

Flexible Workflow Management with WASA2

An Internet Bookstore Example

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This handout briefly describes the architecture and usage of the flexible workflow management system WASA2 with a sample workflow from Electronic Commerce.

THE APPLICATION

An electronic bookstore enables users to order books via the Internet using a web page like the one shown below. The user selects the URL of the bookshop and fills in the provided form; after selecting the *send order* button, the ordering data is transferred to the bookshop, and a series of activities is performed in order to process the order inside the bookstore.

The activities which are spawned by the ordering activity are, for example, checking the correctness of the order, obtaining the ordered books from the store's warehouse, and sending the parcel as well as the bill to the customer.

These activities are related to each other by various constraints, for instance, execution-order and data dependencies (e.g., a bill cannot be issued before the parcel is shipped). In addition, persons and software systems to perform the activities have to be defined, like specific billing programs. These properties of the application process and its environment are represented by a **workflow schema**, including, for instance, control flow, data flow, and role information:

Article Number	Description	Price	Amount	Inc	Dec
7882	Hitchhikers Guide Through The Galaxy	19.98	2	+	-
8001	Lord Of The Flies	12.95	0	+	-
8733	Catcher In The Rye	24.95	1	+	-
6954	Gone With The Wind	39.95	0	+	-
6355	Java In A Nutshell	49.98	0	+	-
7524	1984	69.98	1	+	-

My Address:

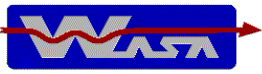
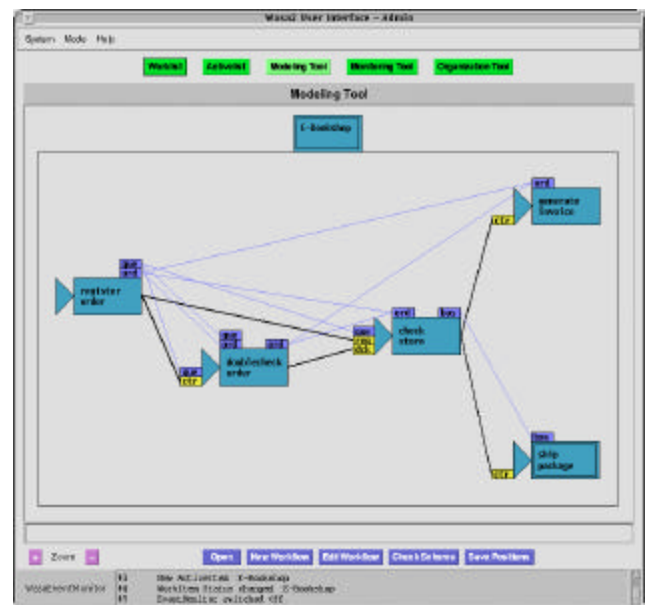
Name:

Address:

City:

Country:

please fill out the formular

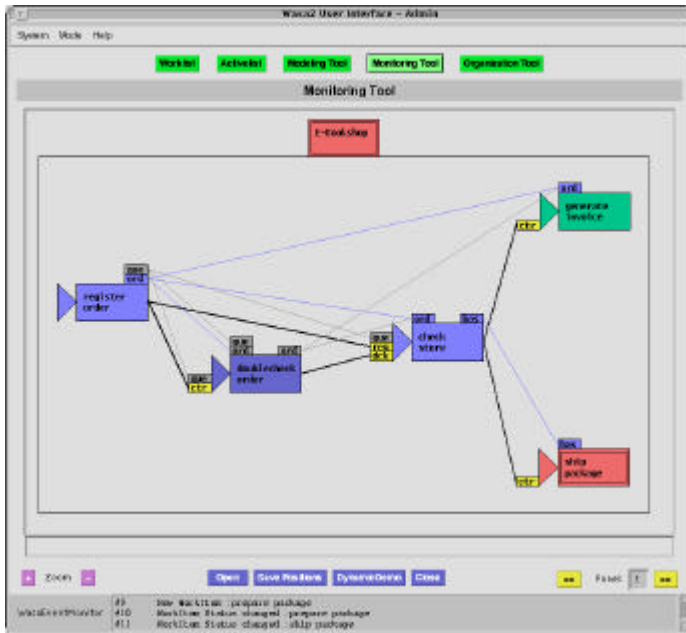
Workflow Schema

In the workflow schema shown, workflow activities are represented by rectangles, and control flow and data flow constraints are represented by directed arcs. Each workflow is assigned a start condition which controls if and when a sub-workflow of a complex workflow is started. The sample workflow consists of the following sub-workflows, which are executed as defined by control flow and data flow constraints in the workflow schema.

- Register order and Doublecheck order
- Check store
- Prepare invoice
- Ship package

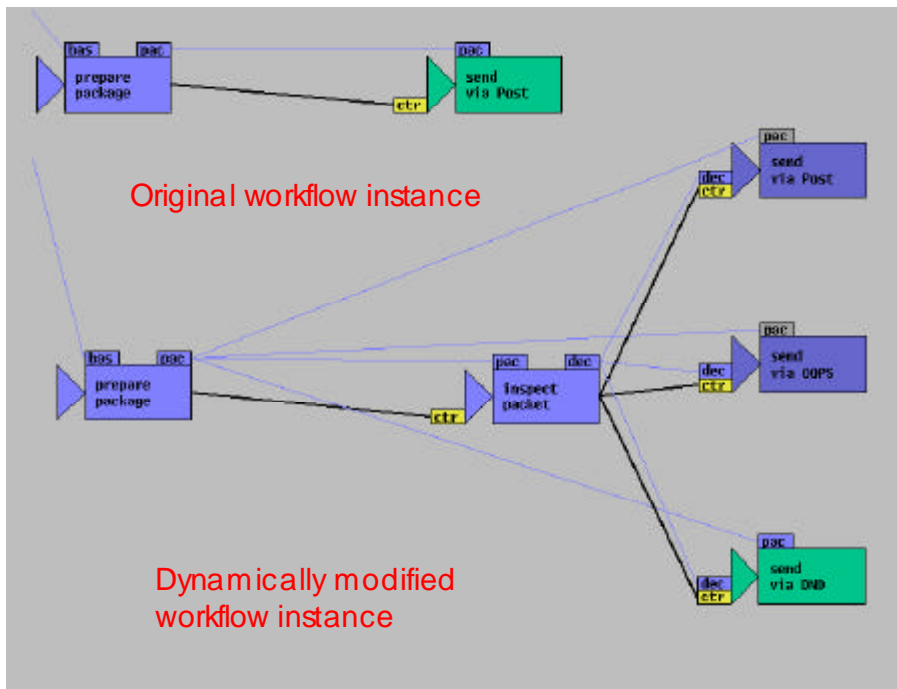
Workflow Instance

Each application process is represented by one **workflow instance**. To allow an observation of state and progress of workflow instances, WASA2 provides a workflow monitoring tool. Completed workflows are displayed in **blue**, currently active workflows are shown in **red**, and workflows which are in ready state appear in **green**.



Workflow Flexibility: Dynamic Modifications

WASA2 supports controlled dynamic modifications of workflow instances at runtime. This is an important feature in advanced workflow management, since today's rapidly changing markets require the ability to perform quick changes to workflows conveniently. A dynamically modified workflow instance is shown below; at the top of this figure, a screenshot of the original workflow instance is shown – in the lower part, the dynamically modified version of the workflow appears.



IMPLEMENTATION OF WASA2

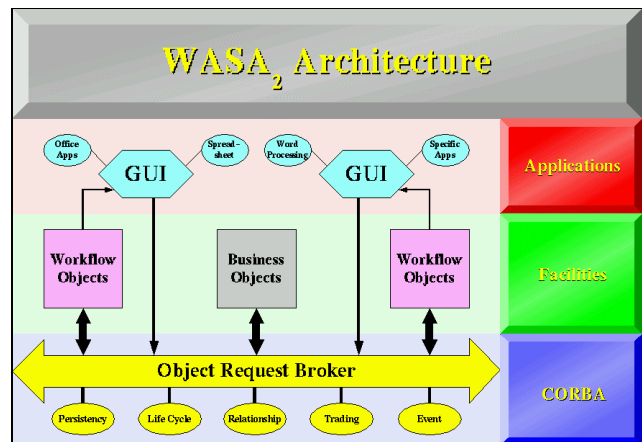
WASA2 was developed based on object-oriented methods and infrastructure. In particular, UML was used to design the system, and the implementation is based on the middleware standard CORBA.

System Architecture

WASA2 has a three-level architecture as shown below. Users access the system with a graphical user interface, which can also spawn external programs to implement workflow activities. Examples of external programs are office applications and software systems to implement specific tasks within a given workflow.

The key level in the WASA2 architecture is the Facilities level, where workflow objects as well as business objects reside. While workflow objects perform specific and workflow-related tasks, business objects are highly domain-specific. Since business objects and workflow objects rely on the same middleware infrastructure, a seamless integration of business objects into workflow applications is achieved. Hence, the component-based architecture of WASA2 allows a re-use of workflow objects and business objects in different CORBA applications.

In the lower level, standardized CORBAServices are used to cater for reliable and efficient distributed workflow executions.



SUMMARY

WASA2 is a flexible workflow management system, which features the following highlights:

- Interactive, graphical workflow definitions
- Distributed and persistent workflow executions
- Dynamic adaptability of running workflows
- Integration of Business Objects
- Object-oriented design with UML
- Standard middleware CORBA

More Information on WASA2 can be ordered from the above address, or can be obtained from <http://www.math.uni-muenster.de/informatik/u/dbis>