On the Use of Boundary Scan for Code Coverage of Critical Embedded Software

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Abstract: Code coverage tools are becoming increasingly popular as valuable aids in assessing and improving the quality of software structural tests. For some industries, such as aeronautics or space, they are mandatory in order to comply with standards and to help reduce the validation time of the applications. These tools usually rely on code instrumentation, thus introducing important time and memory overheads that may jeopardize its applicability to embedded and real-time systems. This paper explores the use of IEEE 1149.1 (boundary scan) infrastructure and on-chip debugging facilities from embedded processors for collecting the program execution trace during tests, without the introduction of any extra code, and then extracting detailed code coverage analysis and profiling information. We are currently developing an extension to the csXception tool to include such capabilities, in order to study the advantages, difficulties and impediments of using boundary scan for code coverage.