

Surgical Team – Harlan Mills

- Surgeon – all of the design, programming, testing- at least 10 years experience and “super programmer”
- Co-Surgeon – thinks and evaluates. Super Programmer with less experience
- Administrator – takes care of people, money and machinery

Surgical Team – Harlan Mills

- Editor – takes care of documentation
- Program Clerk – maintains machine readable and human readable files
- Toolsmith – constructs, maintains and upgrades special tools (editors, debuggers, etc.)
- Tester – black box testing from specifications

Surgical Team – Harlan Mills

- Language Lawyer – knows the source language very well – finds ways of dealing with the language
- 2 Secretaries – Administrator, Editor

Surgical Team – Harlan Mills

- Conventional Team – equal pieces for each member
- Surgical team

- If 200 people are on a project: -- Coordinate 200 minds or 20

Design Methodologies

- Functional Decomposition
 - Top – ultimate function
 - Divide the rest into subfunctions decomposing with respect to time, data control flow, etc.

Design Methodologies

- Hierarchical Design
 1. Calling Hierarchy
T.H.E. system – Dijkstra 1968
 2. “USES” Hierarchy – Parnas 1975
“A uses B if correct execution of B is necessary for A to complete its work”

Design Methodologies

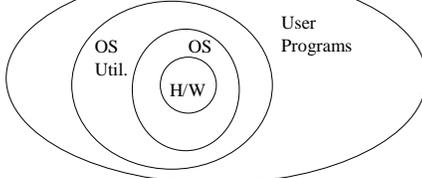
- 3. Dependency Hierarchy – Jansen, 1977
 - A calls B and expects B to return control and possible results
 - A sends a message to B and expects a reply
 - A and B share a data structure

Hierarchies

- Strict
 - A module at level I may “call” anything at level I + 1
- Weak
 - A module at level I may “call” anything at level I or higher

Design Methodologies

- Bottom – Up Design
 - Process of enhancing your machine by giving it more powerful instructions which hide more of the detail.



Software Design Strategies

- Modular Design
- *Why is a Module?*
- Characteristics of a Module
 1. 1 function
 2. Separately testable
 3. Single entry and exit point

Software Design Strategies

- What is the size of a module?
- Lower Bound
- Upper Bound

Software Design Strategies

- Advantages of Modular Programming
 1. Easier to read
 2. Easier to maintain
 3. Easier to test
 4. More reliable
 5. Easier to understand

Software Design Strategies

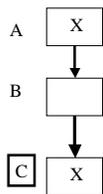
- Disadvantages of Modular Programming
 1. Inefficient
 1. Memory
 2. Speed
 2. More cost for design
 3. More expensive to train programmers

Software Design Strategies

- Modular Program – a program made up of modules

C needs some information from

A



- Choices
 1. Pass X through B
 2. Make X global
 3. Re-design

Information Hiding -- Parnas

The technique of encapsulating software design decisions in modules in such a way that the module interfaces reveal as little as possible about the module's inner workings; thus each module is a "black box" to the other modules in the system. The discipline of Information Hiding forbids the use of information about a module which is not in the module's interface specification.