



ChangePoint 2022

Hardware Recommendations

September 30, 2022

Revision: 2.0

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Revision history

1.0 [Jan 28, 2022]	For a very large implementations, added reference to SQL Server Always On for ChangePoint and split Cognos Dispatcher and Content Manager and multiple Cognos Dispatcher for IBM Cognos installation Increased minimum Cognos AppTier CPU to 4 cores from 2 cores Updated RAID configuration of Transaction Log drive of very large implementation to RAID 10.
2.0 [Sept 22, 2022]	Updated ChangePoint product name and document formatting.

What's new for ChangePoint 2022

IBM Cognos Analytics 11.2.1 IF3 is being released with ChangePoint 2022. Refer to Cognos Analytics Implementation section below for the recommended hardware requirements specific to Cognos Analytics 11.2.1.

In general, ChangePoint 2022 hardware recommendations are the same as ChangePoint 2021.

Introduction

This document provides hardware recommendations based on sizing requirements for typical customer installations. The hardware guidelines were determined by analyzing over 60 customer implementations for a one-year period and subsequent internal performance testing. While these guidelines are relevant for any environment, we strongly recommend that you follow these guidelines for your production environment.

Because hardware requirements are influenced by telecommunications and network infrastructure and the distribution of users, we recommend that you work with your IT staff to develop an appropriate hardware recommendation for your environment.

Assumptions

The hardware sizing recommendations are based on a typical customer installation with a mixture of the following user profiles for users who perform distinct sets of business transactions:

- Resource: ChangePoint user that enters and submits time, views and updates requests, and creates expense entries.
- Support Analyst: Creates and updates requests and navigates request workflow.
- Project Manager: Creates and updates projects and tasks. Modifies task assignments using Project Worksheet.
- Finance Manager: Creates and updates contracts and budgets, approves time entries and invoices.
- Relationship Manager: Creates and updates opportunities and activities.
- Resource Manager: Creates and updates resource requests and assigns resources using Resource Planner.
- Administration: Creates and updates customers, contacts, and invoices.

Each of the user profiles and their corresponding business transactions puts load on the system differently due to the difference in the level of complexity of the logic being executed for each business transaction. By performance testing these user profiles in various hardware configurations, the resource cost of each user profile was determined.

All configurations presented in this document are recommended for installations of ChangePoint 2022.

- We recommend that no other business applications be run on the ChangePoint server.
- The recommendations are based on hardware dedicated to a single production or production-like ChangePoint instance.
- Due to different network configurations found at customer sites, the illustrated topologies are suggested guidelines.
- The scope of this document does not include clustering, fail-over, multi-server replication, and backup strategies.
- The actual hard-drive space required may vary from the recommendation. Variables that affect the space required include volume of data, projected data growth, etc.

Variables

During the tests that resulted in the recommended configurations, care was taken to duplicate real-life network conditions and typical user scenarios. However, situations may arise that could enhance (or degrade) perceived solution performance. These include:

- Client workstation configuration
- Customer LAN integrity/quality
- Customer router network integrity/quality
- Patterns of client database usage
- Types of client activity
- Customer ChangePoint topology (site distribution, WAN bandwidth, etc.)

General recommendations

The following best practices will minimize bottlenecks and contribute to optimal performance:

- Place the log files on a separate I/O channel (LUN) – suggest RAID 10 array.

- Place the database index files on a separate I/O channel (LUN) – suggest RAID 10 array.
- Place the tempDB database on a separate I/O channel (LUN) – suggest RAID 0 array.
- Do not place the tempDB database and operating system pagefile.sys on the same I/O channel.
- Use multiple tempDB data files. The number of data files should match the number of processor cores on the database server and the sizes of the data files must be identical and have the same growth factor.
- SQL Server requires sufficient memory to operate optimally. However, over allocating memory can lead to insufficient memory left for OS and other services. When configuring the SQL Server, do not use the default value for “maximum server memory (in MB)” setting in the SQL Server properties. Instead, choose the maximum server memory value that will leave OS and other services with enough memory to minimize swapping. In general, a minimum of 1GB up to 4GB should be left for non-SQL Server use.
- Virtualization using VMWare is supported with ChangePoint 2022. However, ensure that the virtualized ChangePoint environment has sufficient resources (CPU, memory, I/O bandwidth and throughput) allocated for optimal performance. For a large or high transaction volume deployment, the recommendation is to limit the deployment of virtualization to the web servers only.
- For VMWare virtualization, ESX 5 or higher is recommended for greater virtual vCPU support, improved I/O performance, and reduced virtualization overhead.
- When virtualizing the Web Application Tier, do not oversubscribe the environment. Maintain a 1:1 ratio between the physical and virtual resources.
- When virtualizing the web tier, better performance will be achieved by having a single virtual host with more vCPU than multiple virtual hosts with less vCPU. Larger virtual hosts reduce the OS overhead.
- For Cognos Analytics implementations, IBM supports virtualization of hardware with IBM software. Customers can leverage virtualization strategies for IBM Cognos Analytics that is used with ChangePoint as per the IBM Cognos VMWare Configuration Recommendations (<https://www-01.ibm.com/support/docview.wss?uid=swg21425494>).

Installations of 150 named users ¹

When implementing a ChangePoint installation of 150 users or less, a single server can be configured to host IIS and the Redis cache service, alongside a dedicated SQL Server.

There is no architectural redundancy built into this solution. Intra-server fail-over capacity is limited to RAID configurations, power supply and NIC redundancy strategies.

ChangePoint Web Server/Windows Server

- Minimum 2 Processor Cores – 3.0GHz
- Minimum 4 GB DRAM memory
- Storage: RAID 1 (2 drives, Mirrored) for Operating System
- Bandwidth: 1000 Mbps NIC
- Required File System: NTFS
- See the *ChangePoint Software Compatibility Matrix* for required software.

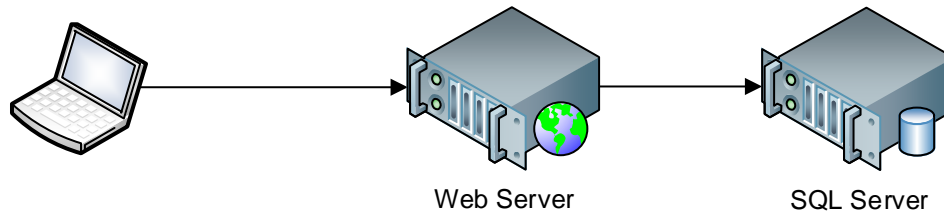
ChangePoint SQL Server

- Minimum 2 Processor Cores – 3.0GHz
- Minimum 8 GB DRAM memory
- Storage:
 - RAID 1 (2 drives, Mirrored) for Operating System
 - RAID 10 (4 drives, Stripe of mirrors) for SQL Database files
- Bandwidth: 1000 Mbps NIC
- See the *ChangePoint 2022 Software Compatibility Matrix* for required software.

¹ A *named user* represents a single user that is defined in the application and does not represent the number of users using the application concurrently. Hardware configurations recommended within this document assume a 20% concurrency model, where a maximum 20% of the named users may access the system concurrently.

Recommendations for installations of 151 – 500 named users

Solution Architecture



For ChangePoint implementations between 151 and 500 users, a single server can be configured to host IIS and the Redis cache service, alongside a dedicated SQL Server.

As with the 150 named user configuration, there is no inherent architectural redundancy, except for the RAID configurations, power supply and NIC redundancy strategies.

Web Server

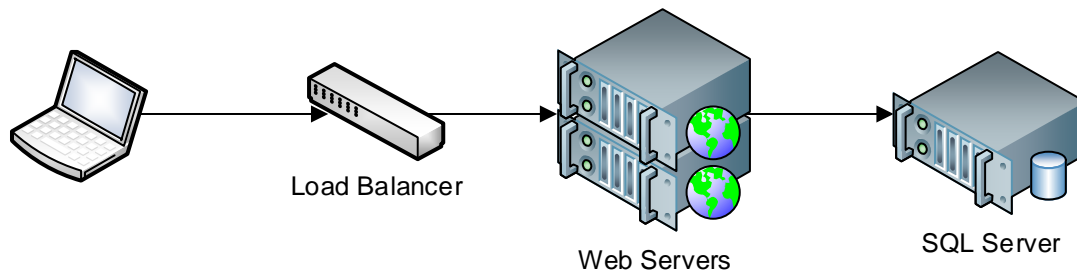
- Minimum 2 Processor Cores – 3.0 GHz
- Minimum 4 GB DRAM
- Storage: RAID 1 (2 drives, mirrored) for operating System
- Bandwidth: one 1000 Mbps NIC
- See the *ChangePoint 2022 Software Compatibility Matrix* for required software.

SQL Server

- Minimum 4 Processor Cores – 3.0 GHz
- Minimum 16 GB DRAM
- Storage:
 - RAID 1 (2 drives, mirrored) for operating system
 - RAID 10 (4 drives, Stripe of mirrors) for SQL database files
- RAID 0 (2 drives, stripe set) for TEMPDB
- RAID 1 (2 drives, Mirrored) for SQL database transaction log files
- Bandwidth: one 1000 Mbps NIC
- See the *ChangePoint 2022 Software Compatibility Matrix* for required software.

Recommendations for installations of 501+ named users

Solution Architecture



A multiple web server implementation is recommended for installations that have over 500 users.

Comprising multiple web servers and a dedicated SQL server, this solution can be scaled well beyond 500 users with the introduction of a load balancer and additional web servers to balance performance.

Redundancy for this configuration comes from the load balanced web servers, the RAID configurations, power supply and NIC redundancy strategies.

Hardware requirements are influenced by telecommunications infrastructure, distribution of users, and network infrastructure. For implementations of more than 1000 users, Planview will work with your IT staff to develop an appropriate hardware recommendation and deployment strategies, including the use of SQL server Always On architecture to deploy multiple SQL server instances for scalability.

Web Servers

- Minimum 4 processor cores – 3.0GHz
- Minimum 8 processor cores – 3.0GHz in very large configurations (> 5,000 named users)
- Minimum 4 GB DRAM
- Storage: RAID 1 (2 drives, mirrored) for operating system
- Bandwidth: one 1000 Mbps NIC
- See the ChangePoint 2022 Software Compatibility Matrix for required software.

SQL Server

- Minimum 4 processor cores – 3.0 GHz
- Minimum 24 GB DRAM

- Minimum 8 processor cores – 3.0 GHz in very large configurations (> 5,000 named users)
- Minimum 32 GB may be required in very large configurations (> 5,000 named users)
- Storage:
 - RAID 1 (2 drives, mirrored) for operating system, including operating system page file
 - RAID 10 (6 drives, stripe of mirrors) for SQL database files
 - RAID 0 (2 drives, striped set) for TEMPDB
 - RAID 10 (6 drives, Stripe of mirrors) for SQL database transaction log files
- Bandwidth: one 1000 Mbps NIC
- See the ChangePoint 2022 Software Compatibility Matrix for required software.

Redis cache service

Redis is an open source (BSD licensed), in-memory data structure store, used as a database, cache and message broker. Redis also supports master-slave asynchronous replication and optionally provides high availability via Redis Sentinel.

Redis is a mandatory component that must be installed and configured. For details, see the “Installing and Configuring Redis” chapter of the *ChangePoint 2022 Installation Guide*.

General Recommendations for Redis Cache Service

Memory consideration

Redis is an in-memory object cache service. Therefore, its effectiveness is purely constrained by the amount of memory it has available for use. For its use with ChangePoint, our recommendation is that a minimum of 2 GB of DRAM be allocated to the Redis cache service. For instructions on configuring the Redis cache, see the “Installing and Configuring Redis” chapter of the *ChangePoint 2022 Installation Guide*.

After the initial configuration, based on the cache usage statistics, physical memory and cache size may need to be adjusted for optimal end-user and server performance.

Non-dedicated host

It is recommended (and is the default for installation) that the Redis service be co-hosted with IIS on the web servers.

Clustering and high availability

To provide higher availability, the Redis cache provides the ability to create a cluster that can be distributed across multiple servers to provide a single, unified cache system. To implement a cache cluster, Redis Sentinel must be configured with at least three Redis cache services.

Workstation hardware requirements

Client-side workstation hardware requirements may vary based on the usage of ChangePoint. Activities that perform large data calculations and interactions on the client-side may require additional hardware for best performance.

For the minimum software requirements, see the *ChangePoint 2022 Software Compatibility Matrix*.

Workstation hardware requirements

Recommended:

- Processor: Dual Core – 2 GHz 32-bit (x86)
- Memory: 4 GB
- Hard disk space: 2 GB available
- Monitor resolution: 1920 x 1080 (normal size 96 DPI)

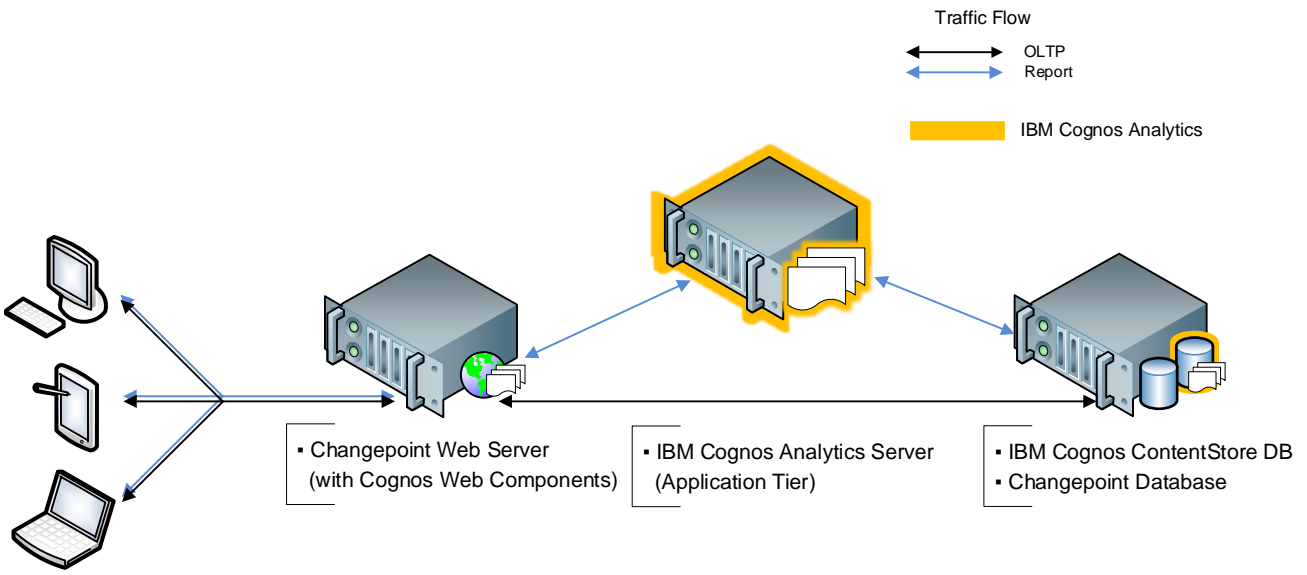
Changepoint Analytics implementations

ChangePoint provides an integrated IBM Cognos Analytics solution. To enable this functionality, additional server hardware is required.

High level architecture

Regardless of the size of customer implementation, the Cognos Analytics Reporting capabilities require the following deployment:

- Web Server – In each ChangePoint website instance, Cognos Web Components must be installed to connect with IBM Cognos.
- Application Server – additional server is required
 - IBM Cognos Reporting Server (Application Tier)
- Database Server – will be installed by default on the ChangePoint DB Server
 - IBM Cognos ContentStore DB



ChangePoint 2022 includes Cognos Analytics 11.2.1 IF3 as part of the ChangePoint solution. Cognos Analytics architecture and Deployment strategies such as those noted above can be found on the IBM website (<https://www.ibm.com/docs/en/cognos-analytics/11.2.0?topic=security-deployment>).

For more information, see the “Installing and configuring Cognos Analytics” section of the *ChangePoint 2022 Installation Guide*.

Requirements for ChangePoint Analytics configuration

All software and operating systems supported by IBM Cognos Analytics is available on the IBM website: <https://www.ibm.com/support/pages/node/6440667>.

There are specific requirements and dependencies for the ChangePoint hardware configurations; therefore, the Web Server and Database server must follow the ChangePoint certified Operating System configuration.

Certification information for the supported components is documented in the *ChangePoint 2022 Software Compatibility Matrix* and is the reference to use for installation and configuration.

Note: The figures below represent the nominal amount of processor cores and memory necessary to support the projected throughput in Cognos Analytics.

Recommendations for production environments of up to 150 named users

Web server

No additional hardware is required for the ChangePoint Web Server.

Application server

- IBM Cognos Reporting Server (Application Tier)
 - Minimum 4 processor core
 - RAM - 32 GB (64-bit OS)

Database server

- No additional hardware is required for the ChangePoint SQL server that hosts the Cognos ContentStore database.

Recommendations for production environments of 151-500 named users

Web server

- No additional hardware is required for the ChangePoint web Server.

Application server

- IBM Cognos Reporting Server (Application Tier) – new server requirement
 - Minimum 4 processor Cores
 - RAM - 48 GB (64-bit OS)

Database server

- No additional hardware is required for the ChangePoint SQL server that hosts the IBM Cognos ContentStore database.

Recommendations for production environments of 500+ named users

For an installation of more than 500 users, the minimum starting requirements are listed below. It is strongly recommended that high-level capacity planning be performed with Planview to ensure that the hardware is sized and configured appropriately.

For implementations of more than 1000 users or a very large reporting requirement, Planview will work with your IT staff to develop the appropriate hardware recommendations and distributed Application Tier implementation, which includes separating the Cognos Dispatcher and Content Manager and setting up multiple Cognos Dispatchers for load balancing.

Web server

- No additional hardware is required for the ChangePoint web server.

Application server

- IBM Cognos Reporting Server (Application Tier) – new server requirement
 - Minimum 8 processor cores
 - RAM - 48 GB (64-bit OS)

Database server

- No additional hardware is required for the ChangePoint SQL Server that hosts the IBM Cognos ContentStore database.

Recommendations for non-production environments

These are guidelines for configuring smaller environments for testing non-production scenarios. These specifications are not certified and are not supported for production environments.

Web server

- Follow the recommendations for the ChangePoint web server.

Application server

- IBM Cognos Reporting Server (Application Tier) – new server requirement
 - Minimum 4 Processor Core
 - RAM - 16 GB (64-bit OS)

Database server

Follow the recommendations for the ChangePoint SQL server.