CSE 6359-001 Special Topics in Systems and Architecture:

Internet Computing (Clusters, Grids, and Clouds)

Spring 2010

Official Location of This Document:

http://crystal.uta.edu/~zaruba/CSE6359/CSE6359syllabus.pdf

Short Course Description:

This course focuses on the enablers of scientific computing, i.e., computer clusters, grids, and clouds. We will discuss the technologies behind the concept of "computing power on demand". Students will be introduced to the cutting edge in the field and will be exposed to projects that are using the above technologies.

Prerequisites:

- CSE 3322 or equivalent (Computer Architecture)
- CSE 4351 or CSE 4353 or equivalents (i.e., knowledge about basic distributed computing concepts)
- CSE 3320 or equivalent (Operating Systems)
- "upper level standing" in the graduate program
- Good programming skills and ability to pick up new languages quickly (which really is the prerequisite to getting a computer science degree in the first place)

Note: if your situation is questionable please contact the instructor and/or your graduate advisor to avoid complications.

Instructor: Gergely Záruba

- Office: 113 GABC
- Phone: (817) 272-3602
- Office hours: Mondays and Wednesdays 2:30pm – 3:50pm
  (other consultations by appointment only.)
- Instructor's e-mail: zaruba@uta.edu
- GTA: TBA
  Office hours: TBA

Objectives:

As PCs and workstations have become cheaper, faster, reliable and easy to connect clusters of computers have been replacing high-end workstations and servers, mainframes, and supercomputers. Groups of clusters may form grids of available computing power. Virtualization techniques enable the formation of clouds which promise to provide real "computing on demand". How does one run a job on a cluster or grid? What is a "job"? How should authentication and authorization be handled? What happens when computers or jobs crash? When the network is unavailable? What can these systems do? What is the likely future?

Outcomes:

By finishing this course, students will posses the knowledge of how clusters are organized. What important qualities clusters need to satisfy before they become a grid (and not just a bunch of loosely connected clusters), and what have been the driving forces that lead us to computing clouds.

Details of Curriculum:

- Class WWW site: http://crystal.uta.edu/~zaruba/CSE6359/
  Note: Please check WWW site for up to date information
- Class mailing list address: CSE6359-ZAR@LISTSERV.UTA.EDU
  Note: students are strongly encouraged to sign up for the mailing list of the class; ***Please either request membership via the listserv provided web interface OR send me an email within the first week of classes with the subject:CSE6359 and the body containing your email address.***
- Text Books: None (papers, publications, WWW documents, Instructor's notes and notes taken by the students)
  Recommended books:
  - "The Grid 2", edited by Ian Foster and Carl Kesselman, ISBN:1-55860-933-4
  - '"Introduction to Grid Computing," Frederic Magoules, Jie Pan, Kiat-An Tan, and Abhinit Kumar, ISBN: 1-42007-406-7
  - "Cloud Computing, A Practical Approach," Toby Velte, Anthony Velte, and Robert Elsenpeter, ISBN: 0-07162-694-8
- The Instructor may invite researchers who use or build grids on selected class days.

Details of Class Policies:

Course Grades:

Course grades will be based on the following:

- Homework project: 30%
  - The homework will be a simulation project in C++, with a hard due deadline of TBA.
  - There will be no make up for homework. The maximum grade given for the homework will decline by 10% of the total grade each calendar day the homework is overdue starting razor sharp after the deadline.
- Midterm: 30%
  - There will one midterm exam during the semester (no final exam), tentatively on April 13th, 2010.
  - There will be no make up exams!
- Research paper and presentation: 30%
  - Students will be required to write a summary on one aspect of Internet computing and present it to the rest of the class during regular class hours. Scheduling presentations will be done during the semester by consulting with the Instructor. Presentations may happen during "Final Review Week" as well.
  - The paper's topic should be chosen by consultation with the Instructor in the early phases of the semester.
  - Students are encouraged to approach the Instructor with proposals on the topics of their papers.
  - Groups may be formed for up to 2 persons/group, however (depending on demand) some students may be required to perform research on their own.

- Class participation: 10%
    - Although no attendance catalogue will be kept, students are expected to attend classes and arrive on time, and to interact during the debate section of the seminars of their fellow students.

Tentatively, course grades are determined from the total points (100) earned as follows, but the instructor reserves the right to "grade over the curve," or even to give everyone the best grade.:

90-100: A ; 75-89: B ; 60-74: C ; <60: F

Make-ups:

Make-ups for (non-exam) graded activities may be arranged if your absence is caused by illness or work/personal emergency. A written explanation (including supporting documentation) must be submitted to your Instructor. If the explanation is acceptable, an alternative to the graded activity will be arranged. Make-up arrangements must be arranged prior to the scheduled due date.

Notes:

- The Instructor reserves the right to modify course policies, the course calendar, and assignment or project point values and due dates.
- All students are expected to be responsible users of the computer systems used for this course.

Accepted file formats for papers/reports:

The Instructor requires the students to turn in their papers and reports either in *.pdf* (Adobe's portable document format – can be generated, e.g., either by *Adobe Distiller* or later versions of *ghostscript*) or in *.ps* (Adobe's Postscript – can be generated, e.g., from Latex source files by *latex* and *dvips* or from the Windows operating systems by installing a virtual postscript printer device and printing the document to a file) formats. Source files (!) must be turned in along with the paper in a zip or a gzip (or tgz, .tar.zip) archive. Students are encouraged to use the Latex language and its appropriate compilers or the Microsoft Office program family (please see the Instructor if you intend to use anything else). If viruses are submitted along with the files a student turns in, the Instructor may degrade the grade of the assignment.

Academic honesty:

All students are expected to pursue their academic careers with honesty and integrity. "Scholastic dishonesty includes, but is not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts" *(Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22.)* Students found guilty of dishonesty in their academic pursuits are subject to penalties that may include suspension from the university. Any student found guilty of academic dishonesty will receive a -100% for that work (project, exam, homework, etc.) as well as having the course grade lowered one full letter grade - in addition to any other penalties assessed (suspension, expulsion, probation). These and other applying UTA rules, will be strictly enforced. Any case of academic dishonesty will be treated in accordance with the UTA ***Handbook of Operating Procedures*** or the Judicial Affairs website at

http://www2.uta.edu/discipline. If you do not understand this policy, it is your responsibility to obtain clarification or any additional information you may require

Students are allowed to discuss homework with classmates, but are **not** allowed to copy the solutions of others or share solutions with others. All work turned in for grading must be the student's own work.

Students will be required to sign an academic honesty letter to be kept with the instructor. Failing to provide with such a letter by census day will result in the respective students' withdrawal from the class.

In addition to the punishment from the University, the instructor will give a "minus 100%" grade on the given assignment/exam in question.

Disabilities:

If you require any accommodation based on disability, please meet with the Instructor (with your supporting papers) in the privacy of his office the first week of the semester to be sure you are appropriately accommodated.

Grievance Procedure

Anyone feeling that a dispute exists after the grading of any assignment or exam may submit a written grievance. This grievance should identify the item in dispute and arguments supporting the student's position. Grievances must be submitted in writing within two class periods following the return of the assignment. The instructor or GTA agrees to return a written response to the student's grievance within two class periods from receipt of the grievance. If the error is due to wrongful calculation of points, then no grievance needs to be submitted. If a written grievance is received, the instructor and GTA reserve the right to re-grade the entire exam (not just the specific point in question).

Student Support Services Available

The University of Texas at Arlington supports a variety of student success programs to help you connect with the University and achieve academic success. These programs include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.

Electronic Communication Policy

The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system.

All students are assigned a MavMail account. Students are responsible for checking their MavMail regularly. Information about activating and using MavMail is available at http://www.uta.edu/oit/email/.