

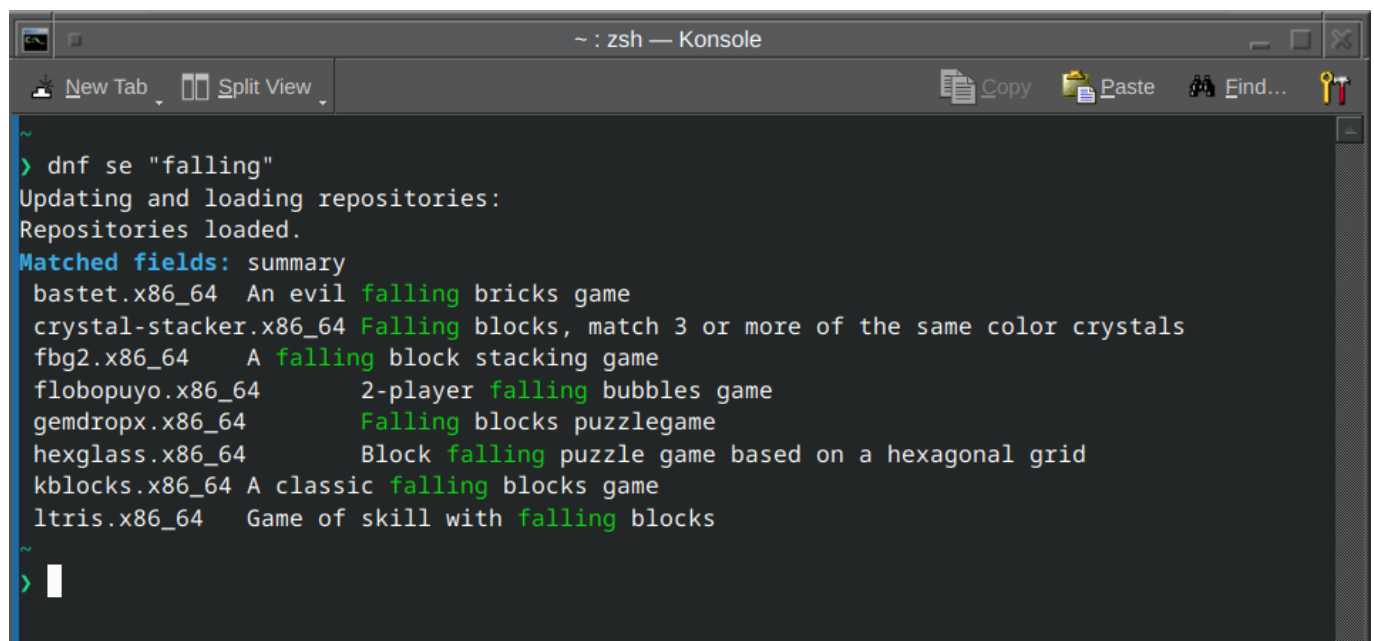
Lab 4 Submission

This lab was completed in Fedora Linux using the DNF package manager instead of APT.

Using DNF

q1.1

Searched for 'falling' games as Tetris-specific packages are limited in Fedora repos. Results demonstrate DNF search functionality.

A terminal window titled '~ : zsh — Konsole' showing the output of the command 'dnf se "falling"'. The terminal displays the following text:

```
> dnf se "falling"
Updating and loading repositories:
Repositories loaded.
Matched fields: summary
bastet.x86_64    An evil falling bricks game
crystal-stacker.x86_64 Falling blocks, match 3 or more of the same color crystals
fbg2.x86_64     A falling block stacking game
flobopuyo.x86_64 2-player falling bubbles game
gemdropx.x86_64 Falling blocks puzzlegame
hexglass.x86_64  Block falling puzzle game based on a hexagonal grid
kblocks.x86_64  A classic falling blocks game
ltris.x86_64    Game of skill with falling blocks
> 
```

q1.2

```

~ : zsh — Konsole
New Tab Split View Copy Paste Find...
> sudo dnf remove bastet && sudo dnf install ltris kblocks
Package Arch Version Repository Size
Removing:
bastet x86_64 0.43.2-11.fc42 fedora 231.8 KiB

Transaction Summary:
Removing: 1 package

After this operation, 232 KiB will be freed (install 0 B, remove 232 KiB).
Is this ok [y/N]: y
Running transaction
[1/2] Prepare transaction 100% | 3.0 B/s | 1.0 B | 00m00s
[2/2] Removing bastet-0:0.43.2-11.fc42.x86_64 100% | 31.0 B/s | 13.0 B | 00m00s
Complete!
Updating and loading repositories:
Repositories loaded.
Package Arch Version Repository Size
Installing:
kblocks x86_64 25.08.2-1.fc42 updates 2.8 MiB
ltris x86_64 1.3.2-2.fc42 rpmsfusion-free 5.2 MiB
Installing dependencies:
SDL_mixer x86_64 1.2.12-34.fc42 fedora 203.4 KiB
libmikmod x86_64 3.3.13-1.fc42 updates 400.8 KiB

Transaction Summary:
Installing: 4 packages

Total size of inbound packages is 4 MiB. Need to download 4 MiB.
After this operation, 9 MiB extra will be used (install 9 MiB, remove 0 B).
Is this ok [y/N]: y
[1/4] SDL_mixer-0:1.2.12-34.fc42.x86_64 100% | 211.7 KiB/s | 85.3 KiB | 00m00s
[2/4] libmikmod-0:3.3.13-1.fc42.x86_64 100% | 160.9 KiB/s | 166.8 KiB | 00m01s
[3/4] kblocks-0:25.08.2-1.fc42.x86_64 100% | 1.5 MiB/s | 2.3 MiB | 00m02s
[4/4] ltris-0:1.3.2-2.fc42.x86_64 100% | 791.6 KiB/s | 1.2 MiB | 00m02s
-----
[4/4] Total 100% | 1.8 MiB/s | 3.7 MiB | 00m02s
Running transaction
[1/6] Verify package files 100% | 333.0 B/s | 4.0 B | 00m00s
[2/6] Prepare transaction 100% | 9.0 B/s | 4.0 B | 00m00s
[3/6] Installing libmikmod-0:3.3.13-1.fc42.x86_64 100% | 49.2 MiB/s | 402.8 KiB | 00m00s
[4/6] Installing SDL_mixer-0:1.2.12-34.fc42.x86_64 100% | 14.4 MiB/s | 205.8 KiB | 00m00s

```

Used ltris and kblocks as available block-game alternatives to demonstrate install/remove operations, since tetris was not found in any matched fields.

q1.3

```

~ : zsh — Konsole
New Tab Split View Copy Paste Find...
> sudo dnf remove ltris
Package Arch Version Repository Size
Removing:
ltris x86_64 1.3.2-2.fc42 rpmfusion-free 5.2 MiB
Removing unused dependencies:
SDL_mixer x86_64 1.2.12-34.fc42 fedora 203.4 KiB
libmikmod x86_64 3.3.13-1.fc42 updates 400.8 KiB

Transaction Summary:
Removing: 3 packages

After this operation, 6 MiB will be freed (install 0 B, remove 6 MiB).
Is this ok [y/N]: y
Running transaction
[1/4] Prepare transaction 100% | 9.0 B/s | 3.0 B | 00m00s
[2/4] Removing ltris-0:1.3.2-2.fc42.x86_64 100% | 1.8 KiB/s | 47.0 B | 00m00s
[3/4] Removing SDL_mixer-0:1.2.12-34.fc42.x86_64 100% | 1.2 KiB/s | 16.0 B | 00m00s
[4/4] Removing libmikmod-0:3.3.13-1.fc42.x86_64 100% | 33.0 B/s | 13.0 B | 00m00s
Complete!
~ took 4s

```

q1.4

```

~ : zsh — Konsole
New Tab Split View Copy Paste Find...
> sudo dnf clean all && sudo dnf autoremove
Removed 68 files, 48 directories (total of 98 MiB). 0 errors occurred.
Package Arch Version Repository Size
Removing:
intel-media-driver x86_64 25.2.6-1.fc42 rpmfusion-nonfree-upd 37.4 MiB
libfreeaptx x86_64 0.2.2-1.fc42 rpmfusion-free 53.2 KiB
libva-intel-driver x86_64 2.4.1^20241027gitd30e013-1 rpmfusion-free 7.9 MiB
pipewire-codec-aptx x86_64 1.4.8-1.fc42 rpmfusion-free-update 45.1 KiB

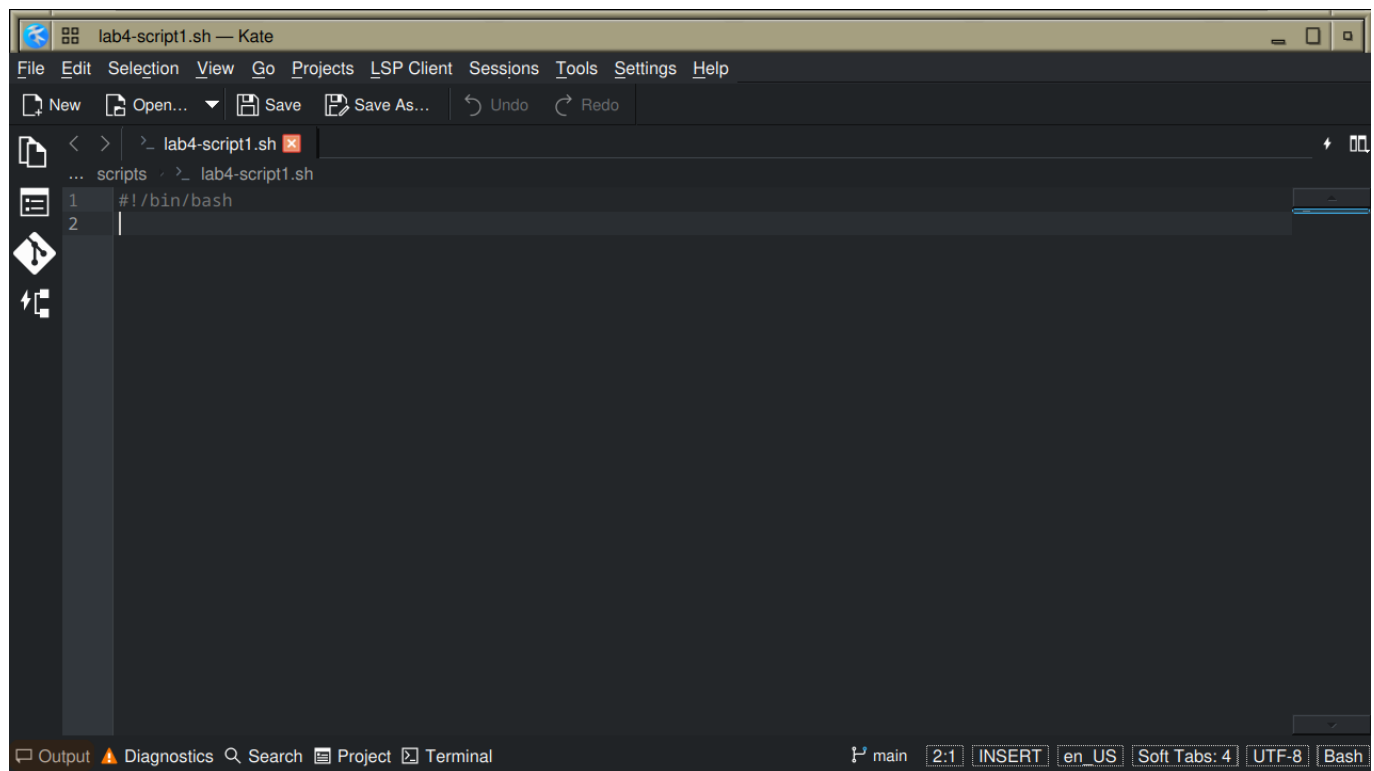
Transaction Summary:
Removing: 4 packages

After this operation, 45 MiB will be freed (install 0 B, remove 45 MiB).
Is this ok [y/N]: y
Running transaction
[1/5] Prepare transaction 100% | 12.0 B/s | 4.0 B | 00m00s
[2/5] Removing pipewire-codec-aptx-0:1.4.8-1.fc42.x 100% | 750.0 B/s | 6.0 B | 00m00s
[3/5] Removing libfreeaptx-0:0.2.2-1.fc42.x86_64 100% | 3.4 KiB/s | 7.0 B | 00m00s
[4/5] Removing libva-intel-driver-0:2.4.1^20241027g 100% | 2.1 KiB/s | 11.0 B | 00m00s
[5/5] Removing intel-media-driver-0:25.2.6-1.fc42.x 100% | 25.0 B/s | 9.0 B | 00m00s
Complete!
~ took 16s
> 

```

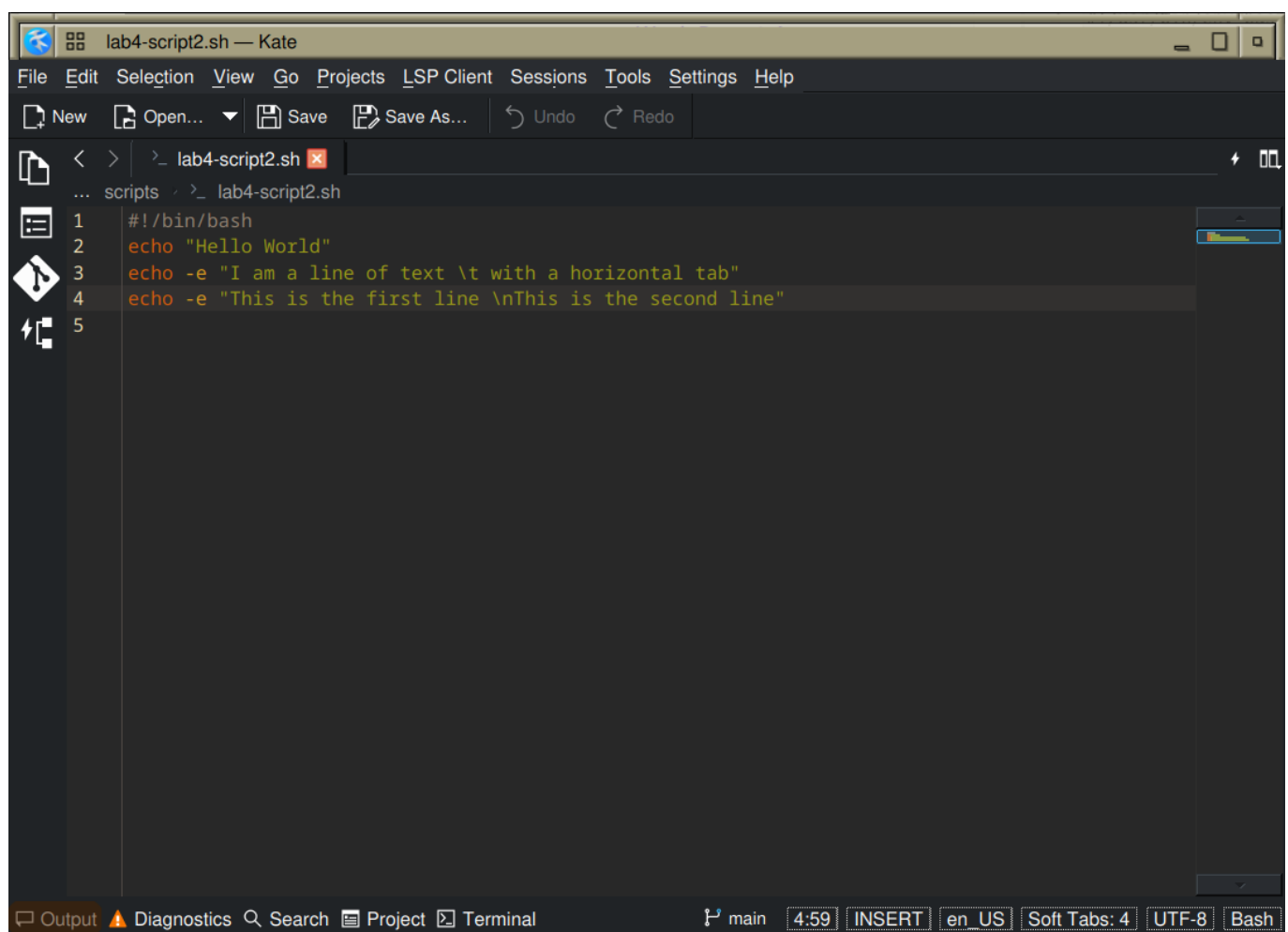
dnf does not ship with `autoclean` and `autopurge``dnf clean all` cleans the cache.

q2.1



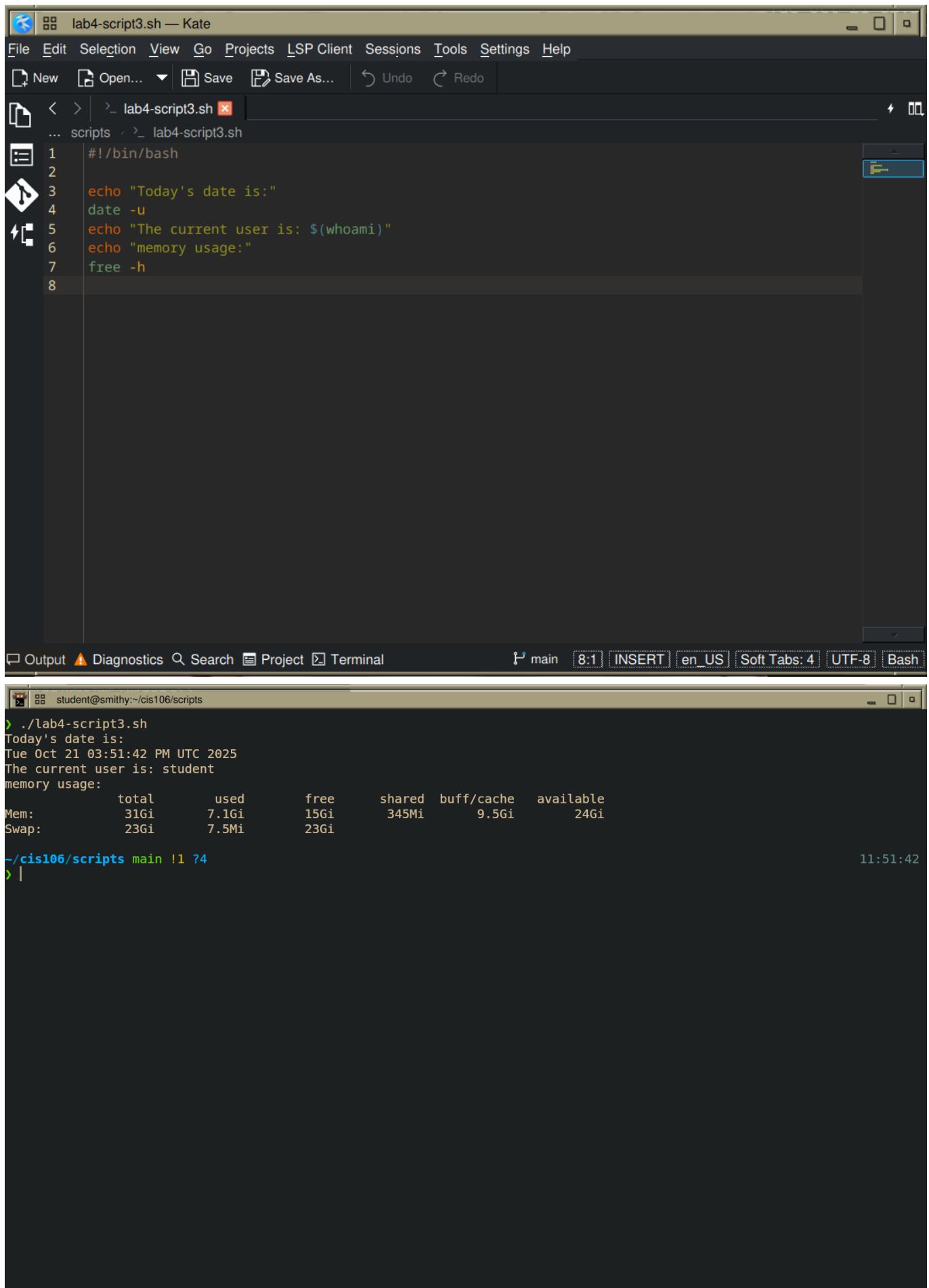
```
lab4-script1.sh — Kate
File Edit Selection View Go Projects LSP Client Sessions Tools Settings Help
New Open... Save Save As... Undo Redo
... scripts / lab4-script1.sh
1 #!/bin/bash
2 |
Output Diagnostics Search Project Terminal main 2:1 INSERT en_US Soft Tabs: 4 UTF-8 Bash
```

q2.2



```
lab4-script2.sh — Kate
File Edit Selection View Go Projects LSP Client Sessions Tools Settings Help
New Open... Save Save As... Undo Redo
... scripts / lab4-script2.sh
1 #!/bin/bash
2 echo "Hello World"
3 echo -e "I am a line of text \t with a horizontal tab"
4 echo -e "This is the first line \nThis is the second line"
5
Output Diagnostics Search Project Terminal main 4:59 INSERT en_US Soft Tabs: 4 UTF-8 Bash
```

q2.3



The image shows two windows from a Linux desktop environment. The top window is a text editor named 'Kate' editing a file called 'lab4-script3.sh'. The script contains the following lines:

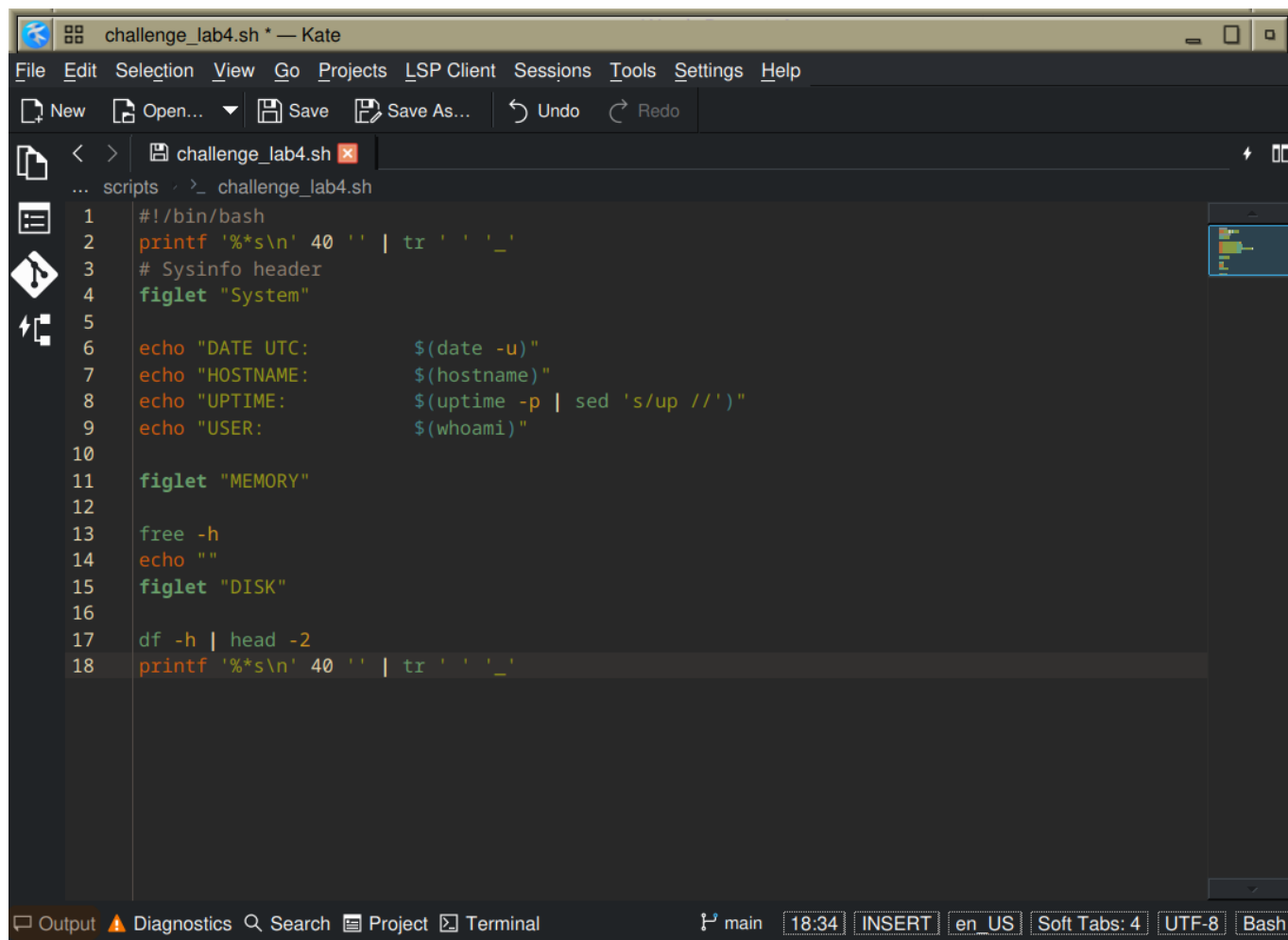
```
1 #!/bin/bash
2
3 echo "Today's date is:"
4 date -u
5 echo "The current user is: $(whoami)"
6 echo "memory usage:"
7 free -h
8
```

The bottom window is a terminal with the prompt 'student@smithy:~/cis106/scripts'. It shows the execution of the script: `./lab4-script3.sh`. The output is as follows:

```
> ./lab4-script3.sh
Today's date is:
Tue Oct 21 03:51:42 PM UTC 2025
The current user is: student
memory usage:
total      used      free      shared  buff/cache  available
Mem:      31Gi       7.1Gi     15Gi     345Mi     9.5Gi      24Gi
Swap:     23Gi       7.5Mi     23Gi
```

The terminal prompt is now `~/cis106/scripts main !1 74` and the time is 11:51:42.

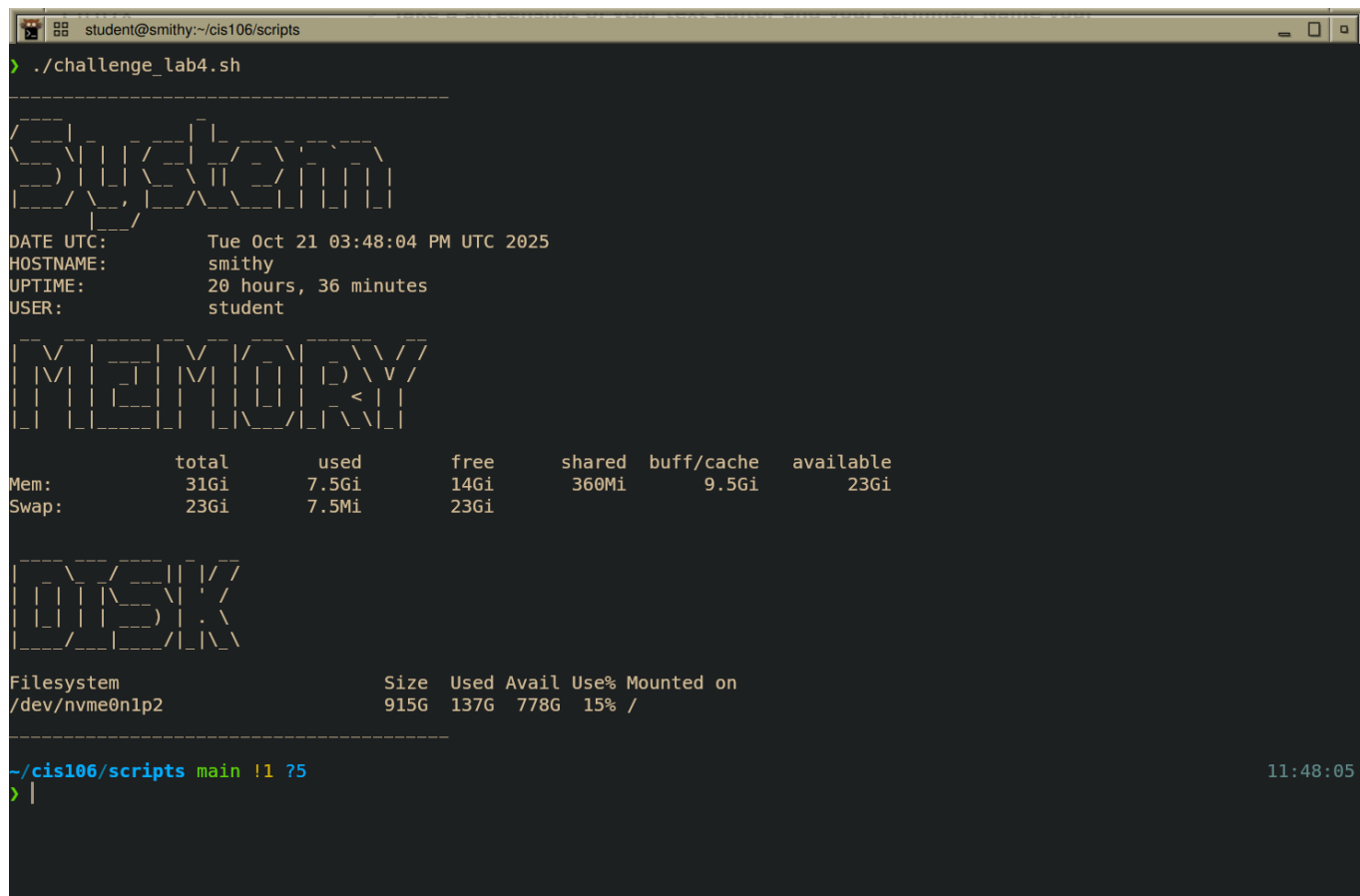
Challenge Question



The screenshot shows the Kate text editor with the file `challenge_lab4.sh` open. The script is a shell script that uses `figlet` to display ASCII art for 'SYSTEM' and 'MEMORY', and `df` to show disk usage. The script is as follows:

```
1  #!/bin/bash
2  printf '%s\n' 40 ' ' | tr ' ' '_'
3  # Sysinfo header
4  figlet "System"
5
6  echo "DATE UTC:      $(date -u)"
7  echo "HOSTNAME:      $(hostname)"
8  echo "UPTIME:         $(uptime -p | sed 's/up //' )"
9  echo "USER:           $(whoami)"
10
11  figlet "MEMORY"
12
13  free -h
14  echo ""
15  figlet "DISK"
16
17  df -h | head -2
18  printf '%s\n' 40 ' ' | tr ' ' '_'
```

The status bar at the bottom indicates the current file is `main`, the time is 18:34, the mode is INSERT, the locale is en_US, there are 4 soft tabs, the encoding is UTF-8, and the shell is Bash.



The screenshot shows a terminal window where the script `challenge_lab4.sh` has been executed. The output is as follows:

```
> ./challenge_lab4.sh
-----
      _____
     /            \
    /              \
   /                \
  /                  \
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/                      \
\                      /
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  \                  /
   \                /
    \              /
     \            /
      \          /
       \        /
        \      /
         \    /
          \  /
           \/
DATE UTC:      Tue Oct 21 03:48:04 PM UTC 2025
HOSTNAME:      smithy
UPTIME:        20 hours, 36 minutes
USER:          student

      _____
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    /              \
   /                \
  /                  \
 /                    \
/                      \
\                      /
 \                    /
  \                  /
   \                /
    \              /
     \            /
      \          /
       \        /
        \      /
         \    /
          \  /
           \/

Mem:          total      used      free      shared  buff/cache  available
Swap:         31Gi       7.5Gi     14Gi      360Mi     9.5Gi       23Gi
Swap:         23Gi       7.5Mi     23Gi

      _____
     /            \
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        \      /
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          \  /
           \/

Filesystem      Size  Used Avail Use% Mounted on
/dev/nvme0n1p2  915G  137G  778G  15% /

~/cis106/scripts main !1 75
> |
```

The terminal window shows the user `student` at `smithy` in the directory `~/cis106/scripts`. The script output includes system information and disk usage. The terminal prompt is `> |` and the time is 11:48:05.