Study program: Information Technology

Course title: COMPUTER SYSTEM ORGANIZATION

Teacher(s): Uroš M. Pešović

Course status: elective

Number of ECTS credits: 6

Prerequisite courses: none

Course objectives

Familiarsation with the organization of computers based on the von Neumann and Harvard architectures. Learning the functional units of computers and their characteristics; Logical design of the central processor in accordance with the architecture specification; identifying the relationship between hardware and computer system software: virtual machine, compiler and operating system.

Learning outcomes

The student knows how to explain the basic organization of a computer system; designs arithmetic/logic unit, registers, data path and controller unit of computer based on hardwired logic; writes programs in assembly language for designed computer architecture. He designed an assembler, and a translator for a high-level object-oriented language. Understands the role and design process of system software;

Content of the course

Theoretical teaching

Basic organization of computer systems. Boolean logic and design of arithmetic/logic unit, sequential logic and design of registers and memory. Design of computer instruction set architecture. Design of processor data-path and hardwired logic based control unit. Program and data memory. Memory-mapped input/output devices. Design of assembler, virtual machine and compiler for object oriented language.

Practical teaching

Practical application and verification of acquired knowledge through solving tasks using hardware description language and writing assembler and object oriented programs and execution on simulator.

Literature

[1] Noam Nissan, Shimon Schocken, The Elements of Computing Systems: Building a Modern Computer from First Principles, MIT Press, Second Edition, 2021, ISBN: 9780262539807

[2] David Patterson, John Hennessy, Computer Organization and Design - The Hardware/Software Interface: RISC-V Edition, Morgan Kaufmann; 1st edition, 2017, ISBN: 978-0128122754

[3] William Stallings, Организација и архитектура рачунара: пројекат у функцији перформанси, (превод деветог издања), CET, Београд, 2012, ISBN: 978-86-7991-361-6

[4] Andrew Tanenbaum, Архитектура и организација рачунара, Микро књига, Београд, 2007, ISBN: 978-86-7555-314-4

[5] Јован Ђорђевић, Архитектура рачунара : едукациони рачунарски систем: архитектура и организација рачунарског система, Академска мисао, Београд, 2002, ISBN: 86-7466-090-8

[6] Kip Irvine, Assembly language for x86 processors, 7th Edition, Pearson, 2014, ISBN: 978-0-13-376940-1

Number of active teaching classes: 4	**Theoretical teaching: 2**	**Practical teaching: 2**

Teaching methods

Realization of lectures according to the model of interactive teaching with the use of practical work methods.

Evaluation of knowledge (maximum number of points 100)

Pre-exam obligations	**Points**	**Final exam**	**Points**
Activities during teaching process	/	Final exam (written):	20
Practical teaching	10	Final exam (oral):	30
Colloquium	40		
Practical teaching	/		