

Embedded system paranoia: results from real systems

Les Hatton
CISM, Kingston University*

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Abstract

A new version of the well-known program *paranoia* suitable for use with embedded control systems was introduced recently [1]. This paper shows results from real systems.

1 Introduction

paranoia is a program designed to test the arithmetic of computers. ESP (Embedded System Paranoia) was introduced to extend this sophisticated test to the arithmetic of embedded systems. The following results show what happens with real systems. They are shown in tabular form along with an explanation of the environment under which they were run. In one case, ESP could only be run on the simulator for space reasons.

*L.Hatton@kingston.ac.uk, lesh@oakcomp.co.uk

Compiler / chip	Environment	Date	Failures	Serious Defects	Defects	Flaws
TI-OMAP (ARM9)	target	26-Sep-2003	0	0	6	4
STAR-12	target	19-Sep-2003	6	7	12	1
IAR / MSP430	simulator + Fast math library	01-Nov-2003	2	1	9	4
IAR / MSP430	simulator + IEEE library	01-Nov-2003	0	0	6	1
IAR / MSP430	simulator + EC++ library	01-Nov-2003	0	0	0	1
KEIL	Compiler v. 3.12k	15-Jan-2004	4	2	4	3
PowerPC 8240	Diab v. 4.3g compiler (single and double precision)	09-Mar-2004	0	0	0	1
PowerPC 800	gcc v. 3.3.2 compiler double precision; ucLibC 0.9.28	22-Jan-2007	0	0	0	3
Intel Pentium	gcc v. 3.4.6 compiler double precision; Ubuntu Linux	22-Jan-2007	0	0	1	4
Intel Pentium	gcc v. 3.4.6 compiler double precision; Ubuntu Linux	22-Jan-2007	0	0	1	4
IAR ARM9	IAR ARM C/C++ Compiler V5.10.5.731/W32	10-Sep-2008	0	0	0	3
Sparc Instruction Simulator 3.0.5	gcc v. 2.91.66 compiler double precision; Unknown Linux	25-Feb-2010	0	0	0	3

2 Conclusions and Acknowledgements

As can be seen, ESP is living up to the reputation of its parent in flushing out arithmetic defects although things seem to be improving which is very good news.

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3 References

References

- [1] Hatton L. (2003) *Embedded System Paranoia: a tool for testing embedded system arithmetic* Submitted to IST