Advenced Computer Organization and Architecture

Course Name	Course section (credit/hours)	Elective course(3/3)		course code	F057
	course item			course component	
	Target students Division/major/grade			opening semester	2021 1ST SEMESTER
	Class time and classroom	Tue A(Pal407)Fri A(Pal407)		English Grade	A(100%English)
Reference to this course	Credit compositon	Theory(0) + Design(0) + Practice(0)			
	Prerequisite courses	컴퓨터구조, 운영체제			
	Related basic courses				
	Recommanded concurrent courses				
	Related advanced course				
Instructor	Name (title/division)	Jeongseob Ahn(Assistant Professor, Software and Computer Engineering)			
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Teaching Assistant	Name (title/division)				
	Office Room Number		Office phone Number		e-mail	

1. Course 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).

In this semester, due to COVID-19, I will be offering lectures in video with Zoom for discussion, Q/A, and reviews.

2. Course Objectives & course outcome

"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 Sciencd Active Learning)
- [ ] others

7. Evaluation method of course outcome

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance			
midterm exam	1	30%	
final exam	1	30%	
quiz			

7. Evaluation method of course outcome

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
presentation	1	20%	논문 읽고 발표
discussion			
homework	2	20%	프로그래밍 숙제
etc			
study hours			

8. Textbook and Reference material

Main/Sub	Title	Writer	Publisher	Publication year
Main	Computer Architecture : A Quantitative Approach	John Hennessy and David Patterson		

9. Class system and Class shedule

< Schedule >

* language : K-korean, E-English

Weeks	Title of lecture	language	time distribution(minutes)			Teaching Method	evaluation method
			theory	design	experiment practice		
1	Course overview	E	3				
2	ISA review	E	3				
3	ISA design and pipelining	E	3				
4	ILP (Instruction-level parallelism) I	E	3				
5	ILP II	E	3				
6	ILP III and case studies	E	3				
7	Cache and memory hierarchies	E	3				

< Schedule >

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Weeks	Title of lecture	language	time distribution(minutes)			Teaching Method	evaluation method
			theory	design	experiment practice		
8	Midterm	E	3				
9	Multiprocessors I: overview and consistency	E	3				
10	Multiprocessors II: Coherence	E	3				
11	Multiprocessors III: SMT and Multicores	E	3				
12	MP case studies	E	3				
13	Parallel programming and transactional memory	E	3				
14	GPU architecture	E	3				
15	Computer architecture for AI	E	3				
16	Final	E	3				

10. Contribution index of the course for attaining ABEEK program outcomes

course outcome	contribution scale
No Data	

11. Analysis of improved matters for the previous semester

13. Reference items