**N-Version Software Fault Tolerance Techniques**

Project Update

Kathryn Bergmann
February 17, 2005

---

**N-Version Software Techniques**

- Two main techniques
  - N-Version Programming
  - Recovery Blocks
- Many variations of these...

---

**1960s & 70s: Initial Research**

- Fault tolerance first proposed at NATO 1968
  - Acknowledgement that software will have bugs
- Research began in the mid 70s

---

**1980s: Initial Implementations**

- Problems found in NVP
  - Common mode failures
  - Comparison of numbers
- More advanced versions of RBs
1990s: Determine location of errors
- Algorithmically find source of errors during operation
- Based on control system algorithms
- Allows ability to rewrite problem areas

2000s: Fix errors during operation
- Acknowledgement that specifications will have bugs
- Begin weighting dependability of software versions based on deviation from majority behavior

Common Research Methods
- Implement an Enhanced Solution and report on Experience
  - Techniques build on each other – nothing radical
  - Tools generally not used
  - Not many new methods in this area
- I will be focusing on Experience for my research method

Questions?