

Release Notes: GCC 8.3.0.202102-GNURX

31st of May 2021

CyberThor Studios Ltd. is releasing the GCC 8.3.0.202102-GNURX, a cross compiler tool for Renesas RX micro-controllers.

SALIENT FEATURES

The GCC 8.3.0.202102-GNURX toolchain is based on:

- ❖ GCC 8.3.0 [released]
- ❖ Binutils 2.36.1 [released]
- ❖ Newlib 3.1.0 [released]
- ❖ GDB 7.8.2 [released]

The latest patches are applied to GCC, Binutils and GDB sources.

ABOUT GCC 8.3.0.202102-GNURX

Release Version:	GCC 8.3.0.202102-GNURX
Release Date:	31 st of May, 2021
Platforms Supported:	64bit Red Hat GNU/Linux v8.0 or later (or compatible distribution) Windows XP, Windows 7, Windows 8, Windows 10
Language:	C, C++
Targets:	RX100 RX200 RX600 RX64M RX700
Object File Format:	ELF



CHANGES IN THE GCC 8.3.0.202102-GNURX

This section describes the fixes made in the GCC 8.3.0.202102-GNURX release.

GCC:

1. *[Improvement]* - The RX140 CPU type is now supported.
2. *[Improvement]* - Using the `-tfu` option will now expand libcalls to intrinsic functions.
3. *[Improvement]* - The `-fpu` option is now supported by the RX13T CPU type.
4. *[Bug Fix]* - Fixed register settings for `__builtin_rx_rmpa8`.
5. *[Bug Fix]* - Disabled the `icf ipa` optimisations for interrupt functions.
6. *[Bug Fix]* - The `-mint-register=N` now properly reserves the registers.
7. *[Bug Fix]* - The `mvtc #imm, creg` instruction now to properly generate an error for targets without floating point support.
8. *[Bug Fix]* - Fixed the order of pushed/poped registers when the `-msave-acc-in-interrupts` option is used.

Binutils:

1. *[Improvement]* - Binutils version updated from version 2.24 to version 2.36.1.
2. *[Bug Fix]* - Fixed SETPSW decoding.
3. *[Bug Fix]* - Fixed the `-flto` generating unexpected linker/compiler errors.

GDB:

1. *[Bug Fix]* - Fixed double floating instructions simulation.
2. *[Bug Fix]* - Fixed SETPSW decoding.

INSTALLER and RPM:

1. The GCC 8.3.0.202102-GNURX 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 at "C:\Program Files\GCC 8.3.0.202102-GNURX" 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 our GNU Tools support website (<https://llvm-gcc-renesas.com>) and also provided along with Linux RPM and Windows installer.

Notes:

This 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 visit the following link below:

http://www.renesas.com/products/tools/ide/ide_e2studio/index.jsp

There is no support in this installer to integrate toolchain with the HEW IDE.



This section describes all known issues for this particular release:

1. `-Wreturn-type` is enabled by default

G++ now assumes that control never reaches the end of a non-void function (i.e. without reaching a return statement). This means that you should always pay attention to `-Wreturn-type` warnings, as they indicate code that can misbehave when optimized.

To tell the compiler that control can never reach the end of a function (e.g. because all callers enforce its preconditions) you can suppress `-Wreturn-type` warnings by adding `__builtin_unreachable()`:

```
char signchar(int i) // precondition: i != 0
{
    if (i > 0)
        return '+';
    else if (i < 0)
        return '-';
    __builtin_unreachable();
}
```

Because `-Wreturn-type` is now enabled by default, G++ will warn if `main` is declared with an implicit `int` return type (which is non-standard but allowed by GCC). To avoid the warning simply add a return type to `main`, which makes the code more portable anyway.

2. Stricter rules when using templates

G++ now diagnoses even more cases of ill-formed templates which can never be instantiated (in addition to the stricter rules in GCC 7). The following example will now be diagnosed by G++ because the type of `B<T>::a` does not depend on `T` and so the function `B<T>::f` is ill-formed for every possible instantiation of the template:

```
class A { };
template <typename T> struct B {
    bool f() const { return a; }
    A a;
};
```

In member function `'bool B<T>::f() const'`:
 error: cannot convert 'const A' to 'bool' in return

```
    bool f() const { return a; }
                        ^
```

Ill-formed template code that has never been tested and can never be instantiated should be fixed or removed.

3. Changes to `alignof` results

The `alignof` operator has been changed to return the minimum alignment required by the target ABI, instead of the preferred alignment (consistent with `_Alignof` in C).

Previously the following assertions could fail on 32-bit x86 but will now pass. GCC's preferred alignment for standalone variables of type `double` or `long long` is 8 bytes, but the minimum alignment required by the ABI (and so used for non-static data members) is 4 bytes:

```
struct D { double val; };
static_assert(alignof(D) == alignof(double), "...");
struct L { long long val; };
static_assert(alignof(L) == alignof(long long), "...");
```

Code which uses `alignof` to obtain the preferred alignment can use `__alignof__` instead.

4. Associative containers check the comparison function

The associative containers (`std::map`, `std::multimap`, `std::set`, and `std::multiset`) now use static assertions to check that their comparison functions support the necessary operations. In C++17 mode this includes enforcing that the function can be called when `const`-qualified:



```

struct Cmp {
    bool operator()(int l, int r) /* not const */ { return l < r; }
};
std::set<int, Cmp> s;

```

In member function 'bool B<T>::f() const':

```

error: static assertion failed: comparison object must be invocable as const
    static_assert(is_invocable_v<const _Compare&, const _Key&, const _Key&>,
                  ^~~~~~
    bool f() const { return a; }
                        ^

```

This can be fixed by adding const to the call operator:

```

struct Cmp {
    bool operator()(int l, int r) const { return l < r; }
};

```

5. The following feature is considered deprecated: Optlib library

The OPTLIB library feature is considered deprecated, due to the following reasons:

1. It does not contain all the headers and the defines of the ANSI/ISO standard.
2. Partial implementation of library functions (e.g. standard I/O functions are not all implemented)
3. The math library sacrifices precision for speed/code size (not IEEE754 compliant)

It is now removed from the product.



FREE SUPPORT FOR GCC 8.3.0.202102-GNURX

For free technical support, please register at
<https://llvm-gcc-renesas.com>

For your feedback and suggestions, please visit
<https://llvm-gcc-renesas.com/help/contact-us/>

