Master Thesis/Diploma Thesis

Approach and Realization of a Multi-tenant aware Process Model Registry
/Konzeption und Implementierung einer mandantenfähigen Prozessmodell-Registry

Beginning: immediately

Background

The SimTech Cluster of Excellence [1] studies multi-scale and multi-physics simulation methods. These methods aim for combining different scales (e.g. cells, tissue, bone, skeleton) and different physics (e.g. mechanics, thermodynamics, quantum physics) into one overall simulation. The Institute of Architecture of Application Systems (IAAS) has built a Workflow Management System (WFMS) that is tailored specifically for the requirements and needs of scientists [2]. The workflow system allows to model simulations as workflows in order to make them more flexible and improve automation. The workflows can be modeled, executed, adapted, monitored, and analyzed. The current system orchestrates different simulation components into one workflow using either only one scale or an approximation of all physics/scales onto one scale. In order to extend the system for handling the coupling of separate simulation workflows operating on different scales and physics we want to introduce the notion of choreographies to simulations. Choreographies are coordinated interactions between so-called participants, i.e. orchestrations/workflows, without a central controlling mechanism. We use the choreography language BPEL4Chor [7], [8] to model choreographies of simulation workflows. A BPEL4Chor choreography itself is not executable but can be transformed into BPEL [11] workflows that represent the participants in a choreography. As first step towards the support of collaborative modeling and execution of such choreographies, in [4] the SimTech workflow engine is extended with multi-tenancy support (SCE\textsuperscript{MT})\textsuperscript{1} and integrated into a multi-tenant Enterprise Service Bus (ESB\textsuperscript{MT})\textsuperscript{2} [5], [6].

Tasks

In order to effectively and securely identify, store and manage choreography and workflow models in distributed and multi-user environments (like the SimTech WFMS) a centralized, multi-tenant aware Process Model Registry is required. The registry should enable the centralized administration and management of choreography and

\begin{itemize}
\item SCE\textsuperscript{MT}: http://www.iaas.uni-stuttgart.de/scemt/
\item ESB\textsuperscript{MT}: http://www.iaas.uni-stuttgart.de/esbmt/
\end{itemize}
process models and their meta-data (e.g. author, purpose, revision/version or configurations). Furthermore, scientists should be able to synchronize their local modeling workspaces over the registry with each other to support collaboration during modeling time.

Therefore, in this work the following tasks have to be fulfilled:

- Literature analysis of the state-of-the-art with regard to multi-tenancy, model registries and collaborative modeling,
- Conceptual definition of a multi-tenant Process Model Registry,
- Prototypical realization of the defined concepts,
- Integration of the prototype into the SimTech WfMS

**Required previous knowledge and experiences:**

- Java programming skills
- Workflows [10]
- WS-BPEL [11], [12]

The lectures "Services and Service Composition", “Business Process Management”, and the listed literature are recommended for preparation. The student has to manage his schedule including the work packages and milestones by himself. A helpful guide for planning and writing a thesis can be found in [13] and [14]. The thesis can be written in English or German.

**Literature**


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