CS+ RL78 Compiler CC-RL V1.05.00 Release Note

R20UT4085EJ0101
Rev.1.01
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Contents

Chapter 1 Target Devices

The target devices the CC-RL supports are listed on the Website.

Please see the URL below.

CS+ Product Page:

http://www.renesas.com/cs+

Chapter 2 User's Manuals

Please read the following user's manuals along with this document.

Manual Name	Document Number
CC-RL Compiler	R20UT3123EJ0105
CS+ CC-RL Build Tool Operation	R20UT3284EJ0104

Chapter 3 Keywords When Uninstalling the Product

There are two ways to uninstall this product.

- Use the integrated uninstaller from Renesas (uninstalls all CS+ components)
- Use the Windows uninstaller (only uninstalls this product)

To use the Windows uninstaller, select "CS+ CC-RL V1.05.00" from "Programs and Features" of the control panel.

Chapter 4 Changes

This chapter describes changes to V1.05.00 of the CC-RL compiler.

4.1 Changes to CC-RL

This section describes changes to CC-RL from V1.04.00 to V1.05.00.

The features of the latter can only be used if the compiler is registered under the professional license.

They are indicated by [Professional edition] from here on.

4.1.1 Enhanced optimization

For V1.05.00, optimization has been further enhanced on points (1) to (2), listed and described below.

(1) Handling of switch statements

```
<Example of source code>
void sub(int);
void func(int key) {
  switch(key & 0x3){
  case 0:
    sub(0);
    break;
  case 1:
    sub(1);
    break;
  case 2:
    sub(2);
    break;
  case 3:
    sub(3);
    break;
  default:
    sub(4);
    break;
  }
}
```

Since the result of (key & 0x3) at the third line will be 0, 1, 2, or 3, optimization in V1.05.00 takes the fact that the condition for the block default will never be satisfied into account.

```
<Code generated by V1.04.00>
        mov a, x
        and a, #0x03
        bz $.BB@LABEL@1_5
.BB@LABEL@1_1:          ; entry
        dec a
        bz $.BB@LABEL@1_6
.BB@LABEL@1_2:          ; entry
        dec a
        bz $.BB@LABEL@1_7
.BB@LABEL@1_3:          ; entry
        dec a
        bz $.BB@LABEL@1_8
.BB@LABEL@1_4:          ; bb5
        movw ax, #0x0004
        br !!_sub
.BB@LABEL@1_5:          ; bb
        clrw ax
        br !!_sub
.BB@LABEL@1_6:          ; bb2
        onew ax
        br !!_sub
.BB@LABEL@1_7:          ; bb3
        onew ax
        incw ax
        br !!_sub
.BB@LABEL@1_8:          ; bb4
        movw ax, #0x0003
        br !!_sub
```

```
<Code generated by V1.05.00>
        mov a, x
        and a, #0x03
        bz $.BB@LABEL@1_4
.BB@LABEL@1_1:          ; entry
        dec a
        bz $.BB@LABEL@1_5
.BB@LABEL@1_2:          ; entry
        dec a
        bnz $.BB@LABEL@1_6
.BB@LABEL@1_3:          ; bb3
        onew ax
        incw ax
        br !!_sub
.BB@LABEL@1_4:          ; bb
        clrw ax
        br !!_sub
.BB@LABEL@1_5:          ; bb2
        onew ax
        br !!_sub
.BB@LABEL@1_6:          ; bb4
        movw ax, #0x0003
        br !!_sub
```

(2) Alias analysis

```
<Example of source code>
struct tag1 {
   char member1;
   int   member2;
   long long member3;
} StructArray[2];

struct tag2 {
   short index0;
   short index1;
   short index2;
};

void func(struct tag2 *p) {
   StructArray[p->index1].member1 = 1;
   StructArray[p->index1].member2 = 2;
   StructArray[p->index1].member3 = 3;
}
```

Although the address of StructArray[p->index1] would be calculated three times in V1.04.00, it is only calculated once in V1.05.00.

```
<Code generated by V1.04.00>
        movw de, ax
        movw bc, #0x000C
        movw ax, [de+0x02]
        mulh
        movw bc, ax
        mov LOWW(_StructArray)[bc], #0x01
        movw ax, [de+0x02]
        movw bc, #0x000C
        mulh
        addw ax, #LOWW(_StructArray+0x00002)
        movw hl, ax
        onew ax
        incw ax
        movw [hl], ax
        movw ax, [de+0x02]
        movw bc, #0x000C
        mulh
        addw ax, #LOWW(_StructArray+0x00004)
        movw de, ax
        clrw ax
        movw [de+0x06], ax
        movw [de+0x04], ax
        movw [de+0x02], ax
        movw ax, #0x0003
        movw [de], ax
        ret
```

```
<Code generated by V1.05.00>
        push hl
        movw de, ax
        movw bc, #0x000C
        movw ax, [de+0x02]
        mulh
        addw ax, #LOWW(_StructArray)
        movw [sp+0x00], ax
        movw de, ax
        movw ax, de
        mov [de+0x00], #0x01
        incw ax
        incw ax
        movw de, ax
        onew ax
        incw ax
        movw [de], ax
        movw ax, [sp+0x00]
        addw ax, #0x0004
        movw de, ax
        clrw ax
        movw [de+0x06], ax
        movw [de+0x04], ax
        movw [de+0x02], ax
        movw ax, #0x0003
        movw [de], ax
        pop hl
        ret
```

4.1.2 Improvements to the feature for checking source code against MISRA-C:2012 rules [Professional edition]

The following rule numbers have been added to those which can be designated as arguments of the -misra2012 option, which selects checking by the compiler of source code against the specified MISRA-C:2012 rules.

The V1.05.00 compiler supports Amendment 1 of MISRA-C:2012.

[Mandatory rules] **12.5, 21.13**

[Required rules] **13.2, 13.5, 21.15, 21.16**

[Advisory rules] **17.5, 17.8**

The following are the numbers of MISRA-C:2012 rules against which each revision of compilers can check source code for compliance.

Rule classification (number of rules in the standard)	*V1.02.00*	*V1.03.00*	*V1.04.00*	*V1.05.00*
Mandatory rules (16)	3	3	4	**6**
Required rules (108)	31	58	76	**80**

Advisory rules (32)	7	21	23	**25**
Total number of rules (156)	41	82	103	**111**

4.1.3 Improvement to the method of authenticating licenses

The way licenses are authenticated was improved to reduce build times.

With this improvement, when a license for the professional edition has not been registered and the code includes #pragma extended language directives for the professional edition, the compiler operates as follows.

- Versions earlier than V1.05.00

  The compiler outputs a warning and ignores the option.

- V1.05.00 and later versions

  When the syntax of the #pragma extended language directive is correct, the compiler outputs a warning but still ignores the option.

  When the syntax of the #pragma extended language directive is not correct, the compiler outputs an error message.

4.1.4 Change to the output of the initial values for array type variables

The output of the initial values for array type variables in assembly source code has been changed so that the values are collectively output on one line. This change reduces the load of analytical processing during building and so can reduce build times.

```
<Example of source code>
float flt[4] = {1,2,3,4};
```

```
<Code generated by V1.04.00>
_flt:
        .DB4 0x3F800000   ; float value: 1
        .DB4 0x40000000   ; float value: 2
        .DB4 0x40400000   ; float value: 3
        .DB4 0x40800000   ; float value: 4
```

```
<Code generated by V1.05.00>
_flt:
        .DB4 0x3F800000,0x40000000,0x40400000,0x40800000 ; float 1,2,3,4
```

4.1.5 Specification of the type of end record of Motorola S-type files

A linker option **-end_record** for specifying the types of end records of Motorola S-type files has been added. In versions earlier than V1.05.00, the end record was output to suit the address of the entry point. In V1.05.00, Motorola S-type files can be generated with specified types of end record.

-end_record=*record*

For the argument “record”, **S7**, **S8**, or **S9** can be specified.

4.1.6 Change to the specification of link map files

The ATTRIBUTE column which is the relocation attribute was added to “Mapping List” of the link map file.

When **-show=relocation_attribute** is specified, the relocation attribute corresponding to the section is output. For details on the attributes, refer to the CC-RL Compiler User’s Manual.

4.1.7 Change to the messages for linkage errors

The file name is output in messages for the linkage error “F0563102”.

- Versions earlier than V1.05.00

  F0563102:Section contents overlap in absolute section <section name>.

- V1.05.00 and later versions

  When F0563102:Section contents overlap in absolute section <section name> in <file name>.

4.1.8 Addition of an option for inserting a local label and nop instruction

The -insert_nop_with_label option, which is used in the solution for measuring current drawn by CS+ or the e^2 studio, was added.

This option is for use with CS+ or the e^2 studio.

4.1.9 Extension of the functionality of the -vfinfo option

The output attribute *attribute* was added to the -vfinfo option.

In V1.05.00, specifying near functions as well as callt functions is now possible. In addition, information on functions in sections specified for the ROM option or the far area is not output.

4.1.10 Extension of the functionality of the -binary option

For the -binary option, items that are specifiable for the section attribute *attribute* have been extended.

- Versions earlier than V1.05.00

  CODE,DATA

- V1.05.00 and later versions

  CALLT0, CODE, TEXT, TEXTF, TEXTF_UNIT64KP, CONST, CONSTF,
  SDATA, DATA, DATAF, OPT_BYTE, and SECUR_ID

4.1.11 Addition of #pragma near/far

The #pragma directives can specify the near or far attribute of functions.

The near or far attribute can be specified at the same time for multiple functions.

4.1.12 Addition of #pragma pack/unpack

The #pragma directives can specify whether a structure is to be packed or not.

Packing can be specified for parts of C source files.

4.1.13 Extension of the functionality of #pragma address

#pragma address can specify an address for the allocation of const variables.

4.1.14 Acceptance of duplicated #pragma directives when the function to support porting is specified

When the function to support porting is specified, the duplication of #pragma directives such as #pragma nop in code will not lead to an error.

4.1.15 Addition of numbers to messages when using the evaluation version

Numbers W0561016 and W0561017 were added to the messages that may be output during building by using the evaluation version. This enables control by using -change_message such that the message is handled as an error when the evaluation version is in use.

W0561016:The evaluation version is valid for the remaining *** days

W0561017:The evaluation period has expired

4.1.16 Rectified point for caution

The point for caution on the following item no longer applies. For details, refer to Tool News.

-Assembly Statements Not in Accord with the Specification (CCRL#001)

4.1.17 Other changes and improvements

Other major changes and improvements are described below.

(a) Improved runtime library for arithmetic operations on the float type

Performance of the runtime library functions for the addition, subtraction, multiplication, and division of float type variables has been improved.

(b) Correction of a compiler

The generation of compiler error code “F0530800” in response to specification of the -merge_files option has been corrected.

(c) Improved prevention of interna errors

A problem with an internal error during building has been rectified.

Chapter 5 Points for Caution

Please refer to the user's manual for caution regarding V1.05.00 of the CC-RL compiler.

Revision History

Rev.	Date	Description	
		Page	Summary
Rev.1.00	Jun 20,2017		First Edition issued
Rev.1.01	Jan 16,2021	11	The error in rectified point for caution is corrected.

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