ASG – Adaptive Services Grid

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Abstract

The provision of dynamic and semi-automatic solutions for discovery, creation, composition and enactment of Web and Grid services represents the goals of many research projects and initiatives in both Web Services [Alonso et al., 2003] and Grid computing [Foster and Kesselman., 1999] domains. Adaptive Service Grid (ASG) subscribes to these goals by taking an *adaptive* approach for service discovery, composition, creation and enactment. ASG is an ongoing research project in which the dynamic aspect of services and users requests is considered in the research for solutions to all previous mentioned tasks.
A special attention is given semantic technologies that support semi-automatic discovery, selection and composition of adaptive services. Semantic descriptions of services and requests are specified using WSMO [Roman et al., 2005], one of the major initiative in Semantic Web services.

1 Introduction

The goal of Adaptive Services Grid (ASG) is to develop a proof-of-concept prototype of an open development platform for adaptive services discovery, creation, composition, and enactment.
To achieve its goal, ASG addresses scientific and technological issues making use of the knowledge and expertise of major European research institutions with significant contributions from the software, telecommunications, and telematics industry. ASG provides the integration of its subprojects in the context of an open platform, including tool development by small and medium sized enterprises. Based on semantic specifications of requested services by service customers, ASG discovers appropriate services, composes complex processes and if required generates software to create new application services on demand. Subsequently, application services will be provided through the underlying computational grid infrastructure based on adaptive process enactment technology. In ASG, methods and concepts from software architectures, software development methodologies, Web services composition and workflow process planning and coordination will be complemented by recent results in domain engineering, software generation and Semantic web and agent negotiation research. Impact on a European level is supported by strong industry involvement both with respect to platform development, deployment, and exploitation in the areas of telecommunications and telematics.

2 ASG – Overall Structure

The overall structure of ASG is illustrated in Figure 1. Different work components that address the tasks mentioned previously are described below in more details.

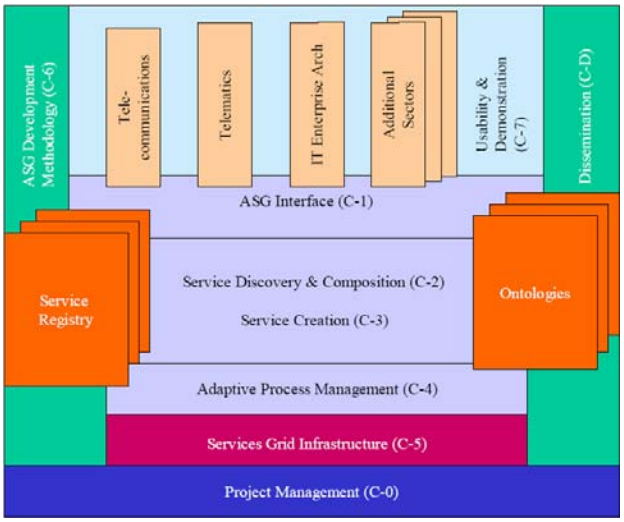

Figure 1. Overall ASG Structure

- C-0: Project Management – details the project management structure involving scientific, administrative, financial, and dissemination coordination.
- C-1: ASG Interface – will provide interfaces and mechanisms to ensure access to and semantic interoperability across ASG and its users. In particular it will develop a language for semantically rich description of user requests and service descrip-

tions including both functional and non-functional requirements, based on existing Semantic Web standards.

- C-2: Service Discovery & Composition – will provide mechanisms to register, discover, and compose services. Based on information on services available within ASG and semantic specifications of desired functionality, service composition will create composed services to fulfill requests that can only be satisfied by several services that are executed as a service process.
- C-3: Service Creation – will provide mechanisms for dynamic creation of services, mainly based on automated generation of software components according to semantic service specification and agreements, taking into account both the functional and non-functional requirements. Semantic specifications will be transformed into specific language constructs, which are then used for software and service generation.
- C-4: Adaptive Process Management – will provide mechanisms for the enactment, monitoring and management of service and process execution in order to ensure collective QoS and stateful coordination of services in ASG. It will include identification of prospective service providers for the services planned in the application workflow and coordinated negotiation of service provision agreements and sub-contracts with the providers in order to meet the application nonfunctional requirements, primarily related to the Quality of Service (QoS).
- C-5: Services Grid Infrastructure – will provide a generic open software platform for implementation of the ASG elements together with the core computational grid functionality, standard service interfaces and basic services required for the development, integration and deployment of service-oriented applications. The research will specifically address nonfunctional properties – such as timeliness, reliability, availability, and security – for services, thereby considerably enhancing existing grid computing models.
- C-6: ASG Development Methodology – is responsible for managing the software lifecycle process of applications using ASG, including both the structure of software processes, the deliverables produced in the various phases and development of tools used when working with ASG or tailoring ASG to a new application domain.
- C-7: Usability and Demonstration – will show how ASG-based services will provide advanced new services in the context of specific application domains. Partners from the Telecommunications and IT industry areas are active in this context, and have identified the three ASG application domains Telecommunications, Enterprise IT, and Telematics.
- C-D: Dissemination – is represented by a dedicated work component. With the help of partners in the e-training and e-learning context and event management a set of dissemination actions, both with respect to scientific dissemination, training and industrial dissemination will be conducted.

Acknowledgments

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