Los Alamos National Laboratory Site Report

One Year Post Migration

Slurm Users Group 2018

Joseph ‘Joshi’ Fullop
26 September 2018
<table>
<thead>
<tr>
<th>System</th>
<th>Node Count</th>
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<tr>
<td>Lightshow</td>
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<td>Fog</td>
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<td>Trinity</td>
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Migration to Slurm mid 2017

• Transition Issues
  – Binding Affinity
    • Getting the combination of the job request and MPI to deliver the desired layouts
  – Dependency Changes
    • Code rebuilds, Packaging, Configuration Management
  – User Education
    • Training Classes
    • JIT Training scripts
      – NO wrapper scripts!

• Integration Efforts
  – JobComp/script creation and Slurm modifications
  – YETI: Multiple security zones
  – SDBM: Synchronization of accounts/projects/allocations/etc. with LDAP
Hurdles

• Large number of node state changes flooded slurmdbd and crashed slurmctld

• DataWarp staging
  – Needed implementation
  – SchedMD and Cray collaborative effort

• OOM Message deliverance
  – cgroup work
  – Also a collaboration of SchedMD and Cray (fun with hugepages)

• Fairshare Edge Cases
  – Accounts with lots of users and equal weights (1)
  – Fairshare = Parent helped

• Jobs stuck in COMPLETING
  – Potentially already fixed.

• Jobs not being considered for launch
  – Found during resiliency code of relaunching a node-failed job with a spare already in the allocation.
  – May be the same root cause as a rare occurrence that we were not able to reproduce.
  – Unstick the job by changing an attribute (update to set an attribute to the same thing does not work)
User Feedback

• **Immediately High Utilization**
  – Good Training & Documentation

• **Efficient Scheduling**
  – We had to re-tune a number of things on the system

• **Very Fast Response Times**
  – Some patches were same day.

• **Syntax varies between command line tools**
  – (scontrol, srun, salloc) vs (sacct, sacctmgr, sreport)
Upcoming Investigations

- Federated Scheduling
  - Special purpose clusters
- Database Co-Location / Single slurmdbd
- File system aware scheduling
- PMIx
- Workflow Visualization/Monitoring
Upcoming features we are anxiously awaiting

• True Heterogeneous jobs
  – Trinity is half Haswell and half KNL architecture.

• TRES scheduling

• Priority Accrual
  – Limits on the number of jobs that grow in priority over time per user.
  – Some users flood the queue and overwhelm others with age points, even with caps
Wishlist

• Account for which scheduling method a job was launched.
  – Main vs Backfill vs Submit
  – Very valuable in mitigating users complaining about utilization of others

• Accounting for last reason a job was blocked
  – Allows us to monitor and appropriately modify policy

• Accounting for which constraints a job required
  – Searchable and available to jobcomp/script

• Sortable SPRIO

• Job dependencies in federated scheduling
  – For managing workflow utilizing specialized clusters
Wishlist continued

• **Accrued Eligible Time**
  – How much time was a job eligible vs (submit – start).

• **scancel propagation for stage-out (DataWarp)**
  – Especially useful for failed/aborted jobs.

• **Current Backfill Opportunity**
  – “If I were to submit a job of X size, how long could it run?”

• **Job Pending state for nodes**
  – sinfo would show how many nodes are waiting on enough other nodes to launch the next priority job.
  – Disambiguate ‘idle’.

• **Auto sbcast of dependent files**
  – With obvious limitations.
The End

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