

(while you're designing)

Design for Test

Design for Test

- Products will have faults ("bugs").
- The purpose of testing is to be able to find those faults, to enable their correction.
- Testability can be designed into the product.
- This is easier than adding it later.

Levels of Testing

- Unit tests:
 - Test of methods or functions
 - Tests of entire classes
- Sub-system tests:
 - Tests of inter-operation of related functions and classes
- Integration tests:
 - Test of entire system

White-Box Test Coverage

- Devise tests to cover every aspect of the code:
 - Every statement gets exercised
 - Every loop gets exercised
 - Every variable gets used

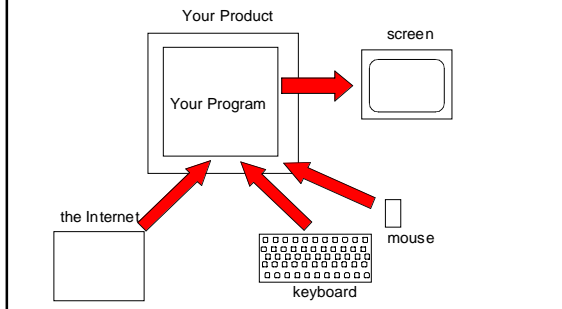
Trace Capability

- Generally speaking, it is not a good idea to interleave i/o statements with computational ones:
 - Keep the i/o in a separate section
 - Interact with the outside through well-defined interfaces.
- Consider creating a log facility that can be toggled on or off. The program describes what is doing in the log.

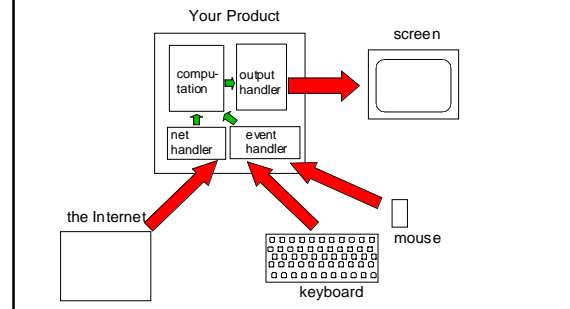
Testing a GUI

- Testing GUI's can be difficult.
- Design for test can help:
 - As with other i/o, keep event handling separate from computation.
 - Consider creating a synthetic driver that will simulate your GUI but be driven from a script.

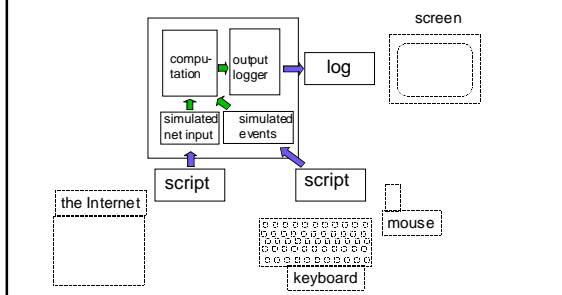
Monolithic Design (Bad)



Layered Design (Good)



Test Harness



Log Design

- Repeat inputs and events in the log, so that stimulus/response can be checked.
- Design log for diff-type comparison with other logs.
 - Do not include things like memory addresses in log.
 - Prefer sequence numbers rather than timestamps.
 - Prefer relative quantities to absolute ones.

Log Analysis

- Log analysis can be a separate step
 - Possibly off-line program
- Do not try to put much analysis in the logger itself
 - Introduces error possibilities
 - Want to see the results in relatively unprocessed form

Regression Testing

- Put test drivers in the Makefile and run them with every build (not necessarily every compile).
- Compare output with a known "standard".
- Initially, this can be a previous output of the program. Eventually this aspect must be checked carefully.