Advenced Computer Organization and Architecture

Course Name	Course type (credit/hours)	Elective course(3/3)	Course code	F075
	Target students Division/major/grade	Software and Computer Engineering/Senior	Opening semester	2019 2ND SEMESTER
	Class time and classroom	Tue B(Pal409)Thu A(Pal409)	English Grade	A(100%English)
Reference to this course	Prerequisite courses	컴퓨터구조, 운영체제		
	Related basic courses			
	Recommended concurrent courses			
	Related advanced courses			

Instructor	Name (title/division)	Jeongseob Ahn(Assistant Professor, Software and Computer Engineering)				
	Office Room Number	팔달관 1004-1	Office phone Number	3823	e-mail	
	Office hours		Homepage address	http://jeongseob.github.io		
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

1. Introduction

Computer architecture is a fast-evovling area with interesting new techniques added in every generation of processors. Recently, the area is a facing a new phase of evolution with billions of transistors on a chip and multicores techniques. The goal of this course is to learn important concept in computer architecture. This course will cover various aspects of high-performance microprocessors, which include out-of-order execution and advanced memory hierarchies As multicore technologies have been used in all levels of computing from laptops to supercomputers, the course will cover topics in traditional multiprocessors and recent developments of multicores technologies. Further, we will spend a few weeks discussing domain-specific architectures and accelerators (such as GPU and TPU).

2. Course Objectives

"컴퓨터구조" 수업에서 시간 관계상 다루지 못했던 부분에 대해서 공부한다.

- ILP (Instruction-level parallelism)을 높이기 위해서 사용되는 out-of-order execution 기법에 대해서 심도 있게 공부한다.
- TLP (Thread-level parallelism)을 높이기 위한 멀티프로세서/멀티코어 구조에 대해서 공부하고 이 때 프로그래밍 기술 및 하드웨어 캐쉬 기술이 어떠한 영향을 미치는지 공부한다.
- 최근의 클라우드 및 데이터센터에서 사용되는 컴퓨터 프로세서에 대해서 공부한다.

3. Class types and activities

4. Teaching Method

- [V] lecture
- [V] discussion and debate
- [V] team project(presentation and case studies)
- [ ] experiments(role-playing,etc)
- [ ] designing and production
- [ ] on-site learning(on-site training)
- [ ] others

5. Support Systems in Use

- [V] AjouBb
- [ ] automatic recording system
- [ ] web-based assignment
- [ ] cyber lecture
- [ ] online content
- [ ] class behavior analyazing system
- [ ] others

6. Teaching Tools

- [ ] PBL(Problem Based Learning)
- [ ] CBL(Case Based Learning)
- [ ] TBL(Team Based Learning)
- [ ] UR(Undergraduate Research)
- [ ] FL(Flipped Learning)
- [ ] DSAL(Data Science Active Learning)
- [ ] others

7. Knowledge and ability required for taking this course

이 강좌를 이해하기 위해서는 "컴퓨터구조" 및 "운영체제" 수업을 들었거나 비슷한 수준의 학문적 배경을 가지고 있어야 하며 로우 레벨 프로그래밍을 할 줄 알아야 한다.

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance			
midterm exam	1	30%	
final exam	1	30%	
quiz			
presentation	1	20%	논문 읽고 발표
discussion			
homework	2	20%	프로그래밍 숙제
etc			
study hours			

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	Computer Architecture : A Quantitative Approach	John Hennessy and David Patterson		

10. Class system and Class shedule

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Course overview	E	Jeongseob Ahn			
2	ISA review	E	Jeongseob Ahn			
3	ISA design and pipelining	E	Jeongseob Ahn			

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
4	ILP (Instruction-level parallelism) I	E	Jeongseob Ahn			
5	ILP II	E	Jeongseob Ahn			
6	ILP III and case studies	E	Jeongseob Ahn			
7	Cache and memory hierarchies	E	Jeongseob Ahn			
8	Midterm	E	Jeongseob Ahn			
9	Multiprocessors I: overview and consistency	E	Jeongseob Ahn			
10	Multiprocessors II: Coherence	E	Jeongseob Ahn			
11	Multiprocessors III: SMT and Multicores	E	Jeongseob Ahn			
12	MP case studies	E	Jeongseob Ahn			
13	Parallel programming and transactional memory	E	Jeongseob Ahn			
14	GPU architecture	E	Jeongseob Ahn			
15	Computer architecture for AI	E	Jeongseob Ahn			
16	Final	E	Jeongseob Ahn			

11. Other items of notification