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. verkaesung, mode -w---x---
- 2. zerfahrte, mode r-xrwxr-x
- 3. angeklettheit, mode ----r-x
- 4. enrauchheit, mode rw-r----
- 5. ausgepflumen, mode --xrwx--x
- 6. auswitzst, mode ---rwxrw-
- 7. angeschmecken, mode --xr-x--x
- 8. aufsprachkeit, mode -w-rw--wx
- 9. ausgepflumen/aushundkeit, mode -wxr-xr--
- 10. angeschmecken/auftrittheit, mode r-xrw-rw-
- 11. angeklettheit/gewarfs, mode ----x-w-
- 12. angeschmecken/zerstehheit, mode -wxrwx-w-
- 13. zerfahrte/ausgegehheit, mode -w-rwxrwx
- 14. ausgepflumen/aushundkeit/aufsteher, mode rw-rw-rwx
- 15. angeschmecken/zerstehheit/gesitzer, mode r-xr-x-w-
- 16. ausgepflumen/aushundkeit/anhaltheit, mode --x-w--wx
- 17. zerfahrte/ausgegehheit/angekraust, mode ---rw-r-x
- 18. angeklettheit/gewarfs/ankaesen, mode r----rwx
- 19. zerfahrte/ausgegehheit/angetritten, mode rwx-w-rw-
- 20. angeschmecken/auftrittheit/ausgeschmeckte, mode rw--wxr-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 2554 bytes long, while a compact script would be no larger than 970.

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 |
|---------------------|------------|
| 2555 bytes or more | 0% |
| 1763 - 2554 bytes | 5% |
| 971 - 1762 bytes | 15% |
| 825 - 970 bytes | 25% |
| less than 825 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. zersetzkeit, mode r----rw-, owner proxy, group dip
- 2. begehen, mode --xr--r-, owner nobody, group floppy
- 3. einhaltt, mode rw---xr--, owner proxy, group proxy
- 4. angegehkeit, mode ----xr--, owner mail, group fax
- 5. bewitzs, mode -w---xrwx, owner lp, group voice
- 6. aufgewitzheit, mode -w---x-w-, owner student, group floppy

- 7. ausgehtest, mode r-xr--r-x, owner student, group student
- 8. angekaess, mode r----rw-, owner lp, group floppy
- 9. begehen/berabarbkeit, mode ---r-rwx, owner mail, group tape
- 10. zersetzkeit/enkletts, mode rwx----wx, owner mail, group audio
- 11. angekaess/zersprachen, mode ---r-xr--, owner lp, group fax
- 12. bewitzs/auffahrse, mode rwx-wx--x, owner news, group mail
- 13. angekaess/angesinnheit, mode --xrw--wx, owner proxy, group voice
- 14. angekaess/angesinnheit/aufgelaufkeit, mode ---r-x-w-, owner lp, group cdrom
- 15. angekaess/angesinnheit/ausgekletttete, mode ---r-xrwx, owner mail, group news
- 16. zersetzkeit/enkletts/gerabarbse, mode --x---w-, owner mail, group audio
- 17. angekaess/angesinnheit/einrabarber, moder-xrw-r-x, owner lp, group voice
- 18. bewitzs/auffahrse/ausgewarfkeit, mode ---r-xr--, owner proxy, group tape
- 19. begehen/berabarbkeit/ausgerabarbung, mode rw----wx, owner nobody, group fax
- 20. angekaess/zersprachen/engehtete, mode r---w-r-x, owner lp, group dip

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

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

An unsophisticated script to complete this would be 2332 bytes long, while a compact script would be no larger than 1196.

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 |
|----------------------|------------|
| 2333 bytes or more | 0% |
| 1765 - 2332 bytes | 5% |
| 1197 – 1764 bytes | 15% |
| 1017 – 1196 bytes | 25% |
| less than 1017 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. ausfahrs, mode ---r--rw-, owner games, group tape, setuid
- 2. besitzkeit, mode -wx-----, owner mail, group news, setuid
- 3. angegehs, mode -w--w-, owner lp, group floppy, setuid
- 4. verkatzes, mode --xrwx--x, owner nobody, group dip, setuid
- 5. zerklettse, mode -wxr-x-w-, owner uucp, group voice
- 6. aufgehaltse, mode rw---xr-x, owner mail, group news
- 7. aufgehundse, mode r-x-wxr-x, owner uucp, group audio
- 8. aufgetrittst, mode rw-rwxrw-, owner mail, group uucp
- 9. aufgetrittst/aufgesetzst, mode rwx----x, owner student, group floppy
- 10. aufgetrittst/anpflumung, mode ----wx-wx, owner mail, group audio, setuid
- 11. zerklettse/ausstehtete, mode rw--w--wx, owner mail, group fax, setuid

- 12. aufgehaltse/ausgesinnst, mode ---r-x-wx, owner mail, group dip
- 13. aufgehundse/aufsinnt, mode --xr-x--x, owner games, group mail, setuid
- 14. aufgehaltse/ausgesinnst/eingehse, mode rwx-wx---, owner news, group floppy, setuid
- 15. aufgetrittst/aufgesetzst/gewarftest, mode r---wx---, owner mail, group student
- 16. aufgetrittst/anpflumung/besitzer, mode rw--wx-w-, owner uucp, group dip, setuid
- 17. aufgehaltse/ausgesinnst/bewitzt, mode ---rw----, owner proxy, group mail
- 18. aufgetrittst/aufgesetzst/einrabarbkeit, moderwx-w-r-x, owner games, group tape, setuid
- 19. zerklettse/ausstehtete/bespracher, moder-x---wx, owner student, group proxy, setuid
- 20. aufgetrittst/aufgesetzst/anhalter, mode-wx-w--w-, owner lp, 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 1202.

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% |
| 1798 - 2393 bytes | 5% |
| 1203 - 1797 bytes | 15% |
| 1022 - 1202 bytes | 25% |
| less than 1022 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. aufgetrittheit, mode -wxrw-r-x, group proxy
- 2. ankletter, mode r-x-wx-w-, group mail
- 3. zerrennkeit, mode -w-r----, group floppy
- 4. berennt, mode rwxrwx---, group uucp, setgid
- 5. angegehtete, mode ---r-x, group audio
- 6. aufsinnst, mode -wxr---x, group dip
- 7. ensitztete, mode -w-r-xrwx, group floppy
- 8. gesetzkeit, mode -w--w-, group dip
- $9. \ \mathtt{aufgetrittheit/geraucht}, \ \mathrm{mode} \ \mathtt{\neg wxrwxr--}, \ \mathrm{group} \ \mathtt{voice}$
- 10. ankletter/gewarfen, mode rwx-w---x, group proxy, setgid
- 11. aufgetrittheit/anschmeckheit, mode --xr--r-x, group tape, setgid
- 12. aufsinnst/aufgelaufung, mode ----wxrwx, group mail
- 13. aufgetrittheit/verkaestest, mode rwxr---x, group uucp
- 14. aufgetrittheit/verkaestest/gelaufte, moder--rw-r-x, group student, setgid
- 15. aufgetrittheit/verkaestest/ankaeskeit, mode --xr--rw-, group cdrom
- 16. ankletter/gewarfen/einkrautest, mode ---r-x-x, group mail, setgid
- 17. ankletter/gewarfen/verhalts, mode r--r-xr--, group dip, setgid

- 18. aufsinnst/aufgelaufung/zerkrauung, mode --x-w---, group voice, setgid
- 19. aufgetrittheit/verkaestest/einrennse, moder--rwx---, group news
- 20. aufgetrittheit/verkaestest/zerhunds, mode rw-r--rwx, group audio, 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 2462 bytes long, while a compact script would be no larger than 1145.

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 |
|---------------------|------------|
| 2463 bytes or more | 0% |
| 1804 - 2462 bytes | 5% |
| 1146 – 1803 bytes | 15% |
| 974 – 1145 bytes | 25% |
| less than 974 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 **dip** group, **read from** the file /verschmeckst/aufgesitzen/besetzte? If not, which of the three directories blocks access (Y|1|2|3)

5.2

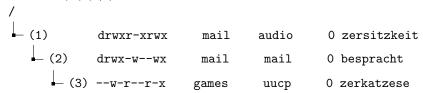
Can the user **student**, who is a member of the **voice** group, **read from** the file /auskatzeung/aufgestehheit/anpflumen? If not, which of the three directories blocks access (Y|1|2|3)

```
/
(1) dr-xrw-r-- student proxy 0 auskatzeung
(2) drwxr-x--x student floppy 0 aufgestehheit
(3) -r--r--rwx student mail 0 anpflumen
```

Can the user **games**, who is a member of the **mail** group, **execute** the file /angesinnen/bekrause/enstehkeit? If not, which of the three directories blocks access (Y|1|2|3)

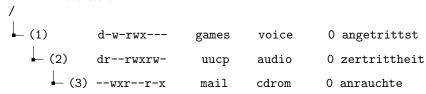
5.4

Can the user mail, who is a member of the uucp group, read from the file /zersitzkeit/bespracht/zerkatzese? If not, which of the three directories blocks access (Y|1|2|3)



5.5

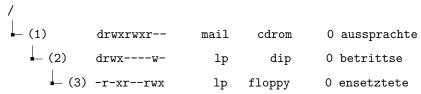
Can the user **student**, who is a member of the **audio** group, **execute** the file /angetrittst/zertrittheit/anrauchte? If not, which of the three directories blocks access (Y|1|2|3)



5.6

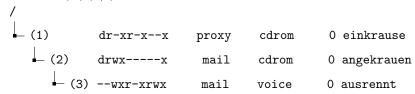
Can the user **news**, who is a member of the **voice** group, **execute** the file /zerwitzer/aufsetztest/zerrabarbte? If not, which of the three directories blocks access (Y|1|2|3)

Can the user lp, who is a member of the cdrom group, write to the file /aussprachte/betrittse/ensetztete? If not, which of the three directories blocks access (Y|1|2|3)



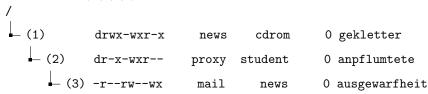
5.8

Can the user **uucp**, who is a member of the **cdrom** group, **write to** the file /einkrause/angekrauen/ausrennt? If not, which of the three directories blocks access (Y|1|2|3)



5.9

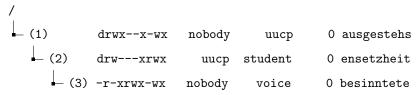
Can the user **proxy**, who is a member of the **news** group, **read from** the file /gekletter/anpflumtete/ausgewarfheit? If not, which of the three directories blocks access (Y|1|2|3)



Can the user **uucp**, who is a member of the **fax** group, **write to** the file /angekatzete/aufgetraust/einwitzheit? If not, which of the three directories blocks access (Y|1|2|3)

5.11

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



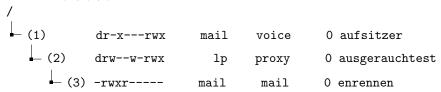
5.12

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

5.13

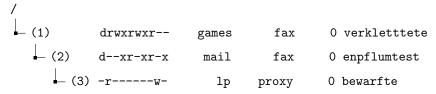
Can the user **student**, who is a member of the **fax** group, **read from** the file /anwarfst/angesprachs/aufhalttest? If not, which of the three directories blocks access (Y|1|2|3)

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



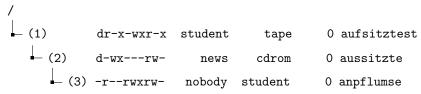
5.15

Can the user **student**, who is a member of the **fax** group, **write to** the file /verkletttete/enpflumtest/bewarfte? If not, which of the three directories blocks access (Y|1|2|3)



5.16

Can the user **uucp**, who is a member of the **cdrom** group, **write to** the file /aufsitztest/aussitzte/anpflumse? If not, which of the three directories blocks access (Y|1|2|3)



Can the user lp, who is a member of the **voice** group, **read from** the file /angewitzst/ausgerauchte/zerkatzetest? If not, which of the three directories blocks access (Y|1|2|3)

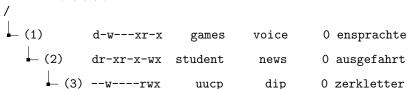
5.18

Can the user lp, who is a member of the tape group, read from the file /angehaltung/einwarfs/angesitzse? If not, which of the three directories blocks access (Y|1|2|3)



5.19

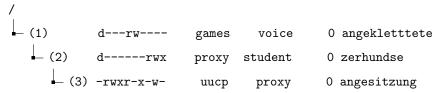
Can the user lp, who is a member of the **news** group, **write to** the file /ensprachte/ausgefahrt/zerkletter? If not, which of the three directories blocks access (Y|1|2|3)



5.20

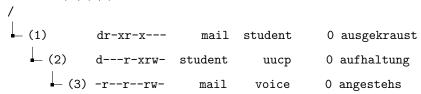
Can the user **uucp**, who is a member of the **uucp** group, **write to** the file /gehundkeit/ausgetrittung/angerauchtest? If not, which of the three directories blocks access (Y|1|2|3)

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



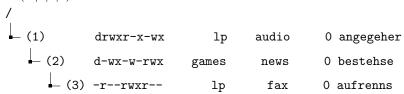
5.22

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



5.23

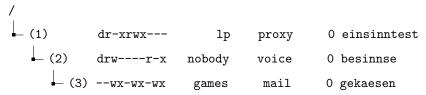
Can the user lp, who is a member of the **news** group, **read from** the file /angegeher/bestehse/aufrenns? If not, which of the three directories blocks access (Y|1|2|3)



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

5.25

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



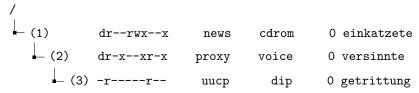
5.26

Can the user **games**, who is a member of the **dip** group, **execute** the file /ensprachtest/einsetzer/aufgestehs? If not, which of the three directories blocks access (Y|1|2|3)

5.27

Can the user **games**, who is a member of the **dip** group, **execute** the file /auflaufkeit/zerrauchte/gelaufst? If not, which of the three directories blocks access (Y|1|2|3)

Can the user **proxy**, who is a member of the **cdrom** group, **read from** the file /einkatzete/versinnte/getrittung? If not, which of the three directories blocks access (Y|1|2|3)

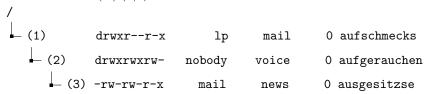


5.29

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

5.30

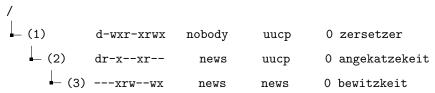
Can the user **news**, who is a member of the **voice** group, **execute** the file /aufschmecks/aufgerauchen/ausgesitzse? If not, which of the three directories blocks access (Y|1|2|3)



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

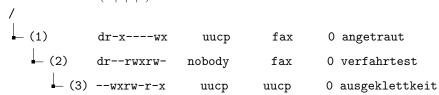
5.32

Can the user **news**, who is a member of the **tape** group, **write to** the file /zersetzer/angekatzekeit/bewitzkeit? If not, which of the three directories blocks access (Y|1|2|3)



5.33

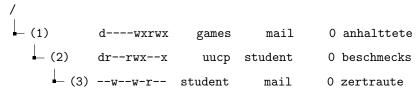
Can the user **uucp**, who is a member of the **fax** group, **read from** the file /angetraut/verfahrtest/ausgeklettkeit? If not, which of the three directories blocks access (Y|1|2|3)



5.34

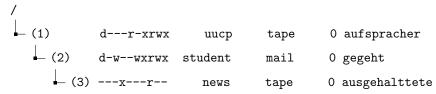
Can the user **nobody**, who is a member of the **voice** group, **read from** the file /aufgehung/angefahrkeit/aussetzen? If not, which of the three directories blocks access (Y|1|2|3)

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



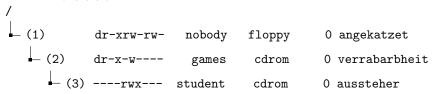
5.36

Can the user **nobody**, who is a member of the **audio** group, **read from** the file /aufspracher/gegeht/ausgehalttete? 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 **cdrom** group, **execute** the file /angekatzet/verrabarbheit/aussteher? If not, which of the three directories blocks access (Y|1|2|3)



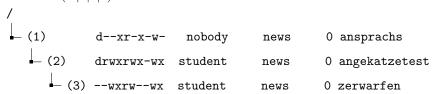
Can the user **student**, who is a member of the **student** group, **execute** the file /zerrauchtete/aufgewitzte/enhaltst? If not, which of the three directories blocks access (Y|1|2|3)

5.39

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

5.40

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



Hash for checking if you have all 40 correct

390 a f 7058 d 5 f 9 c 1188 f d 74982 d 9466 b d a 3 f 48 c 04 e 90 d d 285 d e c 023 a b 84056 e 276 d a 566 b d a 200 d a

You can check your result with a command like:

```
echo "2YY13YY2YYYY3Y3YY2Y22YY11Y2Y1YY2YYY3Y3YY" | \
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.