Fall Semester 2017

From Nand to Tetris (CS 492B)

Lecturer: Otfried Cheong

TAs: none

Lecture time: Wed 16:00–17:15, Fri 13:00–14:15

Course webpage:
http://otfried.org/courses/cs492fall2017

Administrative

Piazza

I use Piazza (see webpage) for all announcements (class changes, exams, homeworks) and for answering all questions about the course contents or the homeworks.
Students can ask questions anonymously. You can ask questions in English or Korean.
You can access Piazza online or through the Piazza app.
You can have all announcements emailed to you automatically.

You must register on Piazza if you want to take this course successfully!

Why Q&A on Piazza?

- Nice Wiki format, where users can work together to answer a question. Student answer / instructor answer.
- Notifications and smartphone app let me answer questions very quickly.
- Students can ask questions anonymously.
- I'm teaching two new courses this semester, and I work with Piazza much more efficiently.

Grading and Homework

Homework

Many, but small graded programming projects (1 – 3 weeks time),

Homework requirement

You must submit all programming projects. Fail to submit one project and you fail the course.

Participation

We will take attendance in every class. You have four missed classes free—use this for doctor appointments, interviews, etc. You do not need to send me email about missing a class.

Grading Policy

Programming projects (30%), Midterm exam (30%), Final exam (30%), Participation (10%).

Student level

We have students from 2nd year undergraduate up to Ph.D. students!

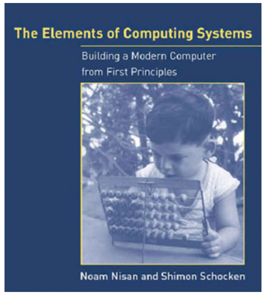
You are all welcome!

But note: if this course becomes permanent, it will most likely have a 2xx course number.

To make it more apppropriate for graduate students, and to be fair to the undergraduates, we will:

- have extra projects for graduate students,
- have different exams for graduate students,
- grade undergraduates and graduate students separately.

Course materials


The Elements of Computing Systems
Building a Modern Computer from First Principles
Noam Nisan and Shimon Schocken

We will closely follow the textbook.

It comes with a website:
`www.nand2tetris.org`

The first six book chapters (hardware) are available as PDF files on the website. You also need to download the software (nand2tetris.zip).

In the first half of the semester we will only use the HardwareSimulator from the software package.

What is this course about?

We want to learn how a computer really works.

Not just a rough idea—but down to every detail!

We achieve this by building a computer system from scratch, using nothing but logic gates.

We will learn everything we need to know in order to construct a working processor with RAM and ROM. We will then program this computer in machine language.

The next step is to write a compiler and a system library so we can program in a higher-level language.

I'm not sure how much of that material I want to cover, because it overlaps with the compiler course and is not so essential to "understanding how a computer works."

Let's keep realistic

The processor we will build will not be a state-of-the-art Intel CPU.

A state-of-the-art CPU has billions of transistors, took years of development effort, and would require a supercomputer to simulate.

Our processor will be more similar to 8-bit microprocessors such as AVR chips, used on Arduino and in many embedded systems.

This doesn't stop us from learning how a computer works: All the additional "stuff" in modern CPUs is optimization: hardware floating point arithmetic, caches, complex instruction sets, etc.