5001 Homework 1

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1 Problem 1: Linux operating system and memory hierarchy

Use Gitpod, which provide a cloud-based Linux container. The version of bash is 5.0.17(1), and the detail is as Figure 1 shows.

```
gitpod /workspace/KlausZhangjt.github.io (main) $ echo $SHELL
/bin/bash
gitpod /workspace/KlausZhangjt.github.io (main) $ bash --version
GNU bash, version 5.0.17(1)-release (x86_64-pc-linux-gnu)
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License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>

This is free software; you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
```

Figure 1: Details of bash version

1.1 Question 1

Run the command "top" on the terminal to real-time display the resource occupancy status of each process in the system, and save a screenshot as Figure 2.

```
top - 05:43:35 up  4:25,  0 users,  load average: 6.31, 4.37, 4.45
Tasks:  17 total,   1 running,  16 sleeping,   0 stopped,   0 zombie
%Cpu(s):  9.7 us,  2.1 sy,  0.0 ni, 87.5 id,  0.0 wa,  0.0 hi,  0.7 si,  0.0 st
MiB Mem :  64310.7 total,   1038.6 free,  28588.8 used,  34683.3 buff/cache
MiB Swap: 384000.0 total, 383966.2 free,     33.8 used.  34965.3 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
     34 root      10 -10  735136  30760  16492 S   1.0   0.0   0:08.41 supervisor
    242 gitpod    20   0   13.8g   1.8g 350984 S   0.7   2.8   0:59.72 ld-linux-x86-64
      1 root      10 -10  732576  18252  13772 S   0.0   0.0   0:00.05 supervisor
     61 gitpod    10 -10    2620    328    256 S   0.0   0.0   0:00.12 sh
     62 gitpod    20   0   12424   9128   3384 S   0.0   0.0   0:00.13 bash
     63 gitpod    20   0  721216  10176   8324 S   0.0   0.0   0:00.00 status
     75 gitpod    20   0    2616    324    256 S   0.0   0.0   0:00.00 remote-dev-serv
     84 gitpod    20   0    2616   1500   1380 S   0.0   0.0   0:00.00 launcher.sh
    909 gitpod    15  -5  939052  86064  35260 S   0.0   0.1   0:10.66 node
    928 gitpod    15  -5  635748  47992  32504 S   0.0   0.1   0:00.78 node
   1212 gitpod    20   0   10604   1648   1308 S   0.0   0.0   0:00.11 fsnotifier
   1249 gitpod    15  -5  981228 112744  37264 S   0.0   0.2   0:04.12 node
   1262 gitpod    15  -5  704440  36944  28512 S   0.0   0.1   0:00.17 node
   1300 gitpod    15  -5  637416  85280  30244 S   0.0   0.1   0:00.58 node
   1337 gitpod    15  -5   12408   8956   3268 S   0.0   0.0   0:00.08 bash
   1604 gitpod    15  -5  589880  39032  28236 S   0.0   0.1   0:00.16 node
   2202 gitpod    20   0    9076   3700   3160 R   0.0   0.0   0:00.02 top
```

Figure 2: Result of "top"

1.2 Question 2

Use Linux commands to collect the hardware information.

Command list:

1. lscpu : check the information of CPU
2. free -h : display memory usage information briefly
3. cat /proc/meminfo : display RAM usage information in detail
4. getconf -a — grep CACHE : check the details of L1 cache, L2 cache and L3 cache.
5. (1) sudo apt-get install lshw (2) sudo lshw -class memory : get the information of main memory
6. df -h : check the information of disk storage

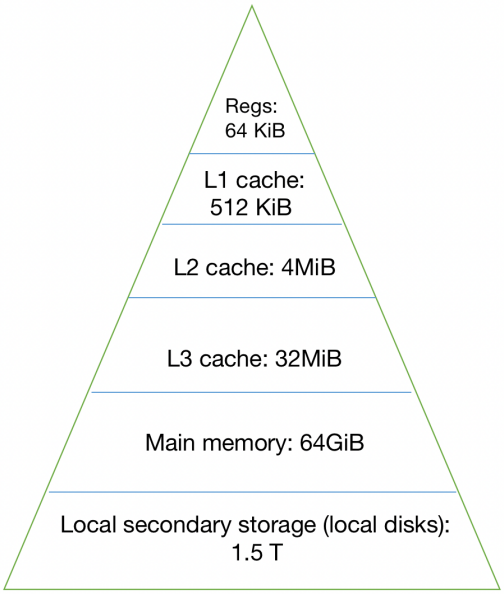

Figure 3: Memory hierarchy diagram

```
gitpod /workspace/KlausZhangjt.github.io (main) $ free -h
               total        used        free      shared  buff/cache   available
Mem:            62Gi        19Gi        13Gi        62Mi        30Gi        43Gi
Swap:          374Gi       248Mi       374Gi
gitpod /workspace/KlausZhangjt.github.io (main) $ cat /proc/meminfo
MemTotal:       65854172 kB
MemFree:        12545592 kB
MemAvailable:   45314804 kB
Buffers:            1420 kB
Cached:         30051692 kB
SwapCached:        12424 kB
Active:          6424176 kB
Inactive:       39565376 kB
Active(anon):    1291144 kB
Inactive(anon): 14486968 kB
Active(file):    5133032 kB
Inactive(file): 25078408 kB
Unevictable:       82692 kB
Mlocked:           82692 kB
SwapTotal:      393215996 kB
SwapFree:       392961276 kB
Dirty:           1599204 kB
Writeback:             0 kB
```

Figure 4: Result of command 2-3

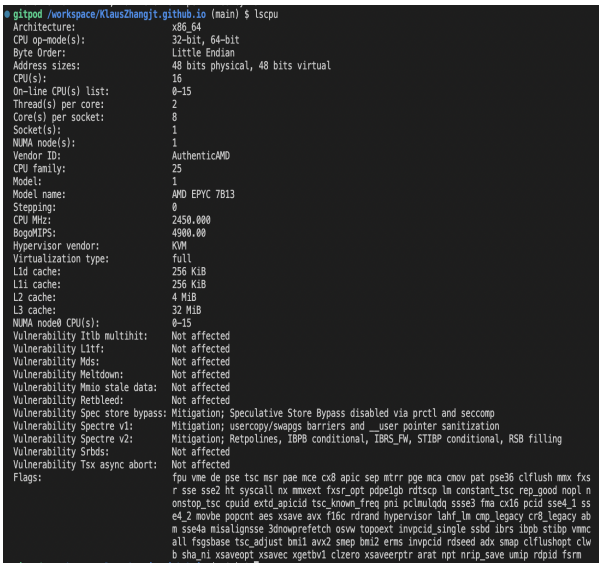

Figure 5: Result of command 1

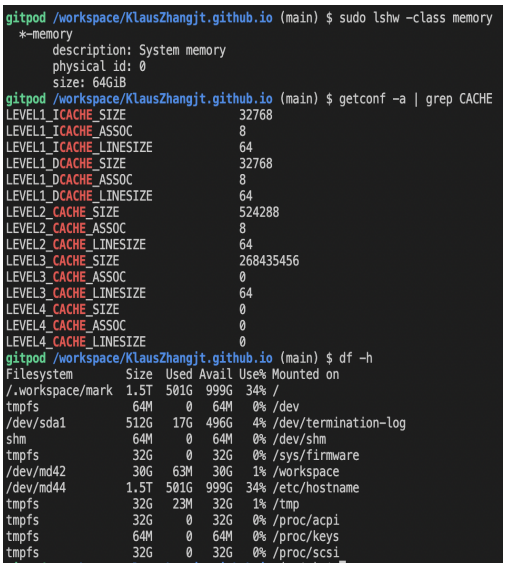

Figure 6: Result of command 4-6

1.3 Question 3

Command:

(1) sudo apt install tree (2) cd /etc; tree — head -n 30

These commands are to list the first 30 files of the etc directory as a treemap, and the output is as Figure 7 shows.

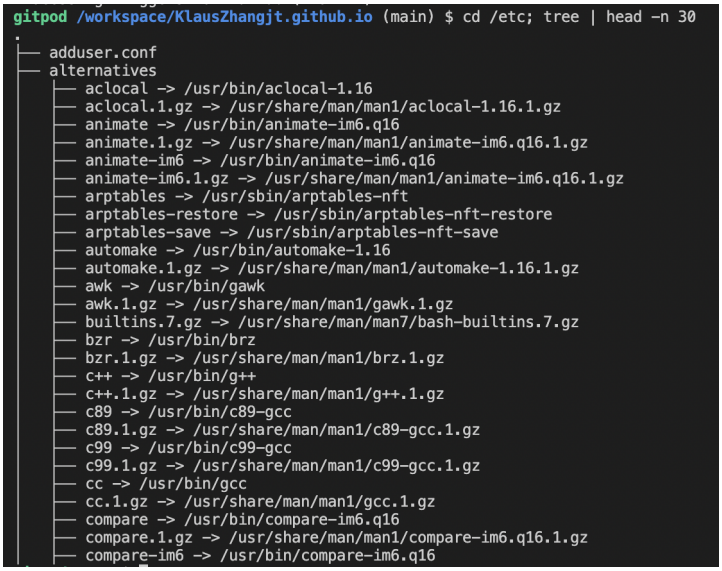

Figure 7: Result of question 3

2 Problem 2: Bash script

Bash script(codes of q2.sh):

```
#!/bin/bash

for i in $(seq 1 180)
do
  echo "make directory postproc$i"
  mkdir MSDM$i
  touch /workspace/KlausZhangjt.github.io/MSDM$i/"time till now.txt"
  echo microseconds since 1970-01-01 00:00:00 UTC:  >> \
  ./MSDM$i/"time till now.txt"
  cur_ns=`date '+%s%N'`
  echo "scale=0; $cur_ns/1000" | bc >> ./MSDM$i/"time till now.txt"
  # remian integer part
done
```

Then use these commands:

(1) chmod +x ./q1.sh

(2) ./q1.sh

Then we can get 180 folders, whose names are "MSDM1, MSDM2, MSDM3, ..., MSDM180". And in each folder, there is a text file "time till now.txt", in which the content is the microseconds from 1970-01-01 00:00:00 UTC to now.

Besides, we only remain the integer part the microseconds.

Part of the results is shown in Figure 8.

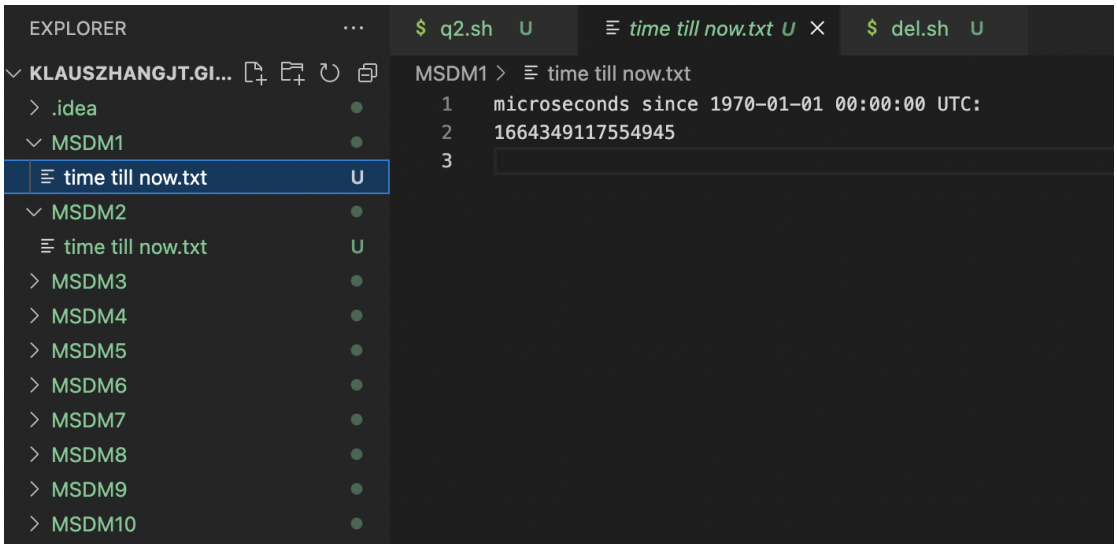

Figure 8: Part result of problem 2

3 Problem 3: Regular expression

Python script(codes of q3.py), version: python3.9

```python
import re

# question 1
f = open("blocklist.xml", encoding="utf-8")
bl = f.read()
regular1 = r'\<emItem\sblockID=\"[i|d].*[0-9]\"\s.*>'
pattern1 = re.compile(regular1)
result1 = pattern1.findall(bl)
for i in range(len(result1)):
    print(result1[i])
print('There are', len(result1), 'text lines satisfy the requirement in question 1.')

# question 2
f = open("blocklist.xml", encoding="utf-8")
bl = f.read()
regular2 = r'<.*\sid=\"[^/\^]*[c|o][o|r][m|g]\".*>'
pattern2 = re.compile(regular2)
result2 = pattern2.findall(bl)
for i in range(len(result2)):
    print(result2[i])
print('There are', len(result2), 'text lines satisfy the requirement in question 2.')
```

And then we can get the results in Figure 9 and Figure 10:

There are 455 text lines that satisfy the requirement in question 1;

And there are 163 text lines that satisfy the requirement in question 2.

```
<emItem blockID="i13" id="{E8E88AB0-7182-11DF-904E-6045E0D72085}">
<emItem blockID="i48" id="admin@youtubespeedup.com">
<emItem blockID="i47" id="youtube@youtube2.com">
<emItem blockID="i10" id="{8CE11043-9A15-4207-A565-0C94C42D590D}">
<emItem blockID="i43" id="supportaccessplugin@gmail.com">
<emItem blockID="i7" id="{2224e955-00e9-4613-a844-ce69fccaae91}">
<emItem blockID="i21" id="support@update-firefox.com">
<emItem blockID="i1492" id="googlotim@gmail.com">
<emItem blockID="i1493" id="{de71f09a-3342-48c5-95c1-4b0f17567554}">
<emItem blockID="i1522" id="/^(ciscowebexstart1@cisco\.com|ciscowebexstart_test@cisco\.com|ciscowebexstart@cisco\.com|ciscowebexgpc@cisco\.com)$/">
<emItem blockID="i1523" id="{a0d7ccb3-214d-498b-b4aa-0e8fda9a7bf7}">
<emItem blockID="i1524" id="ext@alibonus.com">
<emItem blockID="d33f6d48-a555-49dd-96ff-8d75473403a8" id="mozilla_cc2@internetdownloadmanager.com">
<emItem blockID="d6425f24-8c9e-4c0a-89b4-6890fc68d5c9" id="/^\{(9321F452-96D5-11E6-BC3E-3769C7AD2208)|({18ED1ECA-96D3-11E6-A373-BD66C7AD2208})\}$/">
There are 455 text lines satisfy the requirement in question 1.
```

Figure 9: Result of question 1

```
<emItem blockID="i60" id="youtb3@youtb3.com">
<emItem blockID="i90" id="videoplugin@player.com">
<emItem blockID="i48" id="admin@youtubespeedup.com">
<emItem blockID="i47" id="youtube@youtube2.com">
<emItem blockID="i43" id="supportaccessplugin@gmail.com">
<emItem blockID="i21" id="support@update-firefox.com">
<emItem blockID="i1492" id="googlotim@gmail.com">
<emItem blockID="i1524" id="ext@alibonus.com">
<emItem blockID="89a61123-79a2-45d1-aec2-97afca0863eb" id="InternetProtection@360safe.com">
<emItem blockID="d33f6d48-a555-49dd-96ff-8d75473403a8" id="mozilla_cc2@internetdownloadmanager.com">
<emItem blockID="e16408c3-4e08-47fd-85a9-3cbbce534e95" id="WebProtection@360safe.com">
<emItem blockID="28736359-700e-4b61-9c50-0b533a6bac55" id="xdict@www.iciba.com">
<emItem blockID="22431713-a93b-40f4-8264-0b341b5f6454" id="fi@dictionaries.addons.mozilla.org">
<emItem blockID="baf7f735-d6b6-410a-8cc8-25c60f7c57e2" id="adbeaver@adbeaver.org">
There are 163 text lines satisfy the requirement in question 2.
```

Figure 10: Result of question 2

4 Problem 4: GitHub webpage

Create a webpage on GitHub.com using the "index.html" file. The domain name is:

`https://klauszhangjt.github.io/`