WMS and Computing Resources

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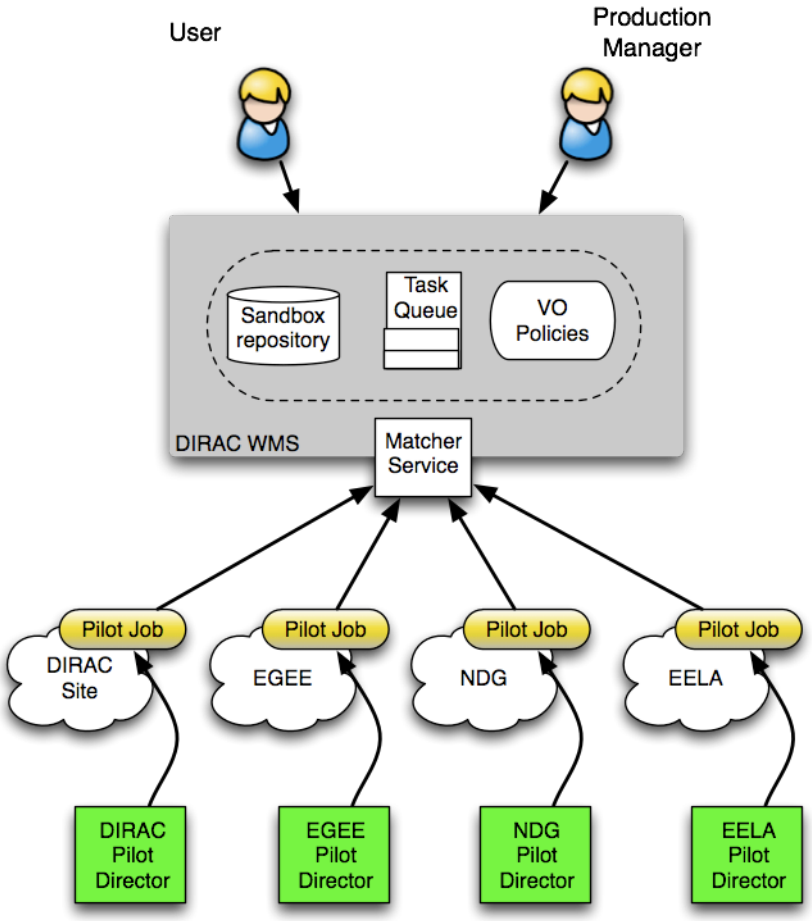
DIRAC
THE INTERWARE

Plan

- WMS developments
- Computing Resources developments
- WMS COMDIRAC interface
- Pilot 2.0 (*Federico*)

WMS Architecture

- Pilot based Workload Management
  - High user job efficiency
  - Suitable for usage with heterogeneous resources
  - Allowing application of community policies



Computing Element classes

- BatchSystems
  - DIRAC independent classes containing batch system clients all sharing the same interface:
    - Condor, GE, LSF, Torque, OAR, SLURM
    - Host
    - Globus
  - Parameters to the methods are passed as json encoded dictionaries
    - No more long lists of arguments passed to shell scripts
- BatchSystem code is dynamically wrapped into a executeBatch script shipped through SSH tunnel
  - Replaces xxxce scripts
- Can be used together with
  - LocalComputingElement – for submission to local batch systems
  - SSHComputingElement – for submission to remote batch system
    - through SSH or GSISSH tunnel

Computing Element classes

- CE configuration:

```
CEType = SSH
BatchSystem = LSF
SSHType = ssh ( or gsissh )
```

- SSH tunnel to cope with the sites where the batch system is not accessible from the gateway node:

```
SSHTunnel = ssh final_user@final_host
```

Tags in job matching

- General purpose matching mechanism
  - CE/Queue configuration:

```
Tag = lhcb_app_v1r0, green, WholeNode
MaxRAM = 4096
```

  - Job JDL:

```
…
Tag = { “green”,  “4GB”, “lhcb_app_v1r0”  };
…
```

Will match only CEs/Queues where ALL the tags are present

Tags in job memory requirements

- Used for job memory requirements
  - MaxRAM CE/Queue parameter automatically expanded into a list of tags 1GB, 2GB, …, *N*GB
  - MaxRAM value is automatically imported from BDII
    - Not consistently reported in the BDII
    - Per host rather than per job slot value
- Job (user application) memory consumption is reported in the pilot output
  - Max memory consumption over the user application life cycle
  - Measured by the Watchdog periodically (each 30 mins)
  - Should be reported in the job parameters as well

PoolComputingElement

- Suitable for multi-core or whole node slots
  - E.g. Virtual Machines
- Called in the JobAgent
  - Instead of InProcessComputingElement
- Presenting the number of cores to the Matcher as part of its description as a list of tags
  - Job can specify the number of cores requirement
- Keeps counter of already used cores
  - Job Agent can ask for extra jobs if there are free cores still available
- JobAgent still needs small modifications
  - Proper job parameters reporting

Bulk operations: splitters

- One of the main v6r14 features to be ported back from v7r0
  - Generalization of parametric jobs
  - Parametric jobs are a subset of the splitters family
- Server side job splitting
  - Splitter type is selected in the job description
  - WMS Client is receiving synchronously the master job ID at submission time
    - Can be used later to extract job IDs for the whole created job group
  - Bulk operations on Job Groups are applicable

Bulk operations: splitters

- Splitters are generic plugins
  - Discoverable in DIRAC extensions
  - VO's can provide custom splitters that can be requested in the jobs
- Splitters are invoked in a dedicated executor
  - Can be a lengthy operation
- Still to be done
  - More operations on job groups
    - Progress reports, special monitoring, special wep application to deal with job groups

COMDIRAC UI

- COMDIRAC is an alternative set of DIRAC command line tools
  - Mimicking UNIX or standard batch system (torque) commands
- Job submission

```
$ dsub –JobGroup=MyGroup /bin/hostname
6723938
```

- Job status lookup

```
$ dstat -a
JobID     Owner    JobName  OwnerGroup   JobGroup  Site         Status   MinorStatus             SubmissionTime
=============================================================================================================
31173575  atsareg  Unknown  biomed_user  MyGroup   LCG.SARA.nl  Done     Execution Complete      2015-05-27 22:20:44
31173581  atsareg  Unknown  biomed_user  MyGroup   ANY          Waiting  Pilot Agent Submission  2015-05-27 22:29:57
```

COMDIRAC UI

- Job output retrieval

```
$ doutput –g MyJobGroup –D output/directory
```

- COMDIRAC is quite popular in the user tutorials

- For more information see COMDIRAC Tutorial

  https://github.com/DIRACGrid/COMDIRAC/wiki/Job-Management

Pilot 2.0

- Pilot 2.0 is the main feature of v6r12
  - See Federico's presentation