World Academy of Science, Engineering and Technology
International Journal of Computer and Systems Engineering
Vol:10, No:09, 2016

Simulation of Utility Accrual Scheduling and Recovery Algorithm in Multiprocessor Environment

Authors : A. Idawaty, O. Mohamed, A. Z. Zuriati

Abstract : This paper presents the development of an event based Discrete Event Simulation (DES) for a recovery algorithm known Backward Recovery Global Preemptive Utility Accrual Scheduling (BR_GPUAS). This algorithm implements the Backward Recovery (BR) mechanism as a fault recovery solution under the existing Time/Utility Function/ Utility Accrual (TUF/UA) scheduling domain for multiprocessor environment. The BR mechanism attempts to take the faulty tasks back to its initial safe state and then proceeds to re-execute the affected section of the faulty tasks to enable recovery. Considering that faults may occur in the components of any system; a fault tolerance system that can nullify the erroneous effect is necessary to be developed. Current TUF/UA scheduling algorithm uses the abortion recovery mechanism and it simply aborts the erroneous task as their fault recovery solution. None of the existing algorithm in TUF/UA scheduling domain in multiprocessor scheduling environment have considered the transient fault and implement the BR mechanism as a fault recovery mechanism to nullify the erroneous effect and solve the recovery problem in this domain. The developed BR_GPUAS simulator has derived the set of parameter, events and performance metrics according to a detailed analysis of the base model. Simulation results revealed that BR_GPUAS algorithm can saved almost 20-30% of the accumulated utilities making it reliable and efficient for the real-time application in the multiprocessor scheduling environment.

Keywords : real-time system (RTS), time utility function/ utility accrual (TUF/UA) scheduling, backward recovery mechanism, multiprocessor, discrete event simulation (DES)
Conference Title : ICCEA 2016 : International Conference on Computer Engineering and Applications
Conference Location : Singapore, Singapore
Conference Dates : September 08-09, 2016