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Problem

- Digital circuits are becoming more vulnerable to transient, intermittent and permanent in-field faults.
- Traditional post-fabrication burn-in testing is no longer sufficient.

Online testing is necessary

- Static Online Testing → Significant performance and energy overheads.

Adaptive Online testing

Solution

Thorough (Static)

Fault Coverage ↑
Testing Time and Energy ↑

SignTest (Adaptive)

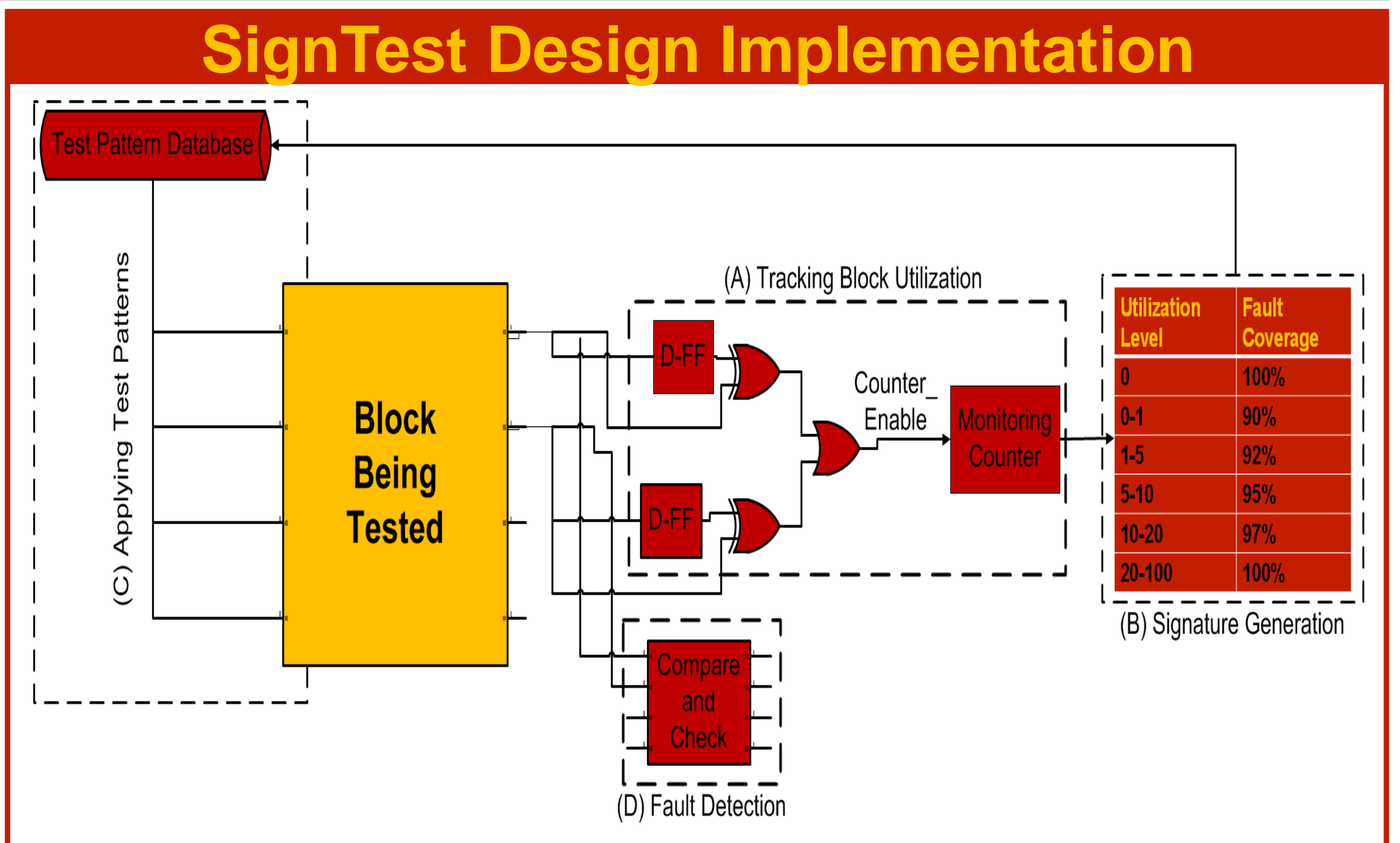
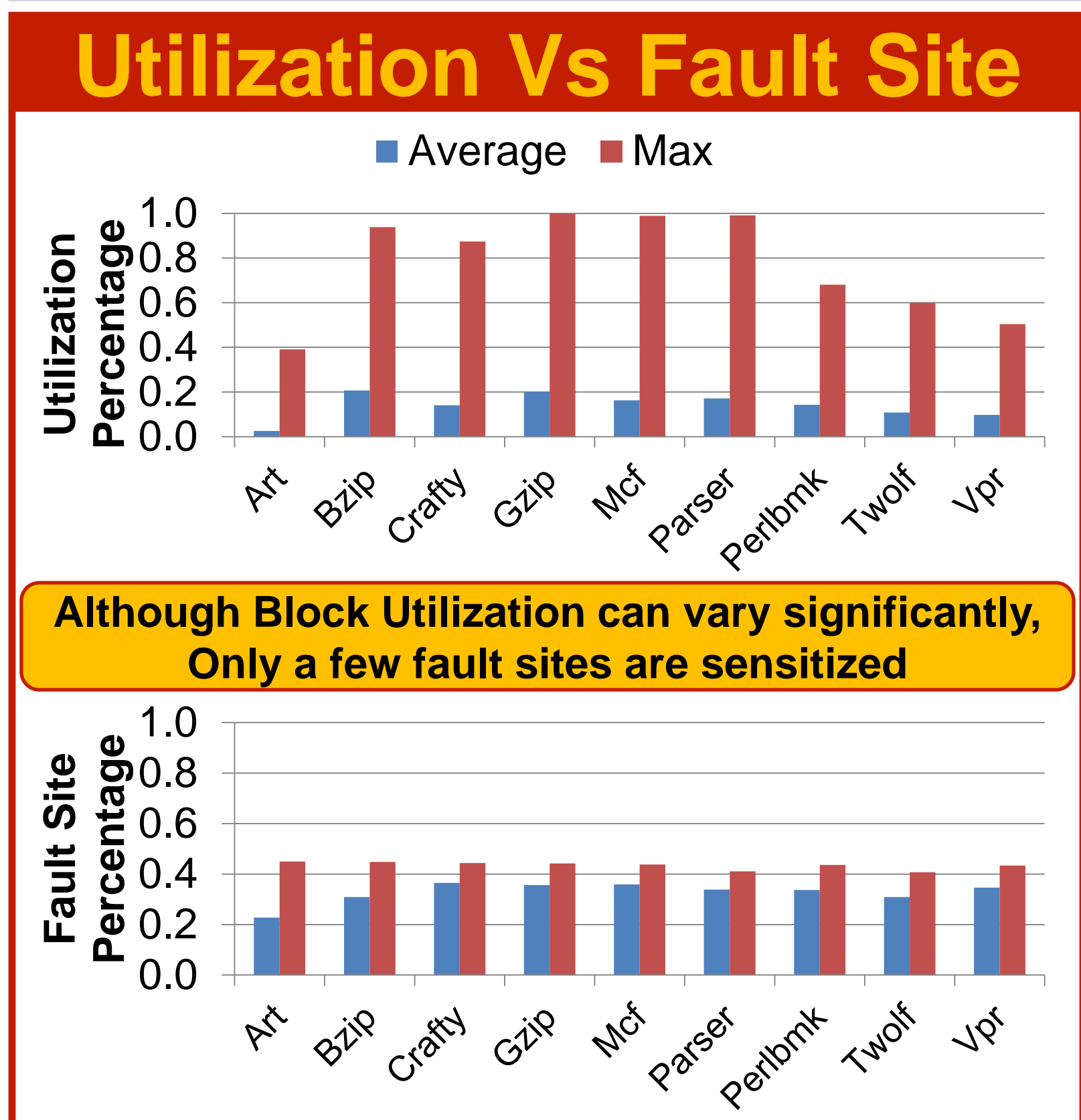
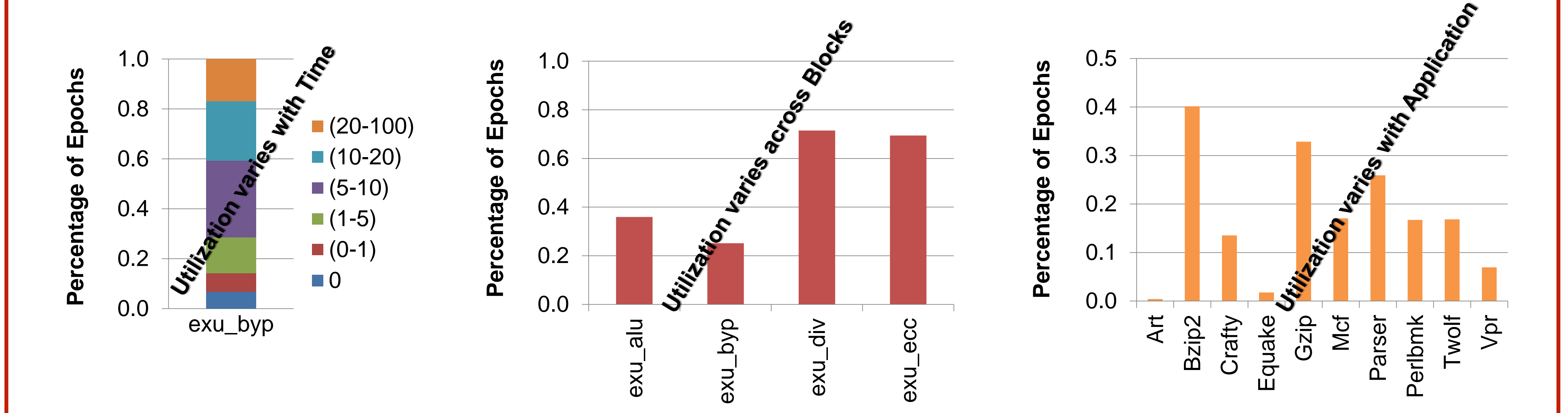
Fault Coverage ↑
Testing Time and Energy ↓

Why Does It Work?

- The lower the utilization level of a healthy block, the slower the block will wear out.
- The lower a faulty block is utilized, the less frequent the fault will be activated.

SignTest leverages the utilization-failure relationship to achieve adaptive online testing

Heterogeneous Block Utilization



Experimental Evaluation

