INTRO TO OPERATING SYSTEMS

MONITORING/LOGGING and PERFORMANCE/CONFIG

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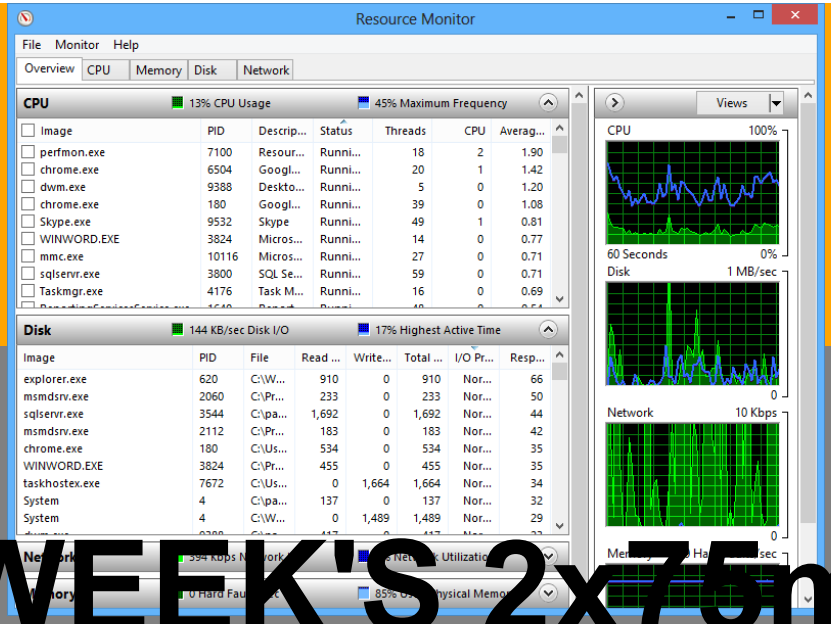

THIS WEEK'S 2x75min 4p-5:15p

https://solutioncenter.apexsql.com/operating-system-os-performance-monitoring/

- Booting into Linux (10m)
- Byobu F9 Toggles (10m)

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- Tour of Linux (40m)
- Top, VM, and Threads Demo (40m)
- Some Logs (20m)
- Discussion of Labs I and II (Carryover) (30m)

- Booting into Linux (10m)

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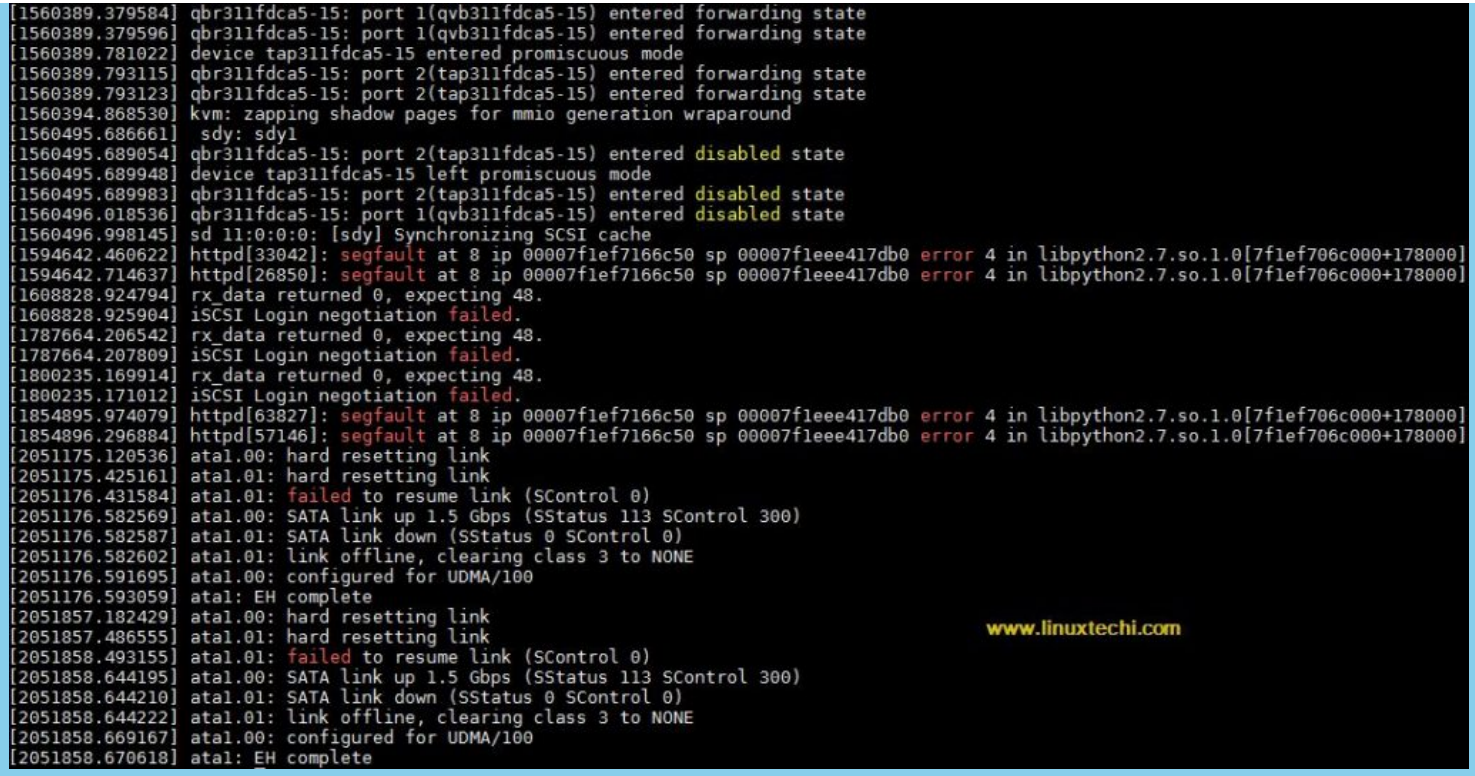

https://www.linuxtechi.com/10-tips-dmesg-command-linux-geeks/

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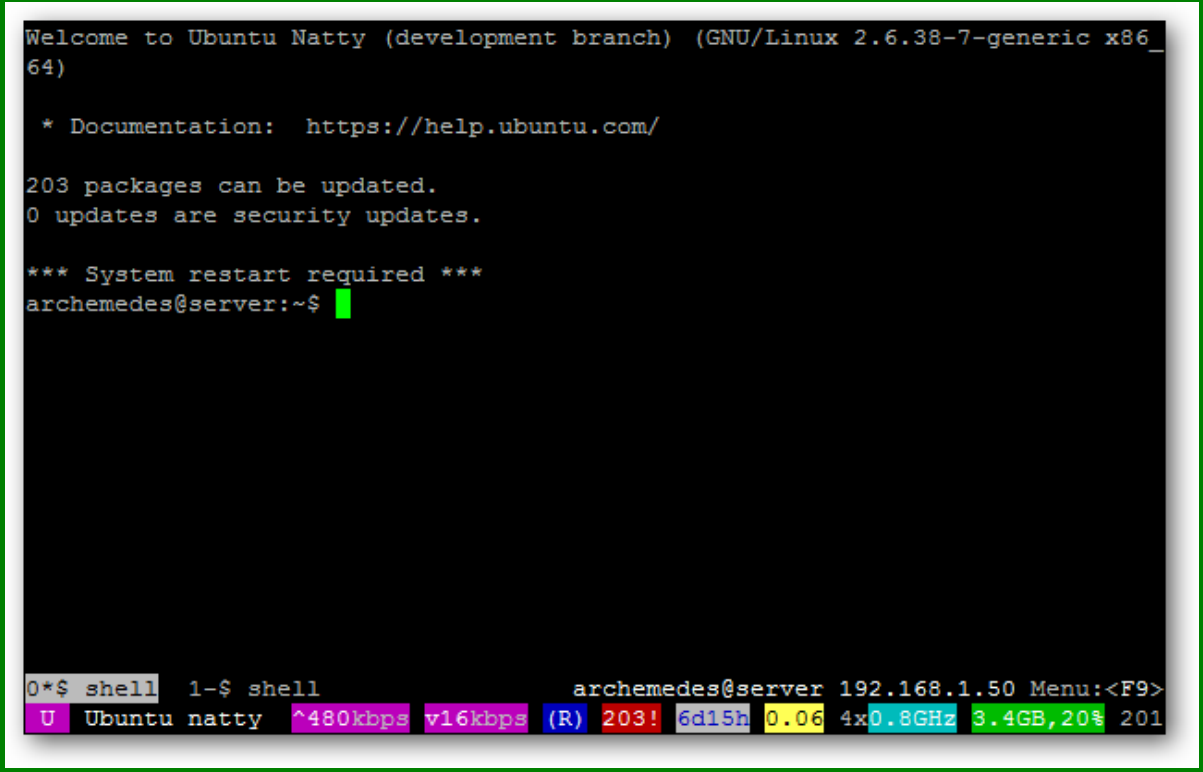
♦ Byobu F9 Toggles (10m)



https://www.howtogeek.com/58487/how-to-easily-multitask-in-a-linux-terminal-with-byobu/

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- Tour of Linux (40m)

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- % who
- % w
- % date
- % uname -a
- % last | tail
- % sensors
- % cat /proc/cpuinfo
- % sudo hdparm -I /dev/sda1
- % ip addr
- % cat /proc/devices
- % cat /proc/interrupts
- % sudo lshw -short
- % sudo lshw
- % df
- % lsblk
- % cat /proc/partitions
- % iostat
- % vmstat
- % free -m
- % cat /proc/meminfo
- % cat /proc/3185/limits
- % cat /proc/3185/maps| grep '\['
- % cat /proc/3185/maps| grep 's '
- % ls -tl /dev
- % ls -tl /proc
- % ls /proc/*/cmdline | awk '{printf $0" ";system("cat " $0);print ""}'|sed 's/[^a-z0-9\/\-]/ /g' | sed 's/ */ /g' | colrm 70 | sed 's/.proc.//' | sort -n
- % ls -tl /var/log
- % find /usr/src/linux-headers-4.4.0-21 | grep 'include.linux.*\.h'
- % lsof | head -1
- % sudo lsof | grep ' \/tmp\/'
- % lsof | head -1

% who % w % date % uname -a % last | tail % sensors % cat /proc/cpuinfo % sudo hdparm -I /dev/sda1 % ip addr % cat /proc/devices % cat /proc/interrupts % sudo lshw -short % sudo lshw % df % lsblk % cat /proc/partitions % iostat % vmstat % free -m % cat /proc/meminfo % cat /proc/3185/limits % cat /proc/3185/maps| grep '\[' % cat /proc/3185/maps| grep 's ' % ls -tl /dev % ls -tl /proc % ls /proc/*/cmdline | awk '{printf $0"

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";system("cat " $0);print ""}'|sed 's/[^a-z0-9\/\-]/ /g' | sed 's/ */ /g' | colrm 70 | sed 's/.proc.//' | sort -n % ls -tl /var/log % find /usr/src/linux-headers-4.4.0-21 | grep 'include.linux.*\.h' % lsof | head -1 % sudo lsof | grep ' \/tmp\/' % lsof | head -1 % lsof -i 4 % nmap 0.0.0.0 % nmap 165.227.104.180 % cat /proc/locks % cat /proc/ioports % cat /proc/iomem % ps -u guest % ps -u root % top -b -n 1 % sudo slabtop -o

♦ Top, VM, and Threads Demo (40m)

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```c
#include <stdio.h>
#include <stdlib.h>
int main() {
  srand(0);
  float *c;
  int n = 100*1000*1000;
  c = malloc(n*sizeof(float));

  int i;
  for (i=0; i<n; i++) c[i] = 1.0;
  // printf("%p ::%c::\n", c,c[1]);
  // printf("%s", "sleeping:"); fflush(stdout);
  // for (i=1; i<=10000; i++) { system("sleep 10"); if (0) printf("%d",i); fflush(stdout); }

  int j;
  for (i=1; i<=10000; i++) {
    for (j=1; j<n; j+=10000) c[i-1] = rand();
    system("sleep 10");
    if (0) printf("%d",i);
    fflush(stdout);
  }
}
```

pig.c:

```
BEGIN {
  # for (i=1; i<=8; i++) system("./pig &")

  mystring = ""
  for (i=1; i<=10; i++) mystring = mystring "0123456789"

  n = 10*1000*1000
  stime = systime(); print "allocating"
  for (i=1;i<=n;i++) sto[i] = mystring
  print "allocated"; print systime()-stime " seconds"

  m = 10*1000*1000
  stime = systime(); print "reading"
  for (t=1; t<=m; t++) {
    from = int(rand()*m)+1; into = int(rand()*m)+1
    sto[into] = sto[from]
  }
  print "read"; print systime()-stime " seconds"
```

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```
# cleanup any pigs
while ("ps -u guest" | getline)
  if ($NF == "pig")
    system("kill -9 " $1)
}
```

test.awk:

♦ Tour of Logs (20m)

- pigs in memory, run test.awk
- pigs swapping, run test.awk
- TOP: f (-PR,NI,S,+PPID,nTH,+CODE,DATA,nMin), t, t, m, m, d.5, z, x, H, >, 0, 1
- Chromium/mlb.com

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Combined Log Format

Another commonly used format string is called the Combined Log Format. It can be used as follows.

```
LogFormat "%h %l %u %t \"%r\" %>s %b \"%{Referer}i\" \"%{User-agent}i\"" combined
CustomLog log/access_log combined
```

This format is exactly the same as the Common Log Format, with the addition of two more fields. Each of the additional fields uses the percent-directive `%{`*header*`}i`, where *header* can be any HTTP request header. The access log under this format will look like:

```
127.0.0.1 - frank [10/Oct/2000:13:55:36 -0700] "GET /apache_pb.gif HTTP/1.0" 200 2326
"http://www.example.com/start.html" "Mozilla/4.08 [en] (Win98; I ;Nav)"
```

The additional fields are:

"http://www.example.com/start.html" (\"%{Referer}i\")
: The "Referer" (sic) HTTP request header. This gives the site that the client reports having been referred from. (This should be the page that links to or includes `/apache_pb.gif`).

"Mozilla/4.08 [en] (Win98; I ;Nav)" (\"%{User-agent}i\")
: The User-Agent HTTP request header. This is the identifying information that the client browser reports about itself.

Multiple Access Logs

Multiple access logs can be created simply by specifying multiple `CustomLog` directives in the configuration file. For example, the following directives will create three access logs. The first contains the basic CLF information, while the second and third contain referer and browser information. The last two `CustomLog` lines show how to mimic the effects of the `ReferLog` and `AgentLog` directives.

```
LogFormat "%h %l %u %t \"%r\" %>s %b" common
CustomLog logs/access_log common
CustomLog logs/referer_log "%{Referer}i -> %U"
CustomLog logs/agent_log "%{User-agent}i"
```

This example also shows that it is not necessary to define a nickname with the `LogFormat` directive. Instead, the log format can be specified directly in the `CustomLog` directive.

https://httpd.apache.org/docs/2.4/logs.html

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- Tour of Logs (20m)

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- % /var/log# ls
- % /var/log# head auth.log
- % /var/log# grep 'invalid user.*from' auth.log | tail
- % /var/log# grep 'invalid user.*from' auth.log | awk '{c[$11]++} END {for (i in c) print c[i],i}' | sort -nr | head -25
- % /var/log# grep 'invalid user.*from' auth.log | awk '{c[$11]++} END {for (i in c) print c[i],i}' | sort -nr | tail -25
- % /var/log# grep 'invalid.* from' auth.log | awk '{c[$13]++}END{for(i in c) print c[i],i}' | sort -nr | head
- % /var/log# grep 'invalid.* from' auth.log | awk '{c[$13]++}END{for(i in c) print c[i],i}' | sort -nr | awk '{system("nslookup " $2)}' | grep 'name =' | head
- % /var/log# tail syslog
- % /var/log/apt# cat history.log
- % /var/log# cat postgresql/postgresql-9.5-main.log.1
- % /var/log# tail apache2/access.log.1
- % /var/log# grep 'Mozilla.*NT' apache2/access.log* | tail
- % /var/log# grep -v ' / ' apache2/access.log* | grep -v 'week[123]' | sed 's/[^:]*://' | grep -v Binary
- % /var/log# grep -v ' / ' apache2/access.log* | grep -v 'week[123]' | sed 's/[^:]*://' | grep -v Binary | awk '{system("nslookup " $1)}' | grep 'name = '
- % /var/log# head -25 ~/.bash_history | sed 's/@.*/@xx.xx.xx.xx/'

```
% /var/log# ls
```

```
alternatives.log        alternatives.log.9.gz  dist-upgrade    dpkg.log.8.gz  syslog.1
alternatives.log.1      apache2                dpkg.log        dpkg.log.9.gz  syslog.2.gz
alternatives.log.10.gz  apt                    dpkg.log.1      fsck           syslog.3.gz
alternatives.log.11.gz  auth.log               dpkg.log.10.gz  kern.log       syslog.4.gz
alternatives.log.12.gz  auth.log.1             dpkg.log.11.gz  kern.log.1     syslog.5.gz
alternatives.log.2.gz   auth.log.2.gz          dpkg.log.12.gz  kern.log.2.gz  syslog.6.gz
alternatives.log.3.gz   auth.log.3.gz          dpkg.log.2.gz   kern.log.3.gz  syslog.7.gz
alternatives.log.4.gz   auth.log.4.gz          dpkg.log.3.gz   kern.log.4.gz  sysstat
alternatives.log.5.gz   btmp                   dpkg.log.4.gz   lastlog        unattended-upgrades
alternatives.log.6.gz   btmp.1                 dpkg.log.5.gz   lxd            wtmp
```

% /var/log# ls % /var/log# head auth.log % /var/log# grep 'invalid user.*from' auth.log | tail % /var/log# grep 'invalid user.*from' auth.log | awk '{c[$11]++} END {for (i in c) print c[i],i}' | sort -nr | head -25 % /var/log# grep 'invalid user.*from' auth.log | awk '{c[$11]++} END {for (i in c) print c[i],i}' | sort -nr | tail -25 % /var/log# grep 'invalid.* from' auth.log | awk '{c[$13]++}END{for(i in c) print c[i],i}' | sort -nr | head % /var/log#

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```
grep 'invalid.* from' auth.log | awk '{c[$13]++}END{for(i in c) print c[i],i}' | sort -nr | awk '{system("nslookup " $2)}' | grep 'name =' | head % /var/log# tail syslog % /var/log/apt# cat history.log % /var/log# cat postgresql/postgresql-9.5-main.log.1 % /var/log# tail apache2/access.log.1 % /var/log# grep 'Mozilla.*NT' apache2/access.log* | tail % /var/log# grep -v ' / ' apache2/access.log* | grep -v 'week[123]' | sed 's/[^:]*://' | grep -v Binary
```

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