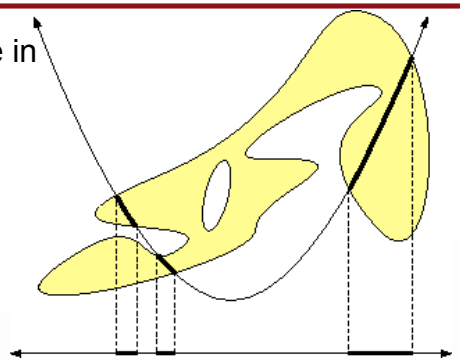
Technical Topic Area: Cyber Security, Subtopic: Process Control System Security

Oak Ridge National Laboratory

Proposal Title: *Maximizing Performance Availability Security and Survivability (MaxPASS)*

Maximizing PASS objective in tradeoff space:

Performance
Availability
Security
Survivability



Insight: Using our unique approach one can,

1: Given SSAP requirements, derive an architecture or configuration that guarantees PASS.

2: Given architecture/technologies, maximize PASS though optimal configuration/usage of existing resources and technologies.

Operational Capability and Benefits:

Capability: Unique analyzer allows to assess PASS in extended fault environment, including benigns, omissions, Byzantine, jamming, random or orchestrated attacks.

Key benefit: Decision superiority: Allow quantification of impact of tradeoff parameters *before* investing in (or committing to) potentially ineffective or infeasible solutions.

Background: We have extensive experience in analyzing the effects of non-malicious and malicious act, investigating the theoretical limitations of solutions and adjusting the solutions for maximal cost/benefit.

Technical Approach:

Typical SSAP analysis consists of using appropriate mathematical models for fixed design considerations.

We introduce a *unique* SSAP analysis using:

1) Hybrid Fault Model for detection, isolation, recovery (*currently*: 1-fault and rarely 2-fault model).
2) dynamic fault model to meat current/future need, i.e. fault assumption may change in time or after events (*currently*: mostly static assumptions).
3) tunable fault assumptions allowing to investigate the impact of different fault scenarios on PASS, e.g. reliability analysis with fault assumptions (*currently*: no tuning).
4) tradeoff analysis of PASS objective in tradeoff space (*currently*: some basic research for survivable storage (PASIS project), not for wireless)
5) inclusion of technology from Ultra Reliably Systems

ROM Tasking/Level of Effort & Schedule:

Task 1: Develop Survivability Parameters.
Task 2: Describe application technologies in the context of hybrid fault models.
Task 3: Develop tools to analyze the impact of architecture and changes to architecture on PASS.
Task 4: Develop tool to visualize the tradeoff space to allow for intelligent adaptation of technologies.

Deliverables:

Include alpha/beta software with limited rights, including all analysis and visualization tools, status reports, manual, etc.

POC: Dr. F. T. Sheldon (865) 576-1339
http://www.ioc.ornl.gov/sheldon
Email: sheldonft@ornl.gov

UT-BATTELLE