STAR Laboratory of Advanced Research on Software Technology

Code Coverage Testing & Tool Support

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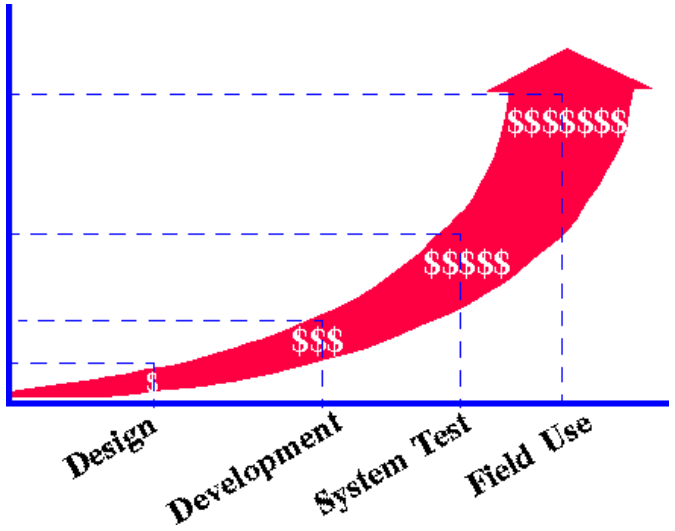
Importance of Code Coverage Testing

- In general, a piece of code must be executed before a fault in it can be exposed
- *Help early fault detection*
  - Are system testers finding faults that should have been found and fixed by developers?
  - Relative cost of fixing a software fault



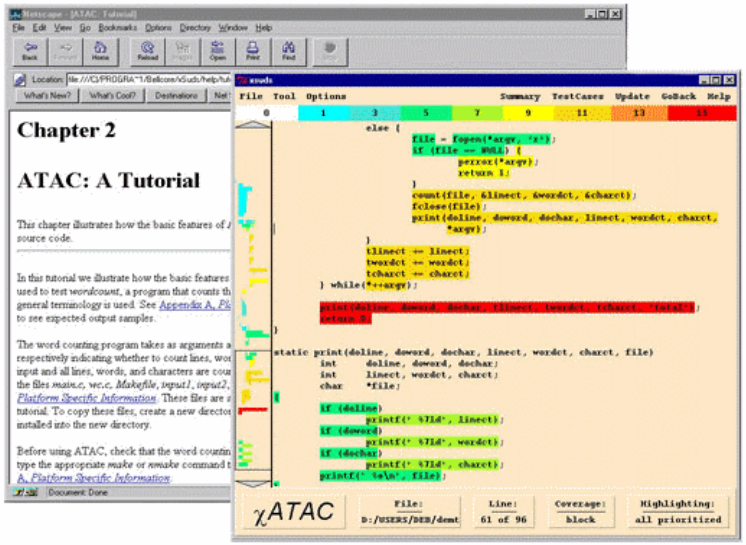
χSuds Home Page

Telcordia™ Technologies

Performance from Experience

Telcordia Software Visualization and Analysis Toolsuite

- Tool Information
- Products
- User Manual
- Demo
- FAQ
- People
- Telcordia Home



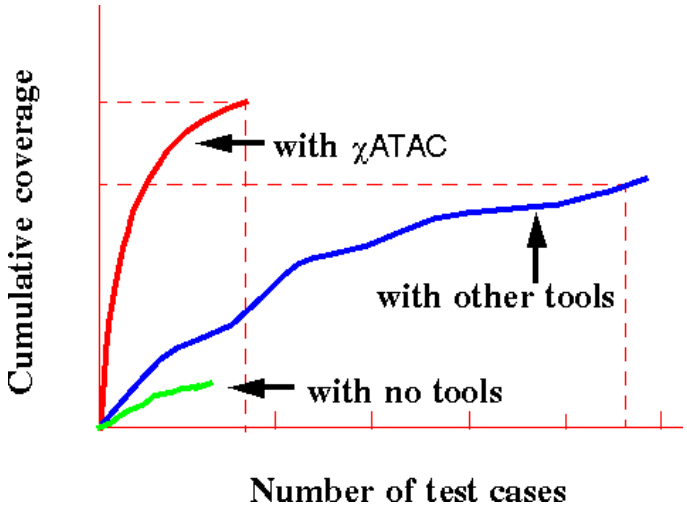
http://xsuds.argreenhouse.com

The χSuds Tool Suite

- Telcordia Technologies (formerly Bellcore or Bell Communications Research)
  - χSuds (Software understanding and diagnosis systems): a set of software testing, analysis, and understanding tools for C and C++ programs
    - χATAC
    - χSlice
    - χRegress
    - χVue
    - χProf

Efficient Coverage Testing (1)

- How much code is currently tested? What is missing?
  - Which statements were exercised?
  - Which paths were traversed?
  - Which def-use associations were exercised?
  - Which functions got invoked from where?
- Need help in creating tests?
  - Which statement should I try to cover next?

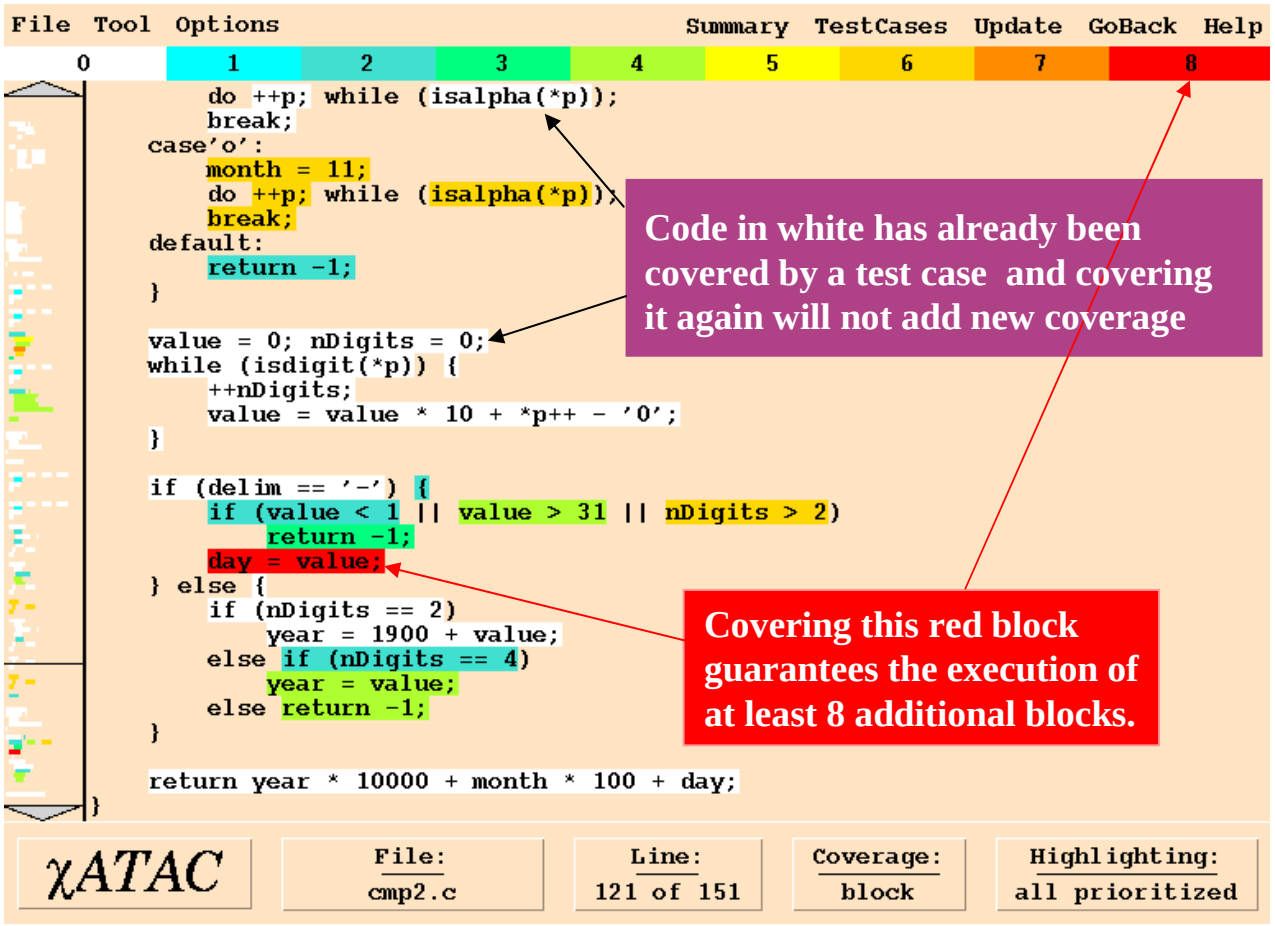


Analyzing the controlflow graph of the program to find the dominant blocks, decisions, and def-use pairs.

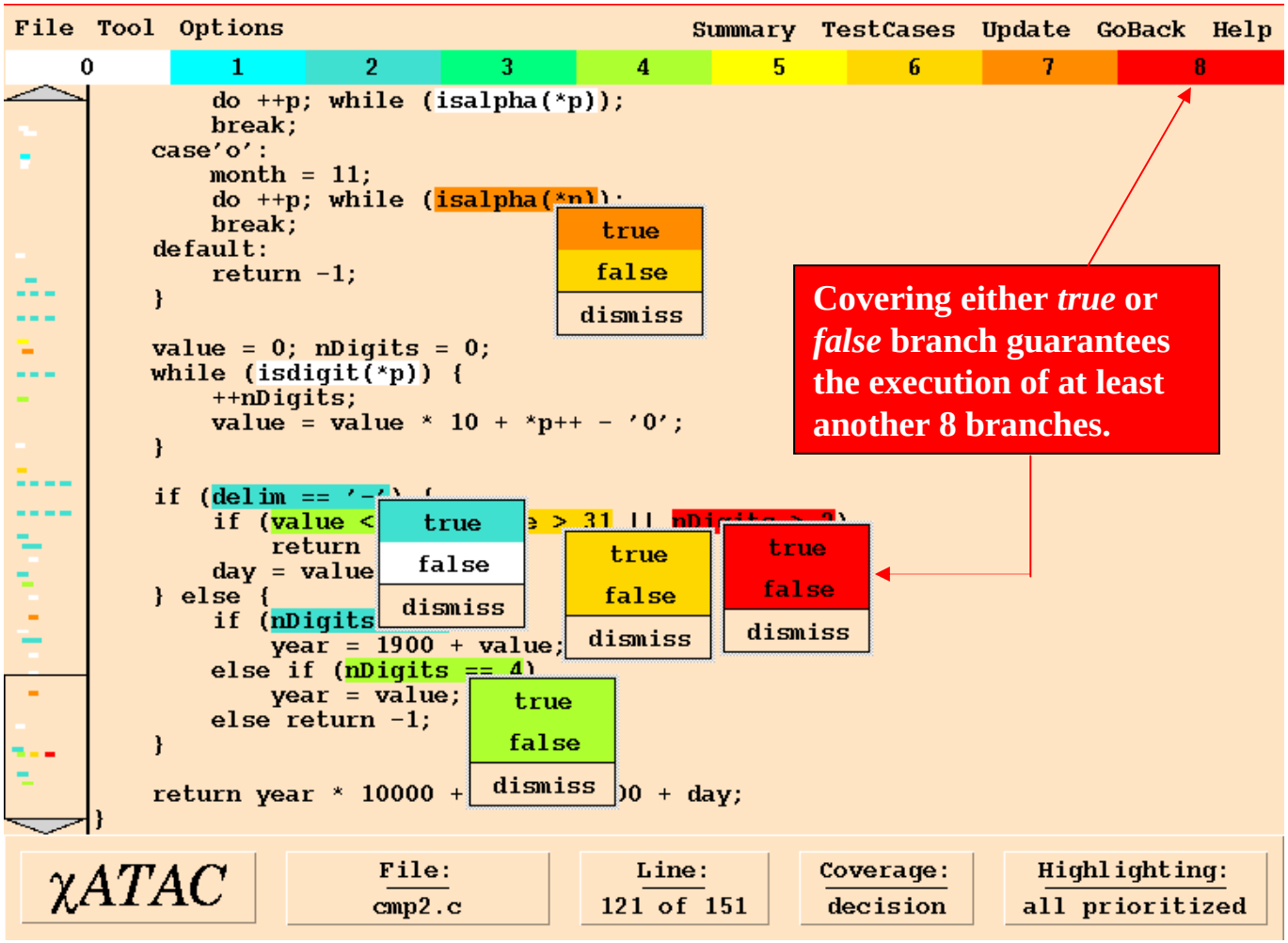
For example, when a test covers highly dominant blocks it will cover many other blocks.

Efficient Coverage Testing (2)

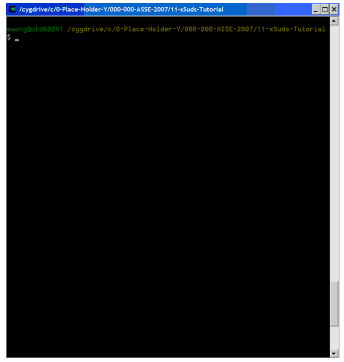
- Use *prioritization* and *visualization* to provide hot spots that give the most value in coverage.
- Each color represents a different weight determined by a control flow analysis using the concept of superblocks and dominators.



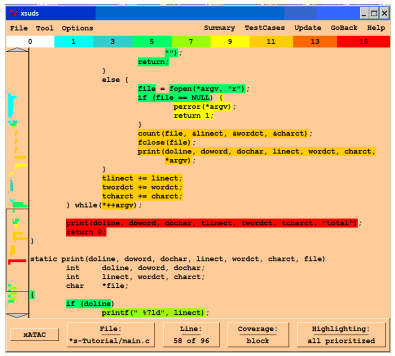
Efficient Coverage Testing (3)



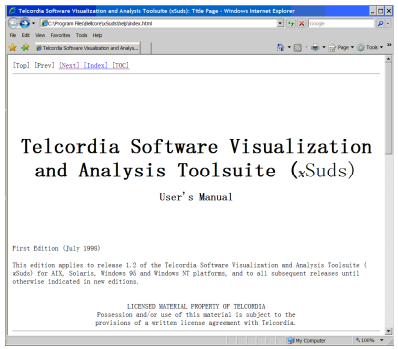
χATAC Demo: Coverage Testing of C Code



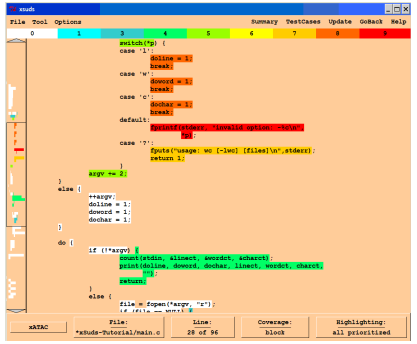
Compile code with χATAC



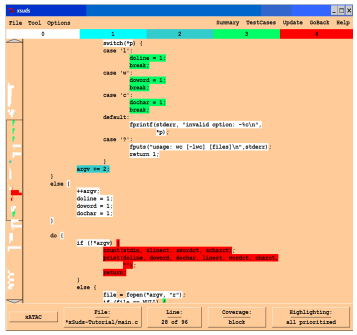
Initial display



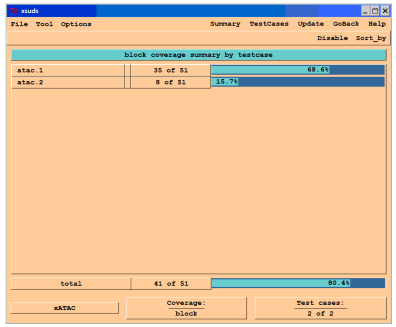
χSuds User's Manual



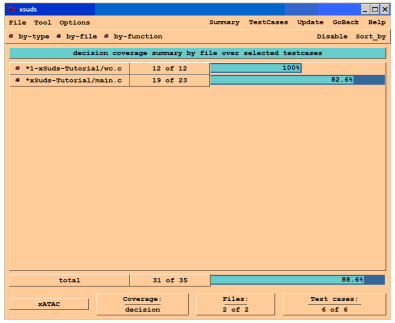
Source display after executing wordcount.1



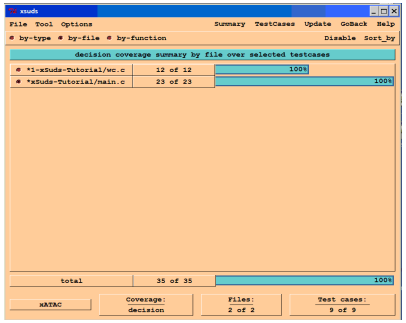
Source display after executing wordcount.2



100 % block coverage after executing wordcount.5



Source display after executing wordcount.6



100 % block & decision coverage after executing wordcount.9

Coverage Testing Tools for Java Code

- eXVantage (eXtreme Visual-aid novel testing and generation)
  - A tool suite for code coverage prioritization, test generation, test execution, debugging, and performance profiling of Java, C, and C++ programs
  - Based on the JBT (Java Bytecode Testing) tool suite developed at UTD since 2002
- Clover
- Cobertura
- etc.