Deployment of the CMS Software on the WLCG Grid.

Wolf Behrenhoff, Christoph Wissing (DESY), Bockjoo Kim (University of Florida), Stijn Blyweert, Jorgen D’Hondt, Joris Maes, Maikel Maes, Petra Van Mulders, Ilaria Villella (Vrije Universiteit Brussel), Luk Vanhelden (Universiteit Gent)

**CMS Computing Infrastructure**

The CMS computing infrastructure is distributed among many sites with multiple file servers and/or multiple node clusters of the same site.

- **Tier 1** - High-throughput computing, long storage of data
- **Tier 2** - Production, analysis
- **Tier 3** - MC production, user analysis

**CMSSSW on the Grid**

The CMS software is deployed to the grid sites centrally, unless otherwise requested by the site administrator. The deployment framework takes care of the following tasks:

- Parental sites: Central deployment of the CMS software (in RPM format) to the grid sites
- Child sites: Central deployment of the CMS software (in RPM format) to the grid sites

**Packaging of CMSSW**

- **Version** (v3.6.3)
- **Size**
  - 114,280 files and 4,197 symbolic links in 11,115 directories
  - 2.4 GB externals in 83 packages

- **Dependencies**
  - 5000 dependencies

- **Build time**
  - Less than 50 minutes

**Installing CMS Software (CMSSW)**

- **Gen** - Grid job submission
- **Install** - Software installation
- **CMSSW** on the Grid

**Automation and Grid Portal**

- **Job generator**
  - Create and submit jobs
  - Monitor deployment jobs and statistics

**Object Oriented Deployment Framework**

The deployment framework is written in well-documented, object oriented/Perl code in consists of 8 modules and several thousand lines of code.

**Monitoring Deployment Jobs and Statistics**

- **Deployment progress of CMSSW 3.6.3 part3**
  - Job queue: green
  - Job running

**CMSSW Removal Procedure**

The removal of CMSSW releases on grid sites is done in several steps. The removal procedure is implemented in the Job Generator, i.e. Delays care of the delay between removing the grid site and removing the dependencies.

**Usage dependencies**

- Site-wide dependencies are removed automatically
- Site-specific dependencies are removed manually

**CMSSW Software Release**

- **Release process**
  - Initial release: 3.6.1
  - Final release: 3.6.3
  - Total number of CMSSW releases: 0
  - Total number of software tags: 0
  - Number of releases with consistency check: 0
  - Number of releases with new features: 9
  - Number of releases with bug fixes: 0
  - Number of releases with deprecating: 0
  - Total number of users: 5

**Monitoring jobs**

- **Start**
  - Job started
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

**Additional Information**

- **CRON**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **MySQL**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **HMS**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Check**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Backup**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Update**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Install**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Remove**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Send**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

**Additional Details**

- **Savannah**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **CRON**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **MySQL**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **SAM**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Backup**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Install**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Remove**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed

- **Send**
  - Job running
  - Job failed
  - Job resubmitted
  - Job completed