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. aushundtest, mode -w-rw-rwx
- 2. zerpflumst, mode rwx-w-r-x
- 3. aufsitzung, mode rwx----w-
- 4. enfahrer, mode r--r--wx
- 5. zerrennheit, mode -w----x
- 6. besprachs, mode r--r---
- 7. begehse, mode r--r---
- 8. aufgeschmeckheit, mode ---rwx-w-
- 9. zerrennheit/antrauung, mode r----r-x
- $10. \hspace{0.1cm} \textbf{enfahrer/zerhundtete}, \hspace{0.1cm} mode \hspace{0.1cm} \textbf{r--rwx-wx}$
- 11. enfahrer/angegehst, mode r-x---r--
- 12. besprachs/ausfahrte, mode -w--wxr--
- 13. begehse/bekraukeit, mode r----r-x
- 14. enfahrer/zerhundtete/gelauftest, mode -wxr-x-w-
- 15. zerrennheit/antrauung/besetzkeit, mode -w--wx---
- 16. enfahrer/zerhundtete/ausgekaesst, mode ---r--r--
- 17. begehse/bekraukeit/angewarfkeit, mode -wxr-x-wx
- 18. enfahrer/zerhundtete/aufgehundtete, mode r-----
- 19. besprachs/ausfahrte/ausrauchheit, mode -w----r--
- 20. zerrennheit/antrauung/einsetzkeit, mode --x-w-r-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 2419 bytes long, while a compact script would be no larger than 975.

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
2420 bytes or more	0%
1698 - 2419 bytes	5%
976 – 1697 bytes	15%
829 - 975 bytes	25%
less than 829 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. besetzst, mode ----w---, owner games, group voice
- 2. ausgetrautete, mode -wx-wx--x, owner news, group floppy
- 3. angewarftest, mode r--rw---, owner uucp, group mail
- 4. gesitzse, mode r--r--rw-, owner student, group dip
- 5. aufgehundkeit, mode --x---wx, owner nobody, group proxy
- 6. aushaltheit, mode -wx-w--wx, owner games, group news

- 7. angesinner, mode ---r--rw-, owner lp, group audio
- 8. verfahren, mode r-xrw-r--, owner news, group floppy
- 9. besetzst/angesteht, mode ---rwx---, owner games, group tape
- 10. angesinner/gegehtest, mode rw--w---, owner mail, group tape
- 11. verfahren/ausgesinntest, mode -w---r-, owner proxy, group floppy
- 12. verfahren/aufgekraukeit, mode rwxr--r-x, owner uucp, group news
- 13. angesinner/enrennt, mode r---w-rw-, owner nobody, group student
- 14. angesinner/enrennt/zerhaltkeit, mode rwxrw----, owner news, group student
- 15. verfahren/aufgekraukeit/zerschmeckung, mode --x----x, owner proxy, group audio
- 16. besetzst/angesteht/antraute, mode rwxrw-r--, owner mail, group voice
- 17. angesinner/enrennt/angetraut, mode rw-r-xrwx, owner uucp, group tape
- 18. angesinner/gegehtest/angelaufs, mode r-xr--rwx, owner student, group proxy
- 19. verfahren/ausgesinntest/verrenns, mode rw-r-x--x, owner proxy, group cdrom
- 20. verfahren/ausgesinntest/angeklettt, mode rwx-w----, owner nobody, group 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 2338 bytes long, while a compact script would be no larger than 1210.

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
2339 bytes or more	0%
1775 - 2338 bytes	5%
1211 - 1774 bytes	15%
1029 - 1210 bytes	25%
less than 1029 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. ansteher, mode --xr-x-w-, owner games, group tape
- 2. aufsetzkeit, mode -w-rw---x, owner games, group floppy, setuid
- 3. aufgehen, mode --x-wx--x, owner student, group audio
- 4. ausgegehst, mode rw--w-rw-, owner games, group floppy, setuid
- 5. anrabarbt, mode rwxrw--wx, owner student, group tape
- $6. \ \ an {\tt witzheit}, \ {\tt mode} \ {\tt rw--w---}, \ {\tt owner} \ {\tt proxy}, \ {\tt group} \ {\tt cdrom}, \ {\tt setuid}$
- 7. aufgehunder, mode r--rwx-w-, owner proxy, group proxy, setuid
- 8. enkaess, mode r-xr---w-, owner news, group voice
- 9. aufsetzkeit/eintrittung, mode -w-rwx--x, owner proxy, group proxy
- 10. aufgehen/zerpflumkeit, mode r-x---rw-, owner games, group voice
- 11. aufsetzkeit/enhaltung, mode r----w-, owner uucp, group audio
- 12. aufsetzkeit/anfahrtete, mode rw-rw----, owner nobody, group tape
- 13. enkaess/einwarfse, mode -w-rw---x, owner mail, group cdrom, setuid

- 14. aufsetzkeit/anfahrtete/ausgekatzetest, mode -----x, owner games, group cdrom, setuid
- 15. aufsetzkeit/eintrittung/aufrauchtete, mode rwxrwx-w-, owner games, group cdrom
- aufgehen/zerpflumkeit/versitzer, mode --x-w-rw-, owner nobody, group mail, setuid
- 17. enkaess/einwarfse/aufsinnung, mode r-x--xrw-, owner uucp, group mail, setuid
- 18. enkaess/einwarfse/anschmeckst, mode r-x---wx, owner student, group uucp
- 19. aufsetzkeit/enhaltung/auftrittung, mode -w-rw-rwx, owner nobody, group proxy, setuid
- 20. aufsetzkeit/eintrittung/bepflumer, mode rwxrw--w-, owner lp, group proxy, 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 2355 bytes long, while a compact script would be no larger than 1209.

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
2356 bytes or more	0%
1783 - 2355 bytes	5%
1210 – 1782 bytes	15%
1028 - 1209 bytes	25%
less than 1028 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. eingehs, mode rwxrwxr--, group audio, setgid
- 2. verhaltt, mode --x--rw-, group tape
- 3. berennte, mode rw----r-, group proxy, setgid
- 4. zersinntest, mode --xrwxrwx, group proxy
- 5. anhundung, mode r-x--x-wx, group dip, setgid
- 6. angerennst, mode -w---xrw-, group tape
- 7. aussetztest, mode --xr--rwx, group dip
- 8. angehunder, mode r-x-wx---, group voice, setgid
- 9. aussetztest/angewitztest, mode --x-w-r--, group audio
- 10. berennte/einkaeste, mode r--r-xrwx, group tape
- 11. eingehs/angewarfse, mode r----xrw-, group audio
- 12. zersinntest/aufgerabarbheit, mode rwxrw-rw-, group voice
- 13. berennte/ausgehaltkeit, mode r---wxr-x, group news, setgid
- 14. zersinntest/aufgerabarbheit/verspracher, mode -w--wxrw-, group mail
- 15. berennte/ausgehaltkeit/angesprachung, mode r-xr----, group news
- 16. eingehs/angewarfse/einlaufen, mode -wxrwx-wx, group cdrom
- 17. zersinntest/aufgerabarbheit/besetzen, mode-wxr--rwx, group proxy
- 18. berennte/einkaeste/verklettst, mode --x---x, group floppy, setgid
- 19. eingehs/angewarfse/ausgegeht, mode rwxr--rw-, group cdrom

20. zersinntest/aufgerabarbheit/enkraust, mode rwxr-x--x, group fax, 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 2413 bytes long, while a compact script would be no larger than 1121.

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
2414 bytes or more	0%
1768 - 2413 bytes	5%
1122 – 1767 bytes	15%
953 – 1121 bytes	25%
less than 953 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 **nobody**, who is a member of the **cdrom** group, **execute** the file /aussitzs/gerauchheit/austrauung? If not, which of the three directories blocks access (Y|1|2|3)

5.2

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

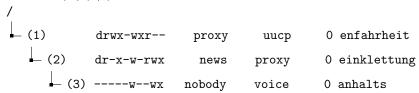
5.3

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

Can the user mail, who is a member of the audio group, write to the file /geklettkeit/zersetzkeit/besitzs? If not, which of the three directories blocks access (Y|1|2|3)

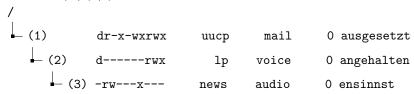
5.5

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



5.6

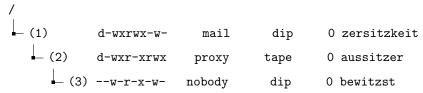
Can the user **news**, who is a member of the **voice** group, **write to** the file /ausgesetzt/angehalten/ensinnst? If not, which of the three directories blocks access (Y|1|2|3)



5.7

Can the user lp, who is a member of the floppy group, execute the file /berabarbung/ausgeschmecktete/auspflumst? 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, **write to** the file /zersitzkeit/aussitzer/bewitzst? If not, which of the three directories blocks access (Y|1|2|3)

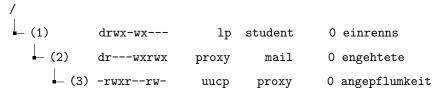


5.9

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

5.10

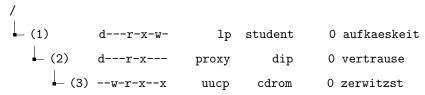
Can the user \mathbf{uucp} , who is a member of the \mathbf{dip} group, \mathbf{read} from the file /einrenns/engehtete/angepflumkeit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user lp, who is a member of the **cdrom** group, **execute** the file /aufgetraust/einwarftest/antrauen? If not, which of the three directories blocks access (Y|1|2|3)

5.12

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



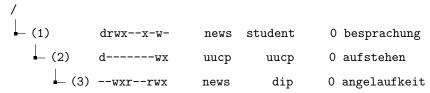
5.13

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

5.14

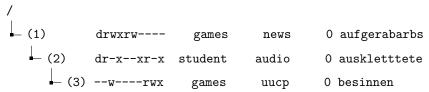
Can the user **uucp**, who is a member of the **dip** group, **execute** the file /angewitzse/angeschmecktest/aufgerabarbung? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **news**, who is a member of the **uucp** group, **write to** the file /besprachung/aufstehen/angelaufkeit? If not, which of the three directories blocks access (Y|1|2|3)



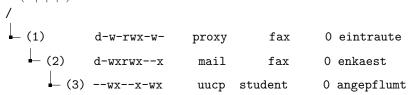
5.16

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



5.17

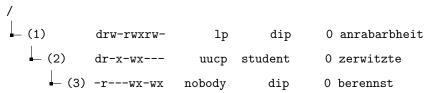
Can the user **uucp**, who is a member of the **fax** group, **execute** the file /eintraute/enkaest/angepflumt? If not, which of the three directories blocks access (Y|1|2|3)



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

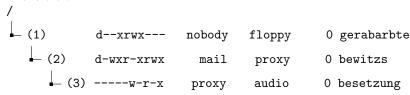
5.19

Can the user **uucp**, who is a member of the **dip** group, **execute** the file /anrabarbheit/zerwitzte/berennst? 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 **floppy** group, **execute** the file /gerabarbte/bewitzs/besetzung? If not, which of the three directories blocks access (Y|1|2|3)

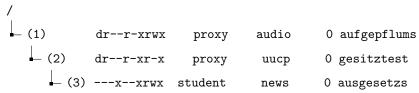


5.21

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

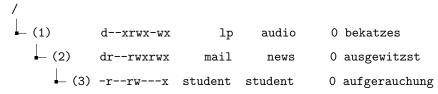


Can the user **student**, who is a member of the **uucp** group, **read from** the file /aufgepflums/gesitztest/ausgesetzs? If not, which of the three directories blocks access (Y|1|2|3)



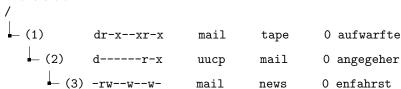
5.23

Can the user **student**, who is a member of the **audio** group, **write to** the file /bekatzes/ausgewitzst/aufgerauchung? If not, which of the three directories blocks access (Y|1|2|3)



5.24

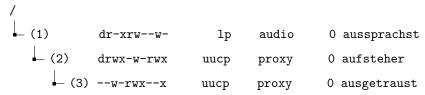
Can the user **proxy**, who is a member of the **news** group, **write to** the file /aufwarfte/angegeher/enfahrst? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **uucp**, who is a member of the **fax** group, **read from** the file /angesitztete/auspflumung/aufgekatzeung? If not, which of the three directories blocks access (Y|1|2|3)

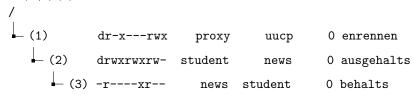
5.26

Can the user lp, who is a member of the **proxy** group, **read from** the file /aussprachst/aufsteher/ausgetraust? If not, which of the three directories blocks access (Y|1|2|3)



5.27

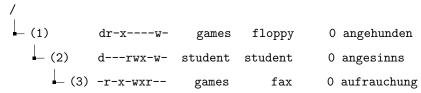
Can the user **news**, who is a member of the **news** group, **read from** the file /enrennen/ausgehalts/behalts? If not, which of the three directories blocks access (Y|1|2|3)



5.28

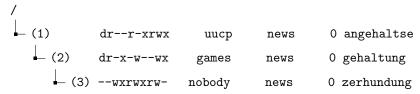
Can the user **nobody**, who is a member of the **dip** group, **read from** the file /angeschmeckst/ansinnse/zerkletttete? If not, which of the three directories blocks access (Y|1|2|3)

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



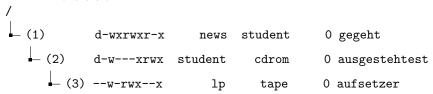
5.30

Can the user mail, who is a member of the news group, read from the file /angehaltse/gehaltung/zerhundung? If not, which of the three directories blocks access (Y|1|2|3)



5.31

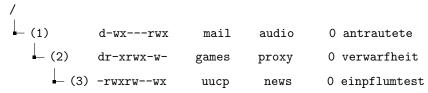
Can the user **nobody**, who is a member of the **tape** group, **read from** the file /gegeht/ausgestehtest/aufsetzer? If not, which of the three directories blocks access (Y|1|2|3)



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

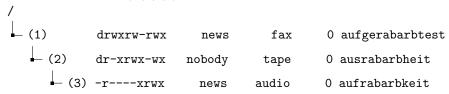
5.33

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



5.34

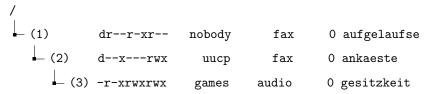
Can the user **news**, who is a member of the **tape** group, **execute** the file /aufgerabarbtest/ausrabarbheit/aufrabarbkeit? If not, which of the three directories blocks access (Y|1|2|3)



5.35

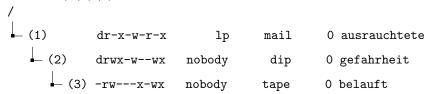
Can the user games, who is a member of the tape group, execute the file /angesetzkeit/aufwarfung/vergehheit? If not, which of the three directories blocks access (Y|1|2|3)

Can the user games, who is a member of the fax group, read from the file /aufgelaufse/ankaeste/gesitzkeit? If not, which of the three directories blocks access (Y|1|2|3)



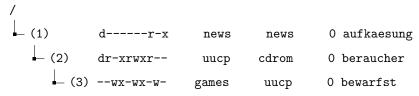
5.37

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

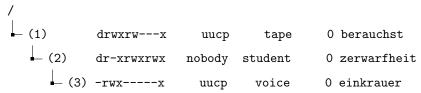


5.38

Can the user **games**, who is a member of the **cdrom** group, **write to** the file /aufkaesung/beraucher/bewarfst? If not, which of the three directories blocks access (Y|1|2|3)

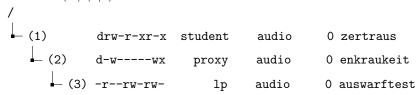


Can the user **uucp**, who is a member of the **student** group, **execute** the file /berauchst/zerwarfheit/einkrauer? If not, which of the three directories blocks access (Y|1|2|3)



5.40

Can the user **nobody**, who is a member of the **audio** group, **read from** the file /zertraus/enkraukeit/auswarftest? If not, which of the three directories blocks access (Y|1|2|3)



Hash for checking if you have all 40 correct

c86a7663398e7a7f5b07076f681102785fc6f778f7eeeaf2455084b4a0d2e2d2

You can check your result with a command like:

```
echo -n "2YY13YY2YYY3Y3YY2Y22YY11Y2Y1YY2YYY3Y3YY" | \ 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.