Institut for Matematik og Datalogi
Syddansk Universitet

August 23, 2011
JFB

Introduction to Computer Science
E11 – Lecture 1

Textbook

Computer Science: An Overview, 11th Edition, by J. Glenn Brookshear, 2012.

The textbook will be supplemented with notes.

Format

The course is being taught by Joan Boyar. You will meet some of the other faculty members in the department during this course, since they will also give some lectures.

The weekly notes and other information about the course are available through the Worldwide Web. Use the URL:

http://www.imada.sdu.dk/∼joan/intro/index.html

You are responsible for finding all weekly notes there (or in Blackboard) yourself. Please read the appropriate sections in the textbook or notes before coming to class and bring your textbook with you. Preparing for discussion sections (and labs) is important. Some of this can be done in your study groups.

The weekly notes will generally contain information about upcoming lectures, problems for the discussion sections, and the assignments.

The discussion sections will sometimes be problems sessions and sometimes labs. Labs will be held in IMADA's Terminal Room. During the first seven weeks (the first quarter), the "instruktor" for one section will be Artavazd Hakhverdyan (artavazd19@gmail.com), and the "instruktor" for the other will be Magnus Gausdal Find (magnus@gausdalfind.dk). They will be teaching the discussion sections (problem sessions and labs). The first problem

session will be on Friday, September 2. The first lab will be on Wednesday, September 7.

The course will be graded on a Pass/Fail basis, and satisfactory completion of all assignments is required to pass. "Satisfactory completion" means that the answers are correct, with only very minor errors, and that they have been turned in on time.

You are allowed to retry (at most once) on at most 2 assignments which were not approved (among assignments 2 through 7) If you turn in an assignment late (regardless of the reason), it will not be approved, and you will have to use a retry on it. These assignments count as the exam in the course, so cheating on these assignments is viewed as cheating on an exam. You are allowed to talk about course material with your fellow students, but working together on assignments is cheating. If you have questions about the assignments, come to me (Joan Boyar) or your "instruktor".

You should turn a paper copy of each assignments and an identical copy via Blackboard. Always turn in a PDF file via Blackboard. Your full name and your section number (S7 or S17) should be clear on the first page. Note that in the upper left hand corner of the screen in Blackboard, there is an icon which you can click on to expand the the menu for the course. It is just to the left of the code for and name of the course. Then, when you want to see the result of what you clicked on in this menu, you can expend the menu to full screen. The assignment hand-in is under "Tools". Keep the receipt it gives you proving that you turned your assignment in on time. Blackboard will not allow you to turn in an assignment late. Note that retries must be turned in to me directly and must include both the old version which was not approved (including comments from being graded) and two copies of the retry.

The first-year computer science students will have a project which is due on September 8 and the other students will have an assignment due at the same time. These will both be available from the course home page shortly after class on August 30, probably by 10:20. (This will be referred to as assignment 1, which explains why assignments 2 through 7 were mentioned above.)

I have office hours on Mondays and Wednesdays from 9:00 to 9:45, but am also available at other times.

Lecture, August 30, 8:15–10, U26

We will begin with an introduction to the course, covering chapter 0 in the textbook, but skipping section 0.2. Sections 5.1 and 5.2 will be partially covered to introduce algorithms. We will also begin on chapter 1.

Lecture, September 1, 12:15–14, U26

There will be a brief introduction to LaTeX. We will also cover more of chapter 1 in the textbook.

The textbook's interpretation of the mantissa in floating-point representations is not the same as the IEEE-standard and hence somewhat outdated: The book says that the mantissa 1010 means 0.1010 and that the first bit is always 1 in normalized numbers. IEEE-standard says that 1010 means 1.1010, meaning that the fixed normalization bit is a "hidden bit" or "implicit bit" before the radix point. In calculating the value represented by the mantissa, an extra 1 is added. This way the first bit in the mantissa may be 0. Notes about the IEEE standard can be found at http://steve.hollasch.net/cgindex/coding/ieeefloat.html. (For problems in this course, we will use the format described in the textbook, using the same number of bits, but the mantissa will have this IEEE-standard form, with the implicit bit.)

Lecture, September 6, 8:15–10, U26

We will finish chapter 1.

Study group for first-year students September 1, 10:15-12

- Consider the problems for the discussion section on September 2. Be prepared for someone in your study group to present problems in discussion section on September 2. Group 1 should prepare problems 2 and 9. Group 2 should prepare problems 3, 4, and 7. Group 3 should prepare problems 5, 6 and 8.

- Prepare a question about something from one of the first two lectures to ask in discussion section (or lecture).

Discussion section: September 2

S7 will be in U49b 14:15-16.
S17 will be in U51 10:15-12.

1. Divide into groups of four (or three) people. One person will choose five cards to give to the first "performer", the first performer will give four of them to the second "performer", one at a time, and the second performer will announce what the fifth card is. Each person should practice each "performer" part at least three times.

2. Propose at least on method for improving the magic trick. For example, if the first card determines the suit, after seeing the trick repeated several times, the audience might find it easier to guess how it is done. Define an algorithm for a modification of the trick which makes this harder to see.

3. Propose an algorithm for doing a magic trick, where one performer is thinking of a number between 1 and 24, tells the audience the number, gets some cards from the audience, and passes some cards to the second performer, who announces the number.

4. Discuss how to extend this to larger numbers than 24. When might it be better to only use the color on the card (whether it is red or black, but also consider using the four different suits), rather than some permutation (ordering) of the cards?

5. Find a "bad" pair of integers for the greatest common divisor algorithm, where a pair is bad if the algorithms must perform a lot of steps relative to how large the numbers are. (One expects more steps for larger numbers.)

6. Do problem 2 in the Chapter Review Problems for Chapter 1 (page 81).

7. Design a circuit, using only AND, OR and NOT gates which takes three bits as input and outputs a 1 if the input has at least two zeros, and a 0 otherwise.

8. Design and draw a circuit containing only AND and XOR gates (with at most two inputs) which takes three bits as input and outputs a 1 if the input has at least two ones, and a 0 otherwise.

   (In the student resources for the course textbook, under the Activities for Chapter 1, there is a simulator for logic circuits which you could use to check your circuit. It is time consuming to use, though.) As an extra challenge, try to do it so that there is only one AND gate, though more XOR gates. (Minimizing the number of AND gates can be useful in some cryptographic applications.)

9. Write up an algorithm for one of the possibilities mentioned in the first paragraph of section 0.1. (For example, give a clear, unambiguous algorithm for getting from where you live to U26 at SDU.)

10. Discuss questions 2, 4 and 5 on page 30 of the textbook.

Laboratory: September 7, IMADA's terminal room

Meet in IMADA's terminal room with your login information. Work in groups of size 2 (maybe one of size 3). This lab is about LaTeX. Look at the notes written by Torben Nielsen and Arun Vadiveal on LaTeX on the homepage for the course: http://imada.sdu.dk/∼joan/intro/latexbook.ps There are also two other useful links about LaTeX available on the course's homepage.