# 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. bekatzetete, mode --x--x
- 2. aufgerauchkeit, mode -w--w---
- 3. ansetzte, mode r--r-rwx
- 4. angekraut, mode r-xr-x---
- 5. gehaltung, mode --x--x---
- 6. einhaltheit, mode -w-r--rw-
- 7. zerhalttete, mode -wx-wxrwx
- 8. gestehs, mode rwxrw---x
- 9. zerhalttete/zerschmecktest, mode -w---xrwx
- 10. gehaltung/ansteher, mode -w-r--rwx
- 11. einhaltheit/auskrauen, mode -wx----w-
- 12. zerhalttete/angeht, mode --xr-xr--
- 13. aufgerauchkeit/beschmeckkeit, mode rw-r--rwx
- 14. zerhalttete/zerschmecktest/aussitztest, mode rwxr-xr-x
- 15. aufgerauchkeit/beschmeckkeit/angekatzeung, mode r--rw-r-x
- 16. zerhalttete/angeht/zerkatzetete, mode r-x--x---
- 17. zerhalttete/angeht/anstehs, mode ---rwxr-x
- 18. einhaltheit/auskrauen/angegehen, mode r--rw---x
- 19. zerhalttete/angeht/anhaltung, mode --x-wxrw-
- 20. gehaltung/ansteher/angelauftete, mode r---x-wx

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 2461 bytes long, while a compact script would be no larger than 962.

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
2462 bytes or more	0%
1712 - 2461 bytes	5%
963 – 1711 bytes	15%
818 - 962  bytes	25%
less than 818 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-solution1711.sh unit1-solution1456672572.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. versitztete, mode r---w-r--, owner proxy, group uucp
- 2. ausgekraute, mode rw-rw--wx, owner uucp, group fax
- 3. zerrennst, mode r-x---r-x, owner mail, group news
- 4. anpflumheit, mode r---wxrwx, owner uucp, group mail
- 5. eingehse, mode rw-r-x-wx, owner uucp, group student
- 6. einkatzest, mode -wxrw-r--, owner games, group news

- 7. angegehheit, mode r---w-r--, owner proxy, group floppy
- 8. aufhaltung, mode r----x--x, owner news, group cdrom
- 9. ausgekraute/gewitzkeit, mode r-xrw-r-x, owner games, group uucp
- 10. zerrennst/ausstehse, mode -w--wxr--, owner uucp, group voice
- 11. aufhaltung/angekatzest, mode --xrwx--x, owner student, group student
- 12. zerrennst/zersetzte, mode rwxr---wx, owner games, group mail
- 13. ausgekraute/einfahrkeit, mode rwx-wxrwx, owner uucp, group news
- 14. ausgekraute/gewitzkeit/ausgekatzetete, mode rw--w-, owner mail, group news
- 15. ausgekraute/gewitzkeit/zerwarfte, mode rwx--x--, owner proxy, group news
- 16. aufhaltung/angekatzest/zersinnte, mode --xrwx-w-, owner mail, group news
- 17. zerrennst/ausstehse/befahrst, mode ----w--, owner nobody, group proxy
- 18. zerrennst/zersetzte/auftrittt, mode-w----wx, owner proxy, group floppy
- 19. zerrennst/zersetzte/angekletttete, mode rwx-wxrwx, owner games, group audio
- 20. zerrennst/ausstehse/entraust, mode ----rw-, owner uucp, 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 2329 bytes long, while a compact script would be no larger than 1193.

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
2330 bytes or more	0%
1762 - 2329 bytes	5%
1194 – 1761 bytes	15%
1015 - 1193 bytes	25%
less than 1015 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-solution1761.sh unit1-solution1456672572.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. angesetzst, mode ----wx-wx, owner lp, group student
- 2. austritter, mode r-x-w-r-x, owner nobody, group news
- 3. berabarbkeit, mode -wx-w---x, owner proxy, group voice, setuid
- 4. ausgerauchs, mode rwxr-x-w-, owner lp, group proxy
- 5. angepflumt, mode rw--w-wx, owner student, group mail
- 6. enrabarbkeit, mode rw---x-wx, owner lp, group floppy
- 7. verfahrer, mode r-x--xrwx, owner news, group fax
- 8. ausschmeckte, mode ----wx, owner uucp, group voice
- 9. angepflumt/zertraut, mode rw---x-wx, owner news, group tape
- 10. verfahrer/ensteher, mode r----r-, owner news, group news, setuid
- 11. verfahrer/vergeher, mode r----r-x, owner nobody, group audio
- 12. berabarbkeit/aufgewarfer, mode --x-wx---, owner proxy, group cdrom, setuid

- 13. ausgerauchs/einraucher, mode r-xr-x-x, owner proxy, group proxy
- 14. ausgerauchs/einraucher/ankatzes, mode -wxr-x---, owner mail, group uucp
- 15. angepflumt/zertraut/aufgesetzt, mode rw--w-rwx, owner mail, group cdrom, setuid
- 16. berabarbkeit/aufgewarfer/zergehs, mode rw--w-rw-, owner nobody, group proxy
- 17. verfahrer/vergeher/enkatzest, mode rwxr-x-wx, owner lp, group dip
- 18. angepflumt/zertraut/ausgehalten, mode ---r--, owner uucp, group cdrom, setuid
- 19. ausgerauchs/einraucher/geschmeckse, mode r---xr--, owner mail, group student, setuid
- 20. verfahrer/ensteher/bewarfte, mode -w-r-xr-x, owner news, group fax, 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 2314 bytes long, while a compact script would be no larger than 1208.

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
2315 bytes or more	0%
1762 - 2314 bytes	5%
1209 – 1761 bytes	15%
1027 - 1208 bytes	25%
less than 1027 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-solution1761.sh unit1-solution1456672572.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. angewarfse, mode r----r-, group dip, setgid
- 2. verstehheit, mode -w--w---, group fax, setgid
- 3. angegehst, mode -w-rwx---, group floppy, setgid
- 4. angetrauer, mode --x--rwx, group floppy
- 5. angehundte, mode r---xr-x, group audio
- 6. aufgekatzeer, mode r-x-w-wx, group cdrom
- 7. angehte, mode r----xr--, group news, setgid
- 8. ankletter, mode rwxrw---x, group uucp
- 9. angehte/gerabarbheit, mode rwxrwx-w-, group cdrom, setgid
- 10. angehundte/angerabarber, mode -wx-w---, group audio
- 11. angetrauer/gekaeser, mode -wxr-xrw-, group audio, setgid
- 12. aufgekatzeer/einsetzst, mode -w-r-xr--, group fax
- 13. angewarfse/ausgesprachen, mode rwxrwx---, group proxy, setgid
- 14. angewarfse/ausgesprachen/angehalttest, mode r-xrwxr--, group dip, setgid
- 15. angewarfse/ausgesprachen/ausgestehte, mode -w-rwx-w-, group fax, setgid
- 16. angehundte/angerabarber/enwarfen, mode --xr--r-x, group news
- 17. angewarfse/ausgesprachen/auslauft, mode rw--w-rw-, group proxy, setgid
- 18. angetrauer/gekaeser/aufgerennheit, mode -wxr--r-x, group voice

- 19. aufgekatzeer/einsetzst/zertraust, mode rwx--x-w-, group floppy, setgid
- 20. aufgekatzeer/einsetzst/aufgetrauer, mode r--rw---, group news, setgid

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 2441 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
2442 bytes or more	0%
1776 – 2441 bytes	5%
1110 – 1775 bytes	15%
943 – 1109 bytes	25%
less than 943 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 **uucp**, who is a member of the **student** group, **write to** the file /geschmeckte/angehst/verkatzese? If not, which of the three directories blocks access (Y|1|2|3)

# 5.2

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

## 5.3

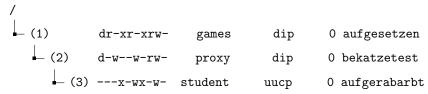
Can the user **nobody**, who is a member of the **student** group, **read from** the file /angegeht/anwitzung/ausrabarbtete? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **news**, who is a member of the **dip** group, **write to** the file /auflaufung/anschmecks/verhundtete? If not, which of the three directories blocks access (Y|1|2|3)



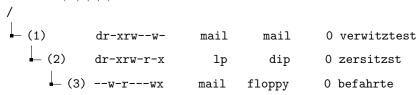
# 5.5

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



## 5.6

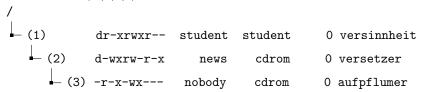
Can the user **proxy**, who is a member of the **tape** group, **write to** the file /verwitztest/zersitzst/befahrte? If not, which of the three directories blocks access (Y|1|2|3)



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

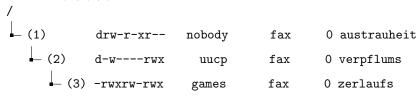
## 5.8

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



# 5.9

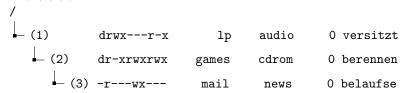
Can the user **proxy**, who is a member of the **fax** group, **read from** the file /austrauheit/verpflums/zerlaufs? If not, which of the three directories blocks access (Y|1|2|3)



## 5.10

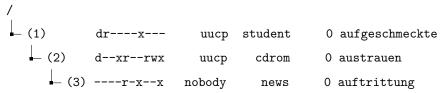
Can the user **news**, who is a member of the **tape** group, **read from** the file /belauftete/aufrenntest/enstehse? If not, which of the three directories blocks access (Y|1|2|3)

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



## 5.12

Can the user lp, who is a member of the **news** group, **execute** the file /aufgeschmeckte/austrauen/auftritte If not, which of the three directories blocks access (Y|1|2|3)



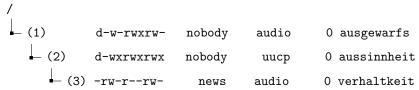
## 5.13

Can the user **nobody**, who is a member of the **fax** group, **execute** the file /anrennse/angerabarbtest/zersinnkeit? If not, which of the three directories blocks access (Y|1|2|3)

# 5.14

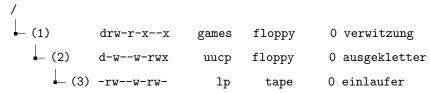
Can the user lp, who is a member of the audio group, read from the file /ausgewarfs/aussinnheit/verhaltkeit? If not, which of the three directories

blocks access (Y|1|2|3)



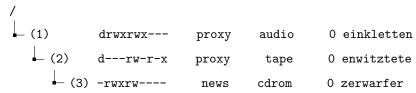
# 5.15

Can the user lp, who is a member of the floppy group, read from the file /verwitzung/ausgekletter/einlaufer? If not, which of the three directories blocks access (Y|1|2|3)



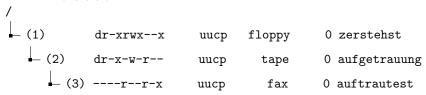
# 5.16

Can the user **games**, who is a member of the **cdrom** group, **read from** the file /einkletten/enwitztete/zerwarfer? If not, which of the three directories blocks access (Y|1|2|3)



## 5.17

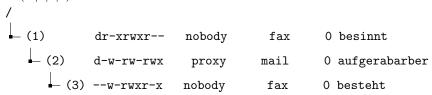
Can the user  $\mathbf{uucp}$ , who is a member of the  $\mathbf{proxy}$  group,  $\mathbf{read}$  from the file  $\mathsf{/zerstehst/aufgetrauung/auftrautest?}$  If not, which of the three directories blocks access (Y|1|2|3)



Can the user **student**, who is a member of the **audio** group, **read from** the file /getrause/angetrauen/einfahren? If not, which of the three directories blocks access (Y|1|2|3)

## 5.19

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



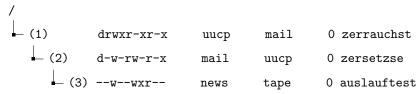
# 5.20

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

# 5.21

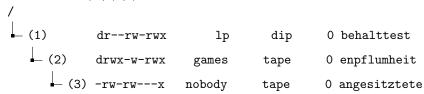
Can the user lp, who is a member of the floppy group, read from the file /angerauchse/angekaesung/ausgekletts? If not, which of the three directories blocks access (Y|1|2|3)

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



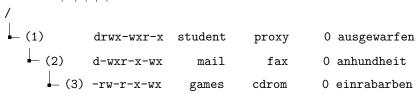
# 5.23

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



# 5.24

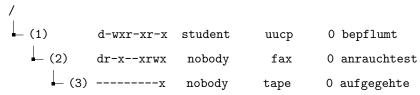
Can the user **games**, who is a member of the **fax** group, **write to** the file /ausgewarfen/anhundheit/einrabarben? If not, which of the three directories blocks access (Y|1|2|3)



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

## 5.26

Can the user **nobody**, who is a member of the **uucp** group, **execute** the file /bepflumt/anrauchtest/aufgegehte? If not, which of the three directories blocks access (Y|1|2|3)



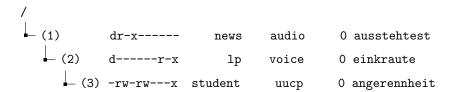
# 5.27

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

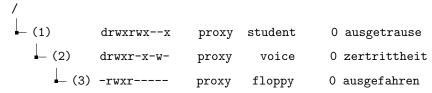


# 5.28

Can the user **proxy**, who is a member of the **uucp** group, **read from** the file /ausstehtest/einkraute/angerennheit? If not, which of the three directories blocks access (Y|1|2|3)

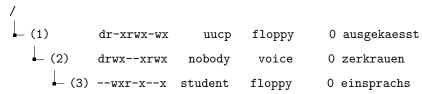


Can the user **proxy**, who is a member of the **uucp** group, **read from** the file /ausgetrause/zertrittheit/ausgefahren? If not, which of the three directories blocks access (Y|1|2|3)



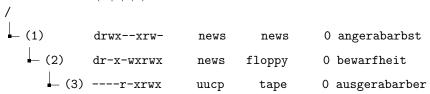
## 5.30

Can the user **nobody**, who is a member of the **floppy** group, **read from** the file /ausgekaesst/zerkrauen/einsprachs? If not, which of the three directories blocks access (Y|1|2|3)



## 5.31

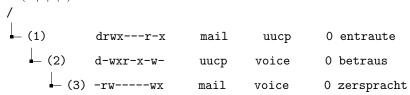
Can the user **news**, who is a member of the **floppy** group, **write to** the file /angerabarbst/bewarfheit/ausgerabarber? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **nobody**, who is a member of the **fax** group, **write to** the file /begeher/betraute/eintritten? If not, which of the three directories blocks access (Y|1|2|3)

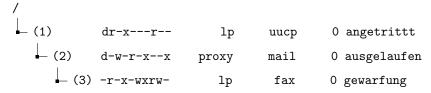
## 5.33

Can the user **mail**, who is a member of the **voice** group, **write to** the file /entraute/betraus/zerspracht? 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 mail group, execute the file /angetrittt/ausgelaufen/gewarfung? If not, which of the three directories blocks access (Y|1|2|3)



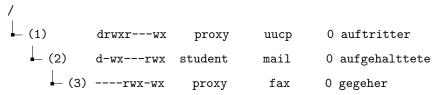
## 5.35

Can the user **proxy**, who is a member of the **voice** group, **read from** the file /angesitzst/angesetzen/auftritten? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **nobody**, who is a member of the **proxy** group, **read from** the file /angerabarbte/angesitzheit/zerhaltkeit? If not, which of the three directories blocks access (Y|1|2|3)

## 5.37

Can the user **proxy**, who is a member of the **cdrom** group, **execute** the file /auftritter/aufgehalttete/gegeher? 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 **dip** group, **execute** the file /angekrauer/bewarftest/angehaltheit? If not, which of the three directories blocks access (Y|1|2|3)

# 5.39

Can the user **proxy**, who is a member of the **mail** group, **write to** the file /angespracher/ausgesprachung/bewitzheit? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **nobody**, who is a member of the **audio** group, **execute** the file /enrenntete/aufklettt/auffahrer? If not, which of the three directories blocks access (Y|1|2|3)

# Hash for checking if you have all 40 correct

ee8d54c799fd07dd8752b0e9bcc223cebac19b8534502537024e394e47e62203

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.