## Fall 2013, EE 599: Special Topics (3 Units)
# Cloud Computing and Distributed Systems

**Morning section (30933D): Tu/Th  9:30 am – 10:50 am, VHE 217** (40 students)
**Afternoon section (31034D): Tu/Th 12:30 pm – 1:50 pm, KAP 140** (40 students)
**Class Web Site: http://blackboard.usc.edu**

**Prof. Kai Hwang,  kaihwang@usc.edu,  Office Hours : Tu/Th 2-4 pm in EEB 212**
**TA:  C.T. Huang (chuntinh@usc.edu), Office Hours : Wed.1 – 3 pm in EEB B-10**

**Course Description:** This course covers Internet technology and network-based computing systems, including clouds, clusters, datacenters, grids/P2P and Internet of Things (IoT). Specific topics include server clusters, supercomputers, P2P networks, virtual machines, data/computational grids, Internet clouds, IoT, social networks, big data security, etc.  Case studies include Amazon EC2 and S3, Google AppEngine, Azure, SalsForce, Facebook, Twitter, MyPlace, Rackspace, Dropbox, iCloud, XEN, KVM, Chord, BitTorrent, MapReduce, Hadoop, Eucalyptus, OpenStack, VMWare Tools, etc.  The course is designed for Master and Ph.D. students in EE, CS, IE, and applied Math. Registered students will have the opportunity to gain hands-on experience on the Amazon AWS cloud with free-access personal accounts.

### Syllabus and Lecture Schedule:

| *Lecture No. / Dates* | *Topics Covered and Relevant Chapters* | *Events, Dates and Remarks* |
|---|---|---|
| Lec. 1/2: Aug. 27, 29 | Internet and Distributed Computing (Chap.1) | Course Introduction |
| Lec. 3/4: Sept. 3, 5 | Clusters and Supercomputers (Chap.2) | Updating Top-500 list |
| Lec. 5 - 7: Sept.10,12,17 | Virtual Machines/Clusters/Datacenters (Chap.3) | **HW #1** assigned, due **Sept 24** |
| **Lec. 8: Sept.19, 2013** | **Project Specification** and AWS Cloud (Chap.4) | **http://aws.amazon.com** |
| Lec. 9/10: Sept. 24, 26 | Cloud Services and Public Clouds (Chap. 4) | **HW #2** assignedn due **Oct. 15** |
| Lec. 11/12: Oct.1 and 3 | MapReduce and Cloud Programming (Chap.6) | Hadoop Library and HLL tools |
| Lec. 13: Oct. 8 | Cloud Performance and Benchmarks | Handout papers |
| Lec. 14/15: Oct.10, 15 | Cloud Operating Systems (Chaps. 4 and 6) | Cloud Software Support |
| Lec. 16/17: Oct. 17, 22 | Community Clouds  and Ecosystems | MeePo Paper and USC Clouds |
| Lec.18 : Oct. 24 | Review Session (Q&A and HW Solutions) | All material before mid-term |
| **Oct. 29, 2013\|** (no lecture) | **Mid-Term Exam,** covering Chaps.1- 4, and Ch. 6, HW #1/#2, and handout papers | **Time and room TBA,** up to review session on Oct. 24 |
| Lec.19: Oct. 31 | Big Data Integrity, Privacy and Security | Paper, **HW #3** due **Nov. 19** |
| Lec. 20/21: Nov. 5, 7 | Computational/Data Grids (Chap.7) | Physical vs. Virtual Networking |
| Lec. 22/23: Nov.12, 14 | P2P and Overlay Networks (Chap 8) | **Project Report** due **Nov. 12** |
| Lec. 24/25: Nov.19, 21 | More Clouds, IoT, Social Networks (Ch. 9) | **HW #4** due **Nov. 26** |
| Lec.26/27: Nov.26,Dec.3 | Future Internet, R/D Trends and Review | Q/A of the entire course |
| **Dec. 5, 2013** (no lecture) | **Final Exam,** covering the entire course with 80% on Chaps. 4, 6 – 9, HW #3/4, and Project | **Time and Room TBA** (2 hours, close-book) |

**Textbook:**  K. Hwang, G. Fox and J. Dongarra, ***Distributed and Cloud Computing***
Morgan Kaufmann Publishers, 2012. (ISBN 978-0-12-385880-1)

**Prerequisite:**  Either EE 457 or EE 450 or equivalent background approved by the instructor

### Grading Policy and Class Procedure:

1. This course is offered in two campus sections, each has 40 seats. Project Team can be formed across the sections. Each team has 3 or 4 students, depending on the class size and TA availability.
2. The course work is evaluated with 4 performance metrics in 15 weeks:
   - **Homework Sets (20 %):**  Four Homework Sets due **Sept. 24, Oct. 15, Nov. 19** and **Nov. 26,** respectively
   - **Mid-Term Exam (30 %): Oct. 29, 2013,** covering Chap. 1- 4, 6, HW #1/#2 and handout papers
   - **Cloud Project (20%):** Team effort on cloud experiments with a written report due **Nov. 12, 2013.**
   - **Final Exam (30%): Dec. 5, 2013,** covering the entire course with 80% on new material in Chapters 4, 6 – 9, HW #3, #4, and the Project beyond the mid-term exam.
3. All HW sets are done individually. No late HW or project report is accepted. Cloud Projects are done in teams. Both exams are close-book and last for 2 hours. No makeup exam is offered for any excuses.
4. Contact TA for records and solutions first. Always Email to both TA and Hwang. Feel free to discuss your problems with Prof. Hwang during his office hours. No lecture on Nov. 28 (Thanksgiving).