Web-based Workflow Software Review

ABSTRACT:

In this document, we review some commercial workflow management software packages, which are important from the point of view of the GECOS research project. Packages included in this review offer some support for managing geographically distributed (virtual) projects.

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1. INTRODUCTION

This review was made for the needs of GECOS project in September-November 1998 about the current market situation of distributed workflow software. As a goal there is to estimate the usefulness of available software, especially from the point of view of distributed work, and to look for features which are important in this field.

The Internet has been a major source of information. This document is not a complete description of the market situation, and some important software packages could have been left out of this review.

Workflow software comes in many flavors: there are general-purpose stand-alone packages, or workflow functionality may come integrated into other software, typically in PDM or project management software. In this review we have concentrated on stand-alone workflow packages.

This review is based on three kinds of information: literature or demos provided by the software vendors, review information from various magazines and organizations, and first hand information through experimenting with software.

In Chapter 2 we give a short introduction to workflow and associated concepts. A short glossary of terms is given, followed by a discussion on distribution architectures of workflow. The product review is organized into individual reviews in Chapter 3 and a summary in Chapter 4, where different products can more easily be compared with each other. Finally, there is Chapter 5 for conclusions and recommendations, and references to the sources.

1.1 Summary of Changes

For version 1.0 of this document, the following additions and changes have been made:

? General proofreading
? Chapter 2.1, a small glossary of workflow terms, has been added
? Workflow model interface issues discussed shortly in chapter 2.2.3.
? Several new references

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1 This is a very short review and should not be used alone as a basis for product selection. While every effort was made to ensure the accuracy of the provided information, the authors cannot make any guarantees of it.
2. WORKFLOW SOFTWARE

Workflow software allows one to manage complex tasks by modeling them as individual but related steps, each one with separate input, output, tools, and resources. A definition from the Workflow Management Coalition defines it as: “The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules.” [WfMC96] A typical workflow software package includes at least:

? a workflow editor for defining the flow of work,

? a multi-user workflow engine for executing the defined process in a (central) server, and

? a graphical client for interacting with the executing process. This may also be integrated into the editor.

2.1 Glossary

Workflow definitions are from [WfMC96].

Workflow

The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules.

Process

A set of one or more linked procedures or activities which collectively realize a business objective or policy goal, normally within the context of an organizational structure defining functional roles and relationships.

Process Definition

The representation of a business process in a form which supports automated manipulation, such as modeling, or enactment by a workflow management system. The process definition consists of a network of activities and their relationships, criteria to indicate the start and termination of the process, and information about the individual activities, such as participants, associated IT applications and data, etc.

Process Instance

The representation of a single enactment of a process, or activity within a process, including its associated data. Each instance represents a separate thread of execution of the process or activity, which may be controlled independently and will have its own internal state and externally visible identity, which may be used as a handle, for example, to record or retrieve audit data relating to the individual enactment.
Workflow Engine

A software service or “engine” that provides the run time execution environment for a process instance.

Intranet

A company- or organization-wide network of computers and software utilizing TCP/IP protocols and WWW standards.

Extranet

A network of computers and software utilizing TCP/IP protocols and WWW standards. Typically set up to allow partners, clients, suppliers, or contractors access to specific data and applications within an organization.

Client/server

A way to organize computer application into one server and multiple client programs. Also refers to the currently predominant way to build business software with an SQL or ODBC database server.

2.2 Distribution architectures

2.2.1 Client/Server

There are several ways one can distribute the definition and execution of a workflow. A straightforward and common way is to store the state of the workflow execution into a single server, and distribute only the clients or a simple client with minimal functionality. This way, every process execution is always consistent and up-to-date, since everything is stored in one server and database. In a single server system, the clients can communicate with the server using various communication methods and protocols. Most common ways are traditional client/server (selected database rows), TPC/IP (sockets), TCP/UDP (datagrams), various Web protocols or proprietary protocols.

The usage of Web protocols for workflow client communication has some obvious benefits. It becomes easy to deploy the workflow from almost any connected web browser. There is no need to distribute the workflow client to different sites. Standard protocols can be used for communication, allowing easier integration to various information systems.

But regardless of the benefits of a web client, the central server architecture has some serious shortcomings. In order to do any interaction with the workflow, a connection with the server is always necessary. It is very evident that the server itself soon becomes a bottleneck and a considerable failure risk in the system.

2.2.2 More elaborate distribution methods

More elaborate products do offer more sophisticated methods to distribute the workflow. With Java or Active X, one can make even the whole functionality of
a workflow product usable from the Web. Because of the security issues involved, few vendors, however, have chosen this approach. Most systems still have, for example, the workflow editor implemented with traditional client/server technology.

The workflow client can be made smarter by allowing it to access several workflow servers. However, coordinating those servers may be difficult if there is no communication between the servers.

In most elaborate case, both the workflow clients and servers communicate with each other, providing a platform for truly distributed workflow.

2.2.3 Model interchange

In order to promote interoperability of workflow products, the WfMC has defined a language (WPDL, Workflow Process Definition Language) [WfMC98b] and a C API [WfMC98a], which allow one to transfer process definitions from one conforming product to another. However, these are new standards, and none of the reviewed products claimed to support them.
3. PRODUCT REVIEWS

3.1 Product selection rationale

There are a lot of workflow products on the market, and selecting the right ones for this kind of review requires some thought and decisions. In this review we list products that at the time of the review had or claimed to have support for Web-based workflow.

All vendors and products listed in the Workflow Management Coalition [WfMC] web site were first considered. By analyzing their web sites and other reviews [Hoard97] [Berger97], the five selected products remained.

3.2 ActionWorks Metro

Metro is a workflow software suite that can be used to build and deploy collaborative business applications for intranets and extranets. The Metro package was awarded in October 1998 the Microsoft Industry Solution Award (ISA) for workflow management.

The Metro suite includes intranet applications and rapid development and deployment tools. The Metro server runs on Windows NT, and provides workflow execution and management services. The server also provides connections to databases and legacy applications. The server interacts with a Web server (Netscape Enterprise) to distribute the workflow to WWW.

Metro provides quite good facilities to distribute workflow. Even though the server and the workflow editor can only be used in Windows environment, multiple servers can be deployed, so that one workflow instance is moved in e-mail (“WorkLink”) from one server to another.

Client interaction to the system is accomplished through e-mail, HTML forms (“Workbox”), and some simple Java applets (address book, calendar). Clients are able to communicate with multiple servers to extend the flow of work.
Metro has a well-established customer base and it has been used in workflow applications for areas such as human resources, sales, marketing, customer service and finance, as well as create applications for specific industries, including: financial services, insurance, manufacturing, healthcare, utilities, telecommunications and government.

3.3 i-Flow

Fujitsu’s i-Flow™ is a web-based workflow development tool for automating collaborative processes and administrative inter-company processes. i-Flow provides a workflow development environment with framework, tools and components necessary to create customized workflow solutions that integrate with existing IT infrastructures. For the deployment of these solutions, i-Flow provides a uniform and scalable support infrastructure within the enterprise through a web-based interface.

i-Flow contains a powerful workflow engine that supports over 100 concurrent users and up to 1000 users via the Web. The workflow server is implemented with Java and available for Windows NT and Solaris environments.

The server uses CORBA IIOP to connect and communicate with clients in the LAN. Four different kinds of clients are provided:

- developer client, a full-function Java applet, for both creation of new workflows and participation in a process. The process models are created and modified visually, either before process initiation or “on-the-fly”.
- simple client, a Java applet for participating in a process, including instantiation of workflows, managing tasks, or working with attached forms and documents.
e-mail client for remote users.

instatiation client, which only allows one to start (instance) a defined workflow.

As organizations grow and processes evolve, i-Flow’s modular architecture can easily scale to handle an increase in transaction throughput. i-Flow supports a large number of connectivity standards and interfaces, including LDAP, JDBC, CORBA, JavaBeans, and WfMC protocols.

List prices start from $25000 for 10 clients.

3.4 Plexus FloWare

Plexus’ FloWare workflow software is a scalable and client/server product family designed to meet the broad range of workflow needs. FloWare uses standard relational database management systems (RDBMS) as its primary means of storing work in progress, statistics and other relevant data. Operating in a UNIX or Windows NT server environment, FloWare is a workflow product that can start as a single server workgroup solution and grow to an enterprise, multi-server, distributed production installation.

FloWare is mainly targeted for custom application development, since it offers both Active X and Java components. Workflow modeling is supported through a third party tool, Meta Software’s Workflow Analyzer [Meta]. The interoperability is obtained by supporting WfMC’s interoperability API (WAPI) [WfMC98a].

Typical FloWare applications include insurance claims processing, securities underwriting, customer service, portfolio management, human resources, government and similar applications in paper- and data-intensive environments.

3.5 Staffware 97 / Staffware Global

Staffware Global allows users to participate fully in automated processes by accessing the Staffware 97 Workflow server using a Web browser or Network Computing device across the Web. Staffware Global is a set of pure Java applets, which allow a user to participate in workflows across the Web and:

View their work queues
Select items of work
View and enter data into forms to complete the work
See documents related to the task in hand such as scanned images or text documents
Track where tasks have got to in the process
The processes are defined using Staffware’s standard Graphical Workflow 
Definer which does not require technical skills. Staffware Global gives users the 
choice of another client to access their workflow application.

![Staffware Global Java client screenshot](image)

Figure 2: Staffware Global Java client screenshot

The architecture of Staffware 97 and Staffware Global quite well match the ref-
erence model of WfMC, they are well committed to the standards work, and 
have demonstrated some interoperability.

### 3.6 Ultimus

Ultimus is a Web-based solution for the automation of administrative workflow 
processes using the Intranet or Internet. Using a powerful, flexible architecture 
and intuitive graphical design tools, Ultimus enables one to design and automate 
processes without programming. Users can participate in an administrative pro-
cess using a browser from anywhere with web access without the need for any 
additional client software. Ultimus is a full-featured solution, which one can 
start using out-of-the-box.

The server runs on Windows NT, and is paired with IIS to provide web serv-
ices. The designer is also a Windows application.
Web functions are accessible through an Active X client, which provides the following functions: task lists, forms, new tasks, and document attachments.

Figure 3: Ultimus Workflow Designer
4. SUMMARY

At least two generations of workflow management software products can be recognized. Before the Internet era the products had their emphasis on supporting work within corporate LANs. Nowadays, since the Internet has dramatically fueled and enabled distributed collaborative work, many products put clear emphasis on workflow, which span organizational boundaries. There are, however, distinct differences in the approach the vendors have chosen for web support, and those of course are reflected in the product architectures and features.

With current trends, one can easily predict that soon also many of the remaining workflow products will also enter the competition, and introduce new versions of their products with support for web-based work. It has even been argued that “Within the next three years, wide area workflow will become a larger market than workflow is today”. [Palmer98]

(The trend also unfortunately implies that this review itself will soon be outdated.)

In the table below we summarize essential qualities of software packages for comparison. Question marks stand for lack of information at the time of writing.

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<th>I-Flow</th>
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5. CONCLUSIONS AND RECOMMENDATIONS

Current generation of workflow management programs answer only partly to the needs of collaborative work, yet they have a great potential for being able to tie together and integrate separate applications, even in a wide-area network.

Of the reviewed packages, only i-Flow offers comprehensive support for operation through the web, including workflow definition, administration, and deployment. The other packages rely on traditional c/s technology in at least workflow editing functions.

A growing number of products confirms to the WfMC reference architecture and supports their standards. When the standards stabilize, and compliance criteria become available, it can be expected that interoperability of workflow products, which is currently very rare, becomes much easier and common. Of the reviewed products, Staffware seems to be most committed to these standards.
REFERENCES


[LSDISLab] Large Scale Distributed Information Systems Lab, Dept. of Computer Science, University of Georgia. http://lsdis.cs.uga.edu/publications/pub_ALL.html


