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Deployment and Configuration of Distributed Applications Request For Proposal

OMG Document: orbos/XX-XX-XX

Submissions due: July 31th, 2002

Objective of this RFP

This RFP solicits proposals for (meta)models, notations, exchange formats and APIs to realize a comprehensive automated deployment and configuration support for component-based distributed applications.

In particular, proposals shall provide:

- A platform independent model and platform specific model(s) specifying automated support of deployment and configuration of component-based distributed applications.
- Metamodel(s), notation(s) and exchange format(s) for the description of topologies, capabilities and properties of heterogeneous software and hardware infrastructures of distributed execution environments for component-based distributed applications.

- Metamodel(s), notation(s) and exchange formats for the specification of distribution topologies, configuration possibilities and deployment requirements of component-based distributed applications.
- Specification of interfaces, components and services necessary for automated support of the entire deployment process of component-based distributed applications and their life-cycle and configuration management.

For further details see section 1.0 of this document.

1.0 Specific Requirements on Proposals

1.1 Problem Statement

Deployment and configuration of distributed component-based applications is an integrative part of the overall system lifecycle that ranges from business modeling, analysis, design and construction down to integration, test and operation. This aspect is especially valid within the recently established Model Driven Architecture (MDA). However, modeling of configuration properties and deployment requirements of component-based distributed applications as well as the modeling of software and hardware infrastructures onto which the applications are to be deployed is not well supported yet. Furthermore, only parts of the APIs necessary to enable the automation of the deployment and configuration process are already covered by OMG specifications.

A first step towards the standardization and automation of the deployment process is done by the CORBA Component Model (CCM), which provides a comprehensive framework for the development of deployable and configurable components for distributed applications. However, a couple of deployment-related aspects are not well covered by the CCM.

At this time, there is no modeling support for the description of the hardware and software infrastructures onto which component-based applications are to be deployed. However, this is a precondition for the automation of the entire deployment process. In this process, components of an application will be deployed onto computing nodes of the hardware infrastructure with respect to their requirements. Both the requirements of the components and the capabilities and properties of the infrastructure need to be modeled to automate this step.

The APIs for retrieval of the information on the targeted hardware and software infrastructure as well as their properties and capabilities need to be standardized. Also, in order to automate the entire deployment process, supportive services enabling deployment and configuration in a platform independent manner have to be standardized respectively their interfaces.

1.2 Scope of Proposals Sought

Proposals should define a platform independent model specifying automated support of deployment and configuration of component-based distributed applications. This model should also support the description of heterogeneous distributed software and hardware infrastructures where distributed applications are to be deployed to.

Furthermore, platform specific models, at least for the automated deployment of CORBA-based distributed applications onto CORBA-based distributed target environments, are sought by this RFP.

Moreover, proposals should define APIs and exchange formats to realize automated deployment and configuration support.

1.3 Relationship to Existing OMG Specifications

Models and metamodels contained in submissions against this RFP should follow the OMG UML standard where it is possible.

Platform specific models based on CORBA should be aligned with the CORBA Component Model (CCM) as well as with CORBA Services, if they are needed.

1.4 Related Documents and Standards

- "Model Driven Architecture" (ormsc/01-07-01.pdf)
- "OMG Unified Modeling Language Specification" (formal/00-03-01)
- "CORBA 3.0 New Components Chapters" (ptc/99-10-04.pdf)
- Online upgrades RFI (orbos/2000-09-15)
- Load balancing and monitoring RFP (orbos/2001-04-27)
- CORBA management services RFI (orbos/2001-08-07)

1.5 Mandatory Requirements

- a) Proposals shall precisely define the semantics and the identity of a *unit of deployment* as well as of assemblies of such units in the context of automated deployment in terms of a platform independent model, and specialize this for CORBA in terms of a platform specific model.
- b) Proposals ought to specify a platform independent model of configuration and deployment strategies for units of deployment and assemblies of such units onto distributed execution environments. This model shall be specialized for CORBA by providing a platform specific model.
- c) Proposals shall precisely define a terminology to describe the software and hardware infrastructures of heterogeneous distributed execution environments in terms of a platform independent metamodel. This metamodel shall at least provide elements for the description of computing nodes, network connections, available computing services on computing nodes, properties of computing nodes and network connections between computing nodes. The platform independent metamodel shall be specialized by a platform specific metamodel for the description of CORBA environments.

- d) Proposals need to specify the required functionality and interfaces of a distributed execution environment as well as exchange formats, which is needed for information retrieval based on c) and automated deployment of units of deployment or assemblies of such units onto the targeted environment.
- e) In particular, proposals shall specify interfaces and functionality required for deployment and management of assemblies of units of deployment. For this purpose, proposals ought to define interfaces for
 - uploading assemblies of units of deployment to the targeted execution environment,
 - installing and uninstalling assemblies of units of deployment,
 - executing, managing and controlling an assembly of units of deployment during its run-time, including creation and destruction of an assembly, as well as establishment and tear-down of connections between the units of deployment of an assembly.
- f) Furthermore, proposals should specify interfaces and functionality required for the management of single units of deployment. Thus, proposals shall define interfaces for
 - uploading units of deployment onto the computing nodes of distributed execution environments as well as unloading them from the execution environment,
 - initial configuration of units of deployment after their creation,
 - executing and terminating (executable) units of deployment on computing nodes of the distributed execution environment.

These interfaces may be used as basis for the implementation of the deployment and management functionality of assemblies of units of deployment mentioned in e).
- g) Proposals ought also to define interfaces for gaining information on
 - available computing nodes registered with the distributed execution environment, and their properties and resources,
 - installed and running assemblies of units of deployment.

and appropriate registrations mechanisms.

1.6 Optional Requirements

- a) Additionally to the exchange formats required by paragraph d) in section 1.5, proposals may provide textual or graphical notation(s) for the description of software and hardware infrastructures of distributed execution environments or to express configuration and deployment strategies for units of deployment or assemblies of such units.

- b) Proposals may define strategies and functionality for life-cycle and reconfiguration management during an application's run-time. This may comprise additional concepts and means for the description of assemblies of units of deployment and their requirements as well as supportive interfaces and services of the distributed execution environment.
- c) Proposals may define mechanisms for partial or complete update of assemblies of units of deployment.

1.7 Issues to be discussed

- a) Proposals should discuss the relationship of the defined terminology for deployment and configuration to the definitions provided by CCM and also to those ones of other component models if platform specific models are provided for other component models than CCM. At least, the definitions of a unit of deployment and an assembly of such units are to be compared with the component and assembly definition of CCM.
- b) Proposals shall explaine how different deployment strategies in terms of distribution topologies, number of instances and initial configurations are represented and expressed for an assembly made up of a given set of units of deployment. It needs to be defined whether an assembly with a given identity may have more than one distribution topologies or not.
- c) Proposals ought to discuss how the proposed description of deployment requirements can be checked against the specification of the target execution environment and whether there are preconditions for the automation of this step.

1.8 Evaluation Criteria

- a) Proposals must provide a comprehensive approach that allows the automation of the entire deployment and configuration process of distributed component-based applications. This includes the installation, creation of instances, initialization and set-up of the initial configurations of a distributed application.
- b) Moreover, the solutions proposed should support automated deployment of component-based multi-vendor applications onto distributed execution environments potentially provided by multiple - vendors.
- c) Proposals must provide a platform specific model for CORBA. This model should be compatible with CCM. If this is not possible, a detailed explanation of the reason(s) is required.

- d) Metamodel(s) and models sought by this RFP should be specified with UML. In case that this is not possible an explanation of the reason(s) is required.

1.9 Other information unique to this RFP

None.

1.10 RFP Timetable

The timetable for this RFP is given below. Note that the TF may, in certain circumstances, extend deadlines while the RFP is running, or may elect to have more than one revised submission step. The latest timetable can always be found in the Member Services section of OMG's Web page (URL <http://www.omg.org/>)

Approx Day	Event or Activity	Actual Date
	<i>Preparation of RFP by TF</i>	<i>November, 2001</i>
	<i>Approval of RFP by Architecture Board Review by TC ("Three week rule")</i>	<i>January, 2002</i>
<i>0</i>	<i>TC votes to issue RFP</i>	<i>January, 2002</i>
<i>60</i>	<i>LOI to submit to RFP due</i>	<i>April, 2002</i>
<i>150</i>	<i>Initial submissions due</i>	<i>July, 2002</i>
<i>164</i>	<i>Voter registration closes</i>	<i>July, 2002</i>
<i>171</i>	<i>Initial submission presentations</i>	<i>September, 2002</i>
	<i>Preliminary evaluation by TF</i>	
<i>270</i>	<i>Revised submissions due</i>	<i>November, 2002</i>
<i>291</i>	<i>Revised submission presentations</i>	<i>November, 2002</i>
	<i>Final evaluation and selection by TF Recommendation to AB and TC</i>	
	<i>Approval by Architecture Board Review by TC ("Three week rule")</i>	
<i>360</i>	<i>TC votes to recommend specifications</i>	<i>January, 2003</i>
<i>390</i>	<i>BOD votes to adopt specifications</i>	<i>February, 2003</i>