The Diagnostic Competition 2009 (DXC'09) https://
dashlink.arc.nasa.gov/topic/diagnostic-challenge-competition/

Organized By
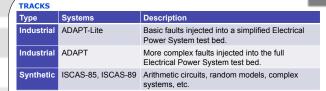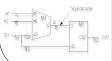### NASA Ames Research Center & Palo Alto Research Center

The Competition

OBJECTIVES

- Accelerate research in theories, principles, and computational techniques for monitoring and diagnosis of complex systems
- Encourage the development of software platforms that promise more rapid, accessible, and effective maturation of diagnostic technologies
- Provide a forum that can be utilized by algorithm developers to test and validate their technologies
- Systematically evaluate different diagnostic technologies and produce comparable performance assessment
- Create a launching pad for future competitions with expanded scope

CONDITIONS OF COMPETITION

- Different diagnostic technologies will be run under same conditions with same data
- The competition is expected to consist of multiple tracks (with independent winners)
- Each track will define one or more diagnostic challenges with some using real hardware test bed data and others using benchmark data
- Metrics, defined by the organizers, will then be computed based on the diagnostic output
- A panel of judges consisting of experts in the field will then determine the final winner(s) in each track

Systems

TRACKS

Type	Systems	Description
Industrial	ADAPT-Lite	Basic faults injected into a simplified Electrical Power System test bed.
Industrial	ADAPT	More complex faults injected into the full Electrical Power System test bed.
Synthetic	ISCAS-85, ISCAS-89	Arithmetic circuits, random models, complex systems, etc.

ISCAS-85 & ISCAS-89 Benchmarks

The widely accepted ISCAS-85 & ISCAS-89 benchmark suites have been in use ever since being introduced at the International Symposium of Circuits and Systems. The circuits are extracted from industrial designs but can be viewed as random logic circuits with no significant high-level structure.
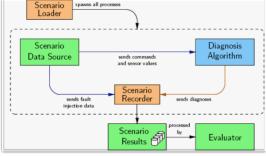
ADAPT – Advanced Diagnosis & Prognosis Test Bed

ADAPT is a facility developed at NASA Ames for testing diagnostic tools and algorithms against a standarized test bed. The facility's hardware consists of an electrical power system with components for power generation, storage, and distribution. Over a hundred sensors report the status of the system. The test bed provides a controlled environment to inject failures, either through software or hardware, in a repeatable manner. It also provides an API for integration of diagnostic technologies.

Evaluation

DXC Evaluation Framework

Evaluation Metrics

Name	Description
Per System Metrics	
False Positive Rate	Spurious faults rate
False Negative Rate	Missed faults rate
Detection Accuracy	Correctness of the detection
Isolation Accuracy	Correctness of the isolation
Per Scenario Metrics	
Fault Detection Time	Time for detection a fault
Fault Isolation Time	Time for minimizing the diagnostic entropy
CPU Load	CPU time spent
Memory Load	Memory allocated

Dates & People

KEY DATES

Date	Venue	Description
Sep 2008	DX 08	Formal Announcement
Oct 2008	Online	Submission of Intent to Participate
Nov 2008	Online	Full Release of Information
Mar 2009	Online	Deadline for Submission of Diagnostic Algorithms
Apr-May 2009	NASA Ames	Evaluation of Diagnostic Algorithms
Jun 2009	DX 09	Presenting Results and Winners of Challenge

ORGANIZERS

Name	Designation	Affiliation
Johan de Kleer	Co-Chair	PARC
Sriram Narasimhan	Co-Chair	UC Santa Cruz @ NASA Ames
Tolga Kurtoglu	Organizing Committee Chair	MCT @ NASA Ames
Alexander Feldman	Organizing Committee Member	Delft University
Scott Poll	Organizing Committee Member	NASA Ames
Lukas Kuhn	Organizing Committee Member	PARC
David Garcia	Organizing Committee Member	Perot Systems @ NASA Ames