Comparison of QNX Neutrino and Linux Vanilla operating systems on PowerPC processor

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Contents

1 About the RTOS evaluation project

This section describes the purpose and scope of the evaluations conducted by Dedicated Systems.

1.1 Purpose and scope of the RTOS evaluation

This document provides quantitative measures to help potential RTOS users make objective comparisons between OSs and help them decide which OS is better for their needs.

This document compares the results of the quantitative evaluations of two (real time) operating systems (RTOSs):

- QNX Neutrino 6.5 patch 2530
- Vanilla Linux 2.6.32.13

The order in which we list these two OSs is based on the overall results obtained by the OSs, with the OS with the best results listed first. This ordering is maintained throughout the whole report.

Both (RT) OSs were evaluated on the same PowerPC platform (Freescale P1021 MDS).

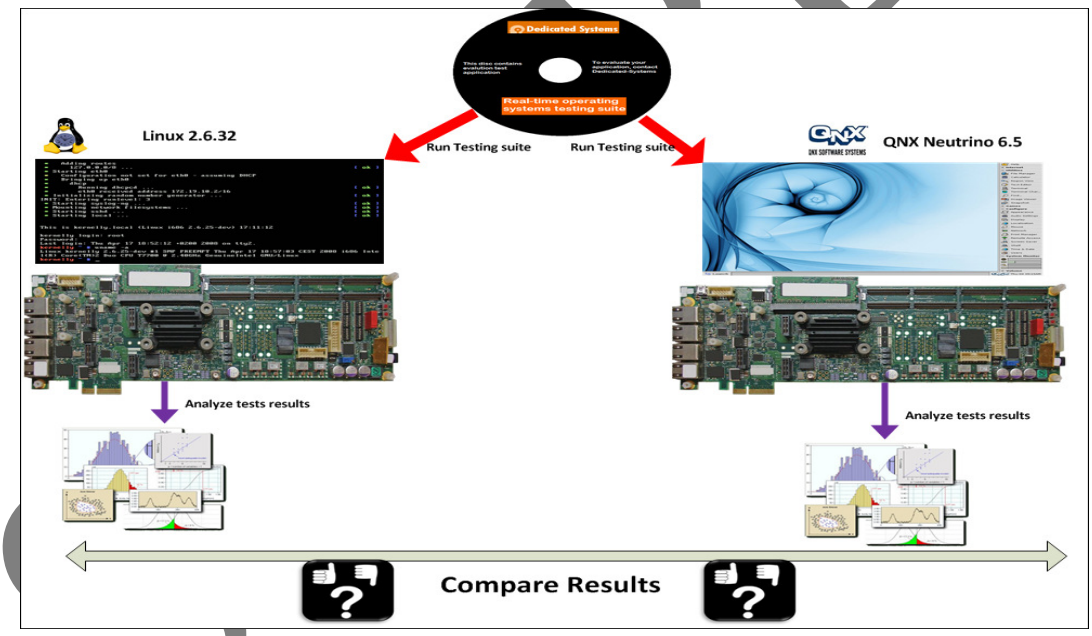


Figure 1: High level view of the evaluation procedure

1.2 Test framework used: 2.9

This document shows the test results in the scope of the evaluation framework 2.9. More details about this framework are found in Doc 1 (see section 6).

2 About the OSs and the testing platform

This section describes the OSs that Dedicated Systems tested using its Evaluation Testing Suite, and the hardware on which both OSs were running during the testing.

2.1 Software

The following table shows the operation systems' versions whose behavior and performance results were compared by Dedicated Systems after testing them with its evaluation testing suite on the same PowerPC platform (Freescale P1021MDS).

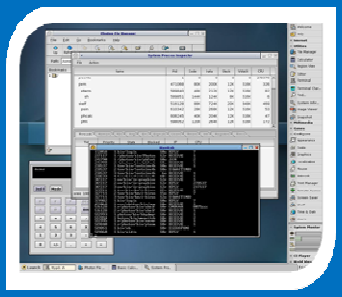
QNX Neutrino RTOS v6.5 with Patch 2530	Vanilla Linux 2.6.32
	

Table 1: The evaluated OSs

For **QNX Neutrino 6.5**, Patch 2530 was applied. This patch introduces a fix to the io-pkt network stack where a timer pulse implementation is used instead of attaching a handler to the timer interrupt. This patch significantly improves clock tick processing times and results in improved real time performance.

For "**Vanilla" Linux 2.6.32.13**, board vendor (Freescale) patches were applied.

2.2 Hardware

We conducted our tests on the same PowerPC platform. This platform is the Freescale QorIQ P1021 Modular Development System (MDS) board from Freescale with the following characteristics:

- Using the P1021 QorIQ™ communication processor.
- Power Architecture (P1021) dual core e500 processor running at 800 MHz (for the tests in this report, we disable one of the cores). As we use one core only, the results should be the same as on a P1012 board. The only difference between these two processors is the number of cores.
- L1 Cache: 32KB instruction and 32KB data cache (for each core)
- L2 Cache: 256KB (shared between cores, but tests run with one core only). Eight-way set-associative cache organization with 32-byte cache lines.
- 512MB DDR3 RAM (SODIMM) with ECC support running at 800MHz

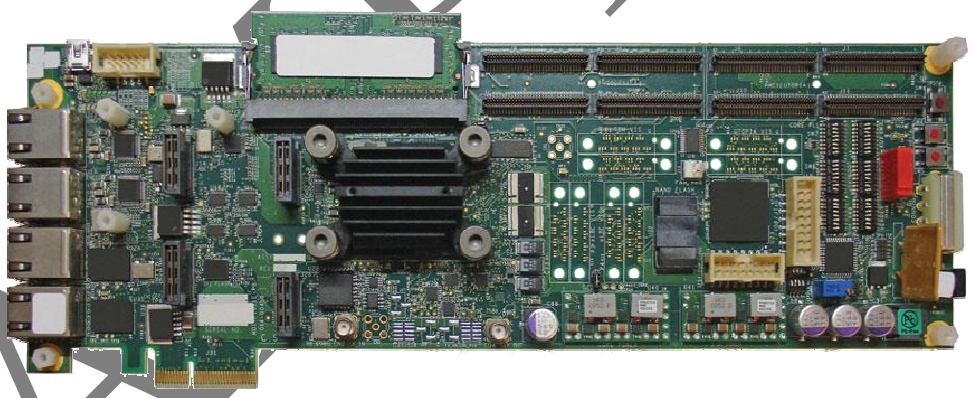


Figure 2: The P1021MDS board on which the tests were conducted

3 Evaluation results overview

This section presents the overall ratings and evaluations based on key tests.

3.1 Dedicated Systems' ratings for the tested (RT)OSs

Table 2 shows Dedicated Systems' overall ratings for the tested OSs:

QNX Neutrino 6.5	Vanilla Linux 2.6.32
★★★★★	★★½

Table 2: Overall ratings for the evaluated OSs

QNX Neutrino 6.5 test results show that QNX is an excellent real-time operating system, with good behavior in general and good real-time results in particular and with an efficient development environment around it.

For Linux, the test results need to be interpreted with care:

Knowing that we were unable in the allotted time budget to configure Linux completely (with all drivers) on this platform, we have been pushed to do the tests with a very minimal set of drivers. As a consequence, the load on the system during the tests was much less than what we normally do, resulting in good test results, at least for the tests we were able to perform. They are not really comparable to the QNX test results which were made with full system load (all drivers installed).

Also, we did not manage to make the interrupt test run correctly in the given time budget and therefore these tests results are not reported. This was due to systematic stability problems when one wanted to add supplementary drivers to the system or due to non-available drivers in the different Linux versions we tried out.

Our work demonstrated that it is very difficult to make Linux in whatever version run correctly on this PPC platform. It seems that PPC is not really endorsed by the Linux community in the same way the X86 family is endorsed and more recently also the ARM family. This is the reason why we give a rather low score.