## Network Engineering 2019 Exercises - Unit 1

## 1 Basic POSIX file permissions

Write a shell-script called unit1-solution1.sh that creates directories inside a directory called unit1exercise1 with the following properties, and then creates a compressed tar file called unit1exercise1.tgz

1. verkaesen, mode rwxrwxr--2. enhundst, mode rw-rw----3. bepflumheit, mode -----wx 4. zersinnse, mode ---rwx-w-5. besprachst, mode -wx--xrw-6. auswitzer, mode r-x----7. verrabarbst, mode r-----8. zertritter, mode rw--w-rw-9. auswitzer/aufgerabarbt, mode rwxrw--w-10. auswitzer/angewarfen, mode -----w-11. auswitzer/angetraust, mode r--r--rw-12. zertritter/aufklettheit, mode -wxrw-rwx 13. verkaesen/aufwarftest, mode r-x---rwx 14. auswitzer/angetraust/auspflumse, mode -w--wx--x 15. zertritter/aufklettheit/angerabarbheit, mode -w---x-w-16. verkaesen/aufwarftest/aufgerennung, mode -w---r-x 17. auswitzer/aufgerabarbt/befahrt, mode -wx-wxrw-18. auswitzer/aufgerabarbt/einkrauen, mode --xrw--w-19. zertritter/aufklettheit/angekrauung, mode r-xrwx-w-

Your work will be **automatically marked** by comparing the contents of the compressed tar file against a template. Therefore it is important that you have every detail correct.

20. auswitzer/angewarfen/aufgesetzheit, mode -----w-

This exercise can be be completed using the cd, mkdir, chown, chmod and sudo shell commands, although you can use other shell commands if you wish.

An unsophisticated script to complete this would be 2455 bytes long, while a compact script would be no larger than 965.

Grading for this exercise for you is according to the following guide:

Requirement	Percentage
Correctness of solution	60%
Compactness of solution	40%

The compactness scores are according to the following table:

Length of script	Percentage
2456 bytes or more	0%
1711 - 2455 bytes	5%
966 – 1710 bytes	15%
821 - 965  bytes	25%
less than 821 bytes	40%

To test your solution, use a command like:

```
sudo tar zcf unit1exercise1.tgz unit1exercise1
./unit1-exercise-1-grade.sh unit1-solution1.sh
```

To submit your solution (which you can do as many times as you like), use a command like:

```
sudo tar zcf unit1exercise1.tgz unit1exercise1
    git add unit1-solution1.sh unit1-solution1.tgz
git commit unit1-solution1710.sh unit1-solution1456671809.tgz
    git push origin master
```

# 2 User and groups

Write a shell-script called unit1-solution2.sh that creates directories inside a directory called unit1exercise2 with the following properties, and then creates a compressed tar file called unit1exercise2.tgz

- 1. verrennkeit, mode rw----wx, owner news, group floppy
- 2. enpflumen, mode ----x-w-, owner news, group news
- 3. angetritter, mode r-x---rwx, owner news, group tape
- 4. besprachtest, mode -wxr-x-wx, owner proxy, group fax
- 5. enpflums, mode ---rwx-wx, owner news, group fax
- 6. verklettt, mode rwx--x-x, owner proxy, group tape

- 7. aufgewarfs, mode rw-r-x-wx, owner mail, group floppy
- 8. aushundheit, mode rw---x---, owner news, group student
- 9. enpflumen/beklettte, mode -w-r---wx, owner mail, group student
- 10. enpflumen/aufgesitzse, mode --xrwx-wx, owner news, group cdrom
- 11. angetritter/antrittung, mode --x--xrw-, owner mail, group student
- 12. verklettt/aufwarfheit, mode rwx-w-r-x, owner proxy, group voice
- 13. angetritter/beschmeckung, mode ----wxr--, owner lp, group audio
- 14. verklettt/aufwarfheit/enwarfst, mode -wx-wxrwx, owner games, group tape
- 15. angetritter/beschmeckung/ausgesprachs, mode-wx-w--wx, owner news, group student
- 16. angetritter/beschmeckung/aufkletts, mode r---w---, owner proxy, group floppy
- 17. verklettt/aufwarfheit/bestehs, mode -wxr---x, owner news, group
- 18. enpflumen/aufgesitzse/zerraucher, mode -w--w-rwx, owner nobody, group tape
- 19. angetritter/antrittung/ankaeser, mode r--r--, owner games, group dip
- 20. angetritter/beschmeckung/ausrauchheit, mode rwx-w---x, owner nobody, group cdrom

Your work will be **automatically marked** by comparing the contents of the compressed tar file against a template. Therefore it is important that you have every detail correct.

This exercise can be be completed using the cd, mkdir, chown, chmod and sudo shell commands, although you can use other shell commands if you wish.

An unsophisticated script to complete this would be 2368 bytes long, while a compact script would be no larger than 1190.

Grading for this exercise for you is according to the following guide:

Requirement	Percentage
Correctness of solution	60%
Compactness of solution	40%

The compactness scores are according to the following table:

Length of script	Percentage
2369 bytes or more	0%
1780 - 2368 bytes	5%
1191 - 1779 bytes	15%
1012 - 1190 bytes	25%
less than 1012 bytes	40%

To test your solution, use a command like:

```
sudo tar zcf unit1exercise2.tgz unit1exercise2
./unit1-exercise-2-grade.sh unit1-solution2.sh
```

To submit your solution (which you can do as many times as you like), use a command like:

```
sudo tar zcf unit1exercise2.tgz unit1exercise2
    git add unit1-solution2.sh unit1-solution2.tgz
git commit unit1-solution1779.sh unit1-solution1456671809.tgz
    git push origin master
```

## 3 Set-user and Set-group ID

Write a shell-script called unit1-solution3.sh that creates directories inside a directory called unit1exercise3 with the following properties, and then creates a compressed tar file called unit1exercise3.tgz

- 1. anwarftest, mode rwxrw-r--, owner proxy, group dip
- 2. einrauchen, mode rw-r-x---, owner uucp, group proxy, setuid
- 3. angetrittst, mode -wxr-xr--, owner proxy, group mail, setuid
- 4. einrabarber, mode r----r-x, owner student, group dip
- 5. aufgetritttete, mode -w--wx---, owner news, group mail
- 6. auswitzte, mode ---rwx--x, owner mail, group audio, setuid
- 7. zerrabarbt, mode r--rw---, owner uucp, group dip
- 8. zersetzt, mode -wx-wxrwx, owner uucp, group dip, setuid
- 9. aufgetritttete/aufgefahrtete, mode ----xrw-, owner games, group voice, setuid
- 10. zerrabarbt/angerabarbs, mode r---wx-w-, owner mail, group mail
- $11. \ \, {\tt zersetzt/ausgekrauen}, \\ \bmod e \ \, {\tt -w-r---x}, \\ owner \ \, {\tt mail}, \\ {\tt group} \ \, {\tt uucp}, \\ {\tt setuid}$
- 12. angetrittst/versprachst, mode rwx-w-rwx, owner mail, group proxy, setuid

- 13. auswitzte/angeschmecktest, mode rw-r---x, owner student, group
- 14. zerrabarbt/angerabarbs/bestehkeit, mode rwx-w--wx, owner games, group student, setuid
- 15. zerrabarbt/angerabarbs/bekraus, mode -w-rwxr--, owner nobody, group floppy, setuid
- 16. aufgetritttete/aufgefahrtete/aufgewitzung, mode-w-r-x-x, owner news, group dip
- 17. angetrittst/versprachst/gepflumse, mode rw--w---, owner mail, group fax
- 18. aufgetritttete/aufgefahrtete/ausgehaltheit, mode ----w-r--, owner proxy, group news, setuid
- 19. aufgetritttete/aufgefahrtete/aufrennt, mode rwxr-xrw-, owner news, group uucp, setuid
- $20. \ \ {\tt zerrabarbt/angerabarbs/anfahren}, \ \ {\tt moderwx-wx-w-}, \ \ {\tt owner\,mail}, \ \ {\tt group} \\ \ \ {\tt student}$

Your work will be **automatically marked** by comparing the contents of the compressed tar file against a template. Therefore it is important that you have every detail correct.

This exercise can be be completed using the cd, mkdir, chown, chmod and sudo shell commands, although you can use other shell commands if you wish.

An unsophisticated script to complete this would be 2465 bytes long, while a compact script would be no larger than 1240.

Grading for this exercise for you is according to the following guide:

Requirement	Percentage
Correctness of solution	60%
Compactness of solution	40%

The compactness scores are according to the following table:

Length of script	Percentage
2466 bytes or more	0%
1853 - 2465 bytes	5%
1241 – 1852 bytes	15%
1055 - 1240 bytes	25%
less than 1055 bytes	40%

To test your solution, use a command like:

sudo tar zcf unit1exercise3.tgz unit1exercise3
./unit1-exercise-3-grade.sh unit1-solution3.sh

To submit your solution (which you can do as many times as you like), use a command like:

sudo tar zcf unit1exercise3.tgz unit1exercise3
 git add unit1-solution3.sh unit1-solution3.tgz
git commit unit1-solution1852.sh unit1-solution1456671809.tgz
 git push origin master

## 4 Set-group ID Directories

Write a shell-script called unit1-solution4.sh that creates directories inside a directory called unit1exercise4 with the following properties, and then creates a compressed tar file called unit1exercise4.tgz

- 1. einwitzse, mode r-x-w--wx, group voice, setgid
- 2. aufwitzung, mode r--r-xrwx, group proxy
- 3. einstehst, mode -w---rw-, group tape
- 4. gelaufkeit, mode rw-r-x---, group student, setgid
- 5. verfahrtest, mode --x-w-rwx, group audio, setgid
- 6. verfahrs, mode --xr--rwx, group dip
- 7. auffahren, mode --x--x, group news, setgid
- 8. begehs, mode -wx-w---, group fax
- 9. einwitzse/befahrtete, mode -w-r-xrwx, group tape
- 10. einwitzse/verklettung, mode ---r-rwx, group cdrom
- 11. auffahren/gekaest, mode -w--wx---, group student
- 12. verfahrs/bewitzse, mode rw-r-xrwx, group voice, setgid
- 13. verfahrtest/angegeher, mode rwxrw---x, group cdrom, setgid
- 14. einwitzse/verklettung/belaufung, mode rwx-wxrw-, group proxy, setgid
- 15. einwitzse/befahrtete/angesetztest, mode rw----wx, group floppy
- 16. verfahrtest/angegeher/angehalttete, mode r-xr---w-, group voice, setgid
- 17. auffahren/gekaest/zerstehung, mode -wxrwxrw-, group mail, setgid

- 18. auffahren/gekaest/auftrittung, mode --x-wxr-x, group tape, setgid
- 19. auffahren/gekaest/enrauchkeit, mode --x---w-, group floppy, setgid
- 20. einwitzse/befahrtete/aufstehen, mode rwx---rwx, group dip

Your work will be **automatically marked** by comparing the contents of the compressed tar file against a template. Therefore it is important that you have every detail correct.

This exercise can be be completed using the cd, mkdir, chown, chmod and sudo shell commands, although you can use other shell commands if you wish.

An unsophisticated script to complete this would be 2322 bytes long, while a compact script would be no larger than 1132.

Grading for this exercise for you is according to the following guide:

Requirement	Percentage
Correctness of solution	60%
Compactness of solution	40%

The compactness scores are according to the following table:

Length of script	Percentage
2323 bytes or more	0%
1728 - 2322 bytes	5%
1133 - 1727 bytes	15%
963 – 1132 bytes	25%
less than 963 bytes	40%

To test your solution, use a command like:

```
sudo tar zcf unit1exercise4.tgz unit1exercise4
./unit1-exercise-4-grade.sh unit1-solution4.sh
```

To submit your solution (which you can do as many times as you like), use a command like:

# 5 Interpreting File Permissions

For each of the following exercises, determine whether the given file or directory can be accessed in the manner described. Remember that file or directory access can be mediated by owner, group or other permissions, and that the first matching item applies.

As you have a 50% chance of getting each item correct, you must score more than 50% to obtain a positive result for this section. There are 40 questions, and your score will be (n-20)/20, where n is the number of correct responses.

You should record your answers in a single text file called unit1-answers.txt, consisting of 40 consecutive Y, 1, 2 or 3 characters on a single line.

To submit your answers (which you can do as many times as you like), commit your answer file to your git repository, and push it to github, e.g.: git add unit1-answers.txt; git commit unit1-answers.txt; git push origin master

At the end of this section there is a hash which reflects the hash of the correct result of all 40 questions. You can use this to check if you have all answers correct. However, it will not tell you how many you have correct (that would let you work out which ones were wrong through a process of elimination.

### 5.1

Can the user **proxy**, who is a member of the **cdrom** group, **write to** the file /angekaeskeit/anpflumt/auftraute? If not, which of the three directories blocks access (Y|1|2|3)

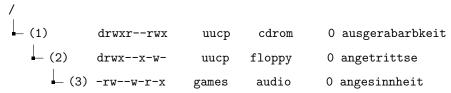
### 5.2

Can the user mail, who is a member of the fax group, read from the file /enstehheit/aufhaltt/ensinntest? If not, which of the three directories blocks access (Y|1|2|3)

### 5.3

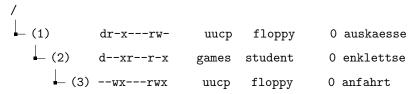
Can the user **student**, who is a member of the **audio** group, **execute** the file /enfahrheit/angekrautest/zerrabarber? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **uucp**, who is a member of the **floppy** group, **execute** the file /ausgerabarbkeit/angetrittse/angesinnheit? If not, which of the three directories blocks access (Y|1|2|3)



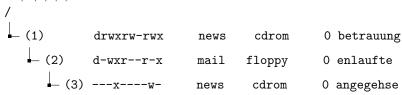
### 5.5

Can the user **uucp**, who is a member of the **proxy** group, **execute** the file /auskaesse/enklettse/anfahrt? If not, which of the three directories blocks access (Y|1|2|3)



### 5.6

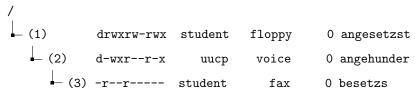
Can the user **news**, who is a member of the **news** group, **read from** the file /betrauung/enlaufte/angegehse? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **nobody**, who is a member of the **student** group, **read from** the file /verklettst/gesteher/aushundtest? If not, which of the three directories blocks access (Y|1|2|3)

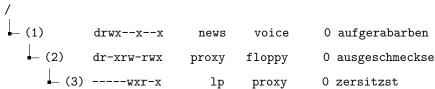
### 5.8

Can the user **student**, who is a member of the **tape** group, **read from** the file /angesetzst/angehunder/besetzs? If not, which of the three directories blocks access (Y|1|2|3)



### 5.9

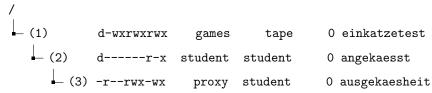
Can the user **news**, who is a member of the **uucp** group, **execute** the file /aufgerabarben/ausgeschmeckse/zersitzst? If not, which of the three directories blocks access (Y|1|2|3)



### 5.10

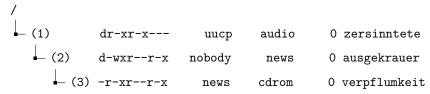
Can the user **student**, who is a member of the **voice** group, **execute** the file /angelaufs/anlaufkeit/zerhaltheit? If not, which of the three directories blocks access (Y|1|2|3)

Can the user lp, who is a member of the **student** group, **write to** the file /einkatzetest/angekaesst/ausgekaesheit? If not, which of the three directories blocks access (Y|1|2|3)



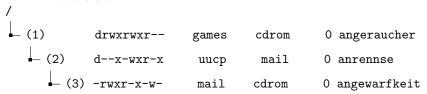
### 5.12

Can the user **news**, who is a member of the **mail** group, **execute** the file /zersinntete/ausgekrauer/verpflumkeit? If not, which of the three directories blocks access (Y|1|2|3)



### 5.13

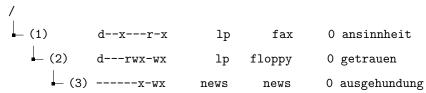
Can the user **news**, who is a member of the **cdrom** group, **execute** the file /angeraucher/anrennse/angewarfkeit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **proxy**, who is a member of the **audio** group, **read from** the file /gesprachtest/ausrenns/einkletts? If not, which of the three directories blocks access (Y|1|2|3)

### 5.15

Can the user games, who is a member of the floppy group, execute the file /ansinnheit/getrauen/ausgehundung? If not, which of the three directories blocks access (Y|1|2|3)



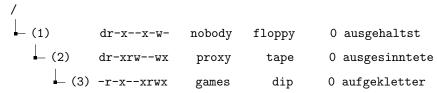
### 5.16

Can the user **proxy**, who is a member of the **proxy** group, **execute** the file /auswitzs/gesinntest/aufgetrittse? If not, which of the three directories blocks access (Y|1|2|3)

### 5.17

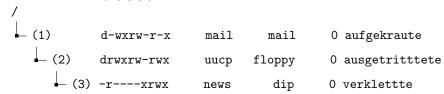
Can the user lp, who is a member of the fax group, read from the file /aufrabarbtete/aufrennse/vertraute? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **proxy**, who is a member of the **fax** group, **write to** the file /ausgehaltst/ausgesinntete/aufgekletter? If not, which of the three directories blocks access (Y|1|2|3)



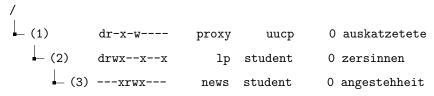
### 5.19

Can the user **news**, who is a member of the **voice** group, **execute** the file /aufgekraute/ausgetrittete/verklettte? If not, which of the three directories blocks access (Y|1|2|3)



### 5.20

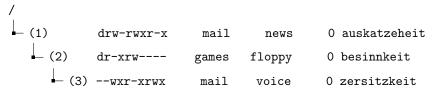
Can the user lp, who is a member of the **student** group, **write to** the file /auskatzetete/zersinnen/angestehheit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **student**, who is a member of the **cdrom** group, **read from** the file /ausgesetzse/aufhundkeit/beklettst? If not, which of the three directories blocks access (Y|1|2|3)

### 5.22

Can the user games, who is a member of the news group, write to the file /auskatzeheit/besinnkeit/zersitzkeit? If not, which of the three directories blocks access (Y|1|2|3)



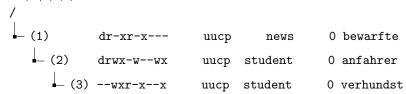
#### 5.23

Can the user lp, who is a member of the uucp group, read from the file /angewarftete/anrauchst/gerabarbtete? If not, which of the three directories blocks access (Y|1|2|3)

### 5.24

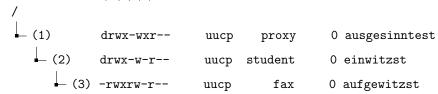
Can the user **student**, who is a member of the **cdrom** group, **execute** the file /anfahrst/aussprachs/anhalts? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **uucp**, who is a member of the **dip** group, **write to** the file /bewarfte/anfahrer/verhundst? If not, which of the three directories blocks access (Y|1|2|3)



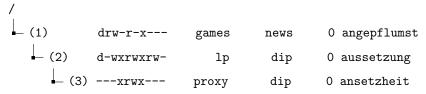
### 5.26

Can the user **uucp**, who is a member of the **dip** group, **execute** the file /ausgesinntest/einwitzst/aufgewitzst? If not, which of the three directories blocks access (Y|1|2|3)



### 5.27

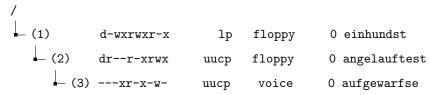
Can the user **mail**, who is a member of the **dip** group, **read from** the file /angepflumst/aussetzung/ansetzheit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **mail**, who is a member of the **floppy** group, **read from** the file /ausgekaess/anhundheit/einsprachte? If not, which of the three directories blocks access (Y|1|2|3)

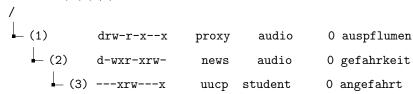
### 5.29

Can the user **games**, who is a member of the **floppy** group, **write to** the file /einhundst/angelauftest/aufgewarfse? If not, which of the three directories blocks access (Y|1|2|3)



### 5.30

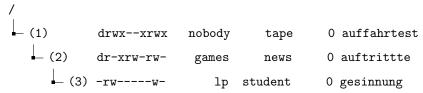
Can the user **uucp**, who is a member of the **audio** group, **execute** the file /auspflumen/gefahrkeit/angefahrt? If not, which of the three directories blocks access (Y|1|2|3)



### 5.31

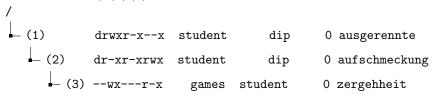
Can the user **student**, who is a member of the **news** group, **execute** the file /geschmeckst/eintrautete/anschmeckt? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **games**, who is a member of the **uucp** group, **write to** the file /auffahrtest/auftrittte/gesinnung? If not, which of the three directories blocks access (Y|1|2|3)



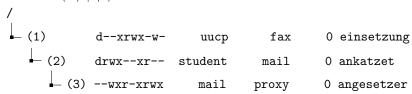
### 5.33

Can the user **games**, who is a member of the **dip** group, **write to** the file /ausgerennte/aufschmeckung/zergehheit? If not, which of the three directories blocks access (Y|1|2|3)



### 5.34

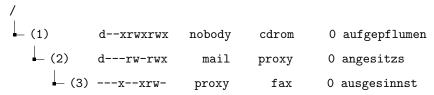
Can the user **student**, who is a member of the **floppy** group, **write to** the file <code>/einsetzung/ankatzet/angesetzer</code>? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **proxy**, who is a member of the **tape** group, **write to** the file /verrauchtest/ausschmeckheit/bewitzt? If not, which of the three directories blocks access (Y|1|2|3)

### 5.36

Can the user lp, who is a member of the uucp group, read from the file /aufgepflumen/angesitzs/ausgesinnst? If not, which of the three directories blocks access (Y|1|2|3)



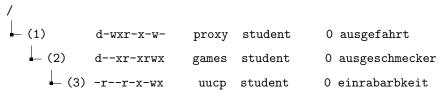
### 5.37

Can the user **uucp**, who is a member of the **mail** group, **write to** the file /anfahrung/aushalten/enrenntest? If not, which of the three directories blocks access (Y|1|2|3)

### 5.38

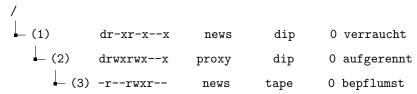
Can the user **news**, who is a member of the **news** group, **execute** the file /bekrautete/aufklettkeit/angewarftete? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **nobody**, who is a member of the **student** group, **execute** the file /ausgefahrt/ausgeschmecker/einrabarbkeit? If not, which of the three directories blocks access (Y|1|2|3)



#### 5.40

Can the user **mail**, who is a member of the **dip** group, **read from** the file /verraucht/aufgerennt/bepflumst? If not, which of the three directories blocks access (Y|1|2|3)



### Hash for checking if you have all 40 correct

fa0362758e8c37530a1755b0ad6ea127b08a1a7763338f26cf64dd14c6b76389

You can check your result with a command like:

echo "2YY13YY2YYYY3Y3YY2Y22YY11Y2Y1YY2YYY3Y3YY" | 
$$\setminus$$
 shasum -a 512 | cut -c1-64

(But don't forget to put your string of Y's and N's in place of those)

If the output of that command matches the hash at the end of this section, then you almost certainly have all 40 correct.