

Simulation-based Software Defects Dynamics Analysis with Queuing Models

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Software reliability models have been evolving during the past decades in order to adapt to the change of the complex software testing environments. Many models have been proposed to describe the software defects related processes. These software reliability growth models (SRGMs) have evolved from describing one defect detection process (DDP) into incorporating defect correction process (DCP) and defect introduction process (DIP) as well. Traditional models with closed form focus on the mathematical tractability, confined by their restrictive assumptions for more general applications. Differently, a simulation based approach is proposed in this paper with a general queuing modelling framework. This framework attempts to integrate DDP, DCP and DIP, with the incorporation of the resource factors from practical software testing process. Furthermore, the release time and debugger staffing issues are investigated. The analysis is conducted through a simulation optimization approach, illustrated with a numerical example.