

Availability Modeling in Practice

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The successful development and marketing of commercial high-availability systems requires the ability to evaluate the availability of systems. Specifically, one should be able to demonstrate that projected customer requirements are met, to identify availability bottlenecks, to evaluate and compare different configurations, and to evaluate and compare different designs. For evaluation approaches based on analytic modeling, these systems are often sufficiently complex so that state-space methods are not effective due to the large number of states, whereas combinatorial methods are inadequate for capturing all significant dependencies. The two-level (or multi-level) hierarchical composition proposed here is found to be suitable for the availability modeling of many commercial systems at Cisco, EMC, IBM, Motorola, NEC, SUN Microsystems, and others. As an example, we present the availability model of a high availability SIP Application Server configuration on WebSphere. Hardware, operating system and application server failures are considered. Different types of fault detectors, detection delays, failover delays, restarts, reboots and repairs are considered. Imperfect coverages for detection, failover and recovery are incorporated. The parameter values used in the calculations are based on several sources, including field data, high availability testing, and agreed upon assumptions. In cases where a parameter value is uncertain, due to assumptions or limited test data, a sensitivity analysis of that parameter is carried out. Relaxation of some of the assumptions will be discussed as well as the difficulties encountered while carrying out such projects.