Today’s topics

Industry Practice
  Software Engineering

Upcoming
  The Killer Robot

Reading
  Great Ideas, Chapters 7

Engineering a Program

- Programming in the Large
  - Not the toy programs we are writing and demonstrating
- What do we require of Software Products for Commercial or Industrial Use?
  - Robustness
  - Testing
  - Documentation
  - Customer Support
    - User Friendliness
    - Help Desk
  - Training
  - Follow on Products
    - Dealing with Competing Products
    - “Creeping Featurism”

Program Life Cycle

- Define the Product
- Developing the Program Specifications
- Designing the System Structure
- Coding the System (small part!)
- Testing the Code
- Revision
- Documentation
- Delivery and Training
- Maintenance and Upgrade
- Waterfall Model
- Rapid Prototype

Program Life Cycle

- Understanding Problem / Specification
  - Communicating with the Customer
    - Possible role of user documentation
  - Specification language
- Implementation Strategies
  - Top Down Implementation
    - Stubs
    - Output First
  - Test as you go
    1. Make it Run
    2. Make it Right
    3. Make it Fast
**Program Life Cycle**

- Debugging (dealing with *Defects*)
  - Testing
  - Can only show *presence, not absence* of bugs
  - Design for Testability
    - Modular
    - Hierarchical
- Correctness
  - Proofs
    - Formal Definition of Specs
    - Formal definition language
  - Very hard
  - Use in life-critical applications
  - What is a correct Graphical User Interface (GUI)?

**Aspects of Software Engineering**

- Psychology of Programming has its effects
  - Design by Committee (good or bad?)
  - Communications problems
  - Interaction
  - Creator Independence
  - 2nd System Syndrome
- Organizational Schemes
  - Chief Programmer Team (Harlan Mills)
    - NY Time Morgue Project
    - Surgical Team Model
    - Assume that some people are 100 time better than others when programming

**Program Life Cycle**

- Documentation
  - Comments on comments in code
    - Program header
    - Block header
    - Procedure (method) specs
      - Preconditions
      - Postconditions
    - Variable descriptions
- Net Productivity:
  - 15 LINES OF CODE / DAY

**Aspects of Software Engineering**

- Nitty-Gritty Practical Problems
  - Back-ups
  - Revision Control System
  - Backwards Compatibility
  - Staff Turnover
  - Pleasant Environment
    - Silicon Valley
    - SAS
- Programming Tools (CASE)