JavaGAT Adaptor for UNICORE 6
Development and Evaluation
in the Project AeroGrid

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Outline

- The AeroGrid Project
- Data Management System DataFinder
- Integration of JavaGAT into DataFinder
- Summary
AeroGrid
Project Data

*Grid-based cooperation between industry, research centres, and universities in aerospace engineering*

**Runtime:** April 1, 2007 – March 30, 2010

**Website:** [http://www.aero-grid.de](http://www.aero-grid.de)
AeroGrid
Project Partner

German Aerospace Center (DLR)
- Institute for Propulsion Technology
- Simulation and Software Technology (Coord.)

MTU Aero Engines GmbH

T-Systems Solutions for Research GmbH

University of the Armed Forces, Munich
- Institute for Jet Propulsion
Background: Turbo Machinery Simulation Tasks

- Simulation of turbine component
  - Design (variants)
  - Optimization
  - Aero elasticity
  - Aero acoustics
  - Cooling
  - Complex geometries
  - Multistage components

- Use of the CFD-Code TRACE
  (Institute of Propulsion Technology)
DataFinder
Overview

DataFinder
➤ Efficient management of scientific and technical data
➤ Focus on huge data sets

Development of the DataFinder by DLR
➤ Available as Open Source Software

Primary functionality
➤ Structuring of data through assignment of meta information and self-defined data models
➤ Complex search mechanism to find data
➤ Flexible usage of heterogeneous storage resources
➤ Integration in the working environment
DataFinder
Basic Concepts

- Client-Server solution
- Based on open and stable standards, such as XML and WebDAV
- Extensive use of standard software components (open source / commercial), limited own development at client side
DataFinder Client
Graphical User Interfaces

User Client

Administrator Client

Implementation in Python with Qt/PyQt
DataFinder Configuration
Data Model and Data Stores

Logical view to data

- Definition of data structuring and metadata (“data model”)
- Separated storage of data structure / metadata and actual data files
- Flexible use of (distributed) storage resources
  - File system, WebDAV, FTP, GridFTP
  - Amazon S3 (Simple Storage Service)
  - Tivoli Storage Manager (TSM)
  - Storage Resource Broker (SRB)
- Complex search mechanism to find data
DataFinder Data Model
Mapping of Organizational Data Structures

- User
  - Project A
    - Relation
      - Simulation I
        - File 1
      - Simulation II
        - Experiment
  - Project B
  - Project C

- Attributes (metadata)
- Object (file)
Grid Application Toolkit (GAT)

- Provides a simple API to several grid applications
- Developed during the **Gridlab project**
  - mainly developed at Max-Plank-Institute for Gravitational Physics (Albert Einstein Institute),
  - at the Center for Computation and Technology at the Louisiana State University, and
  - at VU Amsterdam
- Implementation
  - C version
    - C++ wrapper
    - Python wrapper
  - **Java version**
JavaGAT Architecture

Application (e.g. DataFinder)

Grid Application Toolkit (GAT)

Local Adaptor
- Local Host
  - Single Processor
- SGE Adaptor
- PBS Adaptor

Grid
- Globus 2 Adaptor
- Globus 4 Adaptor
- gLite Adaptor
- UNICORE 5/6 Adaptor
  - UNICORE 5/6 Host

Cluster
- Globus 2 Host
- Globus 4 Host
- gLite Host
UNICORE JavaGAT Adaptor

- Developed at the Max-Plank-Institute for Gravitational Physics
- Based on HiLA
  - HiLA (High-Level API) supports the access to UNICORE 5 and UNICORE 6 via an easy and unique API.
  - It is not necessary to install components of UNICORE 5 or UNICORE 6 on the submitting (client) host.
- Implemented functionalities:
  - Pre and post staging
  - Job submission
  - Offline monitoring
Integration of JavaGAT into DataFinder Job Management System
Integration of JavaGAT into DataFinder
Accessing JavaGAT libraries from Python
Integration of JavaGAT into DataFinder

JPype

What is JPype?
- JNI-based wrapper
- Communication through interfacing at the native level in both Virtual Machines
- Full access to java class libraries

Project Website:
- http://jpype.sourceforge.net/
DataFinder in AeroGrid
Turbine Simulation
Turbine Simulation: Graphical User Interface
Turbine Simulation
Usage of External Applications

1. CGNS Infos / ADFview / CGNS Plot
2. TRACE GUI
3. Gnuplot

Integration with AeroGrid tools!
Summary

- Grid Application Toolkit (GAT) is used by applications to access grid services independently of grid middleware.

- GAT is being standardized within Open Grid Forum (OGF). Standard is called SAGA (Simple API for Grid Applications).

- UNICORE adaptor for JavaGAT allows access of UNICORE 5 and UNICORE 6 resources.

- DataFinder has been extended to use GAT-API calls for grid operations.
Thank for your attention!!!

Links
AeroGrid: http://www.aero-grid.de/
JavaGAT: https://gforge.cs.vu.nl/gf/project/javagat/
DataFinder: http://sourceforge.net/projects/datafinder/

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