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STUDY OF THE DEPENDABILITY CHARACTERISTICS OF A FAULT-TOLERANT DISTRIBUTED REAL-TIME SYSTEM WITH ADJUSTABLE RELIABILITY

Ph.D. THESIS

Code of professional field: 5.3 Communication and computer equipment

Supervisor:

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Annotation:

The Ph.D. thesis presents a fault-tolerant distributed real-time system with adjustable reliability that allows for the distribution of the hardware structural redundancy according to the requirements for system reliability of the application. A software program for simulation modeling of the system is designed and developed. It is used to study the dependability characteristics: reliability function, Mean Time To Failure, Mean Time To Repair, availability, Mean Time Between Failures, downtime, etc. Based on these parameters, the system with adjustable reliability is compared to those without structural redundancy distribution. The simulation results show that the proposed fault-tolerant system with adjustable reliability can achieve high system reliability levels comparable to and, in some cases, higher than those of the systems without structural redundancy distribution. No clear dependence between the hardware structural redundancy distribution and the system reliability was found during the study to allow for a choice of the appropriate configuration for a specific application. Therefore, the author proposes the approach of adjustable reliability, which offers a quantitative assessment and comparison of the dependability characteristics of various configurations of hardware structural redundancy to choose a configuration (with or without structural redundancy distribution) that satisfies the requirement for system reliability of the application.