Homework 4

for the course Parallel and distributed processing

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Question 1

Explore the Globus (GT4) library, describe it's architecture, how are the jobs executed and for which programming languages are supported.

The Globus GT4 architecture consists of the following components:

- Common Runtime which provides a set of fundamental libraries and tools which are needed to build both WS and non-WS services.
- Security which makes sure that the communications are secure, and it's based on the Grid Security Infrastructure.
- Data Management which allows us to manage large sets of data in our virtual organization.
- Information Services which includes a set of components to discover and monitor resources in a virtual organization.
- Execution management deals with the initiation, monitoring, management, scheduling and coordination of executable programs, usually called jobs, in a Grid.

GT4 supports the following languages: Java, C, C++ and Python.

Job lifecycle

On submission the job is waiting for resource allocation, then it runs, if the job is completed successfully it goes into done state, else it goes into failed state.

Question 2

Explore the ChinaGrid platform, describe it's architecture, how are the jobs executed and for which programming languages are supported.

ChinaGrid relies on the China Grid Support Platform, which is designed to provide grid toolkits for application developers and specific grid constructors. It aims to reduce development cost of ChinaGrid as greatly as possible. It follows WSRF specification and is developed based on the core of GT3.9.1.

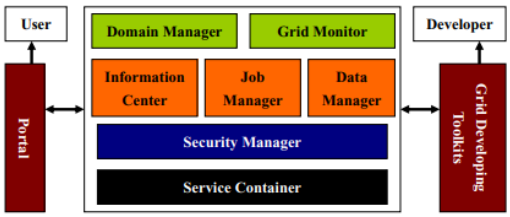

Figure 1: Actors and their modules

Question 3

How does the SETI@Home grid work? How a job is given to a computer? Is there monitoring mechanisms.

The SETI@home distributed computing software runs either as a screensaver or continuously while a user works, making use of processor time that would otherwise be unused.

The load balancers give tasks to all the computers which run the specialized software, and they can monitor various metrics for each node.

Question 4

Give examples for real grids that offer support for MPI and Hadoop.

MPICH-G2 uses a grid-enabled implementation of MSI.

Examples of hadoop applications are CenturyLink Cloud and RDFgrid.

Question 5

What is BIONIC? For which purposes it is used?

BIONIC is open-source platform which utilizes volunteer resources, for providing grid computing services.

It is used in: Engineering, Simulations, Data Mining, etc..

It is the largest grid in the world according to Guinness World Records.

Question 6

Explore and give examples of grids who offer support for research in atmospheric simulations, weather forecasting and climate changes research.

Examples of such grid systems are GridCure, GISS GCM ModelE, SMART Grid, and many more.

Question 7

Explore and give examples of standards for grid computing, and describe each standard.

- **Open Grid Services Architecture (OGSA)** is a set of standards defining the way in which information is shared among diverse components of large, heterogeneous grid systems.
- **OGSI - Open Grid Services Infrastructure** takes the statelessness issues (along with others) into account by essentially extending Web services to accommodate grid computing resources that are both transient and stateful.
- **Web Services Resource Framework (WSRF)** is a family of OASIS-published specifications for web services.

Question 8

Explore and give examples of distributed file systems.

The following file systems are examples of distributed file systems: Sun Microsystems' Network File System (NFS), Novell NetWare, Microsoft's Distributed File System, and IBM/Transarc's DFS.