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# **The Ultix Core Enterprise Application Platform**

Extensible ERP for Sector-Specific Implementation

White Paper

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## Contents

Introduction .....	1
Architecture .....	2
Client/Server .....	2
Pluggable Data Layer .....	2
Aspect Based Entity Management.....	3
UI Organization with Views .....	4
Extensibility Support .....	5
Ability Sets.....	5
Summary .....	6
Enterprise Search Engine.....	7
Security.....	7
Auditing Capabilities .....	8
User Notes.....	8
Critical Notes.....	8
Confidential Notes .....	8
System Notes.....	9
Automation Engine.....	9
Windows-Based Rich Client.....	10
ClickOnce Integration .....	10
Advantages of Using the Ultix Core Enterprise Platform .....	10
Optimized Development Process.....	10
Simplified Project Management .....	11
Hardware and Software Requirements .....	11

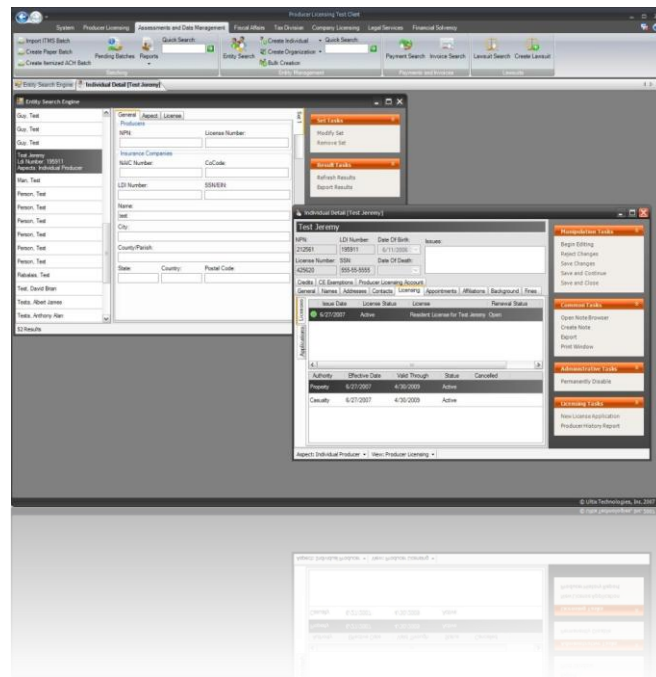
## Introduction

The Ultix Core Enterprise Application Platform (“The Core”) is an ERP and CRM system in which both the client and server can easily be extended and it requires a relatively low effort to customize it for specific sectors or companies.

The system contains superior entity management capabilities and the inherent ability to integrate multiple stand-alone software applications into one large enterprise environment. One direct benefit to using the Ultix Core Platform is having an integrated software environment that allows the organization’s left hand to know what its right hand is doing. The system integrates an organization through a “blended” approach focused around an entity instead of through system modules.

Another benefit is that development projects no longer have to be started from scratch. Using the Ultix Core Platform, the development team no longer has to be concerned with the internal “plumbing” code associated with software development. Instead, the development team can immediately begin designing and refining critical business processes and organizational workflow.

The demands placed on enterprise software are so diverse that an out-of-the-box solution has numerous limitations for smaller enterprises. Such “one size fits all” solutions burden administrators with time consuming configuration and do not provide enough flexibility. Additionally, traditional out-of-the-box enterprise solutions are unable to handle “non-standard” business processes and workflows.



Screenshot of a sample Ultix Core Application.

**Note:** An organization could purchase an out-of-the box solution such as SAP or PeopleSoft for their “standard” business processes such as accounting or distribution. However, these products are not easily able to be extended to account for additional “non-standard” (company specific) functions. The organization would then have to write custom stand-alone systems to account for their non-standard business processes, thereby eliminating integration across the entire enterprise. By utilizing the Ultix Core Platform, these processes can be written within a single enterprise platform taking full benefit of the ability to integrate with the various other processes that occur within the organization.

This whitepaper provides an overview of the Ultix Core Enterprise Application Platform, and explains how it can be used to completely integrate all business processes within an organization regardless of how specific these processes are.

# Architecture

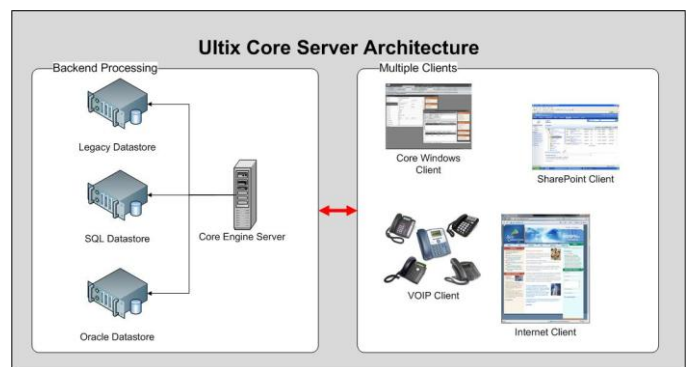
## Client/Server

The Ultix Core platform consists of two parts – the server and different types of clients. The server is a “headless” component, meaning it has no particular user interface associated with it. All of the business processes and features of the system are housed in the server and can be accessed from any number of clients. Currently, the most comprehensive client is a rich client written as a Windows Desktop Application frontend. The server may also have a Web Portal client for external access. This allows outside users to perform “self-service” functionality on their individual entities. Additionally, other clients may include SharePoint, XML Web Services (for 3rd party applications), mobile phone applications, and automated telephone systems. There are many direct benefits to utilizing a **true** client/server architecture for enterprise systems. Some of these benefits are listed below:

- 🌀 **Code encapsulation:** The code that is executing for the business processes is running in a centralized location, instead of having DLLs “synchronized” for multiple projects.
- 🌀 **Eliminates concurrency problems:** Because each entity is executing in a centralized server, the object can be locked while a user is operating on it. Thereby, eliminating the potential for other users to make changes while it is being edited.
- 🌀 **Real-time updates:** Changes to an object can notify all clients in real-time when updates are made. For instance, an internal user can open a corporation for viewing. If that corporation modifies its information through an online interface, the internal user will see the changes immediately without having to perform a screen refresh.
- 🌀 **Batch Processing:** Traditionally, software developers write nightly batch processing jobs to run within a database server. The Ultix Core ships with an internal Automation Engine. Batch processes can be written to execute within this engine, thereby utilizing the business code already in place for the objects. This eliminates the need to re-write business rules within SQL Server stored procedure and maintaining both instances of the business rule.

## Pluggable Data Layer

The Ultix Core platform employs a multi-tier architecture. Each business object running in the Ultix Core Server is associated with its own data provider. This allows the system to support multiple data sources. For example, by simply swapping out the data layer we could migrate from Oracle 9i to SQL Server 2005 without having to rewrite any other components. Additionally, some components in the system can pull from one data source, while others can pull from another data source such as a legacy system. In this regard, our server can actually function as a middleware component.



The Core Server can have multiple types of frontends while simultaneously accessing different datastores.

## Aspect Based Entity Management

The Ultix Core Platform takes a unique approach to tracking entities (individuals or organizations) called “Aspects”. At its most fundamental level, the Ultix Core knows an entity as an individual or an organization (and nothing else). When a new entity is created, the functionality associated with that entity contains only general information regarding the entity (name, federal ID, address, etc). A powerful feature of the Ultix Core Platform is the ability to assign Aspects to entities. An Aspect is a role or personality that can be assigned to an entity. These roles (and all functionality associated with them) are defined with extensions to The Ultix Core Platform. Once a particular Aspect has been associated with a particular entity, all functionality associated with that Aspect can then be performed on the entity.

**Scenario:** An individual has two insurance-related jobs (aspects) that require state regulation. The individual is an Insurance Agent and an Insurance Continuing Education Instructor. The individual is tracked by two separate divisions within the Department of Insurance. In traditional systems, this individual would be added to two separate modules (duplicating his vital information both times). What if his address gets changed in one system and not the other? What if the individual gets married and changes her last name and the change is only made in one of the two systems? What if the Insurance Agent is convicted of fraud but continues to teach other Insurance Agents because the Continuing Education Division was not informed that the individual was convicted of fraud? How do you track every “**aspect**” of this person in a manner that all information is only a mouse click away?

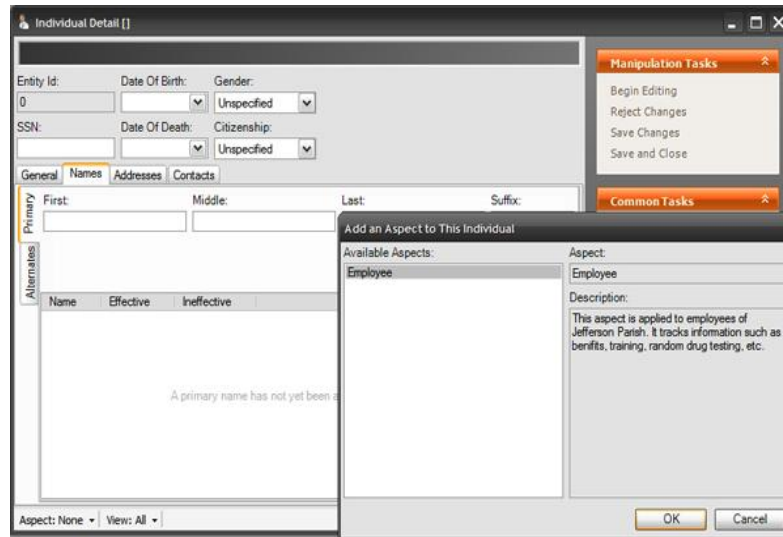
Our method of tracking entities solves these problems by only allowing an entity (the individual) to be entered into the system once. At that point, different aspects (Insurance Agent and Instructor) can be assigned to the entity as it takes on different “roles”. Additionally, when the user changes an entity’s aspect, the UI is dynamically reconfigured to reflect the new set of tasks and responsibilities associated with that aspect.

The following walkthrough will demonstrate how to add an an Aspect to an entity in the system:

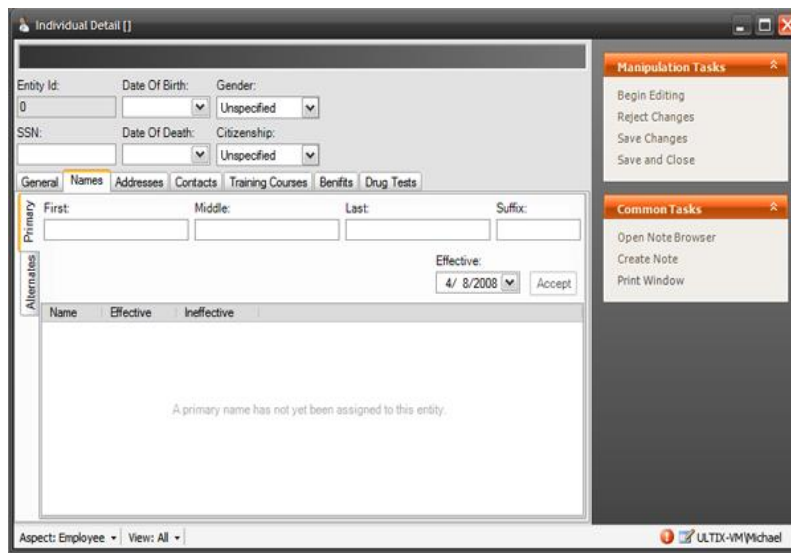
- 🌀 **Step 1:** A new entity is added into the system with no Aspects associated with it. Notice the functionality of the entity is limited to tracking names, addresses, etc. The user then clicks the “Add an Aspect” task from the Aspect panel in the lower left corner of the screen.

The screenshot shows the 'Individual Detail' application window. The main form contains fields for Entity Id (0), Date Of Birth, Gender (Unspecified), SSN, Date Of Death, and Citizenship (Unspecified). Below these are tabs for General, Names, Addresses, and Contacts. The 'Names' tab is active, showing fields for First, Middle, Last, and Suffix. An 'Effective' date is set to 4/8/2008. A table for 'Alternates' is empty, with a message: 'A primary name has not yet been assigned to this entity.' In the bottom left corner, an 'Add an Aspect...' dialog is open, showing a list with 'None' selected. The right sidebar contains 'Manipulation Tasks' (Begin Editing, Reject Changes, Save Changes, Save and Close) and 'Common Tasks' (Open Note Browser, Create Note, Print Window). The status bar at the bottom right shows 'ULTIX-VM Michael'.

- Step 2: Once the user clicks the “Add an Aspect” task, a list of available system aspects is displayed. In this example, there is only an Employee aspect to choose from.



- Step 3: The entity now has the Employee Aspect associated with it and users can now process employee related tasks for the entity such as administration of employee benefits, etc.



## UI Organization with Views

One of the main obstacles that must be overcome when writing large enterprise systems is **UI Organization**. Enterprise applications can quickly become so large that individual users are overwhelmed with the amount of information and functionality (tabs, menus, menu items, etc) presented on the enterprise UI.

A majority of users in an organization are assigned specific responsibilities and therefore only need access to a **subset** of the entire enterprise system.

The question then becomes, “How do you develop a fully integrated system without overwhelming specialized (isolated) users with a UI that has meaningless information and functionality with respect to their job?”

To solve this problem, Ultix developed the concept of “Views” or Virtual Sub-Systems. Views are a powerful way of organizing system functionality and User Interfaces on a user-by-user basis. The implementation of Views allows a user to dynamically re-create his or her UI based on what information and functionality they need to do their job. Think of views as a portal for application functionality as opposed to traditional web portals that deal with content management. A View can take the fully integrated enterprise environment and break it down into functional subsets. Essentially, a View reconfigures the enterprise application into what a smaller, specific, stand-only system would look like.

**Scenario:** Let’s say an entity has an Employee Aspect. This aspect could define business processes such as administration of employee benefits, issuing payroll, and managing the employee’s assigned projects. The Human Resource division does not need to be concerned with the progress of an employee’s assigned projects, so they may elect to switch to the “HR View”. This would filter out the “Projects Tab” and any other needless tabs from the HR user’s UI.

*Essentially, an Aspect tells the system “Here is all the functionality this personality **CAN** perform”; whereas a View tells the system “Of all the features exposed by this Aspect, which ones do I as a user **CARE** to see”.*

## Extensibility Support

One of the overall goals of the Ultix Core Platform is to provide an environment that is powerful enough to manage ALL business processes in a large organization. However, the Ultix Core Platform is designed in such a manner that the entire enterprise’s processes do not have to be developed simultaneously. Rather, different divisions in the organization or different software projects can be written independently over time, incrementally building up the integration of all business processes within the organization. This capability is intrinsic to the architecture of our platform and the basis for this is built with the concept of “Ability Sets”.

### Ability Sets

Ability Sets are the technology that allows easily extensibility for the platform. As previously discussed, **Aspects** in our system define particular “personalities” that entities may be associated with. These personalities include all data and functionality that are relevant to the particular personality. Ability Sets work very closely with Aspects to provide the functions. As the name implies, **Ability Sets** are a collection or set of particular abilities or business processes. These abilities are grouped logically together into an “Ability Set”. An Ability Set could be something such as the ability to pay taxes, the ability to receive payments, or the ability to be licensed or regulated.

**Scenario:** Suppose we wish to develop a system that deals with the licensing of entities such as a driver’s license. We could develop an Ability Set called “Licensing Ability Set” that contains all of the code associated with managing a license. This Ability Set would have procedures for renewing the license, canceling the license, and suspending the license. Once developed, this Ability Set can be

registered with the “Driver Aspect”; thereby providing all entities in the system that are drivers with the ability to be licensed.

### Why have Ability Sets?

- 🌀 **Code Reusability:** Some set of abilities may apply to multiple Aspects. Ability Sets can be registered with multiple Aspects without having to rewrite the abilities for each Aspect and maintaining them in multiple places.

For instance, if both vendors and employees can receive payments from an organization, we can write a “Payable Ability Set” and register this with both the “Employee Aspect” and the “Vendor Aspect”.

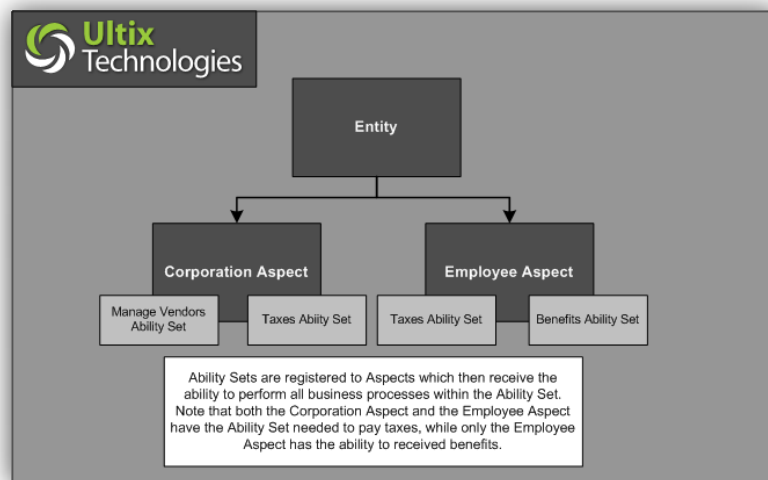
- 🌀 **System Extensibility:** Future updates to business processes in the system can be written with Ability Sets. This allows a developer to continually enhance the system without having to modify existing code that has already been thoroughly tested.

A Human Resources extension for the Ultix Core could be written, tested, and deployed. Later, we can create another extension for Payroll with an Ability Set for issuing paychecks. This Ability Set can be attached to the existing Aspects Employee Aspect which was defined in the HR extension without modifying any of the code residing in the HR extension.

- 🌀 **Independent Development:** Having Ability Sets allows logical groupings of processes to be worked on independently by different development team members. If all of the code pertaining to the functionality of a particular Aspect was contained completely within that aspect, only one developer could work on the processes for that aspect at a given time. With Ability Sets, multiple developers may concurrently work on multiple business processes for any given Aspect.

### Summary

Ability Sets provide the ability for the Ultix Core Platform to promote system extensibility which greatly enhances the adaptability needed for an enterprise environment. The following diagram gives a visual representation of how Aspects and Ability Sets are related in the Ultix Core Platform:



## Enterprise Search Engine

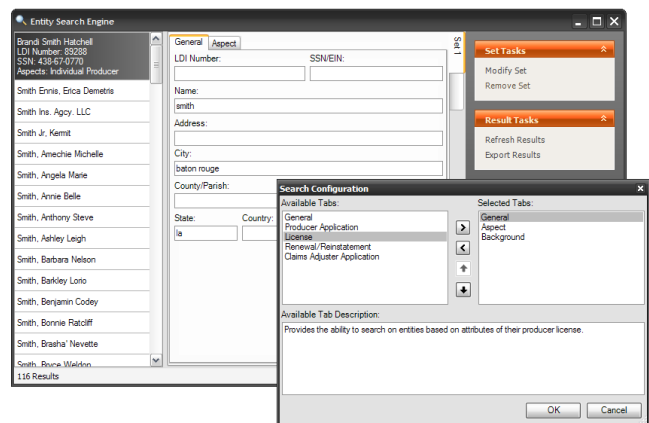
One of the goals of the Ultix Core Platform is to empower users to be able to find items in an enterprise system based on ANY information that the system tracks. For this reason, the Ultix Core Platform includes a robust, pluggable search engine that is itself easily extendable. With this search engine, users can customize (expand) their searches by adding one or more Criteria Tabs (logical groupings of search fields) from different extensions added to the enterprise application.

By default, the Search Engine comes with two Criteria Tabs, “General” and “Aspect”. The “General” tab is for finding entities based on general information that the system tracks such as name and contact information. The Aspect criteria tab is used to find entities in the system with a particular Aspect.

**Note:** Additional search criteria tabs can be custom written and added in extensions, thereby allowing users to find information based on information associated with objects that written within those extensions. For example, suppose an organization writes a Payment Receivable extension to the Ultix Core Platform. The organization would define objects such as Invoices within this extension. The organization could then create an Invoice Criteria that knows how to find entities based on information associated with the entity’s invoice. Now, suppose a user wants to search for all entities that have an outstanding invoice in addition to the default search criteria, the user could add an “Invoice” Criteria Tab to give the ability to search on Invoice information such as amount due, due date, etc.

By allowing the users to add functionality to their search engine piece by piece, nearly any conceivable search request can be built by the end user without the need to employ the services of a Database Administrator.

Because of the dynamic nature of the Ultix Core’s Search Engine, users can also mix and match Criteria Tabs from different extensions. This allows users to perform searches across the entire enterprise, no matter how many different divisions there may be. These types of searches would be next to impossible in an environment outside of The Core Platform. Furthermore, the results of this search can be exported to an Excel document, a mail merge document, or have a custom process (such as email blast) or a custom report run on the search results. Again, this is a much more functional approach to standard ad-hoc querying.



The user can mix and match criteria tabs from any extension.

## Security

One of the most challenging issues in designing and managing large enterprise applications is the complexity of security administration. To overcome this challenge, the Ultix Core Platform ships with a robust and configurable role-based Security Engine.

Role-based security is an elegant way to provide user authorization for an application. A role is a set of users sharing the same security privileges. A user belonging to a particular role can access resources for which permissions are granted specifically for the role.

Roles in the Security Engine may map directly to Active Directory groups. These Active Directory groups are then able to be managed in the application by the Security Manager tool. Security administrators are then able to open a particular Active Directory group and assign privileges to it. These privileges can be identified by each division to secure their data and processes as they see fit.

During development, each extension is able to specify the privileges that it has the ability to secure. For example, an extension can identify a privilege to determine whether a role can access a particular form or it could create privileges to determine whether a role can access specific fields on that form. Regardless of the security methodology defined, the extension will still be fully integrated in the application's security framework.

It is important to note that the Security Engine does not contain any "hard-coded" Active Directory groups. Every portion of the security framework is dynamic in nature. This means that if an organization ever wishes to add or change active directory groups, it can be done without any code changes to the application.

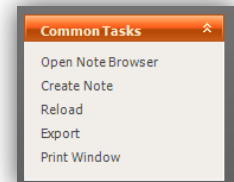
By employing this approach to software security, Ultix can ensure the System Administrators will enjoy the best possible combination of efficient, authorized user access with overall system security.

## Auditing Capabilities

The Ultix Core Platform contains a powerful and secure Notes Engine for creating and maintaining notes that pertain to entities. Additionally, non-entity related notes can be created in extensions to track information related to custom objects. The Ultix Notes Engine ships with numerous default features.

### User Notes

With the Notes Engine, users can create documentation regarding any entity or custom object in the system. Additionally, other users can respond to the note for further tracking.



Common Tasks allow users to create and browse notes.

### Critical Notes

Another feature of the Notes Engine is its ability to declare specific notes as critical notes. Critical notes popup whenever a user opens the entity (or object) the note pertains to, thereby forcing the user to acknowledge the note. The critical note must be **acknowledged** before any work may be conducted on the entity itself.

### Confidential Notes

Confidential Notes are yet another area in the Notes Engine that takes advantage of the built-in security framework. Notes have the ability to be secured to one or more user roles. Once a note has been secured to a user role, any user not in that role will be unable to view the note.

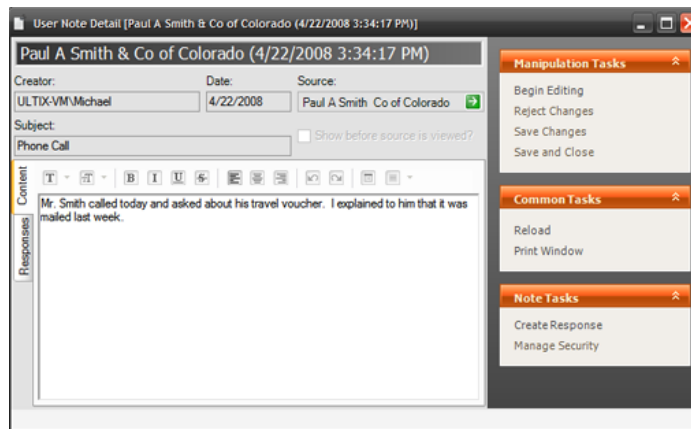
## System Notes

The Notes Engine allows for the automatic generation of system notes. System notes are notes that are automatically created when information about an entity is added, modified, or deleted by a user. This enables the system to track every transaction that has occurred for any object that supports notes.

By default, the system note will document:

- What data was added, modified or deleted
- The user that added, modified or deleted the data
- The date and time the data was added, modified or deleted

The Notes Engine enables any extension that is developed under The Ultix Core Platform to have full audit trail capabilities. In addition to full audit tracking, managers are able to conduct performance evaluations such as “How many records were entered by a particular user or group”.



A sample user note screen

## Automation Engine

The Core includes a built-in Automation Engine that allows for processing of batch jobs. The Automation Engine is also able to be extended from new extensions.

The automation engine works very similarly to the way SQL Server jobs operate. An automation job is scheduled to run at particular timeframes. There is a direct benefit of having the automation engine in The Ultix Core Platform execute jobs instead of having them run within SQL Server. SQL Server has access to data only, while the Automation Engine has access to the data as well as the **business processes** that have already been defined for an object.

**Scenario:** An automation job can be written to notify entities that their driver's license will soon expire. This job can easily ask validation questions such as “Is this entity in violation of any business rules that would prevent them from becoming renewed (such as expired insurance)?” These types of questions are able to be asked without having to duplicate the logic within SQL Server. This allows for much greater maintainability of the system. If the validation rules ever change, they only need to change in one place as opposed to changing them in the system and again in the SQL Server job.

## Windows-Based Rich Client

One of the many benefits of utilizing a **true** client/server architecture is the complete separation between business processes and user interfaces. This provides the ability to have multiple frontends that are tweaked for specific usage scenarios.

The Ultix Core Platform has a base Windows Client frontend that is as highly adaptive and customizable as the internal components utilized in the server. The Windows-Based client can be thought of as the “primary” interface to all business processes available in the server environment. This means that internal users (given sufficient security access) have the ability to perform all actions that have been coded in the server. They can access and manage any entity (as opposed to online users only being able to manage their own entity). Additionally, internal users may work with multiple entities at a single time.

### ClickOnce Integration

Until recently, many internal systems were written as Web-based applications regardless of whether the application was actually better suited as a rich client or not. This was primarily due to a number of benefits that Web-based systems provided over Windows-based systems that no longer hold true. Although, the user experience of a Web-based system is far less enjoyable than a Windows-based system, one of the historical benefits was ease of deployment.

A Web-based system could be deployed to a single web server and all users were guaranteed to be accessing the most up-to-date version. On the other hand, Windows-based systems had to be deployed to each user’s desktop and IT administrators experienced many nightmares managing versions of the product. The deployment nightmare for Windows-based clients has recently been solved by Microsoft using a technology called ClickOnce. The Ultix Core Platform fully supports ClickOnce technology.

Essentially, utilizing the ClickOnce technology allows for the deployment of a Windows-based application to a centralized server. When a user runs the application, ClickOnce will first detect whether a new version has been installed on the server and download it if needed.

**Note:** The Ultix Core Platform also supports the ability to implement Web-based clients for external access.

## Advantages of Using the Ultix Core Enterprise Platform

### Optimized Development Process

#### Any .NET Developer can use it

Any developer proficient in .NET development can utilize Ultix Core Platform functionality.

#### Software Developers are not Restricted

Software Architects and Developers are not boxed-in to a particular way of implementing a solution. Developers are as artistically free to create solutions as they would be writing the entire solution from scratch. However, The Ultix Core Platform provides an environment that promotes integration and consistency throughout the enterprise which greatly reduces development time and cost. The platform handles the labor intensive “plumbing” code (such as communication between the client and

server) so that developers are able to focus on solving business problems from day one. Essentially, development teams are not forced to re-invent the wheel for each system they develop.

### **Consistent User Interface**

Using the Ultix Core Platform improves the consistency of the User Interface. By developers generating their UI from existing base classes, the entire look and feel of the system remains consistent across the enterprise.

### **Enterprise Applications are Easily Extendable**

Using the Ultix Core Application Programming Interface (API), applications can easily be extended and customized. Additionally, seamless integration throughout the entire enterprise is ensured.

### **Simplified Project Management**

The toughest part of managing a large enterprise software development project is insuring that all of the different development teams are on the same page (communicating with each other) to ensure the seamless integration of each module.

Using the Ultix Core Platform, the project manager no longer has to manage the communication between the separate development teams. The project manager needs only to manage each development team individually as the Ultix Core Platform ensures that all custom extensions are fully integrated.

**Scenario:** Suppose a project entails writing a Human Resource System, a Payroll System, a Financial System and a Sales Management System for a given organization. The project manager can manage each team individually and the Ultix Core Platform will allow the modules to be individually developed and yet fully integrated.

## **Hardware and Software Requirements**

The following hardware and software requirements are necessary to use this software:

- **Operating System.** Windows XP Home or Professional (including Tablet PC and Media Center Editions) with Service Pack 2 or later installed. This program is not recommended for use on any other version of Windows.
- **Client Hardware.** A system with at least 256 Mb of RAM and a Pentium III or better CPU is required. For best performance, 512 Mb of RAM and a Pentium 4 or better CPU is recommended.
- **Server Hardware.** A system with at least 512 Mb of RAM and a Pentium 4 or better CPU is required. For best performance, 1 Gb of RAM and a multi-core CPU is recommended.

- **Microsoft .NET Framework.** Version 2.0 of the Microsoft .NET Framework is required. This software will be automatically installed when running Setup if it is not already present on your system. Other versions of the .NET Framework may be safely installed on your system without affecting the use of this software.

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