FIRE Facility Infrastructure Provisioning

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A Cross-Layer and Cross-Domain Approach

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I. INFRASTRUCTURE PROVISIONING CROSSING LAYERS AND DOMAINS

This presentation gives insights into the FIRE facility federation architecture developed by the PII [1] project. The presented architecture design allows computing and network infrastructure provisioning across the boundaries of single domains and across all layers (from connectivity to service platforms). Specific emphasis is put on the TEAGLE tool as it provides the central management framework enabling the design and deployment of requested experimental facility setups. An overview on the current implementation status is given. An online version of the tool has been opened to a small testing group but is not yet publicly available.

II. DESIGN TOOL

TEAGLE provides a design tool (VCT tool) to allow for configuration and deployment of resources. A VCT is the sum of all resources and interconnections configured and rented by a specific federation customer. It is an isolated network where the customer has direct access to the resources and configurations assembled by using TEAGLE.

The VCT tool combines a selection panel on the left hand side that allows browsing available federation resources and getting information on their functions and availability (figure 1). Selected items (e.g. HSS, MySQL, etc.) can be placed and interconnected in the workbench. The arrows interconnecting the items have specific semantics. In the setup shown in figure 1, the solid lines represent a protocol interconnection while the dotted lines reflect containment. This means for example that the MySQL server is hosted (contained) by the XenNode that itself is hosted by the physical node. On the other hand, the HSS is requesting data from the MySQL Server and a specific database via a query interface which requires specific configuration (e.g. MySQL server address and port) on the HSS side.

The VCT layout and its associated resource configuration settings can be saved, upon which an XML document is produced. This is the input for the TEAGLE Orchestration Engine that transforms the VCT specification (a list of involved resources, their configuration, and some dependencies) into an executable script that launches the actual VCT instantiation (the provisioning of resources in different domains). Upon execution of the script, Web Service requests are sent to all involved Domain Managers triggering the deployment and configuration of resources according to the VCT specification.

Given the high resource heterogeneity, an abstraction layer is necessary to allow for common management and provisioning routines. This is offered by one Domain Manager per administrative domain combined with pluggable Resource Adaptors. Resource Adaptors can be seen as device drivers that support resource specific types of communication. Several Resource Adaptors plug into one Domain Manager to support multiple resources. Resources located in different administrative domains are interconnected via Interconnection Gateways that allow for connections on different layers (e.g. layer 2/3 VPN). The Domain Managers offer generic management operations (such as add, delete, modify) towards the upper federation logic in TEAGLE.

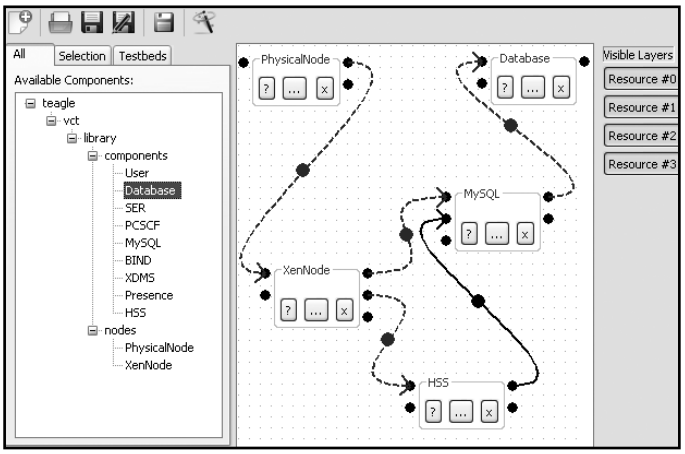

Figure 1. Snapshot of the current VCT tool user interface implementation.

References

[1] PII project website: http://www.panlab.net