LHC ATLAS Analysis Activity in Japan

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Contents

- Atlas Community in Japan
- Tokyo-LCG2 Site Report
- STEP09 Experience
- Analysis Model for Japanese Users
37 countries
170 institutes
2200 researchers

ATLAS Collaboration
ATLAS Collaboration in AP region

- Australia
  - 2 institutes, 26 members
- China
  - 4 institutes, 40 members
- Japan
  - 15 institutes, 108 members
- Taiwan
  - 1 institute, 19 members

22 Institutes
193 members
(5.7% of 3,394)
ATLAS Japan Collaboration

15 Institutes,
~110 Collaborators

Kyoto Univ.
Kyoto Univ. Edu.
Osaka Univ.
Kobe Univ.
Okayama Univ.
Hiroshima Inst. Tech.

KEK
Univ. Tsukuba
Univ. Tokyo
Tokyo Metro. Univ.
Tokyo Inst. Tech.
Waseda Univ.
Shinshu Univ.
Nagoya Univ.
LHC ATLAS Analysis Activity in Japan

Hiroshi Sakamoto (ICEPP, Univ. Tokyo), ISGC2010 Taipei Mar. 2010
New Computing Resources at Tokyo-LCG2

- **Computing servers:**
  - CPU: X5560 (2.80GHz)
  - 720 nodes of 8 cores/node: 5,760 cores
  - memory: 16GiB (2GiB/core, 240nodes), 8GiB (1GiB/core, 480nodes)
  - local disk: 300GB (mirror)
New Computing Resources at Tokyo-LCG2

- **Disk arrays:**
  - Total (physical) disk space: 5,760TB
  - 120 arrays of 2TB/HDD 24HDDs/array
    (2 x RAID6; ~4HDDs for parity)

- **Backbone network:** 10Gb/s
WLCG Pledge in 2010

- CPU 12,2000 HEP-SPEC06
- Disk 1,000TB (was 600TB in Oct.09)

<table>
<thead>
<tr>
<th>Japan, ICEPP, Tokyo</th>
<th>2009</th>
<th>2010</th>
<th>Split 2010</th>
<th>ALICE</th>
<th>ATLAS</th>
<th>CMS</th>
<th>LHCb</th>
<th>SUM 2010</th>
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<tbody>
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<td>CPU (HEP-SPEC06)</td>
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<td>12000</td>
<td>Offered</td>
<td>12000</td>
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<td>5%</td>
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<tr>
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<td>Offered</td>
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<td></td>
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<td></td>
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<td>% of Total</td>
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<td>3%</td>
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<td>3%</td>
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<td>2000</td>
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STEP09
Scale Test for the Experiment Program 09

- Coherent exercises by 4 LHC experiments
- ATLAS operations
  - Data distribution (RAW→ESD→AOD)
  - Reprocessing at Tier1s (Tape→Disk)
  - MC production at Tier2s
  - Chaotic user analyses
  - Stress tests on software infrastructure
Site Configuration during STEP09

- Tier-2 dedicated to ATLAS
- SE:
  - DPM 1.7.0
  - 13 disk servers + 1 head node
- WN:
  - 4 cores/node
  - 120 nodes (480 cores)
Visible T2 Site Resources

STEP09 Job Efficiency at T2

- No strong correlation between job efficiency and storage resource size
- Which is ok!
- N.B. Job efficiency is (success/total) not (cpu/wall)
Tokyo LCG2 in STEP09 Jobs

H. Matsunaga, STEP09 Post-mortem workshop Jul. ‘09
Local Area Network Throughput

Aggregate network traffic of disk servers

- Inbound: ave: 2359.5 MB/s max: 6322.8 MB/s
- Outbound: ave: 48.7 MB/s max: 128.3 MB/s

Network throughput vs. Concurrent WMS jobs

- Network traffic (MB/s)
- Concurrent WMS jobs
User Analysis Model

- Jobs are distributed to data sites
  - GANGA/PANDA framework
  - DQ2 data management
  - Local analysis on ROOT

- Databases
  - sqlite
  - oracle
  - frontier/squid
Databases for offline analysis

For Monte Carlo Simulation

Database Release

SQLite Files

File Catalog

POOL Files

For Real Data Analysis

Frontier Server

Squid Server

Oracle Server

SQLite Files

POOL File Catalog

ROOT Files

Common LCG Software

COOL CORAL

POOL

ATLAS Core Database Software

IOVDbSvc

POOL Token

PoolSvc

Athena Algorithms
Big improvements with using squid for the remote sites.
All the jobs using the same datasets, so it should be the maximum performance gained.
Physics Analysis Activities

- Plenary
  - Detector Performance
  - Supersymmetry
  - Exotics/Extra Dimension
  - Higgs
  - Standard Model

- Working groups
  - Supersymmetry
  - Standard Model
  - Higgs and EWSB

LHC Physics Workshop Apr. 1-3, 2009, Tokyo
Japanese group’s (short term) strategy

- gLite operation experiences
  - High energy physicists are doing this
  - Very few companies can support operation

- Limited personpower. We want to minimize
  - Operation of grid sites
  - Maintenance of ATLAS software installation

- Our choice
  - Tokyo-LCG2 as Tier2/Tier3
  - Institute resources as Tier4(?)
  - Good connectivity to Tokyo (RTT<20ms, BW>1Gbps)
Analysis Infrastructure in Japan

- Tokyo-LCG2
  - Grid resources including UI
  - Local resources for Japanese collaborators
- Institutes
  - UI/PANDA/DQ2 clients
  - ROOT as analysis platform
- User desktop
  - Remote login
  - ROOT
Summary

- **LHC computing grid is well tested**
  - Successful STEP09 campaign
  - Even at far distant sites like Tokyo
- **Tokyo-LCG2 in good shape**
  - Very efficient operation (~98%)
  - High throughput from Lyon (~300MB/s)
  - More users on the grid (>60)
- **Analysis activities in Japan**
  - Accelerated in these months
  - Real data arriving – exciting days
Visible T2 Site Resources II

#events Processed vs SE size

- No strong correlation between storage size and number of events analysed
- Which is bad!
Job Efficiency = CPU time/Wall clock time

MC Production = CPU bound
Analysis = IO bound