

## Release Notes: GNURX v11.02

24<sup>th</sup> June 2011

KPIT Cummins Infossystems Limited is releasing the GNURX v11.02, a cross compiler tool for Renesas RX micro-controllers.

### SALIENT FEATURES

1. The GNURX v11.02 toolchain is based on gcc-4.5.3 [released], binutils-2.21.51 [snapshot dated 13<sup>th</sup> January 2011], newlib-1.19.0 [released] and gdb-7.3.50 [snapshot dated 23rd May 2011].
2. The latest patches are applied to gcc, binutils and newlib sources.
3. The GNURX toolchain now supports project generation for the RX630 target in HEW.
4. The GNURX toolchain has been further optimized to achieve the improved CoreMark benchmark score of 2.34 on hardware.
5. The GNURX v11.02 ELF toolchain installer supports integration with KPIT Eclipse. Please visit the following link for information on the latest releases of KPIT Eclipse:  
<http://www.kpitgnutools.com/releaseNotes.php>

### ABOUT GNURX v11.02

Release Version:	GNURX v11.02
Release Date:	24 <sup>th</sup> June 2011
Platforms Supported:	Red Hat GNU/Linux v8.0 or later (or compatible distribution) Windows NT / 2000 / XP / Vista / Windows 7
Language:	C, C99, C++
Targets:	RX200 RX600
Object File Format:	ELF

## CHANGES IN THIS RELEASE

This section describes the enhancements made and the issues fixed in the v11.02 release.

### GCC:

1. The GNURX toolchain has been further optimized to achieve the improved CoreMark benchmark score of 2.34 on hardware. This score is an improvement over the previous GNURX release.  
The following improvements have been made:
  - The timings related to bit instructions have been adjusted to improve optimizations for the GNURX toolchain.
  - The timings related to 3 operand mode 'AND' instructions have been adjusted to improve optimizations for the GNURX toolchain.
  - The code size generated by GNURX compiler is improved by effective usage of instruction side effects. e.g., replaced 'MOV' + 'CMP' instructions by 'ADD' instruction.
  - The code size generated by GNURX compiler is improved by use of the 'MIN' and 'MAX' instructions for 8 bit, 16 bit unsigned and signed operands.
  - The code size optimization has been improved effectively by using the 'TST/STNZ' instructions.
  - The GNURX toolchain has been enhanced to use the '.B', '.UB', '.W' and '.UW' memexes when compiling using '-O2' optimization and above.
  - The GNURX toolchain has been further optimized by adding support for pre-decrement and post-increment instructions for byte, word and long accesses.
2. The objcopy utility generated incorrect binary output (S-record motorola file) when initialized variables were used in the application code.  
This bug has now been fixed.
3. The objcopy utility generated incorrect S-record output file for Big-Endian targets.  
This bug has now been fixed.  
The '-l elf32-rx-be-ns' option should be used with the 'rx-elf-objcopy' command while converting the output file into the S-record file format.  
e.g., `$rx-elf-objcopy -l elf32-rx-be-ns -O srec <input>.x <output>.mot`
4. The GNURX toolchain generated incorrect code with the '-O2' optimization option for a test case that calculates the square root using the 'daddexp' function.  
This bug has now been fixed.
5. The GNURX toolchain used the SMOVF instruction to move data bytes into the volatile IO register memory. This SMOVF instruction did not take care of the endianness in the IO registers.  
This bug has now been fixed by suppressing the generation of SMOVF for volatile qualified objects.
6. The GNURX GDB simulator generated segmentation error when the 'sim' command was executed.  
This bug has now been fixed.
7. The GNURX GDB simulator caused stack access error while initializing the stack pointer.  
This bug has now been fixed.
8. The GNURX GDB simulator incorrectly executed the MVFC instruction.  
This bug has now been fixed.

9. The GNURX GDB issued the warning "warning: Loadable segment ".data" outside of ELF segments" while loading the ROM object code.  
This issue has now been fixed.
10. The RX62N GNU 'iodefine.h' GNU header file has been updated to new version to match the hardware manual update.
11. The RX62T 'iodefine.h' GNU header file had incorrect 'MSTPA9' timer peripheral module bit definition for the MSTPCRA register. This has been corrected.

#### **OPTLIB:**

1. The 'floor' and 'ceil' functions of optimized libraries generated incorrect output.  
This bug has now been fixed.
2. The GNURX compiler generated incorrect result for 'sqrt' function when the toolchain used optlib in project built mode.  
This bug has now been fixed.

#### **INSTALLER:**

The GNURX v11.01 Installer onwards supports the 'Custom Installation' and 'Default Installation' modes. The "Default Installation" mode is set by default where the tools are installed into the default HEW and Eclipse (if either is found) and the user's username and activation key are silently accepted if cached in the registry.

#### **KNOWN LIMITATIONS IN RX-ELF**

This section describes the known limitations in this release. We intend to fix these issues in our future releases.

We occasionally release maintenance packs for critical bug fixes.

#### **Windows and GNU/Linux:**

1. The GNURX toolchain has an issue related to the '-fstrict-aliasing' compiler option which gets enabled for optimization level '-O2' and above. Please turn off this option using the '-fno-strict-aliasing' compiler option in case of any inconsistent behavior with this toolchain.
2. The 'beq LABEL' in assembly code can sometimes cause invalid instructions to be generated in object code.
3. The following test case fails to compile:

```
int main (void)
{
    __builtin_rx_setpsw(__builtin_rx_mvfc (0)&0x10);
    return 0;
}
```

4. Library Generator: Please visit the following link for the known issues and limitations related to this utility:

<http://www.kpitgnutools.com/phpmyfaq/index.php?aktion=artikel&rubrik=010002&id=485&lang=en>

**HEW (For Windows OS only):**

1. The 'Generate Makefile' feature is currently not supported in HEW.  
For other limitations pertaining to the single interface for the compiler, assembler, linker and library generator, please visit the following link:  
<http://www.kpitgnutools.com/phpmyfaq/index.php?aktion=artikel&rubrik=003001&id=445&lang=en>

**Eclipse (For Linux OS only):**

1. The 'Debugging in simulator' feature in KPIT Eclipse v2.1 for Linux may exhibit some issues while working with GNURX ELF v10.02 or later toolchain objects. This is due to the enhanced GDBRX version. These issues will be fixed in the KE update release.

**NOTE:**

**Windows and GNU/Linux:**

1. The optimized libraries provided along with the newlib libraries in the toolchain do not require a separate download.
2. The optimized libraries ('liboptm.a' and 'liboptc.a') are not provided under GNU GPL. The source code of these optimized libraries is neither released nor available on request.
3. The "libgen" utility is not provided under GNU GPL. The source code of the "libgen" utility is neither released nor available on request.

For free technical support, please register at <http://www.kpitgnutools.com>

For your feedback and suggestions, please visit <http://www.kpitgnutools.com/feedback.php>