DIRAC ↔ Cloud for Belle II

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Why?

- Reduce TCO of Belle II computing...
Previously

Monitor queues and starts and stops instances as necessary

SQS

EC2

CloudMC

CloudMC

CloudMC

CloudMC

CloudMC

S3

XML

Ingestor

User submits scripts

Users

files

script

Retrieval

User retrieves determines which files to retrieve and uses script to download them from S3
10 Million Events

- 10,000,998 events generated.
- 0.001% of time wasted due to failures
- 18 hours on wall clock
- 100 instances of 8 cores (800 cores in total)
- 906 Instances hours cost $USD 724.80
- 234 GB data files transferred to KEK $39.78
- Total cost per $10^4$ events = $0.76

VWO PowerEdge 1950 8-core box (with electricity 100% utilization) ~ $0.76
... but there was problems ... 

- Lifeguard was under strain
  - The PoolManager crashed within 6 minutes of the instances starting
  - Poolmanager erroneously terminated instances running jobs
  - Instances failed to contact SQS
- FUSE module was flaky
- S3 couldn't sustain data rates
- Difficult to extract statistics, logs
- No grid integration
… cloud integration?
Why?

• Less dependence on Amazon API
• DIRAC has proven scale
• Modularity of code makes it easy to add new backend
• Takes care of:
  – job & data management
  – Authorisation & accounting
• Pilot model
DIRAC Workload Management
- The cloud becomes a DIRAC site
- On VM load, connects to Configuration System
- On-cloud DIRAC SE & File Catalogue
  - Fast stage-out
  - Avoids S3 charges
- No longer need SQS, S3
Jobs running on the cloud

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<th>Status</th>
<th>Minor Status</th>
<th>Application Status</th>
<th>Site</th>
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<th>LastSignOfLife [UT]</th>
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Next-up

- Finishing software
- Scale testing
  - Long test
  - Peak test
- Non-production ("user") use
  - Billing?
Questions?

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