Improving the Reliability of Smart Grid: A Perspective from Software Design

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Motivation

- Large applications such as Smart Grid applications have tendencies to grow in complexity and decrease in reliability if left unmanaged.
A failure in a part of the system-of-systems can cascade to other parts.
Software Engineering support for Smart Grid Applications: Focus

• We need to quickly monitor the quality of software (and its internal components) being developed for the Smart Grid
• Improve the management of software evolution in Smart Grid
• Identify architectural “hot spots” and area that should be focused for refactoring/testing in order to build resilient Smart Grid systems.
Architectural hotspots in Software

Cyclic structure among components in software is a well-known design problem.
Cyclically connected components have significantly:

- Higher number of defective components
- Higher number of critical defects
- Higher number of defects
- Higher propagation of defects
- Higher correction effort
Conclusion and Next Steps

• Cyclic structure is a design smell and has the possibility to reduce system’s reliability
• Related Smart Grid software and components need regular quality check to reduce the probability of failure
• Next Steps
  – Refactor those “hotspots” in the software structure
  – Tool assistance for automatic breaking of complex cyclic structures
References


THANK YOU