Graduate Thesis Topics for AY2007

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Embedded Processor Design and Evaluation

- Microprocessors on potable devices need to run various applications under the tight constraint on hardware resource and power consumption
- Performance requirements are rapidly increasing by multimedia applications (still and movie pictures, music player, GPS)
- Java Virtual Machine (JVM) is another burden, which has a quite different architecture than current microprocessors.
- Analyze portable device applications and discover performance bottleneck and hardware/software solutions

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.
- Possibles 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.

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