

GSAW 2007 Tutorial D:

Integrated Hardware and Software Reliability and Availability Modeling for Software Intensive Ground Systems

Length: Half day

Overview:

System reliability and availability have always been very important to ground systems. Over the past two decades, software has grown dramatically in complexity in such systems, and architectures have evolved from centralized mainframe-based systems to LAN-based client server systems and now to service oriented architectures. At the same time, hardware has become more reliable and as a result, software failures are becoming the dominant cause of system failures. Unfortunately, reliability modeling and analysis techniques developed in the 1960s have not kept pace with this trend.

This talk will describe approaches for assessment of complex distributed real time systems used in mission critical or safety critical applications. We will demonstrate the combined use of traditional system reliability assessment techniques with software static and reliability growth models to enable the prediction of whether such systems will meet their reliability and availability requirements, and demonstrate how such an integrated model can be used for system level tradeoffs (e.g., redundancy vs. test time). Successive generations of both system and software reliability prediction methods and tools have been developed since the early 1970s. However, these techniques assumed that the software executed in a single module or node, and are therefore not sufficient to address the needs of current complex systems that incorporate both COTS and developmental software, COTS hardware, and Internet Wide Area Networks (WANs), all of which contribute to system downtime.

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