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=== Be sure to read this note. ===

MISRA C Rule Checker SQMlint V.1.03 Release 00A Release Notes

Renesas Solutions Corporation
Aug. 1, 2009

Welcome to MISRA¹ C Rule Checker SQMlint V.1.03 Release 00 (called SQMlint). This document contains supplementary descriptions to User's Manual. When you read certain items in the User's manual, please read this document as well.

* You can get the latest version of this document from our homepage: <http://www.renesas.com/en/tools>

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1. Outline of the Product

This product adds the MISRA C rule inspection functions to the Renesas C compiler that is already installed in your computer. This product cannot be run singly.

1. Contents of CD-ROM
 - SQMLint V.1.03 Release 00
 - SQMLint Users' Manual (PDF format file)

2. Operation Verification Environment

2.1. Supported Compiler

Supported Compilers		
NC30WA	V.5.20 Release 2 or later	Japanese and English versions for Windows
NC308WA	V.5.10 Release 1 or later	Japanese and English versions for Windows
NC100	V.1.01 Release 00 or later	Japanese and English versions for Windows
CC32R	V.4.10 Release 1 or later	Japanese and English versions for Windows
SH Compiler	V.9.00 Release 00 or later	Japanese and English versions for Windows
H8 Compiler	V.6.01 Release 00 or later	Japanese and English versions for Windows

SQMLint cannot be used for any other compilers.

2.2. Supported OS

SQMLint has been confirmed to be capable of operating properly on the host machines and under the OS versions listed below.

Host Machine	Supported OS
IBM PC/AT and its compatibles	Microsoft Windows 98 Microsoft Windows Me Microsoft Windows NT 4.0 Microsoft Windows 2000 Microsoft Windows XP

3. Installation

3.1. Before You Start Installing

Please confirm the following contents before you start installing SQMLint:

- Carefully read the License Agreement and the Release Notes included with your product. When you've installed your product, you are assumed to have agreed with the contents written in the agreement.
- *Before installing SQMLint, first make sure the compiler you are using is installed.*
* Installing SQMLint does not automatically install the compiler.
- You will be requested to supply your license ID in the middle of installation. Check your license ID before you start installing SQMLint.
- SQMLint can only be installed in the supported compilers (2.2).
- To install SQMLint in Windows NT, 2000 or XP, you must have administrator privileges.

3.2. Files to be Installed

3.2.1. For NC308WA

Here, the explanation is given assuming that NC308WA has been installed in a directory below `\Program files\Renesas\HEW\Tools\Renesas\nc308wa\VERSION-Num\`.

1. Newly added files

- LIB308\SQLINT.EXE (MISRA C Rule Checker)
- LIB308\SQMTYSZ.DLL (DLL file for SQMLint)
- LIB308\SQLINT.DEF (Definition file for SQMLint)
- MANUAL\SQLINTUE.PDF (Users Manual)
- BIN\SQMMERGER.EXE (Merge Utility)
- BIN\SQMFORM.EXE (Format Conversion Utility)

2. Overwritten files of NC308WA

Only when you install SQMLint for **NC308WA V.5.10 Release 1**, the files shown below are overwritten.

- \MTOOL\BIN\NC308.EXE
- \MTOOL\LIB308\NC308.OPT

3.2.2. For NC30WA

Here, the explanation is given assuming that NC30WA has been installed in a directory below `\Program files\Renesas\HEW\Tools\Renesas\nc30wa\VERSION-Num\`.

1. Newly added files

- LIB30\SQLINT.EXE (MISRA C Rule Checker)
- LIB30\SQMTYSZ.DLL (DLL file for SQMLint)
- LIB30\SQLINT.DEF (Definition file for SQMLint)
- MANUAL\SQLINTUE.PDF (Users Manual)
- BIN\SQMMERGER.EXE (Merge Utility)
- BIN\SQMFORM.EXE (Format Conversion Utility)

3.2.3. For CC32R

Here, the explanation is given assuming that CC32R has been installed in a directory below `\Program files\Renesas\HEW\Tools\Renesas\cc32r\VERSION-Num\`.

1. Newly added files

- LIB32R\SQLINT.EXE (MISRA C Rule Checker)

- LIB32R\SQMTYSZ.DLL (DLL file for SQMLint)
- LIB32R\SQMLINT.DEF (Definition file for SQMLint)
- MANUAL\SQMLNTUE.PDF (Users Manual)
- BIN32R\SQMMERGER.EXE (Merge Utility)
- BIN32R\SQMFORM.EXE (Format Conversion Utility)

2. Overwritten files of CC32R

Only when you install SQMLint for **CC32R V.4.10 Release 1**, the files shown below are overwritten.

- \MTOOL\BIN32R\CC32R.EXE
- \MTOOL\LIB32R\CC32R.OPT

3.2.4. For SuperH RISC engine C/C++ Compiler

Here, the explanation is given assuming that SH Compiler has been installed in a directory below \Program files\Renesas\HEW\Tools\Renesas\Sh\VERSION-Num\.

Newly added files

- bin\SQMLINT.EXE (MISRA C Rule Checker)
- bin\SQMTYSZ.DLL (DLL file for SQMLint)
- bin\SQMLINT.DEF (Definition file for SQMLint)
- bin\SQMMERGER.EXE (Merge Utility)
- bin\SQMFORM.EXE (Format Conversion Utility)
- \Program files\Renesas\HEW\Manuals\renesas\PDFs\bin\SQMLNTUE.PDF (Users Manual)

3.2.5. For H8, H8S, H8SX family C/C++ Compiler

Here, the explanation is given assuming that H8 Compiler has been installed in a directory below \Program files\Renesas\HEW\Tools\Renesas\H8\VERSION-Num\.

Newly added files

- bin\SQMLINT.EXE (MISRA C Rule Checker)
- bin\SQMTYSZ.DLL (DLL file for SQMLint)
- bin\SQMLINT.DEF (Definition file for SQMLint)
- bin\SQMMERGER.EXE (Merge Utility for SQMLint)
- bin\SQMFORM.EXE (Format Conversion Utility)
- \Program files\Renesas\HEW\Manuals\renesas\PDFs\bin\SQMLNTUE.PDF (Users Manual)

3.3. Files to be Backed Up before Installation

3.3.1. For NC308WA V.5.10 Release 1

Since the installer overwrites the NC308WA compile driver (NC308.EXE) and the option files for TM (NC308.OPT), be careful not to uninstall only SQMLint, because in that case NC308WA will become unable to start.

Be sure to back up the files shown below before you install SQMLint.

Here, the explanation is given assuming that NC308WA has been installed in a directory below \MTOOL.

■ Files to be backed up

- \MTOOL\BIN\NC308.EXE
- \MTOOL\LIB308\NC308.OPT

3.3.2. For CC32R V.4.10 Release 1

Since the installer rewrites the CC32R compile driver (CC32R.EXE) and the option files for TM (CC32R.OPT), be careful not to uninstall only the SQMLint, because in that case CC32R will become unable to start.

Be sure to back up the files shown below before you install SQMLint.

Here, the explanation is given assuming that CC32R has been installed in a directory below \MTOOL.

■ Files to be backed up

- \MTOOL\BIN32R\CC32R.EXE
- \MTOOL\LIB32R\CC32R.OPT

If you are installing SQMLint for other Compiler, you do not need to back up any files.

3.4. Installing SQMLint

1. Only when you are using NC308WA V.5.10 Release 1 or CC32R V.4.10 Release 1, read the explanation in Section 3.3 to create backups of the indicated files.
2. Start \SQMLINT\W95E\SETUP.EXE under the root directory of CD-ROM.
3. Follow the instructions that display after starting the installer, until the installation is complete

3.5. Uninstalling SQMLint

1. Launch Add/Remove Programs in Control Panel and delete
 "SQMLint for NC308WA V.x.xx Release xx," "SQMLint for NC30WA V.x.xx Release xx,"
 "SQMLint for NC100 V.x.xx Release xx," "SQMLint for CC32R V.x.xx Release xx,"
 "SQMLint for SH-C V.x.xx Release xx" or "SQMLint for H8-C V.x.xx Release xx."
2. Place the backup files that you created when installing SQMLint back into the directory in which they had been stored.

* Precautions

Always be sure to uninstall SQMLint before you uninstall NC308WA, NC30WA, NC100, CC32R, SH or SH8 Compiler in which SQMLint is installed. If you uninstall NC308WA, NC30WA, NC100, CC32R, SH or H8 Compiler before SQMLint, you will become unable to uninstall SQMLint.

4. Notes

4.1. About the standard header files and standard library source files included with supported compilers

About whether the C source codes of the standard header files and standard library source files support the MISRA-C rules, it is mentioned in the manual or release notes of the compiler. Please refer to them.

4.2. About the inter-file inline expansion of the SH compiler

The file specified by the file_inline option is not inspected.

4.3. About "MISRA2004" and "Group definition file" options

When you use SQMLint V.1.03 Release 00 concerned together with any of the compiler packages to be published in and after September 2007, opening the Renesas xxx Standard Toolchain dialog box and clicking the Compilers tab in the compiler will include MISRA C rule check in the Categories list. And selecting either of these may provide "MISRA2004" and "Group definition file*" (newly introduced options) as options for SQMLint. If you select the above two options, an error will arise at a build. So, to avoid this problem, select option "MISRA1998" instead of "MISRA2004".

Options "MISRA2004" and "Group definition file" will be supported by SQMLint V.2.00 and later.

*When using the C compiler package for the R32C/100, "Rule define file" appears instead of "Group definition file."

5. Changes from V.1.02 Release 00

5.1. Problem correction

Improvements have been made to all of the following precaution that had been informed to you by tool news:

- On a violation of Rule 29
- On delivering incorrect messages when Rule 43 violated
- On delivering incorrect messages that tell Rule 1 has been violated at initialization of global variables

5.2. Interpretation of the Rules

5.2.1. About the interpretation of Rule 44

In rule 44, what is called a "redundant cast" was defined as follows.

1. One that is cast to the same type
2. One that is cast to the same type as an implicitly converted type

However, the reference books published by the society for the study of MISRA C state definitely that only condition 1 applies. Furthermore, a large number of messages on violation of rule 44 attributable to condition 2 have been output and no solutions to that have hitherto been found. Therefore, condition 2 has been deleted.

```
data1 = (UCHAR)(sdata & 0x00FU); /* Not a violation of rule 44 from V.1.03 on */
```

5.2.2. About the interpretation of Rule 77

The program fragment shown below constitutes a "violation." The rule has been changed, so that this is not a violation now.

```
void func(const char*);
void xxx()
{
    char* p;
    func(p); /* this line */
}
```

5.2.3. About the interpretation of Rule 113

In sqlmlint V.1.02 R00, taking the address of a structure object constituted a violation of rule 113. This was based on the concept that because the members can be touched on by a pointer operation, "taking an address itself is an act of violating the rule."

However, this had a problem that for functions that have a pointer to a structure as argument to them, the address of a structure cannot be passed to the function. Of course, accessing the members by only address and offset calculations in a pointer operation does violate the rule, but access with a pointer pointing to a structure and the -> operator does not present a problem.

Therefore, the rule has been changed, so that the operation of taking the address of a structure object now does not violate rule 113.

5.2.4. About the interpretation of Rule 43

Writing a compound assignment similar to the one shown below did not constitute a violation of rule 43. Rule 43 has been changed, so that such an assignment now violates the rule.

```
/* 32bits integer */
void func(void)
{
    unsigned int ui16;
    ui16 &= 0xFFFFFFFFFu; /* this line */
}
```

5.2.5. About the interpretation of Rule 104

Rule 104 stipulates that the "pointer to a function must have a constant address when compiled."

In sqlmlint, this is inspected with respect to all declarations. For this reason, a message is output for a statement similar to "extern FP ptr;" written in a header file.

Only the variable declarations that are explicitly declared as 'extern' have now been excluded from the subject of inspection under rule 104.

```
extern void(*FP1)(void);    /* non-violation */
void(*FP2)(void);         /* violation */
```

5.2.6. About the interpretation of Rule 31

When a multi-dimensional array (an array of arrays) is initialized, the statement shown below is permitted only when the array is initialized to zero. However, a violation of rule 31 has been output for this statement. Therefore, an exception for such a violation of rule 31 is now supported.

```
int array[2][3] = {0};
```

5.2.7. About the interpretation of Rule 77

If in a C source similar to the one shown below an argument is assigned a null pointer constant, a message of rule 77 is output. Since null pointer constants essentially are thought to be not problematical, this has now been excluded from the subject of inspection under rule 77.

```
void func(int*);

void xxx()
{
    func(0);    /* this line */
}
```

5.2.8. About the interpretation of Rule 45

Use of a macro NULL similar to the one shown below resulted in a violation of rule 45. However, since this is a general method of use, it has now been excluded from the subject of inspection under rule 45.

```
#define NULL (void*)0
```

5.2.9. Message Formats of NC30/NC308

To support the error help functions of HEW, the message formats have been changed to the one that has error numbers attached.

5.3. Utility Program Added

A tool has been added that converts the CSV files output by sqlmlint.exe into a format needed for tag jump in a text editor. For details, refer to Appendix in the user's manual, "Format Conversion Utility sqmform."

6. User Registration

User registration is important, because you cannot receive upgrade information, technical support or other services unless you've not been registered as official user of SQMlint yet.

Please send your registration to Renesas Solutions Corporation within 30 days after purchase.

6.1. How to Register

When you've installed SQMlint, the file shown below will be generated.

Here, the explanation is given assuming that Compiler has been installed in a directory below
 \Program files\Renesas\HEW\Tools\Renesas\.

1. When you're using NC308WA
 NC308WA\VERSION-NUM\SUPPORT\SQMNC308WA\regist.txt
2. When you're using NC30WA
 NC30WA\VERSION-NUM\SUPPORT\SQMNC30WA\regist.txt
3. When you're using NC100
 NC100\VERSION-NUM\SUPPORT\SQMNC100\regist.txt
4. When you're using CC32R
 CC32R\VERSION-NUM\SUPPORT\SQMCC32R\regist.txt
5. When you're using SH Compiler
 SQMlint\1_3_0\sh\support\SQMSH\regist.txt
6. When you're using H8 Compiler
 SQMlint\1_3_0\H8\support\SQMH8\regist.txt

Confirm contents of "regist.txt" and send it to the e-mail address shown below.

regist_tool@renesas.com

7. Software Versions

The program versions included with your product are listed below.

1	sqmlint.exe	V.1.03.00.000	MISRA C rule checker
2	sqmtysz.dll	V.1.00.00.000	for SH compiler
	sqmtysz.dll	V.1.00.00.000	for H8 compiler
	sqmtysz.dll	V.1.00.00.000	for M32R compiler
	sqmtysz.dll	V.1.00.00.000	for M32C compiler
	sqmtysz.dll	V.1.00.00.000	for M16C compiler
	sqmtysz.dll	V.1.00.00.000	for R32C compiler
3	sqmtysz.def	V.1.00.00.000	for SH compiler
	sqmtysz.def	V.1.00.00.000	for H8 compiler
	sqmtysz.def	V.1.00.00.000	for M32R compiler
	sqmtysz.def	V.1.00.00.000	for M32C compiler
	sqmtysz.def	V.1.00.00.000	for M16C compiler
	sqmtysz.def	V.1.00.00.000	for R32C compiler
4	sqmmerger.exe	V.1.00.00.000	Merge Utility
5	sqmform.exe	V.1.00.00.000	Format Conversion Utility