

Graduation Thesis Topics for AY2008

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High Performance Storage System Using SSDs

- Today's microprocessors are ultra fast and have many processing cores on a single chip at cheap prices. For example, a quad-core Xeon server cost less than 100K Yen.
- However, the storage systems are still slow and expensive.
- Even with 100K Yen HDDs, only few percents of CPU time is utilized (other CPU time is just wasted).
- A DRAM-based SSD is a storage device which is made of DRAM chips (same as the main memory of the computers) but looks like a disk.
- It is very fast but small in size. We are trying to design a novel storage architecture utilizing the DRAM-based SSD.

Performance Analysis of Server Workload

- High-performance server systems are running various non-scientific applications: web servers, on-line transaction processing (OLTP), decision support systems.
- These applications have quite different characteristics from scientific applications (database access, numerous short requests from network-connected user terminals, etc).
- Using open-source implementation of industrial standard benchmark programs (OSDL-dbt suites), try to analyze the behavior of server workloads.
- Possible topics: development of analytical models of workload, automation and visualization of simulation.

System Level Virtual Machine

- It is likely a server runs various applications (web server, file server, OLTP, etc)
- Resource demand for each application varies time to time.
- A bug or security hole for an application will affect entire system.
- Virtual Machine: build multiple *virtual machines* on a single platform.
- Each virtual machine behaves as a logically independent and separate computer, which runs a different operating system and is isolated each other.

Virtual Machine for Sensor Network Nodes

- Sensor Network: a large number of sensor nodes distributed in a field and communicate each other autonomously.
- Each node consists of a microcontroller, memory, wireless network interface, and sensors.
- Requirements: Large number of nodes (low cost per node), low power consumption (for longer lifetime), self-organization (find neighbor nodes and configure network, etc).
- Possible topics: designing virtual machine for sensor node reprogramming, protocol for network self-organization.

Collaborator: Dr.Bleakley (UCD, Ireland)

We need students who ...

- are interested in the topics explained earlier.
- come to the lab and spend substantial time of your day in the lab (you do this because you are interested, not because you are forced).
- come to the meeting and other activities of the lab. Please note that if you miss the group meeting too many times without notice and justifiable reasons, you will be dismissed from the lab.

If you have any questions, please contact Dr. Hitoshi Oi at hitoshi@u-aizu.ac.jp or talk to any students in the lab (241-E).