Computer Architecture and Technology Convergence Assignment

Q1.1

Carry	1	1		1	1	
Binary No.		1	1	0	1	1
Binary No.			1	0	1	1
Addition Result	1	0	0	1	1	0

Verification using decimal:

$11011_2 = 27_{10}$
$1011_2 = 11_{10}$
$11011_2 + 1011_2 = 38_{10}$ and 100110(result above) $= 38_{10}$

Q1.2

- $-31_{10} = 1110\ 0001$ (2s complement)
  Calculations:

  - Convert -31 to equivalent binary number:
    31/2 = 15, Remainder (R) 1
    15/2 = 7, R1
    7/2 = 3, R1
    3/2 = 1, R1
    1/2= 0, R1
    = 0001 1111

  - Decimal number negative therefore invert all the bits:
    1110 0000

  - And add 1:
    1110 0001

- $-59_{10} = 1100\ 0101$ (2s complement)
  Calculations:

  - Convert -59 to equivalent binary number:
    59/2 = 29, R1
    29/2 = 14, R1
    14/2 = 7, R0
    7/2 = 3, R1
    3/2 = 1, R1
    1/2= 0, R1
    = 0011 1011

- Decimal number negative therefore invert all the bits:
    1100 0100

- And add 1:
    1100 0101

Q1.3
1110 1001 represents: Minus 23
- Minus as the lead number is 1
- 23 calculated as follows:
    1110 1001 – 1 (as negative) = 1110 1000
    Invert = 00010111
    $0 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$ = -23

Q1.4

Truth table

X	Y	D	B
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

This circuit performs the function of a half subtractor, i.e. performs a subtraction operation on two binary digits. It produces a sum and a borrow bit for the next stage
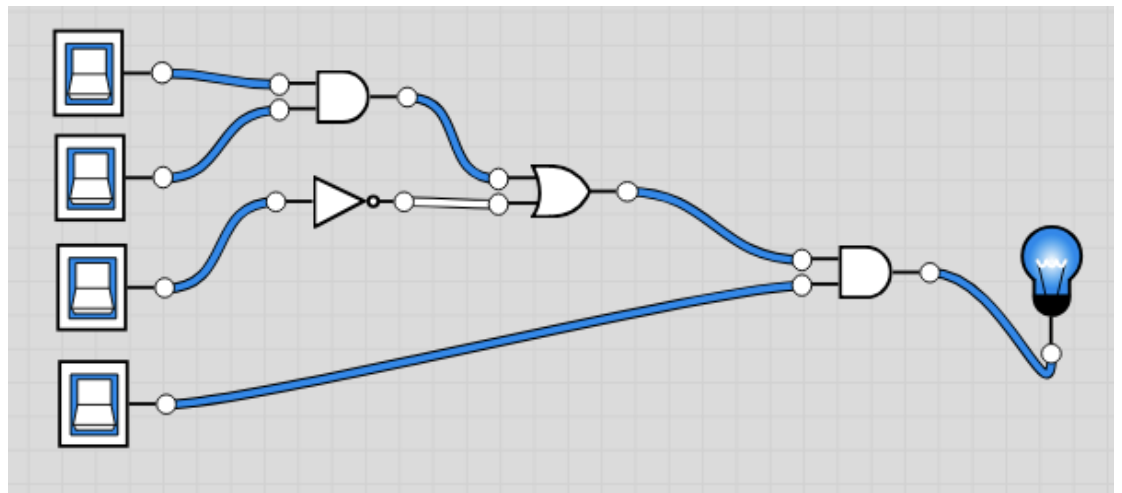
Q1.5

A

B

C

D

Q2: Linux Assignment

Q2.1

- echo hello world: Writes text to the terminal window

```
josephinemccrann@ip-172-31-3-33:~$ echo hello world
hello world
```

- passwd: Used to change the password of a user account. Non-root users can change their password, the system administrator can change other users' passwords

```
josephinemccrann@ip-172-31-3-33:~$ passwd
Changing password for josephinemccrann.
```

- date: Displays system date and time, can also be used to set system date and time

```
josephinemccrann@ip-172-31-3-33:~$ date
Thu Mar 26 21:44:52 UTC 2020
```

- hostname: Displays current host name and domain name

```
josephinemccrann@ip-172-31-3-33:~$ hostname
ip-172-31-3-33
```

- arch: Displays the architecture identifier string of the current host CPU

```
josephinemccrann@ip-172-31-3-33:~$ arch
x86_64
```

- uname –a: Displays detailed information about all relevant system information e.g. the machine name, operating system, and kernel

```
josephinemccrann@ip-172-31-3-33:~$ uname -a
Linux ip-172-31-3-33 4.4.0-1101-aws #112-Ubuntu SMP Thu Jan 9 11:27:02 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux
```

- dmseg | more: the dmseg command displays the kernel related messages. When used with the more command; these messages are displayed in a scrollable manner, one screen at a time

```
josephinemccrann@ip-172-31-3-33:~$ dmesg|more
[    0.000000] Initializing cgroup subsys cpuset
[    0.000000] Initializing cgroup subsys cpu
[    0.000000] Initializing cgroup subsys cpuacct
[    0.000000] Linux version 4.4.0-1101-aws (buildd@lgw01-amd64-040) (gcc version 5.4.0 20160609 (Ubuntu 5.4.0-6ubuntu1~16.04.12) ) #112-Ubuntu SMP Thu Jan 9 11:27:02 UTC 2020 (Ubuntu 4.4.0-1101.112-aws 4.4.208)
[    0.000000] Command line: BOOT_IMAGE=/boot/vmlinuz-4.4.0-1101-aws root=LABEL=cloudimg-rootfs ro console=tty1 console=ttyS0 nvme.io_timeout=4294967295 nvme_core.io_t
imeout=4294967295
[    0.000000] KERNEL supported cpus:
[    0.000000]   Intel GenuineIntel
[    0.000000]   AMD AuthenticAMD
[    0.000000]   Centaur CentaurHauls
[    0.000000] x86/fpu: xstate_offset[2]:  576, xstate_sizes[2]:  256
[    0.000000] x86/fpu: Supporting XSAVE feature 0x01: 'x87 floating point registers'
[    0.000000] x86/fpu: Supporting XSAVE feature 0x02: 'SSE registers'
[    0.000000] x86/fpu: Supporting XSAVE feature 0x04: 'AVX registers'
[    0.000000] x86/fpu: Enabled xstate features 0x7, context size is 832 bytes, using 'standard' format.
[    0.000000] e820: BIOS-provided physical RAM map:
[    0.000000] BIOS-e820: [mem 0x0000000000000000-0x000000000009dfff] usable
[    0.000000] BIOS-e820: [mem 0x000000000009e000-0x000000000009ffff] reserved
[    0.000000] BIOS-e820: [mem 0x00000000000e0000-0x00000000000fffff] reserved
[    0.000000] BIOS-e820: [mem 0x0000000000100000-0x00000000003fffffff] usable
[    0.000000] BIOS-e820: [mem 0x00000000fc000000-0x00000000ffffffff] reserved
[    0.000000] NX (Execute Disable) protection: active
[    0.000000] SMBIOS 2.7 present.
[    0.000000] DMI: Xen HVM domU, BIOS 4.2.amazon 08/24/2006
[    0.000000] Hypervisor detected: Xen
[    0.000000] Xen version 4.2.
[    0.000000] Xen Platform PCI: I/O protocol version 1
[    0.000000] Netfront and the Xen platform PCI driver have been compiled for this kernel: unplug emulated NICs.
[    0.000000] Blkfront and the Xen platform PCI driver have been compiled for this kernel: unplug emulated disks.
              You might have to change the root device
              from /dev/hd[a-d] to /dev/xvd[a-d]
              in your root= kernel command line option
[    0.000000] HVMOP_pagetable_dying not supported
[    0.000000] e820: update [mem 0x00000000-0x00000fff] usable ==> reserved
```

- uptime: Displays the current time, how long the system has been running, the number of users with running sessions, and the system load averages for the past 1, 5, and 15 minutes

```
josephinemccrann@ip-172-31-3-33:~$ uptime
 20:12:02 up 35 days, 22:53,  4 users,  load average: 0.00, 0.00, 0.00
```

- whoami: Displays the username of the current user

```
josephinemccrann@ip-172-31-3-33:~$ whoami
josephinemccrann
```

- who: Displays list of users currently logged in to the system

```
josephinemccrann@ip-172-31-3-33:~$ who
clarkehenderson pts/0        2020-04-06 16:51 (31.7.54.145)
josephinemccrann pts/1        2020-04-06 20:11 (40.115.105.60)
ubuntu   pts/2       2020-04-06 19:39 (212.129.81.17)
```

- last: Displays last login and logout times of system users

```
josephinemccrann@ip-172-31-3-33:~$ last
josephin pts/1       40.115.105.60     Mon Apr  6 20:11    still logged in
patrickt pts/3       37.228.242.227    Mon Apr  6 19:52 - 20:14  (00:21)
ubuntu   pts/2       212.129.81.17     Mon Apr  6 19:39    still logged in
patrickt pts/2       37.228.242.227    Mon Apr  6 17:26 - 18:36  (01:09)
clarkehe pts/0       31.7.54.145       Mon Apr  6 16:51    still logged in
clarkehe pts/2       31.7.54.145       Mon Apr  6 16:49 - 16:51  (00:02)
patrickt pts/0       37.228.242.227    Mon Apr  6 16:48 - 16:50  (00:02)
patrickt pts/0       37.228.242.227    Mon Apr  6 16:31 - 16:36  (00:05)
patrickt pts/0       37.228.242.227    Mon Apr  6 16:01 - 16:25  (00:24)
darrenco pts/1       78.17.77.140      Mon Apr  6 15:57 - 20:00  (04:03)
clarkehe pts/1       31.7.54.145       Mon Apr  6 13:43 - 13:50  (00:06)
patrickt pts/0       37.228.242.227    Mon Apr  6 13:43 - 16:00  (02:17)
patrickt pts/0       37.228.242.227    Mon Apr  6 11:12 - 12:20  (01:08)
patrickt pts/1       37.228.242.227    Sun Apr  5 21:45 - 21:47  (00:02)
eoinfinn pts/1       37.228.233.195    Sun Apr  5 19:02 - 20:54  (01:51)
liamodri pts/2       78.18.207.215     Sun Apr  5 17:14 - 19:03  (01:49)
patrickt pts/4       37.228.242.227    Sun Apr  5 16:39 - 19:37  (02:57)
philomen pts/3       86.44.100.39      Sun Apr  5 15:46 - 22:19  (06:32)
philomen pts/3       86.44.100.39      Sun Apr  5 15:34 - 15:46  (00:12)
isabelab pts/2       217.138.222.188   Sun Apr  5 12:50 - 16:47  (03:57)
robertho pts/4       86.45.104.249     Sun Apr  5 12:17 - 13:06  (00:49)
johannad pts/1       93.107.201.245    Sun Apr  5 12:12 - 17:40  (05:28)
patrickc pts/3       86.45.224.235     Sun Apr  5 12:09 - 12:53  (00:44)
johannad pts/1       93.107.201.245    Sun Apr  5 12:07 - 12:11  (00:04)
johannad pts/2       93.107.201.245    Sun Apr  5 10:17 - 12:29  (02:11)
liamodri pts/1       78.18.207.215     Sun Apr  5 09:20 - 11:00  (01:40)
markwhit pts/0       109.255.90.113    Sun Apr  5 03:17 - 02:51  (23:34)
patrickc pts/0       86.45.224.235     Sat Apr  4 20:35 - 21:59  (01:24)
aronnutl pts/4       109.77.134.128    Sat Apr  4 19:16 - 22:27  (03:11)
aronnutl pts/1       109.77.134.128    Sat Apr  4 19:04 - 21:17  (02:13)
danielcl pts/0       212.17.34.71      Sat Apr  4 19:03 - 19:31  (00:27)
aronnutl pts/0       109.77.134.128    Sat Apr  4 18:46 - 19:01  (00:14)
lucmcaul pts/2       37.228.249.4      Sat Apr  4 17:56 - 19:56  (02:00)
lucmcaul pts/2       37.228.249.4      Sat Apr  4 17:52 - 17:55  (00:03)
lucmcaul pts/2       37.228.249.4      Sat Apr  4 17:39 - 17:51  (00:12)
```

```
johannad pts/0    109.76.96.146     Sat Apr  4 16:48 - 18:18  (01:30)
danielcl pts/1    212.17.34.71      Sat Apr  4 16:20 - 19:03  (02:42)
lucmcaul pts/0    37.228.249.4      Sat Apr  4 14:42 - 16:45  (02:02)
aronnutl pts/3    109.77.134.128    Sat Apr  4 14:26 - 20:55  (06:28)
danielcl pts/1    212.17.34.71      Sat Apr  4 13:00 - 15:00  (01:59)
lucmcaul pts/0    37.228.249.4      Sat Apr  4 12:56 - 14:33  (01:37)
patrickc pts/2    86.45.224.235     Sat Apr  4 12:23 - 15:34  (03:11)
danielcl pts/1    212.17.34.71      Sat Apr  4 12:00 - 13:00  (00:59)
lucmcaul pts/0    37.228.249.4      Sat Apr  4 11:36 - 12:55  (01:18)
patrickc pts/0    86.45.224.235     Sat Apr  4 09:24 - 10:47  (01:22)
patrickc pts/0    86.45.224.235     Sat Apr  4 09:13 - 09:21  (00:08)
bryanwal pts/0    40.115.105.60     Fri Apr  3 17:59 - 18:06  (00:06)
bryanwal pts/0    40.115.105.60     Fri Apr  3 17:48 - 17:59  (00:11)
bryanwal pts/0    40.115.105.60     Fri Apr  3 17:38 - 17:48  (00:09)
bryanwal pts/0    40.115.105.60     Fri Apr  3 17:25 - 17:38  (00:12)
philomen pts/0    86.44.100.39      Fri Apr  3 16:34 - 16:55  (00:21)
bryanwal pts/0    40.115.105.60     Fri Apr  3 16:01 - 16:02  (00:01)
bryanwal pts/0    40.115.105.60     Fri Apr  3 15:36 - 16:00  (00:24)
bryanwal pts/0    40.115.105.60     Fri Apr  3 15:31 - 15:33  (00:01)
bryanwal pts/0    40.115.105.60     Fri Apr  3 15:14 - 15:25  (00:11)
sarahmor pts/2    212.129.80.106    Fri Apr  3 14:37 - 14:43  (00:05)
sarahmor pts/1    212.129.80.106    Fri Apr  3 14:36 - 14:43  (00:06)
sarahmor pts/2    212.129.80.106    Fri Apr  3 14:24 - 14:36  (00:11)
sarahmor pts/1    212.129.80.106    Fri Apr  3 13:50 - 14:36  (00:46)
bryanwal pts/0    40.115.105.60     Fri Apr  3 13:03 - 15:14  (02:10)
aislingc pts/1    178.167.218.51    Fri Apr  3 12:06 - 12:40  (00:33)
aislingc pts/1    178.167.218.51    Fri Apr  3 11:39 - 12:05  (00:26)
liamodri pts/0    78.18.207.215     Fri Apr  3 11:29 - 12:23  (00:54)
eoinfinn pts/0    144.15.240.8      Fri Apr  3 10:16 - 10:34  (00:18)
eoinfinn pts/0    37.228.233.195    Thu Apr  2 19:28 - 21:11  (01:42)
sarahmor pts/2    212.129.80.106    Thu Apr  2 18:37 - 18:42  (00:04)
sarahmor pts/2    212.129.80.106    Thu Apr  2 18:16 - 18:34  (00:18)
danielcl pts/1    212.17.34.71      Thu Apr  2 18:01 - 19:27  (01:26)
danielcl pts/1    212.17.34.71      Thu Apr  2 16:45 - 16:58  (00:12)
eoinfinn pts/0    37.228.233.195    Thu Apr  2 16:40 - 19:08  (02:28)
davidlyo pts/0    37.228.252.32     Thu Apr  2 16:18 - 16:32  (00:14)
```

```
sarahmor pts/4         212.129.80.106     Thu Apr  2 15:39 - 16:36  (00:56)
sarahmor pts/4         212.129.80.106     Thu Apr  2 15:27 - 15:33  (00:05)
matthewc pts/0         79.97.145.101      Thu Apr  2 15:20 - 15:43  (00:23)
davidlyo pts/2         37.228.252.32      Thu Apr  2 15:02 - 16:17  (01:14)
matthewc pts/0         79.97.145.101      Thu Apr  2 14:44 - 15:18  (00:33)
bryanwal pts/3         40.115.105.60      Thu Apr  2 14:16 - 16:35  (02:18)
bryanwal pts/2         40.115.105.60      Thu Apr  2 13:47 - 14:21  (00:33)
bryanwal pts/2         40.115.105.60      Thu Apr  2 13:44 - 13:47  (00:03)
bryanwal pts/2         40.115.105.60      Thu Apr  2 13:32 - 13:44  (00:11)
matthewc pts/0         79.97.145.101      Thu Apr  2 13:16 - 14:18  (01:01)
matthewc pts/0         79.97.145.101      Thu Apr  2 12:44 - 13:16  (00:32)
matthewc pts/0         79.97.145.101      Thu Apr  2 12:38 - 12:43  (00:04)
nnennama pts/1         37.228.233.94      Thu Apr  2 12:15 - 16:05  (03:50)
nnennama pts/1         37.228.233.94      Thu Apr  2 12:12 - 12:14  (00:02)
matthewc pts/0         79.97.145.101      Thu Apr  2 11:46 - 12:38  (00:52)
eoinfinn pts/4         37.228.233.195     Wed Apr  1 19:47 - 21:43  (01:56)
eoinfinn pts/4         37.228.233.195     Wed Apr  1 19:35 - 19:40  (00:05)
edelcurt pts/3         86.43.181.17       Wed Apr  1 19:31 - 19:51  (00:20)
edelcurt pts/0         86.43.181.17       Wed Apr  1 19:07 - 21:39  (02:31)
eoinfinn pts/1         37.228.233.195     Wed Apr  1 18:49 - 21:40  (02:50)
matthewc pts/0         79.97.145.101      Wed Apr  1 18:41 - 18:56  (00:15)
ellannah pts/3         80.233.57.132      Wed Apr  1 17:59 - 18:00  (00:01)
matthewc pts/1         79.97.145.101      Wed Apr  1 17:46 - 18:40  (00:54)
matthewc pts/1         79.97.145.101      Wed Apr  1 17:17 - 17:46  (00:28)
matthewc pts/1         79.97.145.101      Wed Apr  1 17:13 - 17:17  (00:03)
matthewc pts/1         79.97.145.101      Wed Apr  1 16:41 - 17:13  (00:31)
matthewc pts/4         79.97.145.101      Wed Apr  1 16:29 - 16:41  (00:11)
nnennama pts/1         37.228.233.94      Wed Apr  1 16:09 - 16:32  (00:22)
ellannah pts/0         80.233.57.132      Wed Apr  1 15:56 - 18:03  (02:07)
ellannah pts/0         80.233.57.132      Wed Apr  1 15:49 - 15:55  (00:05)
ellannah pts/0         80.233.57.132      Wed Apr  1 15:42 - 15:47  (00:04)
nnennama pts/8         37.228.233.94      Wed Apr  1 15:33 - 18:19  (02:45)
ellannah pts/7         80.233.57.132      Wed Apr  1 15:30 - 15:37  (00:06)
darrenco pts/2         78.17.77.140       Wed Apr  1 15:29 - 20:07  (04:38)
nnennama pts/6         37.228.233.94      Wed Apr  1 15:22 - 17:44  (02:21)
ubuntu   pts/5         212.129.73.206     Wed Apr  1 15:11 - 17:23  (02:11)

philomen pts/1         86.44.100.39       Wed Apr  1 14:34 - 16:05  (01:30)
eoinfinn pts/5         144.15.240.8       Wed Apr  1 13:53 - 14:05  (00:11)
kamilabo pts/4         212.129.84.63      Wed Apr  1 13:49 - 16:15  (02:25)
nnennama pts/3         37.228.233.94      Wed Apr  1 13:49 - 16:51  (03:02)
bryanwal pts/1         40.115.105.60      Wed Apr  1 13:46 - 14:20  (00:33)
bryanwal pts/1         40.115.105.60      Wed Apr  1 13:41 - 13:42  (00:01)
bryanwal pts/1         40.115.105.60      Wed Apr  1 13:39 - 13:40  (00:00)
bryanwal pts/1         40.115.105.60      Wed Apr  1 13:38 - 13:39  (00:00)
bryanwal pts/4         40.115.105.60      Wed Apr  1 13:19 - 13:38  (00:18)
bryanwal pts/1         40.115.105.60      Wed Apr  1 13:17 - 13:38  (00:21)
bryanwal pts/1         40.115.105.60      Wed Apr  1 13:08 - 13:16  (00:08)
kamilabo pts/3         212.129.84.63      Wed Apr  1 12:53 - 13:48  (00:55)
bryanwal pts/3         109.77.176.21      Wed Apr  1 12:37 - 12:41  (00:03)
bryanwal pts/1         40.115.105.60      Wed Apr  1 12:16 - 13:07  (00:51)
sarahmor pts/2         212.129.83.48      Wed Apr  1 12:14 - 15:25  (03:11)
sarahmor pts/2         212.129.83.48      Wed Apr  1 12:07 - 12:13  (00:05)
bryanwal pts/1         40.115.105.60      Wed Apr  1 11:54 - 12:16  (00:22)
nnennama pts/0         37.228.233.94      Wed Apr  1 08:44 - 15:38  (06:53)
kamilabo pts/1         212.129.74.202     Wed Apr  1 08:35 - 11:38  (03:03)
nnennama pts/0         37.228.233.94      Wed Apr  1 07:06 - 08:42  (01:36)
nnennama pts/0         37.228.233.94      Wed Apr  1 06:48 - 07:04  (00:15)

wtmp begins Wed Apr  1 06:48:56 2020
```

- finger: Used to look up currently logged in user information e.g. username, home directory, shell information

```
josephinemccrann@ip-172-31-3-33:~$ finger
Login                  Name        Tty        Idle  Login Time   Office      Office Pho
ne
danielclyne                        pts/0            Apr 26 10:58 (212.17.34.71)
isabelabellomo                     pts/3        15  Apr 26 12:15 (37.228.244.127)
johannadeltagrimaldi               pts/1        58  Apr 26 11:02 (93.107.77.185)
josephinemccrann                   pts/4            Apr 26 12:36 (40.115.105.60)
kateblackett                       pts/2         3  Apr 26 12:32 (40.115.105.60)
josephinemccrann@ip-172-31-3-33:~$
```

- w: Displays information about currently logged in users and what they are doing including login name, tty, remote host, login time, idle time. It also gives information about the load the activity is putting on the computer

```
josephinemccrann@ip-172-31-3-33:~$ w
 12:37:34 up 55 days, 15:19,  5 users,  load average: 0.00, 0.00, 0.00
USER     TTY      FROM            LOGIN@   IDLE   JCPU    PCPU WHAT
danielcl pts/0    212.17.34.71    10:58    1:26   0.06s  0.06s -bash
johannad pts/1    93.107.77.185   11:02   59:49   0.07s  0.00s man history
kateblac pts/2    40.115.105.60   12:32    4:35   0.03s  0.03s -bash
isabelab pts/3    37.228.244.127  12:15   16:46   0.04s  0.04s -bash
josephin pts/4    40.115.105.60   12:36    1.00s  0.04s  0.00s w
josephinemccrann@ip-172-31-3-33:~$
```

- top: Displays running processes


```
josephinemccrann@ip-172-31-3-33: ~
top - 12:39:46 up 55 days, 15:21,  5 users,  load average: 0.00, 0.00, 0.00
Tasks: 137 total,   1 running, 136 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,  0.3 sy,  0.0 ni, 99.7 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
KiB Mem :  1014424 total,   131824 free,   118692 used,   763908 buff/cache
KiB Swap:        0 total,        0 free,        0 used.   662112 avail Mem

  PID USER      PR  NI    VIRT    RES    SHR S %CPU %MEM     TIME+ COMMAND
    1 root      20   0  185180   5336   3576 S  0.0  0.5   1:07.28 systemd
    2 root      20   0       0      0      0 S  0.0  0.0   0:00.02 kthreadd
    3 root      20   0       0      0      0 S  0.0  0.0   0:48.78 ksoftirqd/0
    5 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 kworker/0:0H
    7 root      20   0       0      0      0 S  0.0  0.0   0:57.22 rcu_sched
    8 root      20   0       0      0      0 S  0.0  0.0   0:00.00 rcu_bh
    9 root      rt   0       0      0      0 S  0.0  0.0   0:00.00 migration/0
   10 root      rt   0       0      0      0 S  0.0  0.0   0:23.43 watchdog/0
   11 root      20   0       0      0      0 S  0.0  0.0   0:00.00 kdevtmpfs
   12 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 netns
   13 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 perf
   14 root      20   0       0      0      0 S  0.0  0.0   0:00.00 xenwatch
   15 root      20   0       0      0      0 S  0.0  0.0   0:00.00 xenbus
   17 root      20   0       0      0      0 S  0.0  0.0   0:01.16 khungtaskd
   18 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 writeback
   19 root      25   5       0      0      0 S  0.0  0.0   0:00.00 ksmd
   20 root      39  19       0      0      0 S  0.0  0.0   0:08.27 khugepaged
   21 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 crypto
   22 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 kintegrityd
   23 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 bioset
   24 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 kblockd
   25 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 ata_sff
   26 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 md
   27 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 devfreq_wq
   30 root      20   0       0      0      0 S  0.0  0.0   0:01.81 kswapd0
   31 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 vmstat
   32 root      20   0       0      0      0 S  0.0  0.0   0:00.00 fsnotify_mark
   33 root      20   0       0      0      0 S  0.0  0.0   0:00.00 ecryptfs-kthrea
   49 root       0 -20       0      0      0 S  0.0  0.0   0:00.00 kthrotld
```

- echo $SHELL: Displays the shell that is currently being used

```
josephinemccrann@ip-172-31-3-33:~$ echo $SHELL
/bin/bash
```

- echo {con,pre}{sent,fer}{s,ed}: This uses brace expansion to generate a sequence of strings and writes the strings to the terminal window

```
josephinemccrann@ip-172-31-3-33:~$ echo {con,pre}{sent,fer}{s,ed}
consents consented confers confered presents presented prefers prefered
```

- man ls: The man command is an interface to the online reference manuals and ls lists the directory contents. Therefore man ls displays the manual page with reference to ls

```
josephinemccrann@ip-172-31-3-33:~$ man ls
LS(1)                                    User Commands                                    LS(1)

NAME
       ls - list directory contents

SYNOPSIS
       ls [OPTION]... [FILE]...

DESCRIPTION
       List  information  about  the  FILEs (the current directory by default).  Sort entries alphabetically if none of -cftuvSUX nor --sort is
       specified.

       Mandatory arguments to long options are mandatory for short options too.

       -a, --all
              do not ignore entries starting with .

       -A, --almost-all
              do not list implied . and ..

       --author
              with -l, print the author of each file

       -b, --escape
              print C-style escapes for nongraphic characters

       --block-size=SIZE
              scale sizes by SIZE before printing them; e.g., '--block-size=M' prints sizes in units of 1,048,576 bytes; see SIZE format below

       -B, --ignore-backups
              do not list implied entries ending with ~

       -c     with -lt: sort by, and show, ctime (time of last modification of file status information); with -l: show ctime and sort by  name;
              otherwise: sort by ctime, newest first
```

- man who: Displays the manual page with reference to the who command. Who shows who is logged in and man who gives more options for the who command

```
josephinemccrann@ip-172-31-3-33:~$ man who
WHO(1)                                   User Commands                                    WHO(1)

NAME
       who - show who is logged on

SYNOPSIS
       who [OPTION]... [ FILE | ARG1 ARG2 ]

DESCRIPTION
       Print information about users who are currently logged in.

       -a, --all
              same as -b -d --login -p -r -t -T -u

       -b, --boot
              time of last system boot

       -d, --dead
              print dead processes

       -H, --heading
              print line of column headings

       --ips  print ips instead of hostnames. with --lookup, canonicalizes based on stored IP, if available, rather than stored hostname

       -l, --login
              print system login processes

       --lookup
              attempt to canonicalize hostnames via DNS

       -m     only hostname and user associated with stdin

       -p, --process
              print active processes spawned by init
```

- clear: Clears the terminal screen

```
josephinemccrann@ip-172-31-3-33:~$ clear
josephinemccrann@ip-172-31-3-33:~$
```

- cal 2000: Used to see the calendar of a specific month or whole year, in this case the year 2000

```
josephinemccrann@ip-172-31-3-33:~$ cal 2000
                              2000
          January                 February                  March
Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa
                   1            1  2  3  4  5               1  2  3  4
 2  3  4  5  6  7  8      6  7  8  9 10 11 12      5  6  7  8  9 10 11
 9 10 11 12 13 14 15     13 14 15 16 17 18 19     12 13 14 15 16 17 18
16 17 18 19 20 21 22     20 21 22 23 24 25 26     19 20 21 22 23 24 25
23 24 25 26 27 28 29     27 28 29                 26 27 28 29 30 31
30 31

           April                    May                     June
Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa
                   1         1  2  3  4  5  6               1  2  3
 2  3  4  5  6  7  8      7  8  9 10 11 12 13      4  5  6  7  8  9 10
 9 10 11 12 13 14 15     14 15 16 17 18 19 20     11 12 13 14 15 16 17
16 17 18 19 20 21 22     21 22 23 24 25 26 27     18 19 20 21 22 23 24
23 24 25 26 27 28 29     28 29 30 31              25 26 27 28 29 30
30

           July                   August                 September
Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa
                   1            1  2  3  4  5                     1  2
 2  3  4  5  6  7  8      6  7  8  9 10 11 12      3  4  5  6  7  8  9
 9 10 11 12 13 14 15     13 14 15 16 17 18 19     10 11 12 13 14 15 16
16 17 18 19 20 21 22     20 21 22 23 24 25 26     17 18 19 20 21 22 23
23 24 25 26 27 28 29     27 28 29 30 31           24 25 26 27 28 29 30
30 31

          October                 November                 December
Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa     Su Mo Tu We Th Fr Sa
 1  2  3  4  5  6  7               1  2  3  4                     1  2
 8  9 10 11 12 13 14      5  6  7  8  9 10 11      3  4  5  6  7  8  9
15 16 17 18 19 20 21     12 13 14 15 16 17 18     10 11 12 13 14 15 16
22 23 24 25 26 27 28     19 20 21 22 23 24 25     17 18 19 20 21 22 23
29 30 31                 26 27 28 29 30           24 25 26 27 28 29 30
```

- cal 9 1752: Used to see the calendar for September 1752. It is unusual as there are days missing from the calendar month. This is because the Gregorian calendar was adopted in 1752 and it was necessary to correct by 11 days and therefore the 11 days are missing

```
josephinemccrann@ip-172-31-3-33:~$ cal 9 1752
    September 1752
Su Mo Tu We Th Fr Sa
       1  2 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
```

- yes please: The yes command will repeatedly generate any string you choose, in this case please

josephinemccrann@ip-172-31-3-33: ~

```
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
please
```

- time sleep 5: The time command displays information on timing statistics. It is used to execute a command and display a summary of real-time, user CPU time and system CPU time spent by executing a command. In this case sleep 5 creates a job which lasts 5 seconds and time displays the above information

```
josephinemccrann@ip-172-31-3-33:~$ time sleep 5

real    0m5.001s
user    0m0.000s
sys     0m0.000s
```

- history: This displays the bash history of the current user

```
josephinemccrann@ip-172-31-3-33:~$ history
    1  ls
    2  mkdir
    3  mkdir<Music-name>
    4  mkdir<Music>
    5  mkdir <Music>
    6  music
    7  ls
    8  mkdir
    9  mkdir newfolder
   10  mkdir
   11  ls
   12  mkdir myfolder
   13  Music
   14  ls
   15  mkdir Music
   16  ls
   17  cd Music
   18  ls
   19  mkdir Bruce Springsteen
   20  cd Bruce Springsteen
   21  mkdir Born to Run
   22  mkdir The River
   23  cd ..
   24  mkdir Rory Gallagher
   25  cd Rory/
   26  mkdir Calling Card
   27  mkdir Tattoo
   28  cd ..
   29  Dusty Springfield
   30  mkdir Dusty Springfield
   31  cd Dusty/
   32  mkdir A Brand New Me
   33  mkdir It Begins Again
   34  cd ..
   35  cd Music/
```

```
36   tree
37   cd ..
38   tree
39   rm music
40   rm Music
41   rm Rory Gallagher
42   rmdir Music
43   rmdir Rory
44   rmdir Rory Gallagher
45   rm -r Music
46   ls
47   rmdir myfolder
48   rmdir newfolder
49   ls
50   mkdir Music
51   cd Music/
52   mkdir RoryGallagher
53   cd RoryGallagher/
54   mkdir Tatoo
55   mkdir CallingCard
56   cd ..
57   DustySpringfield
58   mkdir DustySpringfield
59   cd DustySpringfield/
60   mkdir ABrandNewMe
61   mkdir ItBeginsAgain
62   cd ..
63   mkdir BruceSpringsteen
64   cd BruceSpringsteen/
65   mkdir BornToRun
66   mkdir TheRiver
67   cd ..
68   tree
69   echo hello world
70   passwd
71   date
```

```
72  hostname
73  arch
74  uname -a
75  dmesg|more
76  uptime
77  whoami
78  who
79  last
80  finger
81  w
82  top
83  echo $SHELL
84  echo {con,pre}{sent,fer}{s,ed}
85  man ls
86  man who
87  clear
88  cal 2000
89  history
```

Grouping commands into a shell script to automate commands using Vim:

- Access Vim via Putty by typing vim command. If saving in file e.g. filename, type vim filename.sh
- Type i to enter 'Insert mode' in Vim
- Shell script:

  #!/bin/bash
  date
  hostname
  arch
  uname –a
  uptime
  whoami
  who
  finger
  w
  top
  history

- Then press esc on keyboard to enter 'Normal mode'. Type :wq and hit enter to save and exit Vim
- In Putty make shell script executable with:
      chmod +x ./filename.sh
- To run and check if shell script works, use:
      ./filename.sh

To add output redirection:

- Use the output redirection operator >
- For example to append the output of command date to josephineMccrann.txt:
      date > josephineMccrann.txt (anything in josephineMccrann.txt will be overwritten) or
      date >> josephineMccrann.txt (will append the output of the command to the end of the file and josephineMccrann.txt will be created if not in existence)

Making use of the echo command within the shell script to format:

```
#!/bin/bash
echo "Today's date and the current time is"
date

echo "The hostname is"
hostname

echo "The architecture identifier string of this host CPU"
arch

echo "Find all relevant system information below"
uname –a

echo "Uptime is"
uptime

echo "I am"
whoami

echo "Current users"
who
finger
w

echo "Current running processes"
top

echo "My bash history"
history
```

To submit shell script and text file:

- Use Putty Secure Copy (PSCP)
- Open the Windows Command Prompt and set up a path
        PATH = c:\path\to\putty\directory;%path%
- Transfer the file using e.g.
        pscp josephinemccrann@18.202.243.115: remote_path/filename
        host_path\filename

Q2.3

Q2.3.1

```
josephinemccrann@ip-172-31-3-33:~$ ls -l
total 4
drwx------ 5 josephinemccrann josephinemccrann 4096 Mar 15 23:45 Music
```

Q2.3.2

```
                                                        IP Location (p1 of 2)
    [logo.svg]

IP Location

Instantly Locate Any IP Address

    This free online tool allows you to see the geographical location of
    any IP address. Just input the IP address and you will be shown the
    position on a map, coordinates, country, region, city and organization.
    [INS: :INS]
    18.202.243.115_____    (BUTTON) Find
    - NOT FOUND
    Your IP address 18.202.243.115    CHANGE
       Latitude      53.3331
       Longitude     -6.2489
        Country      Ireland
        Region       Leinster
          City       Dublin
    Organization     Amazon.com

(Textfield "%s") Enter text. Use UP or DOWN arrows or tab to move off.
            Enter text into the field by typing on the keyboard
     Ctrl-U to delete all text in field, [Backspace] to delete a character
```

Q2.4

```
josephinemccrann@ip-172-31-3-33:~$ ./tea.sh
Would you like a cup of tea? (y/n)y
Great, I'll make tea now
josephinemccrann@ip-172-31-3-33:~$ ./tea.sh
Would you like a cup of tea? (y/n)n
Are you sure?
Are you sure?
Are you sure?
Are you sure?
Are you sure?
josephinemccrann@ip-172-31-3-33:~$
```

```
#!bin/bash
read -p "Would you like a cup of tea? (y/n)" RESP
if [ "RESP" = "y" ]; then
echo "Great, I'll make tea now";
else ["RESP" = "n" ];
echo "Are you sure?"
n=1
while [ $n -le 4 ]
do
   echo "Are you sure?"
   let n++

done

fi
```