Testing framework and monitoring system for the ATLAS EventIndex

Elizaveta Cherepanova\textsuperscript{1*}, Elizabeth Gallas\textsuperscript{2}, Fedor Prokoshin\textsuperscript{3}, Miguel Villaplana Pérez\textsuperscript{4}

1: University of Amsterdam/Nikhef, 2: University of Oxford 3: JINR Dubna, 4: IFIC Valencia

CHEP2023
May 8-12, 2023

*elizaveta.cherepanova@cern.ch
The ATLAS EventIndex (EI) is the global catalogue of all events collected, processed or generated by the ATLAS experiment at the CERN LHC accelerator.

The system provides:

- A way to collect and store event information using modern technologies
- Various tools to access this information through command line and web services
- An indexing system that points to these events in millions of files scattered through a worldwide distributed computing system

More information in the posters:
- Deployment and Operation of the ATLAS EventIndex for LHC Run 3
- Query Service for the new ATLAS EventIndex system
- HBase/Phoenix-based Data Collection and Storage for the ATLAS EventIndex
The complexity of the EventIndex system requires the monitoring of its sub-systems and processes.

**Producer:**
- collects data about status and the performance of the system (~15k values a day)
  - scan of the logs and hdfs space
  - REST requests
  - analysis of the web-pages
- transfer data to the InfluxDB through the HTTP requests

**Viewer:**
- grafical presentation of the data – Grafana
- every EI sub-component has a status dashboard
- important parameters of each module have dedicated dashboards

- Scheduler (acrontab) controls data collection and processing
- The status of each EI service is also fed into the global ATLAS service monitoring view
Monitoring system

Functional schema for the monitoring system of the EventIndex components

status of the EventIndex processes

status of functional and performance tests

status of the computing infrastructure
Functional tests

Test event picking in all newly-indexed samples both locally and via PanDA

Dataset indexation is triggered automatically when a dataset is marked as complete in AMI (the ATLAS metadata catalog)

The test runs twice per week: Monday and Thursday:

• scan EventIndex catalog and get a list of datasets indexed between 24 hours and 4 days ago

• for each new sample found
  o get reference to file (GUID) and the runNumber-eventNumber pair of a random event in the dataset
  o test event lookup locally using CLI and runNumber-eventNumber pair
    • If unsuccessful log sample name
    • If successful send 2 GRID jobs, which pick the given event
      ▪ Using the runNumber-eventNumber pair
      ▪ Using the runNumber-eventNumber pair and the GUID
  o Send the complete list of samples that failed local event lookup to EventIndex Ops mailing list

➢ Check the functionality of the performance chain
Monitoring the functional tests

- Check test jobs' status in PanDA:

<table>
<thead>
<tr>
<th>Task ID</th>
<th>Request ID</th>
<th>Task name</th>
<th>N files total</th>
<th>N files done</th>
<th>N files failed</th>
<th>Status (JEDI)</th>
<th>Duration days</th>
<th>Task logged status</th>
<th>Jobs failure, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>32869647</td>
<td>701618</td>
<td>group.proj-evind.EPRAW.NG.v0.data22_13p6TeV/00404613.physics_ZeroBias.merge.AOD.f1231_m2153.20230327/</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>done</td>
<td>0.04</td>
<td>0</td>
</tr>
<tr>
<td>32869646</td>
<td>701617</td>
<td>group.proj-evind.EPRAW.YG.v0.data22_13p6TeV/00404613.physics_ZeroBias.merge.AOD.f1231_m2153.20230227/</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>done</td>
<td>0.13</td>
<td>0</td>
</tr>
<tr>
<td>32869645</td>
<td>701616</td>
<td>group.proj-evind.EPRAW.NG.v0.data22_13p6TeV/00404613.physics_Main.merge.AOD.f1231_m2153.20230327/</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>done</td>
<td>0.16</td>
<td>16.67</td>
</tr>
<tr>
<td>32869644</td>
<td>701615</td>
<td>group.proj-evind.EPRAW.YG.v0.data22_13p6TeV/00404613.physics_Main.merge.AOD.f1231_m2153.20230237/</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>done</td>
<td>0.03</td>
<td>0</td>
</tr>
<tr>
<td>32869643</td>
<td>701616</td>
<td>group.proj-evind.EPRAW.NG.v0.data22_13p6TeV/00404613.physics_Main.deriv.DAOD_PHYS.f1231_m2153_p5442.20230327/</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>100</td>
<td>done</td>
<td>0.16</td>
<td>0</td>
</tr>
</tbody>
</table>

- In contact with PanDA developers to improve error logs

```
Something went wrong while the log file downloading. [group=znf4553-896g-4f17-9819-o23675434dfl, scopengroup=proj-evind, fnamegroup=proj- 
evind.EPRAW.YG.v0.data22_13p6TeV/00404613.physics_BphsDelayed.merge.AOD.f1231_m2153.20230309.0.log.37213754.000000, log.tgz]
File download failed with command [export RUCIO_ACCOUNT=atlas; export X509_USER_PROXY=~/atlas/sx09_upu25606]; export ATLAS_LOCAL_ROOT_BASE=/cvmfs/atlas.cern.ch/repo/ATLLocalRootBase; source $ATLAS_LOCAL_ROOT_BASE/user/atlas kölnSetup.sh -s;source $ATLAS_LOCAL_ROOT_BASE/packageSetups/localSetup.sh rucio; rucio download --dir=/opt/prod/pypaths/core/media/filebrowser/znf4553-896g-4f17-9819-o23675434dfl group.proj-evind/group.proj- 
evind.EPRAW.YG.v0.data22_13p6TeV/00404613.physics_BphsDelayed.merge.AOD.f1231_m2153.20230309.0.log.37213754.000000, log.tgz]. Output: [7]setup ...
```

8-12 May 2023 - CHEP2023
E. Gallas
Monitoring the functional tests

- Overall view of test jobs’ status over time in Grafana

**EventIndex Monitoring / ATLAS EI Event Picking Tests**

**EVENT PICKING TESTS**

- Number of tasks: 16, done: 16
- Tasks failed: 2
- Tasks running: 3
- Tasks finished: 12
- Tasks submitted: 20
- Tasks registered: 20
- Tasks aborted: 9
- Tasks broken: 1

**STATUS**

- 2023-03-27 08:00:00 tasks: 16, done: 16
- 2023-03-23 13:00:00 tasks: 20, done: 20
- 2023-03-23 07:00:00 tasks: 15, running: 3, done: 12
- 2023-03-21 07:00:00 tasks: 20, done: 20
- 2023-03-20 13:00:00 tasks: 19, done: 19
- 2023-03-20 07:00:00 tasks: 16, done: 16
- 2023-03-16 13:00:00 tasks: 20, done: 20
- 2023-03-16 07:00:00 tasks: 9, done: 9
- 2023-03-13 13:00:00 tasks: 20, done: 20
- 2023-03-13 07:00:00 tasks: 17, done: 17
- 2023-03-09 19:00:00 tasks: 20, done: 18, Failed: 2
- 2023-03-09 13:00:00 tasks: 19, done: 17, Failed: 2
- 2023-03-09 07:00:00 tasks: 10, done: 10, Failed: 2
- 2023-03-07 01:00:00 tasks: 20, done: 20

- Only locally failed EI jobs displayed
- Various statuses

How many times this status was read by Grafana
Performance tests

Data for the tests:

• Run2 LHC data (2015-2018) ~50000 events
  • runNumber-eventNumber lists for several datasets in each year

• Two combinations of event lists:
  • Lists with events from different datasets (mixed): data15, data17
  • Lists with events from datasets with 1 million events (1M): data15, data18

• Lists are fixed OR generated randomly before running the query

Query:

• Event Lookup
  • Fast search of events using CLI
  • Return events GUIDs, full dataset names, data types (RAW, AOD, DAOD)
### EventLookup

With randomly generated event lists (running every **1 hour** in acrontab)

<table>
<thead>
<tr>
<th>dataset</th>
<th>nevents</th>
<th>Avg time, s</th>
</tr>
</thead>
<tbody>
<tr>
<td>data15 (1M)</td>
<td>1000</td>
<td>18.4</td>
</tr>
<tr>
<td>data15 (mix)</td>
<td>1000</td>
<td>23.6</td>
</tr>
<tr>
<td>data17 (mix)</td>
<td>1000</td>
<td>36.7</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>10</td>
<td>3.29</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>100</td>
<td>4.45</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>1000</td>
<td>12.7</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>10000</td>
<td>81.7</td>
</tr>
</tbody>
</table>

With fixed event lists (running every **2 hours** in acrontab)

<table>
<thead>
<tr>
<th>dataset</th>
<th>nevents</th>
<th>Avg time, s</th>
</tr>
</thead>
<tbody>
<tr>
<td>data17 (1M)</td>
<td>1000</td>
<td>6.97</td>
</tr>
<tr>
<td>data17 (mix)</td>
<td>1000</td>
<td>34.0</td>
</tr>
</tbody>
</table>

*Green ones are displayed*

Response times of the event lookup queries for data18

2023/03/23 – 2023/03/30

*peaks in the response times are due to interference with other activities on the HBase cluster*
Event Lookup

With randomly generated event lists (running every 1 hour)

<table>
<thead>
<tr>
<th>dataset</th>
<th>nevents</th>
<th>Avg time, s</th>
</tr>
</thead>
<tbody>
<tr>
<td>data15 (1M)</td>
<td>1000</td>
<td>18.4</td>
</tr>
<tr>
<td>data15 (mix)</td>
<td>1000</td>
<td>23.6</td>
</tr>
<tr>
<td>data17 (mix)</td>
<td>1000</td>
<td>36.7</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>10</td>
<td>3.29</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>100</td>
<td>4.45</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>1000</td>
<td>12.7</td>
</tr>
<tr>
<td>data18 (1M)</td>
<td>10000</td>
<td>81.7</td>
</tr>
</tbody>
</table>

With fixed event lists (running every 2 hours)

<table>
<thead>
<tr>
<th>dataset</th>
<th>nevents</th>
<th>Avg time, s</th>
</tr>
</thead>
<tbody>
<tr>
<td>data17 (1M)</td>
<td>1000</td>
<td>6.97</td>
</tr>
<tr>
<td>data17 (mix)</td>
<td>1000</td>
<td>34.0</td>
</tr>
</tbody>
</table>

Response times of the event lookup queries

*Green ones are displayed*

*peaks in the response times are due to interference with other activities on the HBase cluster*
Monitoring the performance tests

- Test results have been written to JSON files and sent to Grafana

How many times this status was read by Grafana

No errors

Shows what test finished with error: error message is being saved
Summary

• The Monitoring System provides a good representation of the status of all EventIndex sub-systems and major parameters

• Functional and performance tests control the well-being and the responsiveness of the EventIndex tool

  • Run regularly
  • Run locally and remotely (on GRID)
  • Quick indicators of technical problems, not necessarily caused by EventIndex malfunctions
  • Enable performance studies and system optimization
Thank you for your attention!