Installation and Basic Configuration

GridWay

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1. Philosophy
2. Installation Directories and their Meanings
3. Required Software
4. Platform Notes
5. Configuration
6. Logging
7. Scheduling Policies
8. MAD Configuration
Philosophy

Roles

- User Policies (Urgent jobs, Shares…)
- Resource Policies (Usage, Fixed Priority…)
- Accounting

Site Users

GridWay

System Administrator

Globus Services
GRAM, GridFTP, MDS

Local Clusters / Resources

Other Sites

Other Partner Grids

Globus Services
GRAM, GridFTP, MDS

Resources
Philosophy

Alternative Interfaces

SSH
- Standard Deployment
- User access the GridWay host

GSISSH
- Standard Deployment + gsissh component
- User submit, control and monitor jobs from their computers

GridGateWay
- Standard Deployment + gridgateway component
- User access using any GRAM compatible client

Shared Homes
- Standard Deployment + NFS
- User submit, control and monitor jobs from their computers

Portal
- Standard deployment + portal
- User access through a Web Page
Philosophy

Interoperability

• GridWay is also a tool for interoperability

• Documents available on how to configure GridWay to interface:
  
  ▪ EGEE
  
  ▪ TeraGrid
  
  ▪ Open Science Grid

  that can be found in http://www.gridway.org/documentation/guides.php

• Interoperability achieved through the use of adapters.
Contents

1. Philosophy
2. Installation Directories and their Meanings
3. Required Software
4. Platform Notes
5. Configuration
6. Logging
7. Scheduling Policies
8. MAD Configuration
Installation Directories and their Meanings

• $GW_LOCATION/
  • bin/ • executables
  • doc/ • documentation (optional)
  • etc/ • gwd and default job template
  • share/ • license & usage examples (optional)
  • include/ • header files
  • lib/ • compiled libraries
  • libexec/ • wrapper and monitor scripts
  • test/ • test suite (optional)
  • var/ • log, port and log files
Installation Directories and their Meanings

Installation Procedure

- Uncompress gw_src.tar.gz
- Set $GW_LOCATION
- PATH = $PATH:$GW_LOCATION/bin
- ./configure --prefix=$GW_LOCATION
  - There are more options -- check them out in the manual
- make
- make install

√ Since June 2007, GridWay is included in Globus Toolkit 4.0.5+, and can be installed as part of Globus.
1. Philosophy
2. Installation Directories and their Meanings
3. Required Software
4. Platform Notes
5. Configuration
6. Logging
7. Scheduling Policies
8. MAD Configuration
Required Software

- **C Compiler**
  - Tested versions: gcc 3.4.2, 3.4.4, 4.0.3 and 4.1.2

- **Globus C Libraries**
  - globus_gram_client, globus_ftp_client and globus_gass_copy
  - $GLOBUS_LOCATION must be set

- **Globus JAVA Development Libraries**

- **J2SE**
  - Versions 1.4.2_10+ (Builds higher than 10) or 1.5.0+

- **GNU Make**

- **Sudo command**
  - Only required for multiple-user mode

- **Berkeley Database Library**
  - Version 4.4.20 (only required to compile the accounting module)
Contents

1. Philosophy
2. Installation Directories and their Meanings
3. Required Software
4. Platform Notes
5. Configuration
6. Logging
7. Scheduling Policies
8. MAD Configuration
Platform Notes

- **Fedora Core**
  - FC4 and Sun's Java 1.4.2: Upgrade to Java 1.5+
  - 32 bits JSDK binaries on AMD64 architectures

- **Debian Testing**
  - No known issues

- **Mac OS X**
  - No known issues
  - Tested on Mac OS X 1.4 (Tiger)

- **Solaris 10**
  - No known issues

- **Other Linux/UNIX flavours**
  - Should run smoothly
  - Have you tested GridWay on other flavours? Let us know!
1. Philosophy
2. Installation Directories and their Meanings
3. Required Software
4. Platform Notes
5. Configuration
6. Logging
7. Scheduling Policies
8. MAD Configuration
Overview

- `$GW_LOCATION/etc/gwd.conf`
  - Configuration options for GridWay daemon (GWD)

- `$GW_LOCATION/etc/sched.conf`
  - Configuration options for GridWay built-in scheduling policies

- `$GW_LOCATION/etc/job_template.default`
  - Default values for job templates

- `$GW_LOCATION/etc/gwrc`
  - Default environment variables for MADs

```
<option> = [value]
```
Connection Options

- **GWD_PORT**: TCP/IP port where GWD will listen for client requests.
  - TCP/IP port being used by GWD can be found at $GW_LOCATION/etc/gwd.port
- **MAX_NUMBER_OF_CLIENTS**: Max number of simultaneous client connections.

Pool Options

- **NUMBER_OF_JOBS**: Max number of jobs handled by GridWay.
- **NUMBER_OF_ARRAYS**: Max number of array-jobs handled by GridWay.
- **NUMBER_OF_USERS**: Max number of different users.

Intervals

- **SCHEDULING_INTERVAL**: Seconds between two scheduling actions.
- **DISCOVERY_INTERVAL**: Seconds between searches for new hosts on the Grid (Information Manager).
- **MONITORING_INTERVAL**: Seconds between host information updates (Information Manager).
- **POLL_INTERVAL**: Seconds between underlying Grid middleware queries for job state.
Middleware Access Driver (MAD) Options

- **IM_MAD**: Information Manager MADs.
- **TM_MAD**: Information Manager MADs.
- **EM_MAD**: Execution Manager MADs.
- **MAX_ACTIVE_IM_QUERIES**: Max number (soft limit) of active IM queries
  - Each query spawns one process

Scheduler Options

- **DM_SCHED**: Scheduling module.
Contents

1. Installation Directories and their Meanings
2. Required Software
3. Platform Notes
4. Configuration
5. **Logging**
6. Scheduling Policies
7. MAD Configuration
Logging

- `$GW_LOCATION/var/
  - `gwd.log`: System level log
    - MADs
    - Jobs (coarse-grain)
  - `sched.log`: Scheduler log
    - Fit scheduler policies to your organization needs
  - `$JOBID/job.log`: Detailed job log information
    - Details of job resource usage and performance
  - `acct`: Accounting information
    - `gwacct` accesses the databases (needs Berkeley DB Library version 4.4.20)
  - `.lock`: Prevents from running more than one instance of GWD
  - `gwd.port`: TCP/IP port listening for client connections
  - `globus-gw.log`: Used to encapsulate GridWay in a GRAM service
Contents

1. Philosophy
2. Installation Directories and their Meanings
3. Required Software
4. Platform Notes
5. Configuration
6. Logging
7. Scheduling Policies
8. MAD Configuration
Fixed Priority Policy (FP)

• Assigns fixed priority to each job (00 – 19).

• **User**: All jobs of a user are given a fixed priority.

• **Group**: All jobs of a user in the specified group are given a fixed priority.

• User priority prevails over group priority.

• Users can set priority of their own jobs without exceeding the limit
  • gwsubmit -p

• **Urgent Job Policy**
  • Grid administrator can set a fixed priority of 20 to a job.
    – This job becomes *urgent and bypasses all scheduling policies.*
Scheduling Policies

Jobs

Fair-Share Policy (SH)

- Allows to establish a dispatching ratio among users of a scheduling domain.
- Job submission considered, not resource usage.
- SH_WINDOW_DEPTH: Time intervals considered for evaluation.
- SH_WINDOW_SIZE: Duration of each interval (day).

Waiting-time Policy (WT)

- Allows to prevent low-priority jobs to starve.
- Jobs with long pending state will be eventually submitted to the Grid.

Deadline Policy (DL)

- Job **submission** deadlines may be specified.
- Job priority will be increased when deadline approaches.
- **DL_HALF**: When half of the max priority should be assigned (days)
Scheduling Policies

Resources

Fixed Resource Priority Policy (FP)

- Assigns fixed priority to each resource (01 – 99).
- **Example:** Resources of *intranet* are used more than those from *grid*.
- Priority 00 bans a resource.

Rank Policy (RA)

- Prioritizes resources suitable for a job from its point of view.
- Configured via the **RANK** attribute in job template.

Usage Policy (UG)

- Reflects behavior of Grid resources based on job execution statistics.
  - History contribution: During a period of time.
  - Last job contribution: Considering last job on that resource.
- **UG_HISTORY_WINDOW:** Days used for statistics in history contribution.
- **UG_HISTORY_RATIO:** Weight of history contribution statistics.
Scheduling Policies

Resources

Failure Rate Policy (FR)

- Exponential linear back-off strategy in case of resource failure.
- Resources with persistent failures are discarded (for a given user).
- **FR_MAX_BANNED_TIME**: Max time a resource can be banned.
- **FR_BANNED_C**: Constant that sets how fast the max banned time is reached.

RESCHEDULING POLICIES

A better resource is discovered.
A job has been waiting in the remote queue system more than a given threshold.
Requirements changed by application.
Performance degradation is detected.
Contents

1. Installation Directories and their Meanings
2. Required Software
3. Platform Notes
4. Configuration
5. Logging
6. Basic Troubleshooting
7. Scheduling Policies
8. MAD Configuration
MAD Configuration

Execution Driver

• Job **execution** and **management**.

• Provided MADs:
  – Pre-WS GRAM (>GT 2.4).
  – WS GRAM (GT 4.0).

• `$GW_LOCATION/var/gwd.conf`

  ```
  EM_MAD = <mad_name>:<path_to_mad>:<args>:<rsl|rsl_nsh|rsl2>
  ```

• **mad_name**: tag for identifying MAD. Useful for logging.

• **path_to_mad**: name of MAD executable. Must be placed in `$GW_LOCATION/bin/`.

• **args**: additional arguments to be passed to MAD.

• **rsl|rsl_nsh|rsl2**: Language used for describing job requests.
  – **rsl**: Pre-WS GRAM.
  – **rsl_nsh**: Pre-WS GRAM non-shared home directories (i.e. LCG).
  – **rsl2**: WS GRAM.
MAD Configuration

File Transfer Driver

- File **staging**, remote working **directory set-up** and remote host **clean up**.
- Provided MADs:
  - GridFTP server (>version 1.1.2).
  - Dummy Transfer driver (clusters without shared home).
- `$GW_LOCATION/var/gwd.conf`

```
TM_MAD = <mad_name>:<path_to_mad>:[args]
```

- **mad_name**: tag for identifying MAD. Useful for logging.
- **path_to_mad**: name of MAD executable. Must be placed in `$GW_LOCATION/bin/`.
- **arg**: additional argument to be passed to MAD.
MAD Configuration

Information Driver

• Host **discovery** and **monitoring**.

• Provided MADs:
  – Static host information data.
  – MDS2 with MDS schema (GT 2.4)
  – MDS2 with GLUE schema (GT 2.4 and LCG middleware)
  – MDS4 (GT 4.0)

• `$GW_LOCATION/var/gwd.conf`

```plaintext
IM_MAD = <mad_name>:<path_to_mad>:<args>:<nice>:<tm_mad_name>:<em_mad_name>
```

• **mad_name**: tag for identifying MAD. Useful for logging.
• **path_to_mad**: name of MAD executable. Must be placed in `$GW_LOCATION/bin/`.
• **args**: additional argument to be passed to MAD.
• **nice**: integer to be added to RANK (i.e. for prioritizing resources).
• **tm_mad_name**: File Transfer driver to be used by managed hosts.
• **em_mad_name**: Execution driver to be used by managed hosts.
Thank you for your attention!