OPERATING SYSTEMS

Project 3

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In this project I have made a custom kernel module that gives detailed information about processes.

I did my tests and development on Ubuntu with linux kernel 4.10.0 running in VirtualBox.

Firstly, I did a research on the data structures linux uses to keep process and file information. In the images below you can see the head of some of the structs I used.

```
519    struct task_struct {
520    #ifdef CONFIG_THREAD_INFO_IN_TASK
521            /*
522             * For reasons of header soup (see current_thread_info()), this
523             * must be the first element of task_struct.
524             */
525            struct thread_info              thread_info;
526    #endif
527            /* -1 unrunnable, 0 runnable, >0 stopped: */
528            volatile long                   state;
529
530            /*
531             * This begins the randomizable portion of task_struct. Only
532             * scheduling-critical items should be added above here.
533             */
534            randomized_struct_fields_start
535
536            void                            *stack;
537            atomic_t                        usage;
```

https://elixir.free-electrons.com/linux/v4.7/source/include/linux/sched.h#L1458

```
struct mm_struct {
        struct vm_area_struct *mmap;            /* list of VMAs */
        struct rb_root mm_rb;
        u32 vmacache_seqnum;                    /* per-thread vmacache */
#ifdef CONFIG_MMU
        unsigned long (*get_unmapped_area) (struct file *filp,
                                unsigned long addr, unsigned long len,
                                unsigned long pgoff, unsigned long flags);
#endif
        unsigned long mmap_base;                /* base of mmap area */
        unsigned long mmap_legacy_base;         /* base of mmap area in bottom-up al
#ifdef CONFIG_HAVE_ARCH_COMPAT_MMAP_BASES
        /* Base adresses for compatible mmap() */
        unsigned long mmap_compat_base;
        unsigned long mmap_compat_legacy_base;
#endif
        unsigned long task_size;                /* size of task vm space */
        unsigned long highest_vm_end;           /* highest vma end address */
        pgd_t * pgd;

        /**
         * @mm_users: The number of users including userspace.
         *
```

http://elixir.free-electrons.com/linux/latest/source/include/linux/mm_types.h#L362

```
struct file {
        union {
                struct llist_node         fu_llist;
                struct rcu_head           fu_rcuhead;
        } f_u;
        struct path               f_path;
        struct inode              *f_inode;          /* cached value */
        const struct file_operations    *f_op;

        /*
```

http://elixir.free-electrons.com/linux/latest/source/include/linux/fs.h#L852

I iterated over task_struct structure through recursive Depth First Traversal algorithm.

My module prints code, data and stack memory start and end locations, size of those regions.
It also prints the file handles and filenames of open files used by processes.
It does this for every process.

I iterated over files with a while loop using file table of every process.

In order to get filenames I used d_path from dcache.h.

I encountered with some errors related to dereferencing null pointers. I observed this errors by reading /var/log/kern.log. In order to solve them, I used the debugging tool GDB. GDB showed me the assembly code and which line the error corresponds to in source code. In that way, I fixed the bugs with an ease.

I justified the output of the code with ps aux as well

Some of processess' mm_struct attribute is null so they don't have memory info.
Here is some part of output of my kernel module:
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603361] stack start 0x7ffc0074db80,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603362] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603364]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603365] name: gvfsd-network, pid: [1786], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603365] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603366] code memory end 0x4063bc,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603366] code memory size 25532,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603366] data start 0x606da0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603367] data end 0x607490,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603367] data memory size 1776,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603368] stack start 0x7fff1e5777e0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603369] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603371]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603372] name: sh, pid: [1816], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603372] code memory start 0x561879b3d000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603373] code memory end 0x561879b6021c,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603373] code memory size 143900,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603374] data start 0x561879d60f68,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603374] data end 0x561879d62220,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603375] data memory size 4792,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603375] stack start 0x7ffd67930950,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603376] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603377]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603378] name: zeitgeist-daemo, pid: [1820], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603378] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603379] code memory end 0x4304f4,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603379] code memory size 197876,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603379] data start 0x630928,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603380] data end 0x631be8,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603380] data memory size 4800,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603381] stack start 0x7fffa9e93850,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603381] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603384]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603384] name: zeitgeist-fts, pid: [1828], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603385] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603385] code memory end 0x41e684,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603386] code memory size 124548,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603386] data start 0x61ed70,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603386] data end 0x61f940,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603387] data memory size 3024,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603387] stack start 0x7ffdb8828c20,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603388] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603392]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603392] name: gvfsd-dnssd, pid: [1849], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603393] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603393] code memory end 0x40656c,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603394] code memory size 25964,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603394] data start 0x606d70,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603394] data end 0x607458,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603395] data memory size 1768,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603395] stack start 0x7fffb956f3b0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603396] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603398]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603399] name: gvfsd-metadata, pid: [1862], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603400] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603400] code memory end 0x410a24,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603401] code memory size 68132,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603401] data start 0x611848,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603401] data end 0x6126ac,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603402] data memory size 3684,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603402] stack start 0x7fffef957510,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603403] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603406]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603406] name: gnome-terminal-, pid: [1887], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603407] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603407] code memory end 0x4485fc,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603408] code memory size 296444,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603408] data start 0x648d40,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603409] data end 0x64b8e8,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603409] data memory size 11176,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603410] stack start 0x7fff3281fe10,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603410] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603414] Open file with fd 13 /dev/ptmx
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603415] Open file with fd 14 /dev/ptmx
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603416]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603417] name: bash, pid: [1895], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603417] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603418] code memory end 0x4f3cac,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603418] code memory size 998572,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603418] data start 0x6f3df0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603419] data end 0x6fcc88,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603419] data memory size 36504,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603420] stack start 0x7ffe8f51e400,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603421]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603422] name: bash, pid: [2324], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603422] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603423] code memory end 0x4f3cac,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603423] code memory size 998572,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603423] data start 0x6f3df0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603424] data end 0x6fcc88,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603424] data memory size 36504,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603425] stack start 0x7ffd027ab3a0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603426]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603426] name: sudo, pid: [3730], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603427] code memory start
0x5567dcbee000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603427] code memory end
0x5567dcc0d524,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603428] code memory size 128292,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603428] data start 0x5567dce0d6c8,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603429] data end 0x5567dce0ee58,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603429] data memory size 6032,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603429] stack start 0x7ffdad9cf130,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603431]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603432] name: insmod, pid: [3731], state: 0
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603432] code memory start
0x562af21b5000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603432] code memory end
0x562af21d78bc,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603433] code memory size 141500,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603433] data start 0x562af23d8128,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603434] data end 0x562af23d9380,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603434] data memory size 4696,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603435] stack start 0x7ffde18648b0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603435]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603436] name: firefox, pid: [2772], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603437] code memory start
0x55a6af2b1000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603437] code memory end
0x55a6af2ce6d4,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603438] code memory size 120532,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603438] data start 0x55a6af4cea10,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603439] data end 0x55a6af4cf088,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603439] data memory size 1656,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603440] stack start 0x7ffcb8472a30,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603441] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603456]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603457] name: gconfd-2, pid: [2803], state:
1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603457] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603458] code memory end 0x40a424,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603458] code memory size 42020,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603459] data start 0x60adc0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603459] data end 0x60b530,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603460] data memory size 1904,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603460] stack start 0x7ffee4a82570,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603461] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603461] Open file with fd 1 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603462] Open file with fd 2 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603462] Open file with fd 3 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603464]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603464] name: rtkit-daemon, pid: [1149],
state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603465] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603465] code memory end 0x40e194,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603466] code memory size 57748,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603466] data start 0x60edc8,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603469] data end 0x60f4d0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603470] data memory size 1800,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603470] stack start 0x7fff3f622580,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603471] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603473]

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603474] name: upowerd, pid: [1163], state:
1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603474] code memory start
0x5562b6753000,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603475] code memory end
0x5562b678778c,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603475] code memory size 214924,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603475] data start 0x5562b6987a08,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603476] data end 0x5562b698a010,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603476] data memory size 9736,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603477] stack start 0x7ffc6a388170,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603478] Open file with fd 0 /dev/null

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603480]

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603481] name: colord, pid: [1176], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603481] code memory start
0x55b1391e9000,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603482] code memory end
0x55b13922e89c,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603482] code memory size 284828,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603482] data start 0x55b13942f338,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603483] data end 0x55b139430048,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603483] data memory size 3344,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603484] stack start 0x7ffdc9f8d1c0,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603485] Open file with fd 0 /dev/null

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603489]

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603489] name: systemd, pid: [1196], state:
1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603490] code memory start
0x56274ecc6000,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603490] code memory end
0x56274ee21e00,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603491] code memory size 1424896,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603491] data start 0x56274ee23c80,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603492] data end 0x56274ee476e8,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603492] data memory size 146024,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603492] stack start 0x7ffd78a0d310,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603493] Open file with fd 0 /dev/null

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603498]

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603498] name: (sd-pam), pid: [1197], state:
1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603499] code memory start
0x560f6a433000,

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603499] code memory end 0x560f6a58ee00,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603500] code memory size 1424896,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603500] data start 0x560f6a590c80,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603501] data end 0x560f6a5b46e8,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603501] data memory size 146024,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603502] stack start 0x7ffe836dbb60,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603502] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603503]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603504] name: gnome-keyring-d, pid: [1202], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603505] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603505] code memory end 0x4e8734,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603505] code memory size 952116,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603506] data start 0x6e9148,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603506] data end 0x6f7108,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603507] data memory size 57280,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603507] stack start 0x7ffeb15742e0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603508] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603508] Open file with fd 1 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603509] Open file with fd 2 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603512]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603513] name: whoopsie, pid: [1228], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603513] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603514] code memory end 0x40c01c,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603514] code memory size 49180,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603515] data start 0x60cd98,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603515] data end 0x60d6f0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603515] data memory size 2392,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603516] stack start 0x7fffb1ca04f0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603517] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603520]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603521] name: agetty, pid: [1236], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603522] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603522] code memory end 0x408fc4,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603522] code memory size 36804,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603523] data start 0x609e10,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603523] data end 0x60a3d0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603524] data memory size 1472,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603524] stack start 0x7ffe10d2fde0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603525] Open file with fd 0 /dev/tty1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603525] Open file with fd 1 /dev/tty1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603526] Open file with fd 2 /dev/tty1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603526]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603527] name: udisksd, pid: [1666], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603528] code memory start 0x400000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603528] code memory end 0x452224,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603528] code memory size 336420,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603529] data start 0x6530a0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603529] data end 0x655938,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603530] data memory size 10392,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603530] stack start 0x7ffc2df347a0,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603531] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603532] Open file with fd 1 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603532] Open file with fd 2 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603535]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603536] name: fwupd, pid: [1685], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603536] code memory start
0x55cab037a000,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603537] code memory end
0x55cab03977ec,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603537] code memory size 120812,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603538] data start 0x55cab0597ff8,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603538] data end 0x55cab0599048,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603538] data memory size 4176,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603539] stack start 0x7fffc909b980,
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603539] Open file with fd 0 /dev/null
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603545]
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603546] name: kthreadd, pid: [2], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603547] name: kworker/0:0H, pid: [4], state:
1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603547] name: kworker/u2:0, pid: [5], state:
1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603548] name: ksoftirqd/0, pid: [6], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603549] name: rcu_sched, pid: [7], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603550] name: rcu_bh, pid: [8], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603550] name: migration/0, pid: [9], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603551] name: lru-add-drain, pid: [10],
state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603552] name: watchdog/0, pid: [11], state:
1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603553] name: cpuhp/0, pid: [12], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603554] name: kdevtmpfs, pid: [13], state: 1
Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603554] name: netns, pid: [14], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603555] name: khungtaskd, pid: [15], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603556] name: oom_reaper, pid: [16], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603557] name: writeback, pid: [17], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603558] name: kcompactd0, pid: [18], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603558] name: ksmd, pid: [19], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603559] name: khugepaged, pid: [20], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603560] name: crypto, pid: [21], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603561] name: kintegrityd, pid: [22], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603561] name: bioset, pid: [23], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603562] name: kblockd, pid: [24], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603563] name: ata_sff, pid: [25], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603564] name: md, pid: [26], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603565] name: devfreq_wq, pid: [27], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603566] name: watchdogd, pid: [28], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603566] name: kworker/u2:1, pid: [29], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603567] name: kworker/0:1, pid: [30], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603568] name: kauditd, pid: [32], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603569] name: kswapd0, pid: [33], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603569] name: vmstat, pid: [34], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603570] name: bioset, pid: [35], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603571] name: ecryptfs-kthrea, pid: [36], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603572] name: kthrotld, pid: [76], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603572] name: acpi_thermal_pm, pid: [77], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603573] name: bioset, pid: [78], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603574] name: bioset, pid: [79], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603575] name: bioset, pid: [80], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603575] name: bioset, pid: [81], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603576] name: bioset, pid: [82], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603577] name: bioset, pid: [83], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603578] name: bioset, pid: [84], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603578] name: bioset, pid: [85], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603579] name: scsi_eh_0, pid: [86], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603580] name: scsi_tmf_0, pid: [87], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603580] name: scsi_eh_1, pid: [88], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603581] name: scsi_tmf_1, pid: [89], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603582] name: ipv6_addrconf, pid: [95], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603583] name: charger_manager, pid: [116], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603584] name: bioset, pid: [117], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603584] name: kworker/0:1H, pid: [166], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603585] name: scsi_eh_2, pid: [167], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603586] name: scsi_tmf_2, pid: [168], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603587] name: bioset, pid: [169], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603587] name: jbd2/sda1-8, pid: [193], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603588] name: ext4-rsv-conver, pid: [194], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603589] name: kworker/0:4, pid: [246], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603590] name: iprt-VBoxWQueue, pid: [362], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603591] name: ttm_swap, pid: [386], state: 1

Dec 31 02:38:51 halilbilgin-VirtualBox kernel: [550.603591] name: kworker/u2:2, pid: [2943], state: 1