

Grid Runtime Service Discovery Tool (GRSDT)

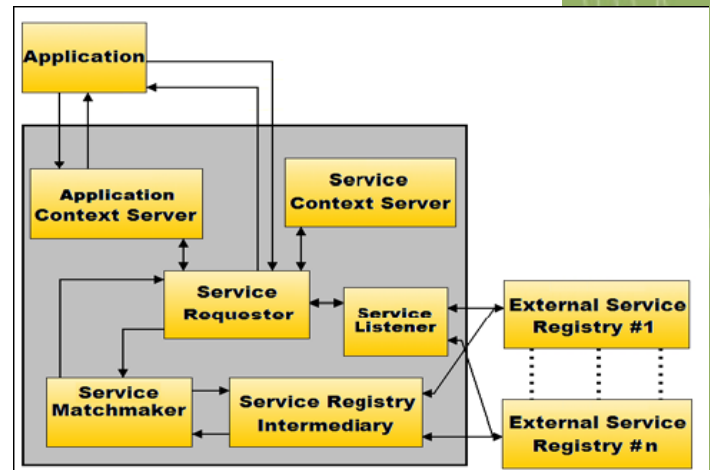
Motivation and Challenges

The identification of services to replace existing services in service-based applications during execution time of these applications has been recognised as an important activity for service-based applications. In such situations it is necessary to identify services that can fulfil structural, functional, quality, and contextual properties and that can be deployed as part of service-based applications. There are several circumstances that may trigger the need to identify services during execution time of service-based applications such as (a) unavailability or malfunctioning of services participating in the application, (b) changes in the structure, functionality, quality, or context of services participating in the application, (c) changes in the context of the application that uses a service, or (d) emergence of new services that can fulfil the role of an existing service in an application in a better way, i.e., in a superior way than the current service.



GREDIA Solution Overview

The GRSD tool provides an integrated solution to identify services during execution time of service-based applications in order to support the execution of Grid business applications. It uses complex queries that can express combinations of structural, behavioural, quality, and contextual conditions. These queries are specified in an XML-based query language, called *SerDiQueL*. The GRSD tool assumes services that have multi-faceted descriptions including service interface, behaviour, quality, and context descriptions. To support the circumstances that may trigger service discovery described above, the GRSD tool allows service discovery based on both pull and push query execution modes in a proactive way. The pull mode of query execution is performed by searching service registries when a service-based application is deployed. The push mode of query execution is performed in parallel to the execution of the application using pre-subscribed queries. These queries are associated with specific service binding points in the application and aim to maintain up-to-date sets of candidate replacement services for these binding points. In both modes, query execution is based on the computation of distances between query and services specifications.



The GRSD tool has five main components, namely (i) a service requester, (ii) a service matchmaker, (iii) a service listener, (iv) service and application context servers, and (v) a service registry intermediary. The service requester orchestrates the functionality offered by the other components in the tool. The service matchmaker parses the different criteria in a service discovery query and evaluates them against service specifications in the various service registries. The service context server and application context server support the acquisition of context information about the services and the application environment, respectively. The service listener notifies the service requester about new services that become available, or about changes in the descriptions of existing services. The service registry intermediary provides an interface for accessing registries.

Innovation

The main features of the GRSD tool are: (a) dynamic service discovery based on both pull and push mode of query execution; (b) the use of a pro-active push mode of discovery process in which services are identified in parallel to the execution of an application; and (c) the use of an XML-based query language (SerDiQueL) for expressing complex service discovery queries representing structural, behavioural, quality, and contextual conditions, (d) a new behavioural matching process that considers behavioural constraints described as temporal logic expressions.

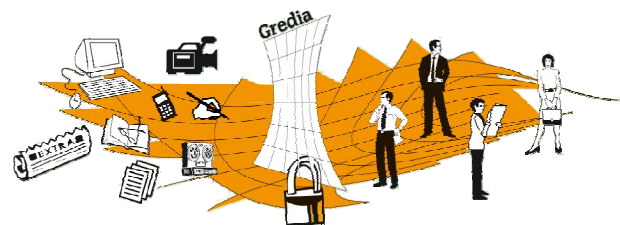


Business Impact

GRSD tool advances the area of service discovery by allowing services to be identified proactively and, therefore, providing a considerable gain in the time required for identifying replacement services at run-time. Furthermore, GRSD tool considers different characteristics of the service, such as structural, behavioural, quality, and contextual aspects, at the same time when attempting to identify services, which allows for a more precise identification of the services.

Interoperability

The GRSD tool can be integrated with any other application that requires the identification of services during execution time of service-based applications. Although in the scope of Gredia GRSD tool has been integrated with the APPEA runtime system, it can also be invoked other applications that can represent service requests in SerDiQueL.



Partners Involved



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