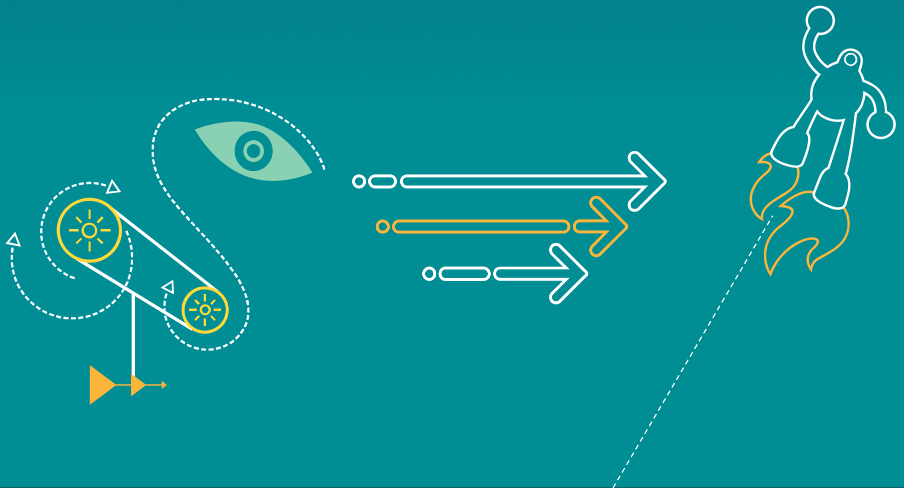
Introduction to Linux Ramdump Parser

Qualcomm Technologies, Inc.



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Revision History

Revision	Date	Description
A	June 2016	Initial release

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- Ramdump parser logs
- Ramdump parser commands
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- TRACE32 simulator launcher for Linux
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- Each core’s timer list
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- IRQ state

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- CPR info (Not for all targets)
- Thermal sensor data
- Page type info
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- Read-only area comparison
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- Questions?

Ramdump parser introduction

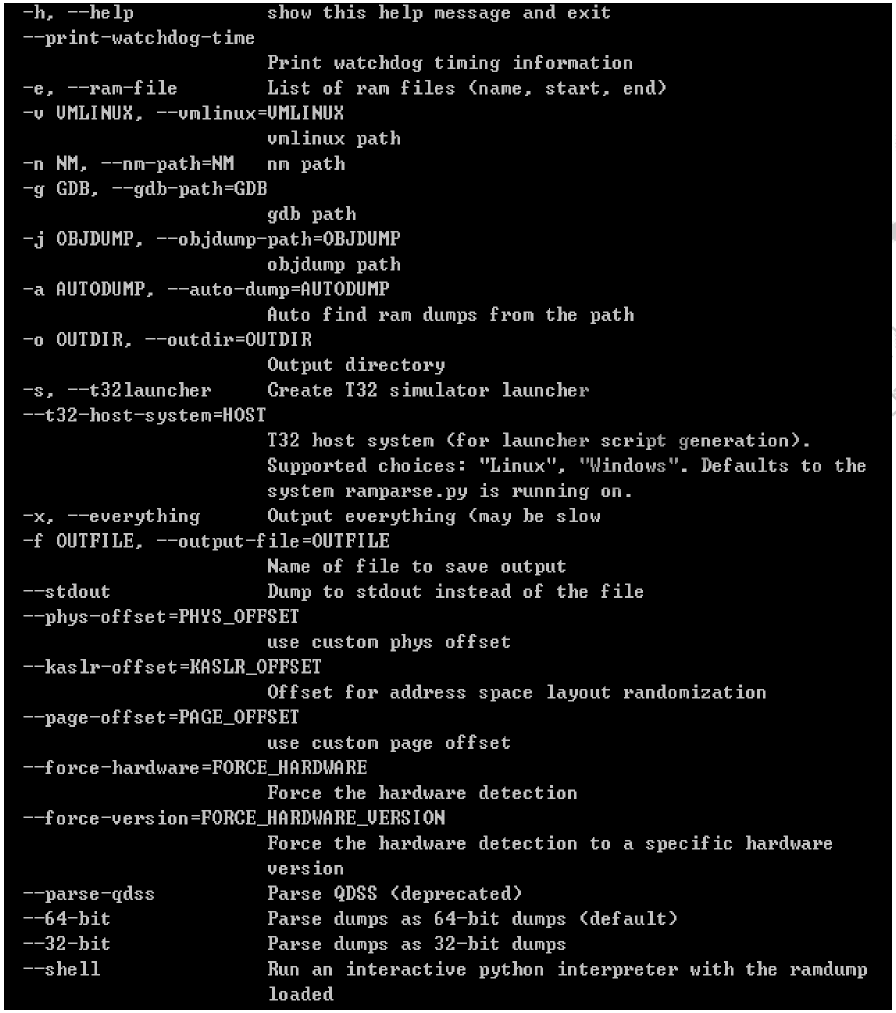
- What is Linux Ramdump parser?
  - Qualcomm developed open source tools, used to analyze crash dumps from Linux’s perspective.
- How to get Ramdump parser?
  - git clone git://codeaurora.org/quic/la/platform/vendor/qcom-opensource/tools
- How to run Ramdump parser?
  - Example:

    -
      ```
      python  C:\Tools\linux-ramdump-parser-v2\ramparse.py  -v C:\Port_COM3\vmlinux -g C:\D\Tools\aarch64-linux-gnu-gdb.exe -n C:\D\Tools\aarch64-linux-gnu-gcc-nm.exe -j C:\D\Tools\aarch64-linux-gnu-gcc-objdump.exe -e C:\Port_COM3\DDRCS0.bin 0x80000000 0x13fffffff  --force-hardware 8996 --64-bit  --phys-offset=0x80000000 -x -o C:\Port_COM3\parser
      ```
    - See load.cmm under dump folder to know how to set **–e and –phys-offset**.

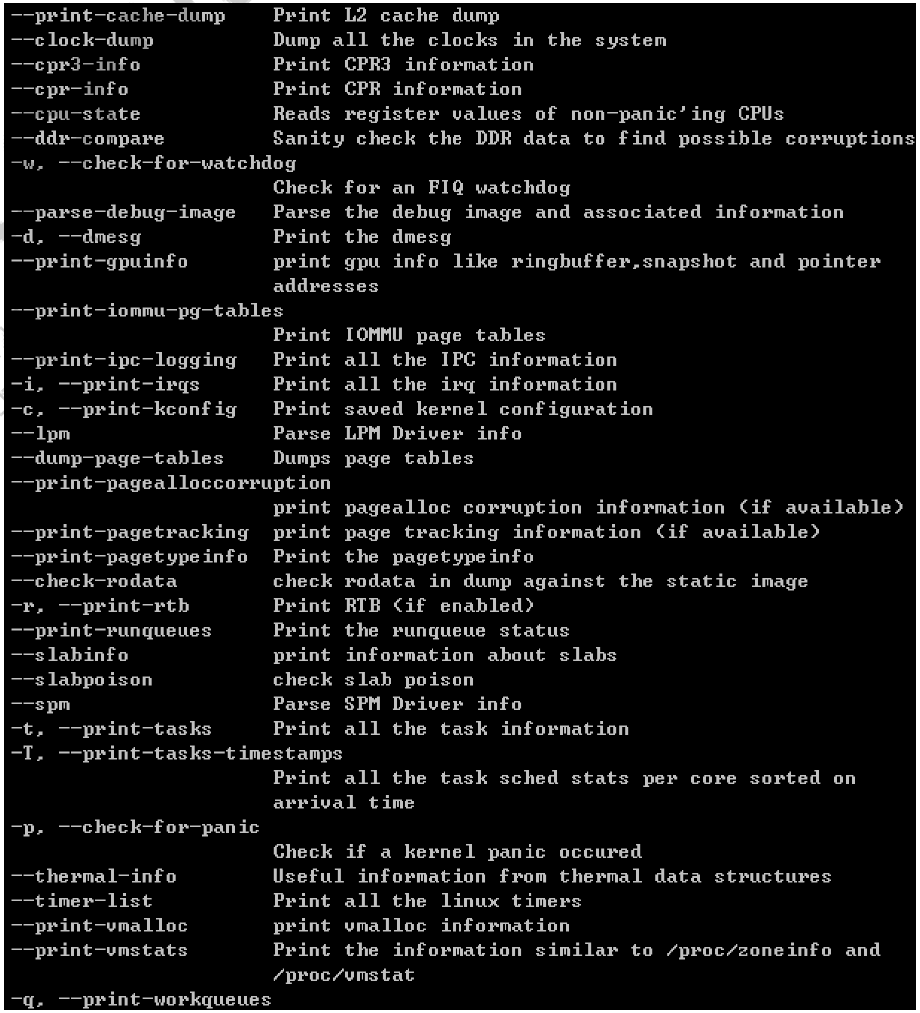
Ramdump parser logs

- Kconfig
- Kernel log
- RTB log
- An entry to launch TRACE32 simulator
- Cores’ final call stack in non-secure world, parsed from debug images
- Runqueue for each core
- Each task’s call stack, state, stack base
- Each core’s timer list (tv1/2/3/4/5, and hrtimers)
- Clock dumps
- Workqueue
- IRQ state
- CPR information
- Thermal info
- L2 cache dump
- Zone info
- /proc/pagetypeinfo
- Page allocation corruption
- DDR cache compare

Ramdump parser commands

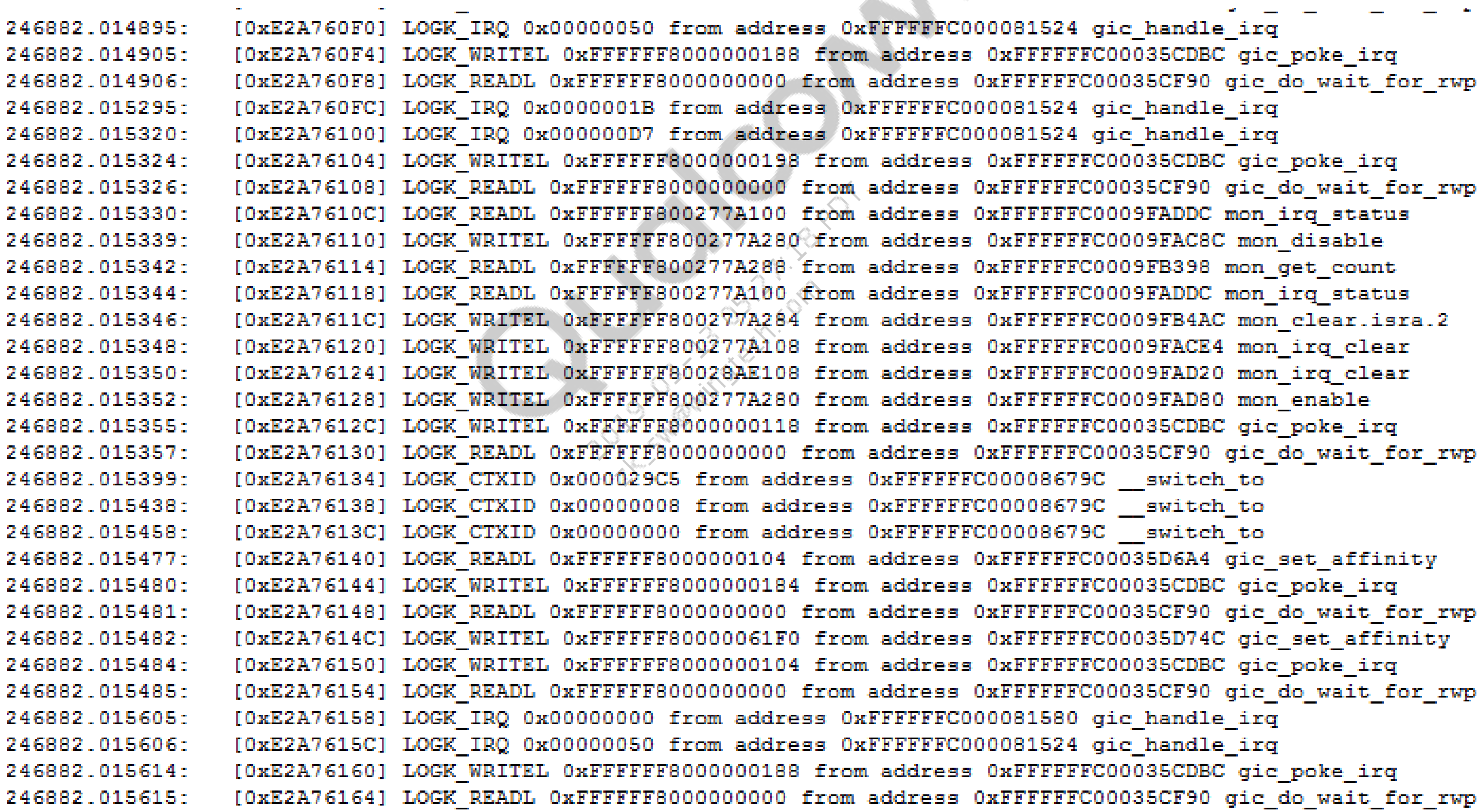


```
-h, --help            show this help message and exit
--print-watchdog-time
                      Print watchdog timing information
-e, --ram-file        List of ram files (name, start, end)
-v VMLINUX, --vmlinux=VMLINUX
                      vmlinux path
-n NM, --nm-path=NM   nm path
-g GDB, --gdb-path=GDB
                      gdb path
-j OBJDUMP, --objdump-path=OBJDUMP
                      objdump path
-a AUTODUMP, --auto-dump=AUTODUMP
                      Auto find ram dumps from the path
-o OUTDIR, --outdir=OUTDIR
                      Output directory
-s, --t32launcher     Create T32 simulator launcher
--t32-host-system=HOST
                      T32 host system (for launcher script generation).
                      Supported choices: "Linux", "Windows". Defaults to the
                      system ramparse.py is running on.
-x, --everything      Output everything (may be slow
-f OUTFILE, --output-file=OUTFILE
                      Name of file to save output
--stdout              Dump to stdout instead of the file
--phys-offset=PHYS_OFFSET
                      use custom phys offset
--kaslr-offset=KASLR_OFFSET
                      Offset for address space layout randomization
--page-offset=PAGE_OFFSET
                      use custom page offset
--force-hardware=FORCE_HARDWARE
                      Force the hardware detection
--force-version=FORCE_HARDWARE_VERSION
                      Force the hardware detection to a specific hardware
                      version
--parse-qdss          Parse QDSS (deprecated)
--64-bit              Parse dumps as 64-bit dumps (default)
--32-bit              Parse dumps as 32-bit dumps
--shell               Run an interactive python interpreter with the ramdump
                      loaded
```



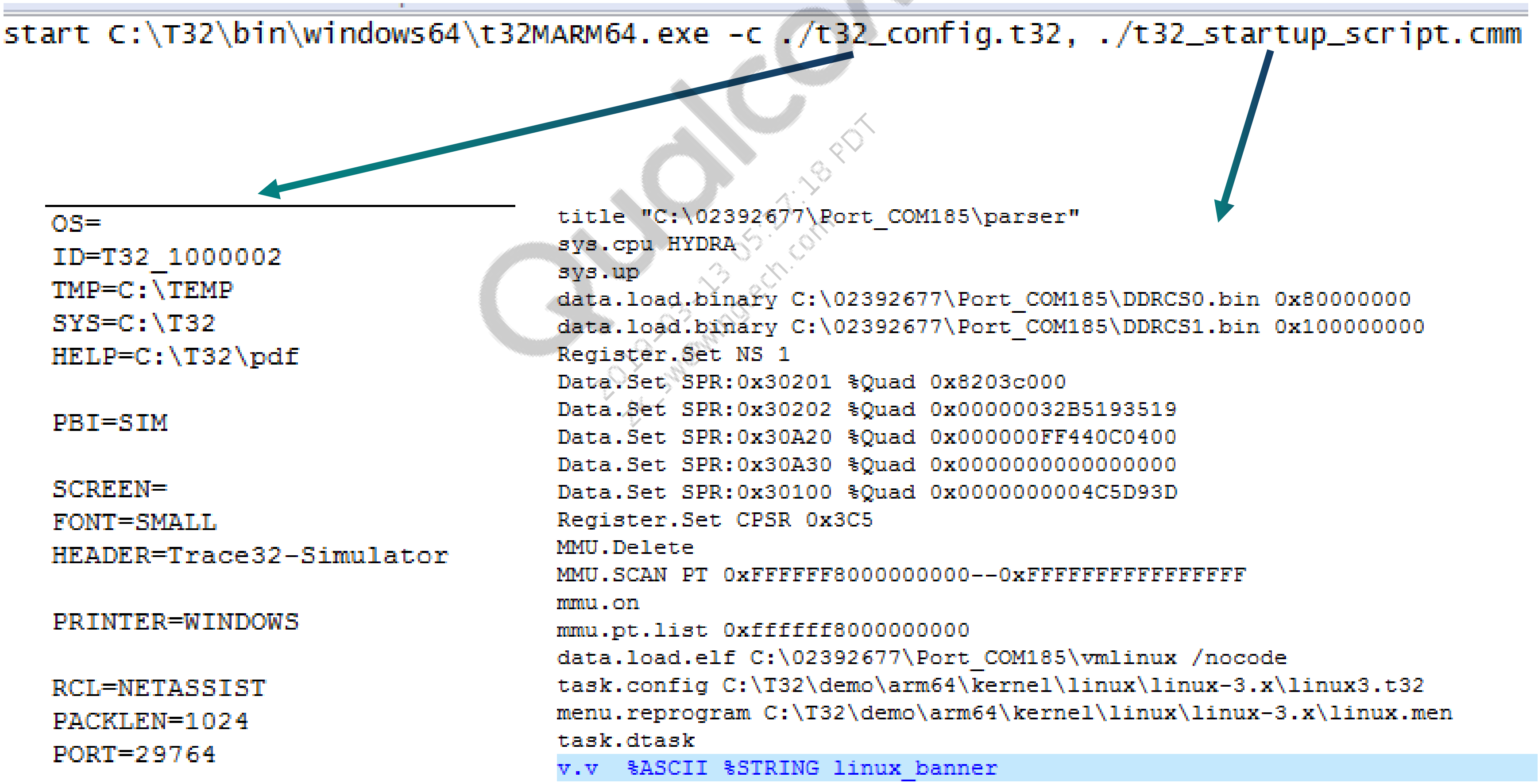
```
--print-cache-dump    Print L2 cache dump
--clock-dump          Dump all the clocks in the system
--cpr3-info           Print CPR3 information
--cpr-info            Print CPR information
--cpu-state           Reads register values of non-panic'ing CPUs
--ddr-compare         Sanity check the DDR data to find possible corruptions
-w, --check-for-watchdog
                      Check for an FIQ watchdog
--parse-debug-image   Parse the debug image and associated information
-d, --dmesg           Print the dmesg
--print-gpuinfo       print gpu info like ringbuffer,snapshot and pointer
                      addresses
--print-iommu-pg-tables
                      Print IOMMU page tables
--print-ipc-logging   Print all the IPC information
-i, --print-irqs      Print all the irq information
-c, --print-kconfig   Print saved kernel configuration
--lpm                 Parse LPM Driver info
--dump-page-tables    Dumps page tables
--print-pageallocorruption
                      print pagealloc corruption information (if available)
--print-pagetracking  print page tracking information (if available)
--print-pagetypeinfo  Print the pagetypeinfo
--check-rodata        check rodata in dump against the static image
-r, --print-rtb       Print RTB (if enabled)
--print-runqueues     Print the runqueue status
--slabinfo            print information about slabs
--slabpoison          check slab poison
--spm                 Parse SPM Driver info
-t, --print-tasks     Print all the task information
-T, --print-tasks-timestamps
                      Print all the task sched stats per core sorted on
                      arrival time
-p, --check-for-panic
                      Check if a kernel panic occured
--thermal-info        Useful information from thermal data structures
--timer-list          Print all the linux timers
--print-vmalloc       print vmalloc information
--print-vmstats       Print the information similar to /proc/zoneinfo and
                      /proc/vmstat
-q, --print-workqueues
```

RTB log example



```
246882.014895:   [0xE2A760F0] LOGK_IRQ 0x00000050 from address 0xFFFFFFC000081524 gic_handle_irq
246882.014905:   [0xE2A760F4] LOGK_WRITEL 0xFFFFFF8000000188 from address 0xFFFFFFC00035CDBC gic_poke_irq
246882.014906:   [0xE2A760F8] LOGK_READL 0xFFFFFF8000000000 from address 0xFFFFFFC00035CF90 gic_do_wait_for_rwp
246882.015295:   [0xE2A760FC] LOGK_IRQ 0x0000001B from address 0xFFFFFFC000081524 gic_handle_irq
246882.015320:   [0xE2A76100] LOGK_IRQ 0x000000D7 from address 0xFFFFFFC000081524 gic_handle_irq
246882.015324:   [0xE2A76104] LOGK_WRITEL 0xFFFFFF8000000198 from address 0xFFFFFFC00035CDBC gic_poke_irq
246882.015326:   [0xE2A76108] LOGK_READL 0xFFFFFF8000000000 from address 0xFFFFFFC00035CF90 gic_do_wait_for_rwp
246882.015330:   [0xE2A7610C] LOGK_READL 0xFFFFFF800277A100 from address 0xFFFFFFC0009FADDC mon_irq_status
246882.015339:   [0xE2A76110] LOGK_WRITEL 0xFFFFFF800277A280 from address 0xFFFFFFC0009FAC8C mon_disable
246882.015342:   [0xE2A76114] LOGK_READL 0xFFFFFF800277A288 from address 0xFFFFFFC0009FB398 mon_get_count
246882.015344:   [0xE2A76118] LOGK_READL 0xFFFFFF800277A100 from address 0xFFFFFFC0009FADDC mon_irq_status
246882.015346:   [0xE2A7611C] LOGK_WRITEL 0xFFFFFF800277A284 from address 0xFFFFFFC0009FB4AC mon_clear.isra.2
246882.015348:   [0xE2A76120] LOGK_WRITEL 0xFFFFFF800277A108 from address 0xFFFFFFC0009FACE4 mon_irq_clear
246882.015350:   [0xE2A76124] LOGK_WRITEL 0xFFFFFF80028AE108 from address 0xFFFFFFC0009FAD20 mon_irq_clear
246882.015352:   [0xE2A76128] LOGK_WRITEL 0xFFFFFF800277A280 from address 0xFFFFFFC0009FAD80 mon_enable
246882.015355:   [0xE2A7612C] LOGK_WRITEL 0xFFFFFF8000000118 from address 0xFFFFFFC00035CDBC gic_poke_irq
246882.015357:   [0xE2A76130] LOGK_READL 0xFFFFFF8000000000 from address 0xFFFFFFC00035CF90 gic_do_wait_for_rwp
246882.015399:   [0xE2A76134] LOGK_CTXID 0x000029C5 from address 0xFFFFFFC00008679C __switch_to
246882.015438:   [0xE2A76138] LOGK_CTXID 0x00000008 from address 0xFFFFFFC00008679C __switch_to
246882.015458:   [0xE2A7613C] LOGK_CTXID 0x00000000 from address 0xFFFFFFC00008679C __switch_to
246882.015477:   [0xE2A76140] LOGK_READL 0xFFFFFF8000000104 from address 0xFFFFFFC00035D6A4 gic_set_affinity
246882.015480:   [0xE2A76144] LOGK_WRITEL 0xFFFFFF8000000184 from address 0xFFFFFFC00035CDBC gic_poke_irq
246882.015481:   [0xE2A76148] LOGK_READL 0xFFFFFF8000000000 from address 0xFFFFFFC00035CF90 gic_do_wait_for_rwp
246882.015482:   [0xE2A7614C] LOGK_WRITEL 0xFFFFFF80000061F0 from address 0xFFFFFFC00035D74C gic_set_affinity
246882.015484:   [0xE2A76150] LOGK_WRITEL 0xFFFFFF8000000104 from address 0xFFFFFFC00035CDBC gic_poke_irq
246882.015485:   [0xE2A76154] LOGK_READL 0xFFFFFF8000000000 from address 0xFFFFFFC00035CF90 gic_do_wait_for_rwp
246882.015605:   [0xE2A76158] LOGK_IRQ 0x00000000 from address 0xFFFFFFC000081580 gic_handle_irq
246882.015606:   [0xE2A7615C] LOGK_IRQ 0x00000050 from address 0xFFFFFFC000081524 gic_handle_irq
246882.015614:   [0xE2A76160] LOGK_WRITEL 0xFFFFFF8000000188 from address 0xFFFFFFC00035CDBC gic_poke_irq
246882.015615:   [0xE2A76164] LOGK_READL 0xFFFFFF8000000000 from address 0xFFFFFFC00035CF90 gic_do_wait_for_rwp
```

TRACE32 simulator launcher for Linux

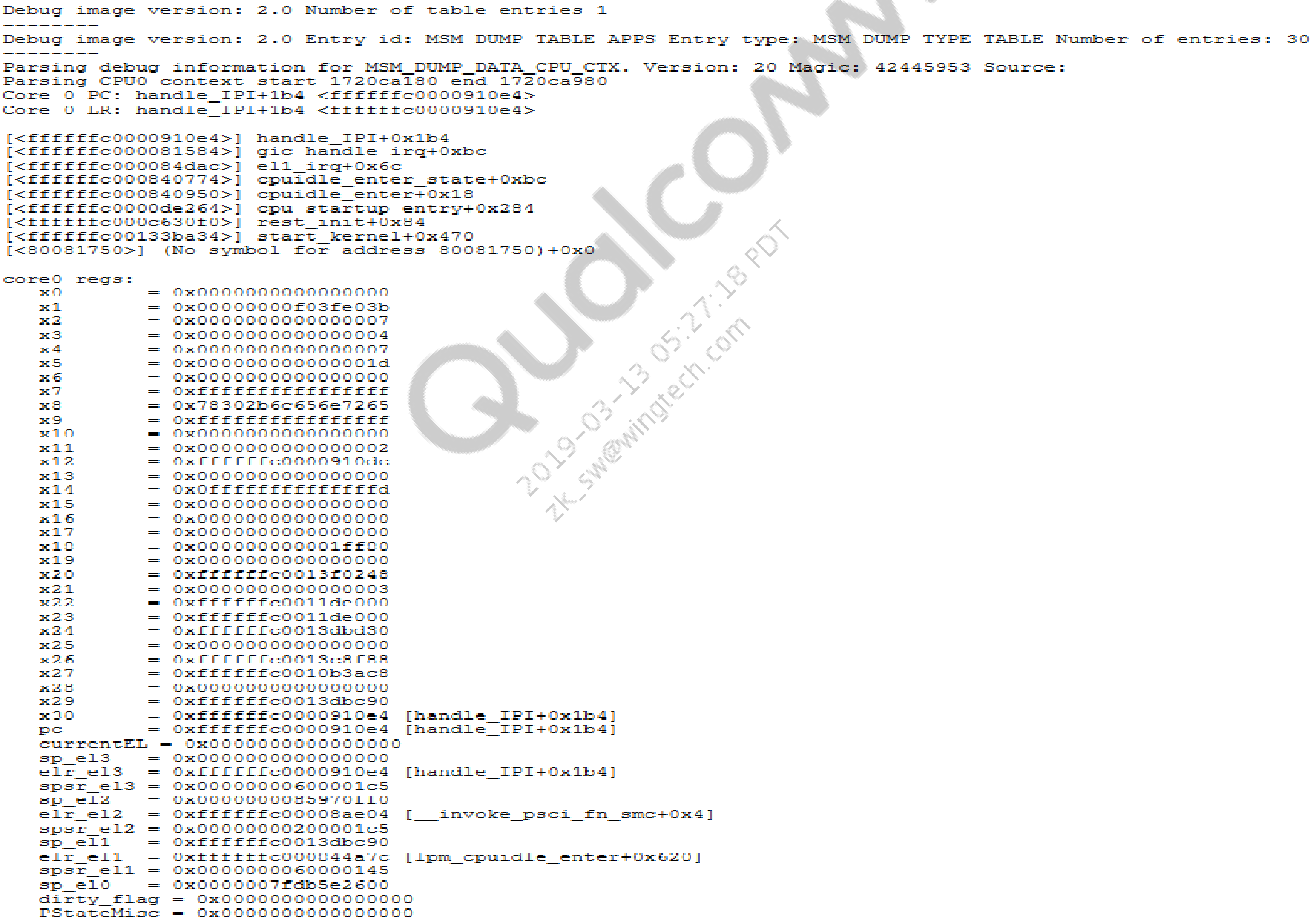


```
start C:\T32\bin\windows64\t32MARM64.exe -c ./t32_config.t32, ./t32_startup_script.cmm
```

```
OS=
ID=T32_1000002
TMP=C:\TEMP
SYS=C:\T32
HELP=C:\T32\pdf

PBI=SIM

SCREEN=
FONT=SMALL
HEADER=Trace32-Simulator

PRINTER=WINDOWS

RCL=NETASSIST
PACKLEN=1024
PORT=29764
```

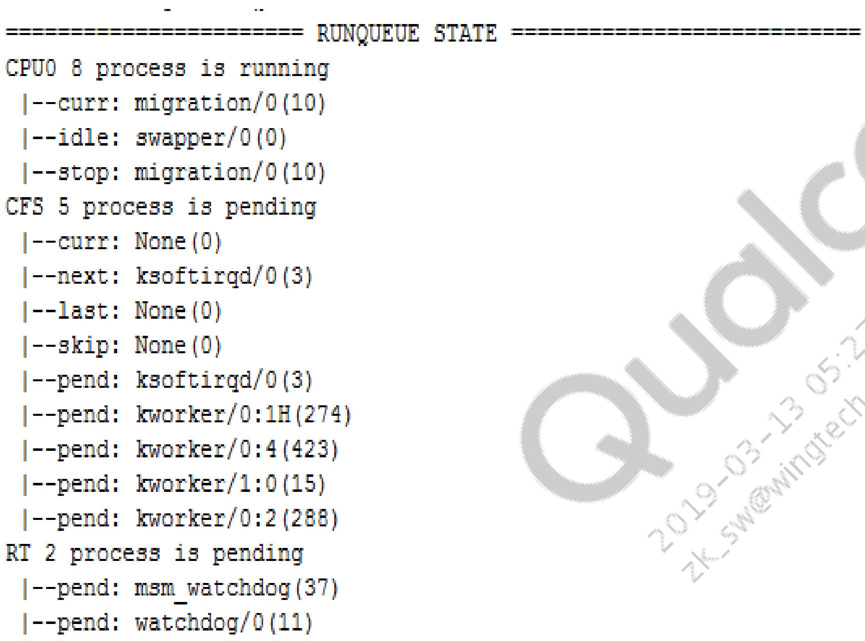
```
title "C:\02392677\Port_COM185\parser"
sys.cpu HYDRA
sys.up
data.load.binary C:\02392677\Port_COM185\DDRCS0.bin 0x80000000
data.load.binary C:\02392677\Port_COM185\DDRCS1.bin 0x100000000
Register.Set NS 1
Data.Set SPR:0x30201 %Quad 0x8203c000
Data.Set SPR:0x30202 %Quad 0x00000032B5193519
Data.Set SPR:0x30A20 %Quad 0x000000FF440C0400
Data.Set SPR:0x30A30 %Quad 0x0000000000000000
Data.Set SPR:0x30100 %Quad 0x0000000004C5D93D
Register.Set CPSR 0x3C5
MMU.Delete
MMU.SCAN PT 0xFFFFFF8000000000--0xFFFFFFFFFFFFFFFF
mmu.on
mmu.pt.list 0xffffff8000000000
data.load.elf C:\02392677\Port_COM185\vmlinux /nocode
task.config C:\T32\demo\arm64\kernel\linux\linux-3.x\linux3.t32
menu.reprogram C:\T32\demo\arm64\kernel\linux\linux-3.x\linux.men
task.dtask
v.v  %ASCII %STRING linux_banner
```

Debug image (registers/call stack for each core)



```
Debug image version: 2.0 Number of table entries 1
--------
Debug image version: 2.0 Entry id: MSM_DUMP_TABLE_APPS Entry type: MSM_DUMP_TYPE_TABLE Number of entries: 30
--------
Parsing debug information for MSM_DUMP_DATA_CPU_CTX. Version: 20 Magic: 42445953 Source:
Parsing CPU0 context start 1720ca180 end 1720ca980
Core 0 PC: handle_IPI+1b4 <ffffffc0000910e4>
Core 0 LR: handle_IPI+1b4 <ffffffc0000910e4>

[<ffffffc0000910e4>] handle_IPI+0x1b4
[<ffffffc000081584>] gic_handle_irq+0xbc
[<ffffffc000084dac>] el1_irq+0x6c
[<ffffffc000840774>] cpuidle_enter_state+0xbc
[<ffffffc000840950>] cpuidle_enter+0x18
[<ffffffc0000de264>] cpu_startup_entry+0x284
[<ffffffc000c630f0>] rest_init+0x84
[<ffffffc00133ba34>] start_kernel+0x470
[<80081750>] (No symbol for address 80081750)+0x0

core0 regs:
   x0        = 0x0000000000000000
   x1        = 0x00000000f03fe03b
   x2        = 0x0000000000000007
   x3        = 0x0000000000000004
   x4        = 0x0000000000000007
   x5        = 0x000000000000001d
   x6        = 0x0000000000000000
   x7        = 0xffffffffffffffff
   x8        = 0x78302b6c656e7265
   x9        = 0xffffffffffffffff
   x10       = 0x0000000000000000
   x11       = 0x0000000000000002
   x12       = 0xffffffc0000910dc
   x13       = 0x0000000000000000
   x14       = 0x0ffffffffffffffd
   x15       = 0x0000000000000000
   x16       = 0x0000000000000000
   x17       = 0x0000000000000000
   x18       = 0x0000000000001ff80
   x19       = 0x0000000000000000
   x20       = 0xffffffc0013f0248
   x21       = 0x0000000000000003
   x22       = 0xffffffc0011de000
   x23       = 0xffffffc0011de000
   x24       = 0xffffffc0013dbd30
   x25       = 0x0000000000000000
   x26       = 0xffffffc0013c8f88
   x27       = 0xffffffc0010b3ac8
   x28       = 0x0000000000000000
   x29       = 0xffffffc0013dbc90
   x30       = 0xffffffc0000910e4 [handle_IPI+0x1b4]
   pc        = 0xffffffc0000910e4 [handle_IPI+0x1b4]
   currentEL = 0x0000000000000000
   sp_el3    = 0x0000000000000000
   elr_el3   = 0xffffffc0000910e4 [handle_IPI+0x1b4]
   spsr_el3 = 0x00000000600001c5
   sp_el2    = 0x0000000085970ff0
   elr_el2   = 0xffffffc00008ae04 [__invoke_psci_fn_smc+0x4]
   spsr_el2 = 0x00000000200001c5
   sp_el1    = 0xffffffc0013dbc90
   elr_el1   = 0xffffffc000844a7c [lpm_cpuidle_enter+0x620]
   spsr_el1 = 0x0000000060000145
   sp_el0    = 0x0000007fdb5e2600
   dirty_flag = 0x0000000000000000
   PStateMisc = 0x0000000000000000
```

Runqueue analysis



```
====================== RUNQUEUE STATE ==========================
CPU0 8 process is running
 |--curr: migration/0(10)
 |--idle: swapper/0(0)
 |--stop: migration/0(10)
CFS 5 process is pending
 |--curr: None(0)
 |--next: ksoftirqd/0(3)
 |--last: None(0)
 |--skip: None(0)
 |--pend: ksoftirqd/0(3)
 |--pend: kworker/0:1H(274)
 |--pend: kworker/0:4(423)
 |--pend: kworker/1:0(15)
 |--pend: kworker/0:2(288)
RT 2 process is pending
 |--pend: msm_watchdog(37)
 |--pend: watchdog/0(11)
```

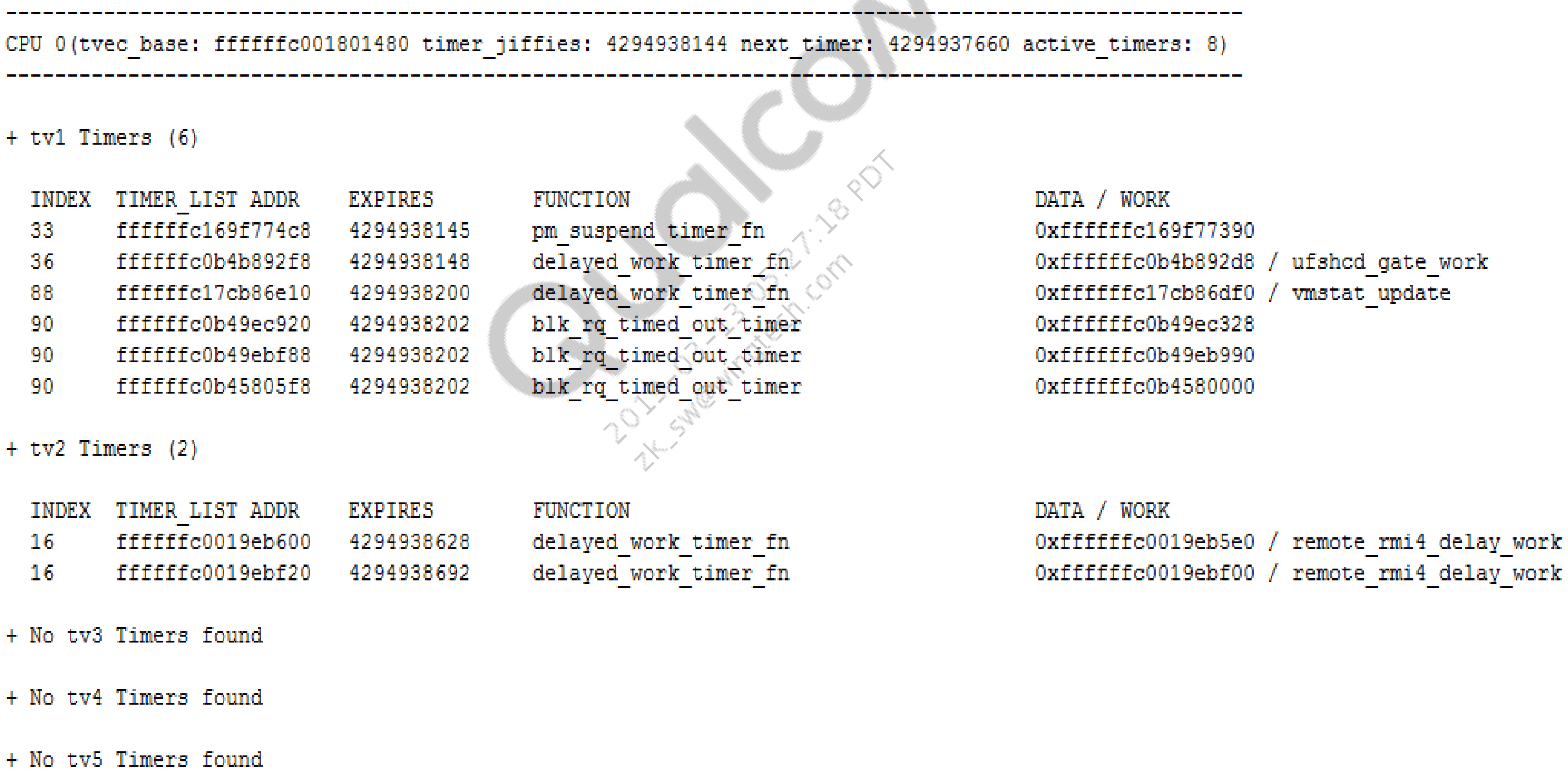
```
current callstack is maybe:
<snip>
0xffffffc16b177bd8:('el1_irq', 108L)
0xffffffc16b177be8:('save_return_addr', 0L)
0xffffffc16b177bf8:('walk_stackframe', 48L)
0xffffffc16b177c40:('cpu_bit_bitmap', 24L)
0xffffffc16b177c88:('__func__.26497', 0L)
0xffffffc16b177cb0:('save_return_addr', 0L)
0xffffffc16b177d00:('walk_stackframe', 40L)
0xffffffc16b177d10:('walk_stackframe', 48L)
0xffffffc16b177d38:('return_address', 64L)
0xffffffc16b177d48:('smpboot_thread_fn', 460L)
0xffffffc16b177d68:('preempt_count_sub', 212L)
0xffffffc16b177d98:('preempt_count_sub', 208L)
0xffffffc16b177da8:('smpboot_thread_fn', 460L)
0xffffffc16b177dc8:('kthread', 228L)
0xffffffc16b177de0:('kallsyms_token_index', 25411L)
0xffffffc16b177df0:('smpboot_thread_fn', 0L)
0xffffffc16b177e08:('kthread', 200L)
0xffffffc16b177e18:('ret_from_fork', 16L)
0xffffffc16b177e20:('kthread', 0L)
```

Kernel stack and Running state of every task

Process: swapper/0, cpu: 0 pid: 0 start: 0xffffffc0015405b0

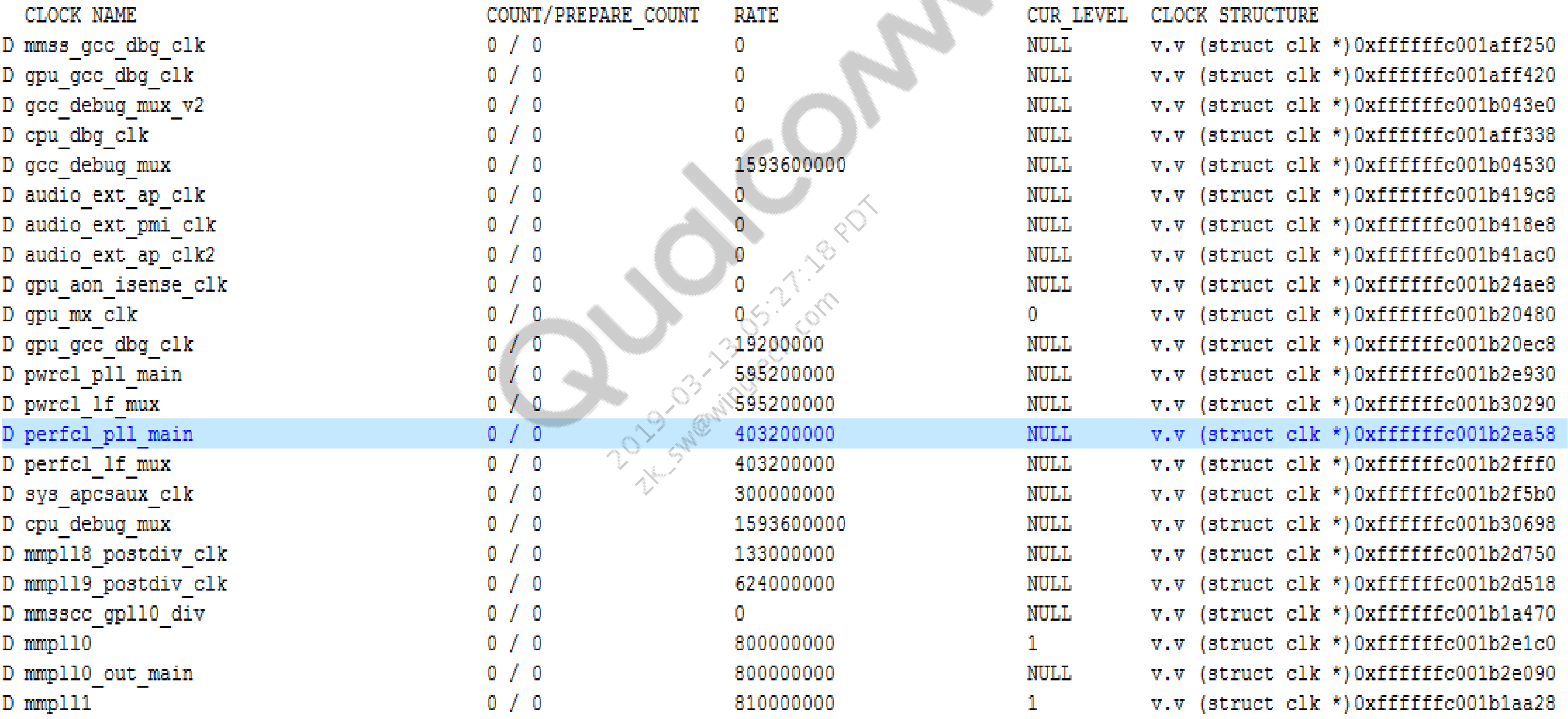
```
==========================================================
    Task name: swapper/0 pid: 0 cpu: 0
    state: 0x0 exit_state: 0x0 stack base: 0xffffffc00152c000
    Stack:
    [<ffffffc0000867ac>] __switch_to+0x7c
    [<ffffffc000d048ac>] __schedule+0x56c
    [<ffffffc000d04f4c>] preempt_schedule_irq+0x48
    [<ffffffc000084e24>] el1_preempt+0x8
    [<ffffffc000d04b68>] schedule+0x74
    [<ffffffc000d04ef4>] schedule_preempt_disabled+0x14
    [<ffffffc0000dfbd8>] cpu_startup_entry+0x324
    [<ffffffc000cf6680>] rest_init+0x84
    [<ffffffc0013fa9b4>] start_kernel+0x3f0
    [<40081750>] (No symbol for address 40081750)+0x0
```

Each core’s timer list



```
-----------------------------------------------------------------------------------------------------
CPU 0(tvec_base: ffffffc001801480 timer_jiffies: 4294938144 next_timer: 4294937660 active_timers: 8)
-----------------------------------------------------------------------------------------------------

+ tv1 Timers (6)

  INDEX  TIMER_LIST_ADDR    EXPIRES       FUNCTION                                 DATA / WORK
  33     ffffffc169f774c8   4294938145    pm_suspend_timer_fn                      0xffffffc169f77390
  36     ffffffc0b4b892f8   4294938148    delayed_work_timer_fn                    0xffffffc0b4b892d8 / ufshcd_gate_work
  88     ffffffc17cb86e10   4294938200    delayed_work_timer_fn                    0xffffffc17cb86df0 / vmstat_update
  90     ffffffc0b49ec920   4294938202    blk_rq_timed_out_timer                   0xffffffc0b49ec328
  90     ffffffc0b49ebf88   4294938202    blk_rq_timed_out_timer                   0xffffffc0b49eb990
  90     ffffffc0b45805f8   4294938202    blk_rq_timed_out_timer                   0xffffffc0b4580000

+ tv2 Timers (2)

  INDEX  TIMER_LIST_ADDR    EXPIRES       FUNCTION                                 DATA / WORK
  16     ffffffc0019eb600   4294938628    delayed_work_timer_fn                    0xffffffc0019eb5e0 / remote_rmi4_delay_work
  16     ffffffc0019ebf20   4294938692    delayed_work_timer_fn                    0xffffffc0019ebf00 / remote_rmi4_delay_work

+ No tv3 Timers found

+ No tv4 Timers found

+ No tv5 Timers found
```

Clock dump



```
  CLOCK NAME                               COUNT/PREPARE_COUNT   RATE                      CUR_LEVEL  CLOCK STRUCTURE
D mmss_gcc_dbg_clk                         0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001aff250
D gpu_gcc_dbg_clk                          0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001aff420
D gcc_debug_mux_v2                         0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001b043e0
D cpu_dbg_clk                              0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001aff338
D gcc_debug_mux                            0 / 0                 1593600000                NULL       v.v (struct clk *)0xffffffc001b04530
D audio_ext_ap_clk                         0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001b419c8
D audio_ext_pmi_clk                        0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001b418e8
D audio_ext_ap_clk2                        0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001b41ac0
D gpu_aon_isense_clk                       0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001b24ae8
D gpu_mx_clk                               0 / 0                 0                         0          v.v (struct clk *)0xffffffc001b20480
D gpu_gcc_dbg_clk                          0 / 0                 19200000                  NULL       v.v (struct clk *)0xffffffc001b20ec8
D pwrcl_pll_main                           0 / 0                 595200000                 NULL       v.v (struct clk *)0xffffffc001b2e930
D pwrcl_lf_mux                             0 / 0                 595200000                 NULL       v.v (struct clk *)0xffffffc001b30290
D perfcl_pll_main                          0 / 0                 403200000                 NULL       v.v (struct clk *)0xffffffc001b2ea58
D perfcl_lf_mux                            0 / 0                 403200000                 NULL       v.v (struct clk *)0xffffffc001b2fff0
D sys_apcsaux_clk                          0 / 0                 300000000                 NULL       v.v (struct clk *)0xffffffc001b2f5b0
D cpu_debug_mux                            0 / 0                 1593600000                NULL       v.v (struct clk *)0xffffffc001b30698
D mmpll8_postdiv_clk                       0 / 0                 133000000                 NULL       v.v (struct clk *)0xffffffc001b2d750
D mmpll9_postdiv_clk                       0 / 0                 624000000                 NULL       v.v (struct clk *)0xffffffc001b2d518
D mmsscc_gpll0_div                         0 / 0                 0                         NULL       v.v (struct clk *)0xffffffc001b1a470
D mmpll0                                   0 / 0                 800000000                 1          v.v (struct clk *)0xffffffc001b2e1c0
D mmpll0_out_main                          0 / 0                 800000000                 NULL       v.v (struct clk *)0xffffffc001b2e090
D mmpll1                                   0 / 0                 810000000                 1          v.v (struct clk *)0xffffffc001b1aa28
```

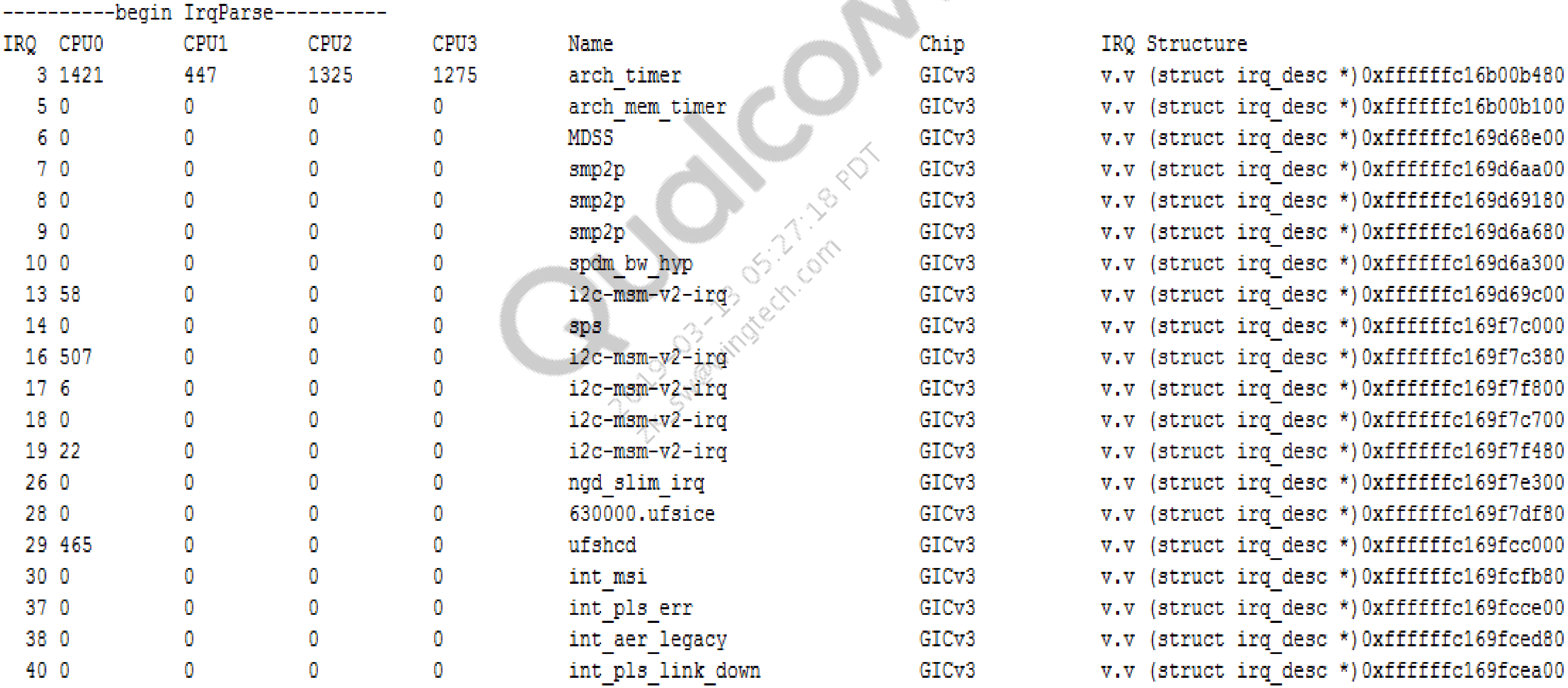
Note: The clock structures' pointer can be obtained so that the details in TRACE32 simulator can be checked. The current rate can be seen, whether it is enabled (if count = prepar_count !=0).

.

Workqueue for each core

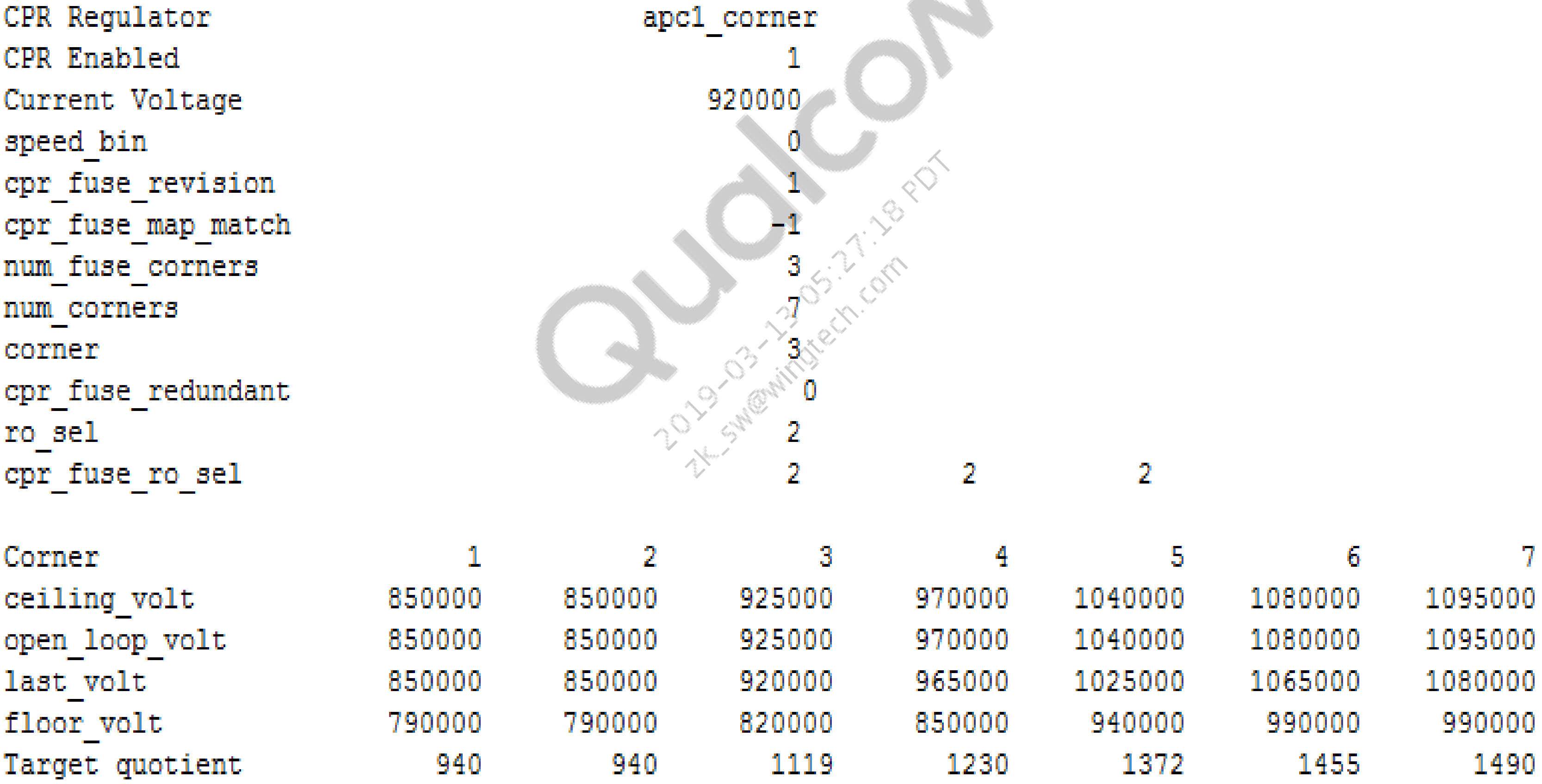
```
CPU 0
pool 0
BUSY Workqueue worker: kworker/0:4 current_work: (None)
BUSY Workqueue worker: kworker/0:2 current_work: (None)
IDLE Workqueue worker: kworker/0:3 current_work: (None)
IDLE Workqueue worker: kworker/0:0 current_work: (None)
IDLE Workqueue worker: kworker/0:1 current_work: (None)
Pending entry: push_to_pool
Pending entry: ding entry: battery_age_tsens_poll
Pending entry: rslow_comp_work
Pending entry: update_cycle_count
Pending entry: update_esr_value
Pending entry: power_supply_changed_work
Pending entry: power_supply_changed_work
Pending entry: push_to_pool
pool 1
BUSY Workqueue worker: kworker/0:4 current_work: (None)
BUSY Workqueue worker: kworker/0:2 current_work: (None)
IDLE Workqueue worker: kworker/0:1H current_work: (None)
IDLE Workqueue worker: kworker/0:0H current_work: (None)
Pending entry: cfq_kick_queue
```

IRQ state



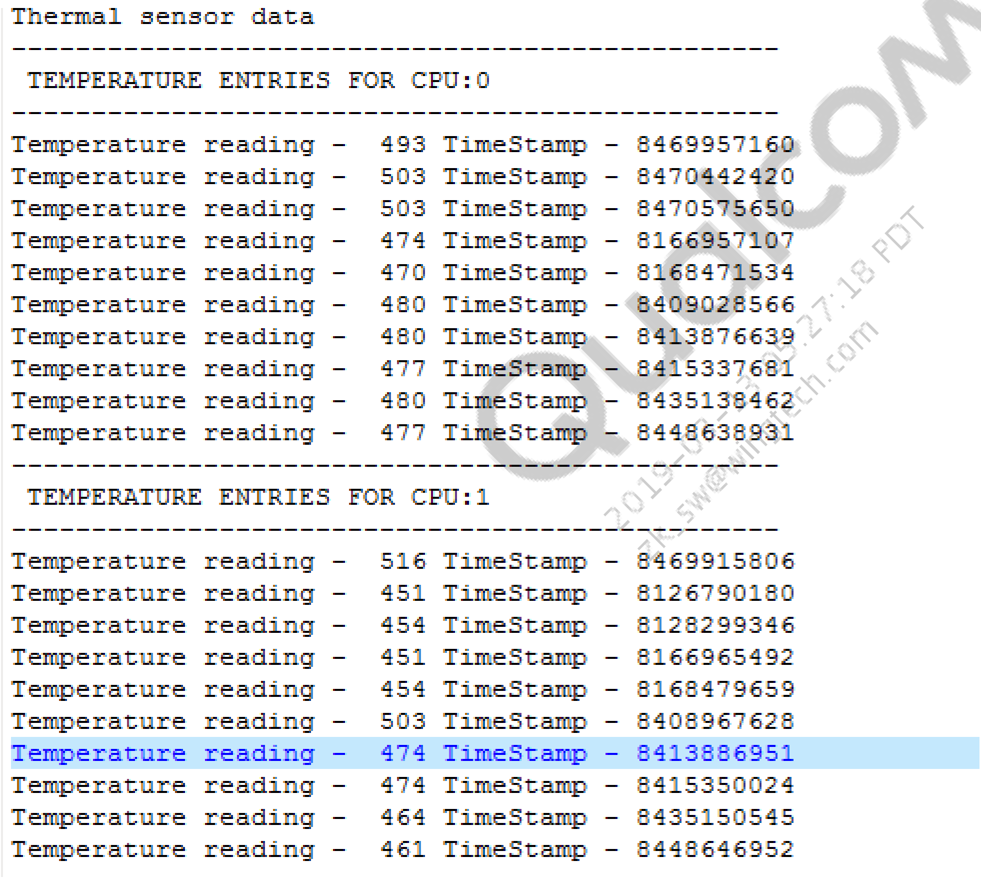
```
----------begin IrqParse----------
IRQ  CPU0       CPU1       CPU2       CPU3        Name                          Chip            IRQ Structure
   3 1421       447        1325       1275        arch_timer                    GICv3           v.v (struct irq_desc *)0xffffffc16b00b480
   5 0          0          0          0           arch_mem_timer                GICv3           v.v (struct irq_desc *)0xffffffc16b00b100
   6 0          0          0          0           MDSS                          GICv3           v.v (struct irq_desc *)0xffffffc169d68e00
   7 0          0          0          0           smp2p                         GICv3           v.v (struct irq_desc *)0xffffffc169d6aa00
   8 0          0          0          0           smp2p                         GICv3           v.v (struct irq_desc *)0xffffffc169d69180
   9 0          0          0          0           smp2p                         GICv3           v.v (struct irq_desc *)0xffffffc169d6a680
  10 0          0          0          0           spdm_bw_hyp                   GICv3           v.v (struct irq_desc *)0xffffffc169d6a300
  13 58         0          0          0           i2c-msm-v2-irq                GICv3           v.v (struct irq_desc *)0xffffffc169d69c00
  14 0          0          0          0           sps                           GICv3           v.v (struct irq_desc *)0xffffffc169f7c000
  16 507        0          0          0           i2c-msm-v2-irq                GICv3           v.v (struct irq_desc *)0xffffffc169f7c380
  17 6          0          0          0           i2c-msm-v2-irq                GICv3           v.v (struct irq_desc *)0xffffffc169f7f800
  18 0          0          0          0           i2c-msm-v2-irq                GICv3           v.v (struct irq_desc *)0xffffffc169f7c700
  19 22         0          0          0           i2c-msm-v2-irq                GICv3           v.v (struct irq_desc *)0xffffffc169f7f480
  26 0          0          0          0           ngd_slim_irq                  GICv3           v.v (struct irq_desc *)0xffffffc169f7e300
  28 0          0          0          0           630000.ufsice                 GICv3           v.v (struct irq_desc *)0xffffffc169f7df80
  29 465        0          0          0           ufshcd                        GICv3           v.v (struct irq_desc *)0xffffffc169fcc000
  30 0          0          0          0           int_msi                       GICv3           v.v (struct irq_desc *)0xffffffc169fcfb80
  37 0          0          0          0           int_pls_err                   GICv3           v.v (struct irq_desc *)0xffffffc169fcce00
  38 0          0          0          0           int_aer_legacy                GICv3           v.v (struct irq_desc *)0xffffffc169fced80
  40 0          0          0          0           int_pls_link_down             GICv3           v.v (struct irq_desc *)0xffffffc169fcea00
```

CPR information (Not for all targets)



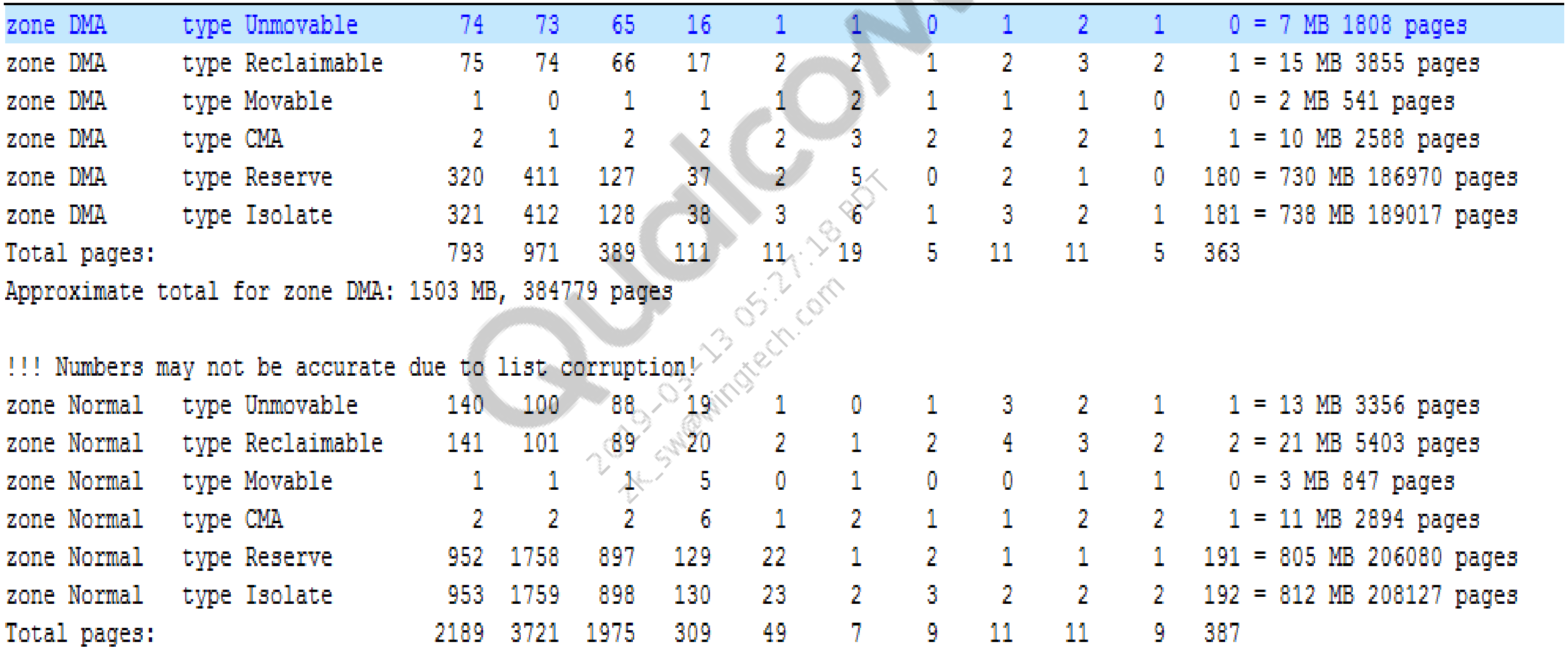
```
CPR Regulator                           apc1_corner
CPR Enabled                                       1
Current Voltage                              920000
speed_bin                                         0
cpr_fuse_revision                                 1
cpr_fuse_map_match                               -1
num_fuse_corners                                  3
num_corners                                       7
corner                                            3
cpr_fuse_redundant                                 0
ro_sel                                            2
cpr_fuse_ro_sel                                   2          2          2

Corner                      1          2          3          4          5          6          7
ceiling_volt           850000     850000     925000     970000    1040000    1080000    1095000
open_loop_volt         850000     850000     925000     970000    1040000    1080000    1095000
last_volt              850000     850000     920000     965000    1025000    1065000    1080000
floor_volt             790000     790000     820000     850000     940000     990000     990000
Target quotient           940        940       1119       1230       1372       1455       1490
```

Thermal sensor data



```
Thermal sensor data
------------------------------------------------
 TEMPERATURE ENTRIES FOR CPU:0
------------------------------------------------
Temperature reading -  493 TimeStamp - 8469957160
Temperature reading -  503 TimeStamp - 8470442420
Temperature reading -  503 TimeStamp - 8470575650
Temperature reading -  474 TimeStamp - 8166957107
Temperature reading -  470 TimeStamp - 8168471534
Temperature reading -  480 TimeStamp - 8409028566
Temperature reading -  480 TimeStamp - 8413876639
Temperature reading -  477 TimeStamp - 8415337681
Temperature reading -  480 TimeStamp - 8435138462
Temperature reading -  477 TimeStamp - 8448638931
------------------------------------------------
 TEMPERATURE ENTRIES FOR CPU:1
------------------------------------------------
Temperature reading -  516 TimeStamp - 8469915806
Temperature reading -  451 TimeStamp - 8126790180
Temperature reading -  454 TimeStamp - 8128299346
Temperature reading -  451 TimeStamp - 8166965492
Temperature reading -  454 TimeStamp - 8168479659
Temperature reading -  503 TimeStamp - 8408967628
Temperature reading -  474 TimeStamp - 8413886951
Temperature reading -  474 TimeStamp - 8415350024
Temperature reading -  464 TimeStamp - 8435150545
Temperature reading -  461 TimeStamp - 8448646952
```

Page type information

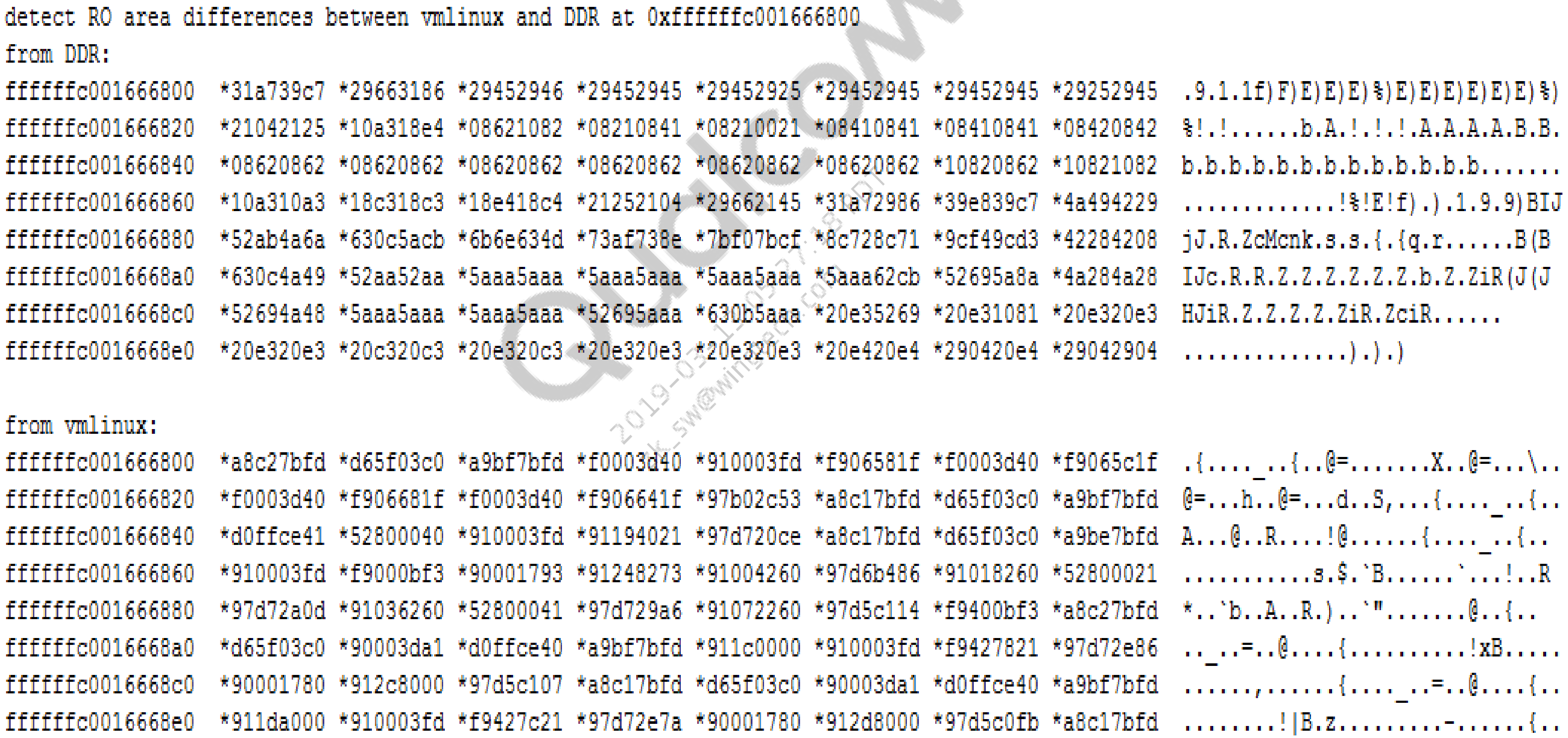


```
zone DMA      type Unmovable     74   73   65   16    1    1    0    1    2    1    0 = 7 MB 1808 pages
zone DMA      type Reclaimable   75   74   66   17    2    2    1    2    3    2    1 = 15 MB 3855 pages
zone DMA      type Movable        1    0    1    1    1    2    1    1    1    0    0 = 2 MB 541 pages
zone DMA      type CMA            2    1    2    2    2    3    2    2    2    1    1 = 10 MB 2588 pages
zone DMA      type Reserve      320  411  127   37    2    5    0    2    1    0  180 = 730 MB 186970 pages
zone DMA      type Isolate      321  412  128   38    3    6    1    3    2    1  181 = 738 MB 189017 pages
Total pages:                    793  971  389  111   11   19    5   11   11    5  363
Approximate total for zone DMA: 1503 MB, 384779 pages

!!! Numbers may not be accurate due to list corruption!
zone Normal   type Unmovable    140  100   88   19    1    0    1    3    2    1    1 = 13 MB 3356 pages
zone Normal   type Reclaimable  141  101   89   20    2    1    2    4    3    2    2 = 21 MB 5403 pages
zone Normal   type Movable        1    1    1    5    0    1    0    0    1    1    0 = 3 MB 847 pages
zone Normal   type CMA            2    2    2    6    1    2    1    1    2    2    1 = 11 MB 2894 pages
zone Normal   type Reserve      952 1758  897  129   22    1    2    1    1    1  191 = 805 MB 206080 pages
zone Normal   type Isolate      953 1759  898  130   23    2    3    2    2    2  192 = 812 MB 208127 pages
Total pages:                   2189 3721 1975  309   49    7    9   11   11    9  387
```

Zone information

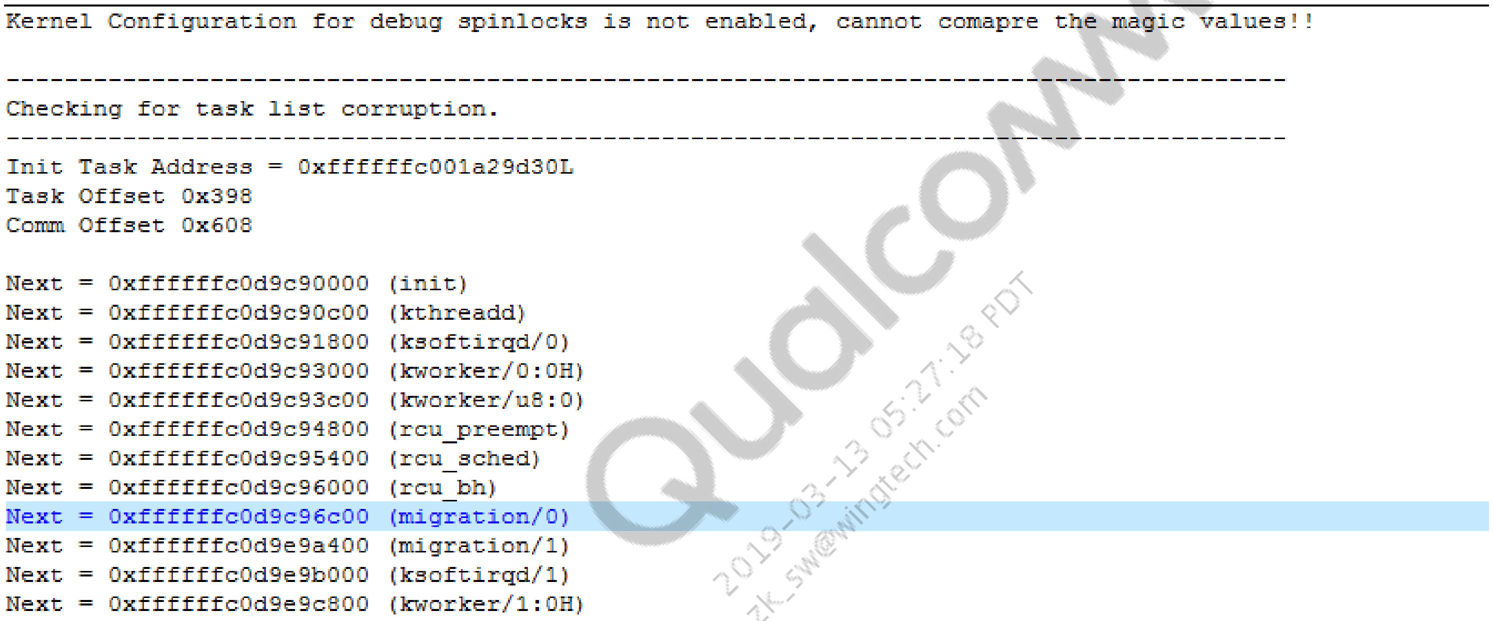
```
Zone DMA
NR_FREE_PAGES                 :   692168
NR_ALLOC_BATCH                :      277
NR_LRU_BASE                   :        2
NR_ACTIVE_ANON                :      316
NR_INACTIVE_FILE              :        0
NR_ACTIVE_FILE                :       74
NR_UNEVICTABLE                :        0
NR_MLOCK                      :        0
NR_ANON_PAGES                 :      317
NR_FILE_MAPPED                :        4
NR_FILE_PAGES                 :      119
NR_FILE_DIRTY                 :        0
NR_WRITEBACK                  :        0
NR_SLAB_RECLAIMABLE           :     2010
NR_SLAB_UNRECLAIMABLE         :    10488
NR_PAGETABLE                  :        3
NR_KERNEL_STACK               :      104
NR_UNSTABLE_NFS               :        0
NR_BOUNCE                     :        0
NR_VMSCAN_WRITE               :        0
NR_VMSCAN_IMMEDIATE           :        0
NR_WRITEBACK_TEMP             :        0
NR_ISOLATED_ANON              :        0
NR_ISOLATED_FILE              :        0
NR_SHMEM                      :        5
NR_DIRTIED                    :        0
NR_WRITTEN                    :        0
NR_PAGES_SCANNED              :        0
WORKINGSET_REFAULT            :        0
WORKINGSET_ACTIVATE           :        0
WORKINGSET_NODERECLAIM        :        0
NR_ANON_TRANSPARENT_HUGEPAGES :        0
NR_FREE_CMA_PAGES             :    34243
NR_SWAPCACHE                  :        0
WMARK_MIN                     :     1195
WMARK_LOW                     :     1493
WMARK_HIGH                    :     1792
```

Read-only area comparison

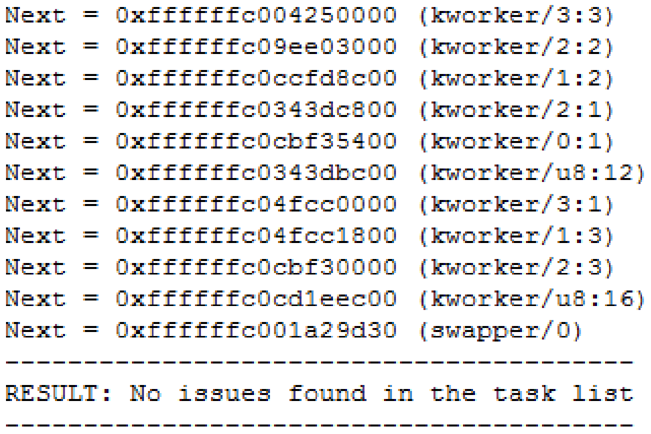


```
detect RO area differences between vmlinux and DDR at 0xffffffc001666800
from DDR:
ffffffc001666800  *31a739c7 *29663186 *29452946 *29452945 *29452925 *29452945 *29452945 *29252945  .9.1.1f)F)E)E)E)%)E)E)E)E)E)%)
ffffffc001666820  *21042125 *10a318e4 *08621082 *08210841 *08210021 *08410841 *08410841 *08420842  %!.!......b.A.!.!.!.A.A.A.A.B.B.
ffffffc001666840  *08620862 *08620862 *08620862 *08620862 *08620862 *08620862 *10820862 *10821082  b.b.b.b.b.b.b.b.b.b.b.b.b.......
ffffffc001666860  *10a310a3 *18c318c3 *18e418c4 *21252104 *29662145 *31a72986 *39e839c7 *4a494229  ..............!%!E!f).).1.9.9)BIJ
ffffffc001666880  *52ab4a6a *630c5acb *6b6e634d *73af738e *7bf07bcf *8c728c71 *9cf49cd3 *42284208  jJ.R.ZcMcnk.s.s.{.{q.r......B(B
ffffffc0016668a0  *630c4a49 *52aa52aa *5aaa5aaa *5aaa5aaa *5aaa5aaa *5aaa62cb *52695a8a *4a284a28  IJc.R.R.Z.Z.Z.Z.Z.Z.b.Z.ZiR(J(J
ffffffc0016668c0  *52694a48 *5aaa5aaa *5aaa5aaa *52695aaa *630b5aaa *20e35269 *20e31081 *20e320e3  HJiR.Z.Z.Z.Z.ZiR.ZciR......
ffffffc0016668e0  *20e320e3 *20c320c3 *20e320c3 *20e320e3 *20e320e3 *20e420e4 *290420e4 *29042904  ...............).).)

from vmlinux:
ffffffc001666800  *a8c27bfd *d65f03c0 *a9bf7bfd *f0003d40 *910003fd *f906581f *f0003d40 *f9065c1f  .{...._..{..@=.......X..@=...\..
ffffffc001666820  *f0003d40 *f906681f *f0003d40 *f906641f *97b02c53 *a8c17bfd *d65f03c0 *a9bf7bfd  @=...h..@=...d..S,...{...._..{..
ffffffc001666840  *d0ffce41 *52800040 *910003fd *91194021 *97d720ce *a8c17bfd *d65f03c0 *a9be7bfd  A...@..R....!@......{...._..{..
ffffffc001666860  *910003fd *f9000bf3 *90001793 *91248273 *91004260 *97d6b486 *91018260 *52800021  ............s.$.`B......`...!..R
ffffffc001666880  *97d72a0d *91036260 *52800041 *97d729a6 *91072260 *97d5c114 *f9400bf3 *a8c27bfd  *..`b..A..R.)..`"......@..{..
ffffffc0016668a0  *d65f03c0 *90003da1 *d0ffce40 *a9bf7bfd *911c0000 *910003fd *f9427821 *97d72e86  .._..=..@....{..........!xB.....
ffffffc0016668c0  *90001780 *912c8000 *97d5c107 *a8c17bfd *d65f03c0 *90003da1 *d0ffce40 *a9bf7bfd  ......,......{...._..=..@....{..
ffffffc0016668e0  *911da000 *910003fd *f9427c21 *97d72e7a *90001780 *912d8000 *97d5c0fb *a8c17bfd  ........!|B.z.........-......{..
```

DDR Cache Compare



```
Kernel Configuration for debug spinlocks is not enabled, cannot comapre the magic values!!

-----------------------------------------------------------------------------------------
Checking for task list corruption.
-----------------------------------------------------------------------------------------
Init Task Address = 0xffffffc001a29d30L
Task Offset 0x398
Comm Offset 0x608

Next = 0xffffffc0d9c90000 (init)
Next = 0xffffffc0d9c90c00 (kthreadd)
Next = 0xffffffc0d9c91800 (ksoftirqd/0)
Next = 0xffffffc0d9c93000 (kworker/0:0H)
Next = 0xffffffc0d9c93c00 (kworker/u8:0)
Next = 0xffffffc0d9c94800 (rcu_preempt)
Next = 0xffffffc0d9c95400 (rcu_sched)
Next = 0xffffffc0d9c96000 (rcu_bh)
Next = 0xffffffc0d9c96c00 (migration/0)
Next = 0xffffffc0d9e9a400 (migration/1)
Next = 0xffffffc0d9e9b000 (ksoftirqd/1)
Next = 0xffffffc0d9e9c800 (kworker/1:0H)
```



```
Next = 0xffffffc004250000 (kworker/3:3)
Next = 0xffffffc09ee03000 (kworker/2:2)
Next = 0xffffffc0ccfd8c00 (kworker/1:2)
Next = 0xffffffc0343dc800 (kworker/2:1)
Next = 0xffffffc0cbf35400 (kworker/0:1)
Next = 0xffffffc0343dbc00 (kworker/u8:12)
Next = 0xffffffc04fcc0000 (kworker/3:1)
Next = 0xffffffc04fcc1800 (kworker/1:3)
Next = 0xffffffc0cbf30000 (kworker/2:3)
Next = 0xffffffc0cd1eec00 (kworker/u8:16)
Next = 0xffffffc001a29d30 (swapper/0)
------------------------------------------
RESULT: No issues found in the task list
------------------------------------------
```

Questions?

https://createpoint.qti.qualcomm.com