

## Outline

When using the C Compiler Package for RH850 Family CC-RH, note the following points.

1. Use of struct/union type arguments (No.34)
2. Cast from pointer type to other type (No.35)
3. Use of an anonymous struct/union (No.36)
4. Use of an address read from memory after writing the address to the memory (No.37)
5. Reference to global/static variables (No.38)

Note: The number following the note is an identification number for the note.

## 1. Use of Struct/Union Type Arguments (No.34)

### 1.1 Applicable Products

CC-RH V1.00.00 to V2.03.00

### 1.2 Details

An incorrect code may be generated when a struct or union type argument with a pointer-type member is used.

There are three conditions in which the problem may occur. Refer to the following for the conditions, examples, and the workarounds.

### 1.3 Conditions (1)

The problem may occur when all the following conditions are met.

- (1) The option *-Nothing* is not specified.
- (2) There is a struct or union type variable with a pointer-type member.
- (3) The size of the struct or union type of (2) is 8 bytes or less.
- (4) There is Function A that does (4-1) to (4-3) below.
  - (4-1) It assigns an address to the pointer-type member of (2).
  - (4-2) It passes the variable of the struct or union type, to which (4-1) has been assigned, to the argument and calls Function B.
  - (4-3) It references the destination of the address assigned in (4-1).
- (5) Function B receives the struct or union type argument of (4-2) from a register.
- (6) In Function B, the destination of the pointer-type member of the argument of (4-2) is referenced.
- (7) Function B is expanded inline.

[Example] `ccrh -Ospeed tp.c` (1), (7)

```
/* tp.c */
#include <stdio.h>
typedef struct {    // (2), (3)
    int* _pointer;
    int _value;
}myStruct;

int flg = 0;
```

```

void func( myStruct arg ) {      // (5)
    if (*(arg._pointer) != 10) { // (6)
        flg = 1;
    }
}
void main(void) {
    int val = 10;
    volatile myStruct st;
    st._pointer = &val;        // (4-1)
    func(st);                  // (4-2)
    val = 20;                  // (4-3)
    if (flg == 1) {
        printf("ng¥n");
    } else {
        printf("ok¥n");
    }
}

```

In this example, the variable *flg* should not become 1, and "ok" should be output by *printf*. However, the code that assigns 10 to the variable *val* has been deleted due to failure and "ng" is output as the result.

### 1.4 Workaround (1)

Do either of the following.

- (a) Specify the option *-Nothing*.
- (b) Change the size of the struct or union type to avoid condition (3) above.
- (c) Adjust the struct or union type argument so that it is not passed by a register.
- (d) Avoid the inline expansion.

### 1.5 Conditions (2)

The problem may occur when all the following conditions are met.

- (1) The option *-Nothing* is not specified.
- (2) The option *-Xintermodule* is specified.
- (3) There is a struct or union type variable with a pointer-type member.
- (4) The size of the struct or union type of (3) is 16 bytes or less.
- (5) There is Function A that does (5-1) to (5-3) below.
  - (5-1) It assigns an address to the pointer-type member of (3).
  - (5-2) It passes the variable of the struct or union type, to which (5-1) has been assigned, to the argument and calls Function B.
  - (5-3) It references the destination of the address assigned in (5-1).
- (6) Function B receives the struct or union type argument of (5-2) from a register.
- (7) In Function B, the destination of the pointer-type member of the argument of (5-2) is referenced.
- (8) Function B is expanded inline.

[Example] `crrh -Ospeed -Xintermodule tp.c` (1), (2), (8)

```

/* tp.c */
#include <stdio.h>
typedef struct {      // (3), (4)
    int* _pointer;
    int _value1;
    int _value2;
}myStruct;

```

```

int flg = 0;
void func( myStruct arg ) {      // (6)
    if (*(arg._pointer) != 10) { // (7)
        flg = 1;
    }
}
void main(void) {
    int val = 10;
    volatile myStruct st;
    st._pointer = &val;        // (5-1)
    func(st);                  // (5-2)
    val = 20;                  // (5-3)
    if (flg == 1) {
        printf("ng¥n");
    } else {
        printf("ok¥n");
    }
}

```

In this example, the variable *flg* should not become 1, and "ok" should be output by *printf*. However, the code that assigns 10 to the variable *val* has been deleted due to failure, and "ng" is output as the result.

## 1.6 Workaround (2)

Do either of the following.

- (a) Specify the option *-Nothing*.
- (b) Unspecify the option *-Xintermodule*.
- (c) Change the size of the struct or union type to avoid condition (4) above.
- (d) Adjust the struct or union type argument so that it is not passed by a register.
- (e) Avoid the inline expansion.

## 1.7 Conditions (3)

The problem may occur when all the following conditions are met.

- (1) The option *-Nothing* is not specified.
- (2) The option *-Xintermodule* is specified.
- (3) There is a struct or union type with a pointer-type member.
- (4) There is a function with the struct or union type argument of (3).
- (5) In the function of (4), the pointer-type member of the struct or union type argument is referenced for either or both of the following.
  - (5-1) It has been read and written.
  - (5-2) It has been written multiple times.

[Example] `ccrh -Ospeed -Xintermodule tp.c` (1), (2)

```

/* tp.c */
typedef struct s_tag { // (3)
    int *ptr ;
    int dmy1 ;
} STRCT ;
STRCT gv;
void func( STRCT arg ) { // (4)
    int i ;
    for( i = 0 ; i < 1 ; i++ ){
        (*(arg.ptr)) += 1 ; // (5)
        (*(arg.ptr)) += 2 ; // (5)
    }
}

```

```
gv = arg;
}
```

In this example, 3 should be added to the destination of *arg.ptr*. However, the code that adds 2 to the destination is generated due to failure.

## 1.8 Workaround (3)

Do either of the following.

- (a) Specify the option *-Nothing*.
- (b) Unspecify the option *-Xintermodule*.

## 1.9 Schedule for Fixing the Problem

The problem will be fixed in CC-RH V2.04.00, which will be released in January 2022.

## 2. Cast from Pointer Type to Other Type (No.35)

### 2.1 Applicable Products

CC-RH V1.00.00 to V2.03.00

### 2.2 Details

An incorrect code may be generated when a casted pointer type is used.

### 2.3 Conditions

The problem may occur when all the following conditions are met.

- (1) The option *-Nothing* is not specified.
- (2) The option *-Xintermodule* is specified.
- (3) A pointer-type value is casted to a non-pointer-type and then assigned to a variable.
- (4) The address of the variable, to which (3) has been assigned, is assigned to a pointer-to-pointer-type variable.\*
- (5) The destination of the pointer-to-pointer-type variable of (4) is referenced.
- (6) The destination of the pointer-type variable assigned in (3) is referenced in the same function of (5).

\*Instead of "a pointer-to-pointer-type", the condition also applies when there are multiple unary operators.

[Example] `ccrh -Ospeed -Xintermodule tp.c` (1), (2)

```
/* tp.c */
#include <stdio.h>
void test(int key){
    int gv = 0;
    volatile int variable = (int)&gv; // (3)
    int** pointer = (int**)&variable; // (4)
    **pointer = 1; // (5)

    if (gv == 1){ // (6)
        printf("ok");
    }
    else{
        printf("ng");
    }
}
```

In this example, "ok" should be output by *printf* as the result of assigning 1 to the variable *gv*. However, the *if-else* statement that compares the variable *gv* and 0 (assuming that *gv* is 0) has been deleted due to failure. As the result, "ng" is output.

## 2.4 Workaround

Do either of the following.

- (a) Specify the option *-Nothing*.
- (b) Unspecify the option *-Xintermodule*.
- (c) Avoid casting a pointer-type value to a non-pointer-type, assigning it to a non-pointer-type variable, and referencing it via the variable of the pointer-to-pointer-type.

## 2.5 Schedule for Fixing the Problem

The problem will be fixed in CC-RH V2.04.00, which will be released in January 2022.

## 3. Use of an Anonymous Struct/Union (No.36)

### 3.1 Applicable Products

CC-RH V1.00.00 to V2.03.00

### 3.2 Details

A struct and union with an anonymous union type member may not be initialized correctly or cause internal errors.

### 3.3 Conditions

The problem may occur when all the following conditions are met.

- (1) There is a variable or compound literal with either of the following types.

(1-1) Struct

(1-2) Union

- (2) The type of (1) has either of the following members.

(2-1) Anonymous struct <sup>(Note 1)</sup>

(2-2) Anonymous union <sup>(Note 2)</sup>

<sup>(Note 1)</sup> A struct member with a member name omitted in the declaration

<sup>(Note 2)</sup> A union member with a member name omitted in the declaration

- (3) The variable of (1) has been initialized with the declaration.

- (4) Either of the following conditions is met.

(4-1) The unions of (1) and (2) have a member that is larger than the first member.

(4-2) A member smaller than the unions of (1) and (2) has been initialized in (3).

(4-3) The initialization of (3) has been done to only some members of the structs, unions, and classes of (1) and (2).

(4-4) *-Oinline\_init=on* is specified. <sup>(Note 3)</sup>

<sup>(Note 3)</sup> When *-Ospeed* is specified, *-Oinline\_init=on* is automatically specified.

[Example] ccrh tp.c

```

/* tp.c */
long func() {
    struct { // (1-1)
        union { // (2-2)
            long a;
        };
    }
    union {

```

```

        long b;
    } c;
} v = {10}; // (3), (4-3)
return v.c.b;
}

```

In this example, *v.a* (anonymous union member) should be initialized to 10, *v.c.b* to 0, and *func* should return 0 as the result. However, *v.c.b* is incorrectly initialized to 10, and *func* returns 10 as the result.

### 3.4 Workaround

Do either of the following.

- (a) Separately perform the declaration and the initialization of the variables that meet condition (1).
- (b) If condition (4-3) is met, initialize all the members of the variables that meet condition (1) at once.
- (c) If condition (4-4) is met, avoid using *-Oinline\_init=on*. Use *-Oinline\_init=off* instead.
- (d) Avoid using anonymous structs and unions. Name and use them as structs and unions.

### 3.5 Schedule for Fixing the Problem

The problem will be fixed in CC-RH V2.04.00 which will be released in January 2022.

## 4. Use of an Address Read from Memory After Writing the Address to the Memory (No.37)

### 4.1 Applicable Products

CC-RH V1.00.00 to V2.03.00

### 4.2 Details

If a pointer has been written to memory and then read, an incorrect code may be generated under certain circumstances.

### 4.3 Conditions

The problem may occur when all the following conditions are met.

- (1) The option *-Onothing* is not specified.
- (2) Regarding the memory, either of the following is met.
  - (2-1) An address has been written to the memory as a pointer-type value. The value is then read as a non-pointer-type value, converted to a pointer-type, and its destination is referenced.
  - (2-2) An address has been written to the memory as a non-pointer-type value. The value is then read as a pointer-type value, and its destination is referenced.
- (3) The destination of the address of (2) is referenced without using the write and read operations in (2).
- (4) The references of (2) and (3) are in the same functions (or the references are put in a single function by inline expansion), and either of the references performs writing.

[Example] *ccrh tp.c* // (1)

```

/* tp.c */
#include <stdio.h>
int fg = 0;
void main(void){
    volatile union{
        int* _pointer;
        int _value;
    }myUnion;
    int val = 10;
}

```

```

myUnion._pointer = &val; // (2-1)
if (*(int*)myUnion._value) != 10){ // (2-1)(4)
    flg = 1;
}
val = 20; // (3)(4)
if (flg == 1){
    printf("ng\n");
} else {
    printf("ok\n");
}
}

```

In this example, the variable *flg* should not become 1, and "ok" should be output. However, the code that assigns 10 to the variable *val* has been deleted due to failure, and "ng" is output as the result.

```
ccrh tp2.c -Ospeed -Xintermodule // (1)
```

```

/* tp2.c */
#include<stdio.h>
typedef struct{
    int *_pointer;
} MyStruct2;
void test(void){
    int autoVar = 0;
    volatile struct{
        int _value;
    } myStruct;
    volatile MyStruct2* castedStruct = (volatile MyStruct2*)&myStruct;
    myStruct._value = (int)&autoVar; // (2-2)
    *(castedStruct->_pointer) = 1; // (2-2)(4)
    if (autoVar == 1){ // (3)(4)
        printf("ok");
    }
    else{
        printf("ng");
    }
}
}

```

In this program, *autoVar* should become 1 and "ok" should be output. However, *autoVar* is judged to be 0 due to failure, the *if-else* statement is deleted, and "ng" is output as the result.

#### 4.4 Workaround

Do either of the following.

- (a) Specify the option *-Nothing*.
- (b) When saving a pointer-type value, write it as a pointer type and read it as a pointer type.

#### 4.5 Schedule for Fixing the Problem

The problem will be fixed in CC-RH V2.04.00, which will be released in January 2022.

### 5. Reference to Global/Static Variables (No.38)

#### 5.1 Applicable Products

CC-RH V1.00.00 to V2.03.00

#### 5.2 Details

When a static variable\* is referenced, an incorrect code may be generated under certain circumstances.

\*Static variables include global variables.

### 5.3 Conditions

The problem may occur when all the following conditions are met.

- (1) The option *-Nothing* is not specified.
- (2) A static variable is referenced by either of the following.
  - (2-1) A static variable (e.g., *gv*)
  - (2-2) If the static variable is a struct or union, its member (e.g., *gv.member*)
  - (2-3) If the static variable is an array, its element (e.g., *gv[i]*)
- (3) The static variable of (2) is referenced by other than (2-1) to (2-3).
- (4) The references of (2) and (3) include the writings to the static variables.

[Example] `ccrh -O tp.c // (1)`

```
/* tp.c */
#include <stdio.h>
int gv;
void test(void){
    int myVal = (int)&gv >> 1;
    gv = 0; // (2)、(4)
    *(int*)((myVal) << 1) = 1; // (3)、(4)
    if (gv == 1){
        printf("ok");
    }
    else{
        printf("ng");
    }
}
```

In this example, 1 should be assigned to *gv* via *myVal*, and "ok" should be output. However, *gv* is judged to be 0, the *if-else* statement is deleted, and "ng" is output as the result.

### 5.4 Workaround

Do either of the following.

- (a) Specify the option *-Nothing*.
- (b) Regarding condition (3), select (2-1), (2-2), or (2-3).

### 5.5 Schedule for Fixing the Problem

The problem will be fixed in CC-RH V2.04.00, which will be released in January 2022.



**Revision History**

Rev.	Date	Description	
		Page	Summary
1.00	Jan.16.22	-	First edition issued

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