

Special Session “Software Reliability Engineering”

Session Coordinator:

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Our society more and more depends on the correct operation of very complex software systems, where a large number of, often very heterogeneous, components have to properly co-operate. Therefore, in spite of today's more comfortable programming environments, the problems of design and programming errors are still becoming even more aggravating. The area of software reliability engineering deals with all aspects of this problem field and the methodologies to solve them. It comprises various sub-areas like

- software failure models;
- reliability growth models;
- testing methods for reliability assessment;
- software redundancy schemes;
- operational profiles as a means for software validation;
- test and verification methods for off-the-shelf components;
- tools for experimental investigation of software reliability;
- the broad spectrum of applications of this engineering discipline, ranging from information systems to knowledge-based expert systems, etc.

The Special Session “Software Reliability Engineering” presents a number of solutions with regard to the problem spectrum mentioned above. Within the Programme of this Euromicro Symposium, it is organized in the form of two conference sessions, namely session A4 “Safety Critical Systems” and B4 “Software Testing”.

In the first of these two sessions, A4, we deal with an application area where solutions with extremely high dependability standards are required. In this session three papers are presented. The first paper, by F. Saglietti from the Institute for Safety Technology (ISTec) GmbH in Garching, Germany considers how standard off-the-shelf software originally designed and tested for less critical applications, can be evaluated with regard to safety-critical applications, too. Some quantitative models for assessing the reliability of such products are discussed.

The second paper, by I. Kovalev from the Technical University of Krasnoyarsk, Russia, and K.-E. Grosspietsch from GMD in St. Augustin, Germany presents a solution how to optimize the structure of n-version software systems. By means of a heuristic search method it is possible to determine, for a given set of basic component candidates to build up the n-version system, that system configuration which yields optimal overall system reliability while additionally fulfilling a number of additional constraints like overall costs, upper bound for execution time, resource requirements etc.

The third paper by E. Schoitsch from the Austrian Research Centers Seibersdorf presents a survey on dependability issues with regard to transportation systems, especially railway systems.

In the second session B4 especially approaches how to diagnose software are considered. Here, the first paper, by H. Stieber from the University of Applied Sciences in Nuremberg, Germany, presents an innovative approach to derive optimal testing strategies, as an alternative to the so-called usage-testing method mainly used so far.

The second paper, by F. Belli and T. Illgen from University of Paderborn, Germany, considers numerical anomalies as e.g. caused by overflow situations, insufficient computational accuracy etc. which, under critical system conditions, might cause severely incorrect results. A PROLOG-oriented modelling approach to reveal such anomalies is exhibited.

Finally the third paper by M. Popovic and V. Kovacevic from University of Novi, Sad, Yugoslavia together with M. Temerinac from MICRONAS Intermetall in Freiburg, Germany, discusses a problem from practice, namely how to test a newly developed C compiler, designed for a family of digital signal processor (DSP) systems. An approach is exhibited how to evaluate the dependability characteristics of the new product by comparing its output with those ones of other commercially available C compilers.