Computer Fundamentals

6L for CST/NST 1A

Michaelmas 2010

MWF @ 10, Arts School “A”

Aims & Objectives

- This course aims to:
  - give you a general understanding of how a computer works
  - introduce you to assembly-level programming
  - prepare you for future courses. . .
- At the end of the course you'll be able to:
  - describe the fetch-execute cycle of a computer
  - understand the different types of information which may be stored within a computer memory
  - write a simple assembly language program

Recommended Reading

- This course doesn't follow any particular book exactly, but any of the following are useful:
  - ***Computer Organization & Design*** (4th Ed), Patterson and Hennessy, Morgan Kaufmann 2008
    - also used in CST Part 1B "Computer Design"
  - ***Digital Design and Computer Architecture***, Harris and Harris, Morgan Kaufmann 2007
    - also used in CST Part 1A "Digital Electronics"
  - ***Structured Computer Organization*** (5th Ed), Tannenbaum, Prentice-Hall 2005
    - good general overview book; somewhat broader in scope, and somewhat simpler to digest than above

Course Outline

- We'll cover the following topics:
  - **A Brief History of Computing**
  - **Operation of a Simple Computer**
  - **Input / Output**
  - **MIPS Assembly Language**
- This course is new this year, but derives from Part I of pre-2010 CST 1A "Operating Systems"
  - This will help in finding e.g. past exam questions
- Feel free to ask questions during the lecture
  - or after it, or via email – see course web page

A Chronology of Early Computing

- (several BC): abacus used for counting
- **1614**: logarithms discovered (John Napier)
- **1622**: invention of the slide rule (Robert Bissaker)
- **1642**: First mechanical digital calculator (Pascal)
- Charles Babbage (U. Cambridge) invents:
  - **1812**: "Difference Engine"
  - **1833**: "Analytical Engine"
- **1890**: First electro-mechanical punched card data-processing machine (Hollerith)
- **1905**: Vacuum tube/triode invented (De Forest)