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## TESTING CRITICAL SOFTWARE USING *IBM -RATIONAL TEST REALTIME*: A CASE STUDY USING A SEMI-PRESENTIAL TEACHING TECHNIQUE

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**Abstract** -This article reports an academic experience at the Brazilian Aeronautical Institute of Technology – ITA, using Semi-presential Teaching Techniques, in an Integrated Computer Aided Software Engineering Environment (I-CASE-E). It used automated software testing tools applied to a critical real time embedded system. The course was based on the Project-Based Learning (PBL) teaching methodology, with Semi-presential Teaching. The RUP methodology was tailored in order to apply the IBM Rational Quality Architect and IBM Rational Test RealTime software. This academic experience has been originated on the need and specifications of the Brazilian Aeronautics and Space Institute – IAE –, and on the Brazilian National Institute for Space Research – INPE –, allowing the definition of a Case Study based upon two ongoing realistic software projects, both applying critical real time embedded software for: 1) an Unmanned Aerial Vehicles; 2) a Student Satellite; and 3) a Ground Control Station. This experience has involved 15 senior computer engineering undergrads and 18 graduate students to develop, test, verify and validate the system, in just 17 academic weeks, on four aggregation levels: Computer Software Unit, Computer Software Component, Computer Software Configuration Item, and Computer Software System, based upon the state-of-the-art software engineering processes, real time notations and tools. The major contribution of this paper was the proper utilization of available tools, on a Semi-presential academic environment, in which the students used the laboratories on their on (or at home), supported by the professor and tutors, to perform automated tests, and to warrant the quality, reliability and safety of the deliverable software. The expertise of the involved



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professionals has increased, and the time necessary to perform unit, integration and system testing has been reduced.

**Keywords** –Semi-presential Learning; Critical Software; Real Time Embedded Systems; Aerospace Applications;