How to calculate the CPU load when an OS is used?

2026-09-02 - Comments (0) - OS-aware debugging

The CPU load can be calculated based on trace information. Therefore, either off-chip or on-chip trace is required.

Configuration

1) Enable OS-aware debugging

Load the appropriate OS awareness or ORTI file. Please refer to the TRACE32 manual for your target operating system (e.g. **rtos_freertos.pdf** for FreeRTOS or **rtos_orti.pdf** for AUTOSAR CP)**.**

Example 1: Load ORTI file for AUTOSAR CP

```
TASK.ORTI < my_orti_file >
```

Example 2: Load awareness for FreeRTOS on Arm

```
TASK.CONFIG ~~/demo/arm/kernel/freertos/freertos.t32
```

2) Record task switches in the trace

Task switches must be recorded to allow CPU load calculation. Refer to the TRACE32 manual of your target OS for details.

Example: enable flow trace and task switches recording in the trace based on data trace:

```
Break.SetTaskMagic /Write /TraceData
```

CPU Load Calculation

The CPU load is calculated as the percentage of time the CPU is not executing the idle task. Therefore, the idle task(s) must be identified and grouped accordingly.

1. Create a task group for the idle task

```
GROUP.CreateTASK "<name>" "<my_idle_task>" /MERGE
```

Example:

```
GROUP.CreateTASK "idle" "NO_TASK" /MERGE
```

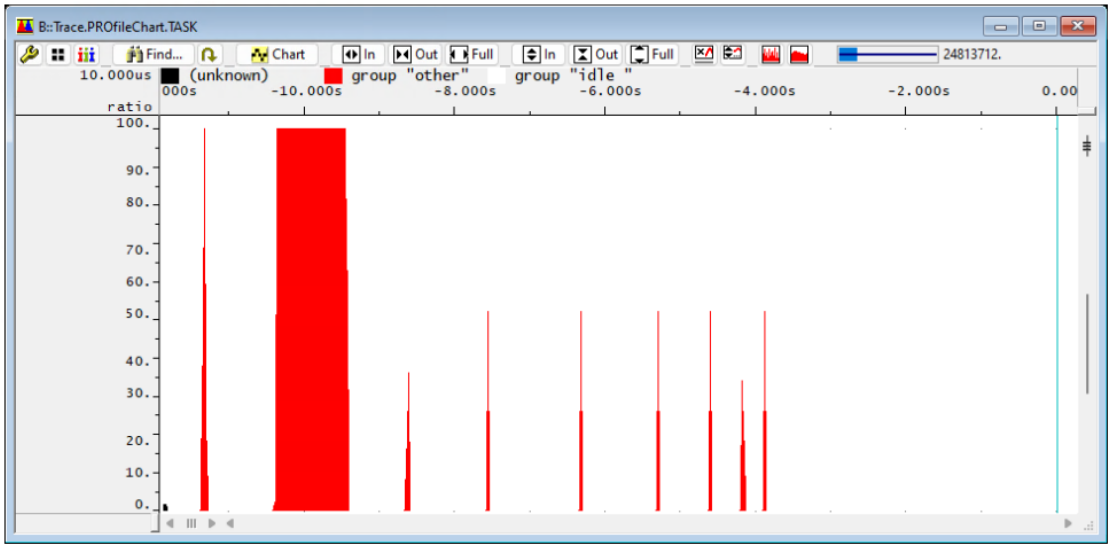
2. Optionally merge all other tasks (if they should not be distinguished in the chart):

```
GROUP.COLOR "other" MAROON
GROUP.MERGE "other"
```

CPU Load Visualization

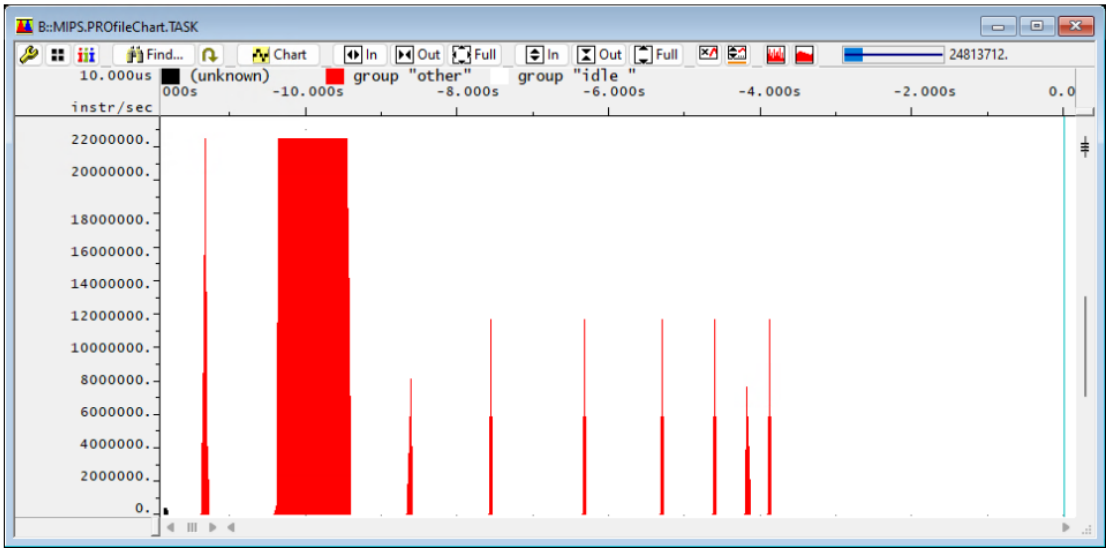
Trace.PROfileChart.TASK

The TRACE32 command `Trace.PROfileChart.TASK` provides a graphical representation of the task-related trace statistics, making load peaks and idle phases easy to identify.



MIPS.PROfileChart.TASK

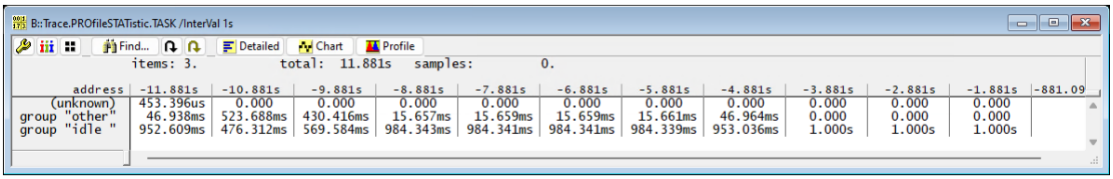
`MIPS.PROfileChart.TASK` displays the instruction execution rate over time graphically



Trace.PROfileSTATistic.TASK

`Trace.PROfileSTATistic.TASK` offers a numerical view of CPU load over defined time intervals, example:

`Trace.PROfileSTATistic.TASK /InterVal 1s`



address	-11.881s	-10.881s	-9.881s	-8.881s	-7.881s	-6.881s	-5.881s	-4.881s	-3.881s	-2.881s	-1.881s	-881.09
(unknown)	453.396us	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
group "other"	46.938ms	523.688ms	430.416ms	15.657ms	15.659ms	15.659ms	15.661ms	46.964ms	0.000	0.000	0.000	
group "idle "	952.609ms	476.312ms	569.584ms	984.343ms	984.341ms	984.341ms	984.339ms	953.036ms	1.000s	1.000s	1.000s	

Note: Using the SNOOPer (Without Trace)

If neither off-chip nor on-chip trace is available, the **SNOOPer** can be used to periodically sample the currently running task.

Please note that this method provides less accurate results compared to trace-based analysis, as it relies on periodic sampling. Additionally, the target processor must support runtime memory access.

Example:

```
SNOOPer.SELect %Long TASK.CONFIG(magic)
SNOOPer.Arm
WAIT 5.s
SNOOPer.Off
GROUP.CreateTASK "idle" "NO_TASK" /MERGE
GROUP.COLOR "other" MAROON
GROUP.MERGE "other"
SNOOPer.PROfileChart.TASK
```