* Machine Language = binary
* Assembly language is pneumonic.
  + Mnemonic is usually 3 or 4 letters.
  + Used to translate into machine language
* Programmer groups
  + Application programmers
  + Systems programmers – write the assembler; used by application programmers to solve problems
* High level languages
  + Includes Fortran, COBOL
  + High level (outside) > assembly > machine (center)
  + System programmers write translators for high level languages
  + Application programmers use high level languages to solve problems
* Systems software (Third Generation Software)
  + Utility programs (printing, copy, paste, save, open, virus protection)
  + Language translators
  + OS
  + Loaders: loads program into memory
  + Linkers: linked pieces of large programs together
  + Compiler: translates program code into machine language
  + Separation between users and hardware
  + Application packages > systems software > high level languages > assembly > machine
* Fourth generation (1971-1989)
  + Structured programming
    - Pascal
    - C++
      * Derived from C
        + created Sun Microsystems, used for Unix computers
    - Basic
  + New application software for users
    - Spreadsheets
    - Word processors
    - Database management systems
  + First GUI interface (1984)
* Fifth Generation (1990- present)
  + Microsoft
    - Windows OS and other applications
  + Object oriented design
  + Based on hierarchy of data objects (C++, Java, etc)
  + Internet (World Wide Web)
    - Tim Bernis-Lee at CERN, creates HTML(1990)  
      Marc Anderson and Eric Bine released Mosaic (Netscape) (1993)
  + New users
    - Today's users needs no computer knowledge
* Computing as a discipline
  + What can be efficiently automated
    - Four necessary skills
      * Algorithmic thinking
      * Representation
      * Programming
      * Design
  + CS is combination of math, science, and engineering
* Systems areas examples
  + Algorithms and data structures
  + Programming languages
  + Architecture
  + Operating systems
  + Software engineering
  + Human-computer communication
* Application area examples
  + Numerical and symbolic computation
  + Databases and information retrieval
  + Intelligent systems
  + Graphics and visual computing
  + Net-centric computing
  + Computation science
* Ethical issues
  + The digital divide
    - This disparity the information age has (page 27)
    - Computer literacy is different things to different people.
* See page 11, 20 (graph theory), `22 (Room to Read), 16 (first CS programs at Stanford, Purdue)
* 1985 Jobs started another company called Next.