Monitoring HTCondor with the BigPanDA monitoring package

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Introduction

- PanDA = Production and Distributed Analysis

PanDA System Overview

T. Maeno, PanDA's Role in ATLAS Computing Model Evolution, ISGC2014
Evolution: The Next Generation

➢ US DOE ASCR and HEP funded project: *Next Generation Workload Management and Analysis System for Big Data*, code name: **BigPanDA**

- 3 year project since September 2012 to evolve PanDA Workload Management System beyond ATLAS and LHC
  - Factorize core
  - Leverage intelligent networking
  - Extend scope
  - **Monitoring** and usability
BigPanDA Monitoring

- BigPanDAmon package based on **django** framework
- Modular, easy to bring up a new project/VO
- Clear separation between data access and visualization
  - Provide REST APIs to access object information
- Runs on top of Oracle or MySQL DB backends
- Documentation for developers: describes configuration and modules
- Deployed with RPMs
HTCondor Monitoring

- HTCondor is an essential foundation technology for PanDA
  - the engine for PanDA's resource provisioning system (pilot factory)
- Integrating HTCondor monitoring into PanDA's successful monitoring system can provide value for both
- HTCondor monitoring has been implemented as a first application of BigPanDAmon's modular architecture
BigPanDA Monitoring Modules

BigPanDA monitoring site

BigPanDAmon-core
- Modules
  - PanDA job
  - Resource
  - HTCondor job
- UI elements
  - REST API
  - Table
  - Plot

Experiment/Project - specific
- Modules
  - e.g. a Model which inherits from core PanDA job
- Common
  - Settings
  - Static
  - Templates
  - Media
Monitoring Traffic

- Condor sched lib plugin to send updates to PanDA mon
  - Asynchronous w.r.t. scheduler
  - More technical details in Todd Tannenbaum's talk

- Connection to PanDA API with frequency 1 Hz
  - Bulk Update, Add, Flag deleted
  - Avg. 2-5 records/s, Peak: 100s records/s
  - Currently HTTPS (X509) authentication

- Updated information available in the monitoring
PanDA – HTCondor REST API

• Bulk-operation API resource

<table>
<thead>
<tr>
<th>Resource</th>
<th>HTTP verb</th>
<th>Purpose</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/v2/api-auth/htcondor/jobs/</td>
<td>POST</td>
<td>create</td>
<td>Bulk create new HTCondor job.</td>
</tr>
<tr>
<td></td>
<td>GET</td>
<td>read</td>
<td>Bulk list HTCondor jobs.</td>
</tr>
<tr>
<td></td>
<td>PUT</td>
<td>update</td>
<td>Bulk update HTCondor jobs.</td>
</tr>
<tr>
<td></td>
<td>DELETE</td>
<td>delete</td>
<td>Bulk flag of records which were deleted from the HTCondor.</td>
</tr>
</tbody>
</table>

• Single job API resource is not needed for now.
  • Perhaps we will need a single-job GET later on.

Nice and useful reading: [http://apigee.com/about/api-best-practices/api-design/ebook](http://apigee.com/about/api-best-practices/api-design/ebook)
## HTCondor Mon – list jobs

<table>
<thead>
<tr>
<th>Details</th>
<th>Owner</th>
<th>WMS ID</th>
<th>Global Job ID</th>
<th>Submitted</th>
<th>Run time</th>
<th>Status</th>
<th>Guessed status</th>
<th>Priority</th>
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</thead>
<tbody>
<tr>
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<td>1792</td>
<td>aipanda002#177326.0#1385140808</td>
<td>2013-11-22T12:20:08Z</td>
<td></td>
<td>R</td>
<td></td>
<td>0</td>
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<td>0</td>
</tr>
</tbody>
</table>
Filter table!

- Filter by all visible columns
- Bookmark filtered view, send to a collaborator
## HTCondor Mon – job details

<table>
<thead>
<tr>
<th>Owner</th>
<th>WMS ID</th>
<th>Global Job ID</th>
<th>Submitter</th>
<th>Priority</th>
<th>Run time</th>
<th>CPU time</th>
<th>Manager</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>apf</td>
<td>1792</td>
<td>aipanda002#177326.0#1385140808</td>
<td>2013-11-22T12:20:08Z</td>
<td>R</td>
<td>null</td>
<td>0</td>
<td>manager</td>
<td>/etc/apf/runpilot3-wrapper-oct02.sh</td>
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<tr>
<td>apf</td>
<td>1792</td>
<td>aipanda002#160997.29#1383646907</td>
<td>2013-11-05T05:21:47Z</td>
<td>R</td>
<td>null</td>
<td>0</td>
<td>manager</td>
<td>/etc/apf/runpilot3-wrapper-oct02.sh</td>
</tr>
</tbody>
</table>

**Job Details**

- **Owner**: apf
- **WMS ID**: 1792
- **Global Job ID**: aipanda002#177326.0#1385140808
- **Submitted**: 2013-11-05T05:21:47Z
- **Priority**: 0
- **Run time**: null
- **CPU time**: 0
- **Manager**: manager
- **Command**: /etc/apf/runpilot3-wrapper-oct02.sh

**Job Execution**

- **p_start_time**: null
- **p_end_time**: null
- **p_modif_time**: null
- **p_schedd**: aipanda002
- **p_stdout**: http://aipanda002.cern.ch:25880/2013-11-05/CERN-P1_OpenStack/160997.29.out
- **p_stderr**: http://aipanda002.cern.ch:25880/2013-11-05/CERN-P1_OpenStack/160997.29.err
- **goodput**: -1
- **cpu_util**: -1
- **mbps**: null
- **read**: null
- **write**: null
- **seek**: null
- **xput**: null
- **bufsize**: 524288
- **blocksize**: 32768
Monitoring Wish list

- HTTPS → HTTP with IP/host restriction of agents
- Schema
  - PanDA mon side: use classads attributes (schema-less)
  - Condor side: minimize data translation
- RPCs
  - Provide list of compulsory/available attributes in API
- Scalability
  - Leverage experience with Redis
  - Webserver performance tuning (Apache2/WSGI, nginx/gunicorn)
- Summaries
  - Provide parameterized summaries/plots beside job lists
Summary

➢ Fruitful collaboration between PanDA and HTCondor teams!
➢ First version of the HTCondor monitor developed
  ✔ API v1 used on a production machine at UW cluster
➢ More updates yet to come.
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