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软件、算法与仿真

基于UML实时扩展的嵌入式软件测试用例生成技术

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摘要：

将统一建模语言(unified modeling language, UML)和对象约束语言(object constraint language, OCL)引入嵌入式软件测试领域，首先提出了一种基于UML实时扩展的嵌入式软件测试建模过程。然后，给出了UML状态图和类图的实时扩展方法。最后，结合航空电子系统嵌入式软件测试用例生成过程，详细阐述了被测系统的静态和动态建模，提出了扩展的测试序列定义及其生成方法，最终将所生成测试用例采用扩展标记语言(extensible markup language, XML)格式存储。工程应用验证表明，上述方法可充分发挥UML作为工业标准的工具资源优势，提高嵌入式软件测试用例生成的准确性、有效性和自动化程度。

关键词： 软件工程 自动化测试 统一建模语言 嵌入式软件 测试用例

Research on embedded software test case generation based on real time extended UML

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Abstract:

The unified modeling language (UML) and object constraint language (OCL) are introduced into the embedded software testing field, and the testing modeling process based on real time extended UML are studied firstly. Then, the real time extensive methods of UML state diagram and class diagram are presented. Finally, combined with the avionics embedded software test case generation practice, the static and dynamic modeling of software under test (SUT) are described in detail. Meanwhile, the definition of the extended test sequence and its generation method are put forward and the generated test cases are eventually stored using extensible markup language (XML). The project application verification result shows that the proposed method can fully make use of the advantages of tool resource of the UML which has been as the industry standard and improve the efficiency, accuracy and the automatic level of embedded software test case generation.

Keywords: software engineering testing automation unified modeling language (UML) embedded software test case

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1. 李震，刘斌，李小勇，殷永峰.基于Petri网模型检验的安全关键软件需求验证[J]. 系统工程与电子技术，2011,33(2): 458-463