Computing Report - LHCb Zurich

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CHIPP LHC Computing and Analysis workshop

Overview

- Computing Activities
- Middleware
  - Production   - Analysis
- Computing Experiences
- Resource Requirements
  - Tier-2   - Tier-3

Software Activities

- Silicon Tracker Project
  - Simulation software
  - Track search software

- Physics Studies
  - $B_s \rightarrow \phi\, \mu^+ \mu^-$
  - $B_s \rightarrow J/\psi\, \eta'$

- LHCb MonteCarlo Production
  - DIRAC development

Middleware - Production

- ## MonteCarlo Simulation Production
  - DIRAC site in Zurich

  DIRAC was developed for LHCb MC production mainly to overcome shortfalls of LCG. It is mainly written in python. In the meantime it has become also the platform to submit LCG and analysis jobs for LHCb. Resent versions have also Grid security software built in.

Key Features

- 4 parts: Services, Agents, Resources, User Interface
- Pull system - the jobs are pulled from the sites
- Optimised for high throughput
- Implementation: python script
    mainly platform independent
- Single configuration file for each site with defaults from the Information Services
- Redundancy: duplication, fail over, caching, watchdogs, wrappers; important for job monitoring, file transfer

LHCb Production - last 30 Days

	Manno	Zurich	
Jobs:	105	270	
CPU time:	1'161	4'359	hours
Events:	44'660	93'840	
Data (DST):	19	41	GByte

DIRAC - Some statistics

LHCb Production - last 12 Months

	Manno	Zurich	
Jobs:	560	2'557	
CPU time:	8'683	64'009	hours
Events:	182'109	1'587'214	
Data (DST):	138	632	GByte

Middleware - Analysis

- ## Silicon Tracker Project
  - mainly local resources for development and debugging

- ## Physics Studies
  - local resources
  - CERN lxbatch system

No new middleware software used.

No use of Phoenix Cluster.

Computing Experience

- ## Local installation
  - Installation and compilation problems, mainly for GRID part of the software (compiler, libraries and Linux versions).
  - Limited number of software releases.

- ## CERN lxbatch system
  - All software releases.
  - Sometimes long waiting times in the batch queue.

- ## GRID: DIRAC or LCG
  - Analysis job submission through DIRAC recently became available. Not yet very reliable - still holiday period.

Resource Requirements

- ## LHCb Computing TDR
  - ### Computing Model
    - 6 Tier-1's and 14 Tier-2's, 6 of them located in Russia. Therefore only 10 average sized Tier-2's are assumed.
    - MonteCarlo production is done at Tier-2's.
    - MonteCarlo simulation is stored at CERN and across Tier-1's.
    - Event reconstruction is performed at CERN and Tier-1's.
    - Stripping is distributed across CERN and Tier-1's.
    - Event analysis is foreseen mainly at Tier-1's.
    - Local analysis is performed at Tier-3's.

Resource Requirements

- ## LHCb Computing TDR

  - ### User Analysis Requirements – Assumptions:

    - 2 jobs / week
    - 80% jobs over 10^6 events
    - 20% jobs over 10^7 events
    - factor 5 in event size reduction
    - 5 active "Ntuples"

    $\Rightarrow$ per user for 2008:   5.6 kSI2k CPU   1.4 TB Disk

Resource Requirements

- ## LHCb Computing TDR
    - ### Efficiency Factors:
        - Scheduled CPU usage: 85%
        - Chaotic CPU usage: 60%
        - Disk usage: 70%
        - Mass storage usage: 100%

    $\Rightarrow$ per user for 2008:   9.3 kSI2k CPU   2.0 TB Disk

    - Stripped Data: about 200 TB Disk

Resource Requirements

- ## Strategy - LHCb Zurich group
  - Production:
    - local DIRAC installation   (LCG ?)
  - Analysis:
    - use Tier-1
    - use Tier-2 - CSCS Manno
    - use local Tier-3   (LCG or DIRAC ?)
      - at institute or at university ?   (Linux / network)
      - not clear if part of institute cluster
    - use local software installation if needed and available
      - local Linux version   (SuSE ?)

Resource Requirements

- ## Assumptions:
  - User requirements from the computing TDR
    CPU: 9.3 kSI2k   Disk: 2.0 TB   per user
  - Half the mount of disk resources for local Ntuple analysis as for running over LHCb data samples.
  - Invest into local Tier-2 instead into a Tier-1.
  - Share of resources over sites:

	Tier-1	Tier-2	Tier-3
CPU:	20%	50%	30%
Disk:	20%	50%	30%

  - Active users over the year in our group
    2008 – 2012:   about 5 FTE

Resource Requirements

- ## LHCb Resources Tier-2:

2008:	CPU	Disk
Production LHCb:	765 kSi2k	3 TB
Analysis Zurich:	35 kSi2k	7 TB + 150 TB
2009:	CPU	Disk
Production LHCb:	765 kSi2k	3 TB
Analysis Zurich:	52 kSi2k	10 TB + 200 TB
2010:	CPU	Disk
Production LHCb:	765 kSi2k	3 TB
Analysis Zurich:	70 kSi2k	14 TB + 250 TB

Resource Requirements

- ## LHCb Resources Tier-3 Zurich:

 | 2008: | | CPU | Disk |
  |---|---|---|---|
  | Analysis Zurich: | | 21 kSi2k | 5 TB |
  | 2009: | | CPU | Disk |
  | Analysis Zurich: | | 31 kSi2k | 7 TB |
  | 2010: | | CPU | Disk |
  | Analysis Zurich: | | 42 kSi2k | 10 TB |

- ## LHCb Resources Tier-3 Production:

  Small amount of resources for DIRAC development.

Dirac

- ## General
  - Few distributed core services, centrally managed
  - Agents managed by the sites
  - Pull system

- ## Services
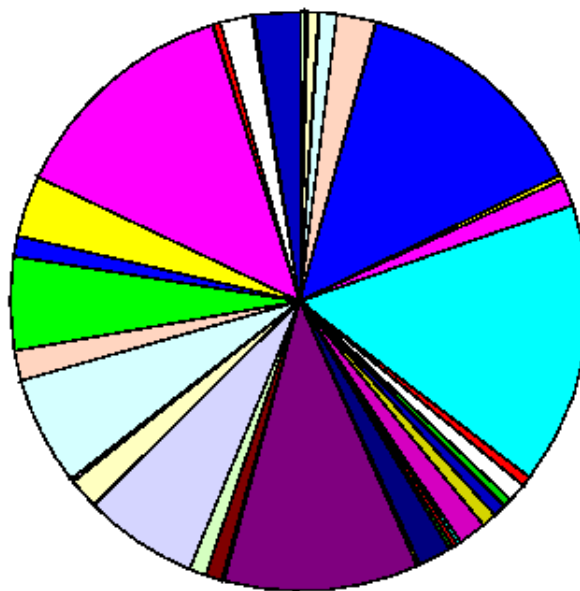 - Job receiver
  - Job database
  - Optimiser
  - Matchmaker
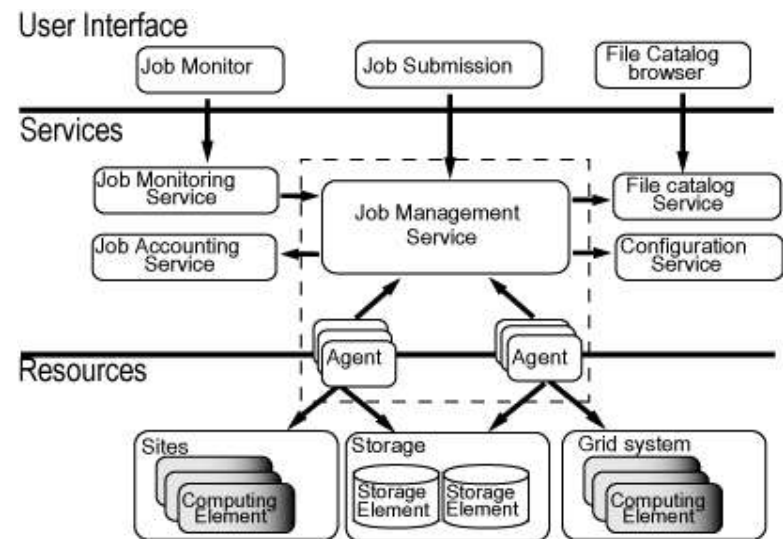
Dirac

- **Agent**
  - Job Request
  - Bookkeeping
  - Transfer

- **Resources**
  - Storage: gridftp, bbftp, sftp, ftp, http, rfio, local
  - Computing: LSF, PBS, NQS, BQS, SGE, CONDOR, GLOBUS, LCG

Dirac

Monitoring:

Total Running Jobs: 2624
DIRAC: 1%   LCG: 98%

Aug 25 2005, 11:30

DIRAC.IF-UFRJ.br	0.304%
DIRAC.Zurich-spz.ch	0.152%
DIRAC.Zurich.ch	0.571%
LCG.ACAD.bg	0.076%
LCG.BHAM-HEP.uk	0.952%
LCG.Bari.it	2.172%
LCG.Bologna.it	0.038%
LCG.CERN.ch	13.52%
LCG.CESGA.es	0.304%
LCG.CGG.fr	1.524%
LCG.CNAF.it	15.77%
LCG.CPPM.fr	0.571%
LCG.CSCS.ch	1.028%
LCG.CY01.cy	0.495%
LCG.Cagliari.it	0.724%
LCG.Durham.uk	0.838%
LCG.Firenze.it	1.562%
LCG.GR-01.gr	0.228%
LCG.GR-02.gr	0.266%
LCG.GR-03.gr	0.228%
LCG.GRNET.gr	1.829%
LCG.ICI.ro	0.190%
LCG.IN2P3.fr	10.82%
LCG.INTA.es	0.152%
LCG.ITEP.ru	0.914%
LCG.Imperial.uk	0.952%
LCG.Lancashire.uk	6.364%
LCG.Milano.it	1.714%
LCG.Montreal.ca	0.190%
LCG.NIKHEF.nl	6.097%
LCG.Oxford.uk	1.676%
LCG.PIC.es	5.221%
LCG.PNPI.ru	1.143%
LCG.Padova.it	3.429%
LCG.QMUL.uk	13.07%
LCG.RAL-HEP.uk	0.038%
LCG.SARA.nl	0.419%
LCG.Torino.it	1.753%
LCG.Triumf.ca	0.152%
LCG.USC.es	2.515%