

**RELEASE NOTES: GNURL78 v14.03**

10<sup>th</sup> November 2014

KPIT Technologies Limited is releasing the GNURL78 v14.03, a cross compiler tool for Renesas RL78 micro-controllers.

RL78 micro-controller family is designed to deliver solutions for Next-Generation 8-/16-bit embedded applications. To know more about RL78 micro-controller family, please visit the following link, <http://www.renesas.com/products/mpumcu/rl78/index.jsp>

**SALIENT FEATURES:**

1. The GNURL78 v14.03 toolchain is based on GCC 4.8.1 [snapshot dated 2nd April 2014], Binutils 2.23 [snapshot dated 2nd April 2014], Newlib 2.0.0 [snapshot dated 2nd April 2014] and GDB 7.7.1 [released].
2. The GNURL78 toolchain comes with bug fixes and more code size optimization.
3. The GNURL78 toolchain adds the auto-vector feature which adds new interrupt/vector attributes to the toolchain.
4. The RL78 toolchain now supports several built-in functions to generate instructions like mov1, and1, or1, xor1, set1, clr1, not1, ror1, rol1, ei, di and pswie (read interrupt flag).

**ABOUT RL78 v14.03 :**

Release Version:	GNURL78 v14.03
Release Date:	10 <sup>th</sup> November 2014
Platforms Supported	Red Hat GNU/Linux v8.0 or later (or compatible distribution) Windows XP, Windows 7 (32 and 64 bit)
Language:	C, C99, C++
Targets	G1X, I1X, D1X, LIN MCP, F1X, and L1X.
Object File Format	ELF

**CHANGES IN THIS RELEASE:**

This section describes the enhancements made and the issues fixed in v14.03 release.

GCC:

1. The GNURL78 toolchain supports the auto-vector feature which adds new interrupt/vector attributes to the toolchain. Using this, gcc will pass additional information to the linker to auto-generate interrupt tables and other vector tables. Below example shows a simple assignment of a function to one vector in the default table.

```
void __attribute__((interrupt (5))) txd1_handler ();
```

Below example assigns a function to two slots in the default table and makes it the default for the 'dct' table:

```
void __attribute__((interrupt (3,5,"dct","$default")))
txd1_handler();
```

2. The RL78 toolchain now supports several built-in functions to generate instructions like mov1, and1, or1, xor1, set1, clr1, not1, ror1, rol1, ei, di and pswie (read interrupt flag). to the toolchain. Following are the built-in prototypes. Please see the gcc manual for details,

```
void __builtin_rl78_mov1 (char *, char, char, char);
void __builtin_rl78_and1 (char *, char, char, char);
void __builtin_rl78_or1 (char *, char, char, char);
void __builtin_rl78_xor1 (char *, char, char, char);
void __builtin_rl78_set1 (char *, char);
void __builtin_rl78_clr1 (char *, char);
void __builtin_rl78_not1 (char *, char);
char __builtin_rl78_ror1 (char);
char __builtin_rl78_rol1 (char);
void __builtin_rl78_ei ();
void __builtin_rl78_di ();
char __builtin_rl78_pswie ();
```

3. The GNURL78 toolchain generated "relocation truncated to fit:" error for the following testcase,

```
int saddr_var1 __attribute__((saddr));
char saddr_var2 __attribute__((saddr));
int main(void)
{
    asm("XOR A, _saddr_var2"); //NOT OK
    asm("AND A, _saddr_var1"); //NOT OK
    // Other assembly instructions e.g., INCW, DEC, SUB etc.
    return 0;
}
```

This issue has been fixed.

4. The GNURL78 toolchain generated internal compiler error for multiplication of multi-dimensional arrays declared with the \_\_far keyword.

This issue has been fixed.

5. The GNURL78 toolchain generated internal compiler error while compiling the following testcase with optimization,

```
void foo(int __far * n)
{
    *n = 5;
}
```

This issue has been fixed.

6. The GNURL78 toolchain generated incorrect epilogue for interrupt service routine when optimization is used for the G10 target variant.

This issue has been fixed.

7. The GNURL78 toolchain generated the following error for certain testcases,  
Error: value of -xx too large for field of 1 bytes at xx.

This issue has been fixed.

#### Libraries:

1. The GNURL78 toolchain generates more optimized code for the division and mod functions for the G10 target variant.
2. While building optlib libraries using libgen tool, the user can get more optimized code for “stdio” functions by passing the following macro under compiler options, “-DOPTLIB\_NO\_FLOAT\_SUPPORT”.

#### KNOWN LIMITATIONS:

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

1. The '-mrelax' option, when passed to the toolchain causes certain applications to fail on hardware execution.
2. The GNURL78 toolchain calculates wrong higher 8/16 bits for operation hi8/hi16 respectively for below testcase.

```
int main ()
{
    asm ("MOVW HL, #(%hi16(0x0EFFE2))"); // FAILS => FFE2 in place of 0EFF
    asm ("MOVW AX, #(%hi8(0x0EFFE2))"); // FAILS => E2 in place of 0E
    asm ("MOVW HL, #(%lo16(0x0EFFE2))"); // Work as expected => FFE2
    return 0;
}
```

3. The GNURL78 toolchain does not handle relocation related calculations when a combination of different data types is used, for example  
.hword %hi16(0xF0A80) + %lo16(Sym1)

**For Windows OS only:**

1. The GNURL78 v14.03 Installer, "Default Installation" mode will install the toolchain to a default location "C:\Program Files\KPIT".

The "Custom Installation" mode allows user to install toolchain at custom directory.

User will not be prompted for IDE selection page while installing a toolchain. Instead, the e2 studio IDE will automatically detect the GNURL78 v14.03 toolchain on start-up for registration. You may also use the Toolchain Management feature in e2 studio IDE to achieve this.

2. In-order to integrate the toolchain with Renesas e2 studio version 2.0 and above, please use the Renesas toolchain management feature in e2 studio IDE ( 'Help' > Add Renesas Toolchains')
3. The registry entry for Windows-7 64-bit system differs to Windows-7 32-bit system.

**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.

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