an URI / NEU collaboration

multipath execution in a large distributed microarchitecture

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Outline

- **introduction**
  - Can multipath execution mitigate difficult-to-predict (low confidence) branch misprediction penalties ?
- **background**
- **conditional branch characterization**
  - branches at domain size
  - mispredictions at domain size
  - branches at prediction accuracy
- **distributed microarchitecture**
  - what we want to capture
  - how we do it
- **results**
  - IPC with only single path execution
  - IPC speedups using multipath execution
- **summary**

background

- **in the beginning ...**
  - IBM System/360 Model 91 (1967) -- fetch down both outcomes
  - IBM 3033 (1979) -- execute down both outcomes
- **Wang --** explores going down both paths of conditional branch outcomes
- **Uht and Sindagi --** disjoint eager execution (1995)
- **Heil and Smith --** dual path execution
- **Kauser et al --** Polypath microarchitecture
- **Tullsen et al** -- other SMT threads to fill in for branch mispredictions
- **Wallace et al** -- multipath using SMT (subordinate multithreading)
- **Ahuja et al** -- limits to speedups w/ multipath execution