

CMPE283 : Virtualization
Assignment 3: Instrumenting KVM

Question2:

- Install m4, bison, and git before starting the below.
- Get to the folder where you want the files to be downloaded.
- Clone the linux kernel tree from github using
`git clone https://github.com/torvalds/linux.git`
- change your directory to linux using
`cd linux`
- get your commit using the command
`git log`
- the first commit id is the one you need to use
`commit 625e2001e99e82ea3eb5b0370a428a4328b9166b`
- Modify the vmx.c file located at the arch/x86/kvm/ so that the statistics will be captured and printed. The function “`static int vmx_handle_exit(struct kvm_vcpu *vcpu)`” needs to be modified.
- Change your directory to linux and then run the make menuconfig command, choose the default setting , save and exit.
- Update the kernel using the following commands :
`sudo make -j4`
`sudo make modules -j4`
`sudo make modules_install -j4`
`sudo make install -j4`
- Once done reboot the system.
- Install “virt-manager” and its required libraries. Start a new virtual machine using an “vir-manager” and an ISO image of Ubuntu. Exit the virtual machine.
- Now in the host system check the message buffer of the kernel using **dmesg**, the messages will provide you with the exit statistic data.
- Once the output is according to your liking commit the code and get the “diff” file using the following commands:
`git add -A`
`git commit -m “Assignment 3”`
`git diff HEAD~ >cmpe283-3.diff`

3. Note whether or not you used a larger count of exits between outputs (1000 or 2000 exits vs the suggested 500).

I have used **500** count of exits for the output.

4. Sample output:

```
sampathl@sampathl-HP-Pavilion-Notebook: ~
[ 248.499428] Exit Reason:EXTERNAL_INTERRUPT      Exits: 20505      Max: 70140 Min: 42 Avg: 61
[ 248.499430] Exit Reason:PENDING_INTERRUPT      Exits: 4365      Max: 23016 Min: 78 Avg: 80
[ 248.499432] Exit Reason:CPUID                  Exits: 14359     Max: 103848 Min: 222 Avg: 245
[ 248.499434] Exit Reason:HLT                    Exits: 13242     Max: 58248 Min: 270 Avg: 359
[ 248.499436] Exit Reason:CR_ACCESS              Exits: 14977     Max: 27150 Min: 366 Avg: 366
[ 248.499438] Exit Reason:DR_ACCESS              Exits: 1         Max: 897 Min: 897 Avg: 897
[ 248.499440] Exit Reason:IO_INSTRUCTION          Exits: 1232806   Max: 153912 Min: 369 Avg: 372
[ 248.499442] Exit Reason:MSR_READ               Exits: 2025      Max: 9210 Min: 212 Avg: 564
[ 248.499444] Exit Reason:MSR_WRITE              Exits: 32748     Max: 97932 Min: 303 Avg: 511
[ 248.499447] Exit Reason:PAUSE_INSTRUCTION      Exits: 10047     Max: 8504 Min: 246 Avg: 246
[ 248.499449] Exit Reason:APIC_ACCESS            Exits: 13        Max: 19137 Min: 2421 Avg: 8665
[ 248.499451] Exit Reason:EPT_VIOLATION          Exits: 18693     Max: 1489536 Min: 801 Avg: 20782
[ 248.499453] Exit Reason:EPT_MISCONFIG          Exits: 25624     Max: 403170 Min: 2211 Avg: 2871
[ 248.499455] Exit Reason:PREEMPTION_TIMER       Exits: 8575      Max: 29472 Min: 144 Avg: 160
[ 248.499457] Exit Reason:WBINVD                Exits: 6         Max: 1032 Min: 246 Avg: 587
[ 248.499458] Exit Reason:XSETBV                 Exits: 2         Max: 3396 Min: 699 Avg: 2047
[ 248.499460] *****
[ 248.522825] Total Cycles 2203394896
[ 248.522825] *****
[ 248.522827] Exit Reason:EXTERNAL_INTERRUPT      Exits: 20521     Max: 70140 Min: 42 Avg: 61
[ 248.522828] Exit Reason:PENDING_INTERRUPT      Exits: 4376      Max: 23016 Min: 78 Avg: 80
[ 248.522829] Exit Reason:CPUID                  Exits: 14359     Max: 103848 Min: 222 Avg: 245
[ 248.522830] Exit Reason:HLT                    Exits: 13249     Max: 58248 Min: 270 Avg: 359
[ 248.522830] Exit Reason:CR_ACCESS              Exits: 14977     Max: 27150 Min: 366 Avg: 366
[ 248.522831] Exit Reason:DR_ACCESS              Exits: 1         Max: 897 Min: 897 Avg: 897
[ 248.522832] Exit Reason:IO_INSTRUCTION          Exits: 1233073   Max: 153912 Min: 369 Avg: 372
[ 248.522833] Exit Reason:MSR_READ               Exits: 2025      Max: 9210 Min: 212 Avg: 564
[ 248.522834] Exit Reason:MSR_WRITE              Exits: 32758     Max: 97932 Min: 303 Avg: 511
[ 248.522835] Exit Reason:PAUSE_INSTRUCTION      Exits: 10056     Max: 8504 Min: 246 Avg: 246
[ 248.522836] Exit Reason:APIC_ACCESS            Exits: 13        Max: 19137 Min: 2421 Avg: 8665
[ 248.522836] Exit Reason:EPT_VIOLATION          Exits: 18693     Max: 1489536 Min: 801 Avg: 20782
[ 248.522837] Exit Reason:EPT_MISCONFIG          Exits: 25795     Max: 403170 Min: 2211 Avg: 2862
[ 248.522838] Exit Reason:PREEMPTION_TIMER       Exits: 8583      Max: 29472 Min: 144 Avg: 160
[ 248.522839] Exit Reason:WBINVD                Exits: 7         Max: 1032 Min: 246 Avg: 611
[ 248.522840] Exit Reason:XSETBV                 Exits: 2         Max: 3396 Min: 699 Avg: 2047
[ 248.522840] *****
[ 248.532848] virbr0: port 1(vnet0) entered disabled state
[ 248.534797] device vnet0 left promiscuous mode
[ 248.534802] virbr0: port 1(vnet0) entered disabled state
sampathl@sampathl-HP-Pavilion-Notebook:~$
```

5. From the output statistics it is clear that only 16 types of exits occur, the number of the exits vary a lot from 1(DR_ACCESS) to 1233073 (IO_INSTRUCTION). which infer that most of the exits occur for IO operations.

The Total Cycles 2204393969 , Total Exits 1398500 as indicated in the output are pretty high.