Upgrading the Cloud Storage Benchmark Framework for ROOT 6 Compatibility

By

Surya Seetharaman
Openlab Summer Intern 2015
IT Department
Data Storage and Services Group
European Organisation for Nuclear Research

Supervisors:
Maria Arsuaga Rios
Seppo S Heikkilä
## Huawei Cloud Storage Setup

### Hardware Features of Universal Distributed Storage Second Generation

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huawei UDS</td>
<td>UDS2</td>
</tr>
<tr>
<td>Storage Capacity</td>
<td>1.2PB</td>
</tr>
<tr>
<td>Control Nodes</td>
<td>4</td>
</tr>
<tr>
<td>Storage Nodes</td>
<td>300</td>
</tr>
<tr>
<td>Disk Capacity</td>
<td>4TB</td>
</tr>
</tbody>
</table>
Cloud Storage Benchmark Framework

Master: C++, Python, ROOT 6

Benchmark

Cloud storage

Client: C++ & Python

S3

Client: C++ & Python

S3

Client: C++ & Python

S3

S3 Simple Storage Service

Amazon Web Services

HUAWEI
What is the need for upgrading the benchmark framework?

-Project Motivation

- A new version of ROOT Software has been released with many improvements.
  - C++11 support
  - multi-threading
  - cmake

19/8/2015
Surya Seetharaman
What is the need for upgrading the benchmark framework?

-Project Motivation

- This benchmark framework is generic and can be used by many storage technologies at CERN
  - Kinetic Drives
  - EOS
  - Ceph
Installing ROOT6

ROOT
Data Analysis Framework

print("Hello, world!")

CERN openlab

python powered

GCC

XRootD

DAVIX

boost
Unified look and feel project
Upgrading the Benchmark Framework

GCC 4.4.7
Boost 1.41.0
Python 2.6.6
Davix 0.2.7
XRootd 3.3.5
ROOT 5.34.00
Cloud Storage Benchmark
Upgrading the Benchmark Framework

Before:

- GCC 4.4.7
- Python 2.6.6
- Boost 1.41.0
- XRootd 3.3.5
- ROOT 5.34.00
- Cloud Storage Benchmark

After:

- GCC 4.9.1
- Python 2.7.6
- Boost 1.55.0
- XRootd 4.2.1
- ROOT 6.04.00
- Cloud Storage Benchmark

Upgraded Benchmark

Surya Seetharaman
Running tests on the Upgraded Benchmark
-Metadata Download Performance

Old Benchmark

Upgraded Benchmark

Downloads speed (1,000 files/s)
Number of concurrent clients

19/8/2015
Surya Seetharaman
Running tests on the Upgraded Benchmark
-Throughput Download Performance

Old Benchmark

Upgraded Benchmark

Number of concurrent clients

Throughput (GB/s)

Number of front-ends
1
2
3
4

Number of concurrent clients

Throughput (GB/s)

Number of front-ends
1
2
3
4

19/08/2015
Surya Seetharaman
Overview of My Project

- Project Impact

Status

1. Installed and configured ROOT6 and the C++ multi-client cloud storage benchmark framework.

2. Upgraded the cloud storage benchmark framework

3. Performing Tests
   ▪ Metadata Download Test
   ▪ Throughput Download Test
   ▪ ROOT Analysis Test (currently working)

➢ New features from the latest versions of the softwares used for the upgrade.
-Thank You