CptS 562 — Fault Tolerant Computer Systems

Motto: “All Your Faults Are Belong To Us” (AUFABTU)

Spring 2004; Tu&Th 2:50-4:05, Murrow 55
Instructor: Dr. David (“Dave”) Bakken
EME 55; 335-2399; bakken@eecs.wsu.edu
Office Hours: Tuesday & Thursday 11:10-12:00 starting second week

1) Background
The last few years have seen a significant number of advances in computer and communications technologies, as well as the sharp decline in their cost. These developments, coupled with the growing availability (almost ubiquity) of network and internet connections, have resulted in the huge growth in the size and diversity of computer programs, which are executed across multiple computers. However, greater reliance of society on these computers and the services they provide has greatly increased the number of failures of such services. Additionally, the greater number of interactions involving multiple computers has greatly increased the occurrences of the partial failure of some of some (but not all) of those interacting components.

In this course we will study fault-tolerant computing, specifically “fault-tolerant software”, software designed to tolerate failures in some of the hardware or software components upon whose services it relies.

2) Course Objectives
As a result of this course, students will:

- Have an understanding of the fundamental issues involved with providing fault-tolerance in both hardware and software
- Have an in-depth understanding of techniques for constructing fault-tolerant software, especially group communication systems and replication paradigms above them.
- Understand open research issues in group communication systems, replication paradigms, and the combining of fault tolerance with security and bandwidth management.
- Gain practice and competence in reading, analyzing presenting research papers.
3) Text

   a) Required Texts:

   b) Optional /Background Texts:

4) Additional Reading

This course will involve substantial reading of papers from the research literature. These will be provided for the students on a regular basis on the course web site.

5) Course Prerequisites

Fault Tolerance is a very broad field. As a result, the prerequisites for this class used to be (and still are listed in the catalog as)

   Prereq Cpt S 460, or EE 424 and elementary probability theory

However, in the opinion of the course’s coordinator and your instructor (same person), it is impossible to have a meaningful graduate course that can handle this breadth of prerequisites. Therefore, the course now has new prerequisites, which are winding their way through the bureaucratic pipeline. The new prerequisites are:

   CptS 460 and 464/564

Students should see me if they have any concerns about this or if they do not meet the prerequisites. I reserve the right to drop any student not meeting the prerequisites if it becomes clear that he or she is deficient in this.

6) Course Requirements

You are required to attend every lecture. If you miss one, it is your responsibility to find out what happened and to collect any material, which was handed out in class.
7) Assigned Work and Tentative Grading Policy

This course benefits greatly from active student participation. (For such advanced graduate classes, the instructor finds such participation a much more useful way to gauge a student’s knowledge than examinations.) Thus, students will be graded on participation. They will also present and lead class discussion on one research paper during the semester. A programming project of modest difficulty will be assigned, with roughly the complexity of Project 3 or Project 4 in 564 in Fall 2001. Finally, the students will do a literature search.

More details will be provided later in the semester regarding these tasks.

The following allocation of grade percentages is tentative, and may change during the semester:

- Midterm Exam: 20%
- Participation: 20%
- Paper presentation(s): 20%
- Literature Survey Report: 10%
- Final Project: 30%

8) Policies and Expectations

Your programming project and all other work should be of your own doing.

9) Overview of Topics

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<tr>
<th>Topic</th>
<th>Lectures (approx)</th>
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<tr>
<td>VR Chapters 6-9</td>
<td>8-10</td>
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<tr>
<td>TvS Chapter 6</td>
<td>4-5</td>
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<td>Presentations</td>
<td>12-15</td>
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<td>Other Topics TBD</td>
<td>2-4</td>
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<td>Exam</td>
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The presentations will give more depth to key areas the book covers, such as replication styles, caching, and the combination of fault tolerance with security and with realtime systems.

10) Disability Accommodations

Reasonable accommodations are available for students who have a documented disability. Please notify the instructor during the first week of class of any accommodations needed for the course. Late notification may cause the requested accommodations to be unavailable. All accommodations must be approved through the Disability Resource Center (DRC) in Administration Annex room 205, 335-1566, e-mail mailto:drc@mail.wsu.edu in Pullman.