COM 410, Computer Architecture

American University of Central Asia
Software Engineering Program

1   Course Information

Course ID
    COM 410, 3268

Course Repository
    https://github.com/auca/com.410

Class Discussions
    https://piazza.com/auca.kg/spring2019/com410

Place
    AUCA, room 410
    AUCA, laboratory G31

Time
    Lecture: Monday 10:50–12:05
    Lab: Wednesday 10:50–12:05
    Lab: Wednesday 12:45–14:00
    Lab: Friday 10:50–12:05

2   Prerequisites

- COM-117, Object-Oriented Programming

- or COM-223, Algorithms and Data Structures

- or COM-311, Circuit Engineering

3   Contact Information

Instructor
    Toksaitov Dmitrii Alexandrovich
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Teacher Assistants
    Umarbaev Bektur
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Office
    AUCA, room 315

Office Hours
    Sat, Sun (remotely through Skype at toksaitov@hotmail.com
    Additional office hours are scheduled by TAs

4 Course Overview

The course introduces students to the topic of computer architecture and organization. Students will focus on studying the structure and design of modern central processing units. During lab sessions, students will learn the basics of the x86 instruction set, the assembly language for the platform mentioned above, and the representation of high-level language structures in the low-level language.

5 Topics Covered

- The modern computer architectures and organization

- The x86 and x86-64 assembly languages

- Representation of high-level language structures in low-level assembly languages

- Acceleration with SIMD instructions

- System emulation

6 Examinations

6.1 Lectures

Students will have to take a midterm and final examinations on topics discussed during lectures. Each exam is in the form of a quiz with a set of open and multiple choice questions.

6.2 Labs

Students will have a number of laboratory tasks to finish on their own. Students will have to defend their work to the instructor during separate midterm and final examination sessions.

7   Course Projects

Throughout the course, students will have to work on one significant project. The work will require to accelerate an image processing application by optimizing the hot path of a C program in x86-64 assembly.

8   Course Materials, Recordings and Screencasts

Students will find all the course materials on GitHub. We hope that by working with GitHub, students will become familiar with the Git version control system and the popular (among developers) GitHub service. Though version control is not the focus of the course, some course tasks may have to be submitted through it on the GitHub Classroom service.

Every class is screencasted online and recorded to YouTube for students convenience. An ability to watch classes remotely MUST NOT be the reason not to attend the class. Active class participation is necessary to succeed in this course.

9   Reading

- Computer Architecture: A Quantitative Approach, 5th Edition by David Patterson and John L. Hennessy (ISBN: 978-0123838728)

- Assembly Language for x86 Processors, 7th Edition by Kip R. Irvine

10   Grading

- Class participation (through Piazza) (5%)

- Lab Midterm (20%)

- Lab Final (25%)

- Lecture Midterm (10%)

- Lecture Final (15%)

- Course projects (30%)

 – 92%–100%: A
 – 85%–91%: A-
 – 80%–84%: B+
 – 75%–79%: B
 – 70%–74%: B-
 – 65%–69%: C+

- 60%–64%: C
- 55%–59%: C-
- 50%–54%: D+
- 45%–49%: D
- 40%–44%: D-
- Less than 39%: F

11 Rules

Students are required to follow the rules of conduct of the Software Engineering Department and the American University of Central Asia.

Teamwork is NOT encouraged. The same blocks of code or similar structural pieces in separate works will be considered as academic dishonesty, and all parties will get zero for the task.

Attendance is mandatory. More than three misses without reason will result in 5 points being deducted from the student. If a student has health/family/personal emergency, he must notify the instructor if possible (through e-mail), to increases the chances for the miss to be not counted.

Active work during the class may be awarded up to 10 points at the instructors discretion.

Poor student performance during a class can lead to up to 3 points deducted from his final grade.

Late submissions will receive a penalty of 10 points for every day after the deadline.