

Release Notes: GNURX v15.02

30th September 2015

KPIT Technologies Limited is releasing the GNURX v15.02, a cross compiler tool for Renesas RX micro-controllers.

SALIENT FEATURES

1. The GNURX v15.02 toolchain is based on,
 - GCC 4.8.4 [released],
 - Binutils 2.24 [released],
 - Newlib 2.2.0 [released],
 - GDB 7.8.2 [released].
2. The latest patches are applied to gcc, binutils and newlib sources.

ABOUT GNURX v15.02

Release Version:	GNURX v15.02
Release Date:	30 th September 2015
Platforms Supported:	Red Hat GNU/Linux v8.0 or later (or compatible distribution) Windows XP, Windows 7, Windows 8, Windows 10
Language:	C, C99, C++
Targets:	RX100 RX200 RX600 RX64M RX700
Object File Format:	ELF

CHANGES IN THE GNURX-ELF v15.02

This section describes the fixes made in the GNURX-ELF v15.02 release.

GCC/Binutils:

1. The GNURX toolchain now ensures that 'jsr' instruction is generated instead of 'bsr' on using the '-mjsr' option
Multi-libs are also provided along with the v15.02 toolchain for the '-msjr' option.
2. The GNURX toolchain now supports the option '-misa=<isa name>'. Currently, 'v1' and 'v2' are the valid ISA names.
3. The GNURX toolchain now generates an optimized Interrupt Service Routine (ISR) code by generating the 'pushm' instruction instead of multiple 'push' instructions on passing the '-O2' optimization option.
4. The GNURX Windows toolchain generated an error "cc1.exe: error: no iconv implementation, cannot convert from UTF-8 to MS932" when the option '-fexec-charset=MS932' is used.
This issue has been fixed.
5. The GNURX toolchain generated segmentation fault when the '-mrelax' option was used along with the '-WI, -no-keep-memory' option.
This issue has been fixed.
6. The GNURX toolchain generated following linker errors for project-built Newlib library on invoking the 'mallinfo()' function,


```
mstats.c:(.text.mallinfo+0x13): undefined reference to `__mallinfo_r'
mstats.c:(.text.malloc_stats+0x11): undefined reference to `__malloc_stats_r'
mstats.c:(.text.mallopt+0x1c): undefined reference to `__mallopt_r'
mstats.c:(.text._mstats_r+0x26): undefined reference to `__malloc_stats_r'
```

 This issue has been fixed.
7. The GNURX toolchain read incorrect bitfield values for complex structures with optimization options '-O1' and '-Os' in certain test scenarios.
This issue has been fixed.
8. The GNURX toolchain generated internal compiler error (ICE) for specific C++ test cases for optimization options '-O1' and above.
This issue has been fixed.
9. The GNURX toolchain generated internal compiler error (ICE) for certain C/C++ testcases for the '-mcpu=rx64m' option.
This issue has been fixed.

10. The GNURX toolchain handled the '.align' directive by inserting optimal 'nop' patterns. When there is a need to insert 7 'nop' instructions, a branch instruction and 6 'nop' instructions were used. However, since delay is caused in branching, this pattern has now been replaced with 'max #0x80000000, r0'.

11. The GNURX C++ projects for NO-FPU target failed to build with an error, "rx-elf-ld: cannot find -lstdc++".

This issue has been fixed.

12. The GNURX objdump utility generates valid code for invalid combinations of the instruction opcode.

This issue has been fixed.

The illegal opcodes are being disassembled as, ".byte 0x.. (actual opcode)" instead of incorrect assembly instructions.

13. The GNURX assembler aligns the sections to the "power of 2" value instead of "multiples of n" when alignment parameter "align=n" used.

This issue has been fixed.

14. The GNURX assembler generated incorrect error messages for the following instructions,

```
racl # 0, a0
rdacl # 0, a0
rdacw # 0, a0
```

```
test.s: Assembler messages:
test.s: 1: Error: RACW expects # 1 or # 2
test.s: 2: Error: RACW expects # 1 or # 2
test.s: 3: Error: RACW expects # 1 or # 2
```

This issue has been fixed.

15. The GNURX toolchain disassembler decodes certain instructions like max r0, r0' as a 'nop' as its functionality is equivalent to functionality of 'nop'. The disassembler has been updated to also decode the instruction 'mul #1, r0' as a 'nop'.

Libraries:

1. The GNURX optimized library is enhanced by adding more functions such as `ldexpf()`, `frexpf()` and `exp10f()`.
2. The project build library with Newlib source is enhanced by adding the library functions `nexttoward()` and `nexttowardf()`.
3. The library generator (libgen) generated warnings while building the library with Newlib source. These warnings were displayed on the console while building a project in e2studio or on the command line.

```
./newlib/include/sys/syslimits.h:40:0: warning: "ARG_MAX" redefined [enabled by default]
./newlib/include/sys/syslimits.h:52:0: warning: "PATH_MAX" redefined [enabled by default]
./newlib/include/_ansi.h:69:42: note: in definition of macro '_DEFUN'
```

This issue has been fixed.

INSTALLER and RPM:

1. 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 location and the user's username and activation key are silently accepted if cached in the registry.
2. The GNURX ABI (Application Binary Interface) is made available on www.kpitgnutools.com website and also provided along with Linux RPM and Windows installer.
3. The GNURX Installer will install the toolchain at the default location at "C:\Program Files\KPIT" in the "Default Installation" mode and "Custom Installation" mode.

Note:

From GNURX v14.01 onwards, the installer does not provide an option to integrate the GNURX toolchain with e2 studio, as the e2 studio IDE will automatically detect the GNURX toolchain installation on start-up for integration.

Alternatively, you may use the 'Toolchain Management' feature in e2 studio to achieve this.

For details on e2 studio please refer following link,
http://www.renesas.com/products/tools/ide/ide_e2studio/index.jsp

From the GNURX v14.02 release onwards, there is no support to integrate toolchain with the HEW IDE.

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. 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>
2. The GNURX 'objdump' utility generates identical instructions for different opcodes. The instruction ".byte 0x80, 0x00" is disassembled as 'mov.b r0, [r0]' instead of 'mov.b r0, 0[r0]'
3. The optimized libraries provided along with the newlib libraries in the toolchain do not require a separate download.
4. 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.
5. The "libgen" utility is not provided under GNU GPL. The source code of the "libgen" utility is neither released nor available on request.

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