

Release Notes: GCC 8.3.0.202311-GNURX

30th of November, 2023

CyberThor Studios Ltd. is releasing the GCC 8.3.0.202311-GNURX, a cross compiler tool for Renesas RX micro-controllers.

SALIENT FEATURES

The GCC 8.3.0.202311-GNURX toolchain is based on:

- ❖ GCC 8.3.0 [released]
- ❖ Binutils 2.36.1 [released]
- ❖ Newlib 4.1.0 [released]
- ❖ GDB 7.8.2 [released]

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

ABOUT GCC 8.3.0.202311-GNURX

| | |
|----------------------|---|
| Release Version: | GCC 8.3.0.202311-GNURX |
| Release Date: | 30 th of November, 2023 |
| Platforms Supported: | Ubuntu 18.04 or later (or compatible distribution) Windows 7 or later macOS Ventura 13.4 on Apple M1 (experimental) |
| Language: | C, C++ |
| Targets: | All RX devices |
| Object File Format: | ELF |



CHANGES IN THE GCC 8.3.0.202311-GNURX

This section describes the fixes made in the GCC 8.3.0.202311-GNURX release.

1. [Bug fix] Fixed superfluous register saving when using interrupt_bank

There were unnecessary register saves inserted for interrupt functions with the interrupt_bank attribute. This was fixed in the current release.

INSTALLER:

The GNURX ABI (Application Binary Interface) is made available on our GNU Tools support website (<https://lvm-gcc-renesas.com>) and also provided along with Linux and Windows installer.

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

Integration with the HEW IDE is not supported by the installer.



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 has been removed: Optlib library

The OPTLIB library feature is now removed, 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)

6. Section to segment mapping issue

In some rare cases there's an issue in the section to segment mapping which can cause load problems in the debugger.

This issue is being investigated and will be fixed in the next release.



FREE SUPPORT FOR GCC 8.3.0.202311-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/>

