uDIREC: Unified Diagnosis and Reconfiguration for Frugal Bypass of NoC Faults

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Unified Diagnosis and Reconfiguration

Our contributions:
- Fault Diagnosis at fine granularity
- Integrated Reconfiguration to find new routes

**Diagnosis**
- End-to-end scheme in SW
- Based on analyzing faulty routes
- Passive and fine-grained

**Reconfiguration**
- Based on a novel routing algorithm
- Tightly integrated with the diagnosis scheme
- Unconstrained by number and location of fault

Faulty irregular network with deadlock-free routes
Reliability and Performance Benefits

- Dedicated testing is not required → no overhead in absence of errors
- Unified implementation in software → low area overhead

Fault manifestation

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Unnecessary loss of healthy links/nodes

Healthy links kept in operation

\[\text{1/3}\text{rd loss of nodes}\]

\[\text{>20}\%\text{ higher throughput}\]

\[\text{dropped nodes}\]

\[\text{throughput}\]

\[\text{injected faults}\]