Interactive task invocation in the Virtual Laboratory


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Virtual Laboratory overview

The Virtual Laboratory is a distributed environment, providing its users with the following functionality:

- Remote access to complex and expensive laboratory research equipment
- User-customized Dynamic Measurement Scenarios
- Digital Science Library
- Data storage and management
- Educational potential
- Workgroup collaboration tools
The Virtual Laboratory architecture

The Virtual Laboratory Environment

Access Layer
- Workgroup Environment
- Scenarios Management Module
- Laboratory and User Management
- Data Presentation

Grid Layer
- Authorization Center
- Global Scheduler
- Grid Gateway
- Data Management System
- Data Transportation

Monitoring Layer
- Local Scheduler
- User Accounting
- Monitoring System

Resources Layer

Grid Environment
- Grid Applications
  - VNC Server / Manager
  - GRMS
  - GridFTP
  - Monitoring and Discovery
  - Grid Information Service
Dynamic Measurement Scenarios

- definition of complex, multi-dimensional research experiment scenarios
- connection of experimental and computational jobs
- multiple conditions on jobs connections, determining the actual execution path
- description language for resources and connection dependencies

Example of a simple measurement scenario
Example of DMS diagram
Batch job scheduling

The Virtual Laboratory
Interactive tasks: Task submission

1. Task is sent to SMM module
2. Task is added to the DB
3. Task sent to Global Scheduler
4. Grid authorization in GAM
5. Accounting verification
6a. Task submitted to GRMS (via Gateway)
6b. Task submitted to GRMS (via Gateway)
7. Task submitted to GRMS (via Gateway)

- VLab portal
- SMM
- Global Scheduler
- Monitoring
- Grid Gateway
- Accounting
- GRMS
Interactive task: VNC session scheduling

1. GRMS checks with MDS for resources
2. GRMS verifies free slot for VNC session
3. GG is informed of status change (notification)
4. Task status updated in VLab DB
Interactive tasks: Establishing a secure connection

1. GRMS launches scheduled task
2. GRMS sends notification to Gateway
3. VNC Manager sends task info
4. Gateway sends info to Vlab DB (Monitoring)
5. User launches SVNC viewer
Interactive tasks: Prolonging the VNC session

1. User request from portal
2. Verification with GAM
3. Accounting verification
4b, 5. Request forwarded to GRMS
6. VNC session reservation
7, 8. GRMS Answer forwarded and updated in VLab DB
Interactive tasks: Ending the VNC session by the user

1. Request to end session forwarded to GRMS
2. End signal sent to VNC Manager
3. Update in the session DB
4. Task status updated in the VLab DB
Interactive tasks: Ending the VNC session by the system

1. GRMS sends end signal to VNC Manager
2. Update in the session DB
3. Task status updated in the VLab DB
4. Monitoring
Summary

Scheduling of the interactive task creates new possibilities for a wide range of Grid-based systems.

Invocation of user-interactive tasks can be divided into the following main steps:

- Task submission
- VNC session scheduling
- Establishing secure connection
- Ending the VNC session
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