Software Fault Tolerance Techniques
Kathryn Bergmann
January 27, 2005

Fault Tolerance Today
- Problem
  - Obtaining good fault detection & correction without using excessive resources, altering timing, etc.
  - SW is becoming more complex and replacing HW
- Solution
  - Develop Fault Tolerance techniques to increase SW reliability

Fault Tolerance Techniques
- Hardware backup
- N-version software redundancy
- Error Correction Codes
  - Roll-back
  - Roll-forward

N-Version Software
- Initially proposed 1966, IEEE Workshop of the Organization of Reliable Automata
- 1975 official research began
Relevant Paper

- “N-Version Programming: A Fault-Tolerance Approach to Reliability of Software Operation” by Chen and Avizienis
- Published 1978
- Classic Paper, best of the last 25 years

Paper Findings

- Implemented N-version programming in two systems
  - One success, one not so successful
  - Ideas to make it more successful
  - Still a potentially effective approach

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