# R-IN32M3, R-IN32M4, RZ/T, RZ/N Series

HW-RTOS Accelerator Kernel Viewer Plug-in for C-SPY User's Guide

R01AN0510EJ0100
Rev.1.00
Jul 26, 2018

## Introduction

This document explains the following.

- Overview of HW-RTOS Accelerator Kernel Viewer Plug-in for C-SPY
- How to Installation procedure
- How to use

## Target Device

| | |
|---|---|
| R-IN Family | R-IN32M3 Series |
| | R-IN32M4 Series |
| RZ Family | RZ/T1 Series |
| | RZ/N1 Series |

## Contents

# 1. Introduction

## 1.1 Overview

The HW-RTOS accelerator Kernel Viewer Plug-in for C-SPY is a plug-in for displaying HW-RTOS kernel information of the R-IN Engine inside the C-SPY debugger of the IAR Embedded Workbench IDE.

## 1.2 Limitations

The plug-in is supported by the C-SPY debugger of IAR Embedded Workbench for Arm v8.3 for Renesas devices R-IN32M3, R-IN32M4, RZ/T1, and RZ/N1.

The plug-in acquires information from HW-RTOS only when reaching a break point. If a HW ISR happens during this time, there is a possibility that a HW ISR is lost. Best is therefore to turn off the plug-in if there is suspicion that a HW ISR is lost, and to not have breakpoints active during final testing. Explanation: This is caused by the plug-in's direct access to HW-RTOS register and memory, which may in rare circumstances compete with a HW ISR occurring in silicon. Observe that the HW-RTOS library also has indirect access to HW-RTOS via the normal system call (command) interface for which this conflict does not exist, however that interface cannot provide full kernel information.

For RZ/N1 GOAL software, the plug-in gets part of the kernel information from GOAL. If a task function name is "goal_tgtTaskWrapper", the plug-in assumes that the task is used for GOAL. Additionally, if task stack size is a default value defined by GOAL, "Stack Size" field in task status window shows 0.

If you encounter a problem with this plug-in's behavior, or if you have any comments or requests, please contact our support desk.

## 2. Folder structure

When IAR Embedded Workbench for Arm is installed, it becomes the following folder structure.

**C:/Program Files**

└──**IAR Systems**

└──**Embedded Workbench 8.1**

└──**arm**

├──**doc**

│ ├──HWRTOSplugin.ENU.pdf

│ └──HWRTOSplugin.JPN.pdf

└──**plugins**

└──**rtos**

└──**HWRTOSplugin**

├──HWRTOSplugin.dll

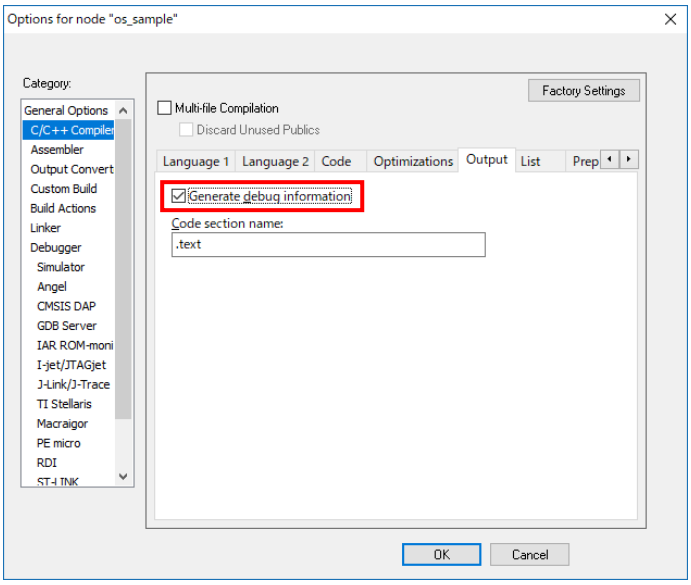
└──HWRTOSplugin.ewplugin

# 3. Settings for using plug-ins

## 3.1 Create debug information

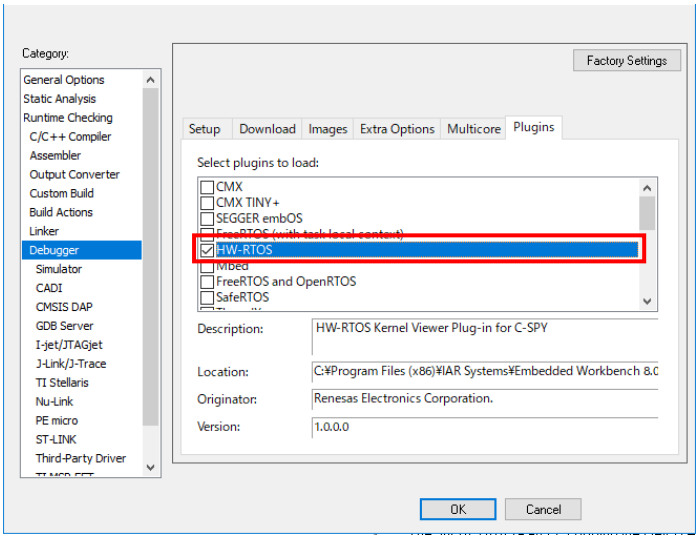
Start IAR Embedded Workbench for Arm.

To enable the plug-in to reference necessary debug information, select [Project]->[Option]->[C/C++Compiler]->[Output]->[Generate debug information].



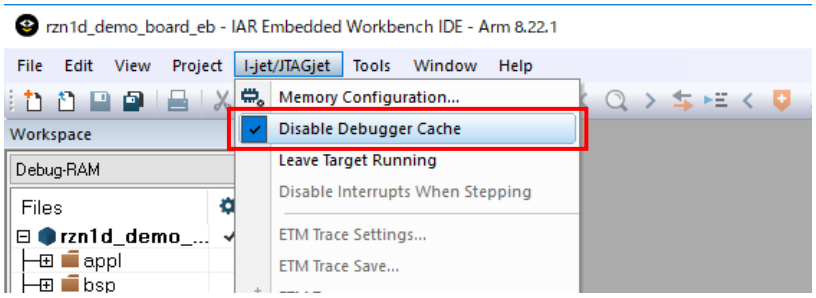

## 3.2 Enable plug-in

Enable HW-RTOS accelerator Kernel Viewer Plug-in for C-SPY by selecting [Project]->[Option]->[Debug]->[Plugins]->[HW-RTOS].



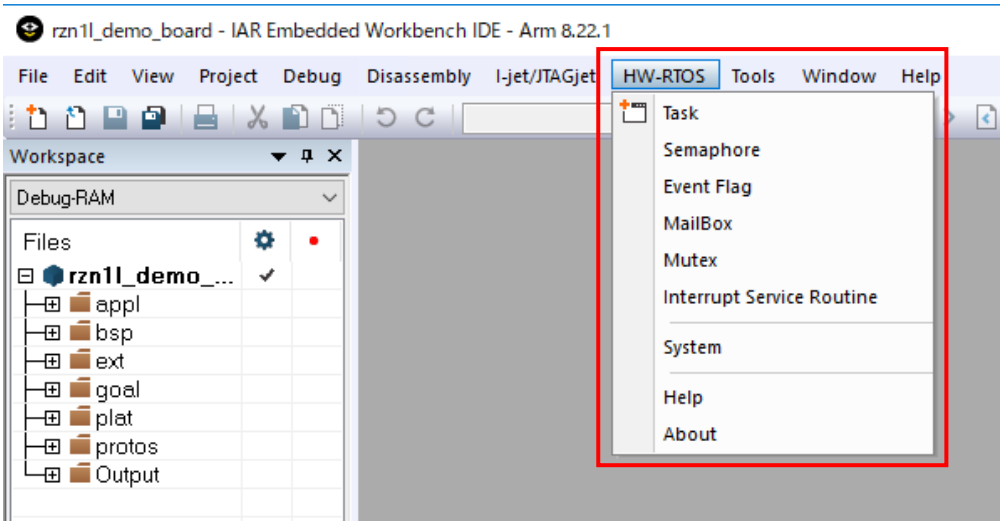
## 3.3 Preparation to use plug-in

If debugger cache is enabled, the plug-in may fail to access memory data needed for HW-RTOS. Therefore, debugger cache should be disabled by checking [I-jet/JTAGjet]->[Disable Debugger Cache].



# 4. How to use Plug-in

After activating the plug-in, start the C-SPY debugger by selecting [Project]->[Download and Debug].
If the plug-in successfully loads, the "HW-RTOS" menu will be displayed in the menu bar.




## 4.1 Menu Item list

**Object status**

Display status monitor of each object

- Task
- Semaphore
- Event Flag
- MailBox
- Mutex
- Interrupt Service Routine

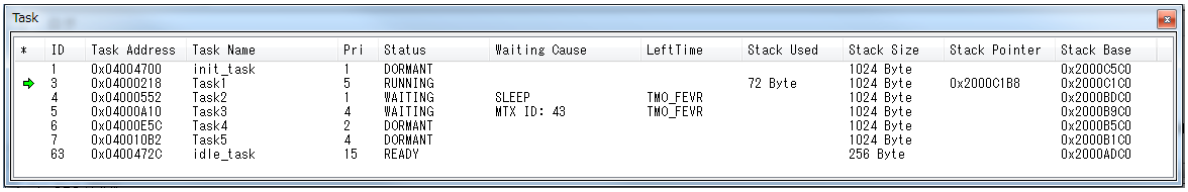
**System information**

| | |
|---|---|
| System | Displays system information (system time) |

**Other**

| | |
|---|---|
| Help | Refer user's guide (opens this document) |
| About | Information about plug-in version |

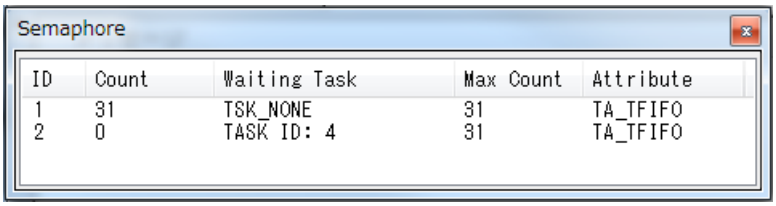
## 4.2 Task / Status of task




Display task status

| Column name | Description |
|---|---|
| * | Currently running task |
| ID | Task ID number |
| Task Address | Task ID start address |
| Task Name | Task function name |
| Pri | Task priority |
| Status | Task status<br>WAITING: Waiting state, RUNNING: Execution state, READY: Executable state, DORMANT: Dormant state |
| Waiting Cause | Wait cause for task in wait state<br>SLEEP: Waiting to wake up, DELAY: Pending time,<br><object type> ID: <object ID> = Wait object<br><object type>Display list:<br>SEM: semaphore, FLG: event flag,<br>MBX: mailbox, MTX: mutex<br>Wait cause for task in running state<br>INTERRUPT: Interrupt processing in progress |
| Left Time | Time left until task wait state times out.<br>TMO_FEVR: Permanent wait |
| Stack Used | Stack usage size of currently executing task.<br>Sizes other than the execution task are hidden. |
| Stack Size | Task stack area size |
| Stack Pointer | Current trade stack pointer<br>Sizes other than the execution task are hidden. |
| Stack Base | Task base stack pointer |

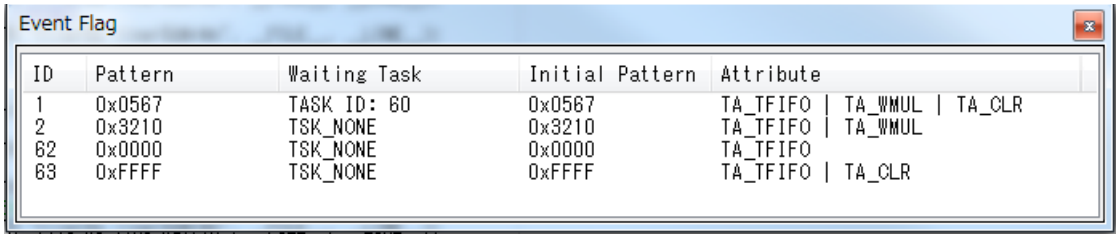
## 4.3 Semaphore / Status of Semaphore




Display the semaphore status

| Column name | Description |
|---|---|
| ID | Semaphore ID number |
| Count | Number of resources of current semaphore |
| Waiting Task | ID number of the task at the head of the semaphore's queue |
| Max Count | Maximum number of resources of current semaphore |
| Attribute | Attributes of semaphores<br>( TA_TFIFO \|\| TA_TPRI ) |

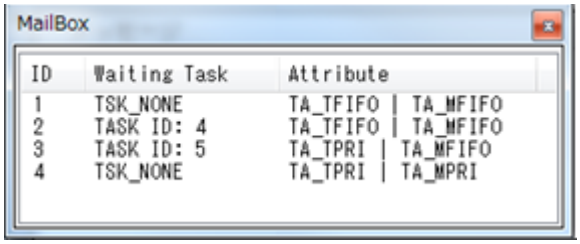
## 4.4 Event Flag / Status of event flag




Display the status of event flag

| Column name | description |
|---|---|
| ID | Event flag ID number |
| Pattern | Current bit pattern |
| Waiting Task | ID number of the task at the head of the event flag's queue |
| Initial Pattern | Initial bit pattern |
| Attribute | Attributes of event flag<br>(( TA_TFIFO \|\| TA_TPRI ) \| (TA_WMUL ) \| [ TA_CLR ]) |

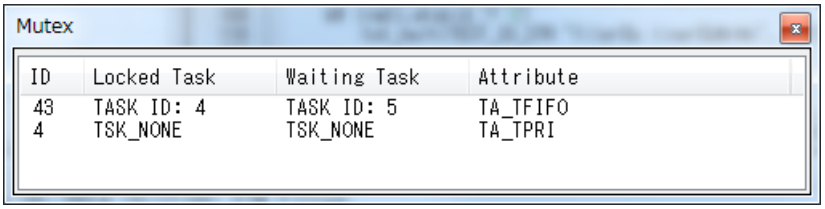
## 4.5 MailBox / Status of mailbox




Display the status of mailbox

| Column name | Description |
|---|---|
| ID | Mailbox ID number |
| Waiting Task | ID number of the task at the head of the mailbox's queue |
| Attribute | Attributes of Mailbox<br>((TA_TFIFO \|\| TA_TPRI) \| (TA_MFIFO \|\| TA_MPRI)) |

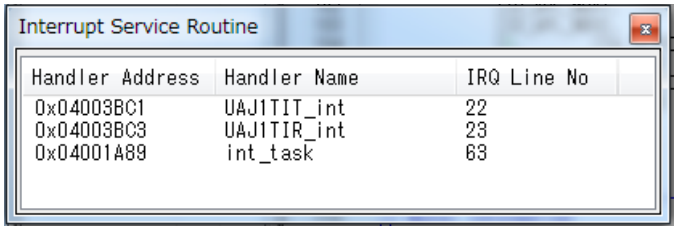
## 4.6 Mutex / Status of mutex




Display the status of mutex

| Column name | Description |
|---|---|
| ID | Mutex ID number |
| Locked Task | ID number of the task locking the mutex |
| Waiting Task | ID number of the task at the head of the mutex's queue |
| Attribute | Attributes of mutex<br>(TA_TFIFO \|\| TA_TPRI) |

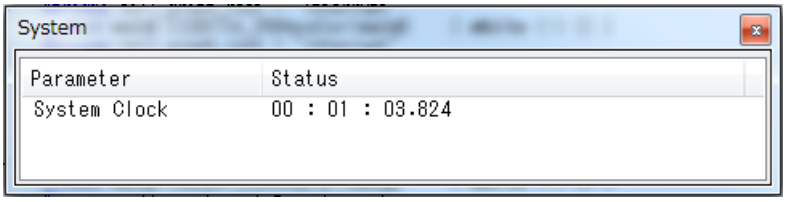
## 4.7 Interrupt Service Routine / Status of interrupt service routine




Display status of interrupt service routine

| Column name | description |
|---|---|
| Handler Address | Start address of the interrupt service routine |
| Handler Name | Function name of the interrupt service routine |
| IRQ Line No. | The exception number corresponding to the interrupt service routine |

## 4.8 System / system information




Display kernel system information

| Column name | Description |
|---|---|
| Parameter | System information parameter |
| Status | System information status |
| **System Parameter** | **Status** |
| System Clock | Current system time |

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http://www.renesas.com/

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## Revision History

| | | Description | |
|---|---|---|---|
| **Rev.** | **Date** | **Page** | **Summary** |
| 1.00 | Jul 26, 2018 | - | First Edition Issued |

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The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Handling of Unused Pins

   Handle unused pins in accordance with the directions given under Handling of Unused Pins in the manual.

   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

   The state of the product is undefined at the moment when power is supplied.

   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

   Access to reserved addresses is prohibited.

   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.

   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

   Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

   — The characteristics of Microprocessing unit or Microcontroller unit products in the same group but having a different part number may differ in terms of the internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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(Rev.4.0-1 November 2017)

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