Performance Management Advisors Hardware Sizing Guide

Pulse Advisors Current

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Genesys Pulse Advisors Hardware Sizing Guide

This document provides recommendations for hardware sizing for typical contact center scenarios.

The information in this guide is provided, based on the assumption that you have read and are familiar with Pulse Advisors components, features, deployment procedures, and software prerequisites that are described in the *Genesys Pulse Advisors Deployment Guide*.

Important

Starting with release 9.0, the name of the Performance Management Advisors family of products changes to Pulse Advisors. In this document, references to the product suite continue to use Performance Management Advisors when discussing software release 8.5.2 and older releases. In this document, any reference made to an Advisors document that is specific to Advisors release 8.5.2 or earlier, or to a document that was discontinued before release 9.0, continues to use the Performance Management Advisors product name in the document title. Other, more general references use the new product name in document titles.

For more information about terminology and concepts used in this document, see:

- *Genesys Pulse Advisors Deployment Guide*
- *Genesys Pulse Advisors Frontline Advisor Administration User's Guide*
- *Genesys Pulse Advisors Contact Center Advisor and Workforce Advisor Administrator User's Guide*

All of the preceding documents are available on the Pulse Advisors (formerly Performance Management Advisors) documentation page.

Performance Considerations

A key performance measurement is the number of concurrent dashboard users (that is, the load-carrying capacity) on a specific deployment architecture. The hardware requirements of the different products within the suite depend on a number of factors that impact this performance measurement.

Summary

This section provides general information about the factors that affect the performance of the Advisors components.

Factors Impacting Performance of Advisors Components

Product	Hierarchy Complexity	Statistics	Base Objects	Filters	Agents	Rules	Call Volume	Metric Graphing
CCAdv/ WA	X	X	X	X	X			X
FAAA	X				X	X		
AGA		X	X		X		X	
ACA					X		X	

Keeping all of these considerations in mind, the information is organized according to the size of the contact center as a function of the number of base objects being monitored and the number of calls that are flowing through the platform on a daily basis.

Performance Considerations by Component

This section provides information about the factors that affect the performance of each Advisors component:

- Contact Center Advisor and Workforce Advisor
- Frontline Advisor and Agent Advisor
- Advisors Genesys Adapter
- Advisors Cisco Adapter

Contact Center Advisor and Workforce Advisor

The performance of Contact Center Advisor (CCAdv) and Workforce Advisor (WA) are not tied directly to the number of calls handled by the underlying platform(s). Instead, their performance depends on the complexity of the configured hierarchy and the number of statistics handled. The number of

underlying base objects (queues, agent groups, and agents) that are being monitored, and their relationships to each other, determine the performance of these applications. This is further complicated when you use filters to segment the data for a given base object.

The following table shows the default number of statistics that are requested by the Advisors Genesys Adapter (AGA) for each type of base object (if the base objects are not segmented by filters) when CCAdv and WA are deployed on a Genesys platform. Note the following:

- These are the numbers of statistics that are requested by default (out-of-box). Additional statistics can be enabled for a specific deployment. There might be fewer default metrics in later releases because, with improvements to the Metrics Manager, you can create more custom metrics that better reflect the needs of your enterprise.

- WA contact group metrics are not counted in this type of stat server load sizing.

CCAdv/WA Source Metrics

Release	Agent Group Voice	Agent Group Multimedia	Application Voice	Application Multimedia	Agent
8.1.5	24	50	41	35	3
8.5.0	39	29	49	16	3
8.5.1	39	37	50	23	3

Frontline Advisor and Agent Advisor

> ### Important
> Agent Advisor is discontinued starting with Advisors release 8.5.2. The Frontline Advisor application continues to be available.

The performance of Frontline Advisor (FA) and Agent Advisor (AA) are not tied directly to the number of calls handled by the underlying platform(s). Instead, their performance depends on the number of agents that are being monitored, the number of rules that have been activated for each agent, and the depth of the organizational hierarchy.

The following table shows the default number of statistics that are requested by the Advisors Genesys Adapter (AGA) when FA is deployed on a Genesys platform. Note the following:

- These are the numbers of statistics that are requested by default (out-of-box). Additional statistics can be enabled for a specific deployment. There might be fewer default metrics in later releases because, with improvements to the Metrics Manager, you can create more custom metrics that better reflect the needs of your enterprise.

- FA rule metrics are not enabled out-of-box; if you enable rule metrics, then you can have up to 12.

- The count of Agent Performance voice and multimedia source metrics in the following table reflect one time profile enabled out-of-box. If you enable additional FA time profiles, performance and rule metrics are multiplied by the number of enabled time profiles to get the total number.

FA Source Metrics

Release	Agent State	Agent Performance Voice	Agent Performance Multimedia
8.1.5	5	19	16
8.5.0	6	19	14
8.5.1	6	20	22

Advisors Genesys Adapter

The performance of the Advisors Genesys Adapter (AGA) depends mostly on the number of statistics it is handling and the number of base objects (queues, agent groups, and agents) configured in the Configuration Server. In releases earlier than 8.5.1, the AGA extracts these objects from the Configuration Server on start-up and stores them in its memory, therefore, a large configuration requires the AGA be allocated extensive amounts of memory.

The default value for the AGA maximum heap space size is 1 GB. Consider increasing this size for the larger deployments.

The number of statistics that the AGA is handling depends on the set of selected base objects and whether the AGA is serving CCAdv/WA or FAAA. (Note that a single instance of AGA cannot serve both CCAdv and FA.)

The performance of the AGA also partly depends on the call volume since the number of T-Events being generated in the Platform drives the number of updates being sent from the Stat Server to the AGA.

Advisors Cisco Adapter

The performance of the Advisors Cisco Adapter (ACA) depends on both the call volume and the number of agents that are being monitored. ACA is designed to work only with FA/AA, hence the number of base objects being monitored in CCAdv has no effect on ACA. The ACA works off the call records retrieved from the underlying Cisco HDS database. The more calls going through the Platform, the more records the ACA must process to extract the statistics required by FAAA.

General Guidelines for Contact Center Sizing

The following table shows the contact center sizing categories based on the number of base objects being monitored and the daily call volume.

Contact Center Sizing Categories

Sizing Category	Number of Agents	Number of Agent Groups	Number of Queues	Daily Call Volume
Small	Fewer than 500	Fewer than 50	Fewer than 50	Of the order of tens of thousands
Medium	Fewer than 5000	Fewer than 400	Fewer than 1000	Up to 500,000
Large	Fewer than 30,000	Fewer than 1000	Fewer than 8000	Up to 4 million

Example Configurations for Contact Centers based on Size

The following are examples of possible configurations based on contact center size. You can use these examples as general guidelines when deploying the full Advisors suite, particularly for Advisors releases prior to 8.1.5. The examples are based on servers running Windows operating systems, but – starting with Advisors release 8.5.0 – you can deploy Advisors components on Red Hat Enterprise Linux 5. See the Pulse Advisors page in the *Genesys Supported Operating Environment Reference Guide* for a list of supported operating systems.

See also "Capacity, Measurement, and Sample Architecture" in this guide, which provides performance information from tested environments running Advisors release 8.1.5 software. The "Capacity, Measurement, and Sample Architecture" section discusses each Advisors component separately (Contact Center Advisor (CCAdv), Workforce Advisor (WA), and Frontline Advisor (FA)) and provides specific deployment architectures for each to successfully achieve 1500 concurrent dashboard users.

In the configurations listed below, Frontline Advisor and Agent Advisor (FAAA) running on a Cisco platform using the Advisors Cisco Adapter (ACA) has not been shown. If you have a Cisco environment and wish to use FAAA, a separate instance of FAAA needs to be installed along with an instance of the ACA. Hence, the hardware requirements shown in this section for FA and the Advisors Genesys Adapter (AGA) for FA will need to be duplicated.

> ### Important
> Agent Advisor and the Contact Center Advisor–Mobile Edition applications are mentioned in the tables on this page. Be aware that both are discontinued starting with Advisors release 8.5.2.

Small Contact Center Size

The following table shows an example of the architecture for a small-sized Contact Center. In this architecture, there is no separate server for the Web tier. Apache is deployed on one of the servers hosting the applications.

Small Contact Center

Server Number	Application Component(s)	Processor(s)	Memory	Hard Drive Space
1	Advisors Platform, Contact Center Advisor XML Generator, and Advisors Web services (including Resource Management Console)	Quad-core 2.0 GHz+	4 GB	10 GB
2	Contact Center Advisor–Mobile Edition	Dual-core 2.0 GHz+	4 GB	5 GB
3	Apache, Advisors Platform, Frontline Advisor, and Advisors Genesys Adapter	Quad-core 2.0 GHz+	4 GB	10 GB
4	Databases	Dual Quad-core 2.0 GHz+	4 GB+	30 GB
5	Supervisor Desktop Service (for Resource Management Console)	Quad-core 2.0 GHz+	4 GB+	10 GB

Medium Contact Center Size

The following table shows an example of the architecture for a medium-sized Contact Center. In this architecture, you separate the major application, database, and Apache installations.

Medium Contact Center

Server Number	Application Component(s)	Processor(s)	Memory	Hard Drive Space
1	Apache Web Server	Dual-core 1.86 GHz+	512+ MB	5 GB
2	Advisors Platform and Advisors Web services (including Resource Management	Dual Quad-core 2.0 GHz+	4 GB	10 GB

Server Number	Application Component(s)	Processor(s)	Memory	Hard Drive Space
	Console)			
3	Advisors Platform and Workforce Advisor	Dual Quad-core 2.0 GHz+	4 GB	10 GB
4	Contact Center Advisor XML Generator	Dual Quad-core 2.0 GHz+	4 GB	10 GB
5	Contact Center Advisor–Mobile Edition	Dual-core 2.0 GHz+	2 GB	5 GB
6	Advisors Genesys Adapter (for Contact Center Advisor) and Advisors Genesys Adapter (for Frontline Advisor)	Dual Quad-core 2.0 GHz+	4 GB	10 GB
7	Advisors Platform and Frontline Advisor	Dual Quad-core 2.0 GHz+	4 GB	10 GB
8	Databases	Dual Quad-core 2.0 GHz+	4 GB+	50 GB
9	Supervisor Desktop Service (for Resource Management Console)	Quad-core 2.0 GHz+	6 GB+	10 GB

Large Contact Center Size

The following table shows an example of the architecture for a large-sized Contact Center.

Large Contact Center

Server Number	Application Component(s)	Processor(s)	Memory	Hard Drive Space
1	Apache Web Server	Dual-core 1.86 GHz+	8 GB	5 GB
2	Advisors Platform and Advisors Web services (including Resource Management Console)	Dual Quad-core 2.83 GHz+	16 GB	20 GB
3	Advisors Platform and Workforce Advisor	Dual Quad-core 2.83 GHz+	16 GB	20 GB
4	Contact Center	Dual Quad-core	16 GB	20 GB

Server Number	Application Component(s)	Processor(s)	Memory	Hard Drive Space
	Advisor XML Generator	2.83 GHz+		
5	Contact Center Advisor–Mobile Edition	Dual-core 2.0 GHz+	4 GB	5 GB
6	Advisors Genesys Adapter (for Contact Center Advisor)	Dual Quad-core 2.83 GHz+	16 GB	20 GB
7	Advisors Genesys Adapter (for Frontline Advisor)	Dual Quad-core 2.83 GHz+	16 GB	20 GB
8	Advisors Platform and Frontline Advisor	Dual Quad-core 2.83 GHz+	16 GB	10 GB
9	Databases	Dual Quad-core 3.0 GHz+	32 GB	80 GB
10	Supervisor Desktop Service (for Resource Management Console)	Quad-core 3.0 GHz+	8 GB+	10 GB

Memory Allocation Recommendations

When an Advisors server records out-of-memory errors in its log file, consider changing the memory allocation for the server. Monitor the errors and, if the problem with memory persists, experiment with higher values. After you change the memory allocation, continue to monitor the server and the log file to ensure that you have configured acceptable values. For example, the Advisors server might fail to start if you set the memory allocation too high because the memory requested from the operating system is simply not available. The server will report an error in the log file if it cannot start because the requested memory is unavailable.

Genesys recommends the following values as the *maximum* memory setting values for the CATALINA_OPTS and JAVA_OPTS variables:

- Small Contact Center: 4 000

- Medium Contact Center: 8 000

- Large Contact Center: 12 000

For additional information, see Change Memory Allocation in the *Genesys Pulse Advisors Deployment Guide*.

Considerations for Stat Server Sizing

The processing part of the Stat Server application is single-threaded; therefore, Genesys recommends that you allocate one complete core on a server to each Stat Server application, without any other processes also using that core.

On a multi-core server machine, you can install more than one Stat Server application, but not more than the number of cores. Genesys recommends that you allow one extra core for the operating system activities. You can install additional components on the same multi-core machine only if additional cores and additional resources are available. Allow at least 2 GB of memory for each deployed Stat Server.

Advisors Genesys Adapter Performance Information

The following performance results were achieved with Advisors Genesys Adapter software release 8.5.1. To avoid AGA performance issues, both the statistics load and maximum message rate must be below the thresholds described in the following table. See Determining Message Rates and Estimating the Number of Requested Statistics for Frontline Advisor for more information.

AGA Performance Information

Advisors Application	Configuration	Message Rate	Stats Load	Notes and Recommendations
Contact Center Advisor	One AGA and one Stat Server	Maximum message rate under 70 000 messages/second Average message rate under 18 000 messages/second	AGA can process up to 1 200 000 statistics without performance degradation. To generate 1 200 000 statistics, Genesys used the following configuration during testing: • Three time profiles enabled • FA hierarchy: 11 320 agents	If your statistics load is more than 1 200 000, then add one more Stat Server. If your maximum message rate exceeds 70 000 messages/second, then add one more AGA.
Contact Center Advisor	One AGA and two Stat Servers	Maximum message rate under 45 000 messages/second Average message rate under 6500 messages/second	AGA can process up to 891 000 statistics without performance degradation. To generate 891 000 statistics, Genesys used the following configuration during testing: • Agent monitoring: On • Number of queues: 550 (with 3 time profiles) • Number of agent groups: 25 396	If your statistics load is more than 891 000, then add one more AGA. If your maximum message rate exceeds 45 000 messages/second, then add one more AGA.

Advisors Application	Configuration	Message Rate	Stats Load	Notes and Recommendations
Frontline Advisor	One AGA and one Stat Server	Maximum message rate under 70 000 messages/second Average message rate under 18 000 messages/second	AGA can process up to 1 200 000 statistics without performance degradation. To generate 1 200 000 statistics, Genesys used the following configuration during testing: • Three time profiles enabled • FA hierarchy: 11 320 agents	If your statistics load is more than 1 200 000, then add one more Stat Server. If your maximum message rate exceeds 70 000 messages/second, then add one more AGA.
Frontline Advisor	One AGA and two Stat Servers	Maximum message rate under 70 000 messages/second Average message rate under 18 000 messages/second	AGA can process up to 1 450 000 statistics without performance degradation. To generate 1 450 000 statistics, Genesys used the following configuration during testing: • Three time profiles enabled • FA hierarchy: 13 680 agents	If your statistics load is more than 1 450 000, then add one more AGA. If your maximum message rate exceeds 70 000 messages/second, then add one more AGA.

Determining Message Rates

It is important to know how many messages arrive per second at the AGA from Stat Server to ensure you have a sufficient number of adapters deployed to handle the load. Use the following procedure to determine the message rates for your AGA.

Procedure: Calculating the message rates

Steps

1. Locate your log4j.properties file in the <AGA installation>\conf folder.

2. Change the log4j.logger.timing log entry to:
   ```
   log4j.logger.timing=debug, timingLog
   ```

3. Check for new entries in the timing.log file. You should see the following type of entries:
   ```
   ... DEBUG timing - For object type: XXXX received xxxx messages from SS:xxx
   ...
   ```

4. Wait until AGA accumulates sufficient data, and then you can determine the maximum number of messages received per second from Stat Server. You can also calculate the average number of messages received per second from Stat Server.

Estimating the Number of Requested Statistics for Frontline Advisor

You can evaluate the number of statistics requested for each agent in Frontline Advisor. When you have an estimate of the number of requested statistics, you can also estimate the following:

- the number of Stat Servers to deploy

- the FA statistics load on each Stat Server

The number of statistics requested for Frontline Advisor depends on the following:

- the number of time profiles currently enabled

- the number of report metrics currently enabled, including all dependencies that are not enabled

- the number of agents currently logged on

Initially, estimate the load based on the enabled default metrics, or based on the metrics that are enabled in the migrated environment. If you change the number of enabled metrics after Advisors installation or migration, or if you make changes to time profiles, then use the same process to re-evaluate the load.

If necessary, you can do a post-installation adjustment of the Stat Server configuration to achieve optimal performance for your enterprise. See the *Genesys Pulse Advisors Deployment Guide* for information about Advisors Stat Server configuration.

Procedure: Estimating the number of statistics requested for each agent in Frontline Advisor

Steps

1. Use the following queries to determine the number of statistics requested for each agent in Frontline Advisor:

   ```
   SELECT COUNT ( * ) "Perf. metrics" from fa_vw_performance_source;

   SELECT COUNT ( * ) "Metrics for rules p/agent" from fa_vw_rule_source;

   SELECT COUNT ( * ) "State metrics p/agent" from fa_vw_state_source;
   ```

   The first query (SELECT COUNT (*) "Perf. metrics" from fa_vw_performance_source;) provides the number of performance metrics. The second query (SELECT COUNT (*) "Metrics for rules p/agent" from fa_vw_rule_source;) provides the number of rules metrics. The third query (SELECT COUNT (*) "State metrics p/agent" from fa_vw_state_source;) provides the number of state metrics.

2. Use the following calculation to estimate the overall, real-time number of statistics that will be sent to the configured Stat Servers:

   *<Number of statistics obtained from running the queries> * <Average number of agents typically logged on to the system>*

Next Steps

You can use the following query to find the number of performance metrics, grouped by time profile (this shows you how many raw metrics will be requested from Stat Server):

1. ```
   SELECT COUNT ( * ) "Perf. metrics p/tprofile",type "Time Profile Type",
   interval "Time Profile Interval" from fa_vw_performance_source group by
   type,interval;
   ```

Apache Tuning Tips

There are some useful Apache tuning tips available at http://www.devside.net/articles/apache-performance-tuning.

XML Generator Compression Options for Apache

Depending on the complexity of your Contact Center Advisor (CCAdv) hierarchy, enabling Apache compression of XML files might be necessary to improve performance. Genesys Professional Services can advise you on the need for such compression in your enterprise. If required, use the following procedure.

Procedure: Apache compression for XML files

Purpose: To enable compression of XML files to reduce payload size and download times for the CCAdv dashboard updates.

Steps

In the `httpd.conf` file of each Apache server installation (the `httpd.conf` file is located in the `conf` folder of the Apache Web Server installation), do the following:

1. Make sure that the following line is not commented out (that is, the line must not have the # preceding it):
        LoadModule deflate_module modules/mod_deflate.so

2. Deflate (compress) only the files associated with the ca-xml context root by specifying the /ca-xml/ location after the ProxyPass statement. See the Example.

Example

Add the following section after the `/ca-xml/` ProxyPass statement to enable Apache compression of the XML files:

```
<Location "/ca-xml/">
    SetOutputFilter DEFLATE
</Location>
```

For example:

```
ProxyPass /ca-xml/ ajp://host:8009/ca-xml/
<Location "/ca-xml/">
    SetOutputFilter DEFLATE
</Location>
```

Recommendations for User Desktops

The recommended requirements for a system running the Advisors dashboards are as follows:

- Processor – Dual-core 2.0 GHz

- Memory – 2 GB RAM

- Hard drive – 1 GB

Prior to Advisors release 8.5.0, users access Advisors dashboards using a client application called the Advisors browser, which you install on each user's computer. You must also install the Flash player plug-in for non-IE browsers (for example, Firefox) to use the Advisors browser.

Starting with Advisors release 8.5.0, users access the application using any of the supported standard web browsers. See *Genesys Supported Operating Environment Reference Guide* for information about specific supported browsers and browser versions. You must also install the Flash Player plugin appropriate for your particular browser.

Starting with Advisors release 8.5.2, the Advisors dashboards (Contact Center Advisor, Workforce Advisor, and Frontline Advisor) no longer require the Adobe Flash Player plugin in order to run. Currently, the Adobe Flash Player plugin is required only on machines on which you access the Advisors administration module.

Contact center size makes no difference to desktop usage because the Advisors dashboards are accessed on the end-user's local machine.

Capacity, Measurement, and Sample Architecture

Genesys tested the information in this section using Advisors release 8.1.5 on Microsoft Windows servers. This section includes the following:

Performance Measurement Environment

The key measurement for Pulse Advisors products is the number of concurrent dashboard users (that is, the load-carrying capacity) on a specific deployment architecture.

The deployment architecture is a combination of the following:

- Object count
- Metric count
- Hardware capacity
- Product Configuration

Object count for a given product includes a subset of the number of Geographic Regions, Reporting Regions, Operating Units, Contact Centers, Agent Groups, Application Groups, and Applications. The layout of the object hierarchy (that is, the number and nature of the objects, as well as the nature of the relationships) may impact the performance of Advisor products, but the number of objects is the main factor affecting performance.

The metric count includes both default and defined custom metrics. Metrics may affect Advisors performance, depending on the metrics definitions, but like object count, the variance is assumed to be minimal.

Unless otherwise specified, performance measurements rely on an environment in which each individual Advisor component is running in its own operating environment, which includes specific hardware (physical or virtualized) and operating system.

The sizing information provided is applicable only to the specific deployment architecture described in this section. For each of the Advisor products, there is also a best practices section that contains general guidelines for performance optimization.

Load-Carrying Capacity

Load-carrying capacity is the number of concurrent dashboard users without significant performance degradation in the deployment architecture.

You can scale up the load-carrying capacity of Advisor products by increasing the number of presentation instances (presentation instances service the dashboard requests).

The following table, Presentation Load-Carrying Capacity, lists the load-carrying capacity for each product based on the following configurations:

- Single-Presentation instance load carrying capacity: The user load that a single independent (with distributed cache) presentation instance can carry in Genesys' recommended deployment architecture.

- Dual-Presentation instance load carrying capacity: The user load that a pair of independent (with distributed cache) presentation instances can carry in Genesys' recommended deployment architecture.

- Triple-Presentation instance load carrying capacity: The user load that three independent (with distributed cache) presentation instances can carry in Genesys' recommended deployment architecture.

The information in the following table is limited to demonstrating the capability to support at least 1500 concurrent users for each product. The deployment architecture that was used to collect the key performance measurement for each product is described in the following sections:

- CCAdv Deployment Architecture and Recommendations for Optimal Performance

- WA Deployment Architecture and Recommendations for Optimal Performance

- FA Deployment Architecture and Recommendations for Optimal Performance

Presentation Load-Carrying Capacity

Product	Single-Presentation Instance Load-carrying Capacity	Dual-Presentation Instance Load-carrying Capacity	Triple-Presentation Instance Load-carrying Capacity
Contact Center Advisor (CCAdv)	600	1300	1600
Workforce Advisor (WA)	700	1200	1500
Frontline Advisor (FA)	1500	Not required; 1500 concurrent users achieved with a single-presentation instance.	Not required; 1500 concurrent users achieved with a single-presentation instance.

CCAdv Deployment Architecture and Recommendations for Optimal Performance

The following table describes the high-level dimensions controlling the environment used to achieve the results described in Load-Carrying Capacity.

Contact Center Advisor Presentation Object Configuration

Object	Count
Geographic Regions	1
Contact Centers	40
Reporting Regions	20
Operating Units	1
Application Groups	150
Applications	1600
Agent Groups	3200 (2 for each application)

The following diagram shows the environment topology used to successfully achieve 1500 concurrent users of Contact Center Advisor (CCAdv). "VM" is a *virtual machine*. The *Aggregation Instance* performs data aggregation; the *Presentation Instance* services the dashboard.
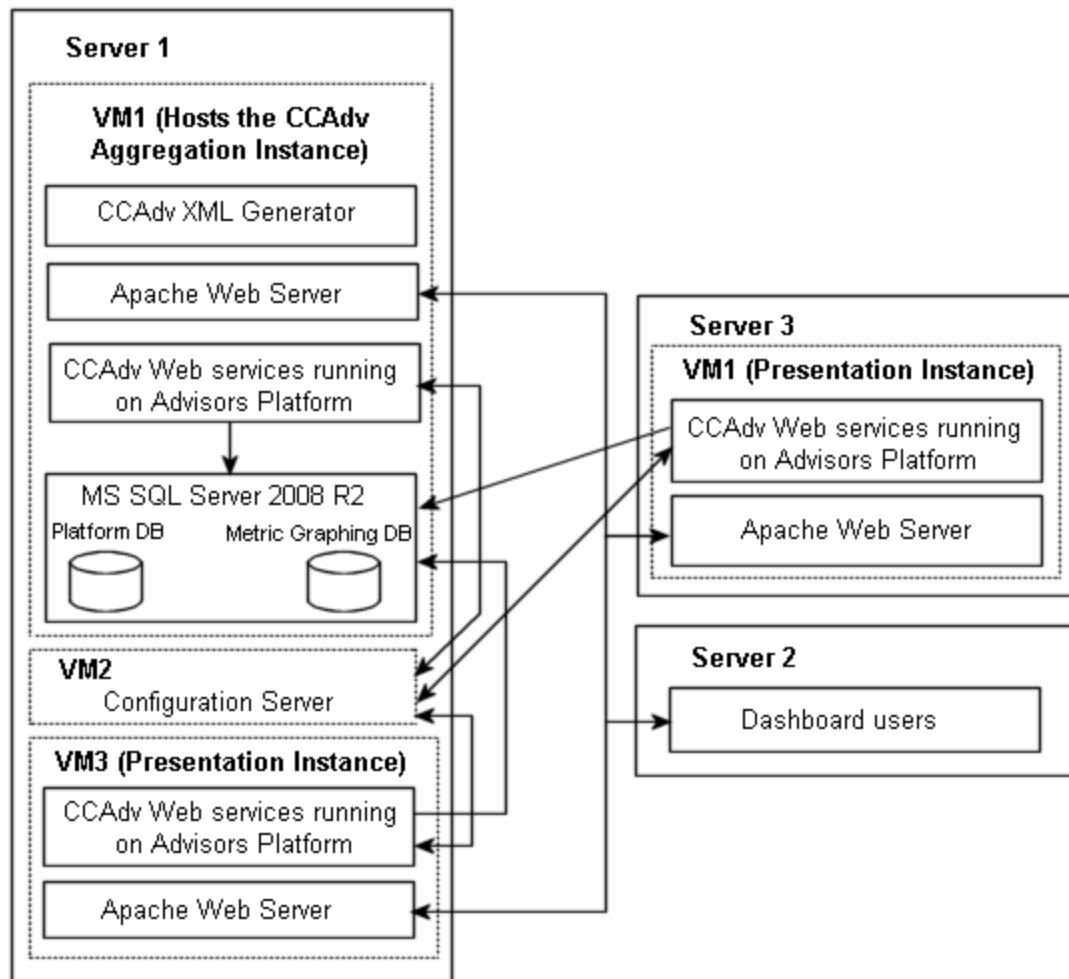
Contact Center Advisor Environment Topology

Contact Center Advisor Presentation Machine and VM Information

The following table describes the characteristics of the hardware and virtualization environment shown in the figure, Contact Center Advisor Environment Topology, which supports 1500 concurrent users of CCAdv.

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
Server 1:	2	Intel Xeon X5675 @	6	24 logical cores with	32 GB	VMWare ESXi 5.0	

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
VM-Host		3.07GHz		hyper-threading		Standard 64bit	
Server 1: VM-1	2	Same as host	4	8	12 GB	Windows Server 2008 Standard SP2 64bit	MS SQL (Advisor database), Apache Geronimo CAXML on Advisors Platform), XML Generator Simulator, Apache
Server 1: VM-2	2	Same as host	1	2	1.5 GB	Windows Server 2003 Standard SP2 64bit **NOTE:** At the time of testing, Genesys supported Windows Server 2003. In your enterprise, be sure to use a Genesys-supported operating system.	Configuration Server
Server 1: VM-3	2	Same as host	4	8	8 GB	Windows Server 2008 R2 Standard SP1 64bit	Apache Geronimo CAXML on Advisors Platform), Apache
Server 2	1	Intel Xeon X3440 @ 2.53GHz	4	4	8 GB	Windows Server 2008 R2 Standard SP1 64bit	Dashboard simulator
Server 3: VM-Host	2	Intel Xeon X5675 @ 3.07GHz	6	24 logical cores with hyper-threading	32 GB	VMWare ESXi 5.0 Standard 64bit	
Server-3: VM-1	2	Same as host	4	8	8 GB	Windows Server 2008 R2 Standard	Apache Geronimo CAXML on Advisors

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
						SP1 64bit	Platform), Apache

Recommendations for Contact Center Advisor Performance Improvement

The following table describes settings you can change to improve Contact Center Advisor performance.

Location	Sub-directory or File, where applicable	Settings

On each CCAdv node	*<CCAdv home>*\geronimo-tomcat6-minimal-2.2.1\bin\setenv.bat
	
	Tip
	Starting with release 8.5.2, the path to the setenv.bat file changes to *<CCAdv home>*\apache-tomcat-<version>\bin\setenv.bat.
		Change
		
		`GERONIMO_OPTS=-ms128m -mx1024m -XX:MaxPermSize=128m`
		
		To
		
		`GERONIMO_OPTS=-Xms6g -Xmx6g -XX:MaxPermSize=256m`
		
		Starting with release 8.5.2, GERONIMO_OPTS becomes CATALINA_OPTS. In addition, the XX:MaxPermSize setting no longer exists in the setenv.bat file. So, starting with release 8.5.2, you make the following change in the setenv.bat file:
		
		Change
		
		`CATALINA_OPTS=-ms1024m -mx2048m`
		
		To
		
		`CATALINA_OPTS=-Xms6g -Xmx6g`

	<CCAdv home>\geronimo\var\catalina\server.xml	Under the `<Connectorname="TomcatAJPConnector">` section, add `maxThreads="1600"` **Tip** Starting with release 8.5.2, you do not change the TomcatAJPConnector setting because it does not exist.
On CCAdv presentation nodes only	*<CCAdv home>*\geronimo-tomcat6-minimal-2.2.1\var\config\config-substitutions.properties	Set `MaxThreadPoolSize` to `"3000"` **Tip** Starting with release 8.5.2, the config-substitutions.properties file does not exist. To change the value of the MaxThreadPoolSize setting, you update the following file: *<CCAdv home>*\apache-tomcat-<version>\config\catalina.properties.
Dashboard administration		For optimal performance:

Location	Sub-directory or File, where applicable	Settings
setting		• Select independent configuration mode (not integrated configuration mode) • Set **Show Totals and Averages** to No
Advisors Platform database		For optimal performance of CCAdv/WA, you can turn off agent monitoring. For release 8.1.5, see the Disabling the agent level statistics templates for CCAdv procedure in the *Performance Management Advisors 8.1 Deployment Guide*. For release 8.5.0 and later, see Enable and Disable Agent-level Monitoring.

On AGA	**Releases 8.1.5 and 8.5.0:**
	
	<AGA home>\conf\wrapper.conf
	
	Release 8.5.1 and later:
	conf\run.bat (Windows)
	bin\setenv.sh (Linux)
		Releases 8.1.5 and 8.5.0:
		
		Change
		
		`Wrapper.java.initmemory=128`
		`Wrapper.java.maxmemory=1024`
		
		To
		
		`Wrapper.java.initmemory=4096`
		`Wrapper.java.maxmemory=14336`
		
		Release 8.5.1 and later:
		In the JAVA_OPTS parameter, change
		
		`-ms128m`
		`-mx1024m`
		
		To
		
		`-ms4096m`
		`-mx14336m`

	<AGA home>\conf\
	inf_genesys_adapter.properties
		Change
		
		`informiam.genesys_connector.stat`
		`Server.maxOpenReqsPerGroup = 1000`
		`informiam.genesys_connector.stat`
		`Server.messages.queuesize = 500000`
		`informiam.genesys_connector.GC`
		`StatisticsObjectDao.batchSize`
		`Overide = 100`
		`informiam.genesys_connector.stats`
		`issue.pausechecklimit = 5000`
		
		To
		
		`informiam.genesys_connector.stat`
		`Server.maxOpenReqsPerGroup = 6000`
		`informiam.genesys_connector.stat`
		`Server.messages.queuesize = 350000`
		`informiam.genesys_connector.GC`
		`StatisticsObjectDao.batchSize`
		`Overide = 1000`
		`informiam.genesys_connector.stats`
		`issue.pausechecklimit = 10000`

Location	Sub-directory or File, where applicable	Settings
		Important The `informiam.genesys_connector.statsissue.pausechecklim` parameter is applicable only to releases earlier than 8.5.1.

On each Apache HTTP proxy	httpd.conf	• Uncomment or add the following modules:
		  `LoadModule deflate_module modules/ mod_deflate.so`
		
		  `LoadModule headers_module modules/ mod_headers.so`
		
		  `LoadModule proxy_module modules/ mod_proxy.so`
		
		  `LoadModule proxy_ajp_module modules/ mod_proxy_ajp.so`
		
		  `LoadModule proxy_balancer_module modules/mod_proxy_balancer.so`
		
		  `LoadModule proxy_http_module modules/ mod_proxy_http.so`
		
		• Add the following block to increase the number of Apache worker threads (note that this is for a Windows-based server):
		
		`<IfModule mpm_winnt_module>`
		`ThreadsPerChild 512`
		`MaxConnectionsPerChild 0`
		`</IfModule>`
		
		  • If you use a Linux server, add the following block:
		
		`<IfModule mpm_event_module>`
		`StartServer 6`
		`ServerLimit 32`
		`MinSpareThreads 150`
		`MaxSpareThreads 250`
		`ThreadsPerChild 25`
		`MaxRequestWorkers 800`
		`MaxConnectionsPerChild 0`
		`</IfModule>`
		
		• Add the following to enable a request response proxy:
		  `ProxyPass /am/ ajp://localhost:8009/am/`
		
		  `ProxyPass /admin/ ajp://localhost:8009/ admin/`
		
		  `ProxyPass /am-admin/ ajp://localhost:8009/am-admin/`

Location	Sub-directory or File, where applicable	Settings
		ProxyPass /ca/ ajp://localhost:8009/ca/
		ProxyPass /ca-ws/ ajp://localhost:8009/ca-ws/
		ProxyPass /ea-ws/ ajp://localhost:8009/ea-ws/
		ProxyPass /base-ws/ ajp://localhost:8009/base-ws/
		ProxyPass /dashboard/ ajp://localhost:8009/dashboard/
		ProxyPass /nav-service/ ajp://localhost:8009/nav-service/
		ProxyPass /prefs-service/ ajp://localhost:8009/prefs-service/
		ProxyPass /wu/ ajp://localhost:8009/wu/
		ProxyPass /rmc/ ajp://localhost:8009/rmc/
		ProxyPass /gc-admin/ ajp://localhost:8009/gc-admin/
		ProxyPass /ca-xml/ ajp://localhost:8009/ca-xml/

Best Practices for Contact Center Advisor Sizing

Use the following notes and best practices for optimizing CCAdv performance:

- Use Gigabit connectivity between the CCAdv aggregation node (runs CCAdv XML Generator) and CCAdv presentation node(s).

- Enable an Apache JServ Protocol (AJP) connection between the Apache HTTP proxy and CCAdv presentation node(s).

- Allocate as much CPU resource to CCAdv as possible; CCAdv performance is improved if you provide multiple CPU cores and faster clock speeds.

- Allocate sufficient memory for CCAdv components (Genesys recommends 6GB).

- Genesys recommends increasing the number of presentation nodes if the dashboard request response time exceeds acceptable thresholds.

- Apply role-based access control to minimize the number of hierarchy objects and metrics that each user can access.

- Regarding Stat Server performance:

- Stat Server is a single threaded process. Carefully monitor the CPU usage of your Stat Server(s).

  - Consider adding more Stat Server pairs if a Stat Server is saturating a CPU. You may require up to four pairs of Stat Servers for best performance.

- Regarding XML Generator performance:

  - Increasing the "Thirty Mins And Today" metrics processing cycle duration reduces XML Generator processing overhead. The configuration parameter name is `generationForThirtyMinsAndToday` (default=120s) and it is located in the following file:
    `<XML Generator home>\conf\xmlgen.properties`

  - Performance improves with a small number of objects and degrades with a large number of objects, however a large number of reporting regions, geographic regions, and/or contact centers causes less degradation than a large number of operating units and/or application groups.

  - The number of columns displayed on the dashboard does not impact XML Generator performance.

- Regarding metrics graphing:

  - The greatest impact to load for the metrics graphing feature is against the aggregation node (XML Generator), not the presentation nodes.

  - The key scaling factor is the number of graphable metrics:

    - The XML Generator CPU usage scales up linearly with the number of graphable metrics. Up to 15 graphable metrics are supported.

  - The number of users and number of requests for distinct graphs has minimal impact on performance.

WA Deployment Architecture and Recommendations for Optimal Performance

The following table describes the high-level dimensions controlling the environment used to achieve the results described in Load-Carrying Capacity.

Workforce Advisor Presentation Object Configuration

Object	Count
Contact Groups	1552[*]
Contact Centers	20
Application Groups	200
Reporting Regions	20
Operating Units	1
Applications	600
Agent Groups	1300

[*] In this environment, the forecast data for all 1552 contact groups is updated every 10 minutes.

The following diagram shows the environment topology used to successfully achieve 1500 concurrent users of Workforce Advisor (WA). "VM" is a *virtual machine*. The *Aggregation Instance* performs data aggregation; the *Presentation Instance* services the dashboard.
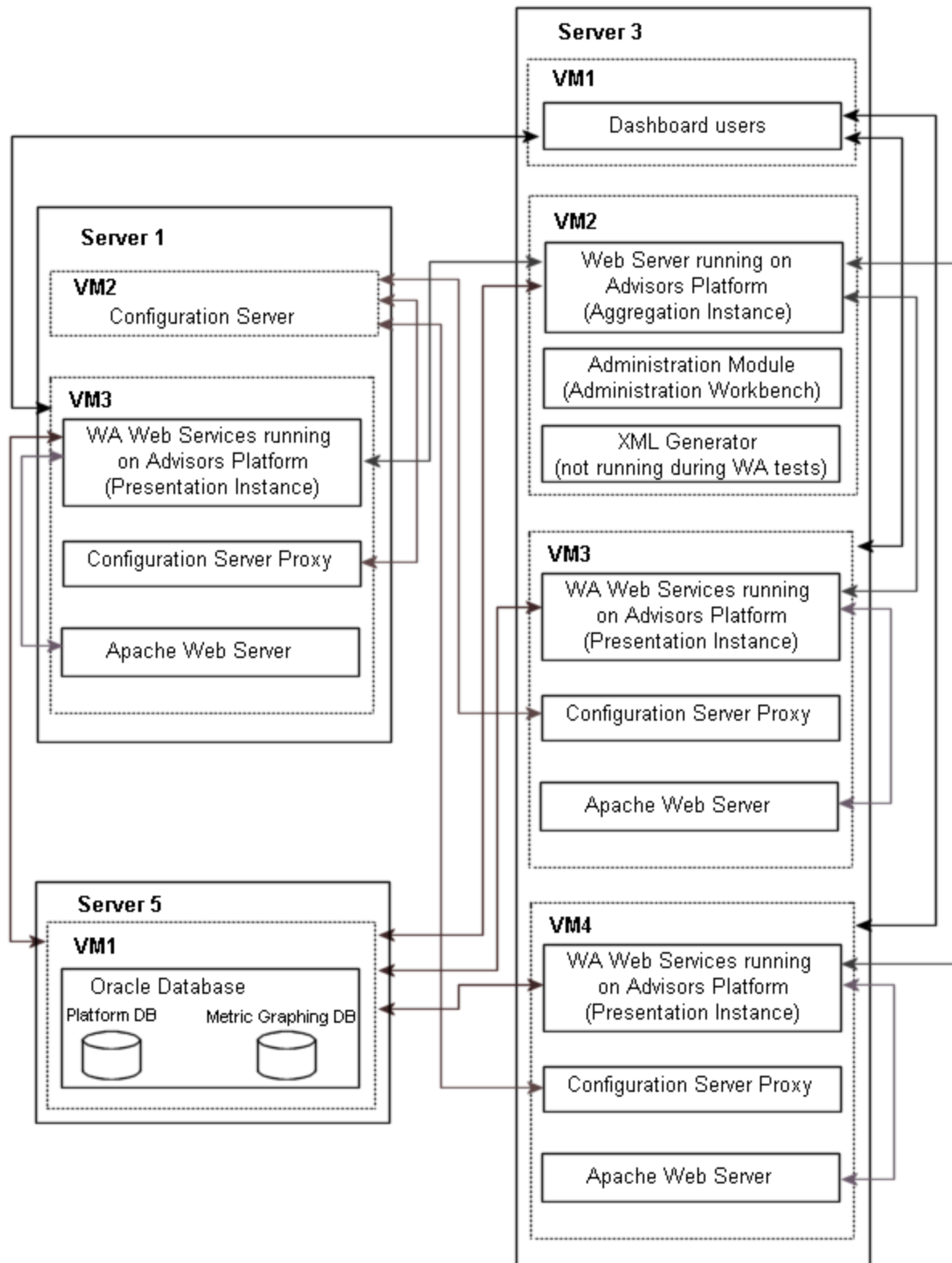
Workforce Advisor Environment Topology

Workforce Advisor Presentation Machine and VM Information

The following table describes the characteristics of the hardware and virtualization environment shown in the figure, Workforce Advisor Environment Topology, which supports 1500 concurrent users of WA.

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
Server 3: VM-Host	2	Intel Xeon X5675 @ 3.07GHz	6	24 logical cores with hyper-threading	32 GB	VMWare ESXi 5.0 Standard 64bit	
Server 3: VM-1	1	Same as host	1	1	8 GB	Windows Server 2008 Standard SP2 64bit	Dashboard simulator
Server 3: VM-2	2	Same as host	2	4	8 GB	Windows Server 2003 Standard SP2 64bit **NOTE:** At the time of testing, Genesys supported Windows Server 2003. In your enterprise, be sure to use a Genesys-supported operating system.	Apache Geronimo (WA aggregation instance on Advisors Platform)
Server 3: VM-3	2	Same as host	4	8	8 GB	Windows Server 2008 R2 Standard SP1 64bit	Apache Geronimo (WA presentation instance on Advisors Platform), Configuration Server Proxy, Apache
Server 3:	2	Same as host	4	8	8 GB	Windows Server	Apache Geronimo

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
VM-4						2008 R2 Standard SP1 64bit	(WA presentation instance on Advisors Platform), Configuration Server Proxy, Apache
Server 1: VM-Host	2	Intel Xeon X5675 @ 3.07GHz	6	12	32 GB	VMWare ESXi 5.0 Standard 64bit	
Server-1: VM-2	2	Same as host	1	2	1.5 GB	Windows Server 2003 Standard SP2 64bit **NOTE:** At the time of testing, Genesys supported Windows Server 2003. In your enterprise, be sure to use a Genesys-supported operating system.	Configuration Server
Server-1: VM-3	2	Same as host	4	8	8 GB	Windows Server 2008 R2 Standard SP1 64bit	Apache Geronimo (WA presentation instance on Advisors Platform), Configuration Server Proxy, Apache
Server 5: VM-Host	2	AMD Opteron 2439SE @ 2.8GHz	6	12	32 GB	VMWare ESXi 5.0 Standard 64bit	
Server 5: VM-1	2	Same as host	1	2	8 GB	RHEL Server 5.7 64bit	Oracle database

Recommendations for Workforce Advisor Performance Improvement

The following table describes settings you can change to improve Workforce Advisor performance.

Location	Sub-directory or File, where applicable	Settings

On each WA node	*<WA home>*\geronimo-tomcat6-minimal-2.2.1\bin\setenv.bat
	
	Tip
	Starting with release 8.5.2, the path to the setenv.bat file changes to *<WA home>*\apache-tomcat-<version>\bin\setenv.bat.
		Change
		
		`GERONIMO_OPTS=-ms128m -mx1024m -XX:MaxPermSize=128m`
		
		To
		
		`GERONIMO_OPTS=-Xms6g -Xmx6g -XX:MaxPermSize=256m`
		
		Starting with release 8.5.2, `GERONIMO_OPTS` becomes `CATALINA_OPTS`. In addition, the `XX:MaxPermSize` setting no longer exists. So, starting with release 8.5.2, you make the following change in the `setenv.bat` file:
		
		Change
		
		`CATALINA_OPTS=-ms1024m -mx2048m`
		
		To
		
		`CATALINA_OPTS=-Xms6g -Xmx6g`

	<WA home>\geronimo\var\catalina\server.xml	Under the <Connectorname="TomcatAJPConnector"> section, add `maxThreads="800"` **Tip** Starting with release 8.5.2, you do not change the `TomcatAJPConnector` setting because it does not exist.
On WA presentation nodes only	*<WA home>*\geronimo-tomcat6-minimal-2.2.1\var\config\config-substitutions.properties	Set `MaxThreadPoolSize` to "3000" **Tip** Starting with release 8.5.2, the config-substitutions.properties file does not exist. To change the value of the MaxThreadPoolSize setting, you update the following file: *<WA home>*\apache-tomcat-<version>\config\catalina.properties.
Dashboard administration setting		For optimal performance: • Select independent configuration mode (not integrated configuration mode) • Set **Show Totals and Averages** to No
On AGA	**Releases 8.1.5**	**Releases 8.1.5 and 8.5.0:**

Location	Sub-directory or File, where applicable	Settings

	and 8.5.0:
	
	<AGA home>\conf\wrapper.conf
	
	Release 8.5.1 and later:
	conf\run.bat (Windows)
	bin\setenv.sh (Linux)
		Change
		
		  `Wrapper.java.initmemory=128`
		  `Wrapper.java.maxmemory=1024`
		
		To
		
		  `Wrapper.java.initmemory=4096`
		  `Wrapper.java.maxmemory=14336`
		
		Release 8.5.1 and later:
		In the JAVA_OPTS parameter, change
		
		  `-ms128m`
		  `-mx1024m`
		
		To
		
		  `-ms4096m`
		  `-mx14336m`

On each Apache HTTP proxy	httpd.conf	• Uncomment or add the following modules:
		    `LoadModule deflate_module modules/`
		    `mod_deflate.so`
		
		    `LoadModule headers_module modules/`
		    `mod_headers.so`
		
		    `LoadModule proxy_module modules/mod_proxy.so`
		
		    `LoadModule proxy_ajp_module modules/`
		    `mod_proxy_ajp.so`
		
		    `LoadModule proxy_balancer_module modules/`
		    `mod_proxy_balancer.so`
		
		    `LoadModule proxy_http_module modules/`
		    `mod_proxy_http.so`
		
		• Add the following block to increase the number of Apache worker threads (note that this is for a Windows-based server):
		
		`<IfModule mpm_winnt_module>`
		`ThreadsPerChild 512`
		`MaxConnectionsPerChild 0`
		`</IfModule>`
		
		    • If you use a Linux server, add the following block:
		
		`<IfModule mpm_event_module>`
		`StartServer 6`
		`ServerLimit 32`
		`MinSpareThreads 150`
		`MaxSpareThreads 250`

Location	Sub-directory or File, where applicable	Settings

		``
		ThreadsPerChild 25
		MaxRequestWorkers 800
		MaxConnectionsPerChild 0
		</IfModule>
		``
		
		• Add the following to enable a request response proxy:
		`ProxyPass /am/ ajp://localhost:8009/am/`
		
		`ProxyPass /admin/ ajp://localhost:8009/admin/`
		
		`ProxyPass /ca-ws/ ajp://localhost:8009/ca-ws/`
		
		`ProxyPass /ea-ws/ ajp://localhost:8009/ea-ws/`
		
		`ProxyPass /dashboard/ ajp://localhost:8009/dashboard/`
		
		`ProxyPass /nav-service/ ajp://localhost:8009/nav-service/`
		
		`ProxyPass /prefs-service/ ajp://localhost:8009/prefs-service/`
		
		`ProxyPass /ca-xml/ ajp://localhost:8009/ca-xml/`
		
		`ProxyPass /wu/ ajp://localhost:8009/wu/`
		
		`ProxyPass /base-ws/ ajp://localhost:8009/base-ws/`
		
		`ProxyPass /fa/ ajp://localhost:8009/fa/`
		
		`ProxyPass /static/ ajp://localhost:8009/static/`

Best Practices for Workforce Advisor Sizing

Use the following notes and best practices for optimizing WA performance:

- Use Gigabit connectivity between the WA aggregation node and WA presentation node(s).

- Enable an AJP connection between the Apache HTTP proxy and WA presentation layer(s).

- Allocate as much CPU resource to WA as possible; WA performance is improved if you provide multiple CPU cores and faster clock speeds.

- Allocate sufficient memory for WA components (Genesys recommends 6GB).

- Genesys recommends increasing the number of presentation nodes if the dashboard request response time exceeds acceptable thresholds.

- Apply role-based access control to minimize the number of hierarchy objects and metrics that each user can access.

- Avoid unnecessary updates to forecast data; that is, avoid calculations that consume processing power unnecessarily. For example, do not configure 10-minute updates of forecast data if hourly updates are sufficient.

- Regarding Stat Server performance:

  - Stat Server is a single threaded process. Carefully monitor the CPU usage of your Stat Server(s).

  - Consider adding more Stat Server pairs if a Stat Server is saturating a CPU. You may require up to four pairs of Stat Servers for best performance.

FA Deployment Architecture and Recommendations for Optimal Performance

The following table describes the high-level dimensions controlling the environment used to achieve the results described in Load-Carrying Capacity.

Frontline Advisor Presentation Object Configuration

Object	Count
Agents	30 000
Depth (levels)	6
Multiplicity (refers to the average number of teams to which an agent belongs)	1
Agent Groups	5000 (with agents)
Time Profiles	3

The following diagram shows the environment topology used to successfully achieve 1500 concurrent users of Frontline Advisor (FA). "VM" is a virtual machine. The Aggregation Instance performs data aggregation; the Presentation Instance services the dashboard.
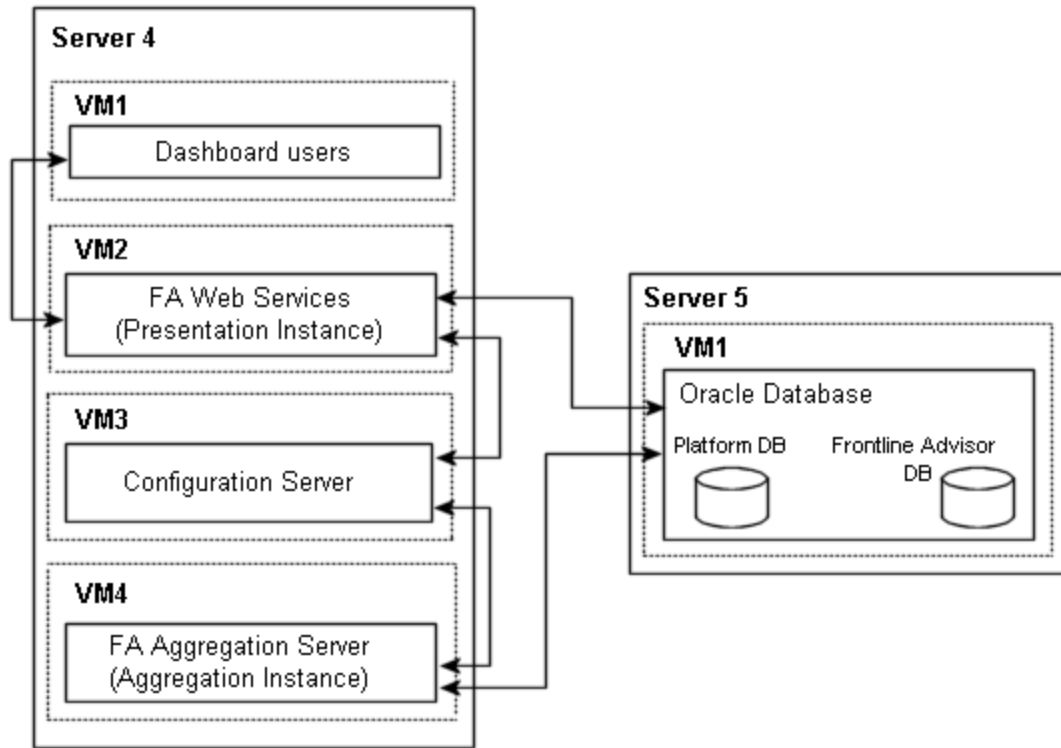
Frontline Advisor Environment Topology

Frontline Advisor Presentation Machine and VM Information

The following table describes the characteristics of the hardware and virtualization environment
shown in the figure, Frontline Advisor Environment Topology, which supports 1500 concurrent users of
FA.

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
Server 4: VM-Host	2	Intel Xeon X5675 @ 3.07GHz	6	12	32 GB	VMWare ESXi 5.0 Standard 64bit	
Server 4: VM-1	2	Same as host	4	8	8 GB	Windows Server 2008 Standard SP1 64bit	Dashboard simulator
Server 4: VM-2	2	Same as host	4	8	8 GB	Windows Server 2003 Standard	Geronimo (FA Presentation instance

Server	# of Processors	Processor Type	# of Cores	Total Cores	RAM	OS	Application
						SP1 64bit **NOTE:** At the time of testing, Genesys supported Windows Server 2003. In your enterprise, be sure to use a Genesys-supported operating system.	on Advisors Platform)
Server 4: VM-3	2	Same as host	1	2	4 GB	Windows Server 2003 32bit **NOTE:** At the time of testing, Genesys supported Windows Server 2003. In your enterprise, be sure to use a Genesys-supported operating system.	Configuration Server
Server 4: VM-4	2	Same as host	4	8	8 GB	Windows Server 2008 R2 Standard SP1 64bit	FA Aggregation instance on Advisors Platform
Server 5: VM-Host	2	AMD Opteron 2439SE @ 2.8GHz	6	12	32 GB	VMWare ESXi 5.0 Standard 64bit	
Server-5: VM-1	2	Same as host	1	2	8 GB	RHEL Server 5.7 64bit	Oracle database

Recommendations for Frontline Advisor Performance Improvement

The following table describes settings you can change to improve the performance of Frontline

Advisor.

Location	Sub-directory or File, where applicable	Settings

On each FA node	*<FA home>*\geronimo-tomcat6-minimal-2.2.1\bin\setenv.bat
	
	Tip
	Starting with release 8.5.2, the path to the setenv.bat file changes to *<FA home>*\apache-tomcat-<version>\bin\setenv.bat.
		Change
		
		`GERONIMO_OPTS=-ms128m -mx1024m`
		`-XX:MaxPermSize=128m`
		
		To
		
		`GERONIMO_OPTS=-Xms4g -Xmx8g`
		`-XX:MaxPermSize=512m`
		
		Starting with release 8.5.2, GERONIMO_OPTS becomes CATALINA_OPTS. In addition, the XX:MaxPermSize setting no longer exists. So, starting with release 8.5.2, you make the following change in the setenv.bat file:
		
		Change
		
		`CATALINA_OPTS=-ms1024m -mx2048m`
		
		To
		
		`CATALINA_OPTS=-Xms6g -Xmx6g`

	<FA home>\geronimo\var\catalina\server.xml	Under the `<Connectorname="TomcatAJPConnector">` section, add `maxThreads="2000"` **Tip** Starting with release 8.5.2, you do not change the TomcatAJPConnector setting because it does not exist.

On AGA	**Releases 8.1.5 and 8.5.0:**
	
	<AGA home>\conf\wrapper.conf
	
	Release 8.5.1 and later:
	conf\run.bat (Windows)
	bin\setenv.sh (Linux)
		Releases 8.1.5 and 8.5.0:
		
		Change
		
		`Wrapper.java.initmemory=128`
		`Wrapper.java.maxmemory=1024`
		
		To
		
		`Wrapper.java.initmemory=4096`
		
		`Wrapper.java.maxmemory=14336`
		
		Release 8.5.1 and later:
		In the JAVA_OPTS parameter, change
		
		`-ms128m`
		`-mx1024m`

Location	Sub-directory or File, where applicable	Settings

		To
		
		`-ms4096m`
		`-mx14336m`

	\<AGA home>\conf\
	`inf_genesys_adapter.properties`
		Change
		
		`informiam.genesys_connector.stat`
		  `Server.addp.clienttimeout`
		`= 120`
		
		`informiam.genesys_connector.timing.`
		
		`messagerate.numberofmessages.batch`
		`= 500`
		
		To
		
		`informiam.genesys_connector.stat`
		  `Server.addp.clienttimeout`
		`= 360`
		
		`informiam.genesys_connector.timing.`
		
		`messagerate.numberofmessages.batch`
		`= 100000`

On each Apache HTTP proxy	`httpd.conf`	• Uncomment or add the following modules:
		    `LoadModule`
		    `deflate_module`
		    `modules/`
		    `mod_deflate.so`
		
		    `LoadModule`
		    `headers_module`
		    `modules/`
		    `mod_headers.so`
		
		    `LoadModule`
		    `proxy_module modules/`
		    `mod_proxy.so`
		
		    `LoadModule`
		    `proxy_ajp_module`
		    `modules/`
		    `mod_proxy_ajp.so`
		
		    `LoadModule`
		    `proxy_balancer_module`
		    `modules/`
		    `mod_proxy_balancer.so`

Location	Sub-directory or File, where applicable	Settings

		LoadModule proxy_http_module modules/ mod_proxy_http.so
		
		• Add the following block to increase the number of Apache worker threads (note that this is for a Windows-based server):
		
		`<IfModule mpm_winnt_module>`
		`ThreadsPerChild 512`
		`MaxConnectionsPerChild 0`
		`</IfModule>`
		
		• If you use a Linux server, add the following block:
		
		`<IfModule mpm_event_module>`
		`StartServer 6`
		`ServerLimit 32`
		`MinSpareThreads 150`
		`MaxSpareThreads 250`
		`ThreadsPerChild 25`
		`MaxRequestWorkers 800`
		`MaxConnectionsPerChild 0`
		`</IfModule>`
		
		• Add the following to enable a request response proxy:
		`ProxyPass /fa/ ajp://localhost:8009/ fa/`
		
		`ProxyPass /am/ ajp://localhost:8009/ am/`
		
		`ProxyPass /admin/ ajp://localhost:8009/ admin/`
		
		`ProxyPass /am-admin/ ajp://localhost:8009/ am-admin/`
		
		`ProxyPass /ca/ ajp://localhost:8009/ ca/`
		
		`ProxyPass /ca-ws/ ajp://localhost:8009/ ca-ws/`

Location	Sub-directory or File, where applicable	Settings

		`ProxyPass /ea-ws/ ajp://localhost:8009/ ea-ws/`
		
		`ProxyPass /base-ws/ ajp://localhost:8009/ base-ws/`
		
		`ProxyPass /dashboard/ ajp://localhost:8009/ dashboard/`
		
		`ProxyPass /nav- service/ ajp://localhost:8009/ nav-service/`
		
		`ProxyPass /prefs- service/ ajp://localhost:8009/ prefs-service/`
		
		`ProxyPass /wu/ ajp://localhost:8009/ wu/`
		
		`ProxyPass /rmc/ ajp://localhost:8009/ rmc/`
		
		`ProxyPass /gc-admin/ ajp://localhost:8009/ gc-admin/`
		
		`ProxyPass /ca-xml/ ajp://localhost:8009/ ca-xml/`

Best Practices for Frontline Advisor Sizing

Use the following notes and best practices for optimizing FA performance:

- Use Gigabit connectivity between the FA aggregation node and FA presentation node(s).

- Enable an AJP connection between the Apache HTTP proxy and FA presentation node(s).

- Allocate as much CPU resource to FA as possible; FA performance is improved if you provide multiple CPU cores and faster clock speeds.

- Allocate sufficient memory for FA components (Genesys recommends 6GB).

- You may require multiple AGAs (up to two).

- Regarding Stat Server performance:

    - Stat Server is a single threaded process. Carefully monitor the CPU usage of your Stat Server(s).

    - Consider adding more Stat Server pairs if a Stat Server is saturating a CPU. You may require up to six pairs of Stat Servers for best performance.

Frontline Advisor Dashboard Age

Dashboard age is a performance measure used in assessing the state and performance/rule processing cycles. It represents the age of the statistics on the dashboard, and includes the following:

1. Pre-Rollup Delay: The time from the end of the last rollup until the scheduled start of the next rollup.

2. Rollup Duration: The duration of the rollup + the time to publish to the distributed cache.

3. Request Response Time (RRT): The 95th percentile of response time for a dashboard request. That is, 95% of the time, a response is returned to a dashboard request after X number of seconds, where X is a constant.

The following table shows results from Genesys' performance testing. *State processing* refers to the state metric rollup cycle and *performance/rule processing* is the performance metric rollup cycle (state and performance metric cycles run independently).

Dashboard Age Results from FA Performance Testing

Measure (seconds)	State Processing			Performance/Rule Processing		
95th Percentile	Median	Average	95th Percentile	Median	Average	
Dashboard age	18 seconds	12 seconds	12 seconds	70 seconds	62 seconds	62 seconds

Improving Supervisor Desktop Service Performance

Supervisor Desktop Service (SDS) is required only in installations where you are deploying the Resource Management Console (RMC).

To improve SDS performance, Genesys recommends that you make the following updates on the servers that host the SDS:

1. Update the `ms` and `mx` values.

    On a Windows server that hosts your SDS service, update the `GDesktopStarter.ini` file, located in the bin directory.

    On a Linux server that hosts your SDS service, update the `/bin/setclasspath.sh` file in the folder where SDS is installed.

    Find the line in the file starting with `[JavaArgs]`. You can copy the block of text below that best suits your environment, and then paste it into the file to overwrite the default settings.

    - For a **small** configuration (the number of agents monitored by RMC is less than 1000), use the following text block:

        ```
        Rem The following line should be used when only the Agents Desktop

        Rem is used or for small to medium configurations using the Supervisor Desktop

        -Xms1024M

        -Xmx2048M

        -XX:MaxPermSize=128M


        Rem The line above should be modified for large configurations and

        Rem when both the Agents and Supervisor desktop are used:

        Rem -Xmx1024M

        Rem -Xms768M
        ```

    - For a **medium** configuration (the number of agents monitored by RMC is between 1000 and 2000), use the following text block:

        ```
        Rem The following line should be used when only the Agents Desktop

        Rem is used or for small to medium configurations using the Supervisor Desktop

        -Xms2048M

        -Xmx4096M

        -XX:MaxPermSize=128M
        ```

```
Rem The line above should be modified for large configurations and

Rem when both the Agents and Supervisor desktop are used:

Rem -Xmx1024M

Rem -Xms768M
```

- For a **large** configuration (the number of agents monitored by RMC is more than 2000), use the following text block:

```
Rem The following line should be used when only the Agents Desktop

Rem is used or for small to medium configurations using the Supervisor Desktop

Rem -Xms128M

Rem -Xmx512M

-XX:MaxPermSize=128M


Rem The line above should be modified for large configurations and

Rem when both the Agents and Supervisor desktop are used:

-Xmx6144M

-Xms3096M
```

2. In addition to setting the ms and mx values, choose one of the following sets of options:

- **On a single-processor system:**

```
Rem The following option should be added after the memory option in

Rem the line above when running on a single processor system:

-XX:+UseConcMarkSweepGC

Rem The following option should be added after the memory option in

Rem the line above when running on a multi-processor system:

Rem -XX:+UseConcMarkSweepGC

Rem -XX:+UseParNewGC
```

- **On a multi-processor system:**

```
Rem The following option should be added after the memory option in

Rem the line above when running on a single processor system:

Rem -XX:+UseConcMarkSweepGC

Rem The following option should be added after the memory option in
```

Rem the line above when running on a multi-processor system:

```
-XX:+UseConcMarkSweepGC
```

```
-XX:+UseParNewGC
```