

TIF21-21-44

Computer Architectures

Arsitektur Komputer

BASIC INFORMATION

Course Credit	2 / 100 minutes per Week
Course Type	Required
Course Classification	Engineering Topics
Prerequisites	Digital Techniques

STUDENT AND LEARNING OUTCOMES

Covered Student Outcomes

Fundamental Engineering Knowledge (a) Engineering Awareness and Society (j)
Modern Tools Utilization (e)

Learning Outcomes

- LO1** Students can explain the parameters of computer system performance, calculate and evaluate the performance of computer systems based on various methods of performance measurement
- LO2** Students can explain the function of the internal components of the processor and describe the structure of the interconnection between component
- LO3** Students can explain the various structure and range of cache memory address mappings, explain the performance parameters of the cache memory and calculate the performance of the cache memory
- LO4** Students can explain I / O components, interactions between I / O devices and CPU
- LO5** Students may explain the Operating System support in managing I / O activities
- LO6** Students are able to recognize and explain various parallels to multiple processor systems, explaining the advantages and disadvantages of shared memory architecture and message passing architecture, explaining the parameters of multiprocessor system performance.

COURSE DESCRIPTION

The introduction and understanding of the architectural approaches applied to the design of modern computers, and their effect on the performance of computer system. Concepts used in computer architecture find application in other courses. In particular, the way in which the computer provides architectural support for programming languages and operating system facilities reinforces concepts from those areas.

TOPICS

1. Introduction
 - a. Course description
 - b. Components of a Computer System
 - c. Development of Computer Architecture
2. Computer System Performance
 - a. Performance Parameters
 - b. Amdahl's Law
 - c. Benchmarking
3. Central Processing Unit Architecture
 - a. Processor Architecture
 - b. Instruction Set
 - Instruction Set Architecture
 - Variety of Operations, Operand, and Addressing
 - RISC Architecture
 - c. Instruction Pipeline
 - The Concept of Pipelining
 - Pipeline Hazards
4. Architecture memory
 - a. The Hierarchical memory Concept
 - b. Main memory
 - c. Cache memory
 - d. Virtual memory

- e. External memory
- 5. Input / Output Architecture
 - a. I/O Interface
 - I/O devices
 - I/O Module
 - CPU Communication Techniques
 - Programmable I/O
 - Interruption
 - Direct Memory Access
 - b. Operating System & I/O devices
- 6. Parallel Architecture
 - a. Parallelism in Uniprocessor
 - Superscalar Architecture
 - VLIW Architecture
 - b. Multiprocessor
 - Shared Memory Multiprocessor
 - Message Passing Multiprocessor

REFERENCES

- [1] William Stallings, *Computer Organization And Architecture, Designing For Performance, 8th Edition*, Pearson Education, Inc., 2010.
- [2] Hennessy, John L. and David A. Patterson, *Computer Architecture: a Quantitative Approach (4th edition)*, Morgan Kaufmann, 4th edition, 2006.