I/O monitoring system for HPC datacenters

CS5352 Course Project, Spring 2021

[This project accepts two students.]

**Contact**

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**Description**

Parallel file systems are designed for high-performance computing systems and data centers to store data across multiple storage systems. A parallel file system breaks up the data and distributes the blocks to multiple storage servers in order to facilitate high-performance data access via concurrent I/O operations between client and storage nodes. Due to the distributed nature of parallel file systems, monitoring the I/O operations on each storage server is not a trivial job and requires developing specific monitoring tools for different file system operations.

In this project, we will study the Lustre parallel file system and will design and build a tool to collect some specific data from parallel I/O operations and parameters on each Object Storage Server (OSS) and store them in a remote NoSQL database. Then, the collected data will be analyzed in a future project for monitoring and data analysis purposes.

**Requirements**

* Knowledge of Python
* Knowledge of file systems
* Knowledge of Linux

**Students will have a chance to learn about:**

* Lustre Parallel File System
* RabbitMQ Message Broker System
* InfluxDB Timeseries Database
* Neo4j Graph Database
* Job Schedulers such as SLURM

**References**

1. Lustre official Website:
   * http://lustre.org/
2. Lustre: A Scalable, High-Performance File System (White paper):
   * <https://cse.buffalo.edu/faculty/tkosar/cse710/papers/lustre-whitepaper.pdf>
3. P. Schwan, “Lustre: Building a File System for 1,000-node”, Proceedings of the 2003 Linux symposium, 2003, pp 401-407:
   * <https://pdfs.semanticscholar.org/1b2c/9845a33bb718fab44bc28415af8e4e03220d.pdf#page=401>
4. Lustre user manual:
   * <http://doc.lustre.org/lustre_manual.pdf>
5. Lustre Wiki (Contains some Lustre monitoring tools)
   * <http://wiki.lustre.org/Category:Monitoring>
6. RabbitMQ official website:
   * <https://www.rabbitmq.com>
7. InfluxDB official website:
   * <https://www.influxdata.com>
8. Neo4j official website:
   * <https://neo4j.com>
9. SLURM official website:
   * <https://slurm.schedmd.com/documentation.html>
10. Univa Grid Engine (UGE) official website:
    * <http://www.univa.com/products/>