AUDIT: Stress Testing the Automatic Way

Tuesday 9:00am, Dec. 4th, 2012

Session IIIIB - Energy II
AUDIT: AUtomated DI/dT Stressmark Generation

- is an **automation framework for stressmark generation**
  - Target: Multi-core processor
  - Finding Max. Voltage Droop: Genetic Algorithm with hardware measurement
- generates **effective di/dt stressmarks in a short time**
  - Larger voltage droop than other benchmarks/stressmarks
  - Higher voltage failure points than other benchmarks/stressmarks
- works well with **different configurations / architectures**
  - Throttling off / on
  - Different processor
Characteristics of $\text{di/dt}$ Voltage Noise
Supply Voltage Failure Symptoms

- Unexpected Value / Wrong Result
  - bit-flip: 0 → 1 or 1 → 0

- OS Freezing / System Hang

- Blue Screen

- Sudden Shutdown
AUDIT – Hardware Measurement

- Hardware Measurement for Max. Voltage Droop and Power

1GHz Bandwidth & 5GS/s

1.7GHz Differential Probe for VDD
Experimental Results - Max. Voltage Droop

Relative Droop of Stressmarks

- Larger Droop

Relative to SM1

0.0% 20.0% 40.0% 60.0% 80.0% 100.0% 120.0% 140.0% 160.0%


100.0%
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