



acontis technologies GmbH

Real-time Accelerator Windows SDK

User Manual

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1 Introduction

1.1 Overview

This document describes how the “Rtacc SDK” can be used to create your own real-time application.

It includes two demo applications:

- RtaccWinTimerDemo is a demonstration program for real-time testing. It launches two threads: one operates on the real-time core, querying a timer at 1ms intervals, while the second thread reports the time measurement results every 2 seconds.
- RtaccWinDeviceDemo is a demonstration program which shows how to use the RtaccDevice interface to access resources/memory/interrupts of hardware directly from user space.

1.2 Requirements

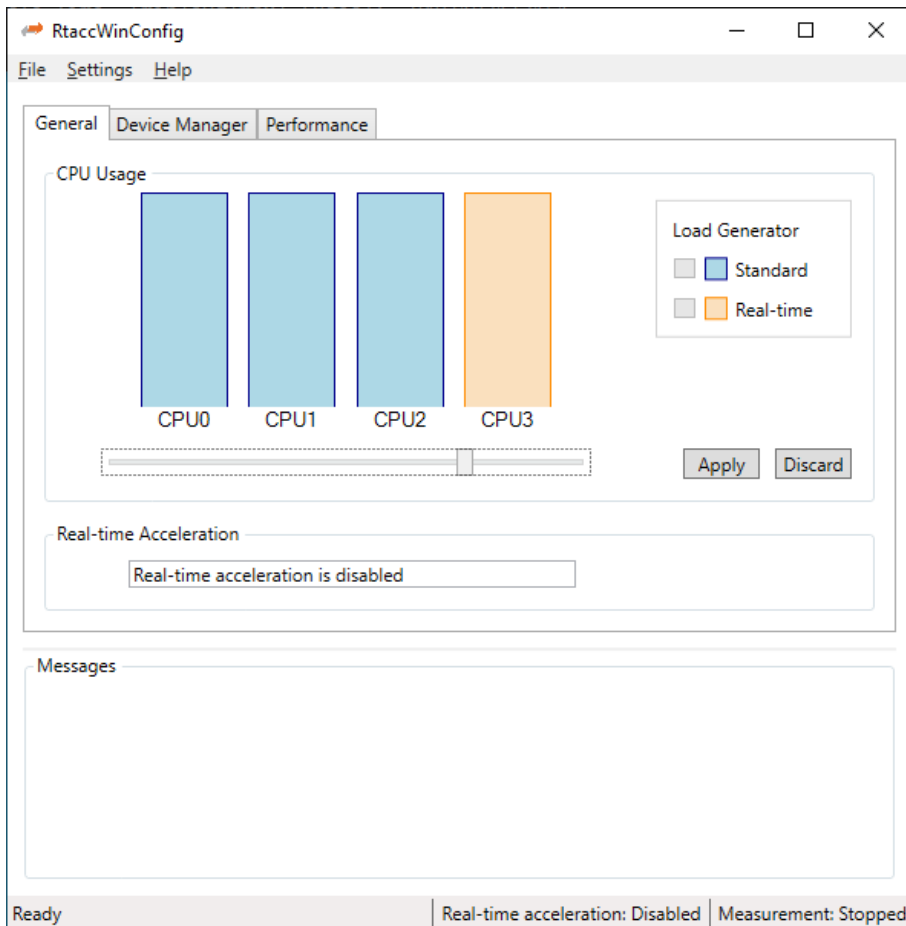
- For Developers
 - Microsoft Windows 10 and above
 - Visual Studio 2015 and above
- For Deployment
 - Microsoft Windows 10 and above
 - Microsoft .NET Framework 4 Client Profile
 - Screen resolution at least 1024x768 pixel
 - Memory as recommended for operating system

2 Tool usage

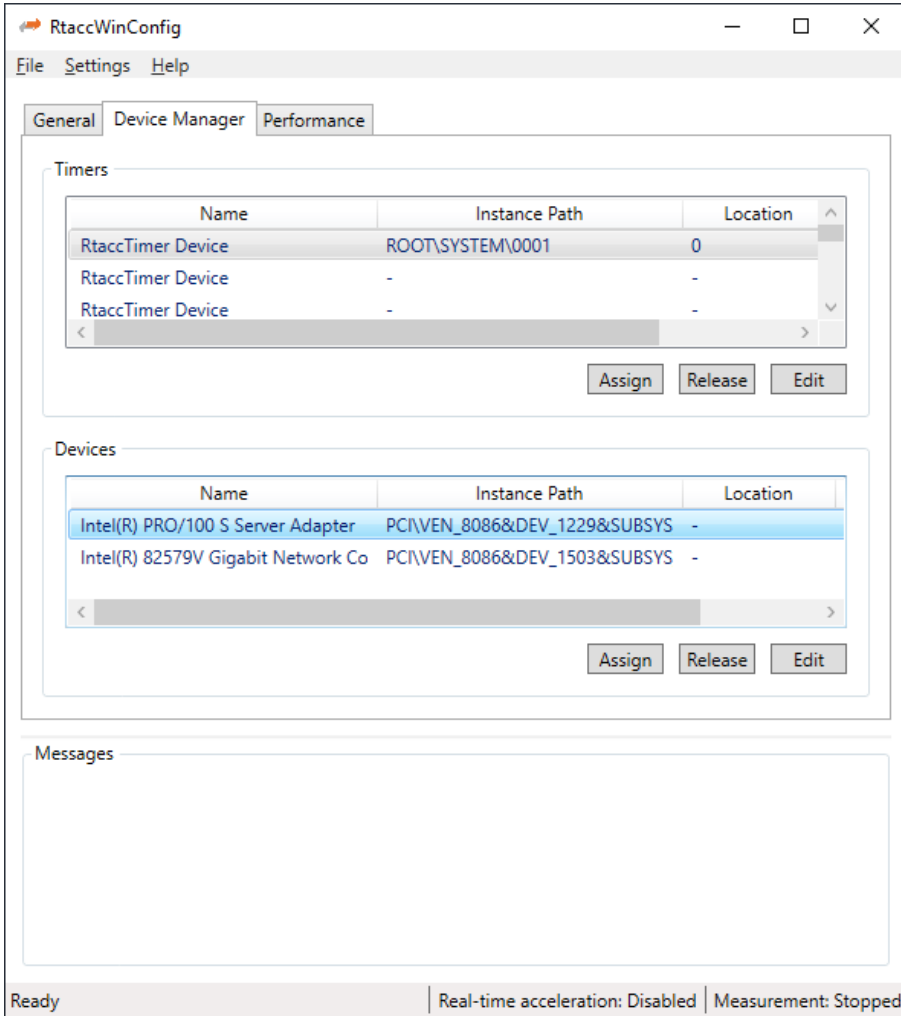
2.1 Prerequisites

Install first the “RealtimeAcceleratorSetup” from “Bin” folder. This installs the “RtaccWinConfig” tool.

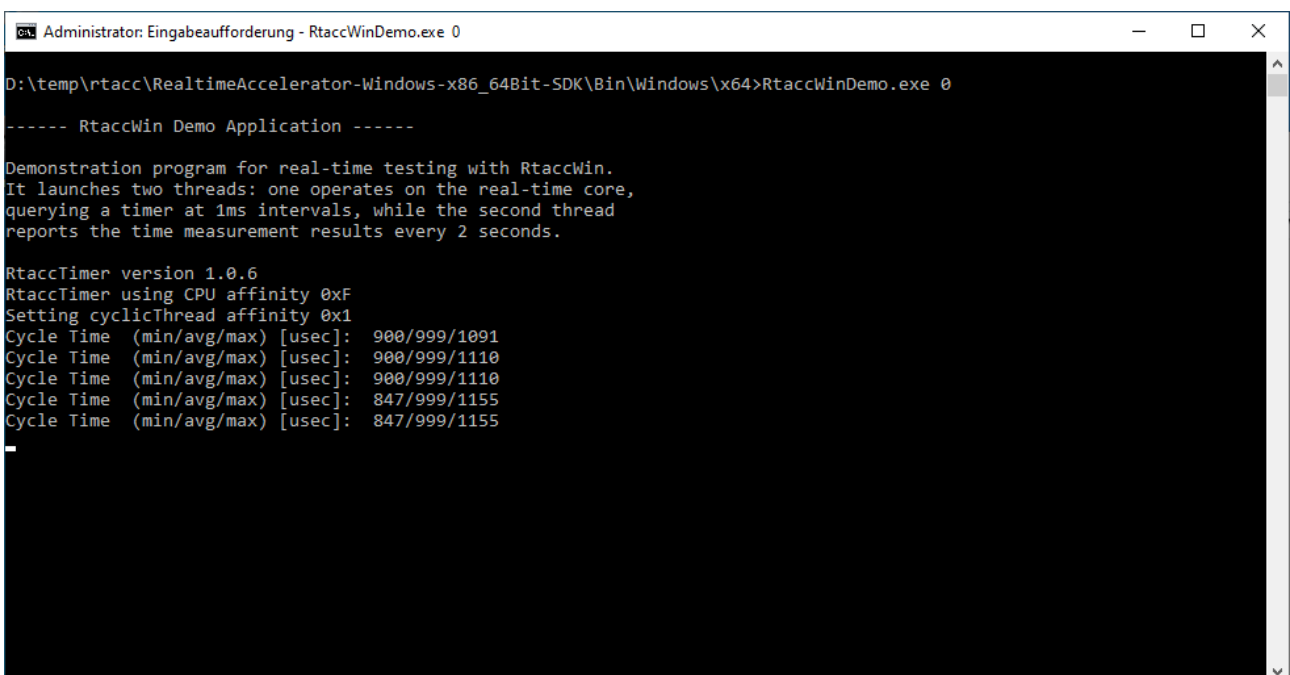
This tool can be used e.g. to isolate one or more cores for realtime usage (might be not necessary if the non-isolated mode is enough):



... or it can be used to install the required timer or device drivers:



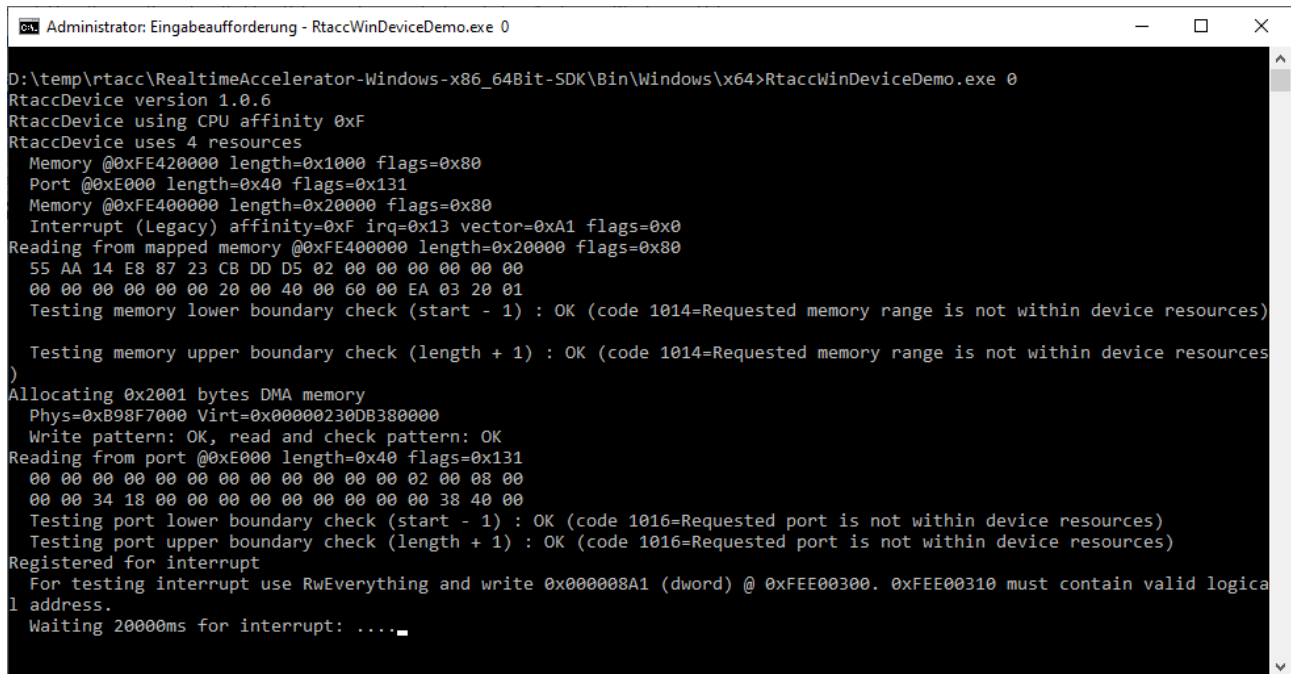
2.2 Timer Demo



RtaccWinTimerDemo.exe [options]

The supported options are described in chapter “4.3 Command line interface”.

2.3 Device Demo



```

Administrator: Eingabeaufforderung - RtaccWinDeviceDemo.exe 0
D:\temp\rtacc\RealtimeAccelerator-Windows-x86_64Bit-SDK\Bin\Windows\x64>RtaccWinDeviceDemo.exe 0
RtaccDevice version 1.0.6
RtaccDevice using CPU affinity 0xF
RtaccDevice uses 4 resources
Memory @0xFE420000 length=0x1000 flags=0x80
Port @0xE000 length=0x40 flags=0x131
Memory @0xFE400000 length=0x20000 flags=0x80
Interrupt (Legacy) affinity=0xF irq=0x13 vector=0xA1 flags=0x0
Reading from mapped memory @0xFE400000 length=0x20000 flags=0x80
55 AA 14 E8 87 23 CB DD D5 02 00 00 00 00 00 00
00 00 00 00 00 00 20 00 40 00 60 00 EA 03 20 01
Testing memory lower boundary check (start - 1) : OK (code 1014=Requested memory range is not within device resources)
Testing memory upper boundary check (length + 1) : OK (code 1014=Requested memory range is not within device resources)
)
Allocating 0x2001 bytes DMA memory
Phys=0xB98F7000 Virt=0x00000230DB380000
Write pattern: OK, read and check pattern: OK
Reading from port @0xE000 length=0x40 flags=0x131
00 00 00 00 00 00 00 00 00 00 00 00 02 00 08 00
00 00 34 18 00 00 00 00 00 00 00 00 00 00 38 40 00
Testing port lower boundary check (start - 1) : OK (code 1016=Requested port is not within device resources)
Testing port upper boundary check (length + 1) : OK (code 1016=Requested port is not within device resources)
Registered for interrupt
For testing interrupt use RwEverything and write 0x000008A1 (dword) @ 0xFEE00300. 0xFEE00310 must contain valid logical address.
Waiting 20000ms for interrupt: ....

```

RtaccWinDeviceDemo.exe [options]

The supported options are described in chapter “4.3 Command line interface”.

3 Project structure

- \Bin
 - RealtimeAcceleratorSetup.msi
 - Rtacc Installer, which is required to install the required drivers
 - RtaccDevice.dll
 - RtaccDevice Interface Library
 - RtaccTimer.dll
 - RtaccTimer Interface Library
 - RtaccWinTimerDemo.exe
 - RtaccWinTimerDemo Application
 - RtaccWinDeviceDemo.exe
 - RtaccWinDeviceDemo Application
- \Doc
 - Manuals
- \Examples\RtaccWinDemo\RtaccWinTimerDemo.sln
 - Visual Studio 2015 Solution File for the RtaccWinTimerDemo Application
- \Examples\RtaccWinDemo\RtaccWinDeviceDemo.sln
 - Visual Studio 2015 Solution File for the RtaccWinDeviceDemo Application
- \SDK\INC
 - Header files for RtaccDevice & RtaccTimer interface
- \SDK\LIB
 - Libraries files for RtaccDevice & RtaccTimer interface

4 Sample Code

4.1 Getting Started

4.1.1 Timer Demo

Open the Visual Studio 2015 Solution (“Examples\RtaccWinTimerDemo\RtaccWinTimerDemo.sln”) and do the following things:

- Compile the solution (Output folder of the “Debug” configuration is the root folder, where all the binaries are located)
- Run “RtaccWinTimerDemo.exe” with parameter “3”, to use the last CPU for realtime processing if computer has 4 CPUs (CPU numbering starts with 0)

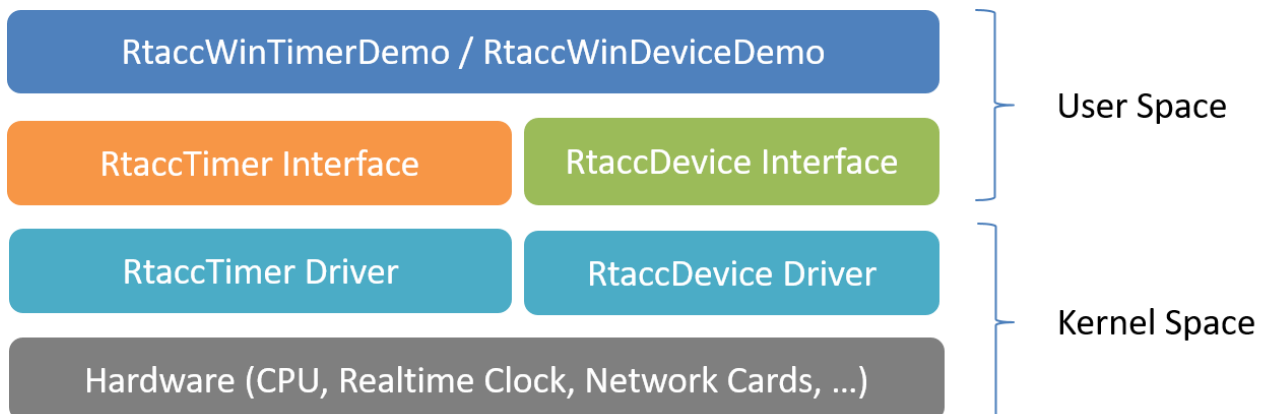
4.1.2 Device Demo

Open the Visual Studio 2015 Solution (“Examples\RtaccWinDeviceDemo\RtaccWinDeviceDemo.sln”) and do the following things:

- Compile the solution (Output folder of the “Debug” configuration is the root folder, where all the binaries are located)
- Run “RtaccWinDeviceDemo.exe” with parameter “0”, to use PCI device with instance “0” is used for demonstration purpose

4.2 Architecture

SDK contains the following components:



- Sample Code
 - RtaccWinTimerDemo.exe
 - Demo application, which launches two threads. One for real-time core to query a timer at 1ms interval, while the second thread reports the time measurement results every two seconds.
 - RtaccWinDeviceDemo.exe
 - Demo application, which shows how to use the RtaccDevice interface to access resources/memory/interrupts of hardware directly from user space.
- SDK
 - RtaccTimer Interface (RtaccTimer.dll)
 - Provide access to RtaccTimer driver, which can be used to access a realtime timer
 - RtaccDevice Interface (RtaccDevice.dll)
 - Provide access to RtaccDevice driver, which can be used to access hardware like network cards directly from user space

4.3 Command line interface

The command line interface supports the following arguments:

- RtaccWinTimerDemo
 - realtimeCPU
 - Sets the number of the CPU to be used for real-time processing (CPU numbering starts with 0)
- RtaccWinDeviceDemo
 - Instance
 - Instance number of the device which should be used
 - Or Bus/Device/Function
 - Bus/Device/Function of the device which should be used to find the correct instance number of the device