CS710 Topics in Computational Architecture: Fault-Tolerant Computing

Course Description: This course aims at providing an introduction to fault-tolerant computing, which is becoming a critical issue in current and near-future computing systems for the continued success of computing. With technology scaling, transistor feature sizes, supply voltages, and threshold voltages are decreasing, resulting in unreliable circuits and systems. Process variations and transient errors are becoming big issues. To address these issues, this course will cover the following topics.

- Preliminaries
- Hardware fault tolerance
- Information redundancy
- Software fault tolerance
- Checkpointing
- Case studies of commercial systems
- Defect tolerance in VLSI circuits
- Fault detection in cryptographic systems
- Simulation techniques

Prerequisites: undergraduate operating systems, computer architecture, software design, basic probability theory

Textbook: "Fault-Tolerant Systems" by Israel Koren and C. Mani Krishna, Morgan Kaufmann publisher, 2007

Class hours: WF 11:00 ~ 12:30 PM

Classroom: information & electronics (E3) 4448

Instructor: Prof. **Soontae Kim**
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Office Hours: before and after classes, knock on my office door for short questions, or via appointment for long discussions

Grading Policy: Final grade will consist of the followings:
Two exams 50%
Attendance & participation 10%
Two presentations 10%
Term project presentation & report: 30%

Course Schedule (subject to change)

Week	Date	Topic	talk	Assignments
1	9/2	Ch1. preliminaries	professor	
	9/4	Ch2. Canonical	professor	
2	9/9	Ch2. Resilient	professor	
	9/11	Ch2. Analysis	professor	
3	9/16	Ch2. byzantine	professor	
	9/18	Ch3. coding1	professor	
4	9/23	Ch3. Coding2	professor	
	9/25	Proposal presentation#1	Students	Prepare 10 min proposal presentation
5	9/30	Proposal presentation#2	Students	Prepare 10 min proposal presentation
	10/2	holiday		
6	10/7	Ch3. RAID	professor	
	10/9	Ch3. Replication	professor	
7	10/14	Ch3. ABFT	professor	
	10/16	Ch5. Swft1	professor	
8	10/21 10/23	Midterm Exam		
9	10/28	Ch5. Swft2	professor	
	10/30	Ch5. Swft3	professor	
10	11/4	Progress presentation#1	Students	Prepare 10 min presentation for progress
	11/6	Progress presentation#2	Students	Prepare 10 min presentation for progress
11	11/11	Ch6. Checkpointing1	professor	
	11/13	Ch6. Checkpointing2	professor	
12	11/18	Ch6. Checkpointing3	professor	
	11/20	Ch7. Case studies	professor	
13	11/25	Ch8. VLSI1	professor	
	11/27	Ch8. VLSI2	professor	
14	12/2	Ch9. Crypto	professor	
	12/4	Ch10. Simulation	professor	
15	12/9	Final presentation#1	Students	Prepare 15 min presentation for whole project
	12/11	Final presentation#2	Students	Prepare 15 min presentation for whole project
16	12/23 12/25	Final exam		