ULTiPRO® WORKFORCE MANAGEMENT: CONNECTING TODAY’S DISTRIBUTED WORKFORCE

A TECHNOLOGY WHITE PAPER
ABSTRACT

This UltiPro Workforce Management technology white paper offers an overview of UltiPro’s technical architecture, and is primarily intended for information technology executives and professionals who want to better understand UltiPro’s technology advantages. After reading this white paper, the reader should have a clear understanding of the modular design and underlying technology of the UltiPro Workforce Management solution and the key benefits to the IT organization.

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Market Overview

Internet technology has changed the way the world does business. Over the past decade, the Internet has already transformed the business-to-consumer market. Today, the power of the Web is transforming the way your business connects to employees, your larger workforce, third-party providers and partners. Even if your company is in a single location, the 24X7 workforce now requires access to corporate information from home, airports, remote offices, and virtually any Internet access point. As a result, many companies are now harnessing the power of the Web to run key applications – such as human resources, payroll, benefits enrollment and recruitment – as well as centralize both internal and external communications.

Companies are concentrating more than ever on controlling costs, monitoring the return on investment (ROI) of their application and technology investments, and at the same time focusing on their most important competitive advantage – their people. In fact, in a recent SHRM survey, it was reported that the use of technology to communicate with employees and manage talent are two of the top five workplace trends today.¹ More and more companies are leveraging Internet technology to create internal Web portals for their workforce, because the use of this technology has proven to increase employee satisfaction, improve efficiencies and reduce internal operating costs.

In addition to implementing workforce portals to integrate internal systems for better employee communications and workforce management, corporate IT staffs are also being required to integrate with business partners and customers in real-time. A sophisticated workforce portal that leverages leading technologies like eXtensible Markup Language (XML) and Web Services – technologies that use open standards to enable interoperability – can enable your IT staff to easily integrate your workforce portal with other enterprise systems as well as third parties.

Ultimate Software connects today’s distributed workforce and enables enterprise integration with UltiPro® Workforce Management. The UltiPro workforce portal leverages cutting-edge technologies such as XML and Web Services that use open standards to provide you the most cost-effective platform for performing critical business functions rapidly over the Web and allowing different systems to communicate easily with one another. The industry’s first XML Web Services-powered workforce management and payroll Web portal, UltiPro was developed specifically to deliver the most out-of-the-box functionality at the lowest cost today.

About UltiPro Workforce Management

Ultimate Software’s UltiPro Workforce Management offers the most rapid, cost-effective road to the benefits of a workforce portal, with a proven rapid return on investment. Much more than an HRMS/payroll system or a Web self-service offering, the UltiPro workforce portal acts as the center of your business, providing features such as core human resources administration, payroll processing, benefits administration, employee management, recruitment and more via the Web. The UltiPro portal allows you to network your organization’s people and processes – bringing them together for collaborative information sharing. You can centralize remote locations, whether stores, offices or warehouses, and link to third parties, like your 401(k) and benefits providers or your General Ledger system. The end result is an empowered, more effective workforce.
In addition, Ultimate Software offers Intersourcing®, a hosted solution that eliminates your in-house IT involvement in maintaining and upgrading UltiPro. We leverage our own technology to provide you a highly affordable managed application and a single point of contact for all support. UltiPro’s architecture minimizes your IT staff’s involvement, whether you host it in-house or with Ultimate Software, freeing your staff to focus on other strategic applications in your enterprise.

Overview of UltiPro’s Architecture

Employees, administrators, managers and executives can all access UltiPro from virtually any Internet access point inside or outside of your company’s firewall. Whether you install UltiPro in-house or we host it for you via our Intersourcing hosted offering, UltiPro utilizes Microsoft technology to deliver a highly deployable and manageable payroll and workforce management solution. The cost-effective, scalable UltiPro architecture consists of an IIS Web/Application server, a Microsoft SQL Server (for your company’s database), a Business Intelligence Server (for reporting and analytics), and one or more processing servers (which we call Distributed Process Management Application Servers).
See the diagram below for a high-level depiction of the UltiPro architecture.

UltiPro’s Architecture

UltiPro delivers best-of-breed functionality utilizing today’s latest technologies. Users enter UltiPro via the IIS Web/Application Server and access your company’s real-time data residing on a Microsoft SQL Server 2000 database server. The Distributed Process Management (DPM) Application Server is our XML Web Services engine that processes business logic and processing requests (such as running a report) via Message Queuing for the user. Within the IIS/Web Application Server, users seamlessly access workforce analytics located on the UltiPro Business Intelligence Server for real-time queries, ad-hoc reports, multi-dimensional workforce analytics and event-driven alerts based on changes to key performance indicators.

One of the highlights of UltiPro’s technology is our Distributed Process Management framework of XML Web Services, a cutting-edge framework that enables business functions to be performed over the Web, and allows different enterprise systems to talk to one another over the Internet. The next section will explain this architecture and our migration to XML Web Services in more detail.

UltiPro’s XML Web Services Architecture

With the rapid acceptance of the Internet and Internet-based applications (not just Web sites), there is a pressing need for Web-based applications to integrate and share data with other Internet and legacy applications. To meet these needs, two key technologies have emerged:

- **XML**, a highly flexible, programming language used for Internet data exchange, provides the mechanism for dissimilar systems to communicate more efficiently.
- **Web Services**, a methodology for implementing businesses services over the Web, allows business logic to be called and executed over standard network protocols, such as HTTP or TCP/IP.
An “XML Web Services application” essentially involves composing the business logic within an existing application and making it accessible to a remote machine via Simple Object Access Protocol (SOAP), a protocol that defines how business objects are called across a distributed network. The interface to this business object is described via XML in a language called Web Services Definition Language (WSDL). Since the SOAP protocol uses standard HTTP as its transport, these XML Web Services are instantly available over the Internet.

The benefits of this new vendor-neutral distributed architecture are enormous:

- Integration efforts can be greatly reduced due to the use of standardized XML Web Services.
- Real-time connections can now be implemented rapidly and very inexpensively because there are many tools available at a low entry cost.
- Applications using this architecture can scale to accommodate the needs of very large organizations down to the very small.
- Customers can develop new business models based on the ability to rapidly connect to their customers and business partners.
- Subscription-based delivery of software as an Internet service is now a reality for software developers as well as business service providers.

UltiPro Workforce Management uses a Web Services architecture that leverages the XML programming language. With its XML Web Services architecture, UltiPro is scalable to adapt to the business needs of companies of any size. Because UltiPro is extremely flexible, you can select from a broad range of features to tailor the system to your individual business needs and then phase in more advanced functionality over time.

The technical architecture UltiPro relies on to enable Web Services capabilities is called UltiPro Distributed Process Management. This unique platform incorporates leading technologies such as Microsoft Message Queuing (MSMQ), XML, SOAP and WSDL to create a distributed processing framework that is Internet-enabled. This means that commonly requested services such as running a report, entering staff time worked, or running steps in the payroll process can be initiated from the Web. These requests are automatically routed to a separate process application server to ensure efficient processing and load balancing, giving you the fast service you want and freeing you up to perform other tasks instead of waiting for your request to finish running.
Benefits of XML Web Services

The benefits of XML Web Services to the executive team are tremendous. A recent Forrester report cited the following benefits for executives:

<table>
<thead>
<tr>
<th>For the:</th>
<th>Web Services are about:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEO</td>
<td><strong>Strategy:</strong> Lock in customers with better product and service links; reach new markets by assembling new applications, such as private label services for your channel.</td>
</tr>
<tr>
<td>COO</td>
<td><strong>Productivity:</strong> Build role-based portals that put information in the hands of employees; improve time-to-market by linking partners into development processes; outsource non-core business services.</td>
</tr>
<tr>
<td>CFO</td>
<td><strong>Cost replacement:</strong> Cut transaction costs with automated direct procurement; reduce customer service spending with self-service; replace administrative staff with self-service interfaces.</td>
</tr>
<tr>
<td>CIO</td>
<td><strong>Control:</strong> Transform IT functions into technology services; protect against security leaks by governing access to the registry of SOAP interfaces and flow of SOAP messages.</td>
</tr>
</tbody>
</table>

Web Services will initially be used for behind-the-firewall implementations of distributed software, but will quickly transform into rapid integration of applications via employee portals.

The XML Web Services Engineering Process

Unlike many vendors that are trying to play “catch up” today, Ultimate Software began its implementation of its XML Web Services architecture several years ago. This means that the latest in distributed technology is available in UltiPro today.

To give you a better understanding of how distributed processing works, let’s look at how most software vendors are re-configuring their systems to leverage a Web Services architecture, a transition that typically is a multi-year effort, given the complexity of this process. Ultimate Software recently followed this process to successfully introduce its new XML Web Services architecture with UltiPro in the fall of 2001 in our Distributed Process Management (DPM) application server.

**Step One – Traditional Software Architecture:** Many software vendors have developed applications consisting of tightly coupled business objects, which are highly integrated and dependent pieces of code designed to perform a collection of business functions in a single program. These programs and their respective business functions must be identified and recomposed to allow for independent and autonomous transactions in a distributed fashion. For payroll and workforce management, a typical example is the business logic involved in the payroll process. Each business object is responsible for a discrete business process such as calculating pay, printing checks or running a report.
The graphic below shows an example of the payroll process as a set of tightly coupled business objects.

### Tightly Coupled Business Objects

- Open Payroll
- Pay
- Calculate
- Run Reports
- Create
- Print Checks

In order to enable these business processes to be called and initiated over the Web and performed in a distributed environment, they must execute independently as discrete business objects.

**Step Two – UltiPro’s Distributed Architecture:** Once the business objects are recomposed, they need a standard Web Services Definition Language (WSDL) interface that allows them to communicate with programs running on remote machines. In addition, the “context,” or application state, is established to provide independent run time execution. Once the context is established, the independent business objects can now run autonomously and provide high degrees of throughput via multi-threading and scalability across multiple servers. The graphic below shows an example of how workforce management and payroll processes are run inside UltiPro’s DPM Application Server.

**UltiPro’s New XML Web Services Using Distributed Business Objects**
Step Three – UltiPro’s Load Balancing Framework: The XML Web Services, which consist of the distributed business objects for running specific business processes, are then installed on multiple machines and executed in a coordinated, load-balanced fashion to maximize system throughput in the DPM Application Servers as pictured below.

Load-Balanced XML Web Services in UltiPro’s DPM Application Servers

UltiPro’s Internet Architecture

One of the major challenges in Internet application design is separating each element of the application and providing tools for developers to work with specific aspects of the application, such as the user interface, HTML pages, business objects, workflow and database design.

Ideally, the more separation you can build into the application design, the more extensible, scalable and maintainable the application. For this reason, the UltiPro Workforce Management application consists of several core components in a layered architecture that leverages Microsoft technology, including IIS, COM/COM+, MSMQ, XML, SOAP, Microsoft SQL Server 2000 and Microsoft Windows 2000 Server. UltiPro’s multi-layered architecture, including the Operating System Layer, Business Logic Layer, Presentation Layer and User Interface Layer, makes it easier to update and maintain UltiPro, as well as integrate UltiPro with other enterprise systems. Put all together, UltiPro’s application framework provides a highly extensible set of services that can scale depending on your business size.
UltiPro’s Multi-Layered Architecture for Scalability and Extensibility

Data and Operating System Layer

The Data and Operating System Layer of UltiPro’s architecture serves as the foundation for the system. It provides the basis for data, security and low-level operating system services (see Security Architecture section for details). This layer is provided by Microsoft SQL Server 2000, Microsoft Windows 2000 Server and Microsoft IIS.

Microsoft SQL Server 2000

The Microsoft SQL Server 2000 database server is the central storage point for all of your company’s human resource, payroll and benefits data. Microsoft SQL Server 2000 is a scalable, high-performance database management system designed specifically for distributed Internet computing. SQL Server leads the industry in price/performance and also has the industrial robustness of an enterprise database solution. Its built-in data replication, centralized administration, powerful management tools and open system architecture provide a superior platform for delivering cost-effective software solutions. SQL Server 2000 simplifies implementation, management and data warehousing while at the same time enhancing Web-based operations. In addition, SQL Server 2000 provides tight integration with Microsoft Office, Microsoft BackOffice and Microsoft Windows 2000.

Ultimate Software is focused on developing for the Microsoft platform only, rather than developing a solution that is supported across multiple databases and hardware platforms, as many vendors do. This means that most other solutions are developed to the lowest common denominator rather than optimized for the most reliable, scalable and cost-effective platform for mid-sized businesses: the Microsoft platform. UltiPro Workforce Management was developed to take maximum advantage of the unique features available in Microsoft SQL Server 2000 and Windows 2000. For example, Ultimate Software has developed specific server-side processes that allow us to leverage the database server’s capabilities for more than just a data repository. UltiPro also supports SQL Server clustering in Active/Active mode for high-availability environments.
One of the most valuable aspects to you of UltiPro’s focused support of SQL Server is that server and application performance can be cost-effectively scaled. Depending on your company’s size and performance requirements, you can scale UltiPro Workforce Management to fit your parameters today, and in the future you can grow by:

- Making use of faster processors
- Increasing the amount of RAM on the server
- Increasing the number of processors on a single server
- Making use of multiple servers and server clustering technology

IIS Web/Application Server

The main entry point of the UltiPro Workforce Management portal is Microsoft’s IIS server. The IIS server provides all of the application security, workflow and business objects to access the database. Scaling for throughput and redundancy is available via hardware or software load-balancing solutions.

Business Logic and Systems Framework Layer

The Business Logic and Systems Framework Layer of the UltiPro architecture provides the core application logic and the supporting services used in the application. The application logic and supporting services components include:

- Business Object Framework
- Distributed Process Management Application Server
- Workflow Services
- Enterprise Integration Tools
- UltiPro Workforce Portal Customization Tools
- DBA Tools
- Data Dictionary
- Workforce Analytics
- Standard Reporting System

Business Object Framework

UltiPro’s Business Object Framework consists of COM and COM+ objects that provide the business rules and business logic for UltiPro. The business objects use an XML Translator to interact with the security, workflow and entity server engines in the application to perform processes within UltiPro. The XML translator “unpacks” the XML code representing the data change, starts the Microsoft Transaction Server (MTS) transaction and calls the appropriate business object to perform the requested process. Several low-level objects are often involved in a given transaction to provide access to the data and specific business events for validating and changing data in the object. These objects are executed inside of the MTS boundary to guarantee the integrity of the data in the transaction. MTS guarantees transaction completion or rollback in clustered SQL Server environments as well for maximum data integrity.

Also included in UltiPro’s Business Object Framework are standard conventions for error logging, database access and security to allow for maximum object reuse of existing components in the framework. The Business Object Framework also provides a highly extensible set of business rules for future functionality and integration with other applications.
Distributed Process Management Application Server

The UltiPro Distributed Process Management (DPM) Application Server is where the DPM XML Web Services engine runs. This queue-based, XML-script driven engine is a dedicated server that provides automation for common HR and payroll tasks, and processes Web Services on behalf of users in the UltiPro Workforce Management portal. The DPM application server listens to Microsoft Message Queuing (MSMQ) for requests to process jobs and interacts with SQL Server to retrieve and update data in the database on behalf of a Web user’s request. The following diagram describes this architecture in detail.

How UltiPro Distributed Process Management Works

With UltiPro DPM, your company’s Web users can initiate work requests such as requesting a report, entering staff time worked or validating a time clock import. These requests become messages that are placed onto a Microsoft Message Queue. The message is a well-formatted SOAP command packet that lists the Web Services necessary to complete the process as well as the order in which the processes are to run. The DPM Application Server then receives the message from the queue, processes the sequence and sends the results back to the queue for notification to the Web user that the job is complete.
You can check the status of your requests via the UltiPro Process Automation Center, a utility that provides a single console view of all of the processes currently running in the system. An operator can view all of the current jobs that are running, which servers they are running on, and also has the ability to resolve discrepancies. The DPM Servers can be scaled and clustered to provide maximum throughput and availability. Jobs can be suspended or restarted in a given step or in the event of an outage in a DPM Application Server.

The UltiPro DPM framework provides:
- The automation of highly repetitive tasks that would normally require personal intervention
- Horizontal and vertical scalability and a cost-effective growth model with distributed architecture
- An extensible platform with comprehensive Web Services and framework for customizing business processes and adding new business objects
- Manageability via the Process Automation Center to monitor, suspend and resume active processes in the system
- High availability with message queue and redundant processing servers

Workflow Services

The ability to process common business tasks efficiently – such as hiring an employee, recording a performance review and pay raise, or making a change to benefits – including recording the necessary approvals without paperwork, is key to any HR or payroll department. For this reason, workflow is inherent within UltiPro’s architecture. In its simplest form, a business process workflow is basically a change request, for example, an employee job or salary change, that a user – manager or HR/payroll staff – initiates in order to maintain up-to-date employee-related data.

In the business world, workflow refers to the process of completing the steps required to perform a business task, from beginning to end, and usually involves the transfer of information between approving individuals within an organization. While “business processes” refer to the actual tasks that you can perform with UltiPro, “workflow” defines the individual steps involved in completing or processing each specific business task. UltiPro’s built-in, flexible workflow management engine includes more than 100 business processes and their respective workflows, each of which can be individually tailored to how your business functions.

The UltiPro workflow management engine stores all pending data in a workflow as an XML document before it is approved. The workflow management engine then invokes the necessary business objects to validate the pending data before it is written to the database to ensure data integrity. The workflow engine also interacts with UltiPro security to ensure that the user performing the workflow has the authorization (based on role or user) to approve the specific business task or workflow event. UltiPro workflows can have up to 10 levels of approval including users who can observe the workflow in the process.
Key benefits of the UltiPro workflow management engine are:

- Over 100 standard workflows delivered in the application, ready to be activated and configured with customizable roles
- Flexible approval paths to accommodate your specific business processes
- Integration with standard e-mail server for real-time notification
- Delegation capability for those users out of the office or who are unavailable
- Workflow management console for overseeing and delegating all pending approvals
- Integration with UltiPro’s role-based security

UltiPro’s workflow management minimizes the administration typically involved with most workflow engines and eliminates any third party licensing they require.

Enterprise Integration Tools

UltiPro delivers Enterprise Integration Tools to facilitate integration with third-party applications and providers such as:

- General ledger
- Accounts payable and accounts receivable
- Workers’ compensation providers
- Unemployment insurance claims administration providers
- Banking and financial institutions
- 401(k) and benefit plan providers
- Job costing systems
- Recruitment sources
- Time and attendance systems
- HR-XML interfaces for job postings and applicants

UltiPro provides out-of-the-box integration templates that map the data from third-party applications into UltiPro Workforce Management or from UltiPro to a third-party system or service. An unlimited number of templates can be used to generate ASCII files for general ledger, 401(k) and benefit provider files, direct deposit, tax filing, W-2s and time and attendance systems, for example. In addition, templates can be created to parse import files and pass that data to UltiPro Workforce Management while respecting the system business rules for data validation. Having this type of flexibility with UltiPro gives you the latitude to have a best-of-breed workforce management system and also select the best solutions for your other business needs without locking you into one provider for all enterprise-wide systems.

UltiPro’s Enterprise Integration Tools provide the power of a template-driven approach without the need for developing and maintaining expensive programming interfaces.

UltiPro Workforce Portal Customization and Extensibility

Many customers have their own company-developed portals, and UltiPro can easily be linked in to the larger company portal framework. Alternatively, if you choose to use UltiPro as your core business portal, the UltiPro portal can be extended to add other applications such as online learning, procurement, or travel and expense management as indicated in the figure below. Even applications outside of workforce management, such as executive
information dashboards or other enterprise applications can be linked into UltiPro. In any case, UltiPro can be customized and extended to provide a single platform for managing and communicating with your entire organization.

UltiPro provides you with a rich framework to customize and extend the portal and at the same time maintain a consistent, easy upgrade path from version to version.

**UltiPro Customization**

UltiPro provides several customization features that give you the opportunity to quickly and easily customize the appearance of the portal without any HTML or ASP programming knowledge. All of these customizations are data-driven and preserved in the database through the upgrade process.

**UltiPro ePalette**

Our UltiPro ePalette facility provides a color customization palette, which modifies the style sheet used for the Web page colors throughout the site. In a few simple steps, you can make the UltiPro portal match your corporate color scheme.
Co-Branding

Our co-branding option allows you to change the page graphics for the login and main UltiPro portal page navigation to reflect your own company's branding and image within the portal.

Co-Branding UltiPro with Your Company's Own Logo

UltiPro Extensibility

UltiPro provides several features that allow you to extend the portal to include external applications as well as add your own custom pages and links.

Site Administration

The UltiPro Site Administration tool gives your administrator a data-driven way to add new menu items and modules to the UltiPro portal and secure them by role type. The menu item administration allows you to give a personalized user experience to every unique role defined in the system by determining which menu items are available in the portal for various roles. Whether you add customized links or an entirely new portal application, the changes are data driven and are upgraded with each release, simplifying and reducing administration of your UltiPro site.
Page Linking

You can extend the UltiPro portal by adding your own custom page links through the system administration module in UltiPro. Without knowing HTML or ASP, your system administrator can quickly add page links to other pages or entire applications to plug into the UltiPro portal. All of these links are stored in the database for preservation across upgrades.

Custom ASP Pages and User Defined Fields

You can extend the UltiPro portal by adding your own custom ASP pages and securing them by role using UltiPro’s existing security framework. In addition, UltiPro supports a variety of user-defined fields and user-defined pages at the employee level to provide maximum flexibility to address your individual business needs.

All of these customization features and extensibility allow for maximum flexibility while preserving the upgrade path from one version of UltiPro to another.

UltiPro DBA Tools

To support the lowest cost of ownership, Ultimate Software has spent significant development effort in analyzing the process of maintaining and upgrading UltiPro. The result is a suite of tools geared for the database administrator to easily manage UltiPro. Operational tasks include migrating data across multiple system environments (e.g. from test to production), upgrading UltiPro from one release to another, auditing changes to the data, and archiving data that is no longer frequently accessed. These tools allow your DBAs to minimize the time they spend administering UltiPro while maximizing control and flexibility.
**Update Utility**

The UltiPro Update Utility is a tool that automates the upgrade process. The Update Utility supports full and incremental executable updates as well as updates to database objects such as field and table definitions, indexes, stored procedures and triggers. Unlike the upgrade process of many other systems, UltiPro’s Update Utility recognizes and respects customer enhancements and retains those changes at the same time that it updates the core UltiPro Workforce Management system components.

**Database Portability Utility**

The database portability utility gives your DBA the ability to easily migrate UltiPro databases from the test environment to production, greatly reducing the time to complete this operation. In addition, the utility ensures that any data specific to an environment is updated automatically and accurately, eliminating the need for manual steps to complete this process. The database portability utility gives you the ability to maintain total control of your environment while minimizing the time it takes to do so.

**Data Archiving Solution**

The UltiPro data archiving solution allows your DBA to remove data that you no longer require direct access to from your UltiPro system – after it is archived. The data archiving solution is delivered with a “best practices” guide that presents a number of data archiving techniques for backing up and restoring your UltiPro databases and application software. Once the data is archived, DBAs can choose a combination of data to purge, such as payroll history, terminated employees, applicants and audit records. Whether you are creating a site for disaster recovery purposes, or simply trimming data from your production system, this solution provides an efficient method to accomplish both.

**Audit Service**

The UltiPro audit service gives you a way to report on all transactions affecting the database. The audit service is a Windows 2000 service capable of auditing transactions made to the UltiPro database regardless of how the changes are made, whether they are made via UltiPro or other applications or tools like Microsoft Access, ISQL, or Query Analyzer. Through the use of the data dictionary, DBAs can configure the databases and tables to be audited. This allows you to selectively audit the information that is more critical to your organization without the overhead of auditing all transactions.

**Data Dictionary**

The Data Dictionary component of UltiPro’s application framework is integral to initial UltiPro installation, system updates, routine maintenance and customer-generated customization.

The Data Dictionary dramatically eases the administrative burden of maintaining and upgrading UltiPro from one release to another because it specifies tables, field definitions and table-level attributes such as indexes, check constraints, triggers, foreign keys and compound-code lookup tables so that the customers can upgrade easily from one version of UltiPro to the next. Using the Data Dictionary, customers can recreate or update database...
tables as well as run detailed reports on all the information contained in the Data Dictionary.

The Data Dictionary also aids in product extensions because it provides you with an interface to define new tables, fields and attributes. You can also use the Data Dictionary when making specific configuration changes and setting up properties, such as whether certain fields are configured or audited.

The Data Dictionary maximizes UltiPro’s flexibility while minimizing the impact that changes have on the upgrade process.

**UltiPro Workforce Analytics**

The UltiPro Business Intelligence suite handles all of the ad hoc reporting and business intelligence functionality through a specialized IIS Web application server. Powered by Cognos, this suite of products provides secure access to your company database for ad hoc report creation and distribution, 150+ fully customizable reports, and more than a dozen pre-built workforce analytics containing key performance indicators for the most commonly desired workforce analytics, such as average salary, turnover, time to fill open positions, benefit plan costs and more. The UltiPro portal provides a central place to organize all of these reports and analytics, giving executives, managers and administrations a central location for their critical information dashboard.

For large-scale installations, the UltiPro Business Intelligence server(s) can also be clustered and load balanced for maximum uptime and scalability. In addition, the UltiPro Business Intelligence suite provides an event-driven notification system to notify you when key performance indicators have exceeded your pre-defined thresholds. The event-driven notification proactively manages your workforce data to keep you informed of key trends in your workforce without running a single report.

**UltiPro Standard Report System**

UltiPro delivers more than 400 standard reports out of the box. Each report may be saved with specific selections, sortings, groupings and output of information. The report engine is a multi-threaded, XML Web Service that allows the user to run multiple reports simultaneously, as well as resume working in other areas of the system without waiting for reports to run. UltiPro standard reports are delivered in PDF format for easy viewing, printing or e-mailing to other users in the company. The reports adhere to the same security rules that apply to all objects in the portal so that the employee data is safely and securely managed.

**Presentation Layer**

The Presentation Layer, or the Entity Server, as we call it, handles the interchange between the User Interface and Business Logic/Systems Object Layers. Its job is to manage all of the input, validation and output of data between the two levels. The Entity Server provides a meta-data driven approach (data classification, interpretation and representation) to HTML presentation and data validation. The Entity Server resides on the Microsoft IIS Web Server and communicates with the SQL Server database to obtain meta-data about the various controls and components that are used to present a page in UltiPro.
The Entity Server also interacts with the security system to determine which elements are “view only” and which can be edited, and also performs data validation for the various field types as well as enforcing required fields in a given Web form. The Entity Server interacts with the business objects and workflow engine via XML to retrieve and store data to and from the database. Because the Entity Server stores all state information outside of the IIS Server, support for IIS Web farm clustering and load balancing is automatic and requires no additional application configuration. Finally, the Entity Server enforces the robust security and rich data editing you require in UltiPro.

UltiPro Entity Server

The UltiPro Entity Server offers a number of key benefits, including:
- Rapid upgrades due to the meta-data driven architecture
- A consistent and secure interface for end users
- Higher data accuracy because data validation is enforced at the point of entry
- Object caching for increased system performance and throughput

User Interface Layer

The User Interface Layer is where UltiPro interacts with the user via a Web browser. By design, the UltiPro user interface is pure HTML with no Active X or Java applets. This means UltiPro has a zero footprint browser – no ActiveX controls or Java applets to download, with no IT involvement required on the user’s PC.

Security Architecture

One of the major concerns of all businesses today is how to secure your data and the systems you access over the Internet. For this reason, Ultimate Software has designed built-in security features that permeate all layers of the UltiPro architecture.

Like many vendors, Ultimate Software requires the use of Secured Socket Layer (SSL) encryption to secure data to and from the browser and the Web server. However SSL alone does not address the potential security problems that can arise once a person gains application access. Because there is a greater need to secure access to the system and also secure data within the system, UltiPro provides further security measures in addition to the basic encryption offered by any Web site via SSL.
There are two key concepts in the UltiPro security system that guard against unwanted access to the UltiPro system and its data: authentication and authorization.

Authentication

Authentication protects against unauthorized users in the system by ensuring that only valid users are able to access UltiPro. The authentication typically consists of a user name and password plus mechanisms to protect against unauthorized usage of user names and passwords. UltiPro manages authentication in three areas:
- User name and password management
- URL filtering
- Token-based authentication

User Name and Password Management

The UltiPro security architecture provides an alias to user names so that users cannot use their Web user names and passwords to gain access to the SQL Server or network resources. The user name alias is set up by the system administrator and stored via 128-bit dynamic-key based encryption in the database. For additional security, UltiPro supports expression-based user name generation and strongly typed passwords. A strongly typed password is one that enforces certain rules, for example, it must be mixed case, have at least one numeric character, and can’t have three repeating letters, to make the password more difficult to “crack.” The user names and passwords are further protected against abuse by password-retry counters that disable accounts when the retry limit has been exceeded.

URL Filtering

An ISAPI (Internet Server Application Programming Interface) filter is used in Microsoft IIS to trap every request coming in over UltiPro’s standard Web port and prevent unauthorized Web users or programs from accessing the application. Each request must have a valid authentication token to pass through the security system. Requests without a valid token are returned to the login page.

Token-Based Authentication

Another key feature of the UltiPro security system is that user names and passwords are not passed around with each request. Instead a unique security token, called a Globally Unique Identifier (GUID), is issued with each request and remains in effect for the duration of the user session. Only requests with valid security tokens or GUIDs are allowed to access the business objects and subsequently the data they return at runtime.

The following diagram illustrates this architecture.
Authorization

Once logged in to UltiPro, a user is assigned to one or more roles that define the business objects, data and employees they are authorized to access and edit. In UltiPro, this authorization is called role-based security.

Through its innovative role-based approach, UltiPro defines system access based on an individual’s role or roles within the organization, so that users are able to see only the information that is appropriate for their role (or multiple roles, if applicable). Users can automatically be assigned to a given role based on their responsibilities and departments to streamline the maintenance of the roles in the system. Examples of typical roles include employee, manager, administrator and executive. These roles are then filtered and qualified by organization levels or reporting structures to ensure that the right information is available to the right individual.

UltiPro Security Authorization

Authorization and authentication work hand in hand. Users are provided a unique token or GUID for the duration of their session that is proof of their authentication, but they also require runtime security that allows them access to execute individual objects in a process. Each object in the system must also obtain a valid runtime token for the object before it is allowed to execute. At runtime, authenticated users request access to run various business objects like “hire a new employee” or “change a salary.” The runtime request is then issued a security token based on the user’s
authentication token. Assuming the user has appropriate access levels through role-based security, the user’s Web process is then granted permission to access the object along with a valid token. A token has a time and date stamp associated with it to invalidate requests that are made past the expiration date of the token.

*UltiPro also complies with current and pending employee privacy legislation protecting employee Social Security Numbers.*

**UltiPro Implementation**

Today’s software industry is plagued with business applications known for extremely long, difficult, expensive and in many cases failed implementations. This is due in large part to the underlying architecture and associated technologies used in developing the system. Because these systems often don’t have the depth of delivered functionality required by customers, most of them require an extensive amount of customization and extended development done by consultants in order to meet the needs of an organization. Given this, it is not uncommon for a typical HRMS/payroll implementation to take a year or more and cost three to four times the price of the software itself. In other words, for many payroll/workforce management solutions, for every dollar spent on the software, it typically costs three to four dollars to implement. Today, many organizations are looking for applications that offer a faster implementation and quicker return on investment.

From its inception, Ultimate Software’s focus has been to develop and maintain workforce management solutions of uncommon excellence that could be implemented rapidly to deliver value to our customers fast. Never wavering from this ambition, Ultimate Software created a unique software design and leveraged the latest technologies to create an application that surpasses virtually all others in delivered functionality, cost, ease and speed of implementation and ongoing upgrades. Our average implementation cost is far less than the price of the software and our implementation strategy is proven to provide tangible ROI for our customers. In fact, our average license fee to implementation cost ratio is an exceptional 1 to 0.7, and the average timeframe to a live payroll with UltiPro is only 69 man-days for a business with an average of 1,500 employees.

UltiPro implements easily in record time because it delivers more out-of-the-box functionality than any other integrated HRMS/payroll solution in the industry. In fact, 98% of the calculations most customers need for earnings, deductions, benefits and paid-time-off plans are pre-delivered in the software – no customization required. In addition, Ultimate Software has developed an implementation methodology and a set of implementation tools that dramatically decrease the amount of time required to get up and running on UltiPro. These conversion tools make use of the same core set of business objects and logic contained in the UltiPro Workforce Management application. They also provide an environment where the customer’s source data can be mapped, transformed, normalized and converted into UltiPro remotely in a hosted data center.

**Our Future is Microsoft .NET**

Ultimate Software’s continued focus on leading technology in today’s distributed Internet world means that we will be leveraging Microsoft .NET in our future. The .NET Framework is Microsoft’s newest development platform that simplifies application development in the highly distributed environment of the Internet.
The .NET framework is designed to fulfill the following objectives:

- To provide a consistent object-oriented programming environment whether object code is stored and executed locally, executed locally but Internet-distributed, or executed remotely
- To provide a code-execution environment that:
  - Minimizes software deployment and versioning conflicts that are so common with other HR systems
  - Guarantees safe execution of code, including code created by an unknown or semi-trusted third party
  - Eliminates the performance problems of scripted or interpreted environments
- To build on industry standards to ensure maximum application interoperability with other .NET and non-.NET applications
- To provide a rapid development environment for XML Web Services and distributed applications

Ultimate Software is optimizing UltiPro Workforce Management for this next-generation application architecture and will continue to build on our existing XML Web Services framework in this new application framework. It is our belief that .NET, with all of its benefits, will help us continue to build the most functional, extensible, manageable and scalable workforce management solution in the industry.

**UltiPro Wireless**

Ultimate Software recognizes the mobile workforce today and is delivering a wireless application suite geared for today’s mobile employees, managers, administrators, and executives. Based on the .NET mobile toolkit, our wireless solution provides every employee access to your company’s directory of phone, e-mail and SMS addresses. Managers can elect to receive wireless SMS notifications for workflow events requiring their approval. Employees and managers alike can access pay stub detail and pay stub history via a wireless browser. In addition, users can individually establish wireless notification preferences. The examples below indicate the type of detailed data UltiPro provides to the wireless user:

UltiPro wireless integrates the best of text messaging and wireless browsing to provide information access whenever and wherever you need it.
Summary

As our economy continues to transform into a services-based environment, workforce and talent management will continue to be a strategic boardroom topic. Many companies will look to manage human resources and payroll at the lowest cost, while others will create new ways to attract, motivate and retain today’s knowledge worker through a workforce management portal that is personalized for every employee in the business. A recent Watson Wyatt Human Capital Index study found that “companies that adopted HR technologies with goals of improving service to employees and managers, achieving cost reductions, or increasing transaction accuracy or integrity saw an increase in shareholder value of as much as 6.5 percent.”

With the advent of new technologies like XML Web Services to enable improved service and transactional efficiencies for today’s distributed workforce, it is important for organizations to select a workforce management solution that connects today’s workforce with tomorrow’s possibilities. UltiPro Workforce Management continues to leverage the latest technology at the lowest total cost of ownership by providing leading functionality, offered through delivery options and pricing models that meet the needs of your business.

1 2002 SHRM survey of 170 senior human resource professionals
