tasktop usage.

Two reports are provided:

- A sanitized report that does not contain personal information (such as names, e-mail addresses, or usernames), that is part of the Support and Usage Report file
- A Customer Usage Report which contains personal information (such as names, e-mail addresses, and usernames), that can be used to analyze and reconcile user counts




Both reports contain the following fields:

- **Tasktop Generated Person Identifier:**
  - This is generated to identify a person that flows between two or more repositories. If Person Reconciliation is in effect, the users that are the same across repositories will have the same Tasktop Generated Person Identifier. This field may be blank in scenarios where a person existed on an artifact seen by Tasktop, but where the field that contained that person did not flow to another repository.
- **Tasktop Generated Repository Person Identifier:**
  - This is generated for each unique person Tasktop sees within one repository. Note that the person field does not need to flow in order to be counted here. Since this is repository-specific, you could see two (or more) different Tasktop Generated Repository Person Identifiers that share the same Tasktop Generated Person Identifier.
- **Connector:**

- Tasktop's name for the connector
- **Repository Label:**
  - The name (label) supplied by the customer for the repository
- **Integration Name:**
  - The name supplied by the customer for the integration within Tasktop
- **Collection Project:**
  - The collection and project names that contain the person
- **Repository Fields:**
  - The repository fields that the person was seen on during the course of a month
- **Model Fields:**
  - The model fields mapped to the repository fields listed above
- **Count:**
  - The number of times the Tasktop Generated Repository Person Identifier was seen for the given integration/collection/project combo in one month
- **Month:**
  - The month that the count (above) applies to

The customer-facing report also contains the following fields:

- **First Name**
- **Last Name**
- **Display Name**
- **Email**
- **Username**
- **Repository Person ID:**
  - A repository specific identifier. Some repositories provide an ID that is unique from the username.

 **Note:** The customer-specific fields above may be blank depending on the associated repository and whether Tasktop has retrieved them yet (these fields are retrieved periodically).

Both reports contain data collected over a rolling 2 year span.

### Logging Settings

Tasktop provides two logging levels for the logs in the support and usage reports: Normal and Troubleshooting. Please see the [Logging](#) section of the Settings page for more details on how to configure each setting.

## Error Message Appendix

The following is a complete list of error messages. Error messages are displayed on the Activity screen. More details on specific errors can be found under Troubleshooting and in our [FAQ](#).

### CCRRTT-0001E – An unexpected error occurred.

#### Description

An unexpected error has occurred.

#### **User Action**

Attempt to resolve error according to the specific error message.

#### **CCRRTT-0002E – The maximum number of allowable errors has been reached.**

#### **Description**

The maximum number of allowable errors has been reached. Any errors encountered after the maximum number will be discarded.

#### **User Action**

1. Open the errors page and resolve the listed errors

#### **CCRRTT-0003E – The system has run out of memory.**

#### **Description**

The system has run out of memory. Services have been stopped.

#### **User Action**

1. Increase the amount of memory available (see help docs).
2. Restart Tasktop.

#### **CCRRTT-0004E – Configuration migration failed.**

#### **Description**

Configuration could not be migrated to match an updated version of Tasktop due to one or more errors.

#### **User Action**

1. Investigate the cause of failure by viewing related errors under Issues on the Activities & Issues page.
2. Attempt to resolve error according to the specific error message and corresponding user actions.
3. Restart the Tasktop application.

#### **CCRRTT-0005E – There is a conflicting artifact association.**

#### **Description**

The artifact association could not be imported as an existing artifact association conflicts with it.

#### **User Action**

Contact support for assistance.

### **CCRRTT-1000E – Unable to communicate with repository.**

#### **Description**

There was a network error when attempting to communicate with a repository.

#### **User Action**

1. Check the network connection between Tasktop and the repository.
2. Try connecting again later.

If the problem persists, contact your network administrator.

### **CCRRTT-1002E – An unexpected connector error occurred.**

#### **Description**

An unexpected connector exception has occurred.

#### **User Action**

Attempt to resolve error according to the specific error message.

### **CCRRTT-1003E – An error occurred while executing an operation.**

#### **Description**

An exception has occurred during the execution of a connector operation.

#### **User Action**

Attempt to resolve error according to the specific error message.

### **CCRRTT-1004E – Connection to LDAP directory failed.**

#### **Description**

An unexpected error has occurred while attempting to establish a connection with an LDAP directory.

#### **User Action**

Attempt to resolve error according to the specific error message.

### **CCRRTT-1005E – An unexpected error occurred while communicating with an LDAP directory.**

#### **Description**

An unexpected error has occurred while communicating with an LDAP directory.

#### **User Action**

Attempt to resolve error according to the specific error message.

**CCRRTT-1104W – Authentication state for repository connection has expired.**

**Description**

The authentication state for a repository connection has expired.

**User Action**

Typically, the authentication state for a repository connection expires on a periodic basis and authentication will be retried automatically. If the error persists, verify that the repository credentials for the associated repository are correct.

**CCRRTT-1105E – Repository collection configuration is invalid.**

**Description**

The repository collection configuration is not valid. This problem is usually caused by a project and/or type being deleted or renamed in the repository, but can also be caused by other problems, such as a change in user permissions within the repository.

**User Action**

1. Determine the cause of the problem from the specific error message
2. Correct the problem on the repository and then click ? *Refresh Projects?* on the repository collection, or
3. Remove the referenced project from the repository collection
4. If a project has been renamed add the renamed project to the repository collection
5. Ensure all related routing, filtering, and mapping configurations are valid and up to date

**CCRRTT-1107E – Connection could not be established with a repository due to a failure during authentication.**

**Description**

There was an unexpected error while attempting to authenticate with a repository.

**User Action**

Attempt to resolve error according to the specific error message.

**CCRRTT-1109E – Repository collection project configuration is outdated.**

**Description**

The Repository Collection project configuration is outdated.

**User Action**

1. Identify the outdated project configured from the specific error message
2. Remove the outdated project from the Repository Collection
3. Select ? *Manage Projects?* and press the ? *Refresh?* button in the Repository Collection
4. Add the project back to the Repository Collection

#### **CCRRTT-1110E – Repository collection project cannot be found.**

##### **Description**

The repository collection configuration is not valid. This problem is usually caused by a project and/or type being deleted or renamed in the repository, but can also be caused by other problems, such as a change in user permissions within the repository.

##### **User Action**

1. Go to the affected repository collection configuration page
2. If the project has been deleted, remove the referenced project from the repository collection
3. If the project has been moved, click ? *Manage Invalid Projects?* and select the project????s replacement
4. Ensure all related routing, filtering, and mapping configurations are valid and up to date

#### **CCRRTT-1111E – Repository collection contains duplicate projects.**

##### **Description**

The high-level container (i.e. the type of container chosen when clicking ? *Manage Projects?* on the Collections screen) has changed.

##### **User Action**

Before resolving this issue, please:

1. Review and write down the current artifact routing configuration for any integrations utilizing this collection as these must be reconfigured once the issue is resolved.
2. To ensure you understand the changes made to your collection, please navigate to the collection and review what is now selected under ? *Manage Projects?* No changes will need to be made on this screen.

Once this issue is resolved, your artifact routing will be removed from any relevant integrations, and need to be manually reconfigured.

#### **CCRRTT-1112E – Artifact is locked.**

##### **Description**

The artifact is locked by another user or process.

##### **User Action**

See the specific error message for details on what artifact is locked. Ensure that no other user or process is currently using the artifact, and retry the operation.

#### **CCRRTT-1401E – Integration must specify at least one route.**

##### **Description**

An integration must contain at least one route.

##### **User Action**

1. Navigate to the integration routing page
2. Add at least one route

#### **CCRRTT-1402E – Integration must satisfy style constraints.**

##### **Description**

An integration must satisfy the constraints of its style. This type of error should not happen when an integration is built using the UI.

See the detailed message for more details about the parts of the integration that are invalid.

##### **User Action**

1. Navigate to the integration page
2. Adjust the configuration to be valid (according to the messages)
3. If this integration was created via the web UI, consider contacting support

#### **CCRRTT-1403E – Integration must have all collections attached to the same model.**

##### **Description**

Collections used in an integration must all be attached to the same model.

##### **User Action**

1. Determine which model the integration should be using
2. Navigate to the integration and determine which collections are not using this model
3. Either remove the identified collections from the integration, or
4. For each identified collection, set the mapping to the correct model

#### **CCRRTT-1404E – Collection must have a mapping to a model.**

##### **Description**

Repository Collections used in an integration must have a mapping to a model.

##### **User Action**

1. Navigate to the collection
2. Select a Model to create a mapping

#### **CCRRTT-1405E – Integration must have a source Collection.**

##### **Description**

An integration must have a source collection.

##### **User Action**

1. Navigate to the Integration
2. Add a collection to be used as a source

#### **CCRRTT-1406E – Integration must have a target Collection.**

##### **Description**

An integration must have a target collection.

##### **User Action**

1. Navigate to the Integration
2. Add a collection to be used as a source

#### **CCRRTT-1408E – Integration failed to lookup artifact.**

##### **Description**

An integration failed to locate the artifact to be modified. This can be caused by:

- a missing formatted ID value on the source artifact,
- an invalid formatted ID value on the source artifact, or
- the absence of a target collection which contains an artifact matched by the formatted ID.

See the detailed message for more details about the parts of the lookup that failed.

##### **User Action**

1. Navigate to the integration page
2. Ensure the key field is configured correctly on the field flow page
3. Ensure the data on the source artifact is correct
4. Ensure a matching artifact is contained in a target collection

#### **CCRRTT-1409E – Integration has invalid filter.**

##### **Description**

The filter used in the integration has become invalid.



#### User Action

1. Navigate to the integration filter in error.
2. Resolve each error that appears in the filter.

#### **CCRRTT-1410E – Integration must specify a key identifier.**

#### Description

An integration must specify a key identifier for the given collections. Key identifiers are used to determine how to locate artifacts in a target collection. They do this by specifying the field on the source model that contains the target artifact formatted id.

#### User Action

1. Navigate to the integration page
2. Select the two collections missing a key identifier
3. Navigate to the field flow page and configure a key identifier

#### **CCRRTT-1411E – All specified routes of an integration must be configured.**

#### Description

All specified routes of an integration must be configured.

#### User Action

1. Navigate to the integration routing page
2. Configure all routes which require configuration

#### **CCRRTT-1412E – Integration has a conditional route with invalid configuration.**

#### Description

The conditional routing configuration of the integration has become invalid.

#### User Action

1. Navigate to the integration route in error.
2. Resolve each error that appears in the routing configuration.

#### **CCRRTT-1413E – Collection has invalid repository query.**

#### Description

The repository query used in the collection has become invalid.

#### User Action

1. Navigate to the collection.

2. Resolve the error by selecting a different repository query.

**CCRRTT-1414I – Tasktop is currently updating its operational data for this integration.**

**Description**

Tasktop is currently updating its operational data for an integration.

**User Action**

1. Wait for the data to be updated.

**CCRRTT-1415E – The routing configuration is invalid.**

**Description**

The artifact routing for this integration is invalid because the high-level container (i.e. the type of container chosen when clicking ? *Manage Projects?* on the Collections screen) has changed for one of more of the collections.

**User Action**

1. Navigate to each collection participating in the integration to review what is now selected under 'Manage Projects.'
2. Navigate to each integration and reconfigure the artifact routing. Once the routing is valid, this issue will clear.

**CCRRTT-10004E – Enterprise Data Stream Integration must have exactly one target SQL Collection.**

**Description**

An Enterprise Data Stream Integration must reference a single SQL collection.

**User Action**

- Select a SQL Collection for the target of the Integration that is in error.

**CCRRTT-10005E – Enterprise Data Stream Integration must have a source Collection.**

**Description**

An Enterprise Data Stream Integration must reference at least one Collection to be used as a source of artifacts.

**User Action**

Select a source Collection for the Integration that is in error.

**CCRRTT-10006E – Enterprise Data Stream Integration target Collection must have appropriate mapping.**

#### Description

An Enterprise Data Stream Integration's data Collection must be mapped to a model. This corresponds to the model desired to be reported on.

#### User Action

Add mappings for the Collection used in the Enterprise Data Stream Integration.

1. navigate to the Collection
2. add a mapping to a model

**CCRRTT-10007E – Enterprise Data Stream Integration source Collection must provide the correct model.**

#### Description

An Enterprise Data Stream Integration source Collection must be mapped to the same model as the target Collection.

#### User Action

Add relationship to the model for the source Collection used in the Enterprise Data Stream Integration

1. navigate to the Integration
2. identify the model of the target Collection
3. navigate to the source Collection in error, and ensure that its model matches the model of the target Collection
  - if the source collection is a Repository Collection, add a mapping to the corresponding model
  - if the source collection is a Gateway Collection, ensure its model is set to the corresponding model

**CCRRTT-10008E – Enterprise Data Stream Integration target Collection must have exactly one project.**

#### Description

An Enterprise Data Stream Integration's Collection must have exactly one project.

#### User Action

1. Navigate to the Collection
2. Ensure it has exactly one project which corresponds to the database table

**CCRRTT-10009E – Enterprise Data Stream Integration is missing required column.**

#### Description

An Enterprise Data Stream SQL Collection's underlying database table is missing a required column.

#### User Action

Add the required column to the underlying database table. See error message for missing column id.

#### **CCRRTT-15002E – Integration services cannot be started due to a problem with the license.**

##### **Description**

Tasktop integration services cannot be started due to a problem with the license. This problem can be caused by running the software without a license, using features that are not included in the installed license, or by having an invalid or expired license.

##### **User Action**

This problem can be resolved by installing a valid license using the following steps:

1. Obtain a valid license by contacting the Tasktop Support Center
2. Navigate to the settings page
3. Press the Apply New License button under License
4. Paste in the license text and press Save

#### **CCRRTT-15005E – Repository cannot be used due to a problem with the license.**

##### **Description**

The repository connection cannot be used because connections to repositories of this type are not enabled by the license.

##### **User Action**

This problem can be resolved by installing a valid license using the following steps:

1. Obtain a valid license by contacting the Tasktop Support Center
2. Navigate to the settings page
3. Press the Edit button under License
4. Paste in the license text and press Save

#### **CCRRTT-15011E – Your licensed user count has been exceeded.**

##### **Description**

Your licensed user count has been exceeded.

##### **User Action**

Please contact your sales representative.

#### **CCRRTT-16001E – Services cannot be started until Tasktop security has been initialized.**

##### **Description**

Tasktop integration services cannot be started because secure password storage has not been configured and initialized.

#### User Action

1. Navigate to the Settings page
2. Specify the Master Password under Secure Password Storage

#### **CCRRTT-17001E – Mapping cannot be applied since it is not valid within the current context.**

#### Description

The mapping cannot be applied since the mapping is not valid for the artifacts in the current context.

#### User Action

1. Determine the source of the problem from the specific error message
2. Either update the mapping to match the artifacts and model in use, or
3. Update the corresponding artifact schema to match the mapping, for example by changing a field type

#### **CCRRTT-17002E – Collection model mapping is invalid.**

#### Description

The collection model mapping is not valid due to inconsistencies between the collection schema, the model schema and the mapping.

#### User Action

1. Determine the cause of the problem from the specific error message
2. Navigate to the mapping
3. Update the mapping to match the collection and model in use, or
4. Update the corresponding collection artifact schema to match the mapping, for example by changing a field type, or
5. Update the model to match the mapping, for example by adding a field, or changing a field type

#### **CCRRTT-17003E – Artifact could not be created or updated because one or more values cannot be accepted.**

#### Description

An artifact could not be updated or created because one or more of its values are not valid. See the specific error message for details.

#### User Action

1. Identify the fields and values that are in error from the specific error message
2. Correct the source data, either by

- updating the source artifact, or
- by making changes to the mapping, or
- by making changes to the target system so that the provided data is valid, or
- by providing a new artifact via a Gateway Collection

#### **CCRRTT-17004W – Artifact cannot be processed since it is currently in use.**

##### **Description**

Artifact cannot be processed since it is currently in use. This temporary problem occurs when Tasktop attempts to process changes to an artifact concurrently.

##### **User Action**

This error will resolve itself automatically, no user action required.

#### **CCRRTT-17005E – Field flow is invalid.**

##### **Description**

The field flow configuration is not valid due to inconsistencies between the the model schema and the field flow.

##### **User Action**

1. Determine the cause of the problem from the specific error message
2. Navigate to the integration
3. Select the collection pair
4. Navigate to the field flow
5. Update the field flow to match the model in use, or
6. Update the model to match the field flow, for example by adding a field

#### **CCRRTT-17006E – Artifact was created but some values could not be set.**

##### **Description**

An artifact was created by an integration but some values on the artifact could not be set. The resulting artifact has some field values that may not be correct.

##### **User Action**

1. Determine the cause from the specific error message
2. Either retry the corresponding activity, or
3. Verify the state of the created artifact and manually adjust values as necessary

#### **CCRRTT-17007E – Conflict resolution strategy is invalid.**

##### **Description**

The conflict resolution strategy configuration is invalid.

#### User Action

1. From the integration, navigate to the conflict resolution strategy
2. Select an option for the conflict resolution strategy

**CCRRTT-17008E – Artifact could not be processed as it did not meet any of the configured conditions on the Conditional Artifact Routing page.**

#### Description

Artifact could not be processed as it did not meet any of the configured conditions on the Conditional Artifact Routing page.

#### User Action

- Update the conditions configured on the Conditional Artifact Routing page to ensure the artifact's field value is accounted for, or
- Update fields on the artifact to ensure that it meets the conditions set on the Conditional Artifact Routing page, or
- Update specification for handling artifacts not matched by conditions configured on the Conditional Artifact Routing page to *Ignore?* or *Default Route?* instead of *Error?*.

**CCRRTT-17009E – Invalid state transition.**

#### Description

An extension provided invalid values when attempting to transition an artifact.

#### User Action

1. Identify the extension that produced invalid values
2. Identify the fields and values that are in error from the specific error message
3. Modify the extension to produce a valid transition

**CCRRTT-17010E – Repeated state transition.**

#### Description

An extension attempted to transition an artifact with the same transition more than once.

#### User Action

1. Identify the extension from the error message
2. Modify the extension to avoid repeated transitions of the same type for an artifact

**CCRRTT-17011E – Extension completed with an error.**

#### Description

An extension completed with an error. See the specific error message for details.

Extensions complete with errors for one of two reasons:

- the extension intentionally raised an error, for example to indicate that a business rule was not satisfied
- the extension itself has an error in its implementation

#### User Action

1. Determine from the specific error message the cause of the error
2. Either modify the extension to prevent the error from occurring, or
3. Modify the source or target artifact to satisfy the condition that caused the error

### **CCRRTT-17013E – The state transition requires the selection of model fields.**

#### Description

A state transition extension is configured in a collection that has no model fields selected.

#### User Action

Either disable the state transition of the collection or select model fields for the state transition.

To select the fields for the state transition:

1. navigate to the collection
2. navigate to the collection state transitions via the ? *Configure State Transition?* link
3. add the model fields required by the state transition in "State Transition Fields"

To disable state transitions in the collection:

1. navigate to the collection
2. navigate to the collection state transitions via the ? *Configure State Transition?* link
3. select ? *None?* for "State Transition"

### **CCRRTT-17014E – Relationship values could not be resolved during synchronization.**

#### Description

One or more relationship links could not be resolved as part of a synchronization.

This problem occurs when two artifacts that link to each other are synchronized out of order. This commonly occurs when one artifact (A) links to another (B), but the linked-to artifact B has not yet been synchronized.

When the copy of artifact A (A') is created in the target repository, a link to a copy of B (B') cannot be created at that time since B' has not yet been created.



This problem usually resolves itself once B' is created; the link from A' to B' is created once B' becomes available.

#### User Action

- None; wait for the error to be resolved automatically, or
- Remove the unresolved link from the artifact being synchronized

#### **CRRRTT-17015E – Relationship values could not be resolved during synchronization.**

#### Description

One or more relationship links could not be resolved as part of a synchronization.

This commonly occurs when one artifact (A) links to another (B), but the linked-to artifact B has more than one corresponding copy in the target repository. This can be caused by having two separate synchronization integrations that cause B to be copied into the target repository.

#### User Action

- Remove the link from A to B, or
- Remove one of the two synchronization integrations

#### **CRRRTT-17016E – An unexpected error occurred when creating the artifact.**

#### Description

An unexpected error occurred when creating the artifact. The artifact may or may not have been created.

#### User Action

1. Do not retry the event without guidance from Tasktop Support,
2. Contact the Tasktop Support Center for assistance: "<https://links.tasktop.com/support>"

#### **CRRRTT-17017E – The repository does not support artifact creation.**

#### Description

The repository does not support artifact creation.

#### User Action

1. Navigate to the corresponding integration,
2. Disable artifact creation flow into the specified collection,
3. Remove all routes flowing into the specified collection.

#### **CRRRTT-17018E – Model does not have all fields required by the state transition.**

#### Description

A state transition extension is configured in a collection that requires fields that are not configured in the model.

#### User Action

Either remove the missing fields in the state transition configuration, or ensure that the model has the required fields.

To add the fields to the model:

1. navigate to the model
2. add the fields

To change the required fields of the state transition extension from the collection:

1. navigate to the collection
2. navigate to the collection state transitions via the *? Edit state transition?* link
3. modify the list of model fields

#### **CCRRTT-17019E – Target collection partition could not be resolved during synchronization.**

##### Description

The work item artifact could not be synchronized due to a missing or invalid route.

##### User Action

1. Verify which container this artifact is in in the repository, and ensure that either that container or one of its ancestors has been configured as part of a mirrored container structure; or
2. Ensure that a route has been created for the container in which this artifact originates in the work item integration; or
3. Ensure that the target container has not been deleted. If it has, and if an error exists for it, re-create the container on the Errors screen. To ensure you see an error for the deleted container, make a change to the still-existing corresponding container in the other collection.

#### **CCRRTT-17020E – Associated target container could not be resolved during synchronization.**

##### Description

The artifact could not be synchronized because the target container could not be found.

##### User Action

1. No action needed, the synchronization should be fixed automatically when the containers synchronize.

#### **CCRRTT-17021E – An error occurred when performing state transitions.**

##### Description

A transition was attempted on an artifact but an error resulted.  
The artifact may be in an incorrect state.

#### User Action

Either address the cause from the specific error message, or disable/reconfigure the state transition of the collection.

1. If the specific error message has a cause, verify the state of the target artifact and manually adjust values as necessary

To disable/reconfigure state transitions in the collection:

1. navigate to the collection
2. navigate to the collection state transitions via the ? *Configure state transition?* link
3. adjust the relevant state transitions

#### **CCRRTT-17022E – The associated container could not be found.**

##### Description

The container associated with the parent container of this artifact could not be found.

##### User Action

- If the parent container is configured in a route, update the routing configuration to use an existing container
- If the parent container is synchronized by an integration, update the parent container to generate an event for the parent container, and use the ? *Recreate Artifact?* action

#### **CCRRTT-17023E – For the artifact pair import to succeed, the associated integration must be running.**

##### Description

For the artifact pair import to succeed, the associated integration must be running.

##### User Action

- Run the integration associated with the artifact pair file.

#### **CCRRTT-17024E – An error occurred when processing the output of an extension.**

##### Description

An error occurred when processing the output of an extension. See the specific error message for details.

##### User Action

1. Determine from the specific error message the cause of the error
2. Either modify the extension to prevent the error from occurring, or
3. Modify the source or target artifact to satisfy the condition that caused the error

**CCRRTT-20000E – No integration is listening to the Gateway Collection.**

**Description**

A Gateway Collection has been used, but the collection is not configured as a source in an integration. The payload has been lost.

**User Action**

1. Use the Gateway Collection in an integration, or
2. Stop pushing to the collection (from the external source)

**CCRRTT-20004E – Relationship fields of a Gateway Collection must be configured to specify the related repository.**

**Description**

A Gateway Collection must configure the Relationship(s) fields to associate them with the repository having referenced artifacts.

**User Action**

1. Navigate to the Gateway collection
2. Locate the ? *Relationship Field Configuration*? section in the UI
3. For each field, select the repository that is associated with that relationship.

**CCRRTT-20005E – Gateway collection must have a model.**

**Description**

A Gateway Collection must have a model configured.

**User Action**

1. Navigate to the Gateway collection
2. Select a model and save the changes

**CCRRTT-20006E – Gateway Collection cannot be used with the configured payload transformation extension due to a restriction in the license.**

**Description**

A gateway collection has been configured with a payload transformation extension, which is not permitted by the current license.

**User Action**

Perform one of the following:

- Delete the offending gateway collection
- Remove the payload transformation extension from the offending gateway collection

#### **CCRRTT-21001E – An unexpected error occurred while sending an email.**

##### **Description**

An error occurred while attempting to send an email.

##### **User Action**

1. Verify that the email settings are specified correctly in the settings
2. Attempt to resolve error according to the specific error message

#### **CCRRTT-21002E – Failed to authenticate with the email server.**

##### **Description**

The mail server rejected the client connection because it was not able to authenticate.

##### **User Action**

1. Verify that the email settings are specified correctly in the settings
  - Double-check the email server hostname and port
  - Double-check the email server credentials
2. Attempt to resolve error according to the specific error message

#### **CCRRTT-30000E – An unexpected error occurred.**

##### **Description**

An unexpected error has occurred. Check the specific error message for details.

##### **User Action**

Check the specific error message for details of the failure. If possible correct the problem described in the error message, or contact your administrator for assistance.

#### **CCRRTT-30001E – Not found.**

##### **Description**

The entity was not found because the entity no longer exists on the server.

##### **User Action**

Ensure that the provided entity id is correct, and if not correct the id and try again.

**CCRRTT-30002E – The data provided was not valid.**

**Description**

The data provided was not valid. See the specific error message for details.

**User Action**

Correct the problem described in the specific error message and try again.

**CCRRTT-30003E – The connector kind was not found.**

**Description**

The connector kind was not found.

**User Action**

Ensure that the connector kind is specified correctly and try again.

**CCRRTT-30004E – The request entity was not valid JSON.**

**Description**

The request entity was not valid JSON.

**User Action**

Ensure that the request payload is formatted as a valid JSON entity and try again.

**CCRRTT-30005E – Secure password storage must be initialized.**

**Description**

Secure password storage has not been initialized.

**User Action**

Configure secure password storage via the settings page.

**CCRRTT-30006E – Error communicating with {0} repository.**

**Description**

Error connecting to repository. See the specific error message for details.

**User Action**

Check the specific error message for details of the failure. If possible correct the problem described in the error message, or contact your administrator for assistance.

### **CCRRTT-30007E – Error processing request MIME attachment.**

#### **Description**

The request MIME attachment could not be accepted either due to a bad request or an I/O failure.

This problem can be caused by insufficient disk space or lack of write permissions in the Tasktop application temporary directory.

#### **User Action**

1. Verify that the temporary directory of the Tasktop application is writable,
  - The Tasktop application must have write permissions to the directory
  - The directory must have sufficient available space
2. Try again

### **CCRRTT-30008E – Tasktop is stopped, see the Activity View and error log for more details.**

#### **Description**

Tasktop has been stopped due to unrecoverable errors. See error log for more details.

#### **User Action**

Correct the problem described in the specific error message and restart.

### **CCRRTT-30009E – The database is not available.**

#### **Description**

The configuration database is unavailable.

#### **User Action**

Ensure the configuration database is online and can be reached and ensure Tasktop's database settings are correct.

### **CCRRTT-30010E – Connection settings are not valid.**

#### **Description**

The provided connection settings are not valid. See the specific error message for details.

#### **User Action**

Correct the problem described in the specific error message and try again.

### **CCRRTT-30011E – The database is locked for maintenance and cannot currently be used.**

#### Description

The configuration database is locked for maintenance and cannot be used.

#### User Action

Wait for the ongoing maintenance to complete.

**CCRRTT-30012E – The database is in use by another instance of the application.**

#### Description

The Configuration database is in use by another instance of the application.

#### User Action

If this is the Tasktop instance which should be running, then shut down any other instances of Tasktop using the same database and restart this instance. Otherwise shut down this instance of Tasktop.

**CCRRTT-30013E – Temporary error communicating with {0} repository.**

#### Description

Temporary error connecting to repository. See the specific error message for details.

#### User Action

Retry your action. If the problem persists, contact your administrator for assistance.

**CCRRTT-50001E – Unable to propagate artifact changes since the target artifact has been removed.**

#### Description

Changes to an artifact cannot be propagated to the corresponding artifact in the alternate repository of a synchronization integration since the target artifact has been removed.

#### User Action

- Use the ? *Recreate Artifact?* action to have Tasktop recreate the artifact that was deleted in the end system and associate it with the still-existing artifact in the other repository (putting them in sync with one another), or
- Delete the associated artifact, or
- Move the associated artifact out of its collection such that the artifact is no longer synchronized, or
- Apply an artifact filter to ensure updates to the artifact will not be synchronized. To do so, make sure the artifact does not meet the filter criteria specified and make sure to configure the filter to apply to artifact updates

**CCRRTT-50002E – A conflict has occurred during synchronization.**



### Description

A field conflict was detected when synchronizing artifacts. A field conflict occurs when the value of a field that is set to flow bidirectionally conflicts across your repositories.

The synchronization of these artifacts was halted with an error because a conflict resolution strategy of *? Error Upon Conflict?* was configured and the system was unable to propagate the value from either artifact without overwriting a change from the other artifact.

### User Action

- Change the conflict resolution strategy to have one of the repositories dominate in case of a conflict, or
- Manually change the conflicting value on at least one of the artifacts such that there is no longer a conflict, or
- Change the field flow of the affected field to be unidirectional (in which case a conflict is not possible)

### **CCRRTT-50005E – A conflict has occurred during synchronization.**

### Description

A conflict was detected when synchronizing artifact containment. A conflict occurs when one or more containers of synchronized artifacts is changed for both artifacts.

### User Action

- Change the container of one or both artifacts to its original value or
- Change the conflict resolution strategy to have one of the repositories dominate

### **CCRRTT-50006E – Unable to update artifact due to values for dependent single selects not found.**

### Description

Unable to find a new value for an unchanged dependent field.

### User Action

- From the error message find the field that the field in error depends on
- In the repository add a value with the same label as the one provided in the error message

OR

- Change the field that the field in error depends on back to its original value

OR

- Remove the mapping for the field that the field in error depends on

### **CCRRTT-50007E – Multiple matching containers were found.**

#### Description

Multiple matching containers were found when attempting to match containers.

#### User Action

- Disable container matching in the container mirroring configuration, or
- Rename the containers such that only one container matches, or
- Change the container matching configuration to choose the first matching container, or
- Change the container matching configuration to match containers differently

#### **CCRRTT-60001E – Error initializing password encryption.**

#### Description

Secure password storage requires 256-bit AES encryption which is not available in the Java runtime environment.

#### User Action

This problem can be resolved by installing the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files in the Java runtime environment. The download is available from [oracle.com](http://oracle.com) including a README file with installation instructions.

Alternatively, the unencrypted level of the password store maybe used.

#### **CCRRTT-61001E – Connector is missing requirements.**

#### Description

The connector requirements are not met.

#### User Action

Read the connector-specific error message to determine which requirements are unsatisfied.

To provide 3rd party components such as a library or SDK, follow the following steps:

1. Navigate to the ? *Connections?* page.
2. Select the connection for which the requirements were unsatisfied.
3. On the connection page, provide the required files.

#### **CCRRTT-61101E – Connection credentials were not accepted by the repository.**

#### Description

There was an authentication error while attempting to communicate with a repository.

#### User Action

1. Verify that the credentials for the associated repository are correct in the settings.

If these steps do not resolve the error, ensure that the user has sufficient permissions in the target repository to create and edit artifacts.

#### **CCRRTT-61102E – Connection HTTP proxy credentials were not accepted by the repository.**

##### **Description**

There was an authentication error with the proxy server while attempting to communicate with a repository.

##### **User Action**

1. Verify that the proxy credentials for the associated repository are correct in the settings.

If these steps do not resolve the error, contact your network administrator for assistance.

#### **CCRRTT-61103E – Connection settings are invalid.**

##### **Description**

The connection settings are invalid.

##### **User Action**

1. Open the connection settings page for the repository that is in error.
2. Update the connection settings to valid values.

If these steps do not resolve the error, contact support for additional assistance.

#### **CCRRTT-61104E – Tasktop is unable to communicate with this repository as it is experiencing high server load.**

##### **Description**

Tasktop is unable to communicate with this repository as it is experiencing high server load. This problem is usually caused by exceeding the number of API calls a repository can receive or otherwise placing a high load on the repository.

##### **User Action**

This error will resolve itself automatically when the repository is no longer experiencing high server load. You can also set an event rate limit on the repository connection screen in Tasktop to limit the number of Tasktop events processed for this repository per minute.

#### **CCRRTT-61105I – This message is to notify you that Tasktop had suspended communication with a repository due to high server load on that repository. Communication has since resumed.**

#### Description

This message is to notify you that Tasktop had suspended communication with a repository due to high server load on that repository. Communication has since resumed.

#### User Action

None.

**CCRRTT-63001E – Integration services cannot be started since the current license has expired.**

#### Description

Tasktop integration services cannot be started because the current license has expired.

#### User Action

This problem can be resolved by installing a valid license using the following steps:

1. Obtain a valid license by contacting the Tasktop Support Center
2. Navigate to the settings page
3. Press the Apply New License button under License
4. Paste in the license text and press Save

**CCRRTT-64001E – Integration cannot be used with the configured repositories due to a restriction in the license.**

#### Description

An integration cannot be run because it is configured with repository pairs which are invalid under the current license restrictions.

#### User Action

Perform one of the following:

- Delete the offending integration
- Disable the offending integration
- Update the offending integration to use repository pairs allowed under the current license restrictions

**CCRRTT-65001E – Extension cannot be used because of a restriction in the license.**

#### Description

A value transformation extension is present which is not permitted by the current license.

#### User Action

Perform one of the following:

- Provide a license that includes extensions of this type, or
- Remove extension by navigating to the the Settings -> Extensions page

**CCRRTT-66001I – Tasktop is currently updating its operational data with a collection's project replacements.**

#### Description

Tasktop is currently updating its operational data with a collection's project replacements.

#### User Action

1. Wait for collection update to complete.

**CCRRTT-66002I – Tasktop is currently updating its operational data with a collection's project replacements.**

#### Description

Tasktop is currently updating its operational data with a collection's project replacements.

#### User Action

1. Wait for collection update to complete.

## Metrics

*See [Tasktop Editions table](#) to determine if your edition contains basic or advanced Metrics functionality.*

### ***Introduction***

Tasktop Integration Hub provides a Metrics dashboard to help you better understand Tasktop activity such as:

- Number of artifacts created by Tasktop
- Number of artifact updates by Tasktop

These metrics are a great tool to:

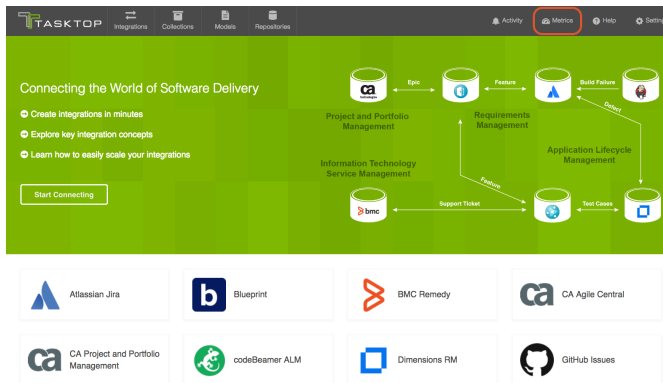
- Understand and troubleshoot downtime
- Communicate the value of Tasktop to your organization
- Analyze trends and patterns within your organization, such as:
  - Are there certain times of year when higher quantities of customer requests flow from your CRM tool to your Requirements tool?
  - Have defects flowing from your ITSM tool to your Agile tool decreased over time?
  - ...and more!

The data used to create the metrics refreshes each time the page is reloaded.



## Instructions

To access the Metrics Dashboard, click the 'Metrics' link in the upper right hand corner of the screen



## Basic Functionality

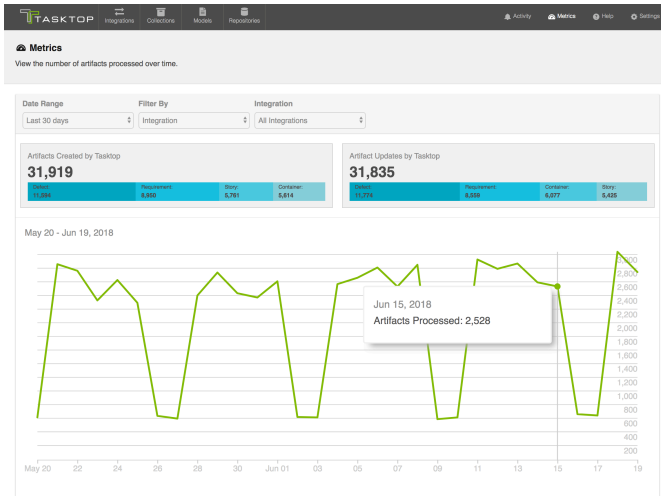
See [Tasktop Editions table](#) to determine if your edition contains basic or advanced Metrics functionality.

Users with basic functionality will be able to view metrics showing the following:

- Total Artifacts Created

- Total Artifact Updates
- To help understand which artifact types are being synchronized, a blue bar will show the distribution for the metrics above based on model

Metrics above are displayed to show data for all integrations, over the last 30 days.



## Advanced Functionality

See [Tasktop Editions table](#) to determine if your edition contains basic or advanced Metrics functionality.

Users with advanced functionality will be able to view metrics showing the following:

- Total Artifacts Created
- Total Artifact Updates
- To help understand which artifact types are being synchronized, a blue bar will show the distribution for the metrics above based on model

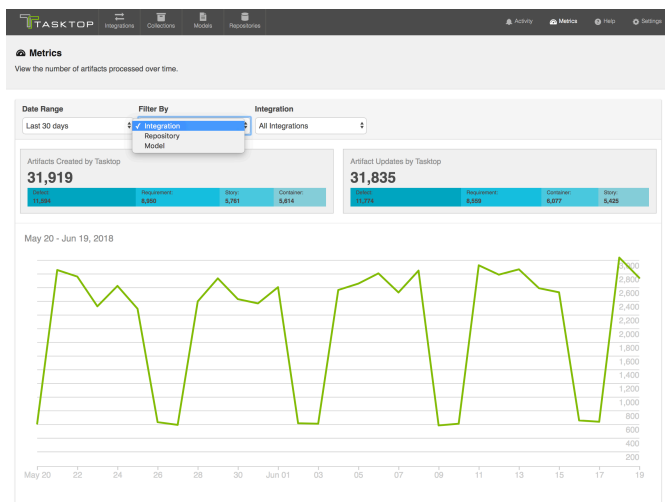
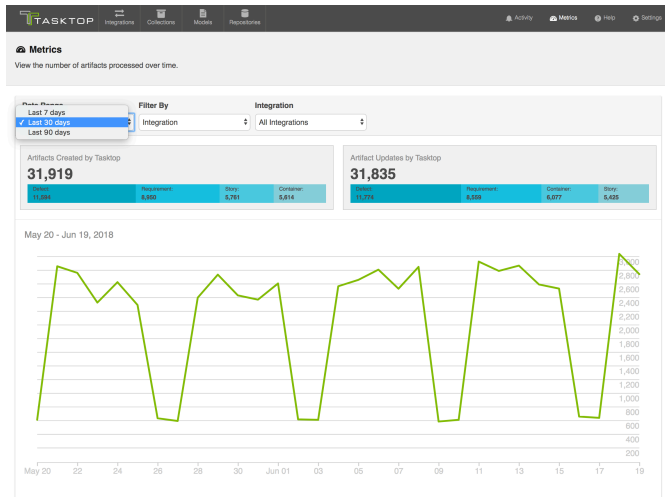
Additionally, users can choose to filter the data above based on

- Date Range
  - Last 7 Days
  - Last 30 Days
  - Last 90 Days
- Integration
- Repository
- Model

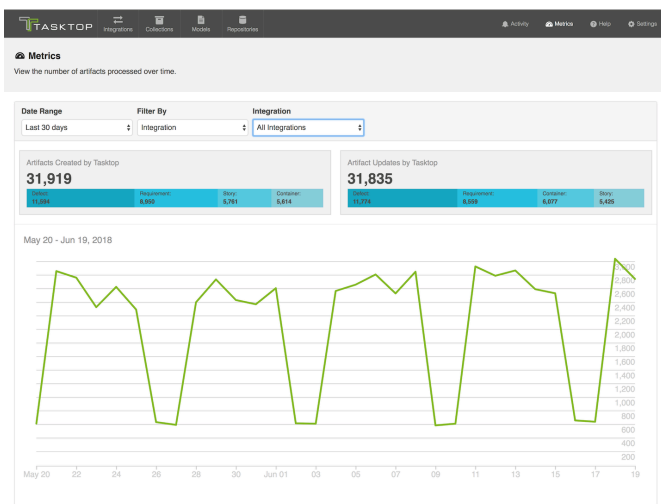
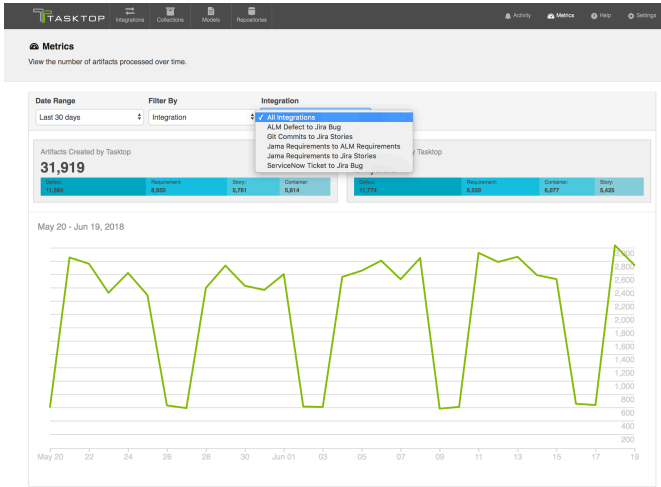
Users can also view tables showing cumulative totals for Artifacts Created, Artifact Updates, and User IDs for each integration and each repository.

The Artifacts Created and Artifact Updates metrics show cumulative totals since installing Tasktop Integration Hub version 18.2.0.

The User ID metrics shows the number of unique user IDs on artifacts that have flowed through or been updated by Tasktop since installing Tasktop Integration Hub version 18.3.0. This metric can be used to better understand the value and scope of the integration, and is not intended to be used to assess Tasktop usage for licensing purposes (for licensing purposes, please see the [Tasktop usage reports](#)).





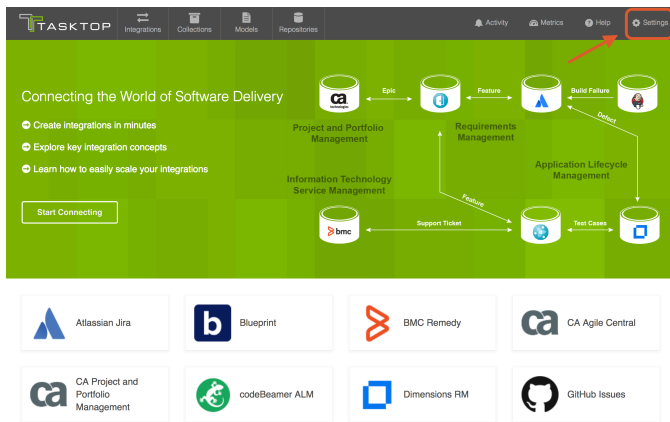


Cumulative Artifact Processing Counts				
Integrations				
Integration Name	Template	# Artifacts Created	# Artifact Updates	# User IDs
ALM Defect to Jira Bug	Work Item Synchronization	35,880	35,368	56
Git Commits to Jira Stories	Modify via Gateway	17,777	17,403	27
Jama Requirements to ALM Requirements	Container + Work Item Synchronization	35,110	35,336	61
Jama Requirements to Jira Stories	Work Item Synchronization	35,215	36,000	78
ServiceNow Ticket to Jira Bug	Work Item Synchronization	35,749	34,920	64
Repositories				
Repository Name		# Artifacts Created	# Artifact Updates	# User IDs
ALM		53,318	52,761	95
Jama		52,729	53,091	107
Jira		71,367	70,673	128
ServiceNow		17,754	17,528	38

## Settings

### Accessing Settings

To access the 'Settings' page, click the Settings button in the upper right corner of your screen



From here, you'll be able to access things like polling interval configuration, extensions, license information, and more.

## Change Detection Interval Configuration

The Configuration section allows the administrator to change the polling frequency of the connected repositories.

- Change Detection Interval:** The time between polling requests made by Tasktop to your external repositories to detect *only changed artifacts*. This defaults to 1 minute, but can be customized as desired.
  - Note: this global setting can be overridden with an integration-specific change detection interval, by updating the [Change Detection](#) settings for that integration
- Full Scan Interval:** The time between polling requests made by Tasktop to your external repositories to detect changed artifacts, in which *all* artifacts of a collection are scanned. Not all changes to an artifact will register as a change. Some repositories do not mark items as changed when (for example) a relationship is added or an attachment has changed. These may not be picked up by regular Change Detection, but will be picked up by a Full Scan. The Full Scan Interval defaults to 24 hours, but can be customized as desired.
  - Note: this global setting can be overridden with an integration-specific full scan interval, by updating the [Change Detection](#) settings for that integration
  - You can learn more about the types of changes that require Full Scan Intervals in the [Connector Docs](#).
- Integration Maximum Concurrency:** This limits the number of events processed concurrently by each integration. Increasing this value will enable more artifact changes to flow concurrently, whereas decreasing this value will reduce the level of concurrent changes. Changing this value

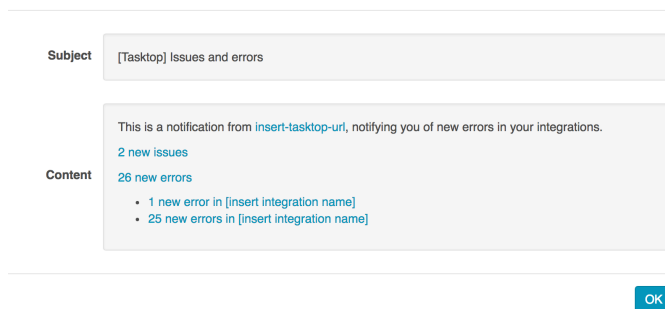
has the potential to affect the load on the end-points of an integration, and may have an adverse effect on performance if set too high. The default setting (10) should be used unless advised to change by Tasktop Support.

## Email Notifications

To facilitate troubleshooting, you can configure automated email notifications for new errors and issues encountered in Tasktop.

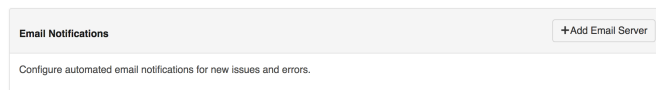
Emails will contain a count of new issues and errors (excluding 'ignored' errors) since the last email notification, and a link to the Activity screen to view the errors/issues. Emails will be sent only if a new error or issue occurs.

### Email Sample



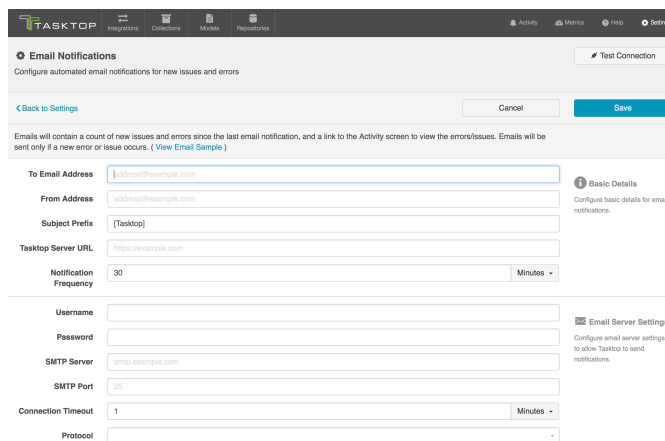
The image shows a preview of an email notification. The subject line is "[Tasktop] Issues and errors". The content area contains the following text: "This is a notification from insert-tasktop-url, notifying you of new errors in your integrations." followed by "2 new issues" and "26 new errors". Below this, there is a bulleted list: "• 1 new error in [insert integration name]" and "• 25 new errors in [insert integration name]". At the bottom right of the preview area is a blue "OK" button.

To configure email notifications click '+Add Email Server' on the Settings screen.



The image shows a snippet of the Tasktop Settings screen. At the top right, there is a button labeled "+Add Email Server". Below it, there is a text label "Email Notifications" and a description: "Configure automated email notifications for new issues and errors."

This will bring you to the Email Notifications screen:



The image is a screenshot of the "Email Notifications" configuration screen in the Tasktop application. The screen has a dark header with the Tasktop logo and navigation icons. The main content area is titled "Email Notifications" and includes a "Test Connection" button. Below the title, there is a description: "Configure automated email notifications for new issues and errors." and a "View Email Sample" link. The screen is divided into two sections: "Basic Details" and "Email Server Settings". The "Basic Details" section includes fields for "To Email Address", "From Address", "Subject Prefix", and "Tasktop Server URL", along with a "Notification Frequency" dropdown set to "30 Minutes". The "Email Server Settings" section includes fields for "Username", "Password", "SMTP Server", "SMTP Port", "Connection Timeout" (set to "1 Minutes"), and "Protocol".

The form requires that the following fields be filled out:


### Basic Details

- **To Email Address:** The email address that will receive the notifications. This field is limited to one email address.
- **From Email Address:** The email address listed in the 'sender address' (or 'from') field of notification emails sent by Tasktop. In many cases, this will match the email whose settings are configured in the 'Email Server Settings' section below, though a different email (such as no-reply@email.com) can be configured here. If a user were to hit 'reply' on an email notification, this is the email the reply would be sent to.
- **Subject Prefix:** The prefix appended to the subject line of the Error Notification emails. This defaults to [Tasktop] but can be edited if needed. This can help users filter email notifications from Tasktop based on prefix.
- **Tasktop Server URL:** The URL used to access your instance of Tasktop. This is used to construct links to errors and issues in the notification emails.
- **Notification Frequency:** The frequency of email notifications. Emails will contain a count of new issues and errors since the last notification and will only send if a new error or issue has occurred since the prior email.

## Email Server Settings

These are the email server settings that allow Tasktop to send notifications.

- **Username:** Username for the authenticated SMTP server.
- **Password:** Password for the authenticated SMTP server.
- **SMTP Server:** The SMTP host name of your mail server.
- **SMTP Port:** The SMTP Port number to use.
  - If Protocol = SMTP, the value for this will typically be 25.
  - If Protocol = SMTPS, the value for this will typically be 465.
  - If Protocol = SMTP\_STARTTLS, the value for this will typically be 587, but can also be port 25.
- **Connection Timeout:** Specifies the maximum period, in seconds, that establishing an email server connection is permitted to take. This defaults to 60 seconds, which should cover most scenarios.
- **Protocol**
  - **SMTP:** Basic unencrypted SMTP Protocol.
  - **SMTPS:** A more advanced, encrypted SMTP Protocol (SMTP Secure), which will perform server certificate validation.
  - **SMTP\_STARTTLS:** A modern protocol that wraps the unencrypted SMTP protocol in TLS (formerly known as SSL encryption), and will perform server certificate validation. This will attempt the STARTTLS wrapper, but if it is not supported by the server, the client will fall back to basic SMTP.

 Google email users should select SMTP\_STARTTLS.

Here's an example of a filled in form:

**Tasktop** | Activity | Alerts | Help | Settings

### Email Notifications

Configure automated email notifications for new issues and errors

[Test Connection](#)

[Back to Settings](#) | [Cancel](#) | [Save](#)

Email Notifications are off.  
 Emails will contain a count of new issues and errors since the last email notification, and a link to the Activity screen to view the errors/issues. Emails will be sent only if a new error or issue occurs. ([View Email Sample](#))

[Turn On Notifications](#)

**To Email Address** admin@email.com

**From Address** tasktop@email.com

**Subject Prefix** [Tasktop]

**Tasktop Server URL** https://localhost:8443

**Notification Frequency** 30 Minutes

**Username** tasktop@email.com

**Password** .....

**SMTP Server** smtp.example.com

**SMTP Port** 25

**Connection Timeout** 1 Minutes

**Protocol** SMTP

**Basic Details**  
 Configure basic details for email notifications.

**Email Server Settings**  
 Configure email server settings to allow Tasktop to send notifications.

You can test your email server settings by clicking the 'Test Connection' button in the upper right corner of the screen.

Once settings are filled in and the connection has been tested, click 'Save' to save your settings, and 'Turn On Notifications' to enable email notifications.

Once saved, you will be able to turn email notifications on or off and to delete the notification settings from the Settings screen. You can also click 'Configure Notification Settings' to modify your existing settings:

### Email Notifications

[Configure Notification Settings](#)

Email Notifications are on.  
 Emails will contain a count of new issues and errors since the last email notification, and a link to the Activity screen to view the errors/issues. Emails will be sent only if a new error or issue occurs. ([View Email Sample](#))

**From Email:** tasktop@email.com  
**To Email:** admin@email.com

[Turn Off Notifications](#) | [Delete Notification Settings](#)

**Note:** If an email notification fails, an issue will be surfaced on the [Activity](#) screen in Tasktop.

## Logging

For troubleshooting purposes, Tasktop logs various events that the application performs.

There are two logging levels available:

- **Normal:** This is sufficient for most scenarios.
- **Troubleshooting:** This setting provides more detailed logs. Due to the large volume of logs created during Troubleshooting logging, this option has a time limit with a maximum of 24 hours. If Troubleshooting level is selected, the Normal logging level can be enabled at any time by clicking the 'Stop Troubleshooting Now' button.

Updating the logging levels immediately changes the logging granularity. Tasktop does not need to be restarted for the change to take effect.

### Default Logging Enabled

Logging

Current Log Level: Normal

Enable Troubleshooting:

## Troubleshooting Logging Enabled

Logging

Current Log Level: Troubleshooting (ends in 4 hours)

Enable Troubleshooting:

[Stop Troubleshooting Now](#)

## Downloading Logs

Please reference the [Troubleshooting](#) page for instructions on downloading the logs as part of the Support and Usage Report.

## Extensions

Extensions add to Tasktop's basic functionality by facilitating processes such as custom data transformations, payload transformations, advanced person reconciliation, and state transitions.

You can create and save custom extensions for use in your integrations on the 'Settings' screen. To create and edit your extensions, click the 'Manage Extensions' button.

Below, you will find basic information about each extension type. You can also see example extensions, and learn technical implementation details in the [Extensions](#) section.

**Extensions**

Extensions add to Tasktop's built-in functionality to satisfy specific use cases.

[Manage Extensions](#)

**Extensions**

View your existing extensions and create new ones. Extensions add to Tasktop's built-in functionality to satisfy specific use cases.

[Back to Settings](#)

You haven't created any extensions.

[+ New Extension](#)

## New Extension: Select Type

Select an extension type. Extensions add to Tasktop's functionality to satisfy specific use cases.

[← Back to Extensions](#)

Done



Custom Data Transformation



Payload Transformation



Person Reconciliation



State Transition

Select the extension type that describes the type of extension you need to create. Extensions add to Tasktop's functionality to satisfy specific use cases.

### Custom Data Transformation

Custom Data Transformation Extensions enable you to map fields to one another which do not have out-of-the-box transforms. You can apply this extension when updating your transform on the [Field Configuration](#) screen.

### Payload Transformation

Payload Transformation Extensions enable you to take the payload sent in by your Gateway Collection and transform it into a format that Tasktop can accept. Once you have saved your extension, you can select it on the [Gateway Collection](#) screen.

### Person Reconciliation

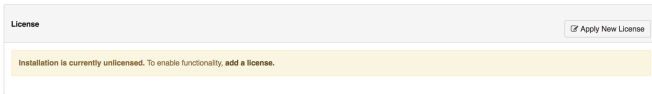
Tasktop comes with a default person reconciliation strategy ("Copy with Default Matching"), which matches based on name, ID, and/or e-mail. This strategy should cover most use cases. If needed, you can also configure a custom Person Reconciliation Extension to match 'person' fields from one repository to another. You can select the extension on the [Person Reconciliation](#) screen during the Collection configuration process.

### State Transition

State Transition Extensions enable you to transition artifacts from one state to another according to a set workflow. The extension can be applied from the State Transition Sash on the Collection Configuration screen.

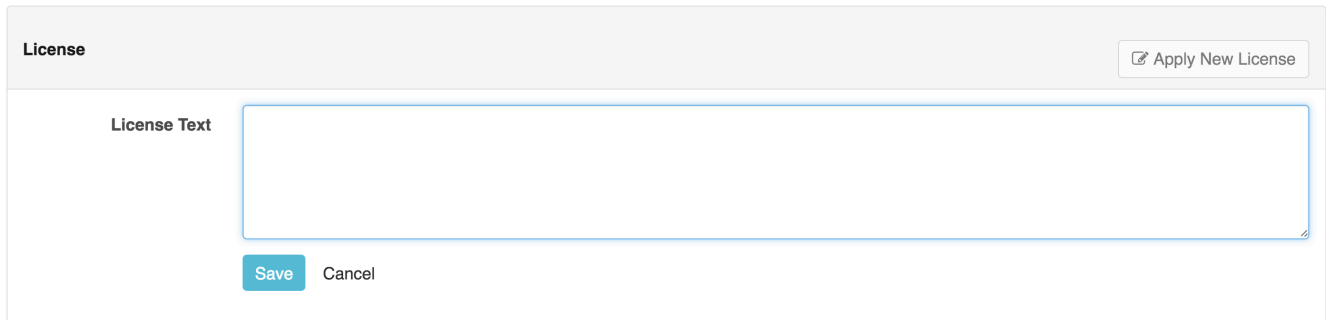
## License

A license is required to run the application. Upon initial log-in, you will see that your product is currently un-licensed:



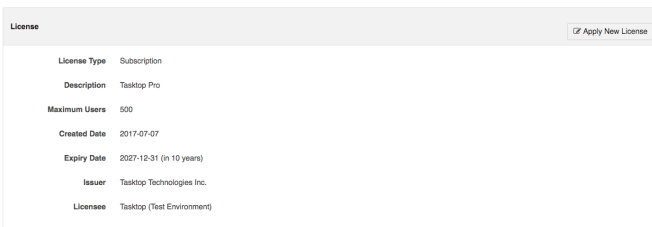
Click 'Apply New License' to enter your license.

The **Master Password** must be set and the License must be entered before the application can be used.

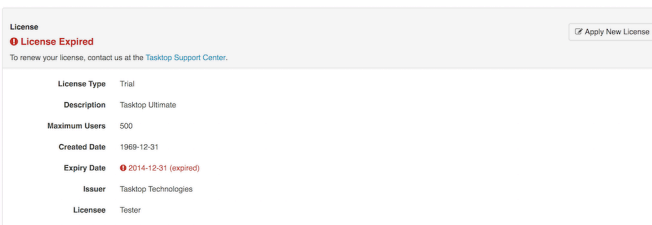


On the license panel you can see:

- License Type
- Description
- Maximum Users
- Created Date
- Expiration Date
- Issuer
- Licensee

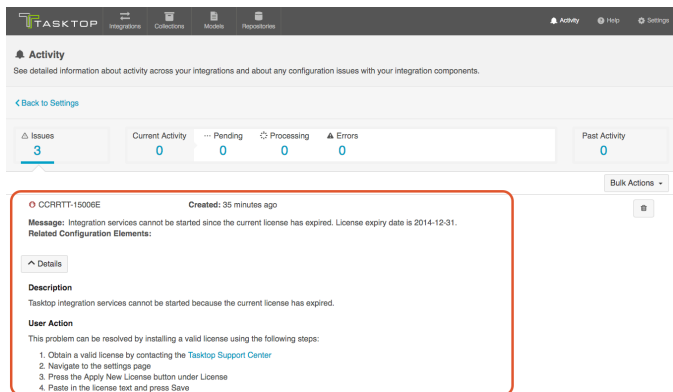


You will also see a warning if your license is expired:




Should your license expire, in addition to seeing a warning on the Settings page, you'll also see that an issue is surfaced on the Activity screen:



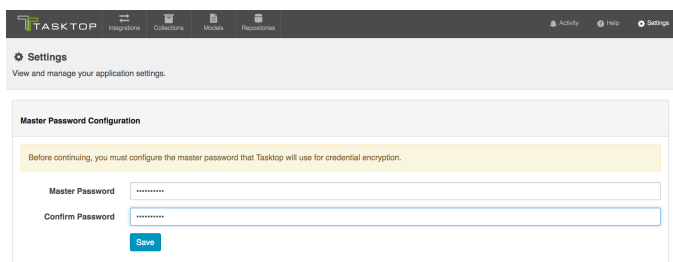


When your license is expired, you'll still be able to navigate within the Tasktop UI, but your integrations will be stopped from running. Note that though they will still display the Run or Stopped state they were in at the time your license expired, no artifacts will process in an integration until a new license is applied.

 Please consult your license agreement or contact your account representative if you have any questions about your license settings or usage policy.

## Master Password Configuration

After installation, you will be prompted to set a Master Password.



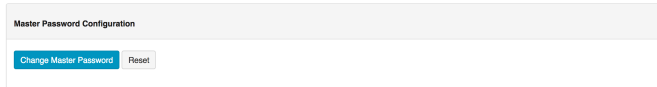
The Master Password is used to encrypt the credentials used in your repository connections and proxy settings. Tasktop Integration Hub will automatically use the stored Master Password to decrypt repository credentials.

Normally you will not need to re-enter your Master Password. However, if the stored Master Password is missing, or if you'd like to change your Master Password from the Settings screen, you will need to enter your current Master Password.

The Master Password is encrypted and stored separately from the encrypted repository credentials. On Windows, the encrypted Master Password is stored in the Windows Registry, encrypted using the Windows Data Protection (DPAPI). On Linux, the encrypted Master Password is stored in the Home Directory of the User running Tasktop Integration Hub.

If desired, you can change or reset the Master Password from the 'Settings' page.

- **Change Master Password:** In order to change the Master Password, you must enter your current Master Password.
- **Reset:** If resetting the Master Password, you will not need to enter your current Master Password, but previously encrypted repository passwords will be lost, and must be provided after resetting.



## Import Artifact Pair Information

Importing artifact pairs allows Tasktop Integration Hub to know about existing artifact pairs that were created by Tasktop Sync. This prevents duplicate artifacts from being created when you switch from using Tasktop Sync to Tasktop Integration Hub to administer your integrations. Please contact Tasktop Support for additional information on how to use this capability.

## Storage Settings

Tasktop automatically stores operational data to a built-in database. However, for production environments, we **strongly recommend** that operational data is stored to an external database for improved maintainability. This will enable you to perform frequent back-ups without having to stop Tasktop Integration Hub, and ensure that your Tasktop Integration Hub practices are consistent with your existing disaster and recovery process.

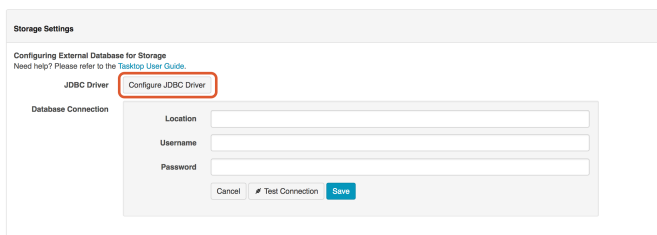
💡 Please see our [Hardware Requirements](#) to see which databases are supported for storing operational data.

### Migrating from the Internal Database to an External Database

To migrate your Tasktop operational data from the internal database to an external database, click the 'Use External Database' button.



Next, click 'Configure JDBC Driver' to select the JDBC driver for your database.



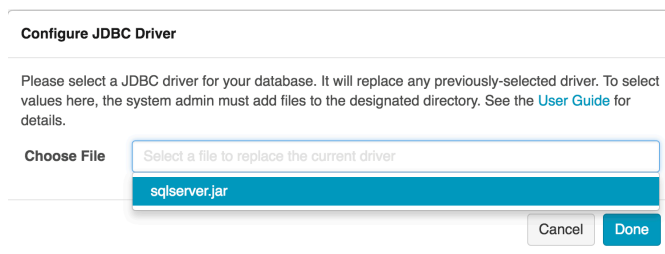
To download the JDBC driver:

- **Microsoft SQL Server:** The JDBC driver for Microsoft SQL Server can be downloaded from the [Microsoft support site](#).
  - Tasktop currently supports use of the 7.0.0.jre8 driver version.
- **MySQL Server:** The JDBC driver for MySQL can be downloaded from the [MySQL download site](#).
- **Oracle:** The JDBC driver for Oracle can be downloaded from the [Oracle support site](#). Note that it is best if the Oracle JDBC driver that is used matches the version of the Oracle server that you are connecting to.
- **PostgreSQL:** The JDBC driver for PostgreSQL can be downloaded from the [PostgreSQL download site](#).

To upload the JDBC driver to Tasktop, a system administrator (a user with file system access to the machine that hosts Tasktop) must add the files to the designated directory:

- On Windows, the default folder is `C:\ProgramData\Tasktop\jdbc-drivers`
- On Linux, the `jdbc-drivers` folder can be found in the Tasktop installation directory
- If needed, the user can change the location in which Tasktop looks for the files. This is done by changing the system property `jdbc.drivers.path`

Once the JDBC driver is uploaded, it can be selected from the 'Choose File' field on the Configure JDBC Driver pop-up.

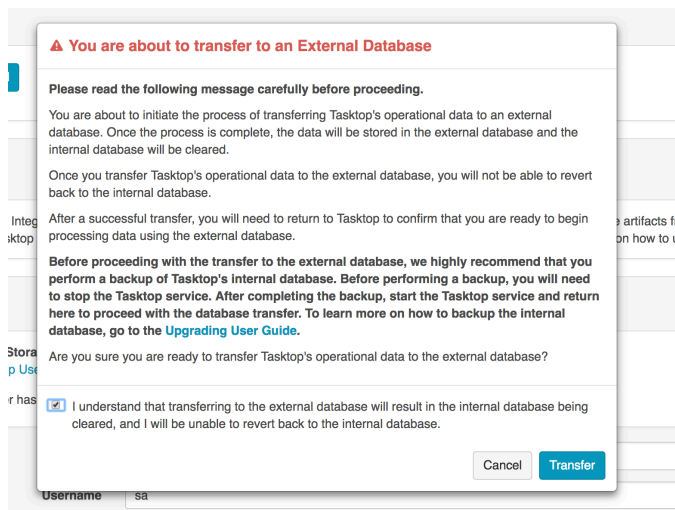


Next, fill out the Database Connection credentials.

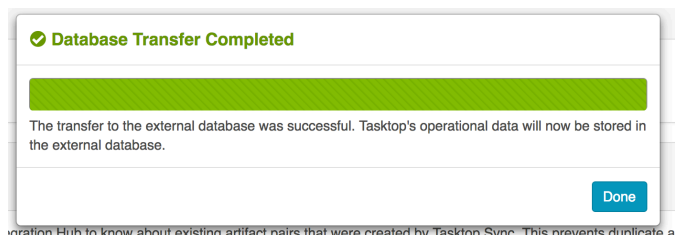
Authentication credentials must be in SQL server authentication mode (aka mixed-mode with SQL credentials). Windows authentication mode is not supported.

You can click 'Test Connection' to confirm that your credentials have been accepted by Tasktop. Once confirmed, click 'Save.'

You will see a warning message telling you that you are about to transfer to an External Database. Review the entire message, **ensuring that you have performed the recommended data backup**, and if approved select 'I understand... ' and then 'Transfer.'



You will get a 'Database Transfer Completed' message once the transfer is complete. You have now successfully transferred your operational data from Tasktop's internal database to your own external database.



## Migrating from an External Database to a Different External Database

**⚠** If you'd like to migrate your data from one external database to a different external database, please note that **you will need to manually transfer the data from the current database to the new target database**. If you do not manually transfer the data, Tasktop will not work properly once you switch to the target database settings. **Tasktop will not automatically transfer this data for you.**

However, if you are simply updating the location or credentials of your current external database and will continue using the same database, you do not need to transfer any data. Tasktop will continue to work properly.

Once you are ready to update the database information, simply update the Location, Username, and/or Password fields in the Database Connection section, click 'Test Connection,' and then 'Save.' Read the warning message that pops up, ensuring you have taken all necessary steps, and then click 'I understand...' and 'Save.'

## If your Database Transfer Fails or is Aborted

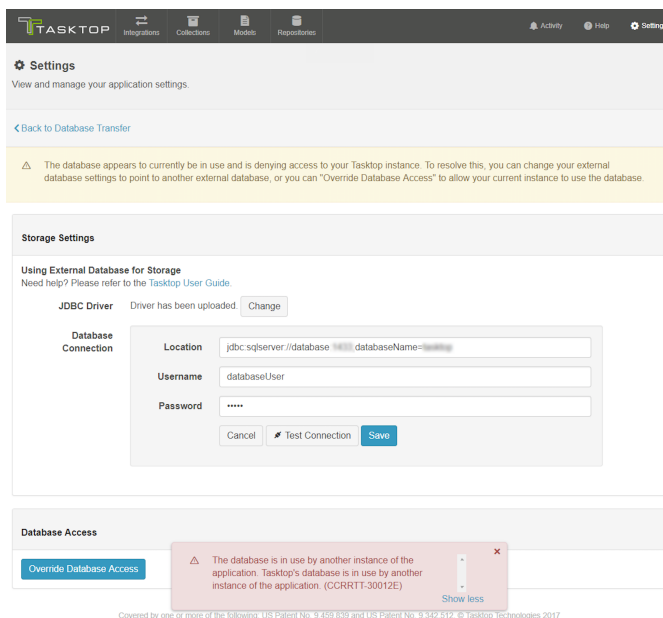
If your database transfer fails or is aborted, Tasktop will continue to use its internal database to store operational data. The internal database is not cleared until a successful transfer is completed, so you should not notice any change in performance.

However, we do recommend reviewing the external database and clearing any data and tables that were created as part of the failed data transfer before starting the transfer process again.

## Overriding Database Access

In order to prevent risk of collisions, duplicates, and other errors, Tasktop has functionality to ensure that multiple Tasktop instances are not able to run on the same operational database. If you connect your instance to a database that is already in use by Tasktop (note that this is not recommended), upon start-up of the new instance, the prior instance will lose database access and stop processing events. When you log on to the prior instance, you will see an error message prompting you to either update your credentials to connect to a different database, or to override database access. If you override database access, this means that the other instance of Tasktop will lose access to that database.

When overriding, be sure to confirm that no other Tasktop instance is using the database before moving forward. If another Tasktop instance is actively using the database, it is recommended that you shut down the other instance of Tasktop before proceeding.



## Extensions

### Introduction


Extensions add to Tasktop's built-in functionality to satisfy specific use cases, such as:

- Performing state transitions incorporating business logic
- Enabling custom data transformations between fields
- Defining person reconciliation strategies between repositories

- Transforming payloads sent to Gateway collections into a format Tasktop can accept

Extensions can be added to Tasktop by navigating to the 'Settings' screen, and selecting 'Manage Extensions.'

Extensions are created with a name and optional description so that they can be centrally managed and reused if needed.

 Note: fields that are not mapped to the model are not retrieved by Tasktop, and therefore are not available to be used in an extension. If fields are needed for scripting purposes, please [map](#) those fields to the [model](#).

## Extension Language

Extensions are written in JavaScript, or more specifically [ECMAScript](#).

## State Transitions

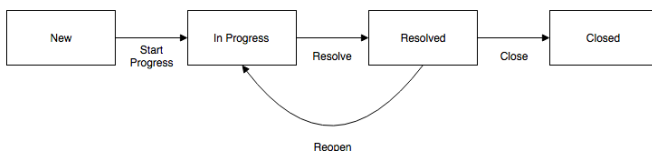
Artifact state transitions are used to transition an artifact from one status to another. To illustrate, we use the fictitious example of an artifact of type Defect with the following status values:

- New
- In Progress
- Resolved
- Closed

The status of a Defect cannot be modified directly. In this example, to move a defect from status "New" to "In Progress", the "Start Progress" transition is used.

Sometimes multiple status transitions are required. For example, to move a defect from "New" to "Closed", the following transitions are used in sequence "Start Progress", "Resolve", "Close".

The following diagram shows how state transitions are used to move a defect from one status to another:



## Configuring State Transitions with Extensions

To perform state transitions, an extension can be used. Add a state transition extension from the Extensions screen, accessible from [Settings](#). Once added, the extension can be applied from the [State Transition sash](#) on the Collection Configuration screen.

💡 Tasktop also provides functionality to configure state transitions using a transition graph. The transition graph is the recommended strategy, as it allows you to configure the state transitions directly within Tasktop's UI.

## Authoring State Transition Extensions

State transition extensions are defined by a single function:

```
function transitionArtifact(context,transitions)
```

The function can return a single transition. For a given artifact, the extension may be called multiple times. Each time the extension is called, the transition that it returns is performed. State transition extensions are called repeatedly until they return `undefined`, indicating that no more transitions are needed.

To prevent errors, extensions are not called again if they cause an artifact to transition to the same status more than once.

A simple state transition extension could look something like this:

```
function transitionArtifact(context,transitions) {  
  
    if (context.sourceArtifact.status === 'Resolved' && context.  
targetRepositoryArtifact.status !== 'Resolved') {  
        var transition = findTransitionWithLabel  
(transitions,'Resolve');  
        transition.attributes.resolution = 'Fixed';  
  
        return transition;  
  
    }  
  
}  
  
function findTransitionWithLabel(transitions, label) {  
  
    for each(var transition in transitions) {  
  
        if (transition.label === label) {  
  
            return transition;  
  
        }  
  
    }  
  
}  
  
}
```

Two parameters are passed to the `transitionArtifact` function:

- `context` - a context object that provides state that the extension can use to determine which transitions are needed
  - `context.sourceArtifact` - a JavaScript object representation of the source artifact, whose structure matches the model configured in the integration
  - `context.targetRepositoryArtifact` - a JavaScript object representation of the target artifact, whose structure matches the structure of the artifact in the repository
- `transitions` - an array of transition objects

Below is an example of a context with a target artifact from Jira:

```
{
  "sourceArtifact": {
    "summary": "a summary value",
    "priority": "Critical",
    "status": "Done"
  },
  "targetRepositoryArtifact": {
    "issuetype": "Bug",
    "components": null,
    "timespent": null,
    "formattedid": "TPC-144",
    "timeoriginalestimate": null,
    "project": "Test Project C",
    "description": null,
    "fixVersions": null,
    "resolution": null,
    "customfield_11500": null,
    "api-id": "JIRA",
    "attachment": null,
    "resolutiondate": null,
    "id": 14400,
    "summary": "a summary value",
    "watches": null,
    "created": "2016-09-23T15:22:20.000+0000",
    "$closed": false,
    "reporter": "****",
    "priority": "Critical",
    "labels": null,
    "revision": null,
    "customfield_11601": null,
    "customfield_11600": null,
    "customfield_11501": null,
    "environment": null,
    "customfield_11504": null,
    "customfield_11602": null,
    "timeestimate": null,
  }
}
```



```

    "versions": null,
    "duedate": null,
    "web-links": null,
    "location": "http://jira.example.com/browse/TPC-144",
    "assignee": null,
    "worklog": null,
    "updated": "2016-09-23T15:22:20.000+0000",
    "status": "To Do"
  }
}

```

Each transition object in the array appears as follows:

```

{
  id: 'an-id',
  label: 'A Label'
  attributes: {
    first-attribute: null,
    ...
  }
}

```

For example, transitions corresponding to the Jira artifact example above are as follows:

```

[ {
  "attributes": {
    "project": "Test Project C",
    "issuetype": "Bug"
  },
  "id": "11",
  "label": "To Do"
}, {
  "attributes": {
    "project": "Test Project C",
    "issuetype": "Bug"
  },
  "id": "21",
  "label": "In Progress"
}, {
  "attributes": {
    "project": "Test Project C",
    "issuetype": "Bug"
  },
  "id": "31",
  "label": "Done"
} ]

```

Attributes of a transition are values that may be set when performing the transition. Attributes should not be set unless needed or required.

The available attributes and whether or not they are required will vary depending on the type of repository of the collection.

## Payload Transformations

[Gateway collections](#) can accept a JSON payload via HTTP, enabling clients to use a REST API to publish artifacts in Tasktop.

Without further configuration, Gateway Collections require a JSON payload that matches the model of the collection.

By configuring a Gateway Collection with an extension, it is possible to accept arbitrarily complex JSON payloads, enabling integration with third party products that integrate with webhooks.

Examples of such third party webhook notifiers include:

- the [Jenkins Notification Plugin](#)
- Microsoft VisualStudio [Web Hooks](#)
- GitHub [Webhooks](#)

### Configuring Gateway Collections with Extensions

To configure a Gateway Collection with an Extension, add a payload transformation extension from the Extensions screen, accessible from Settings. Once added, the extension can be referenced from the [Gateway Collection](#) screen.

### Authoring Payload Transformation Extensions

Payload transformation extensions are defined by a single function:

```
function transformPayload(payload)
```

The function must return an array of 0 or more JSON objects matching the model of the gateway collection.

Given a model representing build jobs with the following fields:

- `created` - a date signifying the creation date
- `summary` - a brief one-line description
- `status` - a single-select indicating the build status

a simple payload transformation extension could look something like this:

```

function transformPayload(payload) {
    var createdTimestamp = new Date(payload.build.completion_time).
toISOString();
    var created = createdTimestamp.substring(0,createdTimestamp.indexOf
('T'));
    return [
        {
            'created': created,
            'summary': payload.name + ': '+payload.build.full_url,
            'status': payload.status
        }
    ];
}

```

The example above corresponds to the payload provided by the Jenkins Notification plugin, which provides JSON payloads as follows:

```

{
    "name": "Robot Lawnmower",
    "url": "job/Robot%20Lawnmower/",
    "build":
    {
        "full_url": "http://build.example.com:8081/job/Robot%
20Lawnmower/4/",
        "number": 4.0,
        "phase": "COMPLETED",
        "status": "FAILURE",
        "url": "job/Robot%20Lawnmower/4/",
        "scm":
        {
        },
        "causes":
        [
            "Started by user admin"
        ],
        "duration_string": "9 ms",
        "completion_time": 1.476313762942E12,
        "failing_since_build":
        {
            "full_url": "http://build.example.com:8081
/job/Robot%20Lawnmower/1/",
            "number": 1.0,
            "change_set":
            [
            ],
            "completion_time": 1.47631304791E12,

```

```
        "failing_since_time": "11 min"
    }
}
}
```

### Ignoring Webhook Payloads

For cases where the gateway collection is called and no corresponding action should be performed, the extension should return a 0-length array:

```
function transformPayload(payload) {
    ...

    if (nothingToDo) {
        return [];
    }
    ...
}
```

### Creating Multiple Artifacts From A Single Webhook Payload

There may be cases when multiple artifacts should be created from a single webhook payload depending on the use case. For example, a [GitHub PushEvent](#) can contain multiple commits. To link each commit to an artifact separately, a payload transformation extension would be used as follows:

```
function transformPayload(payload) {
    var gatewayPayloads = [];
    for each (var commit in payload.commits) {
        gatewayPayloads.push(createCommitPayload(commit));
    }
    return gatewayPayloads;
}
```

## Custom Data Transformations

In cases where specialized value transformations are needed for use in field mappings, such transformations can be added as custom data transformation extensions.

### Creating a Custom Data Transformation Extension

Custom data transformation extensions are created from the Extensions screen, accessible from [Settings](#). Created extensions can be selected when configuring a [field mapping](#) of a collection.

Custom data transformation extensions appear as follows:

```
var inputTypes = 'String';
var outputTypes = 'String';

function transform(context, input) {
    // returns the transformation result
}
```

All custom data transformation extensions must declare their input and output types as shown in the example above. Transformations are only available for a field mapping if the input types and output types match the fields selected in the mapping. In the case of a mapping with multiple source and target fields, the order of the declared input and output types must match the order of the source and target fields.

A simple split-and-trim value custom data transformation extension could look like this:

```
var inputTypes = 'String';
var outputTypes = ['String', 'String'];

function transform(context, input) {
    if (input) {
        var values = input.split('/');
        if (values.length !== 2) {
            throw 'Unexpected value ' + input;
        }
        return values.map(function(s) {
            return s.trim();
        });
    }
}
```

### Single Select and Multi Select in Custom Data Transformation Extensions

Single Select and Multi Select values are specified using their labels. Extensions that accept a Single Select as the input type will receive a string containing the option's label. Extensions that specify a Single Select as the output type should return a string containing the option's label. To specify the empty option, return `undefined` from the extensions instead of a value. Extensions that accept a Multi Select as the input type will receive an array of strings of the option labels. Extensions that specify a Multi Select as the output type should return an array of strings with the option labels or an empty array to specify no options.

### Rich Text Support in Custom Data Transformation Extensions

To perform Rich Text transformations, 'Rich Text' must be declared as input or output types of the extension.

A Rich Text input parameter is passed as a valid HTML string.

For Rich Text as output type, the extension is expected to return a valid HTML string.

To escape HTML characters, the following function is provided:

```
html.escape(string)
```

A simple String-to-Rich-Text value transformation could look like this:

```
var inputTypes = 'String';
var outputTypes = 'Rich Text';

function transform(context, input) {
  if (input) {
    return '<pre>' + html.escape(input) + '</pre>';
  }
}
```

## Web Links in Custom Data Transformation Extensions

To perform a web links transformation, web links must be declared as the input or output types of the extension. A web links field consists of a list of web link objects. A web link object consists of a location and other attributes.

The following is an example of a web link output:

```
[
  {
    label: 'Tasktop',
    location: 'http://www.tasktop.com'
  },
  {
    location: 'http://www.alt-tasktop.com'
  }
]
```

The label attribute is optional and if specified will be used to populate the label of the web link.

## Relationships in Custom Data Transformation Extensions

Tasktop provides a JavaScript API for working with relationship fields. This API is able to retrieve, search and get associated artifacts for artifacts.

## Artifact Service API Reference

Artifacts returned from the Artifact API are the raw JSON representation of a Repository's Artifact. These representations may include internal IDs and other fields not mapped to the model. It may be necessary to manually interpret the results of these calls on a per-repository basis to determine the exact information that is returned.

- `artifacts.retrieveArtifact(relationship):Artifact` - retrieves the artifact for the provided relationship
- `artifacts.listSearchTypes():SearchType[]` - lists the valid search types for the targeted repository
- `artifacts.getSearchDefinition(searchTypeId):SearchDefinition` - returns an object with the parameters that are required for the given search type id
- `artifacts.search(searchType, searchDefinition):Artifact[]` - searches the target repository with the given search type id and search definition, returns a list of matching artifacts
- `artifacts.getFormattedIdSearchDefinition():SearchDefinition` - returns an object with the parameters that are required for a formatted-id search
- `artifacts.searchByFormattedId(searchDefinition):Artifact[]` - searches by formatted id with the provided search definition, returns a list of matching artifacts
- `artifacts.toContainer(relationship, summary):Container` - converts a relationship into a container, summary is optional
- `artifacts.toRelationship(container):Relationship` - converts a container into a relationship
- `artifacts.getAssociatedRelationship(relationship):Relationship` - finds the associated relationship for the given relationship. When mapping from model to collection the input value and source artifact relationship field values are from the source repository and must be converted to their associated value to be used in the target system. An exception is thrown if no artifact is found or multiple artifacts are found.
- `artifacts.getAssociatedContainer(container):Container` - finds the associated container for the given container. When mapping from model to collection the input value and source artifact container link field values are from the source repository and must be converted to their associated value to be used in the target system. An exception is thrown if no artifact is found or multiple artifacts are found.

A sample relationship transformation extension:

```
var inputTypes = 'Relationship';
var outputTypes = 'Relationship';

function transform(context, input) {
    if (input) {
        return findParentFolder(context.sourceArtifact);
    }
    return null;
}

function findParentFolder(artifact) {
    var parent = artifacts.retrieveArtifact(artifact['parent']);
```

```

    if (parent['subtype'] === 'Folder') {
        return artifact['parent'];
    } else if (parent['subtype'] === null) {
        return null;
    }
    return findParentFolder(parent);
}

```

Looking at the above extension, we find the parent artifact and if that artifact is a folder we return that as the parent.

```

var inputTypes = 'Relationship';
var outputTypes = 'Relationship';

function transform(context, input) {
    var searchDefinition = artifacts.
getFormattedIdSearchDefinition();

    searchDefinition['formatted-id'] = 'TPA-42';
    var results = artifacts.searchByFormattedId
(searchDefinition);
    if (results[0]) {
        return results[0];
    }
    return null;
}

```

The above extensions uses the formatted id search to find the correct artifact for the link.

The following extension uses a custom search to determine a relationship:

```

var inputTypes = 'Relationship';
var outputTypes = 'Relationship';

function transform(context, input) {
    var searchType = getCustomSearchType();
    var searchDefinition = artifacts.getSearchDefinition
(searchType);

    searchDefinition['domain'] = 'DEFAULT';
    searchDefinition['project'] = 'My Project';
    searchDefinition['summary'] = context.sourceArtifact.summary;
    var results = artifacts.search(searchType, searchDefinition);
    if (results[0]) {
        return results[0];
    }
    return null;
}

```



```

}

function getCustomSearchType() {
    var searchTypes = artifacts.listSearchTypes();
    for (var i=0; i<searchTypes.length; i++) {
        if (searchTypes[i] === 'My Custom Search') {
            return searchTypes[i];
        }
    }
    return i;
}

```

Note that the returned search results are limited to a maximum of 1024 entries.

### Containers and Relationships

A 'Container' can be used as input and output type in a Custom Data Transformation extension. Tasktop provides a JavaScript API for working with container fields.

The following two functions are provided to handle containers:

```
artifacts.toRelationship(container)
```

```
artifacts.toContainer(relationship[, summary])
```

All container objects provide a `summary` property.

- `.toContainer(relationship[, summary])` converts a relationship object into a container. The summary is provided as a String and is optional. If no summary is provided, the summary of the related artifact is used. An exception is thrown if the artifact or the summary field of the artifact cannot be found.
- `.toRelationship(container)` converts a container into a relationship object to use with the `artifacts.retrieveArtifact(relationship)` API or return as result of the extension.

The following extension finds the first parent folder and returns that as the parent container.

```

var inputTypes = 'Relationship';
var outputTypes = 'Container';

function transform(context, input) {
    if (input) {
        var parentRelationship = findParentFolder(context.
sourceArtifact);
        return artifacts.toContainer(parentRelationship);
    }
}

```

```

        return null;
    }

    function findParentFolder(artifact){
        var parent = artifacts.retrieveArtifact(artifact['parent']);
        if (parent['subtype'] === 'Folder') {
            return artifact['parent'];
        } else if (parent['subtype'] === null) {
            return null;
        }
        return findParentFolder(parent);
    }
}

```

The next extension retrieves the parent of our parent container field and returns it as relationship.

```

var inputTypes = 'Container';
var outputTypes = 'Relationship';

function transform(context, input) {
    if (input) {
        var parentRelationship = artifacts.toRelationship
(input);
        var parentArtifact = artifacts.retrieveArtifact
(parentRelationship);
        var container = parentArtifact['parent'];
        return artifacts.toRelationship(container);
    }
    return null;
}
}

```

Note that only containers based on artifacts are supported.

## Person Reconciliation

Integrations that create or update artifacts often need to deal with differences between the representation of persons in different systems.

Tasktop comes with a default person reconciliation strategy ("Copy with Default Matching"), which matches based on name, ID, and/or e-mail.

More specifically, the algorithm will compare the metadata from each side as follows:

- Username from source to username on target
- Username from source to ID on target
- ID from source to username on target
- ID from source to ID on target

- Email from source to email from target

Note that 'ID' in the steps above refers to what we refer to as the 'default' in the [Connector Docs](#).

This strategy should cover most use cases. However, if needed, you can also configure a custom Person Reconciliation Extension to match 'person' fields from one repository to another.

### Configuring Person Reconciliation with Extensions

A person reconciliation extension can be created from the Extensions screen, accessible from [Settings](#). Created extensions are selected in the [Person Reconciliation](#) section of the Collection screen. In most cases it makes sense to have one extension per repository, since each repository will have different requirements for mapping persons to and from the repository. Person reconciliation extensions apply to all person fields of an artifact, including person fields in comments and attachments.

### Authoring Person Reconciliation Extensions

Person reconciliation extensions are defined by two functions:

```
mapPersonFromRepository(repositoryPerson, unresolvedPerson)
```

```
mapPersonToRepository(modelPerson)
```

Both functions are expected to return a string value corresponding to the user id of the person. Returning `undefined` sets the person field to empty. In the case where a user cannot be mapped and having the field empty is not an option, throw an exception as follows:

```
if (noMatchFoundCondition) {  
    throw 'some descriptive message';  
}
```

Such errors will cause processing of an artifact to result in an error with error code CCRRTT-17011E which will display under the Activity screen.

#### `mapPersonFromRepository(repositoryPerson, unresolvedPerson)`

`mapPersonFromRepository` is used to create a model representation of a person from a repository representation of a person, which occurs whenever a person is copied from a repository artifact to a model artifact. The return value of this function is used as the id of the person in the model artifact.

Two parameters are passed to the `mapPersonFromRepository` function:

- `repositoryPerson` - an object representing the person corresponding to the repository representation

- `unresolvedPerson` – this parameter contains whatever information may be available about the person from the repository. It contains information only if `repositoryPerson` does not.

An example `repositoryPerson` from Jira looks like:

```
{
  "person-id": "userA",
  "person-email": "userA@test.tasktop.com",
  "person-display-name": "User A",
  "active": true
}
```

An example `unresolvedPerson` from Jira might look like:

```
{
  "person-id": "userA",
  "person-email": "userA@test.tasktop.com"
}
```

#### `mapPersonToRepository(modelPerson)`

`mapPersonToRepository` is used to create a repository representation of a person from a model representation of a person, which occurs whenever a person is copied from a model artifact to a repository artifact. The return value of this function is used to lookup the corresponding person in the repository.

A single parameter is passed to the `mapPersonToRepository` function:

- `modelPerson` an object representing the person corresponding to the model representation

A `modelPerson` always has the following properties:

```
{
  "id": "userId",
  "display-name": "Jane Smith"
}
```

Note that `display-name` could be empty.

#### Simple Person Reconciliation Example

A simple person reconciliation mapping extension could look like this:

---

```

function mapPersonFromRepository(repositoryPerson, unresolvedPerson)
{
    if (unresolvedPerson && unresolvedPerson['user-id'].match(
/\^user\.\d\/)) {
        return unresolvedPerson['user-id'];
    }
    if (!repositoryPerson || repositoryPerson['person-email'] ===
'buildserver@mycompany.com') {
        return undefined;
    }
    var mapping = {
        'user1@mycompany.com': 'user.1',
        'user2@mycompany.com': 'user.2'
    };
    var result = mapping[repositoryPerson['person-email']];
    if (!result) {
        throw 'no person found with email='+repositoryPerson['person-
email'];
    }
    return result;
}

```

The SimplePersonReconciliation script is a simple script which makes use of dictionary concept in Javascript (<http://pietschsoft.com/post/2015/09/05/JavaScript-Basics-How-to-create-a-Dictionary-with-Key-Value-pairs>) to map key and values.

#### **Scenario 1: Using E-mail**

Consider an example where Repository 1 has email john.s@email.com and Repository 2 has email john.smith@email.com and the display names and ID's don't match. Assume that the integration has one-way person flow from Repository 1 (john.s@email.com) to Repository 2 (john.smith@email.com).

In that case, we would edit the var mapping on the mapPersonToRepository() function so that the incoming value checks the dictionary (key) and returns a valid email (value) for the repository.

In this example, we would edit the var mapping = { 'john.s@email.com' : 'john.smith@email.com' } in the mapPersonToRepository() function.

If the integration has two-way person flow, we must also edit the mapPersonFromRepository() function. The mapPersonFromRepository() function will show the e-mail addresses in the opposite order - i.e. var mapping = { 'john.smith@email.com' : 'john.s@mail.com' }. For two-way integrations, the person reconciliation extension must be added to both the source collection and the target collection.

#### **Scenario 2: Using ID**

If the source repository does not provide an e-mail, we can use the Simple Person Reconciliation script above to match person ID to person e-mail.

For example, if Repository 1 has user id "JohnSmith" and the matching user in Repository 2 is "john.smith@email.com," then we should edit the script at `var mapping = { JohnSmith: 'john.smith@email.com' }`.

If the integration has two-way person flow, we will also need to edit the `mapPersonFromRepository()` as outlined in Scenario 1. We must also remember to edit the extension in `var result as modelPerson[person-id]` for scenarios where we are using ID instead of e-mail. The edit must be done on both the `mapPersonFromRepository()` and `mapPersonToRepository()` functions.

### Person Reconciliation Extension Javascript API

Tasktop provides a JavaScript API for working with persons in a person reconciliation extension. This API includes two functions:

- `persons.listPersonSearchFields():Object\` allows for the discovery of the searchable fields on a person. Not all fields from a person are searchable and vary between connectors.
- `persons.searchPerson(fieldId, fieldValue):Person\` is used to search for person in a repository. This person can then be used to return the correct id for a user in a repository. `persons.searchPerson(fieldId, fieldValue)` will find exactly one person and will throw `aPersonNotFoundException` if no match is found or `TooManyPersonsFoundException` if more than one person is found. These exceptions can be caught and handled by the extension.

Artifacts returned from the Artifact API are the raw JSON representation of a Repository's Artifact. These representations may include internal IDs and other fields not mapped to the model. It may be necessary to manually interpret the results of these calls on a per-repository basis to determine the exact information that is returned.

Below is a person reconciliation extension that will take the id of a model person, retrieve the user by username and return the exact id from the repository. This is helpful for systems where the person's id is a number or some other non-human readable value.

```
function mapPersonFromRepository(repositoryPerson, unresolvedPerson)
{
    return repositoryPerson['Username'];
}

function mapPersonToRepository(modelPerson) {
    // persons.listPersonSearchFields(); determines the fields
    usable by .searchPerson(...)
    var repositoryPerson = persons.searchPerson('Username',
    modelPerson['id']);
    return repositoryPerson['ID'];
}
```

### SearchPerson Example Script

Below is an example SearchPerson script. `Persons.searchperson (fieldId, fieldValue)` is used to search for a person in a repository using the two parameters: `fieldId` and `fieldValue`. This person can then be used to return the matching ID of a user in that repository. `Persons.searchPerson(fieldId, fieldValue)` will find exactly one person and will throw a `PersonNotFoundException` if no match is found or `TooManyPersonsFoundException` if more than one person is found. These exceptions can be caught and handled by the extension. `searchPerson()` is a native Tasktop call, which means it is functionality that is unique to Tasktop .

```
function mapPersonFromRepository(repositoryPerson) {
    ...
}

function mapPersonToRepository(modelPerson) {
    if (!modelPerson){
        console.log('incoming model person is empty')
        return undefined
    }

    console.log('modelPerson = ' + modelPerson['id']);

    var repoPerson = persons.searchPerson('person-username',
modelPerson['id']);

    console.log('repoPerson = ' + repoPerson['id']);
    return repoPerson['id'];
}
```

#### Scenario 1: Mismatched E-mails

Consider an example where Repository 1 has email `john.s@email.com` and Repository 2 has email `john.smith@email.com`. The `persons.searchPerson(fieldId, fieldValue)` can be used to search the repository for matching person values.

Assume that the integration has one-way person flow from Repository 1 (`john.s@email.com`) to Repository 2 (`john.smith@email.com`). In this case, the `mapPersonToRepository()` function should be edited and the incoming values matched by ID. A search persons call based on incoming username is made and then the matching user object is retrieved.

#### Scenario 2: Returning a Default ID as a Value

```
function mapPersonFromRepository(repositoryPerson) {
    return repositoryPerson['email'];
}

function mapPersonToRepository(modelPerson) {
    var defaultUserId = 'SOMEVALUEHERE'
```

```

        console.log(persons.listSearchFields())
        try{
            var person = persons.searchPerson('email',
modelPerson.id);
            if(person != null) {
                return person['person-username'];
            }
        } catch(e){
            console.log(e)
        }
        console.log('Falling back to default person')
        return defaultUserId
    }

```

The above script allows us to search for persons in the repository based on an incoming e-mail value. In cases where a corresponding person is not found in the repository, Tasktop will return the defaultUserId. To return a default user ID, assign a default value (a user id) to the var defaultUserId.

#### PersonListSearchFields

Persons.listPersonSearchFields() allows for the discovery of the searchable fields on a person. Not all fields from a person are searchable and vary between connectors.

```

function mapPersonFromRepository(repositoryPerson) {
    return repositoryPerson['email'];
}

function mapPersonToRepository(modelPerson) {
    console.log(JSON.stringify(persons.
listPersonSearchFields()))
    var person = persons.searchPerson('person-email',
modelPerson.id);
    return person['person-id'];
}

```

For example, when using the above Person Reconciliation script/extension on the Jira side in a Jira-Microfocus (HPE) integration, the console.log(JSON.stringify(persons.listPersonSearchFields())) line will give you a list of the searchable fields.

In our demo, we got the following values:

```

Person listSearch Fields: ["person-username", "person-email", "person-
id", "person-display-name"]

```



You can then use one of those available values as part of the `persons.searchPerson()` script. In the example scripts shown above, we make use of `person-id`.

## Using LDAP or Active Directory

LDAP (Lightweight Directory Access Protocol) and Active Directory can be used to lookup information required to map persons from one system to another. Tasktop provides a JavaScript API for accessing LDAP and Active Directory as follows:

```
function mapPersonToRepository(modelPerson) {
    ldap.connect('ldap://subdomain.mycompany.com', 'cn=admin,
dc=example,dc=mycompany,dc=com', 'mypassword');
    var results = ldap.search('dc=example,dc=mycompany,dc=com',
'cn='+ldap.escape(modelPerson['id']))
    if (results.length == 0) {
        throw 'no person found with id='+modelPerson['id'];
    }
    return results[0]['sn'];
}
```

Looking at the example above, three steps are involved:

1. establishing a connection
2. looking up the appropriate entries using a search
3. returning a value from the search results

The same approach is used for both LDAP and Active Directory.

The Tasktop JavaScript LDAP API is described as follows:

- `ldap` - the globally-visible object providing the LDAP API
- `ldap.connect(connectionUrl, principal, password):void` - a means of establishing a connection with a connection URL, user principal and password
- `ldap.search(base, query, fields):Map[]` - a means of searching providing a base name of the context to search, a search query, and an optional list of fields to provide in the search results
- `ldap.escape(value):String` - a means of escaping string literals to use in LDAP search queries or distinguished names

There is no need to close an LDAP connection; LDAP connections are managed implicitly by Tasktop.

Artifacts returned from the Artifact API are the raw JSON representation of a Repository's Artifact. These representations may include internal IDs and other fields not mapped to the model. It may be necessary to manually interpret the results of these calls on a per-repository basis to determine the exact information that is returned.

## Accessing Web Resources

Extensions may access resources using HTTP. For example, extensions may access a REST API which could provide data necessary for the extension.

Tasktop provides a fluent JavaScript API for making HTTP requests, inspired by the Java 9 HTTP client API. The API is used as follows:

```
var response = httpClient.request()
    .uri('http://example.com/my/rest/api')
    .parameter('first-param', 'first-value')
    .parameter('second-param', 'second-value')
    .header('my-special-header', 'header-value')
    .GET().response()

if (response.statusCode() == 200) {
    var responseJson = JSON.parse(response.content());
    // do something with response data
}
```

### HTTP Client API Reference

- `httpClient` - the globally-visible object providing the HTTP client API
- `httpClient.request():RequestBuilder` - provides a `RequestBuilder` object
- `RequestBuilder.uri(uriString):RequestBuilder` - specifies the URI of the request
- `RequestBuilder.parameter(key,value):RequestBuilder` - adds a query parameter to the request with the given key and value
- `RequestBuilder.header(key,value):RequestBuilder` - adds an HTTP header value to the request with the given key and value
- `RequestBuilder.GET():Request` - creates a `Request` object for an HTTP GET request
- `Request.response():Response` - creates a `Response` object with the result of the HTTP request
- `Response.statusCode():int` - provides the HTTP status code of the response
- `Response.content():String` - provides the body of the HTTP response as a string
- `Response.headers():Map` - provides the HTTP response headers as a JavaScript object with property names corresponding to HTTP header names, and values as arrays of values of the corresponding HTTP header

Artifacts returned from the Artifact API are the raw JSON representation of a Repository's Artifact. These representations may include internal IDs and other fields not mapped to the model. It may be necessary to manually interpret the results of these calls on a per-repository basis to determine the exact information that is returned.

Example extension `Response.headers()` return value:

```
{
    "Transfer-Encoding": [
```

```
        "chunked"
    ],
    "Server": [
        "Jetty(9.2.13.v20150730)"
    ],
    "Vary": [
        "Accept-Encoding, User-Agent"
    ],
    "Content-Type": [
        "application/json;charset=UTF-8"
    ]
}
```

## Causing Extensions to Complete With An Error

There are occasions where extensions should complete with an error. In such cases, simply use the JavaScript `throw` keyword as follows:

```
if (somethingUnexpected) throw 'some descriptive message'
```

Such errors will cause processing of an artifact to result in an error with error code CCRRTT-17011E which will display on the Activity screen.

## Troubleshooting Extensions

Extension troubleshooting usually involves trial and error. To make the troubleshooting process easier, a global logging function is exposed as follows:

```
console.log(message)
```

`console.log` takes a single argument which is converted to a string.

For example:

```
function transitionArtifact(context,transitions) {
    if (someUnexpectedCondition) {
        console.log('source artifact: '+JSON.stringify(context.
sourceArtifact));
        console.log('target artifact: '+JSON.stringify(context.
targetRepositoryArtifact));
        console.log('transitions: '+JSON.stringify(transitions));
        throw 'message describing that something bad happened';
    }
}
```

The output of `console.log` goes to the Tasktop log file at `logs/extensions.log`

## Extensions and State

Extensions should not rely on declared variables to retain state between invocations. Doing so is not supported and has undefined behavior.

For example:

```
// this is not supported:
```

```
var myGlobalState = // some state

function someFunction() {
  if (myGlobalState == someValue) {
    ...
  }
}
```

## Accessing Object Properties

There are two ways to access object properties:

### Dot notation

You can use the dot notation if the property name only contains alpha-numeric and characters that are allowed in JavaScript variables such as '\$' or '\_'.

For example:

```
person.email
```

### Bracket notation

You must use the bracket notation if the property name contains characters that are not allowed in JavaScript variables such as a hyphen.

For example:

```
person['id']
```

## Resources

## Help and Support

To learn more about Tasktop, see [our website](#)

For help, contact us at the [Tasktop Support Center](#).






## Feedback and Ideas






Have a suggestion or an idea for the product? Please contact us at [feedback@tasktop.com](mailto:feedback@tasktop.com).

# Supported Repository Versions

## Tasktop 18.4 (October 23, 2018)

 If you are interested in extended support, please reach out to your [Tasktop contact](#).

	Repository	General Support (Tasktop 18.4)	 Available for Extended Support (Tasktop 18.4)
 Jira Core	Atlassian Jira Core	7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.12  Current On Demand (Cloud) Version	6.4, 7.0, 7.1
 Jira Software	Atlassian Jira Software	7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.12  Current On Demand (Cloud) Version	6.4, 7.0, 7.1
 Jira Service Desk	Atlassian Jira Service Desk	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10	
	Blueprint	7.0, 7.1, 7.2, 7.3, 7.4, 8.0, 8.1, 8.2, 8.3, 9.0, 9.1  Current On Demand (Cloud) Version	

	Blueprint Storyteller	1.0, 1.1, 2.0, 2.1, 2.2, 2.3, 2.4, 3.0, 3.1  Current On Demand (Cloud) Version	
	BMC Remedy	9.0, 9.1.00 Hotfix, 9.1.02 Patch 002 and higher	8.1.01, 8.1.02
	CA Agile Central (Rally)	2014.1, 2014.2, 2014.3, 2015.1, 2015.2, 2016.1, 2017.1, 2018.1  Current On Demand (Cloud) Version	
	CA PPM	14.4, 15.1, 15.2, 15.3, 15.4, 15.4.1, 15.5  Current On Demand (Cloud) Version	
	codeBeamer ALM	8.2, 9.0, 9.1, 9.2	
	GitHub Issues	Enterprise 11.10.343, 2.3 and higher,  Current On Demand (Cloud) Version	
	GitLab Issues	Enterprise and Community Edition: 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 11.0, 11.1, 11.2, 11.3	
	IBM Rational ClearQuest	9.0, 9.0.1	
	IBM Rational DOORS	9.4, 9.5, 9.5.2, 9.6, 9.6.1	
	IBM Rational DOORS Next Generation (IBM	5.0, 5.0.1, 5.0.2, 6.0, 6.0.1, 6.0.2, 6.0.3 iFix	



RRC)	005 and later, 6.0.4, 6.0.5, 6.0.6	
IBM Rational Quality Manager	5.0, 5.0.1, 5.0.2, 6.0, 6.0.1, 6.0.2, 6.0.3, 6.0.4, 6.0.5, 6.0.6	
IBM Rational RequisitePro	N/A  <i>*Note: IBM Rational RequisitePro has been EOL'd by IBM. Tasktop is in the process of deprecating this connector, and will remove it from all Tasktop versions by October 2019.</i>	7.1.0, 7.1.2, 7.1.3, 7.1.4
IBM Rational Team Concert	5.0, 5.0.1, 5.0.2, 6.0, 6.0.1, 6.0.2, 6.0.3, 6.0.4, 6.0.5, 6.0.6	




iRise	Current On Demand (Cloud) Version	
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Jama	8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.11, 8.12, 8.13, 8.14, 8.15, 8.16, 8.17, 8.18, 8.19, 8.20, 8.21, 8.22, 8.23, 8.24, 8.25  Current On Demand (Cloud) Version	2015.5
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Micro Focus ALM Octane (HPE)	12.53 (inclusive only of 12.53.20 and higher), 12.55, 12.60.4  Current On Demand (Cloud) Version	
Micro Focus ALM / QC (HPE)	12.2, 12.5, 12.53, 12.55, 12.60  SaaS 14.00 (Patch 0)	11.5 (SP2), 12 (SP1)

	Micro Focus PPM (HPE)	9.30, 9.31, 9.32, 9.4, 9.41, 9.42	
	Dimensions RM (Serena)	12.1.1, 12.2, 12.2.1, 12.3, 12.4, 12.4.1, 12.5	
	Solutions Business Manager (Serena)	10.1.3, 10.1.4, 10.1.4.1, 10.1.5, 10.1.5.1, 10.1.5.2, 11.0, 11.0.1.1, 11.1, 11.2, 11.3	10.1.2
	Microsoft Project Server	2013 SP1, 2016*, Project Online*  *Please note limitations in <a href="#">Connecto r Documentation</a>	
	Microsoft SharePoint	2013 SP1, 2016, Sharepoint Online	
	Microsoft Team Foundation Server	2013, 2013.2, 2013.3, 2013.4, 2015, 2015.1, 2015.2, 2015.3, 2017, 2017.1, 2017.2, 2017.3, 2017.3.1 2018, 2018.1, 2018.2, 2018.3  Current On Demand (Cloud) Version	2012, 2012.1, 2012.2, 2012.3, 2012.4
	Microsoft Test Manager	Client Based Application accessing any supported version of Microsoft Team Foundation Server	
	Azure DevOps (Microsoft Visual Studio Team Services)	Current On Demand (Cloud) Version	
Modern Requirements4TFS	Modern Requirements4TFS		



		Plug-in for all supported Microsoft TFS and VSTS versions	
	Mozilla Bugzilla	5.0, 5.0.1, 5.0.2, 5.0.3, 5.0.4	
	Pivotal Tracker	Current On Demand (Cloud) Version	
	Planview Enterprise	14, 15	11.3, 13
	Planview LeanKit	Current On Demand (Cloud) Version	
	Polarion ALM	2014, 2014 SR1, 2014 SR2, 2014 SR3, 2015, 2015 SR1, 2015 SR2, 2015 SR3, 2016, 2016 SR1, 2016 SR2, 2016 SR3, 17, 17.1, 17.2, 17.3  Current On Demand (Cloud) Version	
	PTC Integrity Lifecycle Manager	10.8, 10.9, 11.0, 11.1, 11.2	
	QASymphony qTest Manager	8.1.5, 8.4.4, 8.7.3, 9.0  Current On Demand (Cloud) Version	
	Salesforce: Sales Cloud, Service Cloud, Marketing Cloud	Current On Demand (Cloud) Version	
	ServiceNow:  IT Service Management,	Jakarta On Demand, Kingston On Demand, London On Demand	

	IT Business Management (Agile Development/SDLC, PPM)		
	ServiceNow Express	Current On Demand (Cloud) Version	
	SmartBear QAComplete	11.2, 11.3, 11.4, 11.5, 11.6, 11.7 (for versions 11.7.1990 and later), 11.8  Current On Demand (Cloud) Version	
	Sparx Systems Pro Cloud Server	2.0, 2.1.18, 2.1.19	
	Targetprocess	Current On Demand (Cloud) Version	
	Thoughtworks Mingle	18.1  Current On Demand (Cloud) Version	13.1, 13.2, 13.3, 13.4, 14.1, 14.2, 15.1, 15.2, 16.1, 16.2
	Trello	Current On Demand (Cloud) Version - Business Class Edition	
	Tricentis Tosca	10.1, 10.2, 10.3, 11.0, 11.1, 11.2, 11.3	9.2, 9.3, 10.0
	VersionOne	Enterprise and Ultimate: 17.3 (Fall 2017), 18.0 (Winter 2018), 18.1 (Spring 2018), 18.2 (Summer 2018)  Current On Demand (Cloud) Version	
	Whitehat Sentinel	Current On Demand (Cloud) Version	

	Zendesk	Current On Demand (Cloud) Version	
	Zephyr for Jira	3.2.1, 3.2.2, 3.3, 3.3.2, 3.4	