

Workforce Central Technical Overview

Introduction

The Kronos® Workforce Central® suite is the most comprehensive workforce management solution available from a single source. It includes a core of best-in-class web-based applications that help organizations hire the best people and manage them most effectively. When combined with our intuitive self-service applications, the Workforce Central suite delivers value to the entire workforce — at all levels of the organization.

The Workforce Central suite is designed to maximize workforce productivity while minimizing the impact on IT. This overview provides technical experts with valuable information regarding the Workforce Central architecture, integration capabilities, platform support, and security for Workforce Central Labor Management as well as Workforce Central HR/Payroll products. It also includes guidelines to help new customers with up to 8,000 employees using a SQL database plan and budget for the hardware required to run Workforce Central applications on Intel-powered systems.

Workforce Central Labor Management Technology Overview

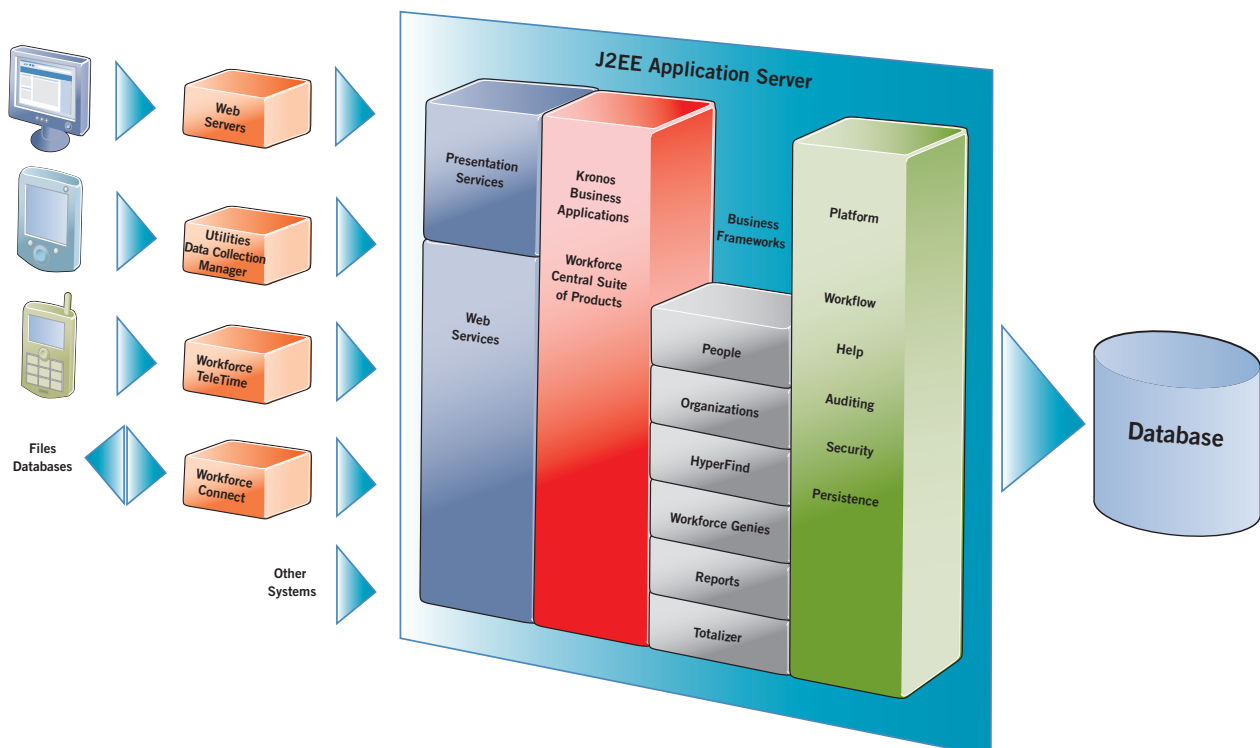
Platform portability

The Workforce Central architecture is based on an industry-standard model that uses the Java 2 Enterprise Edition (J2EE) for web applications. This open, portable approach to application development gives customers many platform options, allowing them to choose from an extensive set of scalable operating systems and application servers. The architecture also supports Microsoft SQL Server and Oracle, the leading industry-standard database systems.

Three-tiered architecture

Workforce Central solutions are designed using a three-tiered application architecture that supports rapid deployment and cost-effective integration of the applications within a customer's existing IT infrastructure.

High-Level Overview of the Workforce Central Suite



Client tier: In the client tier, customers have access to multiple types of interfaces through which end users can interact with the Workforce Central applications. Depending on the role of the user, application access can be provided via telephony, PDAs, data collection terminals, Smart Views™, dynamic HTML, rich web interfaces (Ajax, Java applets), or portals. Web pages and applets connect to the web-based Workforce Central application server in the middle tier.

Application or middle tier: The application tier contains the following key components:

- The J2EE application server, which executes the application logic and displays the dynamic content
- The web server, which contains the static content and serves browser requests that are passed to Workforce Central
- The background processor, a multithreaded Java application that optimizes the application server's data processing for fast response times

At the heart of the background processor is a robust rules engine, designed around an object-oriented model called the Workforce Totalizer. This powerful processor executes Workforce Central's time and attendance business rules in real time to provide payroll managers and supervisors with up-to-date data calculations that support decision making and data modeling.

Database tier: Within the database tier, the database server efficiently stores and retrieves all application data. The customer's specific database configuration is based on several variables, including the number of employee records, the number of clients, the number of stored pay periods, and the configuration of the storage subsystem.

Product extensibility

The Workforce Central suite's technology provides a documented, XML-based API that allows developers to extend the features of the suite. API calls are supported across releases so upgrades to the suite do not impact the extended features.

Security

Kronos recognizes the importance of safeguarding the information in your workforce management solution. To that end, the company continues to make significant investments to help ensure that our security capabilities exceed your expectations and requirements. Workforce Central supports LDAP and NT domain registries for password authentication, which allow customers to centralize password maintenance. Workforce Central also supports SSL — at the customer's option — for added security.

Workforce Central enforces the concept of “no privileges until assigned,” which means that users cannot access system data or functions until access is explicitly assigned to them. User access rights are defined in Workforce Central access control profiles.

Workforce Central performs password- or biometrics-based authentication as well as profile-driven authorization, to help ensure maximum data protection.

Authentication	Authorization
<ul style="list-style-type: none"> • Authentication identifies users based on factors such as user name and password. The biometrics option uses a finger template for authentication. 	<ul style="list-style-type: none"> • Once a user is identified, the authorization function creates a user session containing privileges provided by role-based profile assignment.
<ul style="list-style-type: none"> • The authentication function supports LDAP, Active Directory, and the Kronos database. It also supports the addition of other directory services using JAAS. 	<ul style="list-style-type: none"> • Profiles manage data access, including which employees a specific user can access and the types of data and editing available.
<ul style="list-style-type: none"> • Each user can be configured with a different authentication authority. 	<ul style="list-style-type: none"> • Profiles define which applications are available to a specific user. The user's navigation is automatically generated based on his or her access privileges.
<ul style="list-style-type: none"> • User time-outs and password policies are fully configurable. 	
<ul style="list-style-type: none"> • Single Sign On (SSO) support is provided through CA eTrust. Other SSO options are also available. 	

Reporting

The reporting functionality in Workforce Timekeeper™ v6.0 is based on report definition language (RDL), a Microsoft XML schema for representing reports. Workforce Timekeeper and all other Workforce Central applications support the following reporting solutions:

Standard Reporting Solution* functionality is delivered when you install Workforce Central; no additional setup is required. Basic reporting uses RDL report templates and the Reports Definition Language Client (RDLC) engine.

Advanced Reporting Solution* requires that you purchase and install Microsoft SQL Server 2005 Reporting Services. Additional setup is needed to use Workforce Central with SSRS. Advanced Reporting, which uses RDL-compliant report templates and the Microsoft SQL Server Reporting Services (SSRS) engine, provides sophisticated reporting options, including the ability to export to different formats, such as Microsoft Excel, and to drill down to greater detail. Additional licensing and hardware may be required.

Custom Solutions are available for customers wishing to implement any non-meta data or third-party reporting tools, such as Oracle, Actuate, or Business Object XI. This solution requires engagement with the Kronos Service Solution Team.

Platform support

Client support

Workforce Employee™ and Workforce Manager™ can be accessed using HTML- and Java-based clients. The HTML client extends system utilization by enabling employees across the enterprise to access the applications via low-end Intel PCs. Self-service functionality for employees and managers is provided by means of true thin-client user interfaces (UIs), which utilize hypertext markup language (HTML) and JavaScript scripting. These HTML interfaces are accessed by different URLs than those for the applet-based user interfaces.

Other users may need sophisticated display functions with a highly interactive user interface that efficiently accesses multiple employee records. To meet these needs, Kronos' solution provides Java applets, which are downloaded from the application server via a Java Archive (JAR) file. These applets, averaging approximately 200KB to 300KB in size, are downloaded only once when first accessed. Once downloaded, they run in the Sun Java Plug-in (part of the Java run-time environment - JRE) designed for the user's chosen web browser. As a result, only the Java applets required for the display tasks associated with a particular user role are downloaded to the client. Because the Java applets are downloaded, subsequent product interaction only requires minimal data transfer. In a single http transaction, the client downloads a compressed JAR file containing the applet's class files and associated resources

The current plug-in versions supported include:

- Sun Java plug-in versions 1.5.011+ (shipped with Workforce Central 6.0)
- Sun Java plug-in versions 1.6
- Both supported for Microsoft XP(sp2) , Microsoft Vista and Windows 2003 Server (32-bit)

* Both Standard and Advanced Reporting support customized reports.

The tables below list the client platforms supported by Workforce Central applications. Unless otherwise stated, the listed browsers support both HTTP and HTTPS (SSL enabled).

Browser			Operating System		
Vendor	Product	Version	Vendor	Product	Version
Microsoft	Internet Explorer (IE)	6.x 7.0	Microsoft	Windows XP	SP2
				Windows Vista	
				Windows Server 2003 (32 bit) ¹ Windows 2000 for IE 6.0 Only ⁴	SP2
Mozilla	Firefox	2.0	Mozilla	Windows XP	SP2
				Windows Vista	
				Windows Server 2003 (32 bit) ¹	SP2
Apple ³	Safari	3	Apple	Tiger (Mac OS-X 10.4) and/or Leopard (Mac OS-X 10.5)	

Application server support

The following table details those application servers and technologies supported by Workforce Central products. Please note that Kronos bundles the JBoss Application Server with the Workforce Central software.

Application Server			Operating System		
Vendor	Product	Version	Vendor	Product	Version
JBoss	AS	4.0.4	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
			Sun	Red Hat Linux ²	4
			IBM	Solaris (SPARC) (32 bit and 64 bit) AIX (pSeries) (32 bit and 64 bit)	10 5.3
IBM	WebSphere ²	6.1	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
			IBM	AIX (pSeries) (32 bit and 64 bit) Red Hat Linux ²	5.3 4
BEA	WebLogic ²	9.1	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
			Sun	Solaris (SPARC) (32 bit and 64 bit) Red Hat Linux ²	10 4
Oracle	OAS [†]	10gR3	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
			Sun	Solaris (SPARC) (32 bit and 64 bit) Red Hat Linux ²	10 4

Web server support

The following table lists the web servers and operating systems supported by Workforce Central products. Please note that Kronos bundles the Apache Web Server with the Workforce Central software.

Web Server			Operating System		
Vendor	Product	Version	Vendor	Product	Version
Microsoft	IIS	6.0	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
Apache	Web Server	2.2	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
			Sun	Solaris (SPARC) (32 bit and 64 bit)	10
			IBM	AIX (pSeries) (32 bit and 64 bit)	5.3
IBM	HTTP Server (with WebSphere only) ²	6.0	Microsoft	Windows Server 2003 (32 bit) ¹	SP2
			IBM	AIX (pSeries) (32 bit and 64 bit)	5.3
Oracle	HTTP Server (with OAS only) ²	2.0	Microsoft	Windows Server 2003 (32 bit) ¹	SP1
			Sun	Solaris (SPARC) (32 bit and 64 bit)	10

¹ Workforce Central supports the Standard, Enterprise, Small Business Server, and Datacenter editions of Microsoft Windows Server 2003 SP1 or R2. The Web, Itanium, and x64 editions are not supported.

² Available by special request only. Ask your Kronos representative for details.

³ For Safari browser/OS-X clients, the Java Plug-in (JRE) is automatically provided by the operating system/browser.

⁴ Support for Windows 2000 is provided only for web clients using IE v6.0. (Microsoft currently does not support Windows 2000.)

Database support

Workforce Central supports Microsoft SQL Server and Oracle databases, the two leading industry-standard relational database management systems (RDBMSs) available on the market today.

The following table outlines database system sizing, platform, and support details.

Database Server	Operating System
Oracle	10g (10.1.0.2)/10g R2 (10.2.1.0)
Microsoft SQL Server 2000 SP Microsoft SQL Server 2005 SP2	These Microsoft databases are supported only on 32-bit Intel/AMD hardware platforms. Standard, Workgroup, and Enterprise editions of SQL Server are supported, but the Express edition is not supported.

Other technology supported

Load Balancing

To accommodate large enterprise environments, Workforce Central can be scaled, or expanded, to handle increased usage or to provide fault tolerance. Generally, scaling can be categorized as:

Horizontal scaling — Adding web server or application server machines

Vertical scaling — Adding multiple instances of Workforce Central on the same machine

Horizontal and vertical scaling can also be combined to achieve the benefits of both.

Firewalls

Firewalls are used to secure a corporate network by limiting access to key servers. This can be accomplished by both software and hardware. Software solutions are installed on the server to be protected and attempt to weed out attacks. Hardware, on the other hand, filters traffic by placing a specialized network appliance between the insecure network and the protected servers. Hardware firewalls are more common because they prevent potentially harmful traffic from ever reaching the critical servers.

Workforce Time & Labor and Scheduling, Suite Utilities, and Core Components products support separation of the architecture tiers. In this deployment, Kronos supports firewalls between each of these tiers: between client and web server, between web server and application server, and between application server and database server.

Note that, as with any additional network appliance or network hop, performance will be negatively affected by inserting firewalls between tiers. Therefore firewalls should be used judiciously to properly balance the level of security with the level of overall system performance. In order to maximize performance Kronos recommends not deploying a firewall between the application server and the database server.

Storage Area Networks (SAN)

Storage Area Networks (SAN) offer many benefits, including increased application availability, better application performance, and the ability to consolidate storage. Kronos supports Workforce Central running on a Storage Area Network (SAN). The requirements will be determined by the individual use cases. Your Technology Consultant will be able to provide recommendations once the project starts.

SSL Accelerators

Kronos recognizes that the need to protect the IT infrastructure is critical to the success of any company. Use of the Secure Sockets Layer (SSL) protocol is an industry standard method to protect, through encryption, data transmission. However, SSL places a heavy load on system networks.

Kronos recommends that customers keep current with the SSL Accelerator software and firmware updates.

SQL Server Database Cluster

Workforce Central provides support for Microsoft SQL Server database clusters for failover purposes. Specifically, only Kronos Time & Labor, Absence Management and Scheduling for SQL Server 2000 support the use of a single, primary active server with one or more secondary passive nodes. In order to implement this type of cluster using SQL Server, the port configuration must use a “static IP address”.

For SQL Server 2005 the equivalent terminology for active / passive set has changed, Microsoft no longer calls it active-active or active-passive clustering, instead they state and we will support the usage of a 2-node Microsoft Clustering Services cluster hosting multiple instances SQL 2005. That being said, this behaves as the case was in the past with the Active/Passive technology. Upon failover the other node hosts the SQL instance and that instance name will never change no matter which node hosts. This is identical to A/P clustering presentation back to the application/end-user. “Server Name”, Database Name, and security is a constant and will not change after failover or fail-back.

Oracle Real Application Cluster (RAC)

Oracle RAC is an extension of the Oracle Database Server that transparently allows multiple Oracle instances to access a shared database. Workforce Central supports Oracle RAC based on specific configurations and settings. Once the project starts, your Technology Consultant will be able to provide you with recommendations.

64-bit Support

Workforce Central supports 64-bit platforms for the application web server via 32-bit emulation mode. This means that Workforce Central continues to be a 32-bit application.

VMWARE

Virtualization is a software technology that makes it possible to run multiple operating systems and multiple applications on the same computer at the same time, increasing the utilization and flexibility of hardware. By using virtualization software, an IT department can transform or “virtualize” the hardware resources of an x86-based computer—including the CPU, RAM, hard disk, and network controller — to create several fully functional virtual machines that can each run its own operating system and applications just like a “real” computer.

There are several benefits to virtualization. Because multiple virtual machines share hardware, virtualization saves hardware, environmental, management, and administration costs of the server infrastructure. Virtualization can also help IT administrators spend less time on repetitive tasks, such as application provisioning, configuration, monitoring, and maintenance. Virtualization can increase application availability and improve business continuity. It can be used to reduce planned downtime and recover quickly from unplanned outages with its ability to securely backup and migrate entire virtual environments with no interruption in service. While there are different virtualization vendors, Kronos supports virtualization under for VMware, Inc. (a subsidiary of EMC) which is currently the market share leader in the in the application virtualization space.

The version currently supported is **VMware ESX Server Version 3.5 or later**.

Note: If VMWare is used, Kronos strongly recommends to keep the database on a separate server

Workforce Central HR/Payroll Technology Overview

Workforce HR and Workforce Payroll are core components of the Workforce Central suite, Kronos’ integrated human resources, payroll, scheduling, and time and labor solution. Together, these applications help improve productivity and efficiency by providing greater control over critical human resources and payroll processes. Offering comprehensive capabilities, such as employee self-service, recruiting, benefits enrollment, compliance management, performance reviews, compensation planning, and online earnings histories, Workforce HR and Workforce Payroll streamline and automate a wide variety of time-consuming processes and administrative tasks. The system empowers your human resources and payroll staff to eliminate the hours spent capturing and processing redundant data, and instead they can spend their time on activities that contribute to your organization’s strategic goals.

From an IT perspective, Kronos helps reduce your total cost of ownership with web-based applications that are quickly deployed, easily maintained, and broadly accessible. A thinclient architecture supports a one-time installation, as well as simplified upgrades and maintenance. And by sharing valuable employee and payroll information across applications in the Workforce Central suite you can eliminate the headaches and errors resulting from managing duplicate data in multiple systems. You can also eliminate the arduous task of managing and supporting disparate applications — and the various interfaces that connect them — from different vendors. Instead, you can rely on Kronos as a single point of contact for your human resources and payroll systems.

System Architecture

Workforce HR and Workforce Payroll consist of an easy-to-use web-browser client coupled with a powerful Microsoft SQL Server database that handles back-end processing. Like other components in the Workforce Central suite, Workforce HR and Workforce Payroll communicate seamlessly over the Internet, company intranets, local area networks, and wide area networks.

The thin-client architecture requires just a single installation on your server without the need to install client software on individual desktop systems. This reduces the applications' total cost of ownership and eases maintenance complexities. Plus, the familiar browser-based interface significantly reduces the learning curve for users and simplifies support of client systems.

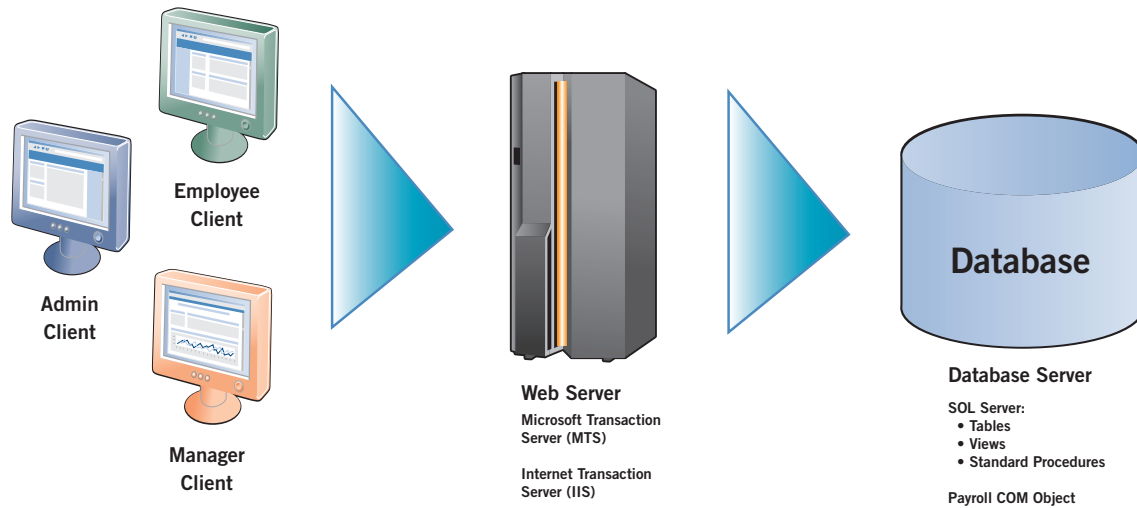
Essential scalability and flexibility

Workforce HR and Workforce Payroll are n-tier applications, consisting of multiple workstations, a web server, and a database server. As a result, your organization can scale the implementation to your network to all users and locations to extend the functionality and value of your solution across your entire organization. This flexibility also allows the applications to be scaled as needed to fit your maintenance and distributed support systems. Workforce HR and Workforce Payroll achieve maximum scalability by exploiting the strengths of Microsoft's Windows Server, Internet Information Server (IIS), and SQL Server. With open protocols and published interfaces, as well as proven reliability and performance, these solutions support flexible deployment and third-party integrations that deliver the required functionality and support needed by organizations' distributed client-server architectures.

Single suite database, single data source

Information about the workforce is needed to fuel processes and decisions across the organization, so keeping this information centralized and synchronized is critical. Workforce HR and Workforce Payroll share a single database with the rest of the Workforce Central applications, ensuring that data is stored only once and kept up to date. Employees and managers access applications using a single, unified login account, clicking seamlessly in a web browser to perform tasks such as editing and approving timecards to updating their benefits or direct deposit information. Reminders and approval cycles are managed using the same configurable workflow mechanisms across the Workforce Central suite, such as human resources processes from hiring to termination — and all the timekeeping, payroll, and scheduling processes in between.

Sample Workforce HR and Workforce Payroll Configuration



Workforce HR & Workforce Payroll Reporting Technology

Kronos has qualified Business Objects Crystal Reports v10.0 with Workforce HR & Workforce Payroll 6.0. All delivered standard reports will now use the Crystal Reports v10.0 engine for report generation.

Kronos Workforce HR and Workforce Payroll offer both client-side and server-side reporting capabilities. In order to use server-side reporting, customers will be required to obtain a Crystal Reports license from Business Objects directly. In addition, customers will need to order the server-side component piece from Kronos. Server-side reporting is not mandatory, but it can be useful because it allows for report processing on the server rather than client-side processing, reducing strain on the client machine. Server-side reporting also allows for secured report delivery over the Internet.

Reporting location	Advantages	Disadvantages
Client side	No limit on number of concurrent users	Requires download of Crystal Report Runtime v10.0
Server side	Download to client is minimal — only requires Crystal Viewer on client	Need to buy additional license(s) if number of concurrent users is greater than 5

Note: The client-side viewer is necessary for both client-side and server-side report generation. Customers wishing to purchase Crystal Professional at a special Kronos discount price can do so directly from the Business Objects web store. Business Objects will provide support and maintenance for Crystal Professional tool directly.

Platform support

Application server support

The following table details those application servers and technologies supported by Workforce Central products. Please note that Kronos bundles the JBoss Application Server with the Workforce Central software

Application Server	
Hardware/Software	Recommended Requirements
Web Server	JBoss 4.0.4
Operating System	Microsoft Windows 2003 Server (32-bit)
Other Requirements	CD-ROM drive Monitor 1024 x 768 SVGA Browser: Internet Explorer 6.x/7.0 Network Protocol: TCP/IP NIC: 100BaseT network card
Server Hardware	Server hardware to be determined by Kronos based upon the customer's unique business requirements.

Database support

Workforce Central HR/Payroll supports Microsoft SQL Server one of the leading industry-standard relational database management systems (RDBMSs) available on the market today.

The following table outlines database system sizing, platform, and support details:

Database Server	
Hardware/Software	Recommended Requirements
Web Server	Microsoft SQL Server 2000, Microsoft SQL Server 2005 SP2+
Operating System	Microsoft Windows 2003 Server (32-bit)
Server Hardware	Server hardware to be determined by Kronos based upon the customer's unique business requirements.

Administrator Client

The following outlines the minimum requirements and supported technology for the client

System Requirements for Administrator Client	
Component	Description
Browser	Microsoft Internet Explorer 6.x/7.0
Operating System	Microsoft Windows XP Professional SP2 Microsoft Windows 2003 Server (32-bit)
CPU	Intel Pentium III 1GHz
Memory	256 MB
Other Requirements	Monitor: 800 x 600 SVGA

Workforce Central 6 server requirement guidelines for budget planning

Kronos is pleased to provide hardware guidelines to assist new customers using a JBoss Application Server and a SQL database with fewer than 8,000 employees in estimating budgets associated with the implementation of the following products:

- Workforce Timekeeper
- Workforce Scheduler™
- Workforce Attendance™
- Workforce Leave™
- Workforce HR™

These estimates are based on benchmark performance as measured in our labs, as well as real-world experience gained from thousands of Workforce Central customer engagements. When the time comes to commence implementation, your Kronos technology consultant will work with you to analyze your specific use case and, if applicable, make additional recommendations for optimizing system performance.

Please note that if your organization is upgrading to Workforce Central 6.0 from a prior version, has more than 8,000 employees and/or uses Workforce Activities™, Workforce Analytics™, Workforce Scheduler with Optimization™, or Workforce Record Manager™, you should contact your Kronos representative for more detailed hardware recommendations.

Number of Employees	Recommended Hardware
Up to 2,000	<p>One server with the following characteristics or better:</p> <ul style="list-style-type: none"> • Intel system with Xeon processor • Speed: 3 GHZ (front bus 1333) • Processors: 2, <i>number of cores per processor: 2</i> • RAM: 4 GB
Up to 5,000	<p>Three servers with the following characteristics or better:</p> <ul style="list-style-type: none"> • Database Server <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB • First Application Server <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB • Second Application Server/DCM <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB • Portal Server (Optional) <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB

Number of Employees	Recommended Hardware
Up to 8,000	<p>Four servers with the following characteristics:</p> <ul style="list-style-type: none"> • Database Server <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB • 2 Application Servers <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB • 1 Application Server/DCM <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB • Portal Server (Optional) <ul style="list-style-type: none"> ◦ Intel Xeon ◦ Speed: 3 GHZ (front bus 1333) ◦ Processors: 2, <i>number of cores per processor: 2</i> ◦ RAM: 4 GB

Assumptions:

- Employee-to-manager ratio = 10:1
- Clock-to-employee ratio = 1:100
- Portals: up to three standard portals
- Process Manager: up to five standard templates
- Model Kronos 4500™ badge terminals
- The Application Server is being used as a report server
- Payroll processing and pay period end are not run concurrently

Additional Recommendations:

- Kronos recommends approximately 125 terminals per Data Collection Manager server.
- Customers wishing to implement Workforce Record Manager may require an additional server.



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