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GUEST EDITORIAL

APPLICATIONS OF DEPENDABLE COMPUTING

BY

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This issue includes fourteen papers that are selected from the 2010 Conference on Dependable Computing (CDC2010) through a peer review process. The papers in this issue mainly incline to practical applications of dependable computing theories. The concept of dependable computing not only appears in the fault tolerant computer system, but also in the communication system, networking and so on. At present, individual and non-individual demands for credible and reliable computing have become more and more urgent. It makes dependable computing steps from theoretical investigation to practical applications.

In the first paper, Tingyao Jiang et al. presented a novel security mechanism with hybrid encryption, and successfully applied it to hybrid encryption in mineral management information system. Improved localization algorithms based on negative gradient method were proposed by Xiaohui Chen et al. for wireless sensor networks, which are capable of increasing the accuracy of localization. Yuanyuan Fu et al. presented a robust processing chain based on illumination normalization, which makes the face recognition more reliable under varying illumination. Yang Xiaodong et al. designed a service integration system based on Bayesian network and service intelligent agents, which provides an effective way for the enterprise to integrate geospatial web services into the existing business system seamlessly. In this system, a quality of service (QofS) reasoning model based on Bayesian network is created, and a method of services executing result monitoring and feedback is proposed based on service intelligent agents, which can effectively improve the efficiency and success rate of service discovery and composition.

The task synchronization process of the triple modular redundancy fault-tolerant was investigated by Shuang'E Zhou et al. using Petri nets, where the model is analyzed by reachable graphs in terms of reachability, activity, boundness and integrity. The developed Petri nets based approach is intuitive, clear and easy to understand the implementation mechanism of the task synchronization process. Nianhua Yang et al. proposed a data concerned Petri net (DCPN) for activity diagram modeling, in order to enhance the trustworthiness. Mapping rules for transforming elements in an activity diagram into DCPNs are proposed in both graphical and formal forms. Ma Chuang et al. proposed a fault-tolerant algorithm of wireless sensor network based on recoverable nodes, where a heartbeat detection algorithm is used to detect node failure. Each recoverable intermediate node has a redundant node for fault tolerant function to increase the rate of successful data reception. The proposed algorithm would extend the lifetime of the wireless sensor networks. Xihong Su et al. analyzed the reliability of software architecture based software deployment with consideration of system deployment. Weipeng Jing et al. proposed a fault-tolerant scheduling heuristics for precedence task based on the primary-backup replication scheme of a realistic platform model, where communication contention is considered. The proposed algorithm would improve the reliability and performance of the scheduling process.

A novel whole-processor soft error detection technique was developed by Yu Hu et al. to reduce performance degradation by alleviating resource racing, while providing whole-processor error detection via redundant operations. Renbin Xiao et al. designed a multi-agent simulation model of malware aiming at the control of its spread. Xingyao Hao et al. analyzed the earthwork calculation based on triangulated irregular network (TIN) accurately. Jie Yin et al. introduced a fault-tolerance simultaneous multithreading (SMT) architecture based on asynchronous checkpoint. In the last paper, Jun Zhou et al. presented a security mechanism for RFID with dependable proxy, which demonstrates a good fusion of physical methods and security protocols, and can efficiently defend RFID systems against monitoring, deception, tracking, reply attacks, and greatly decrease the possibility of suffering from service denials.

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