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R8C Family

How to Implement Timeout Feature in MR8C4

Introduction

In the attempt to achieve a small memory footprint for MR8C/4, service calls with timeout feature were excluded from MR8C/4.

This document discusses on the workaround method for incorporating of timeout feature when using MR8C/4.

Target Device

Applicable MCU: R8C Family

Contents

1. Guide in using this Document

This document provides user a workaround method to incorporate the timeout feature when using MR8C/4.

Table 1 Explanation of Document Topics

Topic	Objective	Pre-requisite
Explanation on Timeout Feature	Describe the timeout feature	MR8C/4
Workaround Method	A step by step implementation of the workaround method	MR8C/4
Reference Documents	Listing of documents that equip users with knowledge in the pre-requisite requirements	None

2. Explanation on Timeout Feature

Timeout feature is conventionally made available to service calls that might enter the WAITING state.

When a service call's process is not completed within a specified time, the timeout feature cancels any further processing and returns from the service call immediately. In this case, the service call returns an E_TMOUT error. Since there are no side effects due to service calls returning an error, the system state, upon returning from the timed-out service call remains unchanged.

In the process of porting MR30 to MR8C/4, all of the service calls with timeout feature are removed. Figure 1 provides the listing.

Task Dependent Synchronization Function	
tslp_tsk	Puts task to sleep (with timeout)
Synchronization & Communication Function (Semaphore)	
twai_sem	Acquires semaphore resource(with timeout)
Synchronization & Communication Function (Eventflag)	
twai_flg	Waits for eventflag(with timeout)
Synchronization & Communication Function (Data Queue)	
tsnd_dtq	Sends to data queue (with timeout)
trcv_dtq	Receives from data queue (with timeout)

Figure 1 Listing of Removed Service Calls with Timeout Features

3. Workaround Method

The workaround method leverage on the option of forcibly release tasks from WAITING when they are enqueued in some waiting queue for a particular resource (e.g. semaphore) or event (e.g. Flag). A timer will be required to keep track of the timeout duration set by user and forcibly release the task when the duration is reached.

Figure 2 illustrates an example of incorporating the timeout feature for the service call "wai_sem" with reference to the sample program "MR8C4_Timeout".

```
/*****************************************************************************
Name:           Task1
Description:    Illustrate the implementation
Parameters:     stacd
Returns:        none
*****************************************
void Task1(VP_INT stacd)
{
    ER  ercd;
    ercd = tmwai_sem(ID_Sem1,6000); /* Wait for ID_Sem1 for 6000msec */
    asm("NOP");
}

/*****************************************************************************
Name:           tmwai_sem
Description:    A function to equip API "wai
Parameters:     semid and tmout
Returns:        ercd
*****************************************
ER tmwai_sem(ID semid, TMO tmout)
{
    ER  ercd;
    ID taskid;

    get_tid(&taskid);
    sta_alm(taskid,tmout);

    ercd = wai_sem(semid);
    if (ercd == E_RLWAI)
    {
        ercd = E_TMOUT;
    }
    return ercd;
}

/*****************************************************************************
Name:           AlmTask
Description:    Alarm Handler for ID_AlmTask
Parameters:     stacd
Returns:        none
*****************************************
void AlmTask(VP_INT stacd)
{
    irel_wai(1); /* Change Task1 from WAITING to READY state */
}
```

Task1 attempts to wait for semaphore "sem1" for a duration of 6sec. If no semphore count is received within 6sec, Task1 will be released from WAITING & continue to execute next line of code.

Function call "tmwai_sem" implements service call "wai_sem" to acquire semaphore "sem1". As initial count of "sem1" is zero, Task1 will be put to WAITING state till "sem1" count is released. ID_AlmTask is set to be triggered when the timeout duration set by user is reached.

Alarm handler "AlmTask" forcibly release Task1 from WAITING state when timeout duration set by user is reached.

Figure 2 Illustration of Workaround Method

To provide portability, it will be useful to provide both task and alarm handler with the same ID number as shown in Figure 3.

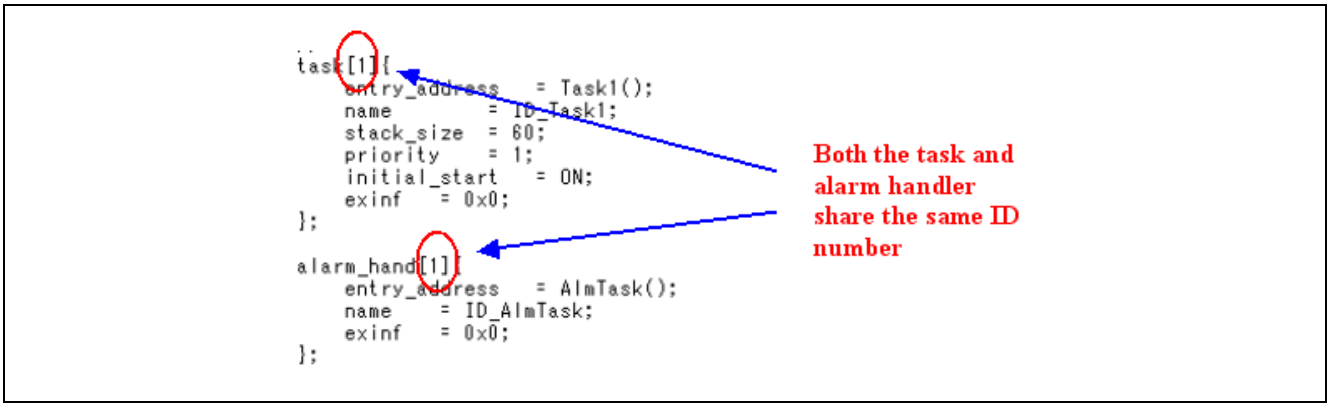

Figure 3 Screenshot of "template.cfg" File

This workaround method comes with the following pros and cons:

Pros

- Allow user to implement timeout feature without much complexity
- Allow constant monitoring of resource or event till timeout duration is reached

Cons

- Require additional service calls (e.g. irel_wai), Time Management Function (e.g. AlmTask1) and function call (e.g. tmwai_sem)
- Require one timer to be used as system clock since Time Management Function is utilized.

4. Reference Documents

User's Manual

- MR8C/4 V1.00 User's Manual

The latest version can be downloaded from the Renesas Technology website

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Revision Record

		Description	
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