Best of Breed HPC Tools on Torque & Slurm

CUG 2017  Nick Ihli

5/11/13
Moab Intelligence Engine + Torque

Moab HPC Suite
- 15+ years battle tested
- Patented (70+ Patents)
- Mimics real-world decision-making

Multi-dimensional Policies Optimize Across:
- Workload/application requirements
- Priorities and SLAs
- Time (real-time and future, predictive)
- Heterogeneous resources

- Torque – Open Source Resource Manager
  -Executes decisions made by Moab
Product Offerings

Flexible Choice

Value Added Features / Applications

- Viewpoint (Submission/Admin Portal)
- Group Sharing
- Advanced Resource Mgmt
- Accounting
- Power
- Advanced Workflow
- Wide Area Grid
- Elastic Computing
- Remote Visualization
- Reporting

HPC Suite

Nitro
High Throughput
Moab/Torque Unification

- **Moab directly communicates with Torque node daemons (pbs_mom)**
- **A faster communication framework**
  - Faster:
    - Submission
    - Job start and teardown
    - MOM communication
    - Performance at scale
- **Eliminates race conditions**
- **Simplifies Everything!**
  - Synched JobIDs
  - Configuration
  - Debugging
  - Etc.
Enhanced Power Management

- **Workload-aware Power Management**
  - Reduce power state of idle nodes
  - Maintain high response times with green pool buffer policy
    - Set quantity of available nodes in power-ready state “buffer pool”
    - Dynamically increase power state of power reduced nodes to maintain “buffer pool” target

- **Per Application CPU Speed Throttling**

  *(New Initiative with Department of Energy)*

- **System Power Cap, Floor and Power Ramp Management**
  - Dynamic control over system energy consumption
    - Conform energy use to electrical power contracts
  - Job-level energy use data
Other Notable Features

- Datawarp Integration
- KNL
- Docker Integration
- Singularity Integration
  - Coming the summer
Get the best-of-breed HPC tools on your choice of scheduler. “Open Platform” enables organizations to unify the user, admin, and manager experience across multi-scheduler environments on a per-service basis.

- **Best-of-Breed HPC Tools:**
  - Viewpoint Submission Portal
  - Remote Visualization
  - Reporting & Analytics
  - Nitro High Throughput
  - Moab Accounting Manager
  - Grid Management

- **Cross Scheduler/RM Support:**
  - Torque
  - Slurm
  - SGE/UGE
  - PBS Pro
  - LSF
Viewpoint
Ease-of-use Driven Productivity

User

▪ Increase productivity of end users with **easier** and **faster portal-based submission** of tasks/jobs
▪ Expand HPC user base to **include non-IT skilled personnel**
▪ **Automate best practices** information into submission process in order to speed submission, reduce error and optimize processing speed

Admin

▪ Enable admins to **manage user requests with less time** due to best practices based templates, and user feedback which **helps users help themselves**
▪ Admins gain quick **visibility** into system and workload status and workload **troubleshooting**
Viewpoint
Ease-of-use Driven Productivity

- End User Submission Portal
- Application Template Form Builder
- Self-help Oriented Job Details
- Simple Integrated File Manager
- Administrative Reporting and Workload Status Tracking
- Resource Job Timeline
Remote Visualization

Avoid purchasing expensive licenses and GPU’s for all worker, by rendering applications remotely and visualizing locally through an integrated portal.

- **Improve Productivity**
  - Avoid waiting for file transfers
  - Collaborate on shared projects
  - Improve access to high value resources

- **Save Resources Integration**
  - Avoid purchasing individual high-end desktops
  - Share memory resources, accelerators, etc.
  - Share expensive application licenses

- **Improves Manageability**
  - Easier to launch, find, and manage sessions from submission portal
  - Schedule, prioritize, and guarantee SLAs between users and groups
  - Integrate into full HPC workflows, including notifications
  - Administrative controls over usage, security, sharing, etc.
Nitro High Throughput

Accelerate launch times for short computing jobs by scheduling only once for large sets of jobs. At 500 tasks/second/core, Nitro eliminates bottlenecks and puts high throughput performance into your computing system.

- Supports thousands to millions of tasks
- Provides simple user job submission
- Sessions can grow and shrink
- Integrates with all common scheduler

Applicable Workloads:
- Job arrays
- Regression tests
- Embarrassingly parallel workloads like Blast, Monte Carlo, and mass simulations
- Anytime there are thousands and thousand of short run jobs
**Gain insights** by streaming resource usage and workload data into **custom reports** and **personalized dashboards**. This drives improved resource utilization and efficiency, **better capacity planning**, and greater alignment of resources to mission objectives.

- **Stream** data with lightning-fast Apache Spark processing engine and flexible Mongo database.
- **Process** data to ensure relevance with traditional analytical functions (group, reduce, join, filter, etc.)
- **Visualize** aggregated information in chart-based reports or structured tables.
- **Monitor** key indicators in customizable dashboards.
- **Drive** better decision-making & policy enforcement.
Reporting & Analytics

1. Data Stream Pipelines
2. Aggregated Views
3. Chart or Table Reports
4. Custom Dashboards
Public Grant Program
Buy Support – Get Licenses Free

**Eligibility:** Government and Education Organizations

- Education organizations must be diploma issuing entities
- Systems must not be used by commercial organizations (e.g. hosting)

**Included Products:** Moab HPC Suite, Viewpoint Submission Portal on Torque or Slurm
Engage Us

**Nick Ihli**
- nihli@adaptivecomputing.com
- +1 801 717 3736

**Stuart Wright**
- swright@adaptivecomputing.com
- +1 801 717 3371