Triana as a Graphical Web Services Composition Toolkit

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Web Services Workflows

• Composition refers to combining and linking together existing services (atomic or composite) to create new processes.
• Makes it possible to create complex hierarchical processes.
A Typical Scientific Process

1. Starting with a DNA sequence in a text file ...
2. The scientist uses a Web-based tool to perform a search for similar sequences.
3. Using another Web-based tool, the scientist retrieves full-length sequence text of best matches.
(Saves results and extracts sequence identifiers)
(Saves results and converts format)
4. Then the scientist uses a command-line tool to create a multiple sequence alignment.
(Source: Siepel et al., 2001)
Requirements

Need to make it easier for users to:
- Create new services which offer more functionality.
- Share and replicate workflows.
- Easily carry out ‘what-if’ analysis by altering any part of a workflow.
Our Objectives

• Hide the low-level details of composing Web services.
• Allow the user to focus on design of workflow at the conceptual level.
• Specifically, allow the user to graphically and transparently:
  – Discover relevant services.
  – Compose services.
  – Invoke composed graph.
  – Publish composite services.
Triana (in a nutshell)

- A graphical PSE that allows users to compose and execute distributed workflows.
- Part of GridLab and GridOneD projects.
- Pluggable architecture - allows users to plug in components as required.
Triana User Interface
Triana Architecture

- Application (e.g. Triana)
- GAP Interface
  - JXTA
    - JXTA Discovery
    - JXTA Pipes
  - P2PS
  - Web Services
    - UDDI
    - Service
Service Discovery

- 3 use cases
  - Retrieve all services from UDDI
  - Retrieve certain services matching search parameters
  - Retrieve services by specifying WSDL location
- Currently focusing on UDDI.
  - Query UDDI—retrieve all WSDL URLs matching search criteria.
  - Retrieve WSDL docs, WSDLReader.
  - Populate toolbox.
  - Instantiate Triana unit (proxy for a service).
Retrieving by Specifying WSDL Location
Retrieving by Querying UDDI
Toolbox Populated with Available Services
Composing Services in Triana

- Drag and drop composition
  - Drag required service from toolbox and connect with pipes.
  - Connect local tools with Web services.
- Generate graph in BPEL4WS
  - For sharing, execution with a BPEL4WS compliant engine.
- Read in a BPEL4WS graph.
Drag and Connect Services as Required
Execute and Process Results
Invoking Services

- Dynamically invoke services using the Web Services Invocation Framework (WSIF).
- Communication between units taken care of by Triana engine.
- Possible to connect local tools with Web services
- Uses ObjectMarshaller – custom SOAP serializer for Triana data-types.
A Trivial Example: Translating The Bible from English into French
Work in Progress
Publishing Composite Services

• Use case:
  • The user wants to make the composite service available to others.

• Steps
  • Use a simple GUI “PublishToUDDI” wizard.
    • User provides relevant info. – network loc., services desc
  • Generate WSDL doc.
    • based on WSDL docs of component services
  • Upload to network location.
    • Backend Triana server
  • Publish to UDDI.
More Information

• Demo at the WeSC booth.
• www.trianacode.org
• www.gridoned.org
• Open Source project – get involved!
Welsh e-Science Centre
Canolfan e-Wyddoniaeth Cymru