

Ultimus®

Workflow for the Information Age

200 Essential Features of Workflow Automation

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Introduction

Workflow automation deals with the pro-active coordination of business processes that involve a large number of individuals, applications, and other processes. Because of the complexity and size of modern business organizations, even the simplest business processes are involved. A comprehensive workflow solution must provide the means to easily and graphically design, test, simulate, implement, monitor, and measure any business process, as well as have the flexibility necessary to deal with organizational complexity.

When evaluating workflow automation software, the following unique characteristics of business processes must be considered:

- Exceptions, or “special cases,” are rampant in every organization.
- Even a simple business process becomes complex if it involves a large number of people.
- Business processes look simple on the surface. It is only when you start implementing them that the true complexity becomes visible.
- People will not give up the old way of doing things unless the new way does everything they want, and more.
- Unforeseen events always happen. An automated solution must provide a way around these.
- No two businesses implement the same process the same way. Everyone is different.

In this white paper, we have listed the 200 most important and essential features of workflow automation offered by Ultimus. This list has been developed after more than 6 years of experience in automating business processes for customers throughout the world. It summarizes the combined needs and requirements of our customers who are actually automating real business processes. This list is an excellent benchmark for workflow automation software. It is followed by a brief description of each feature that describes why it is essential for a workflow solution.

List of 200 Essential Features

No.	Description	Ultimus
General Features		
1.	No Programming or Scripting for Core Features	✓
2.	Transaction Processing	✓
3.	Three Tier Scalable Architecture	✓
4.	Robust Message Transports	✓
5.	Scalability	✓
6.	Integration with Enterprise Servers	✓

7.	XML Support	✓
8.	Process Rollback	✓
9.	LDAP Support	✓
10.	Support for Enterprise Databases	✓
11.	Anonymous User Access	✓
12.	National Language Support	✓
13.	Client Licensing	✓
14.	User Domain Security	✓
15.	Unified Login/Passwords	✓
16.	Intranet and Internet Mode	✓
17.	End-to-End Security	✓
Designer Features		
18.	Graphical Workflow Maps	✓
19.	Role-Based Routing	✓
20.	Parallel Routing	✓
21.	Relationship-Based Routings	✓
22.	Queues	✓
23.	Graphical Data Routing	✓
24.	Dynamic Routing	✓
25.	Conditional Steps	✓
26.	Conditional Jumps	✓
27.	Conditional Aborts	✓
28.	Conditional Returns	✓
29.	Conditional Recipients for Users and Roles	✓
30.	Event Conditions Tables	✓
31.	Status Variables in Event Condition Tables	✓
32.	Return Step	✓
33.	Dynamic Groups	✓
34.	Integrated Intelligent Forms Designer	✓
35.	Server-Side Database Connectivity for Forms	✓
36.	Script Invocation from Step Condition Tables	✓

37.	Custom Scripts in Forms	✓
38.	Invoking Server-Side Components from Clients	✓
39.	Signatures	✓
40.	Memos	✓
41.	Spreadsheet Grid in Forms	✓
42.	Multiple Pages per Form	✓
43.	Sub-Forms	✓
44.	Routing Documents with Workflow	✓
45.	Required and Must-Read Attachments	✓
46.	Auto Attach and Un-Attach	✓
47.	Data Validation and Masking	✓
48.	URL Links	✓
49.	Custom Queries	✓
50.	Multiple Levels of Filter	✓
51.	Open Forms Using Browser Technologies	✓
52.	Third-Party Objects	✓
53.	Import/Export Thin Forms	✓
54.	Relative Time Limits	✓
55.	Absolute Time Limits	✓
56.	Dynamic Forms	✓
57.	Form Object Library	✓
58.	Ad hoc Routing	✓
59.	Junction Steps	✓
60.	Iteration	✓
61.	Anchors	✓
62.	Editing Business Rules	✓
63.	Asynchronous Step Completion	✓
64.	Sub Processes	✓
65.	Synchronous/Asynchronous Sub Processes	✓
66.	Periodic Launches	✓
67.	Automation Agents	✓

68.	Automation Agent API	✓
69.	Excel Agent	✓
70.	Word Agent	✓
71.	XML Automation Agent	✓
72.	Script Agent	✓
73.	ASCII Agent	✓
74.	File Agent	✓
75.	E-Mail Agent	✓
76.	Invoke DLL Agent	✓
77.	Agent Stations	✓
78.	Remote Agent Stations on HTTP	✓
79.	Transaction-oriented Recordset Operations	✓
80.	Simulation	✓
81.	Debugging Tools during Simulation	✓
82.	Repeating Steps	✓
83.	Abort Step or Incident	✓
84.	Perpetual Steps	✓
85.	Private User Steps	✓
86.	Non-assignable User Tasks	✓
87.	Replicating Tasks	✓
88.	Selective Copy and Paste	✓
89.	Save Step Snapshot	✓
90.	Dynamic Task Prioritization	✓
91.	Process Owners	✓
92.	Task Rates	✓
93.	Task Completion Times	✓
94.	Process Completion Time	✓
95.	Collaborative Design via Maplets™	✓
96.	Data Transfer to Sub-Processes	✓
97.	View Sub-Process Status in Monitor View	✓
98.	Global Variables	✓

99.	Databound Global Variables	✓
100.	Visual Component Integration	✓
101.	Process Documentation	✓
102.	E-mail Notification of Late Conditions	✓
103.	Customizable Notification Messages	✓
104.	Group Response/Vote	✓
105.	Seeded Incident Number	✓
106.	Delayed Assignment	✓
107.	Process Initiation Rights	✓
Workflow Server Features		
108.	Centralized, Server-side Database Connectivity	✓
109.	Conditional Automation Agent Recipients	✓
110.	Automation Agent Load Balancing	✓
111.	Process Launch via Text Files	✓
112.	Process Launch via E-mail	✓
113.	Process Launch via XML	✓
114.	WFXML Process Launch	✓
115.	Transaction Log Files	✓
116.	Fail-over Redundancy	✓
117.	Component Load Balancing	✓
118.	Network Load Balancing	✓
119.	Periodic Server Housekeeping	✓
120.	Step Autocompletion via XML	✓
121.	Handling of Stalled Processes	✓
122.	Automatic Server Recovery/Start-up	✓
123.	Event Viewer Logging	✓
Client Features		
124.	Browser-based Client Interface	✓
125.	Prioritized Client Task List	✓
126.	Proactive E-Mail Notifications	✓
127.	Late Task Escalation	✓

128.	Two Levels of Late Notification	✓
129.	Graphical Status Monitoring at Client	✓
130.	Distributed User Administration	✓
131.	Client Assign/Un-Assign Functions	✓
132.	Select Task from Queue	✓
133.	Custom Client Views	✓
134.	Process Level and Step Level Help	✓
135.	Calling Server Side Script from a Form	✓
136.	Custom Logo in Client	✓
137.	Pre-Defined Views	✓
138.	View Assigned Tasks	✓
139.	Forms Caching	✓
140.	Form Templates	✓
141.	Automatic Archiving	✓
142.	Automatic Software Update for Browser Clients	✓
143.	Open Form Send	✓
144.	Digital Certificate for Browser Software	✓
145.	Custom Front-Ends	✓
146.	Roving User	✓
147.	Automatic Periodic Refresh	✓
148.	Printing	✓
149.	Custom Data in Task List Views	✓
150.	Netscape Support	✓
151.	Thin Client	✓
152.	Conferring on a Task	✓
153.	Notification of Abnormal Situations	✓
154.	Database Security	✓
Organization Chart Features		
155.	Organization Chart	✓
156.	Active Directory Support	✓
157.	Web-based Organization Chart	✓
158.	Sub-Charts	✓
159.	Chart Owners	✓
160.	Groups	✓

161.	Sequential Groups	✓
162.	Weighted Groups	✓
163.	Job Function Groups	✓
164.	Multiple Roles Per User	✓
165.	Relative Job Functions	✓
166.	Search	✓
167.	Reorganize	✓
Reports Features		
168.	Advanced Reporting	✓
169.	Web-based Reports	✓
170.	Graphical Reports	✓
171.	User Reports	✓
172.	Step Reports	✓
173.	Incident Reports	✓
174.	Elapsed Time Report	✓
175.	Step Time Report	✓
176.	Step Cost Report	✓
177.	Automation Agent Reports	✓
178.	Pre-defined Reports	✓
179.	Incident Groups View	✓
180.	Report Definition Wizard	✓
181.	Report Access Rights	✓
Administrator Features		
182.	Graphical Workflow Monitoring	✓
183.	Automatic Process Installation and Version Control	✓
184.	Administration using the Microsoft Management Console	✓
185.	Workload View	✓
186.	Remote Administration	✓
187.	Disable Processes	✓
188.	Pull Tasks from Queue	✓
189.	Resubmit Agent Steps	✓
190.	Exclusion Days	✓
191.	Assign Future Tasks	✓
192.	Workflow Metrics Export	✓

193.	Ability to Change Recipient	✓
194.	Ability to View Workflow Data	✓
195.	User-Defined Queries for Reports/Monitor View	✓
196.	System Resource Verification	✓
197.	Automatically Install to New Group Members	✓
198.	Assign Until	✓
199.	Roll-up Sub-process Statistics	✓
200.	Ability to Complete Third-Party Application Steps	✓

1. No Programming or Scripting for Core Features

Ease of application development and deployment is a key requirement of workflow automation. The ability to develop sophisticated workflow processes without programming in order to cater to the demanding needs of modern organizations is an essential feature of workflow automation. Core workflow features must be provided out-of-the-box. Otherwise, the Total Cost of Ownership becomes exorbitant.

Ultimus allows users to design sophisticated workflow processes without any programming, scripting, or macros. This capability makes it easy and cost-effective to deploy and maintain workflow applications. Ultimus makes this possible by ensuring that all the essential features of workflow automation are offered out-of-the-box.

2. Transaction Processing

Workflow automation is about secure, reliable, and high volume transaction processing. In transaction-oriented workflow managers, the transaction determines what actions must be taken next. The workflow engine then ensures that the information necessary for subsequent tasks is delivered to the right individuals or applications. It also needs to be capable of monitoring the task completion state precisely at all times.

Transaction orientation is at the core of the Ultimus Workflow Suite. Steps (tasks or activities) are enterprise level transactions that the workflow engine processes and monitors. The Ultimus workflow manager is built on the Microsoft COM+ framework that encompasses the Microsoft Transaction Server. The transaction processing architecture provides for reliable, efficient, and industrial-strength workflow automation.

3. Three Tier Scalable Architecture

The design architecture of a workflow solution is extremely important because it dictates the robustness and the degree to which the solution can scale. Modern client/server applications rely on a three-tier architecture for providing scalability and flexibility, and a workflow solution must have a similar architecture.

Ultimus offers a three-tier architecture for workflow automation that is highly scalable. At the top level, it uses the workflow server database to control workflow processes and maintain the integrity of process definitions. At the middle level, the Ultimus Workflow Server uses the database to keep track of all tasks that individual users have to perform and the data that they will need. The Ultimus Workflow Server also creates the task lists and paints the forms for the users when needed, using a commercial web server. At the bottom of the tier, the browser is used to display the task list and the forms at each desktop. This is where the user actually performs individual tasks using powerful electronic forms.

4. Robust Message Transports

The workflow solution must use reliable and fail-safe message transports for exchanging critical workflow information between the various system components. If the transports are not reliable, the workflow solution will not be able to perform in the face of the high transaction volume demanded by workflow applications. While e-mail is suitable for ad hoc messaging, it is not reliable enough for routing vital business information.

Ultimus uses reliable and secure data transports for all communications between different program components. These transports include the following:

- The Workflow Server communicates with Ultimus clients using HTTP over TCP/IP or COM/DCOM.
- The Workflow Server communicates with third-party clients using COM/DCOM.

- The Workflow Server communicates with the Ultimus FloStations HTTP or TCP/IP or COM/DCOM.

E-mail is used only for notification messages and for launching messages via e-mail.

5. Scalability

As the number of participants and workflow incidents increases, so do the number of transactions that must be performed reliably by the workflow solution. If the transactions are not reliable or fast, the workflow system will fail. Secure, reliable, and scalable transaction processing is an essential requirement of workflow automation.

Ultimus has the ability to scale to a full range of environments ranging from department to enterprise workflow processes. It achieves scalability by leveraging Microsoft COM+/DNA, Windows 2000 Clustering, Active Directory/LDAP directories, and high-volume databases such as Oracle and SQL Server.

6. Integration with Enterprise Servers

A workflow server has to be able to run in enterprise IT server environments. Windows 2000 Server and Advanced Server are the latest Microsoft enterprise OS platforms. Windows 2000 implements a range of new technologies ranging from management to enterprise directory services that a workflow solution should take advantage of.

Ultimus is Windows 2000 certified and fully supports Windows 2000 Server/Advanced Server. While maintaining backward-compatibility to Windows NT 4.0, it incorporates Windows 2000 services such as Active Directory and the COM+ architecture.

7. XML Support

XML is fast becoming the standard for the interchange of B2B and B2C information. A large number of business applications increasingly use XML for integrating with other applications. Workflow is the glue that binds people and applications together as part of a business process. Hence, it is necessary for a workflow solution to read and write XML data.

Ultimus supports XML and standardized XML schemas such as BizTalk. Workflow designers can integrate 3rd party line-of-business applications that use XML via the XML Flobot™. Furthermore, XML schemas can be used to launch Ultimus workflow processes and complete workflow steps.

8. Process Rollback

In real business situations, people often change their minds. A capable workflow solution must provide a means of handling the situation where a decision was made at a step in the workflow, and then subsequently, when the process has gone forward, the user changes his or her mind. The process must be “rolled back” to accommodate the change. For example, an order entry clerk has placed a customer order and the order process has gone forward. Then the customer changes his mind about some aspect of the order. Instead of canceling the order process, rollback enables the process to be called back to a known state where changes can be made and the process can then move forward with the new information.

Ultimus provides a powerful and unique rollback capability. It allows an incident to be “returned to a known state” from a step even after the step has been completed and the process has gone forward. This provides a powerful means to implement rollback of a process to a known state based upon knowledge of where it is currently. Additional flexibility is provided for determining the “roll-back” state based on real-time conditions specified by the process designer.

9. LDAP Support

Businesses keep user names, passwords, and access rights in directories. Maintenance and synchronization of these directories is a major issue. It is the primary reason why the Lightweight Directory Access Protocol (LDAP) is fast becoming an industry standard with all major software vendors backing it. LDAP provides a standard way for applications to work with different directories. Since workflow automation needs information about users, support for LDAP is an essential requirement.

Ultimus supports LDAP. This means that Ultimus is able to use LDAP-compatible directory services used by our customers. Specifically, these include Active Directory, the Netscape/iPlanet Directory Server, and Novell NDS/eDirectory. This enables Ultimus to seamlessly provide access control and authentication regardless of the directory service used by our customers.

10.Support for Enterprise Databases

Gathering and distributing business information is the essence of workflow automation. A workflow solution must work with the enterprise databases found in modern organizations.

Ultimus supports the Oracle and Microsoft SQL Server enterprise databases. Communications with these databases are optimized with a focus on performance and scalability.

11. Anonymous User Access

Many workflow applications require the inclusion of users outside of the organization. Since they are not in the directory database, there must be some mechanism to allow them to participate in workflow processes. For example, a college may have an automated registration process where the faculty/staff are known users in the process, but students are not.

Ultimus supports Anonymous User Access, allowing users not in the directory to initiate a workflow process.

12.National Language Support

Workflow manager applications are deployed in enterprises worldwide. They allow people to collaborate across geographic boundaries within an organization or provide interfaces to international customers through the Web. A leading workflow solution has to support multiple national languages, including support for multi-byte character sets, such as those found in Chinese and Japanese.

The Ultimus Workflow Suite is double-byte enabled and supports languages such as Japanese, Chinese, and Arabic. It provides support for right-to-left text in forms and the ActiveX client. It includes features such as on-the-fly locale detection in IE forms.

Ultimus is available in multiple languages, including English, German, French, Italian, Spanish, Portuguese, Arabic, Chinese, and Japanese.

13.Client Licensing

The use of a workflow solution can vary widely. They range from those with few processes and a large number of users in Internet applications, to those with many processes and few users in departmental workflow. Client and server licensing needs to provide customer-oriented options to best fit a given scenario.

Ultimus provides flexible licensing options that encompass the use of the server and floating clients. The Ultimus Workflow Suite can be custom fitted to a customer's requirements, providing for managed total cost of ownership. Additionally, it keeps track of license use

responsibly, allowing for over-runs with email-only alerts sent to the designated Administrator.

14. User Domain Security

A workflow solution must authenticate users who will participate in workflow processes. However, user authentication must be based upon the authentication system already in use by the customer. The workflow solution must not require the use of a separate proprietary authentication scheme.

Ultimus uses the existing domain security for login and authentication. Access to the Ultimus browser client is controlled by a user name and password that the user must enter. This data is verified against the user Domain name and password. Ultimus authenticates users and controls access. By using the Domain security, Ultimus eliminates the need for a separate workflow password. Ultimus also provides a simple means for the user to deploy a different proprietary access control scheme if necessary. Ultimus is tightly integrated with Microsoft Active Directory and supports NT Directory services. Ultimus also supports the Lightweight Directory Access Protocol (LDAP). This means that Ultimus can use any LDAP-compatible directory service to verify user names and passwords.

15. Unified Login/Passwords

Login to the workflow solution and its components must be unified with the login to the desktop operating system. It must not rely on a proprietary scheme and force two separate logins.

Ultimus does not rely on separate user names/passwords to access workflow functions such as the Designer, Org Chart, and Administrator. Instead, it uses network user names and corresponding access rights to control access to these functions. Users do not have to login separately to use the Ultimus program components.

16. Intranet and Internet Mode

Workflow clients and modules of a workflow solution can be accessed in-premises, within one building, be physically separated from the server, but part of a logical VPN, connect over the Internet, or any combination thereof. A workflow solution needs to accommodate the variety of connection options present since each there are distinct advantages for particular settings.

The Ultimus Workflow Suite incorporates a unique U2Net™ technology that encompasses both a client/server and a web-based mode of operation. It features an Intranet and an Internet mode for connecting to the Reports, Administrator, Organization Chart, FloStation, and Client applications. The Intranet mode uses tightly-coupled COM+ resulting in high performance, and the Internet mode is based on loosely-coupled HTTP giving it the benefit of remote connectivity.

17. End-to-End Security

With the advent of the Internet, workflow over public networks security has become more important than ever. Workflow managers not only have to provide security to the client within the enterprise, but they also need to be concerned with the security of data traveling across and between countries and continents. Moreover, the security of a solution is only as strong as its weakest link; thereby, raising the requirement for true end-to-end workflow security.

The Ultimus Workflow Solution is built for end-to-end security encompassing even its database connections. It includes an Intranet and an Internet mode of operation. Every

module of the solution, including the reporting and monitoring tools, are designed to use SSL and encrypted communications allowing them to be run remotely over public networks.

18. Graphical Workflow Maps

The ability to graphically design workflow maps for business processes is one of the basic requirements of modern workflow automation solutions. A workflow map represents a business process in a flow chart fashion with clear indications of the dependencies, conditions, and sequences in which tasks must be performed from initiation to completion.

Ultimus allows you to graphically design workflow maps. The workflow map specifies the roles, rules, and routings that are essential for the automation of a business process.

19. Role-Based Routing

This is the ability to route a task to a job function instead of an individual. If individuals change job functions (which they do frequently), the workflow does not have to change.

Ultimus provides this feature without any programming and offers sophisticated capabilities to define roles and groups through the use of an organization chart.

20. Parallel Routing

In every organization, there are many tasks that can be performed in parallel to reduce cycle time. For example, if five department managers are required to make a budget forecast, and each forecast is independent of the other, it does not make sense to route the budget forecast form from one department manager to another in a sequence. This only adds to the completion time since all of them cannot do their part in parallel.

Ultimus allows users to design workflow processes with steps in series or in parallel. This is possible because Ultimus uses an electronic form only to display information and not as the container for carrying the information. In addition, Ultimus allows you to create unique forms for each step in the process. The form is a window to the data and a means for users to perform their tasks. This makes it easy to implement parallel routing.

21. Relationship-Based Routings

Many business processes are based upon reporting relationships. Reviews are done by supervisors, expense reports are reviewed by department managers, and so on. The ability to route workflow tasks based upon reporting relationships is very important.

Ultimus offers the ability to define an organization chart so that the workflow software is aware of reporting relationships. It uses this information to efficiently implement relationship-based routing.

22. Queues

The use of task queues or “shared in-baskets” is common in business so that work can be shared. It is an essential feature for workflow automation.

Ultimus offers the ability to declare a Task Queue. Instead of sending tasks to an individual, they are sent to a Queue. Individuals at the receiving end of the Queue can request tasks when they are free to perform them. This feature is important for task management where multiple users perform the same tasks, such as purchasing.

23. Graphical Data Routing

Workflow processes are all about gathering and disseminating information. A good workflow solution must provide a means of graphically specifying how data will be routed to various

steps in the workflow process. Software that focuses on a single step in the process, such as forms software, makes data routing very difficult.

Ultimus offers the ability to graphically specify the routing of data to all the steps in the workflow map. The routing of information is the most critical aspect of workflow automation. It ensures that the right information is available to the right people at the right time.

24. Dynamic Routing

The ability to dynamically change the routing of a business process based upon real-time events and information is a very important feature of workflow automation. The workflow logic must be able to adjust based upon the data gathered in the process.

Workflow processes implemented using Ultimus are dynamic. The “flow” of the work changes depending on information entered via the electronic forms or through databases. This provides a means to implement workflow that adapts to actual business conditions.

25. Conditional Steps

There are many steps in actual business processes that are only performed on a conditional basis. Automated workflow must offer this capability.

Ultimus has the ability to activate steps unconditionally, or under as many different conditions as specified by the process designer.

26. Conditional Jumps

This is the ability to bypass certain steps in a process as is common in real business processes.

When a step is complete, Ultimus allows the user to specify many different actions that can bypass the normal flow of the process. These actions are activated under different conditions that the process designer can specify.

27. Conditional Aborts

Workflow incidents or specific tasks are frequently aborted based upon changes in business conditions. Workflow automation must provide this capability.

At any step in the process, Ultimus allows other steps or the entire incident to be aborted under various conditions. The process designer has the flexibility to specify conditions necessary to control these actions.

28. Conditional Returns

In real life, business process cases can move forward or backward. They move forward when tasks are completed successfully. However, they can also move backward if a task cannot be performed because of some ambiguity or lack of information. Workflow automation must provide the ability for processes to move in both directions.

Ultimus allows a user at a step to “return” the process to the previous step(s) for lack of information or some other reason. Ultimus also provides the process designer the flexibility to by-pass the previous steps when a step is “returned” and jump to any other step(s) under specific run-time conditions. The process designer can choose to specify the conditions necessary to determine where to return.

29. Conditional Recipients for Users and Roles

In many business situations, tasks are assigned to individuals based on their job functions (roles) as well as their skill levels. Workflow automation must provide a means to assign workflow tasks based upon skill levels.

Ultimus provides the capability to select a recipient of a step on a conditional basis, and the conditions are determined by the associated Event Conditions Table. A process designer has the flexibility not only to activate a step on a conditional basis, but once activated, also select a recipient on a conditional basis. For example, a purchase order may go to a “Buy” step on a conditional basis. Once the step is invoked, the conditional recipient capability may be used to select a recipient dictated by the price or complexity of the items to be purchased. This feature can also be used to assign recipients based upon skill levels and the complexity of the task.

30. Event Conditions Tables

Exceptions and special cases are rampant in modern business organizations. The ability to specify conditional business logic is essential for robust workflow automation. It enables workflow to be intelligent and route tasks based upon the rules of the business and the conditions of each case.

Ultimus offers powerful Event Conditions Tables to control actions for five Events associated with a workflow step (Activate, Complete, Return, ReSubmit, and Late). An Event Conditions Table can have up to 255 columns. Each column can be linked to a workflow variable that reflects real-time workflow conditions. The Event Conditions Table can have up to 5000 rows. Each row has an action (Activate a step, Abort a step, Abort Entire Incident, Call Server-Side Scripts and Execute Server-Side DLL) that is specified in the first column. Each cell in the row can be used to specify a condition that must be satisfied for the cell to be evaluated as TRUE. An action in the row is executed only if each cell is null (Don't Care) or is TRUE. Each row is evaluated separately. The Event Conditions Table provides limitless flexibility in designing rules and exceptions that are common in all businesses.

31. Status Variables in Event Condition Tables

In many situations when deciding the future course of a process, the decision is based upon where the process currently is i.e., the status of a particular step. The status of each step is an important variable that can influence the flow of the process.

Ultimus provides Status Variables in the Event Conditions Table that provide status information about other steps. The workflow designer makes use of the status information to define conditions that control the flow of the process.

32. Return Step

In real life, business processes move both forward and backward. They move backward for lack of information or because of ambiguity. Workflow software must provide the means for a process to move forward or backward.

Ultimus gives users the ability to “return” a workflow step so that the process “flows back” to the previous step without the returning user having to know where it came from. This powerful capability provides the same flexibility as manual business processes.

33. Dynamic Groups

In real business situations, “groups” are defined dynamically in order to accomplish a particular task. The ability to define and use dynamic groups in real-time is a highly desirable feature.

Ultimus provides the capability to define a group at run-time instead of at design time. This can be done either by entering the members of the group in a form, selecting them from a list box, or reading their names from a database. A task can then be routed to all members of the group. For example, one may want to design a process to invite people to a meeting. The invitees are not known when the process is designed. One can use the dynamic group function to allow the initiator of the process to select the invitees and create a dynamic group. Each member of the group will then be sent a form asking about their availability for the meeting.

34. Integrated Intelligent Forms Designer

Forms are the user interface of a business process and are used for gathering and disseminating information. The ability to easily design and use intelligent electronic forms is an essential feature of workflow automation.

Ultimus offers a powerful, seamlessly integrated, and graphical tool for designing intelligent electronic forms for each step of a workflow process. The Ultimus Forms Designer provides the ability to link form fields with an integrated Spreadsheet and enterprise databases. This allows the computing power of the Spreadsheet to make the forms intelligent without any recourse to programming or scripting.

35. Server-Side Database Connectivity for Forms

Businesses store vital information in databases. Workflow uses information from these databases, or massages raw data into useful information, that is then saved in these databases. In either case, connection to databases is essential for workflow automation. Since workflow involves a large number of users, connectivity to databases must be done on the server-side where it is quick, easy, centralized, and a one-time activity. Connecting all workflow participants to databases directly from the client-side poses insurmountable logistical and administrative problems.

With the Ultimus browser-based client interface, any form for a task may be linked to multiple databases containing multiple tables. All connectivity to the databases is provided on the server side through recordsets. There is no administrative burden of making and maintaining ODBC database connections on each user's workstation.

36. Script Invocation from Step Condition Tables

Business processes are extremely varied and are used with many different applications. No single vendor can anticipate all the requirements and provide a "do all" solution. The workflow solution must provide a means for easily extending its logic and functionality in ways that cannot be anticipated in advance. It is also imperative that many options exist on when and how these helper applications are invoked.

In Ultimus it is possible to call server-side scripts and DLLs from within condition tables. A series of scripts/DLLs can be invoked prior to the step becoming active. This enables designers to perform multiple operations on data prior to entering the workflow step. In addition, scripts and DLLs can be invoked by specific events such as when a step is completed or becomes late. Hence, workflow maps can be kept simple and manageable even when many supporting scripts and application invocations are used.

37. Custom Scripts in Forms

Electronic forms are the main user interface in workflow processes. Workflow editors have a standardized set of user interface elements that can be placed on a form during design-time. Scripts, in turn, allow workflow designers to enhance forms in ways unforeseen by the editor. JavaScript, for example, is commonly used to extend browser-based interfaces. Workflow form editors need to be able to work with JavaScript.

Ultimus forms that provide the primary interface between the user and the workflow process support inline JavaScript placeholders. In addition, scriptable controls or functions written in other languages can be invoked through these custom scripts.

38. Invoking Server-Side Components from Clients

Business applications are increasingly modularized into components. The granularity of these components can vary from scripts to COM components. A workflow solution must provide client users means to invoke and interchange data with server-side programs.

The Ultimus Workflow Suite is able to execute server-side scripts from form event actions. When a designer-specified event occurs, Ultimus will pass the values of the variables for the object to the server and invoke a user-defined script. Designers can call VB/JavaScript/Perl scripts, COM objects and stored procedures and use them to enhance the functionality and capabilities of the forms.

39. Signatures

Every business process has some degree of signature requirement. In most cases, there are several required signatures. The ability to provide signature capability is an essential requirement of workflow automation.

Ultimus provides a simple, but effective, electronic signature capability. Workflow designers can place signature fields in the form for any workflow step and declare them optional, required, or read only. Workflow participants must “sign” the required signature fields. This is accomplished by asking the user to specify their domain user name and password. This information is validated by the Ultimus Server. If correct, the name of the user is placed in the signature field with a special bit pattern as the background. If the user name and the special bit pattern appear in a subsequent step of the workflow, it is apparent that only the appropriate user could have “signed” the form.

Ultimus also provides a means of replacing the Ultimus Security DLL with a custom DLL that can implement any other signature verification scheme the customer desires. The image representing a valid signature can be changed by the customer. This may also involve custom images for each signature.

40. Memos

“Sticky notes” are a trademark of business workflow. They are used for attaching small notes and reminders on files and documents. If a business process is automated, it is equally important to provide this capability. The purpose of automation is to make it easier and more cost-effective to conduct business and not to take away the flexibility offered by the manual way of doing things.

Ultimus provides the capability that at any step in the workflow a user can add an ad hoc memo in a simple memo pad that is part of each form. Each memo includes the user name and the date/time stamp. As the workflow process moves forward or backward, the memos at each step are concatenated together in the memo pad to give a running history of comments. A client user is able to invoke a refresh button that updates the memo. This allows the user to review all comments made for the incident since the task was assigned to the user.

41. Spreadsheet Grid in Forms

Many business tasks require the presentation of data in a tabular fashion. This is one of the primary reasons for the popularity of the spreadsheet. Workflow automation solutions must provide some means of presenting information to users in a tabular fashion, or allow the user to enter data with the convenience of a table.

Ultimus provides the capability to embed spreadsheet grids in electronic forms. The spreadsheets have all the mathematical, scientific, logical, and formatting functions of Excel. Furthermore, the spreadsheet can be linked to databases. This provides a powerful means of presenting data in a tabular format.

42. Multiple Pages per Form

For complex business tasks, it is often necessary to use forms with multiple pages so that related items may be segregated and presented in a cohesive format. Workflow automation software targeted at automating business processes must also provide this capability.

Ultimus allows an electronic form for a workflow step to be broken up into multiple pages. This allows the forms designer to present related information on separate pages, instead of trying to fit it on one large and complex form.

43. Sub-Forms

In many situations, there are sub-tasks within a task that need to get done only under specific conditions. For example, certain sections of a medical form may need to be completed only if the person is over 65.

An Ultimus form can be enhanced with sub-forms. A sub-form is invoked by clicking an action button on the form. sub-forms appear as sizable pop-up windows that are easily identifiable as sub-forms.

44. Routing Documents with Workflow

Internal processes as well as processes between business partners carried out over the Internet can involve the interchange of documents as part of the workflow. Workflow automation software must provide a means of attaching and transporting supporting files.

The Ultimus Attachment Control allows a workflow designer to provide document attachments from within forms. Users can place documents in the workflow whereby they are centrally stored as a unique file and retrievable by another intranet or Internet-connected workflow participant. This capability enables document routing on the Intra/Internet.

45. Required and Must-Read Attachments

Business processes often require that a specific document be included in the file folder for a case, or that a person completing a task must first read a document. For example, a home-loan application must include an appraisal, and the loan-processing officer must review the appraisal. Electronic automation of business processes makes it possible to enforce these requirements.

Ultimus allows the workflow designer to configure an attachment as a required or a must-read attachment. A required attachment forces a user to attach a document. A must-read attachment forces the user to at least open the document before they can proceed.

46. Auto Attach and Un-Attach

In a manually implemented business process, it is often the duty of a clerk or secretary to include required documents in a case file for processing. These documents are obtained from file cabinets or other archives. When a business process is automated, it is important to be able to automatically attach the necessary documents from file directories without needing the services of a secretary or clerk.

Ultimus provides the ability to automatically attach and un-attach documents and files to a workflow process incident.

47.Data Validation and Masking

Data entered as a part of a business process must be validated. For user convenience, it is often necessary to mask certain data fields such as those for dates, phone numbers, and social security numbers. Electronic workflow automation must provide new means of validation on the spot.

Ultimus provides sophisticated and enhanced validation of edit controls used for entering information in electronic forms. It also offers masking capabilities that allow users to define their own masks.

48.URL Links

In a Web-enabled environment, the use of URLs to point to key pieces of information is as important as attaching documents in manual workflow processes. The ability to embed URL links is a very important feature of workflow automation.

Ultimus allows attachment of URLs in the form. Users are able to attach pointers to Web pages in a workflow process and route these pointers as needed. The URLs can be static or dynamic.

49.Custom Queries

When using a large database, in many cases it is not possible to implement a simple multi-level filter in order to narrow down to the records of interest. The solution for this is to allow users to create custom queries. Workflow software must also provide this capability.

Ultimus allows users to define custom queries in forms using standard SQL statements. This capability provides tremendous flexibility for zooming down onto database records that are of specific interest to the workflow task at hand.

50.Multiple Levels of Filter

Many business processes deal with information databases that have thousands of records. It is important for the user to be able to quickly narrow down to only those records that are of interest, and then select the specific records that must be used. Workflow software must provide some means of homing-in on records of interest.

Ultimus allows multiple levels of database filtering in a form. If there is a large table, users can narrow down the selection by filtering.

51.Open Forms Using Browser Technologies

Dynamic HTML, ActiveX, and Java are powerful browser technologies to enable businesses to deploy sophisticated Web pages. The ability to use these technologies for electronic forms as a part of a Web-based business process has many benefits.

Ultimus forms are based on Dynamic HTML and ActiveX or Java depending upon the browser being used. Ultimus Thin Forms is based on pure HTML technology. This provides cross-platform client support and the ability to allow users to easily customize the forms.

52.Third-Party Objects

Business processes can become complex and involve a multitude of different tasks. It is not possible for any one vendor to provide all the different software objects that could be used in modern business organizations. The crux of the object model of software development is to enable different software vendors to create objects with specialized functions that can operate together. Workflow automation software must enable customers to easily incorporate these objects.

Ultimus enables process designers to embed third-party objects (controls) into the Ultimus electronic forms. The objects may be either ActiveX or JavaBeans. They can be used to significantly extend the functionality of the Ultimus form and implement specialized functions. Workflow data from Ultimus may be easily exchanged with these objects that use the data or return new information to the workflow process.

53.Import/Export Thin Forms

The ability to use forms developed with external tools has value in a workflow solution. It is often desired to use existing forms for design consistency and efficiency.

Ultimus allows compatible thin forms developed outside of Ultimus to be imported and included in a workflow process. Conversely, forms developed in the Ultimus Thin Forms Designer can be exported and modified with an external tool.

54.Relative Time Limits

The essence of workflow automation is to assure the orderly and timed execution of tasks in a business process. While tasks are intended to be completed on time, the workflow manager needs to detect and be alerted to discrepancies in predefined time limits relative to an event. Some steps and processes in a workflow can be free of time constraints, but others, such as a customer enquiry handling process, may need to include a number of time limit settings.

Ultimus is designed to automate time synchronous as well as time asynchronous processes. It offers designers event mechanisms and advanced setting options such as warnings, late notifications/escalations, process time limits, and delayed steps that are triggered relative to an event.

55.Absolute Time Limits

The execution of workflow tasks sometimes require triggers based on absolute time limits. A date and time for an event to occur must also be capable of being dynamically specified as a variable for design flexibility.

Ultimus is designed to automate time synchronous as well as time asynchronous processes. It offers designers event mechanisms and advanced setting options such as warnings, late notifications/escalations, process time limits, and delayed steps that are triggered at an exact, absolute time. These times can be stored as workflow variables and generated at run time based on current events.

56.Dynamic Forms

Forms in many workflow applications provide the mainstay of the users' interaction with business processes. These forms may need to include a large number of fields for some applications. It is possible for a workflow designer to group fields into separate forms. Yet, the usability of a form increases if the right information is displayed at the right time in one form only. A workflow solution should have the ability to selectively display form elements so that users see only what is relevant at a given point in time.

The Ultimus Workflow Suite allows for automatic showing/hiding of all elements (controls) that make up a form. Any form control can also dynamically be enabled/disabled based upon pre-set conditions or user input.

57.Form Object Library

Modern workflow automation software incorporates browser-based forms for user interaction. Forms include a variety of controls for text, input fields, buttons, selectors, file attachment options, and more. As workflow maps grow in size, so do the number of controls

and their reuse. If similar groups of controls are incorporated into many steps of a process, then changes to the parent group need to be reflected in all others.

Ultimus provides a Form Object Library where controls, or groups of controls, can be stored as objects and placed at various steps in a process. Modifications and changes to a parent object are inherited by all other instances of the form object. This powerful Ultimus feature makes it easy for designers to manage process changes.

58.Ad hoc Routing

In many business processes, it is not possible to determine the recipient of a task when the process is designed. The recipient is determined only when an instance of the process occurs. For example, if an item for purchase is charged to a particular account, it may be necessary for the “account owner” to approve the expense. But since there can be many different accounts with different owners, it is impractical to design a workflow process that is “hard coded” for all these different account owners.

Ultimus provides the ability to specify the recipient of a task on an ad hoc basis when the process is executed rather than specifying it at design time. Ad hoc specification of a recipient may be done with much flexibility. For example, the name of the recipient may be typed in the form at a previous step or read from a database.

59.Junction Steps

Junction steps are “null” steps that provide some simple but powerful capabilities, including the ability to allow process branches to merge and split.

Ultimus allows users to insert Junction steps in the workflow map. Since Ultimus Junction steps can also have powerful Event Conditions, they provide a means of easily branching to various steps under different conditions. Junction Steps make conditional branching easy without repeating conditions.

60.Iteration

Iteration is the ability to execute a sequence of steps in a repetitive fashion until some condition is satisfied.

By using Junction Steps and Event Conditions Tables, Ultimus provides an effective means of designing steps that are executed repetitively based on run-time conditions. The user can design a number of steps that may be invoked from different parts of the workflow map and execute repetitively until some condition is satisfied.

61.Anchors

Anchors provide a means of graphically changing the direction of links that join workflow steps. This makes it easy to lay out complex workflow maps with links that clearly show the “flow” without clutter or confusion.

Ultimus allows users to graphically insert Anchors and drag them to the desired location on the workflow map.

62.Editing Business Rules

A capable workflow solution must provide tools for conveniently editing business rules because of the dynamic nature of modern organizations.

Ultimus provides a menu in the Event Conditions Table that allows users to cut, copy, and paste entries. Any condition may be copied and then inserted between existing conditions.

63. Asynchronous Step Completion

A workflow solution must provide a means of synchronizing workflow with other applications, processes, or events.

Ultimus provides the ability to synchronize workflow with external applications or events. Steps can be configured to wait until a response is received from an external application, the execution of a script has completed, or a sub process has completed. This wait can be overridden by events such as a maximum time limit has expired.

64. Sub Processes

A robust workflow automation solution must provide a means for a business process to initiate other business processes. Since modern business processes can be very complex, this feature ensures that these processes can be implemented modularly.

Ultimus gives process designers the ability to call sub-processes from a main process. This allows users to implement nested workflow design. A purchase requisition approval process could launch a parts receiving process after the purchase order has been approved.

65. Synchronous/Asynchronous Sub Processes

When a main process calls a sub-process, it is desirable to have the flexibility of specifying if the main process should wait till the completion of the sub-process (synchronous initiation) or proceed to the next step without waiting for the sub-process to complete (asynchronous initiation).

Ultimus provides the option of specifying a sub-process to be initiated synchronously or asynchronously.

66. Periodic Launches

Many business processes are periodic in nature. For example, forecasts must be done once a month, reports must be issued every week, and quality inspections are performed every quarter. The ability to automatically initiate business processes is an important feature of workflow automation.

Ultimus has the ability to automatically and periodically launch incidents of a workflow process. It provides fine-grained control over the launch process, including the launch hour. For example, a time sheet process can be launched automatically every Friday at 8:00 AM, and a monthly forecast process could be launched automatically on the first of each month.

67. Automation Agents

Workflow tasks are performed by individuals or by other applications. The ability to call other applications to perform tasks at different steps in the workflow, and the ability to exchange workflow data with these applications, are essential features of workflow automation.

Ultimus provides the ability to use third-party applications to perform tasks as a part of the workflow. Ultimus Flobots are automation agents that enable third party applications to be “trained” to perform workflow tasks. Once “trained,” the agents cause the third party applications to perform these tasks without user involvement.

68. Automation Agent API

Since there is a large variety of applications that are used in workflow processes, and since no single vendor can hope to interface with all these applications, the ability to enable customers to create their own Automation Agents for proprietary or third-party applications is essential.

Ultimus offers an API with the Ultimus software development kit that allows users to create their own automation agents or “Flobots.” The Flobot interface is in COM, which allows developers to use COM/DCOM to create custom Flobots. The SDK contains two samples of custom automation agents, one written in Visual Basic and the other in Visual C++, that can be used as examples by users to write their own flobots. This allows users to use other applications to perform a task in the workflow process.

69.Excel Agent

Microsoft Excel is widely used in many organizations for performing data analysis, tabulation, calculations, and graphing. The ability to use Excel to perform similar tasks as a part of the workflow process is very important.

The Ultimus Excel Flobot allows a workflow designer to use Excel to perform a task as a step in the workflow. Data can be transferred from the workflow to Excel, updated, printed, analyzed, graphed, and read back from Excel.

70.Word Agent

Microsoft Word is the most popular word processor in use worldwide. The ability to use Word to print documents, reports, memos, and faxes is beneficial if the goal is to automate workflow.

The Ultimus Word Flobot allows a workflow designer to use Word to perform a task as a step in the workflow. Data can be transferred from the workflow to a Word template document and printed, faxed, or saved from Word.

71.XML Agent

XML is fast becoming the most important interface for B2B and B2C information interchange. An increasing number of line-of-business applications support XML for interacting with each other. A workflow solution needs to incorporate XML through automation agents.

The Ultimus XML Flobot allows the bi-directional reading and writing of arbitrary customer data in XML. The rich XML functionality does not require programming through the use of visual design. A designer can graphically ‘train’ the XML Flobot by linking workflow variables with any node in the XML schema. Ultimus is fully enabled to exchange information with any XML-compliant line-of-business application.

72.Script Agent

Designers want to have the ability to script business logic into the workflow process in addition to step condition rule tables. Similarly, calling up external line-of-business applications might involve custom scripts. Implementing advanced database operations from the workflow is also an area where a scripting facility is needed. While external languages and tools can be used for that purpose, an integrated scripting language is inherently more accessible.

Ultimus provides an integrated scripting agent. Similar to other constituents of the Ultimus Workflow Suite, scripting is provided via an easy-to-use Flobot automation agent. A built-in editor provides a drag-and-drop facility to link script variables to the workflow. It can be used to script invocations of DLLs, EXEs, COM components, or for database operations using ADO, stored procedures, and OLE DB. Since the scripts are part of the workflow layer, they are easy to maintain.

73.ASCII Agent

Many legacy systems only accept data in ASCII format and these legacy systems play a major role in modern organizations. Since the goal of workflow automation is to move and process information from users to databases and other applications, the ability to output data in an ASCII format is very beneficial.

The Ultimus ASCII Flobot allows a workflow designer to output workflow data into an ASCII file in a user-specified format. ASCII files may be used as the medium to export data from the workflow to legacy systems.

74.File Agent

Copying, renaming, creating, and deleting files is a common activity in business processes. A workflow solution must provide an automated means of doing this.

The Ultimus File Flobot allows a workflow designer to perform file operations at a step in the workflow process. The File Flobot may be used to copy, rename, delete, or execute a user-specified file at a particular step in the workflow.

75.E-Mail Agent

E-mail is probably the easiest, most frequently used means of sending ad hoc notifications and messages. It is used extensively in an office environment and is an important consideration if workflow is to be automated.

The Ultimus E-Mail Agent allows a workflow designer to design a process that sends an e-mail message at a step in the workflow process. It provides the means of incorporating workflow data in the message. This feature may be used for e-mail notifications of late tasks, decisions, actions, or results as a part of a workflow process.

76.Invoke DLL Agent

Dynamic Link Libraries (DLLs) are commonly used to perform specialized software functions, such as interfacing with legacy or third party applications. The ability to invoke a DLL can be very useful as a part of a workflow process. It also enables workflow logic to be customized using specialized algorithms.

The Ultimus Invoke DLL Flobot allows users to easily call custom DLLs. Workflow variables are passed as arguments to the DLL that can act upon them or return new values to the workflow. With this feature, the full power of a programming language, such as Visual C++, is available to enhance the workflow process.

77.Agent Stations

Agent Stations provide a centralized location for Automation Agents to perform their tasks. They are essential in a Web-based solution where clients are distributed without access to third party applications. All Automation Agent tasks can be routed to centralized Agent Stations that are equipped with the necessary software and resources to perform the tasks.

Ultimus allows users to have multiple FloStations. In the Designer, the user is able to specify, statically or dynamically, the FloStation at which any particular Flobot step must run. When a Flobot is trained, the training information for the Flobot is automatically routed to the appropriate FloStation.

78.Remote Agent Stations on HTTP

Workflow allows companies to tie workers together in a business process even if they are in different locations or belong to different organizations. Agents are used to enable third-party

applications to perform tasks as a part of the workflow process. These tasks can include printing, accessing databases, or running applications, etc. Since workflow connects people and organizations at different locations, it is important for the Agent Stations to be able to run at different locations.

Ultimus FloStations communicate with the Ultimus Workflow Server via HTTP. This means that the FloStations can be located anywhere there is Web-access. This powerful feature greatly facilitates B2B and B2C interchanges. It allows Ultimus FloStations located anywhere to call third-party applications, like Word, Excel, and databases, and make them perform tasks as a part of the workflow process. For example, an order that has been approved as a part of a workflow process in one city may trigger a Word Flobot running at a FloStation in a different city to print the order at a remote vendor location.

79.Transaction-oriented Recordset Operations

A workflow solution that provides server-side connectivity to databases not only needs to direct client database queries, but add and update operations as well. If such a database access fails, then the user needs to see a status message on the state of the update.

Ultimus, with its transaction-oriented workflow, monitors recordset add/update operations and alerts the user of any failure allowing designers or administrators to watch over the state of 3rd-party database connections from the workflow.

80.Simulation

Workflow automation is an application that involves a large number of individuals and desktops. Once a workflow process is automated, it is important to test it before deployment. Since it is not logistically practical to test it by actually going from one desktop to another, the workflow automation software must provide some means of testing it via simulation on a single desktop.

Ultimus provides the ability to comprehensively test a workflow application on the same computer on which it is designed by simulation. When installed, the user knows with confidence that the process will work as designed.

81.Debugging Tools during Simulation

When a workflow application is tested via simulation, it is important to have access to debugging tools that enable the designer to determine the values of variables at various steps, especially when a value changes in a variable. This enables the designer to debug the user interface and the logic of the workflow process.

Ultimus provides a dynamically updated “Watch Window” during simulation. Users can configure the watch window to show the values of workflow variables with which they are concerned. As simulation proceeds from step to step, the values of the variables are updated and displayed in the Watch Window as soon as they change. Ultimus also provides the means for the workflow designer to look at the Main and Local Spreadsheets during simulation and determine if their algorithms and logic are correct.

82.Repeating Steps

In real business processes there are situations where one process must trigger several instances of other business processes. Workflow software must provide this capability.

Ultimus workflow software can launch multiple incidents of a workflow process based upon a table. For example, it can launch several incidents of a Performance Review process based upon the list of all employees whose anniversaries fall in the current month. This feature enables the design of sophisticated workflow processes that start multiple incidents of a secondary process based upon a table generated in the primary process.

83.Abort Step or Incident

It is not uncommon for activities or tasks to be cancelled because of changes. Workflow automation software must provide a means of canceling workflow incidents or canceling individual steps in a workflow process.

Ultimus provides the ability to abort an incident of a workflow process. This automatically removes the associated tasks from all of the user desktops involved in the workflow. Incidents may be aborted by the person who initiated the incident or by the workflow administrator. Likewise, individual steps of a process may also be aborted if they are no longer necessary for the successful completion of the incident.

84.Perpetual Steps

In real life, if a person has completed a task, and the case has moved forward, that person can always change his or her mind. With some difficulty, the person can trace the file folder for the case and make changes accordingly. Workflow automation software must provide the ability to mimic this important requirement.

Ultimus provides the capability for a user to open a completed step of an active incident and re-submit it. This capability is configurable on a per-step basis. If an asynchronous event occurs, a user can re-open the task and send new information to the Workflow Server changing the flow of the process based upon the new information and the current status of the process. The “re-submitable step” can be used as a “controller” for the incident. Multiple re-submitable steps may be inserted in a process.

85.Private User Steps

It is often necessary to make certain tasks private since information is often confidential. Workflow automation software must also provide this flexibility.

Ultimus allows workflow steps to be marked as private when the workflow process is designed. A step marked as private may not be viewed by anyone other than the recipient.

86.Non-assignable User Tasks

People frequently assign their tasks to others. However, there are some tasks that must be performed by specific individuals who must not be able to assign it to others. Workflow automation software must enable process designers to specify those tasks that are assignable and those that are not.

Ultimus allows a step to be marked as Un-assignable when the workflow process is designed. A step marked as non-assignable may not be assigned to someone else. Only the Administrator may assign it to another individual.

87.Replicating Tasks

Many tasks in a business process are very similar in nature. When designing a business process, it is convenient to be able to copy one step into another and then make the changes necessary for the second step. In this way, the designer does not have to re-design the electronic form and the other logic of the step.

Ultimus provides the option to copy and paste a step into another step. The form, links, conditions, properties, and the Spreadsheet logic of the step are replicated. This feature greatly simplifies the design of workflow processes.

88. Selective Copy and Paste

Designers using replication to place similar steps at multiple points in a workflow do not need all of the information to be pasted into the destination step. If only the forms change from step to step, but the variables (spreadsheet) and properties stay the same, then it is more efficient to replicate just the variables and properties. A workflow solution should provide a selective copy and paste function.

The Ultimus Designer includes a “Paste Into Special” function that gives the designer a choice between pasting forms, spreadsheets, or properties to the destination step. Substantial savings of design time are possible by using this feature.

89. Save Step Snapshot

When designing complex workflows, it is helpful for a designer to keep libraries of steps. Hence the design module of a workflow solution should provide the ability to load and save whole steps to disk.

The Ultimus Designer provides a “Workflow Snapshot” function to save a step or a group of steps and all of its contents to a file. The complete step can be restored or reused across a number of processes.

90. Dynamic Task Prioritization

When business processes are implemented manually, individuals can easily change the priority of a case based upon their knowledge of how late it is. The ability to change the priority of a workflow incident is an important feature of workflow automation.

Ultimus offers the ability to dynamically change the priority of a task based upon its timeliness or some other criteria. This capability is important in order to ensure proper attention and response time.

91. Process Owners

Business processes have “owners” who are responsible for the quality and integrity of the process, and for the benefits that the organization receives from the success of the process. Workflow automation must provide a means of associating process owners to each workflow process.

Ultimus allows each process to have one or more owners. Only an owner is able to modify a process. This is very important in organizations where there are different business managers responsible for different workflow processes. In addition, the owner may also be notified if a process incident is late or stalled.

92. Task Rates

An individual who performs a task in a business process has a burden or overhead rate associated with him or her. This rate, coupled with the time it takes to complete the task, contributes to the overall cost of the case. Workflow software must provide a means of specifying the rate and computing the cost of the workflow incident.

Ultimus allows the workflow designer to specify the task rate for each step in the workflow process. This information is used by Ultimus to capture the cost of a step. The task rate can either be fixed or variable depending on the person performing the task, the nature of the task, or some other criteria.

93.Task Completion Times

In business processes, it is commonly specified that a certain task will take a certain amount of time to complete. The full duration of the business process is estimated by the cumulative completion time for all steps. When a business process is automated, it is natural to expect that the software will provide some means of controlling the time for each step in the process.

Ultimus allows the workflow designer to specify the Completion Time and an Extension Time for each step in the workflow process. The Completion Time can be fixed or variable, depending on the priority of the task, the customer, or some other criteria.

94.Process Completion Time

The time it takes users to complete workflow instances is the most important process time metric. In order to assure the timely turnaround of processes, there must be a way to specify limits and alert on overruns.

Ultimus allows designers to specify a Process Completion Time for a complete process map. By providing an operational tool for enforcing end-to-end process time, it is possible to assure that a process is not “forgotten” or to guarantee process turn-around times.

95.Collaborative Design via Maplets™

Many business processes tend to be complex and involve many steps. It is unreasonable to expect one person to design an entire process. A workflow automation solution must provide some means of enabling a team of individuals to work together to design a process.

Ultimus provides powerful collaborative process design capabilities through the use of Maplets. Maplets are in-line sub-processes that allow a large workflow process map to be broken down into smaller “chunks,” or Maplets, that can be designed and tested independently. A main process can view the Maplet, but cannot change it.

96.Data Transfer to Sub-Processes

When a workflow process calls another sub-process, it is important to be able to send workflow data to the sub-process. Likewise, when the sub-process is complete, it must be able to return data to the parent process.

In Ultimus, data is seamlessly transferred to the Maplet or sub-process, and it is also returned from the sub-process.

97.View Sub-Process Status in Monitor View

If a process initiates one or more sub-processes, it is important to be able to monitor the status of the sub-processes while monitoring the status of the parent process. The sub-process is merely an extension of the parent process.

Ultimus allows users to click on a sub-process step in the Monitor view and graphically display the status of the sub-process. This lets users seamlessly monitor the status of the entire process.

98.Global Variables

Workflow orchestrates the flow of data between people and applications and the sequence in which tasks are carried out. A workflow manager, being at the center of this star-shaped arrangement critically relies on variables that hold either state information or transient data. These workflow variables need to be accessible network-wide and persistent with transaction

integrity assurances. A workflow solution needs to provide a global network-wide variable space.

Ultimus provides a global, distributed variable space through patented Distributed Spreadsheet Technology. In a spreadsheet, variables can hold data, such as text and numbers or state information. Any node in the workflow network can make changes to a global variable. Ultimus automatically takes care of updating the central workflow server, propagates changes through the network, or take actions if events are attached to changes in a variable.

99. Databound Global Variables

Since global variables are important and are used at every step in a process, it is often necessary to save some or all of them in a database.

Ultimus Global Variables may be linked to a database table in the customer's own datasource. During the execution of the workflow, whenever a workflow incident is initiated and executed, the Ultimus Workflow Server automatically updates the database after every step. This provides a very convenient means of saving critical business process information in a database and is far easier than having to link variables at each step in a workflow process to a database.

100. Visual Component Integration

Increasingly, business functionality is encapsulated into reusable components combined with a workflow solution as a powerful means to create efficient and adaptable automation solutions. A workflow solution has to be able to work with reusable components.

Ultimus workflow provides a Placeholder control that designers can use to visually choose ActiveX components and insert them into forms whereby the class id and startup parameters are automatically entered. These components can be linked to steps in the workflow, grouped, and reused through the Form Object Library.

101. Process Documentation

The ability to document a business process is very important and is a key requirement of quality standards such as ISO 9000. Workflow automation software must provide a means of generating documentation.

Ultimus provides powerful process documentation capabilities. Users can define report templates using Microsoft Word and specify which parts of the process they wish to show in the documentation. When a report is selected and executed, the Ultimus Designer automatically creates a Word document to define the process.

102. E-mail Notification of Late Conditions

Workflow automation software must be able to automatically send e-mail notifications when tasks are late. This ensures that workflow processes can move forward in a timely manner. Making sure that important tasks are not waiting beyond predefined limits is one of the significant benefits of automation.

Ultimus allows the designer to configure Step Properties so that an e-mail message is sent to the supervisor or owner whenever a step is late. This is in addition to any actions specified in the Late Event Conditions Tables. Users do not have to design a special action for each step just to handle Late Notifications. Designers can also enable or disable certain e-mail notification events applying to the whole process map.

103. Customizable Notification Messages

Workflow automation software uses e-mail to notify users of new tasks, late tasks, or other events. The ability to customize these messages with actual data captured by the workflow is a very beneficial feature.

Using Ultimus, the e-mail notification messages that are sent to workflow participants are customizable for each workflow process. In addition, the workflow designer can insert workflow variables in the message. This provides the ability to notify the recipient about the status of the workflow incident.

104. Group Response/Vote

In many business situations, it is necessary to poll a group of individuals about some issue. The process can move forward if all or a certain number of individuals in the group have responded.

With Ultimus, a specific number of responses needed from a group may be set. When the requirement is fulfilled, the workflow will proceed. The non-responsive members of the group will have the tasks removed from their in-boxes, and an e-mail notification is sent to them regarding this fact.

105. Seeded Incident Number

It is often necessary to start an incident or case number of a business process from a specified value.

Ultimus allows the engine to generate incident numbers starting from a specific value.

106. Delayed Assignment

In many real-life situations, it is often necessary to delay a task by a specific time in order to coordinate it with other activities. Workflow automation software must provide a means of accomplishing this.

Ultimus allows users to specify a constant or variable time value that a step will be delayed. This allows processes/steps to be synchronized. The Monitor view in the administrator reflects a delayed step in a different color.

107. Process Initiation Rights

The right to initiate a workflow process is controlled in every organization. Not everyone can initiate every business process. Workflow automation software must also provide a means of easily controlling who can start a workflow process.

The Ultimus software allows the process designer to specify a group as the recipient of the first step or Begin Step of a process. Only members of this group can initiate the workflow process. With this feature, it is easy to control who can start a workflow process.

108. Centralized, Server-side Database Connectivity

Workflow automation solutions make intensive use of databases for controlling processes and for enabling workflow participants to connect to external databases for reading or modifying business information. Since workflow participants are dispersed, it is extremely important that all database connectivity be provided from a single centralized location. Solutions that are not capable of offering this ability rely on database connectivity at each client machine.

Ultimus keeps all process control and user data in a centralized relational database that is connected to the Ultimus Workflow Server. This connection is made only once. This not

only simplifies administration and management, but also allows the database to be centrally managed and backed-up. Since the data is in a commercial enterprise database selected by the user, the user can generate custom workflow reports and queries using a database report-writing tool.

109. Conditional Automation Agent Recipients

Automation agent recipients may need to be placed at geographically distant locations, such as a bank branch for a printing agent. In such a case, there is a need to route steps to specific automation agents. It must be possible for a workflow designer to select the destination for an Automation Agent step based on a table of conditions.

The Ultimus Designer provides the ability to specify a Flobot dynamically by offering “Conditional Recipients” for Flobot steps similar to Conditional Recipients for user steps. This enables the workflow designer to route a Flobot step to a specific FloStation based upon real-time conditions.

110. Automation Agent Load Balancing

High-volume workflow systems that channel large volumes of data between third-party applications can easily reach capacity constraints of individual application servers. The ability to load-balance is essential in environments where bottlenecks on integrated applications could occur. In order to be able to load balance, the workflow solution must be able to route tasks to a cluster of automation agents.

The Ultimus Workflow Suite has a powerful feature that allows FloStations to be combined into groups and balance the workload among its members.

111. Process Launch via Text Files

Business processes can be initiated by users and third-party business applications. For example, a business application may detect a unique situation and initiate a workflow process to handle the situation. So, a robust workflow solution must provide a simple mechanism for third-party applications to initiate workflow processes through ordinary text files that most applications can generate.

Ultimus provides a simple but powerful means to launch a workflow incident based upon the receipt of a text file with a specific format. Ultimus publishes the format of this file that can be created by any application. This capability allows third-party applications to initiate instances of workflow processes simply by creating a text file.

112. Process Launch via E-mail

E-mail is the most popular means of communication. A workflow solution must provide a means of initiating workflow processes based upon receipt of specific e-mail messages.

Ultimus allows users or applications to launch workflow processes by sending a simple E-mail message to the Workflow Server. Ultimus publishes the format of the e-mail message. Any user or program can generate and send the e-mail message. This provides the flexibility of launching workflow processes from other applications.

113. Process Launch via XML

Increasingly, line-of-business applications support XML-based information input and in turn produce XML output files. A workflow solution must be able to automatically notice and act on XML outputs created by an application in the workflow process.

Ultimus provides a versatile feature that enables third-party applications to launch workflow processes by submitting an XML document to the Ultimus Server via HTTP.

The schema for the XML document complies with the BizTalk framework. This feature enables any XML-capable third-application to easily start a workflow process.

114. WfXML Process Launch

It is becoming essential for workflow applications involved in B2B and B2C e-commerce to be able to interoperate, such as on purchase orders. XML is becoming the primary method to achieve this. WfXML is an important standard developed by WfMC to facilitate interoperability so workflow solutions should adhere to this standard.

Ultimus is fully compliant with the WfXML standard and can interoperate with any other application that supports the WfXML schema.

115. Transaction Log Files

A workflow solution must maintain transaction log files for diagnostic and troubleshooting purposes that record every transaction.

Ultimus provides three different log files:

- Administrator Log File: A Log File is provided for Administrator actions. This shows when processes were installed/un-installed and by whom, as well as other important activities.
- FloStation Log File: Users are able to view the log file of a FloStation from the Administrator.
- Workflow Server Log File: Keeps track of all Workflow Server transactions.

In addition, Ultimus writes a Windows NT/2000 event log that can be used from the Microsoft Management Console Event Viewer. Together with the operating system there is a wealth of log information for the administrator to allow for detailed diagnostics.

116. Fail-over Redundancy

Workflow managers are mission-critical middleware that provide the glue between line-of-business applications and business processes. In order to assure their availability, they may be placed on a fail-over cluster configuration along with database and applications.

The Ultimus Workflow Suite is enabled for Microsoft Cluster Services fail-over on Windows 2000 Advanced Server. Together with the operating system, the database server, applications, and the underlying hardware, the Ultimus Workflow Suite integrates into high-availability configurations.

117. Component Load Balancing

Workflow can potentially involve hundreds, perhaps thousands of users. Since the workflow server is controlling workflow processes, it is important that it is scalable to prevent bottlenecks. A workflow solution needs to be able to scale from department workflow automations to enterprise workflow settings. Balancing the load to the workflow system is crucial in high-volume transaction processing environments.

The Ultimus Workflow Engine is fully COM+ based and enabled for Microsoft Component Load Balancing. This technology is presently included in the Windows Application Center Server and supports automatic distribution of its components and component instances across multiple servers.

Ultimus is multi-threaded for use on SMP installations allowing for spreading the user load among multiple processors in one server. If one Cluster Workflow Server goes down due to a problem or routine maintenance, the others can keep workflow moving. Component Load

Balancing contributes to a framework for high scalability, and availability with Ultimus being able to scale from small settings to the most demanding enterprise-workflow configurations.

118. Network Load Balancing

Web-based workflow installations handling a large number of distributed clients may face a substantial rate of HTTP requests on steps and forms. For reasons of scalability and availability, it is beneficial to have the incoming load spread over a number of servers. A workflow solution should allow for load balancing of web requests to a server cluster.

Ultimus provides for Network Load Balancing in conjunction with the Microsoft Internet Information Server (IIS), Windows 2000 Advanced Server, and Application Center 2000. By using a cluster of front-end IIS servers, incoming requests can effectively be distributed among nodes. A cluster using Network Load Balancing is especially suited for serving large forms at a high rate and when the highest levels of system availability are required.

119. Periodic Server Housekeeping

The workflow server must perform some periodic housekeeping functions to maintain the integrity of the workflow processes, check for late steps, and determine if any process is stalled.

The Ultimus Workflow Server performs periodic housekeeping tasks. During housekeeping, it determines if any task is late, unloads the old version of any process that has no outstanding incidents, and performs other such maintenance functions. This relieves the workflow administrator of administrative burdens.

120. Step Autocompletion via XML

Steps in some workflow process may require information from multiple line-of-business and 3rd party applications. The specific time at which the data from the third-party application becomes available is in some cases not immediate. If a processes needs to continue while one of its steps is waiting for data, it would be operating asynchronously. Asynchronous processes are as common as synchronous ones. A workflow solution needs to support both modes of operation.

Ultimus allows for asynchronous step autocompletion via XML. Process steps requiring data from a XML-enabled application switch their state from active to complete when a specific XML input file becomes available and then continue the process automatically.

121. Handling of Stalled Processes

During execution of a workflow process, it is possible to have scenarios where the workflow “stalls.” This generally happens if there are incompatible conditions that block all the paths from being invoked. If a process stalls, the workflow is not completed, thereby defeating the very purpose of workflow automation. The workflow solution must provide some means of detecting and recovering from stalled processes.

Ultimus provides a periodic integrity check for these situations and informs the process owner if a stall situation occurs.

122. Automatic Server Recovery/Start-up

Business processes are essential to the operations of an organization. It is necessary to ensure that the workflow server that controls business processes is functioning all the time. If the hardware shuts down due to an outage or some other problem, the workflow server must start-up and recover as soon as the problem is rectified.

The Ultimus Workflow Server is started as an NT/Windows 2000 Service. It starts-up automatically as soon as Windows is started. No administration is required.

123. Event Viewer Logging

Workflow applications in production need to offer logging and monitoring capabilities of the system as a whole.

Besides providing a transaction log, Ultimus writes system events to the Windows NT/2000 event log. Administrators can use the Windows Event Viewer to examine these records for debugging purposes, or to trigger e-mail notifications in emergency situations.

124. Browser-based Client Interface

The Web browser is ubiquitous. It is present on every desktop and is fast becoming the standard interface for many applications. Since workflow automation is used by a large number of people, it is important that it use a standard interface.

Ultimus provides a client user interface via the Web browser. All functionality of the Ultimus Client is within the browser. This has many significant advantages for the user. There is no need to load any additional client-side software. All database connectivity is accomplished once at the server. Users can easily connect with the server simply by pointing to a URL. Also, many users are already familiar with the use of the browser and do not require additional training.

125. Prioritized Client Task List

Users like to see their tasks in a prioritized order so that they can concentrate on tasks that are of a higher priority. Workflow software must provide a client interface with a prioritized task list.

Ultimus provides a prioritized task list for every user. The task list contains a listing of all the tasks for the user and identifies them as urgent, overdue, or current. If a task is late, it automatically switches from the Current to the overdue category. If the user still does not do the task in a predefined grace period, the task is marked as urgent. Within the task list, the user has the ability to sort by priority, process name, summary description, and due date.

126. Proactive E-Mail Notifications

Web-based workflow solutions are ideal for ease of use, connectivity, and scalability. However, one of the limitations of a Web-based solution is that the Web is inherently a passive medium. One becomes aware of changes on a Web page only when visiting the Web page. Workflow automation on the other hand must be pro-active. One must be notified as soon as one has a new task.

Ultimus provides proactive Web-based workflow by leveraging e-mail. Whenever a user has a new task, the server sends an e-mail notification to the user. The e-mail message contains the URL of the workflow task list page for the user. The user clicks on the URL that invokes the browser and sends the user to the task list where the user can then perform the task.

127. Late Task Escalation

The ability to escalate a task if it is late is a basic requirement of workflow automation. It ensures that tasks do not fall through the cracks and cases are completed expeditiously.

Ultimus provides the capability to trigger another step, a branch, or a process when a step is late. This provides a powerful means of implementing escalation in case a step is late.

128. Two Levels of Late Notification

It is a basic requirement of a workflow solution to notify users of late tasks and to escalate them as defined. However, an escalation should only occur after a user has previously been warned of a task being late. This calls for two levels of late notification.

Ultimus allows for two levels of late notification and provides a completion and an extension time property to each step. If both are specified, the user receives a late notification when the completion time has been reached. The task gets escalated in case it is not completed within the extension time

129. Graphical Status Monitoring at Client

A participant in a workflow process must have the ability to monitor the status of any incident in which they participated.

Ultimus provides the ability to allow users to view the status of any workflow instances in which they have participated. From the browser client, the user can easily obtain a status report of an incident. The user can also select a color-coded graphical view of the process map.

130. Distributed User Administration

In a large enterprise, it is not practical to manage and administer users from a central location. User administration must be distributed so that each manager can be responsible for the administration of his or her subordinates.

Ultimus allows a user to view and perform the tasks of any subordinate. The user either performs the task of the subordinates, checks its status, or re-assigns it to other users. The administration of users is distributed in the organization.

131. Client Assign/Un-Assign Functions

In real life, a user can always assign one or more tasks to other users. Also, the user can always take back the tasks that he or she has assigned to someone else. Workflow automation software must provide similar flexibility.

Ultimus provides Client user's the ability to assign or un-assign some or all of their tasks to other users. This capability is useful if a user is going to be absent, or wants to delegate a task to some other user. Assigned tasks are routed automatically to the other user.

132. Select Task from Queue

Queues are commonly used in an organization. Participants in business processes can pick items from the queue and perform the task. In many cases, the participants want to select which task from a queue they wish to perform next. In addition to a blind queue, workflow automation software must also allow users to view the contents of a queue and select a specific item.

The Ultimus Client allows users to view the contents of a queue and pull a selected task from the queue. The view shows all tasks in all queues for which the user is listed as a recipient. Blind queues are also provided.

133. Custom Client Views

Users want to have the ability to view the task list in the format they want. The workflow client must provide some means of customizing the client task list so that it suits the work habits and needs of the client user.

The Ultimus Client allows users to define their own task list views. The View consists of filtering criteria as well as the list of columns the user wishes to see. The definition of Views can be named and saved so that they can be recalled and the selected View displayed quickly. This provides greater flexibility for users to adjust the task list to the type of work in which they are engaged.

134. Process Level and Step Level Help

Business processes that are automated through a workflow solution can range in scope from small process with a few steps only to large enterprise process maps with many steps. Well-documented processes help new users to quickly familiarize themselves with a workflow and facilitate ISO certification. Workflow users need to have the ability to invoke help on the process as a whole, or in individual steps.

Ultimus provides process and step-level help in the client. Designers can specify custom HTML help files of any size. They may describe the process as a whole and provide guidance on each of its steps. Additionally, help can be environment-sensitive, such as to adapt to the language setting on a particular workflow client.

135. Calling Server Side Script from a Form

The ability to allow a user action to invoke a server-side script or component in real time is a powerful feature of workflow automation. It enables user actions to initiate transactions on the server-side, such as advanced calculations, interactions with legacy systems, and the implementation of sophisticated authentication schemes, etc.

Ultimus provides a powerful capability that allows a designer to specify a server side script that can be triggered by event actions in user forms. When triggered, real-time data from the form is transferred to the server and passed on to the script. The script can in turn call custom DLL, perform calculations, and invoke objects and run executables. Data from the script is then returned to the form and can be presented to the user. This capability greatly extends the functionality of the Ultimus forms for real-time server-side interactions.

136. Custom Logo in Client

Many organizations would like to include their own logo with links to their Web site. This provides a familiar look to the Client users and the link can provide company specific information.

Ultimus allows the splash screen and Client logo and associated link to be customized. A customer can include a logo and link in the Client.

137. Pre-Defined Views

Organizations have users with varying skill levels and needs. When these users participate in workflow, it is often necessary to control what they can view and do in the workflow client. The cost of configuring the client views individually for each and every user is prohibitive. A robust workflow solution must provide a centralized tool that will allow views to be pre-defined for individuals or groups of users.

Ultimus allows an Administrator user with access rights to pre-define Client Views for individual users or groups of users from a central location. The views can control not only what the users can see, but also what actions they can perform. When a user logs-in on an Ultimus Client, the Client Views for the user are automatically downloaded from the server and the Client is configured accordingly. The Client View can also control if the user is allowed to change the Views or not. The ability to define Client Views for groups means that an administrator can create views for Engineers, Sales, Clerks, or Managers. When any user

belonging to one these groups logs-in the appropriate view is displayed. This is a powerful capability for managing the user interface of workflow participants and greatly reduces the Total Cost of Ownership (TCO).

138. View Assigned Tasks

A robust workflow solution must provide a means for a user to assign tasks to other users. This brings up the need to know the tasks that a user has assigned to others.

The Ultimus Administrator and Client provide the capability to display the list of all tasks a user has assigned to others.

139. Forms Caching

Since electronic forms are the front-end user interface of business processes, and since an electronic form may be used many times, it is important to cache it on the client side for the sake of speed and availability.

Ultimus provides caching of forms on the browser side. Since forms may incorporate bitmaps, downloading them into the browser can become slow. They are downloaded once, and then available for use again and again.

140. Form Templates

Certain workflow tasks are performed several times and at differently scheduled intervals. For these tasks, it is important to be able to create a form template with the necessary information so that the user does not have to enter it again and again.

Ultimus allows users to define default form templates to initiate a workflow process. For example, if the maintenance manager issues similar purchase orders for supplies every month, she can create a default form for the initial step of the purchase order process. Then, every month she can use the default form, quickly make the changes for the month, and submit it.

141. Automatic Archiving

In business situations, it is important to be able to save important documents and decisions in an archive for audit purposes. When a business process is automated, this capability must also be available seamlessly so that the system creates an audit trail of all important decisions or actions.

Ultimus has the ability to automatically keep the form and data for selected workflow steps in an archive database to ensure traceability and audit. Special password access is required to select the archived forms and data.

142. Automatic Software Update for Browser Clients

Since a workflow application involves a large number of users, the ability to easily update the client software is very important. In so far as possible, the update of client software should be automatic. Otherwise, the administrative burden of updating client user machines will become prohibitive.

Ultimus provides automatic and seamless upgrades of all client-side software. If the Ultimus client-side controls that reside in the web browser are upgraded, the new controls are automatically distributed to the browser to replace the old ones. This provides zero administration for the browser clients.

143. Open Form Send

Workflow processes that are designed with a high-degree of division of labor have steps assigned to different people and functions. Workflow users in such applications, such as telesales, have a limited number of forms they work with. If field contents are similar from instance to instance then reusing the information in a form can save time and money. A workflow solution hence should allow for forms to be submitted to multiple instances without having to re-key in all fields.

Ultimus provides an 'Open Form Send' feature that when enabled keeps the contents of a form on screen after submitting a step. This way, a user can submit the next instance swiftly by changing only those fields that are different.

144. Digital Certificate for Browser Software

Web-based workflow applications, by necessity, require the use of controls, or applets, that are downloaded from a Web server. For security reasons, browser users are prevented from downloading controls that are not authenticated and are not from a trusted site. The practical way to authenticate controls is providing a digital certificate that clearly identifies the source.

The Ultimus Client software consists of Java or ActiveX Controls. Each control is authenticated by a VeriSign Digital Certificate. When the control is loaded into a browser configured for security, it displays the Ultimus Digital Certificate prior to loading. This ensures that the browser user is loading controls and software from a trusted source. In the Internet Explorer browser, the digital certificate is used to identify the Ultimus workflow page as a secure zone from which controls can be downloaded without prompting the user.

145. Custom Front-Ends

The ubiquitous browser front-end to a workflow process fulfills most client platform requirements. However, some workflow applications require custom end-user interfaces very different from the default clients and their customization options. Other workflow applications may require embedded modes of operation whereby the workflow engine is transparent to the user.

Ultimus uses COM/DCOM workflow objects that allow users to create custom client-front ends, or embed client functionality in their own applications. All the functions provided by the Ultimus Client through its user interface are available to developers programmatically using the Ultimus COM objects. This allows developers to create custom clients in Visual Basic, C++, Delphi, Java, or any other COM-compliant development tool.

146. Roving User

In a modern organization, users are not tied to their desktops. Users must be able to participate in workflow processes from any desktop.

Ultimus supports roving users. A user may participate in workflow from any computer. All user configurations and task list information is kept on the server.

147. Automatic Periodic Refresh

Browser-based user interfaces are passive in nature. They download information from the Web server and after that the information does not change until the user remembers to click the refresh button. Since workflow automation is dynamic, it is important to be able to automatically update the user's task list.

Ultimus allows the user's task list in the browser to be automatically updated after periodic intervals. This makes sure that the task list is up-to-date without the user having to worry about the Refresh button.

148. Printing

Printing is a frequent action in workflow steps. Integrated third-party and ERP applications might print directly. However in many cases printing has to be handled by the workflow solution. A workflow solution needs to provide an automation agent for repetitive printing along with forms and custom printing capabilities.

Ultimus provides all 3 printing options. A Word automation agent can be used to print documents locally and remotely. Forms can also be printed from Internet Explorer while Ultimus also provides the necessary programming interfaces for custom printing agents.

149. Custom Data in Task List Views

A workflow client inbox contains the current list of tasks a user is working on. The information displayed commonly includes the process name and additional information such as the time it was received. Yet if data from customer databases is needed to make tasks in the task list uniquely identifiable, then the workflow manager has to integrate this information into the client view.

Ultimus allows you to include databound variables (data stored in user databases) in a customized task list view. In doing so, a standard workflow client can easily be adapted to fit application-specific requirements.

150. Netscape Support

Netscape is widely used as the main or secondary browser in corporate environments. A workflow solution needs to support it as a client.

The Ultimus Workflow Suite is designed with cross-platform use in mind. Netscape 6 is specifically supported in addition to Internet Explorer and a platform independent client.

151. Thin Client

The Internet is increasingly being accessed from a diverse set of terminals, such as mobile devices and embedded browsers. These front-ends on thin-clients typically provide a basic web interface, but don't included many of the capabilities full-featured browsers such as Internet Explorer and Netscape have to offer. Yet workflow process steps need to be able to be routed to such devices. A workflow solution has to support thin clients and thin forms that frequently comprise the main interfaces between the workflow user and the process.

The Ultimus Workflow Suite includes a thin client with thin forms that use pure HTML. This lightweight client utilizes ASP technology and allows users to participate in workflows from any web browser.

152. Conferring on a Task

Participants in a workflow some times need to ask a coworker or manager for advice on a task received through the inbox. Hence, it needs to be possible for users to send a task to another person with questions attached.

The Ultimus Workflow Suite enables the client user to send a task to an associate to get his or her feedback. Designers can put this feature in place using a 'confer' button.

153. Notification of Abnormal Situations

If an abnormal event occurs during the processing of a case, it is important to notify the participants. Lack of notification may lead to significant confusion, improper decisions, or

the lack of faith in the system. Workflow automation software must provide a means of notifying participants when abnormal situations occur.

The Ultimus Workflow Suite provides robust notification capability to handle abnormal situations. When a situation, such as incident abort, return, or rollback occurs, the client user is asked for a simple explanation. This explanation is embedded in the notification message sent to all users who have participated in the incident.

154. Database Security

Since workflow involves a large number of users as well as databases, it is very important that access to the databases be controlled and secure. However, access must not require every user to be aware of the login name and passwords of the databases with which they will be working. In as much as possible, they should not even be aware that they are working with databases.

When connecting to databases, Ultimus provides a means of supplying a user name and password to gain access to the database without every user having to know them. Database access names and passwords need to be specified only once in the Ultimus Designer.

155. Organization Chart

Business processes deal with individuals, their job functions, reporting relationships, and the groups to which they belong. The ability to be “aware” of the organization structure of a business is an essential requirement of workflow automation. It should be possible to view and administer this information remotely from a browser-based interface.

Ultimus provides an integrated Organization Chart program that allows users to graphically define job functions, departments, reporting relationships, and groups. This feature is important for workflow automation because in almost every organization business processes are dependent on job functions, reporting relationships, and groups. Through the organization chart, Ultimus workflow processes are aware of all of these and can make intelligent routing decisions. Ultimus Organization Chart is a browser application for Internet Explorer using HTTP. Designers and administrators are enabled to manage organization charts locally or remotely over the Intra/Internet.

156. Active Directory Support

Microsoft Windows 2000 includes Active Directory, a new unified network directory scheme. The service stores all Windows user data and authorization besides serving as a registry for PC installed hardware and software. Active Directory uses a hierarchical object storage scheme. It unleashes its full possibilities when Windows applications reuse-and extended data already present in the directory.

The Ultimus Workflow Suite fully supports Microsoft Active Directory while providing backward-compatibility with previous versions. It can use Active Directory as its primary data store and act as a graphical front-end to the central directory.

157. Web-based Organization Chart

There is increasing requirements for using Web-based applications for enterprise solutions. This is particularly crucial for administrative applications, such as an organization chart where remote administration is vital.

The Ultimus Organization Chart (OC) is a Web-based application that can be used to administer an organization chart remotely over the Internet.

158. Sub-Charts

For large organizations, it is not possible to generate one chart to show the entire organization. The organization chart must provide the ability to break an organization down into its units, such as divisions, departments, and sections.

The Ultimus Organization Chart enables users to insert any number of sub-charts within a parent chart. A sub-chart can also have any number of other sub-charts. This provides the ability to create large organization charts that are modular and reflect the organization structure of a modern enterprise.

159. Chart Owners

In a large organization, it is not feasible for one individual to be aware of all the employees, their job functions and reporting relationships, and the changes that frequently take place. It is necessary to allow different individuals to be the “owners” of different charts so that they can be maintained independently.

Ultimus allows each chart to have its own “owners.” Only an owner can change the organization chart. This allows different people in a large organization to control the chart for their own department or group.

160. Groups

In modern organizations, many tasks are performed by groups, or teams that are cross-functional in nature. For example, a task can be to “survey all quality managers,” “get forecasts from all department managers,” “obtain benefit enrollment forms from all employees.” It is important to be able to define groups and assign a task to a group.

Ultimus allows you to define a “group” of individuals or job functions that perform a task collectively. The ability to define groups converts these multiple tasks into single tasks that are forwarded to all members of the group. This greatly simplifies the design of workflow processes.

161. Sequential Groups

In many business situations, it is necessary to get a sign-off or approval from one or several members of a group. In these situations, an employee tries to find any member of the group and secure their approval. Workflow automation software must provide an electronic way of accomplishing this.

Ultimus lets you define a sequential group of individuals or job functions. In a sequential group, the task is assigned to the first member of the group. If the member is unable to do the task in the specified time, it is automatically routed to the next member. The sequence is represented by one step in the workflow map and all sequencing is completed automatically by the workflow software.

162. Weighted Groups

In real life, it is often necessary to distribute tasks among different members of the group. The distribution may either be even, or some members may get more or less tasks based upon their workload.

Ultimus lets you define a “weighted group” so that a task is assigned to members of the group based on their “weights.” If a group consists of John, Jane, and Joe with weights of 10%, 20%, and 70%, respectively, 10% of the tasks are assigned to John, 20% to Jane, and 70% to Joe. By changing the weights, the workload can be changed. This feature is important for workload distribution.

163. Job Function Groups

In large organizations, there are many job functions that are performed by several individuals. For example, a company may have five Buyers, three Payable Clerks, and seven Application Engineers. All of these individuals can be represented separately in the organization chart. However, this requires unnecessary work and use of real estate in the chart. It is better to group them under one box on the chart.

The Job Function Group capability provided by Ultimus provides a means where a single box in the Org Chart can be used to represent a job function that has multiple occupants. If one creates a Job Function Group called Buyer, one can then assign the names of five Buyers to this group. The first Buyer automatically becomes Buyer 1, the second Buyer 2, and so on. This makes it easy to design organization charts, and also makes them concise.

164. Multiple Roles Per User

It is common in every organization for individuals to have more than one job function. They play different roles. Workflow automation software must provide a means of handling multiple roles per user, and still be able to determine the reporting relationship of these users without ambiguity.

The Ultimus Org Chart allows a user to occupy more than one job function. However, every user must have only one primary job function that is used to determine their supervisor in the organization. Ultimus can easily handle multiple roles per job function.

165. Relative Job Functions

This powerful capability allows a task to be routed to a job function relative to the organization position of the initiator or some other person. For example, a company may have 3 divisions, A, B, and C. Each division has a Quality Manager (QM). For a particular process, a task must be routed to the QM for approval. Since there are 3 QMs, this cannot be done simply by naming the Job Function QM as the recipient. If the initiator is in Division A, the task must go to the QM for Division A, if in Division B then it must go to the QM for Division B, and so on. The Relative Job Function feature allows one to specify a Relative Job Function as the recipient. Then the task is routed to the job function that is in the same organization as the initiator or some other “seed” person in the process (i.e., the routing is relative).

Ultimus provides built-in support for Relative Job Functions without any programming.

166. Search

For large organizations with hundreds of users, it is necessary to be able to search the organization charts for users or job functions. Otherwise, it is very difficult to maintain the organization charts.

Ultimus provides a search capability that spans all the charts defined. It is easy to locate users, groups, and job functions without knowing their locations in any of the charts.

167. Reorganize

Businesses often change their organization structure. Workflow automation software must provide a means of changing the organization structure easily.

Ultimus provides a graphical drag and drop way of moving sections of an organization chart from one location to another.

168. Advanced Reporting

The ability to apply metrics to business processes and measure resource usage is one of the main management benefits of workflow. Workflow automation software must provide a way to understand cost drivers and spot eventual bottlenecks. Since every business has different requirements, reporting must be configurable and easily accessible to the appropriate people in the organization.

Ultimus Reports is a separate component of the Ultimus Workflow Suite. Business managers can generate powerful configurable workflow reports using Internet Explorer from anywhere on the Internet. The module includes many default report types that are all customizable.

169. Web-based Reports

Workflow reports are typically shared with many people within or even outside of an enterprise. Web-based reports allow workflow owners to share workflow metrics with managers anywhere over the Internet.

Ultimus Reports is a Web-based reports generation tool that creates sophisticated Internet-ready reports on demand. Built-in access security ensures that reports remain secure.

170. Graphical Reports

Managers and process owners need to see the relevant information on process performance not only in raw data form but also in easy-to-understand graphical representations.

Ultimus Reports allows users to view reports data either in tabular or in graphical form. Chart types include bar, pie, and 3D views.

171. User Reports

Process owners and executive management needs to know how people, the most expensive resource in business processes, are performing.

The Ultimus user reports provide information about the number, type, and status of tasks for a user or a group of users.

172. Step Reports

By using reports about workflow incidents that include information on workflow steps, processes can be fine-tuned and bottlenecks spotted. A workflow solution has to provide complete information about process steps including the affiliated metrics.

Ultimus Step Reports provide information about the number, type, and status of steps or groups of steps. Reports on the metrics step cost, step time and elapsed time are also available.

173. Incident Reports

One of the most important measures for overall throughput of a business process is the number and status of process incidents.

Ultimus reports information about the number, type, and status of incidents. In addition, Ultimus allows for adding columns of databound fields to incident reports. Together, highly custom reports can be generated with ease.

174. Elapsed Time Report

Managers need to be able to quickly query which process steps or incidents have exceeded a certain specified time. If hundreds of instances of a given process or process step are active, it needs to be possible to search for all of those instances that have not completed in two days, even if the completion time limit has not been reached. A workflow manager needs to provide this report type as part of its standard queries to enable authorized users to collect summarized progresses information.

Ultimus provides this elapsed time view in tabular and graphical format that includes the process start time, stop time, and the number of hours and minutes spent on each step. It is a helpful time-saving report if the number of process and step instances is large.

175. Step Time Report

In order to pinpoint those steps in a process that take the longest time to complete, or just to see what the turn-around times for a given step is, a workflow reporting tool needs a step time view.

Ultimus Reports has a default step time report that gives authorized users either a table listing or chart on the time spent on each step by incident. For example, an Ultimus Reports user can get an overview of the time distribution of steps for a complex process using the graphical chart option.

176. Step Cost Report

With cost metrics attached to steps in a workflow, managers want to find out what the cumulative costs of their business processes and the individual steps are. A workflow reporting tool must provide such reports.

Ultimus can provide information on step costs in tabular or graphical format. Using this report makes it easy to find the cost drivers within a process.

177. Automation Agent Reports

Automation agents in a workflow processes are the analogous to robots on an assembly line. A workflow solution needs to collect performance data on automation agents.

Ultimus includes a report providing information about the number, type, and status of steps assigned to the FloStation automation agents. Bottlenecks can be precisely identified.

178. Pre-defined Reports

Each organization has its specific reporting needs that a workflow solution needs to help define through the reporting facility.

In Ultimus, advanced users and designers can create a library of pre-defined reports and access rights to allow users to view or edit their reports.

179. Incident Groups View

Large and complex business processes with many users are inherently more difficult to monitor than simple ones. They require suitable tools that track the workflow on an end-to-end basis. The most user-friendly way to present the workflow process status information is graphically.

Ultimus Reports provides an Incident Groups View that gives the state of each step in the process. It can be used to identify bottlenecks and optimize the process flow. It also displays a synopsis of the information in a graphical monitor view.

180. Report Definition Wizard

Creating reports involves specifying a number of general parameters, fields, and logical operations between them. Creating and modifying such report views, especially complex ones, can be time-consuming, especially to the new user. A workflow manager's reporting functionality should include a capability to guide users through the report definition process.

Ultimus Reports features a Report Definition Wizard that makes it easy to define reports, even for the new user. By giving lists and options on which information to include in a report view, it enables swift report definition without prior knowledge.

181. Report Access Rights

Workflow reports may contain information confidential to a particular individual, group, or function within a company. It is necessary to prevent unauthorized access to their reports.

Ultimus Reports supports access rights. Viewing, editing, and group access rights can be specified as part of each report.

182. Graphical Workflow Monitoring

One of the major benefits of workflow automation is the ability to graphically monitor the status of any workflow incident. This saves considerable time in real business situations where individuals are trying to figure out where things are.

The Ultimus Administrator can be used to graphically monitor the status of any workflow incident. Anyone with password access to the Administrator can monitor the status and use this information for management purposes. This is also available in the Ultimus Client but limited to the workflow incidents in which the user and his subordinates have participated.

183. Automatic Process Installation and Version Control

Workflow automation involves a large number of individuals. The ability to easily install workflow processes is very important. Lack of this feature will make it logistically very difficult and costly to involve many individuals in the process. Likewise, since business processes change frequently, the ability to easily install and manage new versions is crucial.

Ultimus provides a sophisticated installation and version control scheme for workflow processes. When a process is installed, all necessary forms are distributed to users as and when they are needed. If a new version of the process is installed, any new forms are also distributed automatically as and when they are needed. All upgrades to new versions of the forms are transparent to the user. Also, old versions of processes and forms are automatically deleted when they are no longer needed.

184. Administration using the Microsoft Management Console

IT Administrators easily find themselves confronted with a number of administration tools from different software vendors. As the number of servers, services, and workstations in the enterprise increases, unified systems management becomes more crucial. The Microsoft Management Console (MMC) is the standard Windows umbrella management console. It provides a unified view on resources in the network and facilitates configuration and deployment. It is pivotal that a workflow server's management functionality integrates with the MMC.

The rich administration functionality in the Ultimus Administrator is integrated into the MMC-framework as an easy-to-use "snap-in". Administrators can easily look-up and change parameters using a consistent look-and-feel.

185. Workload View

For workflow automation, it is very important to be able to monitor the workload of any individual from a centralized location. Even more important is the ability to move a task from one person to another in the case of exceptions, such as an emergency absence.

Ultimus provides the ability to determine the workload of each user from a central administrator. This facility allows the administrator to determine how much and what types of tasks are pending for a user. Administrators can also re-assign some or all tasks to other users. This feature is important for workload management and for handling exceptions, such as a sick/emergency leave or some other crisis, where the normal workflow routing has to be bypassed.

186. Remote Administration

Enterprises have implemented firewalls at the ingress points into their networks for security reasons. These devices typically filter certain traffic types, and in some cases only allow HTTP packets to pass the firewall. With remote administration being an essential requirement, a workflow solution has to be able to be administered over HTTP links.

The Ultimus Administrator can communicate with the server via HTTP or HTTPS. This means that administrators are able to manage their server remotely.

187. Disable Processes

In many real business situations, it is often necessary to disable a process so that new cases may not be initiated. This generally occurs when a service is discontinued, is temporarily suspended, or is being modified. Workflow automation must also provide the ability to temporarily disable workflow processes.

Ultimus provides the ability to easily disable a process so that new incidents cannot be initiated. However, all existing incidents continue to be processed.

188. Pull Tasks from Queue

If a task is waiting in a queue and some unforeseen event happens that requires that the task be handled immediately, it is important to be able to pull the task from the queue and assign it to someone for immediate action. This is a frequent occurrence in real life, and workflow automation software must provide this capability.

Ultimus gives the workflow administrator the ability to pull a task that is waiting in a queue and assign it to an individual for immediate action. The normal “first in first out” flow is bypassed. This capability is important for handling exceptions where normal workflow rules have to be bypassed.

189. Resubmit Agent Steps

When Automation Agents are used to perform tasks as a part of a workflow process, it is often possible for the Agent to fail because of the failure of an external component such as email, Word, or a database. For these situations it is necessary to provide a “resubmit” capability so that the step can be tried again after the error has been rectified.

The Ultimus workflow administrator can resubmit a Flobot steps. This feature is important in case there is a problem with the step, such as malfunction of the FloStation computer and loss of previously sent information.

190. Exclusion Days

Every business has its own schedule for holidays and weekend work. In the calculation of task completion and late time, it is necessary to exclude non-working days in the calculation. Workflow automation software must provide a means of specifying company holidays and weekend workdays.

Ultimus has the ability to specify exclusion days that are not used in calculating workflow statistics. Typically companies use only business days to measure response time. They would wish to exclude weekends and holidays.

191. Assign Future Tasks

If a person is planning to leave office or is unavailable for work, it is normal for the person to delegate tasks that might arrive in their absence to a subordinate. Workflow automation software must also provide this capability.

An Ultimus Client user can assign his/her current as well as future tasks to other users. This is very useful in case the user is going to be absent or wishes to temporarily delegate responsibilities. The Ultimus Administrator can also be used to assign-and re-assign future tasks for any user to some other user.

192. Workflow Metrics Export

It is often necessary to export process metric information to external applications for further analysis or presentation.

Ultimus provides the means to export workflow metric data into Excel. This allows users to perform more detailed analysis of the data or produce other types of reports. All workflow status information is stored in a commercial database that is ODBC compatible. This allows users to access the information and create custom reports for their unique requirements.

193. Ability to Change Recipient

It is often necessary to “intercept” a case and make sure that a future step is performed by a specific individual who is not the normal recipient. This ability is used to handle or expedite abnormal cases.

Ultimus allows a workflow administrator to graphically change recipients of in-process incidents via the Monitor View in the Administrator.

194. Ability to View Workflow Data

In many situations, it is necessary for an administrator to view workflow data for an incident that is still in progress. Typically, this necessity arises because of the need to debug some anomalous behavior or for retrieving some information on an ad hoc basis.

Ultimus allows a workflow administrator to view the spreadsheets of in-process incidents via the Monitor View in the Administrator. This may be used as a convenient process diagnostics tool.

195. User-Defined Queries for Reports/Monitor View

When generating and measuring workflow reports, the user may be presented with a very large number of incidents from which to choose, especially in big organizations. The workflow solution must provide a means for defining a query to select a subset of incidents using some meaningful criteria.

Ultimus allows users to define custom SQL queries to select incidents to monitor or perform statistical reports. The query statements can use process name, date, initiator, summary, and

databound workflow variables as arguments. This enables users to define and save powerful queries to generate reports and monitor workflow incidents.

196. System Resource Verification

The reliability of a workflow system is essential. One common cause of application failure is simple system problems like inadequate disk space or memory. Workflow systems must monitor and report these types of parameters to maintain the health of the system.

Ultimus Server includes a subsystem that automatically and routinely checks for low disk space, low memory, and for loss of connection to the data source. Thresholds can be set to check against and the workflow administrator is notified when the thresholds are exceeded.

197. Automatically Install to New Group Members

In real life, when a new member joins a group, he or she is immediately assigned some rights and responsibilities. If members of the group can initiate some business processes, the new member must also be able to do that. Workflow automation software must also provide this capability without additional effort.

Ultimus provides seamless capability for enabling new members of a group to participate in workflow processes that the group can initiate. When a new member is added to a Group that is the recipient of the begin step of a workflow process, the process name automatically appears in the Initiate task view of the new member. If new members are added to groups, they will automatically be able to participate in all the workflow processes of the group.

198. Assign Until

When a person delegates a task to someone else, it is sometimes done for a specific time period. For example, a person may be going on a leave of absence for a month. During this period he may delegate some tasks to another person. However, upon his return he may wish to resume his tasks. This is another feature that is required from workflow automation software.

Ultimus allows a user to assign a task to some other user until a certain date. The task is assigned to a different user until the specified date after which it automatically reverts back to the original owner.

199. Roll-up Sub-process Statistics

If a business process involves one or more sub-processes, the total cost and time of the business process must include the time and cost of the sub-processes. The workflow solution must provide this capability.

In Ultimus, the metric information for a sub-process is rolled-up and used as the metric for the process step in the parent process. The full cost and time of the business process are reported.

200. Ability to Complete Third-Party Application Steps

If a workflow process involves a third party application, and for some reason the third-party application is not operational, the business process will stall. The solution must provide a manual way of completing the task performed by the third-party application so processes can continue un-interrupted.

Ultimus provides the capability for the administrator to complete a Flobot step in the Monitor View. This option is useful in cases where a Flobot application fails and it is necessary to complete the Flobot step and continue with the incident.

