# 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

- 1. anpflumst, mode r-x-wx-w-
- 2. entraut, mode ---rwxrwx
- 3. einwitzs, mode r-x-wxr-x
- 4. gewarfheit, mode -wx----w-
- 5. gekletts, mode -w----x
- 6. einlaufse, mode r--rw----
- 7. angehundtest, mode -w-r---x
- 8. enrauchheit, mode rw-r-x---
- 9. enrauchheit/enschmecktest, mode rw-rw-rw-
- 10. gekletts/angetrauen, mode -w-r-xr--
- 11. gewarfheit/aufkaest, mode r---wx-wx
- 12. einwitzs/aufgetrauung, mode r-x-wxrwx
- 13. entraut/zerklettst, mode rwx-w--wx
- 14. gekletts/angetrauen/auspflumte, mode ----x---
- 15. gekletts/angetrauen/angehundt, mode -wxrw-rwx
- 16. entraut/zerklettst/einkatzete, mode --x-w-rw-
- 17. gewarfheit/aufkaest/ausgesprachkeit, mode --x-w---x
- 18. enrauchheit/enschmecktest/verkletttest, mode rwxrwxr--
- 19. einwitzs/aufgetrauung/anfahren, mode --xr-x-wx
- 20. gekletts/angetrauen/gekatzet, mode rw-rwxr--

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 2395 bytes long, while a compact script would be no larger than 956.

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
2396 bytes or more	0%
1676 - 2395 bytes	5%
957 - 1675  bytes	15%
813 - 956  bytes	25%
less than 813 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. vertritts, mode -wx---rwx, owner news, group dip
- 2. gehaltung, mode --xrw--w-, owner mail, group audio
- 3. belaufkeit, mode r--rwxrwx, owner games, group mail
- 4. zerfahrtest, mode rwxrwx---, owner proxy, group fax
- 5. einrenntest, mode -w---rw-, owner uucp, group proxy
- 6. aufgekrauung, mode r-xr--r-, owner uucp, group floppy

- 7. angehaltheit, mode -wxr-xr--, owner uucp, group fax
- 8. aufwitzse, mode ----wx---, owner lp, group fax
- 9. gehaltung/ausgesetzheit, mode rw--w-r-x, owner lp, group uucp
- 10. aufgekrauung/enfahrse, mode r--rwx-w-, owner nobody, group floppy
- 11. aufgekrauung/angeklettt, mode ---r--x, owner mail, group news
- 12. zerfahrtest/verwitzer, mode -wxr-xrw-, owner lp, group mail
- 13. zerfahrtest/anschmeckung, mode rw----rw-, owner games, group tape
- 14. aufgekrauung/enfahrse/verwitztete, mode r--r--rwx, owner uucp, group news
- 15. zerfahrtest/anschmeckung/anrabarbte, mode --x-w-rw-, owner mail, group voice
- 16. aufgekrauung/angeklettt/aufpflumse, mode -wx---rw-, owner nobody, group tape
- 17. aufgekrauung/angeklettt/anpflumtest, mode rw-rw--wx, owner uucp, group fax
- 18. aufgekrauung/angeklettt/enfahrte, mode -wxrwxrw-, owner mail, group student
- 19. zerfahrtest/anschmeckung/bestehtest, mode r-xrw--wx, owner lp, group news
- $20. \ \, {\tt aufgekrauung/enfahrse/ausgesetzs}, \\ {\tt mode-wxr---w-}, owner \\ {\tt news}, \\ {\tt group} \\ {\tt student}$

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 2390 bytes long, while a compact script would be no larger than 1216.

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
2391 bytes or more	0%
1804 - 2390  bytes	5%
1217 - 1803 bytes	15%
1034 - 1216 bytes	25%
less than 1034 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. aufgetritttete, mode -w-rwx---, owner uucp, group proxy, setuid
- 2. auslaufheit, mode r--rw-rwx, owner mail, group fax
- 3. zersinntest, mode -wx----w-, owner nobody, group news
- 4. zerwitzheit, mode --xr----, owner proxy, group proxy
- 5. enpflumtest, mode r---w-r--, owner games, group dip, setuid
- 6. zerhundkeit, mode -wxr----, owner lp, group voice
- 7. ausgekaess, mode ---r---x, owner news, group mail, setuid
- 8. verwarfs, mode rw---x-x, owner uucp, group news
- 9. enpflumtest/aussprachheit, mode r---w-r-x, owner student, group voice
- 10. aufgetritttete/ausstehs, mode ----wxrwx, owner mail, group dip, setuid
- 11. enpflumtest/aufgepflumtest, mode ---rwxr--, owner news, group uucp

- 12. ausgekaess/zerrenntete, mode -----wx, owner news, group tape
- 13. zerwitzheit/anpflumte, mode -wx--xrw-, owner uucp, group fax, setuid
- 14. enpflumtest/aussprachheit/ausrabarbkeit, mode --xr-x-w-, owner mail, group mail, setuid
- 15. enpflumtest/aussprachheit/berennung, moderwx----wx, owner student, group dip, setuid
- 16. zerwitzheit/anpflumte/ansitzst, mode rw-rw-rwx, owner nobody, group proxy, setuid
- 17. enpflumtest/aussprachheit/auskaest, moderwxr-xrwx, owner student, group voice, setuid
- 18. enpflumtest/aufgepflumtest/ausgehalter, mode -wx---r-x, owner lp, group mail, setuid
- 19. zerwitzheit/anpflumte/angesteher, mode-w---r--, owner lp, group audio, setuid
- 20. zerwitzheit/anpflumte/auflauftete, mode rw-rwxrw-, owner lp, group uucp, 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 2445 bytes long, while a compact script would be no larger than 1228.

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
2446 bytes or more	0%
1837 - 2445 bytes	5%
1229 - 1836 bytes	15%
1044 - 1228 bytes	25%
less than 1044 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. aufsetzen, mode -wx---r-, group audio, setgid
- 2. enwarft, mode ----wxr--, group fax, setgid
- 3. gesetzte, mode rw-r-xr--, group uucp
- 4. angesetzst, mode -w-rw--wx, group cdrom, setgid
- 5. ansprachen, mode ----xr--, group dip
- 6. ausgesinnkeit, mode --x---x, group cdrom
- 7. ausgefahrte, mode r-xrwxr--, group student
- 8. angetrauung, mode rw-r--r-, group cdrom
- 9. angetrauung/einsinnen, mode rwx---rw-, group floppy
- 10. ansprachen/verwitzs, mode r--rwxrwx, group mail, setgid
- 11. angesetzst/aufsprachs, mode r---xrw-, group audio, setgid
- 12. gesetzte/ensitzkeit, mode ---r--wx, group tape, setgid
- 13. ausgefahrte/anwitzkeit, mode r----rw-, group floppy
- 14. ausgefahrte/anwitzkeit/bekatzeer, mode -w--wx--x, group dip
- 15. angesetzst/aufsprachs/verkraus, mode ---r--x, group uucp, setgid
- 16. ansprachen/verwitzs/aufkraus, mode --xrw-r--, group student
- 17. ausgefahrte/anwitzkeit/angehundse, mode rwx----w-, group cdrom
- 18. angetrauung/einsinnen/ausgesitzte, mode -wx-wxrw-, group tape

- 19. angesetzst/aufsprachs/angesitzst, mode ----rwx, group voice, setgid
- 20. ausgefahrte/anwitzkeit/verkaesse, mode ----xrwx, group uucp

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 2375 bytes long, while a compact script would be no larger than 1109.

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
2376 bytes or more	0%
1743 - 2375 bytes	5%
1110 - 1742  bytes	15%
943 – 1109 bytes	25%
less than 943 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 **proxy**, who is a member of the **voice** group, **read from** the file /geschmeckse/enwarfung/zerlaufst? If not, which of the three directories blocks access (Y|1|2|3)

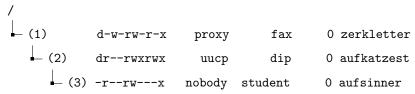
# 5.2

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

#### 5.3

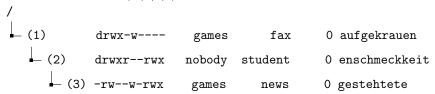
Can the user games, who is a member of the tape group, write to the file /einklettkeit/auftritts/ausgewarfkeit? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **nobody**, who is a member of the **dip** group, **execute** the file /zerkletter/aufkatzest/aufsinner? If not, which of the three directories blocks access (Y|1|2|3)



# 5.5

Can the user games, who is a member of the uucp group, read from the file /aufgekrauen/enschmeckkeit/gestehtete? If not, which of the three directories blocks access (Y|1|2|3)



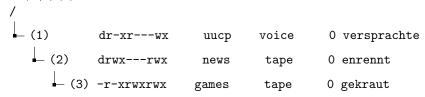
# 5.6

Can the user **student**, who is a member of the **cdrom** group, **write to** the file /anwarfkeit/einsprachung/verhundtest? If not, which of the three directories blocks access (Y|1|2|3)

Can the user games, who is a member of the dip group, read from the file /angehundkeit/aufgelauftest/engehen? If not, which of the three directories blocks access (Y|1|2|3)

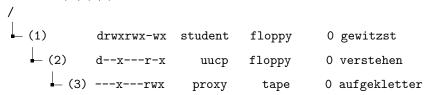
#### 5.8

Can the user **uucp**, who is a member of the **tape** group, **write to** the file /versprachte/enrennt/gekraut? If not, which of the three directories blocks access (Y|1|2|3)



# 5.9

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



# 5.10

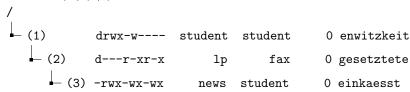
Can the user **games**, who is a member of the **audio** group, **execute** the file /besetzheit/gerabarbung/aufwarftete? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **proxy**, who is a member of the **fax** group, **read from** the file /berenntete/gehundung/angesetzung? If not, which of the three directories blocks access (Y|1|2|3)



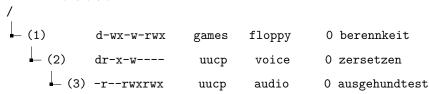
#### 5.12

Can the user  $\mathbf{uucp}$ , who is a member of the  $\mathbf{fax}$  group,  $\mathbf{write}$  to the file /enwitzkeit/gesetztete/einkaesst? If not, which of the three directories blocks access (Y|1|2|3)



# 5.13

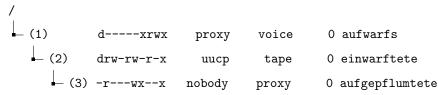
Can the user  $\mathbf{uucp}$ , who is a member of the  $\mathbf{mail}$  group,  $\mathbf{read}$  from the file /berennkeit/zersetzen/ausgehundtest? If not, which of the three directories blocks access (Y|1|2|3)



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

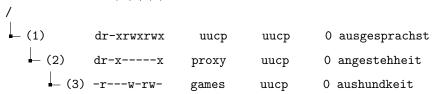
#### 5.15

Can the user **nobody**, who is a member of the **mail** group, **execute** the file /aufwarfs/einwarftete/aufgepflumtete? If not, which of the three directories blocks access (Y|1|2|3)



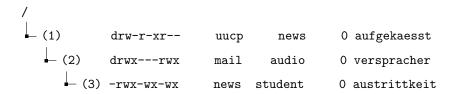
# 5.16

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

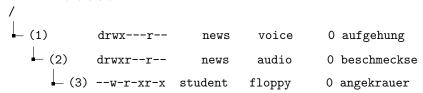


# 5.17

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

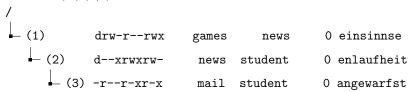


Can the user **news**, who is a member of the **audio** group, **read from** the file /aufgehung/beschmeckse/angekrauer? If not, which of the three directories blocks access (Y|1|2|3)



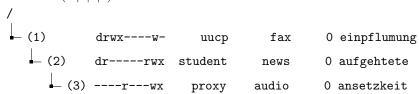
#### 5.19

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



# 5.20

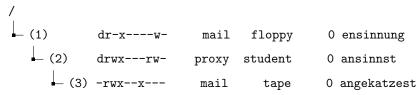
Can the user **uucp**, who is a member of the **news** group, **execute** the file /einpflumung/aufgehtete/ansetzkeit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **mail**, who is a member of the **voice** group, **write to** the file /einrabarbte/ausfahren/einsetzst? If not, which of the three directories blocks access (Y|1|2|3)

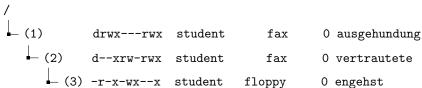
#### 5.22

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



# 5.23

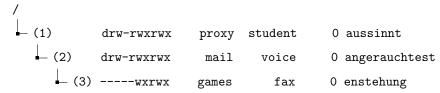
Can the user **mail**, who is a member of the **floppy** group, **write to** the file /ausgehundung/vertrautete/engehst? If not, which of the three directories blocks access (Y|1|2|3)



# 5.24

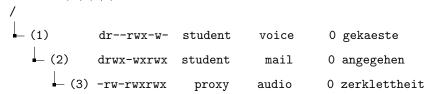
Can the user games, who is a member of the news group, read from the file /angekrauen/aufgepflums/gesinnse? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **games**, who is a member of the **student** group, **write to** the file /aussinnt/angerauchtest/enstehung? If not, which of the three directories blocks access (Y|1|2|3)



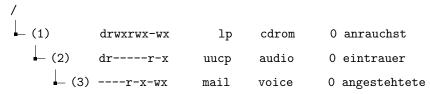
# 5.26

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



# 5.27

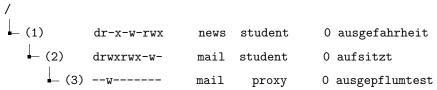
Can the user lp, who is a member of the **voice** group, **execute** the file /anrauchst/eintrauer/angestehtete? If not, which of the three directories blocks access (Y|1|2|3)



# 5.28

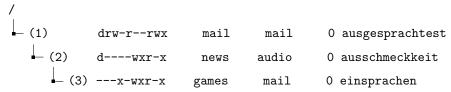
Can the user mail, who is a member of the voice group, write to the file /ausgefahrheit/aufsitzt/ausgepflumtest? If not, which of the three direc-

tories blocks access (Y|1|2|3)



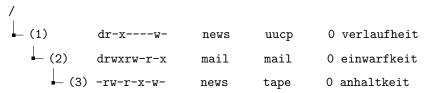
# 5.29

Can the user **student**, who is a member of the **floppy** group, **execute** the file /ausgesprachtest/ausschmeckkeit/einsprachen? If not, which of the three directories blocks access (Y|1|2|3)



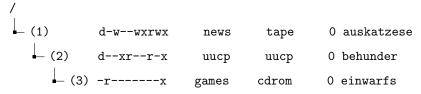
# 5.30

Can the user **nobody**, who is a member of the **tape** group, **read from** the file /verlaufheit/einwarfkeit/anhaltkeit? If not, which of the three directories blocks access (Y|1|2|3)



# 5.31

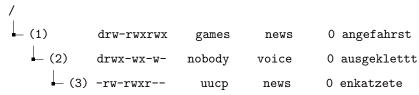
Can the user **games**, who is a member of the **proxy** group, **read from** the file /auskatzese/behunder/einwarfs? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **nobody**, who is a member of the **mail** group, **write to** the file /aufgehaltte/zerkatzetest/ausrenntete? If not, which of the three directories blocks access (Y|1|2|3)

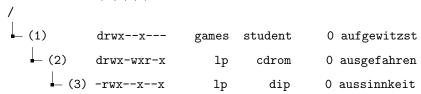
# 5.33

Can the user **nobody**, who is a member of the **news** group, **execute** the file /angefahrst/ausgeklettt/enkatzete? If not, which of the three directories blocks access (Y|1|2|3)



# 5.34

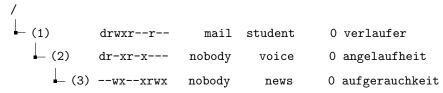
Can the user lp, who is a member of the fax group, read from the file /aufgewitzst/ausgefahren/aussinnkeit? If not, which of the three directories blocks access (Y|1|2|3)



# 5.35

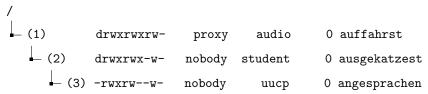
Can the user **student**, who is a member of the **tape** group, **read from** the file /gesitzkeit/aufgestehung/einkaess? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **mail**, who is a member of the **voice** group, **execute** the file /verlaufer/angelaufheit/aufgerauchkeit? If not, which of the three directories blocks access (Y|1|2|3)



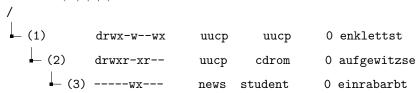
#### 5.37

Can the user **nobody**, who is a member of the **audio** group, **write to** the file /auffahrst/ausgekatzest/angesprachen? If not, which of the three directories blocks access (Y|1|2|3)

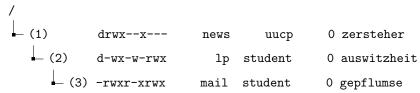


# 5.38

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

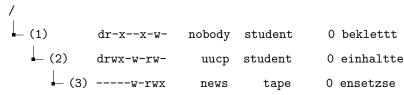


Can the user **news**, who is a member of the **student** group, **execute** the file /zersteher/auswitzheit/gepflumse? If not, which of the three directories blocks access (Y|1|2|3)



#### 5.40

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



# Hash for checking if you have all 40 correct

4d7356f98b636b410949ce8b2b24f0828e0190cdd5d741ed2131fbb26e415a5a

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.