



Software and Informatics Engineering Department

College of Engineering- Salahaddin University

Computer Architecture

2nd Year

Lecturer's: Nyan Dawood Sallman

Spring Semester 2023/2024

Course Book

1. Course name	Computer Architecture
2. Lecturer in charge	Nyan D. Salman
3. Department/ College	Software & Info. Engineering- College of Engineering
4. Contact	e-mail: nyan.sallman@su.edu.krd , eng.nyan2@gmail.com
5. Time (in hours) per week	Theory: 2 hrs
6. Office hours	Monday (2 hours each group)
7. Course code	SE_2012
8. Teacher's academic profile	www.a/su.edu.krd/nyan_dawwod
9. Keywords	8086 , 8088 microprocessor, Pentium, Core2 Due,.. etc
<p>10. Course overview:</p> <p>The main aim of Computer Architecture course is the theory behind the Practical part. In the same way as a building architect sets the principles and goals of a building project as the basis for the draftsman's plans, so too, a computer architect sets out the computer architecture as a basis for the actual design specifications.</p> <p>There are several aims of the term, which can be used to refer to:</p> <ul style="list-style-type: none"> • The design of a computer's 8086, 8088 architecture, instruction set, addressing modes. • More general wider-scale hardware architectures. • The less formal usage refers to a description of the requirements (especially speeds and interconnection requirements) or design implementation for the various parts of a micro computer. • Architecture is often defined as the set of machine attributes that a programmer should understand in order to successfully program the specific computer (i.e., being able to reason about what the program will do when executed). For example, parts of the architecture are the instructions and the width of operands manipulated by them. Similarly, the frequency at which the system operates is not part of the architecture 	
<p>11. Course objective:</p> <p>11.1 Internal microprocessor architecture</p> <p>11.2 How to write assembly programming according to examples of applied assembly programs , these programs including :</p> <ul style="list-style-type: none"> ✓ Arithmetic and Logic instructions ✓ Data movement instructions. 	

- ✓ Jump and call Subroutines
 - ✓ Input/ output instruction.
- 11.3 The hardware side of the microcomputer

12. Student's obligation

Students are obliged to attend within the time stated in the lecture schedule for lessons that are many examples of solution during the lecture for closer understanding of the subject and that's what does not exist in the form reproduced obtained lectures, also the students responsible to solving home works and assignments.

13. Forms of teaching

The subject will be covered theoretical part in the class (material parts of the processor) with programming in the Lab); whiteboard and pen have been mostly used and frequently clear the subject step by step. Homework is normally given throughout the academic year.

14. Assessment scheme

Beside the final exam which have 50% of final degree, the course consists of two parts; each part has many quizzes, and the student activity have a weight of 5% of final degree for total mark will be:

- Normal exams of total weight 25%
- Assignments 10%
- Daily practical Activity 5%
- Practical exam 10%
- Final course exam: 30% Theory, 20% Practical

Average Marks through the course are: 50 % Final Exam: 50 %

Note:

There will be scheduling and randomly quizzes. Each quiz will be given at the beginning of the class period and covers materials covered in the previous lectures.

15. Student learning outcome:

Students will learn about computer performance, computer design, and tradeoffs between cost and performance as well as between hardware and software. Students will formulate and solve problems, understand the performance requirements of systems, and communicate effectively and learn to think creatively and critically, both independently and with others.

16. Course Reading List and References:

- ✓ ■ Key references: “The Intel Microprocessors 8080/8088,

<p>8086....Architecture, programming, and Interfacing”, by Barry B. Brey 2006.</p> <ul style="list-style-type: none"> ✓ 2- 8086 Emulator Software package. ✓ American micro-system, Inc. microprocessor Group 3800 Home stead , Santa Clara, CA 95051 ✓ S. Nedeveschi, L. Todoran, „Micoprocessor”, editor UTC-N, 1995 , UTCN Library 	
17. The Topics:	Lecturer's name
<ol style="list-style-type: none"> 1. Discussion the history of computer. 2. Introduction to modern microprocessors. 3. The function of the microprocessor in the microprocessor based computer system. 4. Internal microprocessor architecture, Bus Interface Unit and Execution Unit. 5. General purpose and special purpose register. 6. Segment register, Memory Addressing , 7. Addressing modes: Register addressing , Immediate addressing , Direct addressing, Continued addressing mode., Register indirect addressing , Base relative addressing 8. Direct index addressing 9. Base index addressing, Arithmetic and Logical Instruction in assembly Language 10. Addition, Subtraction ,Comparison 11. Multiplication and Division, Basic Logical instructions (AND,OR,XOR,TEST and NOT) 12. Shift and Rotate Instructions, String Comparison, Software Development System and Assembler. 13. Cross and Resident Assembler, Conditional and Unconditional Jump instruction 14. Controlling the flow of the program , Loop, while Loop, Repeat until loop, Subroutine (Call and Return) 15. 	<p>Nyan D. Salman(2 hrs)</p>
18. Practical Topics (..)	
<ul style="list-style-type: none"> • Introduction to microprocessors. • How to use emulator 8086. • Bus Interface Unit and Execution Unit. • General Purpose Registers • Special Purpose Registers 	<p>Lecturer name:</p> <p>Nyan Dawood Sallman</p> <p>(2 hrs)/ week</p>

- Memory Addressing
- Addressing Modes [Register & Immediate Addressing Modes] , [Direct & Indirect Addressing Modes].
- Register Relative & Base Plus Index Addressing Modes.
- Base Relative Plus Index Addressing Mode.
- Arithmetic Instructions [Addition, Subtraction & Comparison].
- Multiplication.
- Logical Instructions [Shift, and Rotate instruction].

19. Examinations:

Sample of the Exam paper:

Q fills in the blank

- 1- The beginning of use the cache memory inprocessor of size
- 2- There wereregister in instruction queue of 8086 microprocessor, while in 8088 microprocessor there were
- 3- Parity flag finds in earlier Intel microprocessor for.....
- 4- Bit numberin (F) Register control the operation of INTR
- 5- PUSHA performto the stack
- 6- INSD used to implement
- 7- Execution process is one of basic operations to implementing each instruction which perform 1-....., 2-....., 3.....
- 8-instruction will be checking forward and return the position of the first 1-bit encountered and saved in destination Register with making Z=1.

Q: Clarify the following briefly (with possibility of support the answer by diagram or example)

- 1- Overlapping between memory segment
- 2- Executing of PUSH [DI] instruction
- 3- multiply AX by 17 using shift instruction

Q: Answer by T or F with explaining, why True and why False? (Most of the degree about the cause rather than the notification answers).

- 1- If the Code segment begin with executing instruction at location AB00H then the instruction in physical location BB000H are throughout the same segment.
- 2- The instruction DEC [20H] is legal in assembly language.

Q: Explain what will be happens when executing PUSH EAX, where(SP=0100H, SS=0200H)?

20. Extra notes: