Position Paper: Workflow Enactment with Tycoon and StP Core

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Abstract

We present an overview of our current work with the StP Tool at DBIS and a brief introduction to our research goals. We argue that an extended use of the StP Tool would enable us to implement our newly developed methods for activity-oriented information systems and that these R&D activities are of considerable interest for the StP user community. Based on the description of our workflow environment we point out the need for expanded access to the StP object mappings. Finally, we present related DBIS projects.

1 DBIS Research Interests

The research emphasis of DBIS is concentrated on integrated modeling and programming tools for data-intensive applications. To a great extent the group is project-oriented and cooperates, in particular within the framework of the ESPRIT program, with a number of research institutes and industrial partners nationally and internationally.

Emphasis is placed on the development of systems and languages for data-intensive applications, in which type systems for calculations cooperate closely with models for long lived data storage. Tycoon (Typed Communicating Objects in Open Environments) is a polymorphic persistent programming environment for the development of data-intensive applications in open environments. The Tycoon system emphasizes system scalability and interoperability with other systems. Flexible and safe interoperation between these servers is supported by an elaborate higher-order type system.

2 Workflows and Activity-Oriented System Designs

After developing Tycoon as a modern database programming environment which offers a robust linguistic and architectural framework for a flexible definition and integration of generic services in open environments, we now focus on the impact of Tycoon on modern information systems. In particular process-oriented systems in the context of BPR and Workflow Management require a new kind of support in terms of flexibility and powerful modeling and execution. The strong orthogonal language concepts in Tycoon allow migrating persistent threads as first-class entities that provide a powerful abstraction to support complex activity-oriented information systems.

Furthermore, Tycoon offers an open environment to integrate existing services of specialized systems like databases (Ingres, Oracle, O2, Object Store), communication subsystems (Sun RPC, HTTP,...), window systems (Starview, News), business applications (SAP R/3) etc. This is the key technology to achieve an added value by the integration of specialized services instead of

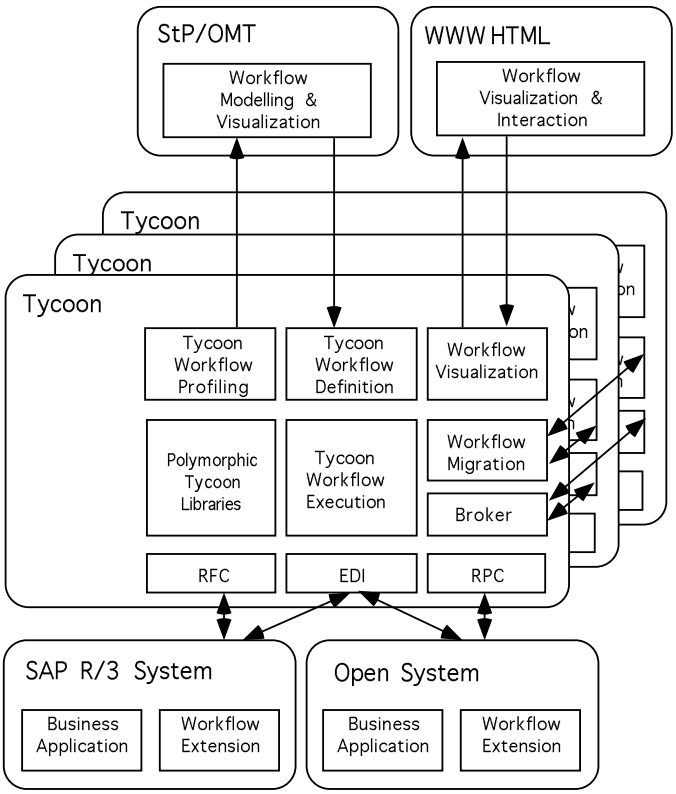

Figure 1: Architecture

building up a new system from scratch. Tycoon also enables the integration of generic services, like configurable tools or databases that are particular valuable for reaching the above mentioned goal.

By means of cooperation with the department of business administration at Hamburg university we are acquiring domain-specific knowledge of activity-oriented and cooperative tasks. The focus of our current work is the development of new concepts and abstractions for modern information systems for large organizations by the use of existing profound knowledge of system designs and modern language technology.

3 Workflow Modeling with the StP Tool

The StP/OMT Tool is a very powerful implementation of the OMT method introduced by Rumbough et al., but the main reason for acquiring the StP Tool was not the predefined and implemented methods but the tool's adaptability, configurability and availability on several platforms. These additional features justified our comparatively high investment in the StP Tool by enabling us to implement our own methods within the context of our research. Up to now, there is heavy use of StP/OMT in teaching and projects. Furthermore, we are investigating the architecture of the StP Core and the different kinds of possible interaction with other tools within our current research.

Indeed, our work with the tool and the examination of the documentation shows that the tool provides generic functionality for building up new kinds of data and process models (OMT, Booch, SA,...). This functionality includes the rule-based specification of the editor's behavior, the Object Management System on top of the StP Repository and the report facilities. Furthermore, it offers an open interface to the underlying repository for an integration of this generic functionality in

the construction of a comprising system. Therefore, the StP Core offers an ideal infrastructure for the desired workflow modeling tool supporting our research.

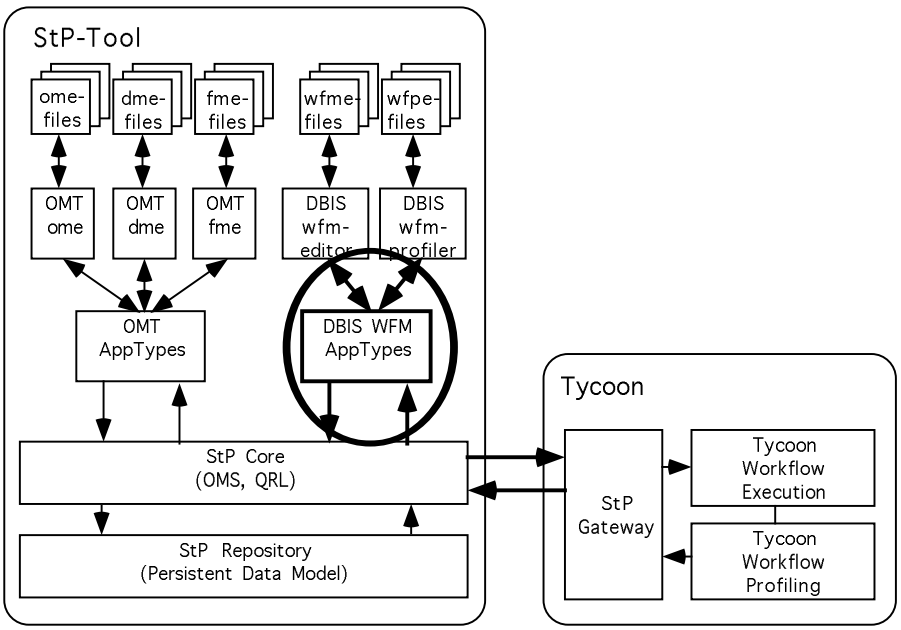

Figure 2: StP Core Integration

After building up some models using the OMT notation provided by the StP/ OMT Tool we first edited the rules defining the behavior of the generic diagram editor. Unfortunately, the OMT method does not fully meet our requirements in the area of workflow modeling. We are dealing with entities like workflow, trace, binding, step, actor, site and resource that are different from those used within the definition of the three OMT models like class, object, method, attribute, state, action, event and transition. Therefore, we designed a prototype of the desired notation by setting up specific editor rules, which demonstrated the flexibility of the tool. However, we are not able to use the main functionality of the repository and the Object Management System because of its built-in password protection. The corresponding statement of your documentation covers our whole problem in a perfect way:

> 'To tie semantics to a notation, you must be able to connect symbols to objects in the repository. ... SE object mappings are password-protected and cannot be customized by end users' (CH!ARCH.DOC 1-6)

Without access to these object mappings our use of the tool is serverly limited:

- We are not able to implement specific semantics, that meet our special requirements for the modeling of workflows.
- Furthermore, no integration can be done between multiple instances of one or more models. This feature is needed to build up non trivial models; for example, the OMT method is a set of three models, the Object Model, the Dynamic Model and the Functional Model, that are connected through the repository.
- The generic report facilities of the StP Core are also limited through the use of the repository.
- Without the symbol object mappings the whole functionality of the integrated Object Management System is unreachable.

- Finally, the openness of the StP Repository cannot be used to implement a StP-Tycoon gateway, that provides functionality to use the specification constructed in the StP environment within the Tycoon system.

Therefore, without these features there is little room for using the StP Tool in our development work. Hence, Hamburg's comparatively high investment cannot be fully justified by the severely limited use of the tool.

4 Related Projects at DBIS

4.1 SAP R/3

SAP R/3 is the dominant business application for large and medium-sized enterprises offering integrated solutions for manufacturing, financials, human resources etc. The underlying systems of the desired workflow system are functional information systems like SAP R/3, other business applications and multiple kinds of specialized solutions, that provide domain-specific functionality in a "conventional" way (i.e. not covering the full power of activity-oriented solutions). Nevertheless, such systems are spread throughout large organizations and they implement substantial portions of the domain-specific functionality. At DBIS, we have installed the full set of standard modules of the SAP R/3 system, two dedicated servers and further tools within the context of SAP R/3 (ARIS Toolset, R/3 Reference Models).

In the long run, we aim to set up further projects with SAP R/3 and Tycoon. Hence, a bidirectional gateway between Tycoon and the SAP R/3 system is a major work item within this project.

4.2 EU/CAN ESPRIT Cooperation: Activity Modeling and Object Technology for Cooperative Systems (1995-1998)

The goal of this research cooperation between six key research groups in Europe and Canada is to improve the future information infrastructure by understanding the full potential of activity modeling and object technology, and assisting the commercial exploitation of cooperative information systems. The European side consists of the following partners: Universita di Milano, Italy, Professor Giorgio De Michelis Universita du Namur, Belgium, Professor Eric Dubois Technische Universität Aachen, Germany, Professor Matthias Jarke Universität Hamburg, Germany, Professor Joachim W. Schmidt (Technical Coordinator).

The Canadian side is represented by University of Toronto, Professor John Mylopoulos University of British Columbia, Professor Carson Woo.

Cooperative Information Systems will be object- and activity-oriented and have to work in heterogeneous and distributed environments (in that their components were developed independently of each other, at different time and by different people). Moreover there is a growing demand to integrate such systems tightly with organizational work so that these information systems can be of direct and immediate use to the business activity at hand. The goal of the proposed cooperation is to integrate on-going research by the participating research groups, thereby contributing towards a technology that deals effectively with the development and maintenance of such information systems.

The overall goal of this cooperation is to improve the future Information Infrastructure by

- understanding the full potential of Activity Modeling and Object Technology, and
- assisting the commercial exploitation of Cooperative Information Systems.

4.3 Workflow Enactment in Cross-Enterprise Cooporations

We currently establish a research cooperation with European insurance industry. The current situation of the European insurance industry is characterized by a phase of radical re-orientation of

its IT strategy towards business process-oriented solutions which is triggered by following pressing market situation:

- The deregulation and opening of the traditionally closed national insurance markets has led to a significant diversification of insurance products (product unbundling) and a need to dramatically reduce the time-to-market for newly developed products in a multi-lingual environment.
- A free trade of insurance services across Europe can no longer be accomplished efficiently by traditional, manual and document-centered processing. Distributed, data-intensive, multi-national and cross-enterprise business processes require the adoption of an open workflow-oriented information infrastructure by insurance enterprises which also has to scale well to cross-enterprise workflows.

At the same time, European academia has attained international leadership in enabling technology for distributed, cross-enterprise workflows (high-level script languages, systems supporting persistence, distribution and iteration abstraction, platform-independent data and code representations, ...) as a result of ESPRIT basic research projects such as FIDE and COMIC.

The main objective of the EWIDE (Electronic Workflow Interchange and Data Exchange) project is to bring together key academic technology providers and industrial partners to focus on the necessary research an development to adapt these existing technology components to the concrete information infrastructure and business process practices of insurance enterprises.