WFO Workforce Management Solution Blueprint

Reference Architecture

Authors: Thomas Tritten

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GENESYS

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Revision History

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0.1	8/8/13	Rakesh Tailor	Initial skeleton document
0.2	12/5/14	Thomas Tritten	All Updates
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1 Introduction

The purpose of this Architecture Blueprint is to document the Genesys Workforce Management architecture. Workforce Management is a major part of the Workforce Optimization (WFO) Solution. It provides a list of components (both Genesys and 3rd party) that could be included in the solution, based on the customer's environment. It also provides guidance for implementing and deploying the solution, including sizing and configuration, as well as addressing several system concerns such as security, high availability, disaster recovery and serviceability.

1.1 Intended Audience

Describing system and solution architectures can be difficult as there are multiple audiences, each with different expectations. This document is intended for multiple audiences with various chapters being more interesting to some readers versus others.

The Overall Architecture and Deployment View are likely meaningful to most audiences. However the Interaction View and the Implementation View may be of more interest to those configuring the network and components.

2 Definitions, Acronyms, and Document Standards

2.1 Definitions

This document uses various abbreviations and acronyms that are commonly used in Genesys product documentation and the telecommunications and contact center industries. The following table defines terms that will be referenced in this document.

2.2 Glossary

AHT	Average Handling Time
ASA	Average Speed of Answer (Average Wait Time)
CEP	Customer Experience Platform
CME	Configuration Management Environment
DB	Database
DBMS	Database Management System
GUI	Graphical User Interface
IP	Installation Package
IV	Interaction Volume
HA	High Availability
HTTPS	HTTP Secure
HTTP	Hypertext Transfer Protocol
LP	Language Pack
OS	Operating System
RDBMS	Relational Database Management System
RTA	Real Time Adherence
SLA	Service Level (Agreement)
SQL	Structured Query Language
SSL	Secure Sockets Layer
UI	User Interface
WFM	Workforce Management

3 Overall Architecture

Genesys Workforce Management (WFM) provides the tools that enable contact center managers to better manage their workforce. It is designed for the true multi-media, multi-site environment, providing optimal schedules for multi-skilled agents who may handle customer interactions of different media types. Agent preferences, skills, proficiency, customer segmentation, historical trends, such as e-mail response times, and outbound call lengths are all considered within the forecast, schedule, and adherence components.

WFM is designed to integrate tightly with the Framework components of the Genesys Customer Interaction Management Platform. Agents and their skill sets are entered and maintained in Genesys Configuration Manager, so there is no need to re-enter this information in a stand-alone workforce management application. This integration also allows contact centers to leverage real-time statistics, contact-center performance, and agent adherence data across all communication channels. Workforce Management consists of the following components:

- WFM Web (with separate interfaces for Supervisors and Agents)
- WFM Server
- WFM Daemon
- WFM Builder
- WFM Data Aggregator
- WFM API.

WFM also requires a database to store all the relevant configuration, forecasting, scheduling, agent adherence, performance, and historical data.

This solution is targeted towards the resource planners and managers of operations and personnel for any contact center environment where the optimization of staffing needs and resource allocation is important.

3.1 Solution Overview

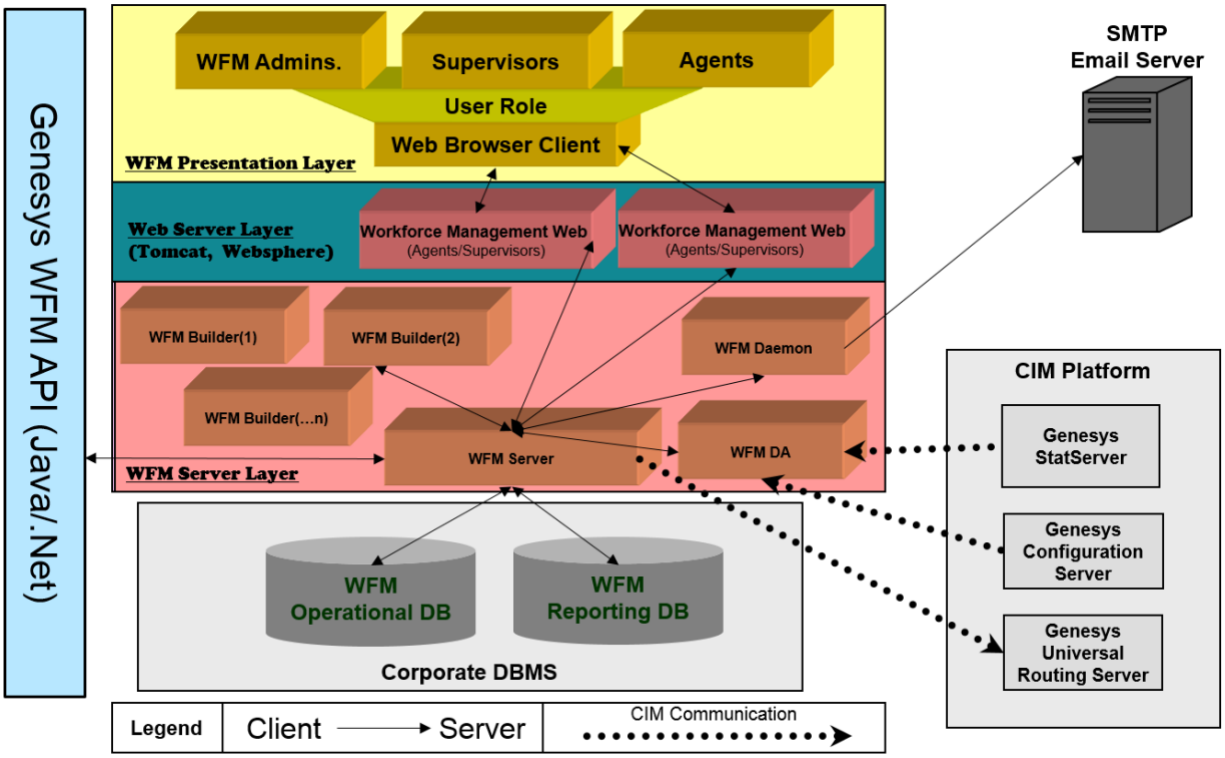
Genesys Workforce Management (WFM) provides a sophisticated package of workload forecasting, agent schedule optimization, and real-time monitoring tools. It provides additional value through its tight integration with Genesys Framework and Genesys Routing. Key functionality is presented through a web interface, which increases its accessibility and flexibility.

WFM is a strategic asset in advancing the goals of any contact center, providing the highest-quality customer service for the best value. In today's contact center, interactions take a multitude of forms, and the agents may have a broad variety of skills. WFM creates forecasts and schedules for multi-skilled agents who are handling interactions in a variety of media, as well as for a more traditional single-skilled agent pool handling mostly voice interactions. WFM enables Supervisors to create proposed future schedules, Agents to bid on those schedules, and Supervisors to integrate the bids into real schedules.

WFM enables agents to request time off and specific working hours, and also to trade schedules with other agents, without sacrificing optimal staffing levels. Flexible agent scheduling can help improve agent retention, resulting in fewer new hires who require training before they can become truly effective.

WFM provides real-time contact-center performance and agent-adherence monitoring. Admins can immediately adjust the number of agents working on a specific activity if they see that the service-level statistics for that activity have fallen out of the acceptable range. Or, if the service levels are more than satisfactory, they can encourage agents to spend additional time up-selling new products, move them to another activity, or even give them time off.

3.2 Logical Architecture Model



3.3 Functional View

The core functionalities of the solution can be broken down into the following areas:

- Forecasting – Future Workload & Staffing Needs analysis
- Scheduling – Optimal Resource Allocation
- Performance Monitoring – Comparisons of Expectations with Reality
- Real Time Adherence – Monitoring Agent Adherence to Schedules
- Historical Reporting
- Agent Self-Service

3.3.1 Forecasting

Use the Workforce Management (WFM) Forecasting tool to predict contact-center workload and staffing requirements, based on historical data or user-defined templates. WFM provides multiple methods of forecasting the workload and staffing requirements for work activities.

Start by creating one or multiple forecast scenarios. Creating multiple scenarios enables you to see the effects of changes to forecasting parameters, such as service objectives and predicted interaction volume. When you have determined the most satisfactory forecast, publish it, making it the Master Forecast on which schedule scenarios, and eventually the Master Schedule, are based.

If you choose to, you can derive workload forecasts from historical information that is either collected automatically by WFM from the Genesys system or imported from .csv files using the WFM Configuration Utility. You can also create workload and staffing forecasts as reusable templates. Once you have generated a workload prediction, WFM determines the staffing requirements needed to service the workload, taking into account any applicable service objectives.

3.3.2 Scheduling

Workforce Management (WFM) uses various Forecasts to create agent schedules that comply with user-defined business constraints. Or you can create “empty” schedules to which you can then assign agents. Schedule constraints include available personnel with required skills, staffing requirements, employment contracts, business policies, and agent preferences.

The staffing requirements act as a target for schedule generation. An optimized schedule ensures the least amount of over- and understaffing while still meeting contractual obligations. WFM uses each agent’s individual skills, contracted working rules, and calendar items as guides to help identify when each agent can work, and what he or she will work on.

You can schedule agents to be available to perform multiple types of work at once or you can schedule them to work on specific types of work for periods of time within their day. You can also combine these, to create schedules in which some periods are set aside for specific types of work while at other times agents perform any work that arrives for which they are qualified.

Once you finalize your schedule, you can publish it to the Master Schedule, where it immediately becomes available for agents to view through WFM Web for Agents. Agents may then trade their schedules as needed, if the schedule trade complies with trading rules and is either auto-approved or is approved by a qualified supervisor.

3.3.3 Performance Monitoring

The Performance modules compare the forecast and schedule to what is actually happening in the contact center. WFM shows intra-day statistics, such as interaction volume, average handling time (AHT), agents logged in, service level, average speed of answer (ASA), and abandons, and compares them to the planned values. Intra-day contact-center performance data is displayed in an informative and easy-to-read format, enabling efficient performance monitoring and quick response to unanticipated interaction flow or agent-staffing situations.

WFM also provides a "what-if" calculator as an aid to decision making. You can enter new values for staffing, interaction volume, and/or other performance statistics into the What-If window. The what-if calculator then supplies the results to be expected if the values change as you project.

3.3.4 Real Time Adherence

Workforce Management provides real-time agent-adherence data, which compares the current agent status to the scheduled status. WFM can track agent adherence per time interval on a single channel or across multiple channels simultaneously. Agents who are not adhering to their schedules (within user-defined thresholds) are highlighted in yellow if they are non-adherent or in red if they are severely non-adherent. WFM also displays the amount of time, in minutes, that the agent's current status has differed from the scheduled status. This running total is continually updated.

3.3.5 Historical Reporting

WFM Web for Supervisors provides access to a variety of reports that are designed to present key contact-center data in a flexible and accessible format. The report types are:

• Configuration Reports—Contain information about work activity configuration.

• Policies Reports—Contain information about agents, contracts, shifts, and rotating patterns.

• Calendar Reports—Contain information about time off and agent calendar items.

• Forecast Reports—Display forecast interaction volumes, AHT, and staffing requirements in tabular and graph formats.

• Schedule Reports—Display schedule data for agents, activities, teams, sites, multisite activities, and business units at various granularities. Also present budget information and schedule validation warnings and errors. Daily Operations Monitoring Workforce Performance and Adherence

• Performance Reports—Contains various types of contact-center performance statistics in detailed and summary formats.

• Adherence Reports—Contain agent-adherence information for agents, teams, sites, business units, and the enterprise.

• Audit Reports—Contain information that enables you to audit a history of changes made within the Calendar subsystem and a history of changes made to the Master Schedule.

3.3.6 Agent Self Service

Genesys WFM Web for Agents enables contact center managers to easily distribute schedule information to their employees and provides agents with proactive scheduling capabilities, such as entering schedule preferences, planning time off, schedule bidding, and trading schedules.

3.3.7 Operations and Administration

The solution includes tools for operating and administrating. These tools include Genesys Administrator and Genesys Administrator Extensions for deploying, configuring, provisioning and monitoring the system.

For more information please consult the Genesys Administrator documentation (http://docs.genesys.com/Documentation/GA).

3.4 Component View

The following tables list both the Genesys and 3rd party components that comprise the Workforce Management solution.

3.4.1 Genesys Workforce Management Components

The following table lists the Genesys components that are included with the Workforce Management Solution. **The Customer is responsible for providing their own hardware, OS licensing, SMTP email server, and DBMS.**

Category	Component	Version	Notes
Customer Engagement Platform	TServer	v8.+	Provides connectivity to supported PBX/ACDs
	Statserver	v8.+	
	Configuration Server	v8.+	
	License Manager (FlexLM)	11.9+	
	Local Control Agent (LCA)	v8.+	
	Message Server	v8.+	
	Solution Control Server (SCS)	v8.+	
	DBServer	v8.+	
CEP Administration	Genesys Administrator	8.1.3+	UI

Category	Component	Version	Notes
WFM Components	WFM Server	V8.5	Centralized communication hub for all WFM Components, houses Forecasting algorithms, server for API integration, as well as populating WFM Reporting Database.
	WFM Builder	V8.5	Houses Scheduling Algorithms
	WFM Data Aggregator	V8.5	Responsible for CME synchronization and Statserver communication for historical data collection and RTA.
	WFM Daemon	V8.5	Serves as SMTP client for the automatic distribution of email notifications as well as manages the auto-generation of reports.
	WFM Web	V8.5	Web Application providing all WFM connectivity for Supervisors and Agents. Can also be configured to be a dedicated report server. Sits on either an Apache Tomcat Web Server or IBM Websphere
	WFM API	V8.5	Java/.NET used to build external integration to the WFM database and/or component functionality. Utilizes SOAP web services communication to WFM Server.
Database			
	WFM Operational Database	V8.5	Houses all WFM data such as configurations, forecasts, schedules, etc. Designed for use of WFM components and external integration REQUIRES use of the WFM API

Category	Component	Version	Notes
	WFM Reporting Database	V8.5	A relational database housing specific metrics around forecasts, schedules, performance, and agent adherence. Is open and accessible via standard SQL queries and does NOT require use of the WFM API.

Table 1: Genesys Components

3.4.2 3rd Party Components

The following table lists the 3rd party components that may be included in the solution. Alternatives are also noted, though the recommended components are encouraged.

Component	Recommended	Version	Note
DBMS	Oracle	11g	
	MSSQL	2005, 2008, 2012	
	DB2	9.1, 9.5, 9.7, 10	
Web Application Server	Apache Tomcat	6, 7	
	IBM Websphere	7, 8	
Server OS	Windows Server	2008	32bit or 64bit
	Windows Server	2012	32bit or 64bit
Browser	Internet Explorer	8,9,10,11	
	Chrome		
Java	JDK	6,7	For Apache Tomcat server
	JRE	6,7	For browser
Virtualization	VMWare	5.1+	

Table 2: 3rd Party Component List

4 Deployment View

4.1 Utilization vs. Workload

Unlike many of the other Genesys Solutions, where expected workload factors such as number of agents, calls per day, or peak-busy-hour are the driving factors towards determining the appropriate and optimal hardware sizing and server counts, Genesys Workforce Management relies more on the expected utilization of the solution as a whole by the end-users: WFM Administrators, Supervisors, and Agents.

Each component of the WFM solution is designed to provide certain functionalities and duties based on what the end user interfacing with the system wishes to do. It is through the understanding of how the end customer foresees their utilization of the solution that will allow us to provide the proper sizing guidelines.

Below is a review of the various components of WFM and when they are actually engaged by the solution.

WFM Web

The WFM Web component serves two roles:

- This is the Web Application that is residing on either an Apache Tomcat Web Server or an IBM WebSphere Web Server. This is the interface through which any user accesses the WFM Supervisor Web interface or the WFM Agent Web interface. The component is being utilized whenever someone is actively "doing something" in the system.
- The WFM Web also contains all of the WFM Reporting functionality. Reports are generated directly by the WFM Web component and provided to the WFM Supervisor Web interface. For this reason, one or more instances of WFM Web can be installed to be dedicated Reporting servers, so that normal WFM functionality requests will be handled by the main instance of WFM Web, but any report-generation requests will be handed off to the WFM Web defined solely for the generation of Reports.

WFM Builder

This is the component that is responsible for generating a new schedule scenario, re-optimizing an existing schedule scenario, and performing an intraday schedule rebuild against an existing schedule scenario or the master schedule. This process receives requests from the WFM Server process to either build, or rebuild, part of all of a schedule scenario or the master schedule. These are processed by the Builder algorithms and the completed or new schedules are returned to the WFM Server. This is the only time WFM Builder is actively "doing something." Even though the code of the WFM Builder process can be considered "multi-threaded" with regards to how it interacts with the hardware (CPU/Cores) upon which it is installed, a single WFM Builder process can only process ONE schedule build request at a time.

WFM Server

This component serves multiple roles:

- WFM Server is the central hub through which practically all inter-process communication passes. For example, when a user in the Supervisor Web interface wishes to build a new

schedule, the WFM Web does not connect directly to WFM Builder. Instead, it makes the request of the WFM Server to which it is a client who then passes the request on to the WFM Builder process. If there are more than one WFM Builder processes available or the requesting user has been assigned a specific WFM Builder process, WFM Server will pass the request on to the appropriate WFM Builder. If all WFM Builder process are occupied, then WFM Server will queue the requested action until one of the need processes becomes available.

- The WFM Server is where all of the WFM Forecasting algorithms reside. This includes the Expert Average Engine and Universal Modelling Engine for calculating future workload forecasts (Volumes & AHT) as well as the Immediate Staffing and Deferred Staffing algorithms for calculating staffing needs based on the workload forecasts. When a user on the WFM Web requests that a forecast be built, the WFM Server component fulfills this request.
- The WFM Server is the component which serves as the server through which any external, third-party client built with the WFM API will communicate. In actuality, the WFM API clients will communicate through a web service, but the WFM component that will process those client request will be the WFM Server.
- The WFM Server is the component which is responsible for populating the WFM ETL/Report database that was introduced with WFM v8.1.3. The primary WFM Server can provide this functionality as well, but you can also install and configure a dedicated WFM Server instance that is only responsible for populating this database.

The WFM Server also has the ability to be assigned to a specific CME Tenant when implemented within a multi-tenant environment for security and partitioning purposes. This is detailed in the WFM Administrator's Guide available here: http://docs.genesys.com/Documentation/WM.

A second WFM Server may also be configured as a backup WFM Server process. This backup would be considered a "warm" backup.

Multiple WFM Servers can be installed within a multi-site environment, with each WFM Server dedicated to one or more sites for load-balancing purposes.

WFM Daemon

This component serves two roles:

- The WFM Daemon acts as the SMTP client to a customer's SMTP server through which automated email notifications are sent.
- The WFM Daemon acts as the process which automatically generates Reports based on a user's Report Scheduler configurations through the WFM Web process that has been configured to generate user-requested reports.

The only time the WFM Daemon is "active" is when it is performing one of these two functions.

WFM Daemon is the only WFM component that could be considered "optional" as it does not provide any functionality that is necessary for the proper functioning of the Workforce Management Solution.

WFM Data Aggregator

This component serves three roles:

- WFM Data Aggregator acts as a client for Configuration Server and registers for any changes in CME regarding Agents, Skills, Agent Skill Proficiencies, and Sites. This allows Genesys WFM's configuration to be automatically synchronized in real time with the Genesys CME.
- WFM Data Aggregator acts as a client of StatServer and registers to receive certain statistics, at 15 minute intervals, that WFM uses in various parts of the system:
    - Interaction Volume – Historical data collection used by forecasting workload algorithms, and Actual data used in Performance views and reports.
    - Average Handle Time - Historical data collection used by forecasting workload algorithms, and Actuals data used in Performance views and reports.
    - Abandons – Used to provide Actuals data used in Performance views and reports.
    - Quality of Service – Used to provide Actuals data used in Performance views and reports.
    - Backlog – Used to gather totals in "backlog" interaction queues for population of "Initial Queue" field in Deferred Staffing algorithm.
- WFM Data Aggregator acts as a client of StatServer and registers for any Agent State Model changes. This provides the real-time state information used within the WFM Real Time Adherence views and reports.

WFM Data Aggregator is the only WFM component that is considered "active" all of the time, even when no one is using the WFM functionality. Therefore, WFM Data Aggregator is the ONLY WFM component that can be configured to be in "hot" standby mode. This configuration option is included with the WFM License and does not require the customer to purchase or own the standard "High Availability Option" necessary for other Genesys solutions. In order for a customer to have a truly HA implementation, there must be at least one primary-backup Data Aggregator pairing.

As can be derived from the description of the roles these various components play within a given Genesys WFM implementation, the size of the environment (# of Agents, # of calls, etc.) does not have nearly the impact on server sizing and server count as does the expected utilization of certain functions of the WFM environment, both in user-scope and frequency.

The following worksheet provides a good template from which to gather the necessary information to help identify the sizing and server needs of a given Genesys WFM customer:

Genesys Workforce Management Architecture Questionnaire		
How many sites (geographic)		
Will Forecasting be generated centrally or locally?		
Will Scheduling be generated centrally or locally?		
Central Administration or Site 1		
How many Agents		
How many Supervisors		
How many individuals will be generating schedules?		
How often will they be generating schedules?		
Will Agents have access to the web interface?		
If so, which pieces will they have access to (please check all that apply)?		
	View Schedules	
	Trade Schedules	
	Enter Preferences	
	Enter Exceptions	
	Bid on Schedules	
	Manage Time Off	
Will Supervisors have access to the web interface?		
If so, what pieces of functionality will they have access to (please check all that apply)?		
	Access Calendar	
	View Forecasts	
	Create/Edit Forecasts	
	View Schedules	
	Create/Edit Schedules	
	View RTA	
	View Performance	
	Generate Reports	

Genesys Workforce Management Architecture Questionnaire		
Site 2	**(Same as Previous Site? Yes or No)**	
How many Agents		
How many Supervisors		
How many individuals will be generating schedules?		
How often will they be generating schedules?		
Will Agents have access to the web interface?		
If so, which pieces will they have access to (please check all that apply)?		
	View Schedules	
	Trade Schedules	
	Enter Preferences	
	Enter Exceptions	
	Bid on Schedules	
	Manage Time Off	
Will Supervisors have access to the web interface?		
If so, what pieces of functionality will they have access to (please check all that apply)?		
	Access Calendar	
	View Forecasts	
	Create/Edit Forecasts	
	View Schedules	
	Create/Edit Schedules	
	View RTA	
	View Performance	
	Generate Reports	
Site 3…n		
How many Agents		
How many Supervisors		
How many individuals will be generating schedules?		
How often will they be generating schedules?		
Will Agents have access to the web interface?		
If so, which pieces will they have access to (please check all that apply)?		
	View Schedules	
	Trade Schedules	

Genesys Workforce Management Architecture Questionnaire		
	Enter Preferences	
	Enter Exceptions	
	Bid on Schedules	
	Manage Time Off	
Will Supervisors have access to the web interface?		
If so, what pieces of functionality will they have access to (please check all that apply)?		
	Access Calendar	
	View Forecasts	
	Create/Edit Forecasts	
	View Schedules	
	Create/Edit Schedules	
	View RTA	
	View Performance	
	Generate Reports	

4.2 Deployment Options

4.2.1 Centralized Deployment

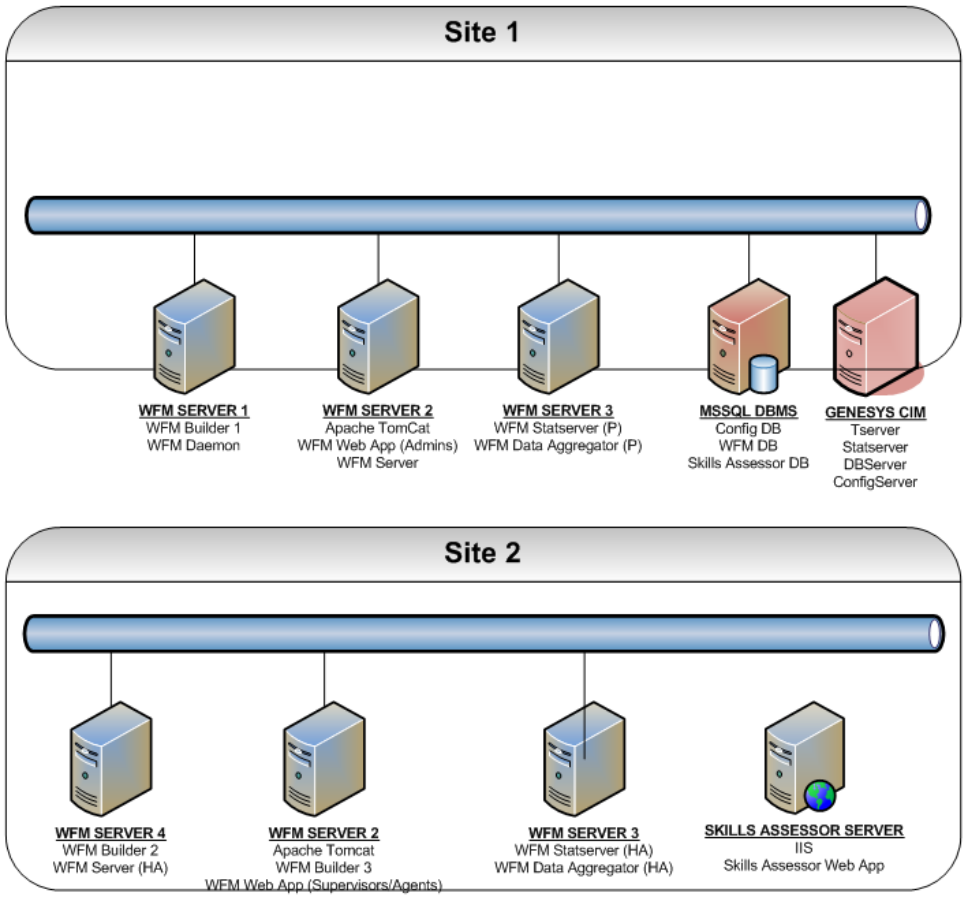
Within a given Genesys WFM environment, the concept of a "centralized" deployment is based more on the expected utilization of the product and its various component-based functionalities as opposed to distribution of hardware and servers themselves.

As can be derived from the questionnaire on the previous page, the understanding of where and by whom a certain WFM functionality will be accessed and used will dictate how centralized the given implementation need be.

For example:

Even though a customer's multiple contact centers are spread out across the globe, all forecasting functionality is handled by a core WFM-team located in only one of the sites. This team is responsible for generating all workload forecasts and staffing requirement forecasts for the entire enterprise, therefore all of the components necessary for forecasting (WFM Server) can be located in the site where the Forecasting team resides.

However, even though this customer has centralized its Forecasting Responsibilities, Resource Planners at each of the local sites are responsible for building the schedules for the agents/resources located at that site based on the Forecasted Staffing needs provided by the Core Forecasting Team. This would require one or more WFM Builders to be located at each of the sites to aid in the efficient performance of their duties as Schedulers.



ASSUMPTIONS

-1500 Agents (500/site)
-60 Supervisors (20/site)
-2 WFM Admins
-Agents will use all WFM Agent Web Functionality
-Supervisors will run reports, view RTA, approve Trades and Time Off Requests via their Web Interface
-Forecasting will be done centrally, monthly
-Schedules will be generated centrally, monthly and re-optimized weekly.
-Server OS: Windows 2008 Server x64, Dual Core, 8gb RAM

In a centralized deployment of Genesys WFM, server count can be quite low if much of the functionality is going to be limited to a core group.

4.2.2 Multi-Site Deployment

As can be seen in the above examples, understanding how the various WFM components should be distributed within a Multi-Site Deployment depends purely on HOW the various individuals at each of

the sites plans on interacting with the WFM Solution.
As we can see from this model, if we have two completely different customers:

- Customer "A" – 500 agents, 1 site. However, each department, of which there are 10, is responsible for generating their own forecasts, and their own schedules on a weekly basis. Every Supervisor has the ability to manage their agents' schedules changes, optimize their own coaching sessions, and access all Real Time Adherence views and run reports on their own Agents. All of the agents have the ability to access all functionality of the WFM Agent Web Interface.
- Customer "B" – 5000 agents spread across 10 sites globally. However, ALL Forecasts and Schedules are generated by the central Resource Planning team located in the corporate headquarters. These Forecasts and Schedules are generated quarterly and pushed out to all of the other sites. There is one Planner located at each site who is responsible for managing all intraday changes. Supervisors only have the ability to see RTA and run reports and Agents have no access to anything functionality other than the ability to view their schedules.

Unlike other Genesys Solutions, where number of sites, number of agents, and interaction volumes are the common determinants of hardware sizing and server count, expected user functionality utilization is the driving force within a WFM implementation and cause the necessary hardware requirements for Customer "A", even though they are 1/10th the size, to be significantly greater than those for Customer "B."

			Site A				Site B
	Server 1				**Server 1**		
		Type	A			**Type**	A
		WFM Software	WFM Statserver (Primary)			**WFM Software**	WFM Statserver (Backup)
			WFM Server 1				WFM Server 2
			WFM Data Aggregator (Primary)				WFM Data Aggregator (Backup)
			WFM Daemon				
500 Agents							
	Server 2				**Server 2**		
		Type	A			**Type**	A
		WFM Software	WFM Web (Admins)			**WFM Software**	WFM Web (Supervisors/Agents)
	Server 3	**Type**	B		**Server 3**	**Type**	B
		WFM Software	WFM Builder 1			**WFM Software**	WFM Builder 3
			WFM Builder 2				WFM Builder 4

			Site A				Site B
	Server 1				**Server 1**		
		Type	A			**Type**	A
		WFM Software	WFM Statserver (Primary)			**WFM Software**	WFM Statserver (Backup)
			WFM Data Aggregator (Primary)				WFM Data Aggregator (Backup)
			WFM Daemon				
	Server 2				**Server 2**		
2000 Agents		**Type**	A			**Type**	A
		WFM Software	WFM Web (Admins)			**WFM Software**	WFM Web (Supervisors/Agents)
	Server 3				**Server 3**		
		Type	B			**Type**	B
		WFM Software	WFM Builder 1			**WFM Software**	WFM Builder 3
			WFM Builder 2				WFM Builder 4
	Server 4				**Server 4**		
		Type	A			**Type**	A
		WFM Software	WFM Server 1			**WFM Software**	WFM Server 2

Notice in the above sizing example, increasing the customer's agent count by 400% only requires the addition of one server per site.

4.2.3 High Availability Deployment

Unlike other Genesys Solutions, WFM can be implemented in a highly available, redundant manner without the need to purchase any additional HA licensing. The two primary components that can be implemented in a HA mode are WFM Data Aggregator and WFM Server.

4.2.3.1 WFM Data Aggregator

As was stated earlier, WFM Data Aggregator is the only component that can be configured as a backup in Hot Standby mode. Details for implementing this can be found in the WFM Administrators Guide. This document is available here: http://docs.genesys.com/Documentation/WM.

4.2.3.2 WFM Server

WFM Server can be implemented to act as a backup to a primary WFM Server, however, this is simply a warm standby backup. Details for implementing this can be found in the WFM Administrators Guide. . This document is available here: http://docs.genesys.com/Documentation/WM.

5 Hardware Utilization

As was stated previously, the necessary hardware for a given WFM deployment depends not so much on how many agents/supervisors are configured within the system, but how often they will be accessing the various components for certain functionalities.

The following test results outline just what kinds of loads are placed on the hardware dedicated to the WFM solution based on utilization:

5.1 WFM Web Agent CPU utilization

Purpose: To estimate the WFM web agent CPU utilization dependency on work load.

Environment:

- WFM Web Server: VMWare Windows-2008 (64-bit), 4 GHz CPU and 4 GB RAM
- WFM Server: VMWare Windows-2008 (64-bit),4 GHz CPU and 4 GB RAM
- MSSQL Server DBMS: VMWare Windows-2008 (32-bit), 4 GHz CPU and 4 GB RAM

Apache Tomcat Tuning:

- Initial memory pool – 1300 MB
- Maximum memory pool – 1300 MB

Test Case: 1500 Agents across 3 sites were simulated for each 15 min time interval.

The above WFM components performed as follows:

Loading on WFM Web Server—

- CPU - usage in MHz: max – 3031, average – 458
- Disk - write rate in KBps: max – 5216, average – 147
- Memory – active in MB: max – 1843, average – 1104
- Network – usage in KBps: max – 846, average – 658

Loading on WFM Server—CPU - usage in MHz: max – 1058, average – 465

- Disk - write rate in KBps: max – 208, average – 113
- Memory – active in MB: max – 655, average – 275
- Network – usage in KBps: max – 410, average – 357

Loading on Genesys Framework (include WFM database):

- CPU - usage in MHz: max – 391, average – 274

- Disk - write rate in KBps: max – 45, average – 7
- Memory – active in MB: max – 205, average – 145
- Network – usage in KBps: max – 295, average – 228

5.2 WFM Web Supervisor CPU utilization

Purpose: To estimate the WFM web supervisor CPU utilization dependency on work load

Environment:

- WFM Web Server: VMWare Windows-2008 (64-bit), 4 GHz CPU and 4 GB RAM
- WFM Server: VMWare Windows-2008 (64-bit),4 GHz CPU and 4 GB RAM
- MSSQL Server DBMS: VMWare Windows-2008 (32-bit), 4 GHz CPU and 4 GB RAM

Apache Tomcat Tuning:

- Initial memory pool – 1300 MB
- Maximum memory pool – 1300 MB

Test Case: 60 simultaneous Web Supervisor sessions across 3 sites were simulated for each 15 min time interval.

The above WFM components performed as follows:

WFM Web Server:

- CPU - usage in MHz: max – 872, average – 208
- Disk - write rate in KBps: max – 43, average – 32
- Memory – active in MB: max – 1188, average – 923
- Network – usage in KBps: max – 562, average – 485

WFM Server:

- CPU - usage in MHz: max – 2129, average – 283
- Disk - write rate in KBps: max – 5338, average – 180
- Memory – active in MB: max – 696, average – 327
- Network – usage in KBps: max – 143, average – 100

Genesys Framework (include WFM database):

- CPU - usage in MHz: max – 269, average – 161
- Disk - write rate in KBps: max – 40, average – 7
- Memory – active in MB: max – 246, average – 153

- Network – usage in KBps: max – 25, average – 12

5.2.1 Database Sizing

The following table summarizes the database sizing requirements for Genesys components stored within the RDBMS. These are estimates based on the sizing assumptions and should be treated as a starting point. Other customer factors can impact the overall data requirements.

These tables were generated using the latest DB Sizing Calculator, found here:

http://docs.genesys.com/Documentation/System#t-1

Workforce Management 8.x with Oracle

Contact Center Configuration	Number			
Type of the Database Server:	Oracle			
Number of Sites:	3	<--	Please enter the estimated number of Sites	nSites
Number of Activities and Multi-Site Activities:	100	<--	Please enter the estimated number of Activities	nActivities
Number of Agents:	3,000	<--	Please enter the estimated number of Agents	nAgents
Number of Teams:	300	<--	Please enter the estimated number of Teams	nTeams
Number of Schedule Trades per Agent per Year:	15	<--	Please enter the estimated number of Trading Transactions per Agent per Year	nTrading
Number of Scenarios per Year for Same Activities:	5	<--	Please enter the estimated number of Scenarios for Same Activities per Year	nScenarios
Number of Days per Scenario:	30	<--	Please enter the estimated number of Days in each Scenario	nDays
Number of Factors:	15	<--	Please enter the estimated number of Factors	nFactors
Number of Events per Factor:	2	<--	Please enter the estimated number of Events per Factor	nFactorEvents
Number of Forecast Override Templates:	25	<--	Please enter the estimated number of Forecast Override Templates	nTemp
Number of Days per Override Template:	30	<--	Please enter the estimated number of Days per Override Template	nTempDays
Number of Forecast non-Override (weekly) Templates:	25	<--	Please enter the estimated number of non-Override Templates	nTempWeekly
Number of Calendar Items changes per Day:	10	<--	Please enter the estimated number of Calendar changes per Day	nCalChanges
Number of changed Calendar Items per transaction:	10	<--	Please enter the estimated number of changed Calendar Items per each change	nCalItems
Number of Calendar Items per Agent per Year:	10	<--	Please enter the estimated number of Calendar Items per Agent per Year (count Vacations, Sick Days, Exceptions, Day Offs, etc.)	nCalendar
Number of manual schedule changes per Agent per Year:	33	<--	Please enter the estimated number of schedule changes for one Agent per Year	nSchChanges
Polling Timer:	525600	<--	Please enter the number of times WFM Daemon will ask WFM Server for updates per Year. Default setting is 1 minute = 365 * 24 * 60. Enter 0 if you will not use WFM Daemon.	nPollingTimer
Audit type:	Low	<--	Please select between Low and High Audit Level. Possible values are: Low or High.	nAuditLevel

Annual WFM Database size	Bytes	GB
DB Size Year 1:	7,066,190,585	6.58
DB Size Year 2:	14,132,381,169	13.16
DB Size Year 3:	21,198,571,754	19.74
DB Size Year 4:	28,264,762,339	26.32

Notes: RecordSize for each subsystem is calculated using customer databases with real data on Oracle 10g.

Workforce Management 8.0 with Microsoft SQL Server

Contact Center Configuration	Number			
Type of the Database Server:	MSSQL			
Number of Sites:	3	<--	Please enter the estimated number of Sites	nSites
Number of Activities and Multi-Site Activities:	100	<--	Please enter the estimated number of Activities	nActivities
Number of Agents:	3,000	<--	Please enter the estimated number of Agents	nAgents
Number of Teams:	300	<--	Please enter the estimated number of Teams	nTeams
Number of Schedule Trades per Agent per Year:	15	<--	Please enter the estimated number of Trading Transactions per Agent per Year	nTrading
Number of Scenarios per Year for Same Activities:	5	<--	Please enter the estimated number of Scenarios for Same Activities per Year	nScenarios
Number of Days per Scenario:	30	<--	Please enter the estimated number of Days in each Scenario	nDays
Number of Factors:	15	<--	Please enter the estimated number of Factors	nFactors
Number of Events per Factor:	2	<--	Please enter the estimated number of Events per Factor	nFactorEvents
Number of Forecast Override Templates:	25	<--	Please enter the estimated number of Forecast Override Templates	nTemp
Number of Days per Override Template:	30	<--	Please enter the estimated number of Days per Override Template	nTempDays
Number of Forecast non-Override (weekly) Templates:	25	<--	Please enter the estimated number of non-Override Templates	nTempWeekly
Number of Calendar Items changes per Day:	10	<--	Please enter the estimated number of Calendar changes per Day	nCalChanges
Number of changed Calendar Items per transaction:	10	<--	Please enter the estimated number of changed Calendar Items per each change	nCalItems
Number of Calendar Items per Agent per Year:	10	<--	Please enter the estimated number of Calendar Items per Agent per Year (count Vacations, Sick Days, Exceptions, Day Offs, etc.)	nCalendar
Number of manual schedule changes per Agent per Year:	33	<--	Please enter the estimated number of schedule changes for one Agent per Year	nSchChanges
Polling Timer:	525600	<--	Please enter the number of times WFM Daemon will ask WFM Server for updates per Year. Default setting is 1 minute = 365 * 24 * 60. Enter 0 if you will not use WFM Daemon.	nPollingTimer
Audit type:	Low	<--	Please select between Low and High Audit Level. Possible values are: Low or High.	nAuditLevel

Annual WFM Database size	Bytes	GB
DB Size Year 1:	6,981,964,105	6.50
DB Size Year 2:	13,963,928,211	13.0
DB Size Year 3:	20,945,892,316	19.5
DB Size Year 4:	27,927,856,421	26.0

Notes: RecordSize for each subsystem is calculated using customer databases with real data on MSSQL Server 2000.

Workforce Management 8.0 with DB2

Contact Center Configuration	Number			
Type of the Database Server:	DB2			
Number of Sites:	3	<--	Please enter the estimated number of Sites	nSites
Number of Activities and Multi-Site Activities:	100	<--	Please enter the estimated number of Activities	nActivities
Number of Agents:	3,000	<--	Please enter the estimated number of Agents	nAgents
Number of Teams:	300	<--	Please enter the estimated number of Teams	nTeams
Number of Schedule Trades per Agent per Year:	15	<--	Please enter the estimated number of Trading Transactions per Agent per Year	nTrading
Number of Scenarios per Year for Same Activities:	5	<--	Please enter the estimated number of Scenarios for Same Activities per Year	nScenarios
Number of Days per Scenario:	30	<--	Please enter the estimated number of Days in each Scenario	nDays
Number of Factors:	15	<--	Please enter the estimated number of Factors	nFactors
Number of Events per Factor:	2	<--	Please enter the estimated number of Events per Factor	nFactorEvents
Number of Forecast Override Templates:	25	<--	Please enter the estimated number of Forecast Override Templates	nTemp
Number of Days per Override Template:	30	<--	Please enter the estimated number of Days per Override Template	nTempDays
Number of Forecast non-Override (weekly) Templates:	25	<--	Please enter the estimated number of non-Override Templates	nTempWeekly
Number of Calendar Items changes per Day:	10	<--	Please enter the estimated number of Calendar changes per Day	nCalChanges
Number of changed Calendar Items per transaction:	10	<--	Please enter the estimated number of changed Calendar Items per each change	nCalItems
Number of Calendar Items per Agent per Year:	10	<--	Please enter the estimated number of Calendar Items per Agent per Year (count Vacations, Sick Days, Exceptions, Day Offs, etc.)	nCalendar
Number of manual schedule changes per Agent per Year:	33	<--	Please enter the estimated number of schedule changes for one Agent per Year	nSchChanges
Polling Timer:	525600	<--	Please enter the number of times WFM Daemon will ask WFM Server for updates per Year. Default setting is 1 minute = 365 * 24 * 60. Enter 0 if you will not use WFM Daemon.	nPollingTimer
Audit type:	Low	<--	Please select between Low and High Audit Level. Possible values are: Low or High.	nAuditLevel

Annual WFM Database size	Bytes	GB
DB Size Year 1:	6,953,362,705	6.48
DB Size Year 2:	13,906,725,411	12.95
DB Size Year 3:	20,860,088,116	19.43
DB Size Year 4:	27,813,450,821	25.90

Notes: RecordSize for each subsystem is calculated using customer databases with real data on DB2 Server 8.2.

5.3 Security

Protecting the customer's infrastructure is imperative for any solution deployment. Genesys components can typically be deployed in a secure manner. Many customers have their own security procedures that our solution needs to conform to. The following are guidelines for some of the requirements that may be encountered or should be recommended.

5.3.1 User Security

In addition to the overall Application-Level security that is controlled at the Person Object in CME, Genesys WFM contains its own security subsystem allowing you to control what specific WFM functionality a user has access to and which Sites and Teams of Agents that user can apply that functionality to.

The User Security module enables you to configure security settings for all supervisors (that is, all non-agents who use WFM). It groups security settings into the following categories: General, Configuration, Policies, Calendar, Forecast, Insert text, Schedule, Trading, Performance, Adherence, Reports, and Data Import/Export.

Under each category are various options. For example, Notifications is an option under Configuration. If a user is assigned Notifications permission, that user can then access the Notifications module in WFM Web for Supervisors. Users without this permission cannot access and therefore cannot modify the configuration of email notifications.

The user security settings allow for a great deal of flexibility. You can specify which sites and business units, teams, and so on, the user can access. You can configure no calendar, forecast, and schedule access; read-only access; or full access. In addition, you can enable users to make only pending schedule changes—that is, schedule changes that require approval from a qualified user before they are incorporated into the Master Schedule.

To configure user security settings efficiently, determine the access levels appropriate for all users. You can change settings at any time, as necessary. You can also use Security Roles to more easily configure security settings for users, by creating a Security Role, assigning permissions to it, and then assigning one or more WFM users to that Security Role. An administrator can configure a security role as the default. All new users added to the WFM system will be assigned to this default security role and will be limited to its access permissions.

5.3.2 Secure Connections

Connections between components, especially those external to the solution should be secured. Where possible use SSL or HTTPS.

5.3.3 VM and OS hardening

Operating Systems are often pre-configured for ease of use and development and not necessarily security. If the O/S is being installed or is part of a set of VMs being delivered, that O/S should be hardened to ensure that typical security holes are addressed.

The following process from the Genesys Cloud solution should be used to harden the solution VMs and the OSs.

https://portal.genesyslab.com/dir/rd/rndsop/Shared%20Documents/10%20Security%20and%20Compliance/SaaS%20Program%20Policies/System%20Configuration%20Standards/10.06.10%20SaaS%20Standard%20-%20Windows%20Server%202008%20Configuration%20-%20v1.0.docx

5.4 Localization and Internationalization

Genesys localizes (translates) Workforce Management (WFM) into a number of languages. You can localize WFM 8.x components by using Genesys localization software or by using the self-localization method.

If Genesys localizes into the desired language, the Genesys-provided localization software can be used to localize WFM Daemon, Server, Builder, Data Aggregator, and Web. Otherwise, you can use the self-localization method to localize WFM Web Supervisor and Agent.

The two methods of localization are described in detail in the following sections.

5.4.1 Genesys WFM Localization Software

Genesys WFM uses Language Packs (LP) to provide localized resources for the end user. The Language Pack is a separate IP, which is installed over the component IP. It contains only localized resources, which replace the resources in the original product IP. The Language Pack contains resources for a single language, so every language requires a separate LP. If you are installing more than one LP, you must install them one at a time. Only one Language Pack can be used over one component IP at one time.

WFM has LPs for the following components:

- WFM Web
- WFM Daemon
- WFM Server
- WFM Data Aggregator
- WFM Builder

The WFM server (Server, Builder, and Data Aggregator) services choose the installed Language Pack according to the locale. It uses the exact language match or, if it is unavailable, the Language Pack for the same language group. WFM servers checks the user or system account locale of the operating system on which it is running. By default it is the system account on Windows 2008/2012.

> Detailed instructions for installing the Genesys WFM Localization Packs can be found in the most current Genesys WFM Administrators Guide, available here: . This document is available here: http://docs.genesys.com/Documentation/WM.

5.4.2 Genesys WFM Self-Localization

It is possible to localize the GUIs for WFM Web Supervisor and WFM Web Agent without having to obtain localized software from Genesys. This enables Genesys partners and customers to deploy translated versions of these user interfaces when Genesys does not provide localized versions of WFM.

The WFM Agent and Supervisor components each draw their GUI text from a properties file, which you can modify. You can localize WFM to any language that you wish by translating the text in these files.

*NOTE: Self-localization does not affect all text in WFM Web. The text of some messages (such as the resolution of Calendar items, Schedule Build Validation messages, and others) do not reside in the wfm.war properties files, and are therefore, not localized.

Requirements: Ensure you have the following requirements to complete your self-localization:

- JDK (the Java Development Kit, same version as required by WFM Web) must be located in the path JAVA_HOME.
- Certificate to sign Java code.

Using localization.bat

The *localization.bat* batch file is installed in the same directory where WFM Web was initially installed. Use this file to:

- Extract the *agent.properties* and *supervisor.properties* properties files from the *wfm.war* file.
- Update the *wfm.war* file by reinserting the two WFM Properties files. Run the *localization.bat* file from the Windows command line interface.

```
USAGE:
localization -{xuci} [wfm-war-file] OR -{eh}
[-a OR -a8 [agent-properties-file]] [-s
[supervisor-properties-file]]
Options:
-x extract properties from WFM war
-u update WFM war with new properties
-c create WFM localization jar archive
-i insert WFM localization jar in the war archive
-a define path to agent properties file
-a8 define path to agent800 properties file
-s define path to supervisor properties file
-e show examples
-h,/? show this message
Parameters:
[wfm-war-file] path to WFM war
[agent-properties-file] path to agent properties file
[supervisor-properties-file] path to supervisor properties file
Additional Info:
If you not define the file name the default name will be used.
For war it is 'wfm.war' in current folder.
For agent it is 'agent.properties' in current folder.
For agent800 it is 'agent800.properties' in current folder.
For supervisor it is 'supervisor.properties' in current folder.
CAUTION:
Please backup the original properties to the safe place
already after extraction.

You may use them for restoring if something goes wrong.
```

Detailed instructions for installing the Genesys WFM Self-Localization can be found in the most current Genesys WFM Administrators Guide. This document is available here:

http://docs.genesys.com/Documentation/WM