



Semester Thesis for Marcus Deluigi

Task Description: Martin Waldburger, Prof. Dr. Burkhard Stiller

Topic: **Impact of Mobile Dynamic Virtual Organizations on AAA-supported Adaptive Workflows**

Start Date: April 1, 2005

End Date: June 30, 2005

Supervisor: Martin Waldburger, Prof. Dr. Burkhard Stiller

Location:

Support: Mobile Dynamic Virtual Organizations (MDVOs), AAA, adaptive workflows, mobile grid services, Akogrimo project related information

1. Introduction and Motivation

Mobile Dynamic Virtual Organizations (MDVOs) are regarded as well suited means to support adaptive electronic workflow execution where its participating organizational entities remain legally independent. However, working in a distributed, dynamic, and even mobile or at least nomadic environment imposes some challenging issues to be solved.

Within this semester thesis, MDVOs with their particular characteristics will be analyzed - especially with respect to potential consequences on knowledge management in an MDVO, on the life cycle of a mobile dynamic virtual organization in general, and on collaborative aspects in dynamically executing and adapting workflows, where MDVO members have to be authenticated, authorized, and the respective workflow steps have to be accounted and charged for.

A platform as the one to be developed within the project Akogrimo [7] will support pervasive access to knowledge by means of offering mobile grid services, that help its possibly dynamically changing organisational members to fulfill complex problems in specific application domains with a clear economic orientation such as e-Health or e-Learning.

2. Description of Work

Executing adaptive electronic workflows based on mobile grid services imposes the need of an embracing understanding of the following components as well as an outline of the respective interrelationships between them:

- MDVOs: Starting from the quite well researched virtual organizations, new characteristics, possibilities but also requirements have to be identified when taking into account that organization members can join and leave a virtual organization dynamically and that they are nomadic or even mobile.

- **Adaptive workflows:** Especially in the area of complex problem solving, the solution of one problem easily can provoke following problems to be solved. Consider for example a patient with a heart attack: After that a sensor-equipped mobile device automatically has detected the patient's condition it transmits important status data to an emergency central. This event triggers several other activities to be executed such as to locate medical personnel on duty near the patient's location in order to send them to the patient. These problems can be represented by electronic workflows. While designing a model to implement these workflows it has to be held to their adaptiveness and to the possible interconnections of different workflows.
- **Authentication, Authorization, Accounting (AAA):** In an economic driven business scenario that relies on a services oriented platform able to have built on top of the platform itself domain specific solutions that incorporate possibilities to execute adaptive workflows and that admit service provision to be achieved through possibly many legally independent service, technology or content providers, it appears to be as a key issue to have a well working AAA-model in place, for both, services users and service providers.

In particular, the key aim of this thesis work is to develop a model for the collaboration of organizational entities within adaptive workflows in the environment of a mobile virtual dynamic organization, keeping the focus on AAA supported mobile grid services which can guarantee that in every administrative domain all participating actors are

- correctly authenticated,
- authorized to access the resources needed to pursue the workflow

and that the mobile grid services are

- reliably accounted by
- meaningful and appropriate metrics.

3. Thesis Goals

- The overall goal of this thesis is to analyze clear findings in the areas of MDVOs and adaptive workflow execution.
- The subsequent goal of this thesis is to apply these respective findings on the underlying technical AAA-supported grid services infrastructure by means of appropriate requirements definitions
- Finally, the development of an MDVO-AAA model which determines the final outcome of this thesis.

4. Activities

Based on the description of work the following activities - some in parallel - are recommended:

- Summary of key requirements of Mobile Dynamic Virtual Organizations
- Summary of Authentication, Authorization, and Accounting requirements
- Determination of electronic workflows
- Definition of values for workflows and its components
- Definition of value metrics applicable to workflows
- Definition of an appropriate MDVO-AAA model
- Application of an example scenario (e.g., grid services) to this model

- Evaluation of advantages/benefits driven by examples and a small simulation

The presented list of activities comprehends recommendations only with regard to provide the student with possible steps to take, but it is highly expected to find the student's personal thoughts and ideas in the work.

5. General Notes

- Provide a proposed schedule for your steps within the first two weeks of your work. Clarify details with your supervisor and finalize the schedule of tasks, basically in a bi-weekly fashion. Prepare an intermediate report and a short internal presentation after half time (date to be set) and discuss this with your supervisor. At the thesis' end a final public presentation has to be given.
- The final written report will document all work undertaken and remember that this report must be self-contained. Major technical basics are to be included and detailed knowledge obtained during the work must be documented. Assumptions, design decisions, configuration choices, and results are part of the report as well as implementation details and usage information. Correct bibliographic references and a list of papers, recommendations, and descriptions used must be added, including those ones given below.
- Establish weekly meetings with the supervisor to report on progress and problems.
- Students involved are required to read and answer e-mails related to this project at least twice a week.
- The sheet on hints for diploma/semester thesis work is required to be known.

6. Formal Results

Besides an oral presentation of your work in exactly 20 min plus 10 min for questions and answers during the public presentation, the following written documents are part of your work and need to be handed in to the supervisor in time:

- A report in a soft cover binding and in 3 copies (in English, preferred): It covers the problem to be solved, the discussion of the design choices, a set of arguments on the final design choice, a list of solved and open issues, a table of content and figures (including tables), a valid list of bibliographic references, and optional appendices as required. A critical consideration of the task, the work, and the result will conclude the report. The official acknowledgement section is mandatory, a personal one optional, however recommended, as usually a number of people took part in the process of finalizing the thesis. The text processing shall be done in FrameMaker (preferred).
- A documentation of the implemented/configured system, covering the systems view point, an implementation description, a use and installation manual, a documentation of all program and data structures developed or utilized. All of this may be part of the report below, however, in case it will not be included, it must exist in a separate document.
- A dedicated CD has to be produced: (1) a collection of all program sources, software components, protocol implementations utilized, hardware/product documentation in PDF, related work papers in PDF or full HTML pages, and a directory description; (2) the written thesis (report) in source files, figures in source file and gif or eps, and a full printable PS as well as PDF file, the set of slides for the final presentation in PowerPoint, and all further material used, if available in electronic form, such as all existing and documented test scenarios, testing plans, and test results.
- A German (or English, in case of a German report) summary of maximum 2 pages, which will enable a quick and clear survey of this work's tasks and results. This summary will be part of the bound report, and is included after the front page and before any other text will

follow. It includes four short sections on: 1. Introduction, 2. Aims and Goals, 3. Results, and 4. Further Work.

- The complete set of copies of the report, the CD, and the talk must be completed and handed in to the supervisor in time before the diploma thesis will change into “submitted” status.

7. References

The following list of references addresses key points. Further paper, scenario, and document research is a must:

- [1] VE-Forum: <http://www.ve-forum.org/>
- [2] VE Portal: <http://www.uninova.pt/~cove/projects.htm>
- [3] e-workflow - the workflow portal: <http://www.e-workflow.org/>
- [4] Workflow Research: <http://www.workflow-research.de/Links/index.html>
- [5] AAA Architecture Research Group: <http://www.aaaarch.org>
- [6] Authentication, Authorization and Accounting (aaa) Charter: <http://www.ietf.org/html.charters/aaa-charter.html>
- [7] Akogrimo Project Website: <http://www.akogrimo.org>