

## High Performance and Cloud Computing Research Theme

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### Abstract

Nowadays, there are many research issues and challenges in cloud computing. Cloud computing would seem to be a high performance computing (HPC) user's dream offering almost unlimited storage and instantly available and scalable computing resources, all at a reasonable metered cost. Many HPC applications require large amounts of data. Many clouds, even those that offer HPC features, cannot solve the problem easily. Ongoing research works in cloud computing are data management, consistency control, high availability, security in access control and computational offloading. The experiments of the ongoing research works are based on the simulation or modeling approaches. The future research works of our research laboratory focus on the high performance in cloud computing, the big data analytics, standardization, security policy and control for data storage of HPC applications or cyber physical systems.

### Research Theme

In this section, the ongoing and future research themes are described as follows:

#### *Ongoing works*

- Computational Offloading in Mobile Cloud Computing
- Data management in Cloud
- Consistency in Cloud Storage
- Flexible Updating Policy based Secure Access Control

- High Availability Model for IaaS Services in Cloud Environment

#### *Future works*

- High performance in Cloud Computing
- Big Data Analytics in Cloud Computing
- Standardization and making security policy and control on cloud storage

### Research Aims of each work

- To make the performance analysis of HPC applications over the Cloud infrastructure
- Not to prolong job completion time when task failures and straggling task occur
- To maintain the appropriate consistency level handling data effectively across locations without long network delays (latency) and optimizing bandwidth usage
- To provide a recovery solution covers from correlated failures on cloud storage
- To make performance analysis on different cloud infrastructure
- To be analytic and standardize data
- To make security policy for data storage control

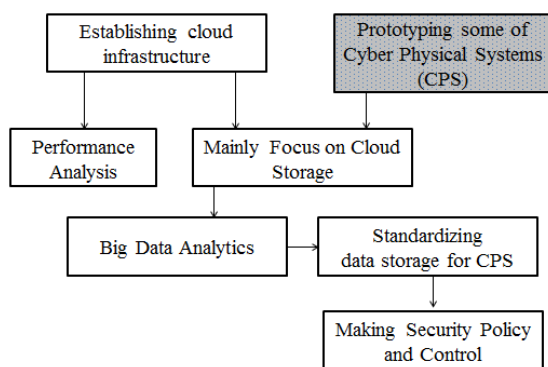
### Research Workflow

The workflow of our research laboratory is shown in Figure 1. Firstly, a cloud infrastructure will be established. In the workflow, prototyping some cyber physical systems (CPS) will not be developed by our laboratory. The cloud infrastructure of our laboratory will be

provided for those systems. When those systems apply our cloud storage, there is necessary for standardization of data and security policy and control in cloud storage. Therefore, the following three areas will be researched on cloud storage.

- big data analytics
- standardizing data storage
- making security policy and control

In the other hand, using that infrastructure, the performance analysis for some scientific HPC applications will be carried out.



**Figure 1 - Workflow of Research Laboratory**

## Conclusion

Recently, cloud environments are widely considered as critical issues in the field of high performance and cloud computing. In this proposal, the ongoing research works in cloud computing are presented. As the future work, the needs of computation for HPC applications or cyber physical systems will be addressed in terms of data standardization and security policy control in cloud storage.

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