

# Graduation Thesis Topics for AY2011

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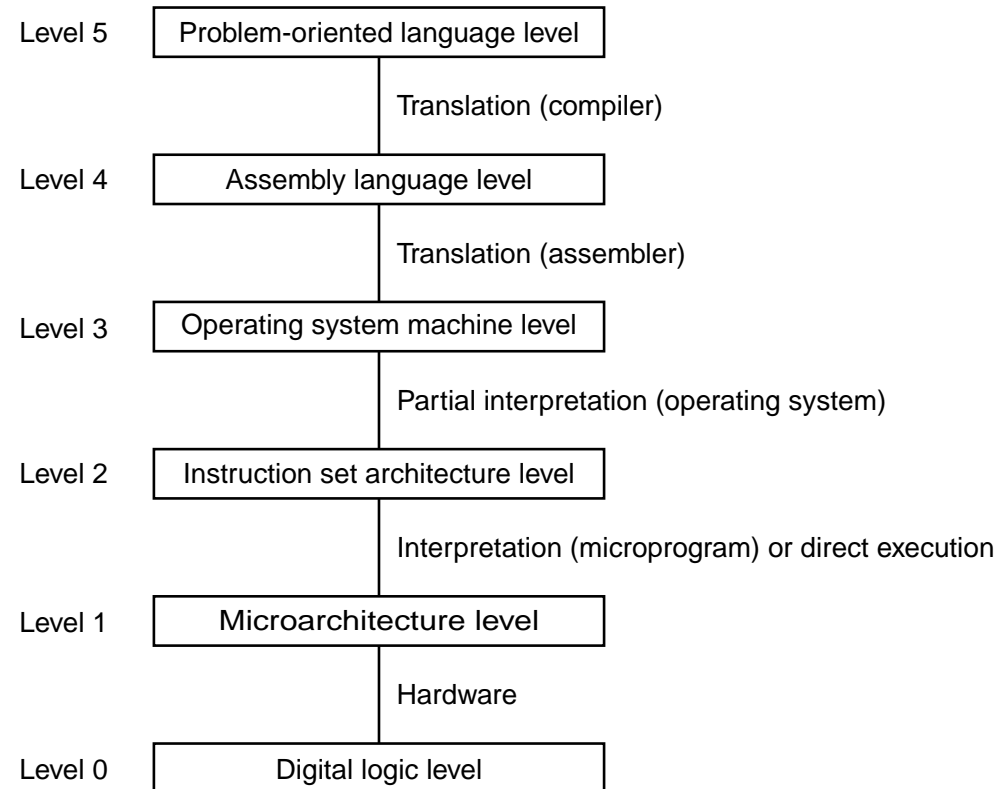
The University of Aizu

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Computer Architecture  
& Operating Systems Group

# Hierarchical Structure of Computer Systems



From “Structured Computer Organization” by Andrew Tanenbaum

## Consolidation of Multi-Tier Application Servers

- SPECjAppserver2004 is an industrial standard benchmark from SPEC, modeling the automobile manufacturer.
- It consists of Web, Application and Database servers. We consolidated them on a single machine using Xen (virtualization software).
- Measuring performance (throughput and response time), and workload balance between virtual machines (web, app, db), and fine-tuning each server setting.

## Performance Modeling of Virtualized Servers

- Using the data obtained in the previous topic, we are trying to develop a performance model to analyze the performance of a virtualized (SPECjApp2004-based) system.
- The workload is broken-down into per-transaction type and per-VM. The overhead of virtualization is also taken into account.
- The model is (should be) useful to estimate the performance when:
  - New technologies are available (e.g. more cores on a CPU)
  - Workload is changed (e.g. transaction mix is changed).

## Resource Management on a Virtualized System

- A single computer can host multiple independent computing environments (VMs) by virtualization.
- Sometimes, VMs try to use resources (such as CPU time) more than available.
- Just giving equal amount of resource to each VM may not be the best scheme sometimes: a VM may need more than others to maintain similar quality-of-service (QoS) metrics.
- Our approach is to utilize fuzzy control theory.  
If response time is slow, give more CPU time to the server.

## 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.

## See the Outside World

- Collaboration with other schools:
  - UCD (Ireland), UPT (Romania), NTU (Singapore), Universidade do Porto (Portugal)
- Exchange program by Univ of Aizu
  - Rose-Hullman (USA), NTU (Singapore) and Universidade do Porto (Portugal)
- Recent Presentations at Conference and Workshop
  - CCV2010 (Singapore), ITSim2010 (Kuala Lumpur, Malaysia), and SWoPP (Kanazawa, Japan).

## Reference

- Group's web site: `www.oslab.biz`
- Open Campus lab information (in Japanese)  
`opencampus.oslab.biz`
- Twitter: `oslab`
- Youtube: `CAOSgroup`
- USTREAM: `ustream.oslab.biz`
- 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).