## 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 unit1-solution1.tgz

angehaltheit, mode ---r-xr- anwitzkeit, mode ----wxr- getrauheit, mode rw---xr--

1. verwitztest, mode -wxrwx---

- 5. angerauchheit, mode ---r----
- 6. angerauchtete, mode wxrwx-w-
- 7. auswitztest, mode r-xrw--w-
- 8. ankatzeen, mode -wx--x-x
- 9. auswitztest/aufgekatzet, mode r---w---x
- 10. angerauchtete/aufgesprachtete, mode -w-r---x
- 11. angehaltheit/aufgestehte, mode -wx-wx---
- 12. ankatzeen/zerrennen, mode --xrwxr-x
- 13. angehaltheit/ausgesetzer, mode r----xr--
- 14. ankatzeen/zerrennen/angestehheit, mode --xr--r--
- 15. angehaltheit/ausgesetzer/ausgefahrt, mode r-xrw-r-x
- 16. angerauchtete/aufgesprachtete/zersitzkeit, mode rw---x-x
- 17. angehaltheit/aufgestehte/angeschmeckheit, mode -wx--x-x
- 18. ankatzeen/zerrennen/angegehtest, mode -wx--x-w-
- 19. angehaltheit/aufgestehte/behaltkeit, mode -wx--x-wx
- 20. angehaltheit/aufgestehte/gekaesung, mode rw--w--x

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 2577 bytes long, while a compact script would be no larger than 989.

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
2578 bytes or more	0%
1784 - 2577 bytes	5%
990 – 1783 bytes	15%
841 – 989 bytes	25%
less than 841 bytes	40%

To test your solution, use a command like:

```
sudo tar zcf unit1-solution1.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:

# 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 unit1-solution2.tgz

- 1. verhalttete, mode r-x-w-r-x, owner uucp, group proxy
- 2. austrauheit, mode r----x-x, owner uucp, group mail
- 3. angetrauer, mode ----x---, owner proxy, group uucp
- 4. aufschmeckst, mode -wxrwx-wx, owner uucp, group audio
- 5. einfahren, mode rwx----, owner student, group news
- 6. zerrabarbt, mode r-xrw-rw-, owner student, group audio

- 7. ausgerauchkeit, mode rw---xrw-, owner nobody, group uucp
- 8. zerkatzete, mode ----wx, owner nobody, group news
- 9. einfahren/angesinnte, mode rwxr-x-w-, owner uucp, group proxy
- 10. zerrabarbt/einwarft, mode rwxrwx-wx, owner lp, group uucp
- 11. ausgerauchkeit/aufgeklettkeit, mode --xr--r-x, owner nobody, group floppy
- 12. angetrauer/ensetzkeit, mode --xr--rwx, owner mail, group proxy
- 13. aufschmeckst/ausgerauchte, mode r-xr-x---, owner proxy, group dip
- 14. ausgerauchkeit/aufgeklettkeit/gesetzer, mode r-xr--r-, owner mail, group news
- 15. zerrabarbt/einwarft/verfahrs, mode rw--w-rw-, owner nobody, group news
- 16. zerrabarbt/einwarft/aufgetritts, moderw-r--rw-, owner news, group news
- 17. angetrauer/ensetzkeit/aufhalttete, mode rwx---rwx, owner news, group tape
- 18. einfahren/angesinnte/geklettt, mode ---r--rwx, owner lp, group
- 19. ausgerauchkeit/aufgeklettkeit/einwitzt, mode r-x-w----, owner proxy, group mail
- 20. einfahren/angesinnte/ausfahrse, mode --x-w----, owner proxy, group tape

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 2393 bytes long, while a compact script would be no larger than 1198.

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
2394 bytes or more	0%
1796 - 2393 bytes	5%
1199 – 1795 bytes	15%
1019 – 1198 bytes	25%
less than 1019 bytes	40%

To test your solution, use a command like:

```
sudo tar zcf unit1-solution2.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:

## 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 unit1-solution3.tgz

- 1. ausgesetztete, mode r-x-w-r--, owner student, group cdrom, setuid
- 2. zergehtest, mode -w-r----, owner uucp, group fax, setuid
- 3. angestehte, mode -wx-wxrwx, owner student, group mail
- 4. gekaesheit, mode r--r-rwx, owner student, group uucp
- 5. auffahrtete, mode r-x-w--wx, owner lp, group floppy, setuid
- 6. zertrautete, mode --xrw---x, owner student, group news, setuid
- 7. aufwarftete, mode r--rwx-w-, owner games, group audio, setuid
- 8. verrabarbkeit, mode rw---x-wx, owner news, group audio, setuid
- 9. zergehtest/getrauen, mode rwx--xr--, owner games, group proxy
- 10. auffahrtete/angesprachung, mode r-x--xr-x, owner lp, group voice
- 11. verrabarbkeit/zerfahren, mode ----w---x, owner news, group fax
- 12. aufwarftete/zerlaufse, mode r-x-w-r-x, owner student, group audio, setuid

- 13. zertrautete/aufgewitzung, mode rwx-w----, owner uucp, group dip
- 14. zergehtest/getrauen/angewarftete, mode-wx-w--wx, owner lp, group fax
- 15. verrabarbkeit/zerfahren/angegeher, mode-w-rw-r--, owner student, group tape, setuid
- 16. verrabarbkeit/zerfahren/zerwitztest, mode -w-r-x--x, owner news, group floppy
- 17. zergehtest/getrauen/angekrause, mode-wx-w--wx, owner uucp, group cdrom, setuid
- 18. zertrautete/aufgewitzung/angetrittheit, moder--rw-r-x, owner games, group audio
- 19. zertrautete/aufgewitzung/zerkatzeung, mode r-xrw-r--, owner nobody, group audio, setuid
- 20. zertrautete/aufgewitzung/angewarft, moder-x-w--x, owner lp, group news. setuid

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 2443 bytes long, while a compact script would be no larger than 1246.

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
2444 bytes or more	0%
1845 - 2443 bytes	5%
1247 – 1844 bytes	15%
1060 - 1246 bytes	25%
less than 1060 bytes	40%

To test your solution, use a command like:

sudo tar zcf unit1-solution3.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:

## 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 unit1-solution4.tgz

- 1. ausschmecker, mode --xrwx-w-, group uucp, setgid
- 2. aufwitzte, mode ---rw-rw-, group voice
- 3. verpflums, mode --x-w-rwx, group news
- 4. zertrauung, mode -wxr-xr-x, group voice
- 5. aufgehalttete, mode ---r--, group fax, setgid
- 6. angesinner, mode ----w-r--, group cdrom, setgid
- 7. angewarfen, mode --x---w-, group floppy, setgid
- 8. engehte, mode r-xrwx-w-, group fax, setgid
- 9. engehte/aufgekaess, mode r-xrw-rwx, group audio, setgid
- 10. angewarfen/aufkaestete, mode r-----, group proxy, setgid
- 11. engehte/aufrabarbs, mode -w-rw--wx, group proxy, setgid
- 12. angewarfen/ausgepflumung, mode ----r-x, group cdrom
- 13. zertrauung/verschmeckst, mode -w--wx--x, group mail
- 14. angewarfen/ausgepflumung/aufgehaltung, mode r----xrw-, group audio
- 15. angewarfen/aufkaestete/angewitzse, mode --xrw--wx, group floppy
- $16. \ \ \, angewarfen/ausgepflumung/gefahrkeit, mode \verb|r--r--w-|, group proxy|, \\ setgid$
- 17. engehte/aufgekaess/angekaestest, mode ---rwxrwx, group student, setgid
- 18. engehte/aufrabarbs/befahrse, mode rw-r-xr--, group audio

- 19. engehte/aufrabarbs/ankatzese, mode --x-wx---, group dip
- 20. engehte/aufrabarbs/angehundse, mode ---rw----, group mail

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 2387 bytes long, while a compact script would be no larger than 1148.

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
2388 bytes or more	0%
1768 - 2387 bytes	5%
1149 – 1767 bytes	15%
976 – 1148 bytes	25%
less than 976 bytes	40%

To test your solution, use a command like:

```
sudo tar zcf unit1-solution4.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 lp, who is a member of the **voice** group, **read from** the file /zerfahrt/gerennt/einwitztete? If not, which of the three directories blocks access (Y|1|2|3)

## 5.2

Can the user **proxy**, who is a member of the **voice** group, **write to** the file /ausgetritts/berabarbse/angehtete? If not, which of the three directories blocks access (Y|1|2|3)

## 5.3

Can the user **mail**, who is a member of the **audio** group, **execute** the file /angesprachse/besinner/zerhaltse? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **news**, who is a member of the **mail** group, **write to** the file /verlauftete/aufklettt/aufgewarftete? If not, which of the three directories blocks access (Y|1|2|3)

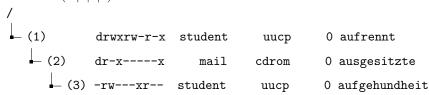


#### 5.5

Can the user **mail**, who is a member of the **fax** group, **execute** the file /eintrause/aufrabarbung/enfahrheit? If not, which of the three directories blocks access (Y|1|2|3)

## 5.6

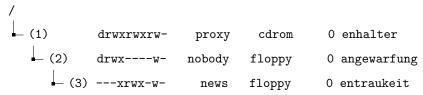
Can the user mail, who is a member of the voice group, read from the file /aufrennt/ausgesitzte/aufgehundheit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user lp, who is a member of the floppy group, write to the file /besitzst/angepflumse/verpflumkeit? If not, which of the three directories blocks access (Y|1|2|3)

## 5.8

Can the user **proxy**, who is a member of the **floppy** group, **write to** the file /enhalter/angewarfung/entraukeit? If not, which of the three directories blocks access (Y|1|2|3)



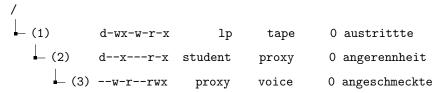
## 5.9

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

## 5.10

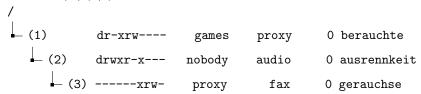
Can the user mail, who is a member of the mail group, execute the file /enrennst/angetrause/verklettheit? If not, which of the three directories blocks access (Y|1|2|3)

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



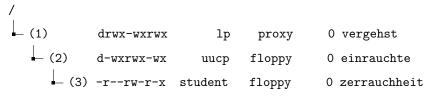
## 5.12

Can the user **games**, who is a member of the **audio** group, **read from** the file /berauchte/ausrennkeit/gerauchse? If not, which of the three directories blocks access (Y|1|2|3)



## 5.13

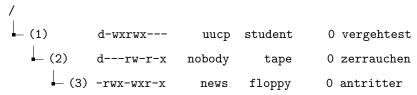
Can the user **student**, who is a member of the **floppy** group, **read from** the file /vergehst/einrauchte/zerrauchheit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user lp, who is a member of the **student** group, **execute** the file /einkaess/behundkeit/angerennung? If not, which of the three directories blocks access (Y|1|2|3)

#### 5.15

Can the user mail, who is a member of the student group, read from the file /vergehtest/zerrauchen/antritter? If not, which of the three directories blocks access (Y|1|2|3)

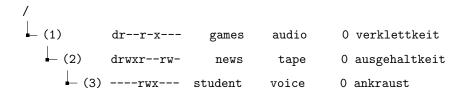


## 5.16

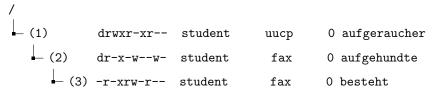
Can the user lp, who is a member of the **news** group, **write to** the file /entrautest/ensetzst/aufgeschmeckst? If not, which of the three directories blocks access (Y|1|2|3)

## 5.17

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

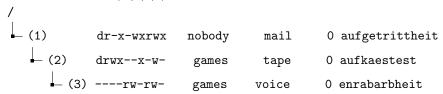


Can the user **student**, who is a member of the **audio** group, **execute** the file /aufgeraucher/aufgehundte/besteht? If not, which of the three directories blocks access (Y|1|2|3)



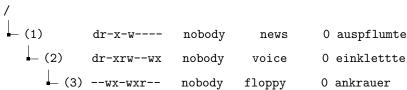
## 5.19

Can the user **games**, who is a member of the **tape** group, **write to** the file /aufgetrittheit/aufkaestest/enrabarbheit? If not, which of the three directories blocks access (Y|1|2|3)



## 5.20

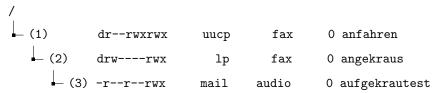
Can the user **nobody**, who is a member of the **tape** group, **execute** the file <code>/auspflumte/einklettte/ankrauer?</code> If not, which of the three directories blocks access (Y|1|2|3)



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

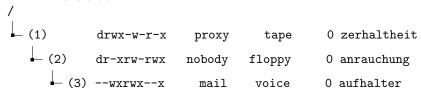
## 5.22

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



#### 5.23

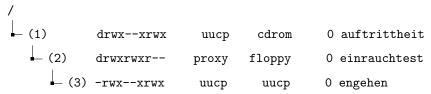
Can the user **student**, who is a member of the **news** group, **execute** the file /zerhaltheit/anrauchung/aufhalter? If not, which of the three directories blocks access (Y|1|2|3)



## 5.24

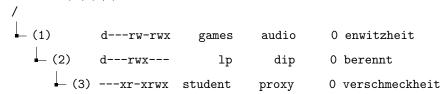
Can the user mail, who is a member of the **news** group, **execute** the file /besprachkeit/ausgesprachtest/gepflumer? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **nobody**, who is a member of the **floppy** group, **write to** the file /auftrittheit/einrauchtest/engehen? If not, which of the three directories blocks access (Y|1|2|3)



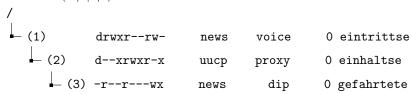
## 5.26

Can the user **student**, who is a member of the **dip** group, **write to** the file /enwitzheit/berennt/verschmeckheit? If not, which of the three directories blocks access (Y|1|2|3)



## 5.27

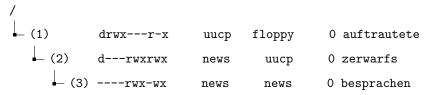
Can the user **news**, who is a member of the **proxy** group, **execute** the file /eintrittse/einhaltse/gefahrtete? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **student**, who is a member of the **dip** group, **execute** the file /ausgeklettte/gepflumung/ankrauen? If not, which of the three directories blocks access (Y|1|2|3)

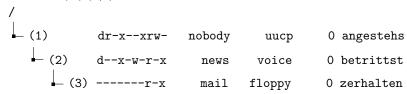
#### 5.29

Can the user **student**, who is a member of the **uucp** group, **write to** the file /auftrautete/zerwarfs/besprachen? If not, which of the three directories blocks access (Y|1|2|3)



## 5.30

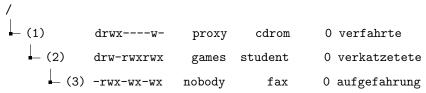
Can the user **nobody**, who is a member of the **voice** group, **execute** the file /angestehs/betrittst/zerhalten? If not, which of the three directories blocks access (Y|1|2|3)



## 5.31

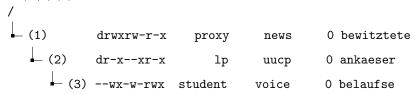
Can the user **nobody**, who is a member of the **uucp** group, **read from** the file /aufgesetzung/ausgewitzst/einwarftest? If not, which of the three directories blocks access (Y|1|2|3)

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



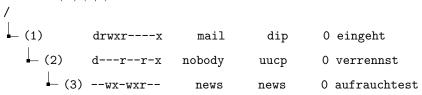
## 5.33

Can the user **nobody**, who is a member of the **voice** group, **write to** the file /bewitztete/ankaeser/belaufse? If not, which of the three directories blocks access (Y|1|2|3)



#### 5.34

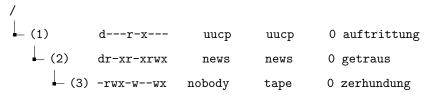
Can the user **mail**, who is a member of the **news** group, **write to** the file /eingeht/verrennst/aufrauchtest? If not, which of the three directories blocks access (Y|1|2|3)



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

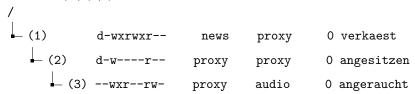
#### 5.36

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



## 5.37

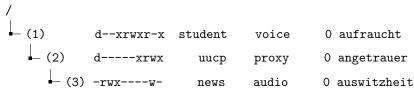
Can the user **student**, who is a member of the **proxy** group, **write to** the file /verkaest/angesitzen/angeraucht? If not, which of the three directories blocks access (Y|1|2|3)



## 5.38

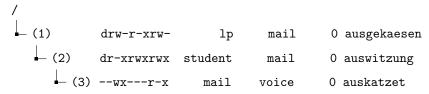
Can the user mail, who is a member of the fax group, read from the file /aufrennst/auslaufte/aufrabarbt? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **news**, who is a member of the **dip** group, **read from** the file /aufraucht/angetrauer/auswitzheit? 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 mail group, write to the file /ausgekaesen/auswitzung/auskatzet? If not, which of the three directories blocks access (Y|1|2|3)



## Hash for checking if you have all 40 correct

dc3ae917ca13755b1b7c0950470f0b392e9ee87e04a9845b9a9776a03a6167b6

You can check your result with a command like:

(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.