OPERATING SYSTEMS I.

PERMISSIONS

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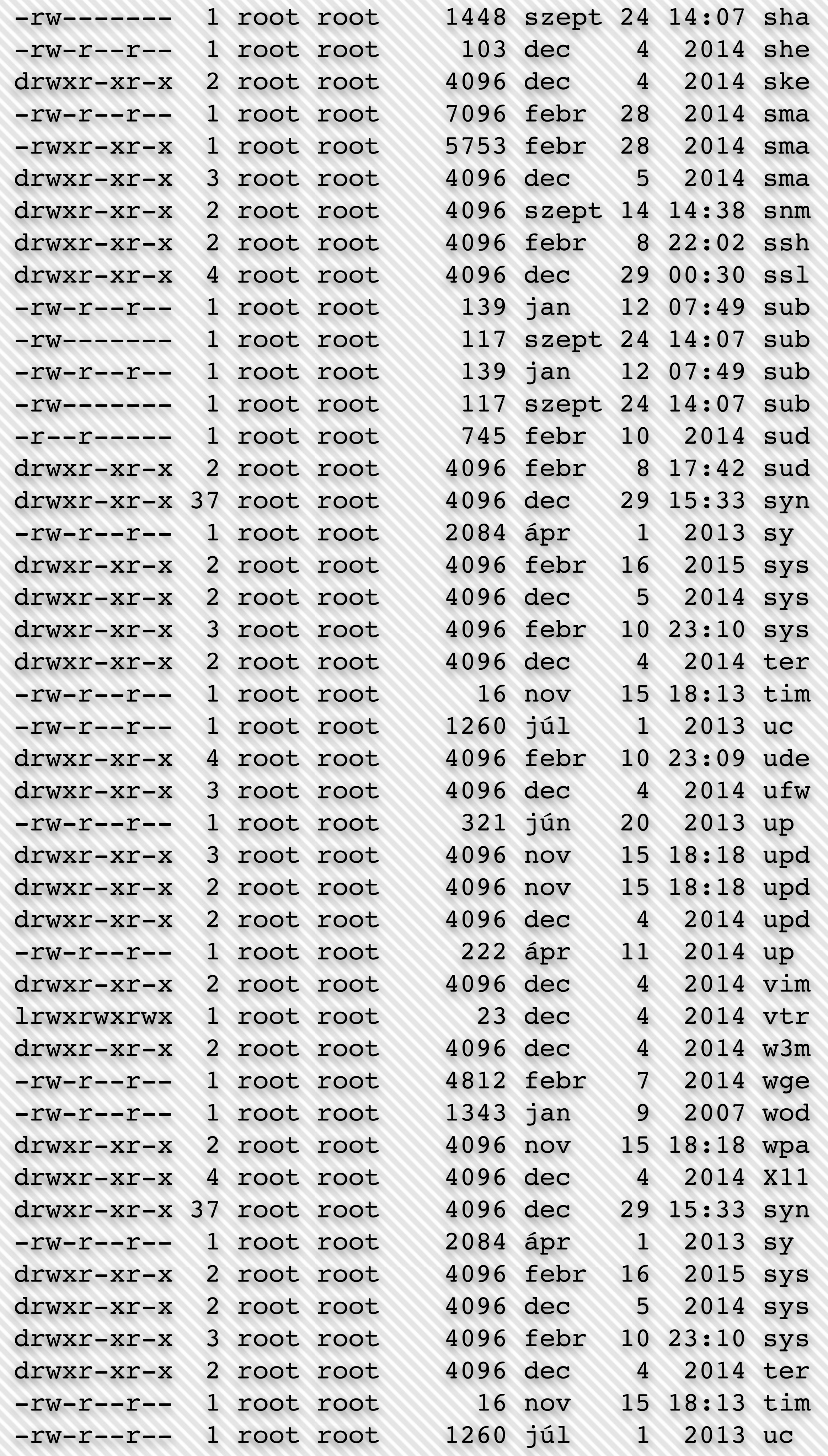
1. Why do we need a permission system?
2. How do operating systems store their users and groups?
3. How does the permission system work in Unix systems?
4. How to set rights?
5. What special rights exist?
6. What are the attributes?
7. Is the permission system better in Windows?
8. What should you learn if you want to know more?



```
-rw-------  1 root root  1448 szept 24 14:07 sha
-rw-r--r--  1 root root   103 dec    4  2014 she
drwxr-xr-x  2 root root  4096 dec    4  2014 ske
-rw-r--r--  1 root root  7096 febr  28  2014 sma
-rwxr-xr-x  1 root root  5753 febr  28  2014 sma
drwxr-xr-x  3 root root  4096 dec    5  2014 sma
drwxr-xr-x  2 root root  4096 szept 14 14:38 snm
drwxr-xr-x  2 root root  4096 febr   8 22:02 ssh
drwxr-xr-x  4 root root  4096 dec   29 00:30 ssl
-rw-r--r--  1 root root   139 jan   12 07:49 sub
-rw-------  1 root root   117 szept 24 14:07 sub
-rw-r--r--  1 root root   139 jan   12 07:49 sub
-rw-------  1 root root   117 szept 24 14:07 sub
-r--r-----  1 root root   745 febr  10  2014 sud
drwxr-xr-x  2 root root  4096 febr   8 17:42 sud
drwxr-xr-x 37 root root  4096 dec   29 15:33 syn
-rw-r--r--  1 root root  2084 ápr    1  2013 sy
drwxr-xr-x  2 root root  4096 febr  16  2015 sys
drwxr-xr-x  2 root root  4096 dec    5  2014 sys
drwxr-xr-x  3 root root  4096 febr  10 23:10 sys
drwxr-xr-x  2 root root  4096 dec    4  2014 ter
-rw-r--r--  1 root root    16 nov   15 18:13 tim
-rw-r--r--  1 root root  1260 júl    1  2013 uc
drwxr-xr-x  4 root root  4096 febr  10 23:09 ude
drwxr-xr-x  3 root root  4096 dec    4  2014 ufw
-rw-r--r--  1 root root   321 jún   20  2013 up
drwxr-xr-x  3 root root  4096 nov   15 18:18 upd
drwxr-xr-x  2 root root  4096 nov   15 18:18 upd
drwxr-xr-x  2 root root  4096 dec    4  2014 upd
-rw-r--r--  1 root root   222 ápr   11  2014 up
drwxr-xr-x  2 root root  4096 dec    4  2014 vim
lrwxrwxrwx  1 root root    23 dec    4  2014 vtr
drwxr-xr-x  2 root root  4096 dec    4  2014 w3m
-rw-r--r--  1 root root  4812 febr   7  2014 wge
-rw-r--r--  1 root root  1343 jan    9  2007 wod
drwxr-xr-x  2 root root  4096 nov   15 18:18 wpa
drwxr-xr-x  4 root root  4096 dec    4  2014 X11
drwxr-xr-x 37 root root  4096 dec   29 15:33 syn
-rw-r--r--  1 root root  2084 ápr    1  2013 sy
drwxr-xr-x  2 root root  4096 febr  16  2015 sys
drwxr-xr-x  2 root root  4096 dec    5  2014 sys
drwxr-xr-x  3 root root  4096 febr  10 23:10 sys
drwxr-xr-x  2 root root  4096 dec    4  2014 ter
-rw-r--r--  1 root root    16 nov   15 18:13 tim
-rw-r--r--  1 root root  1260 júl    1  2013 uc
```

THE TRADITIONAL PERMISSION SYSTEM OF

UNIX

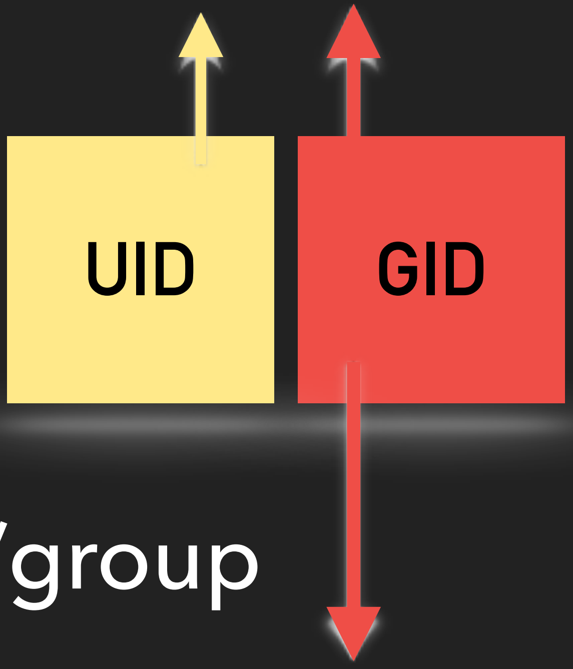
USERS AND RIGHTS IN UNIX

/etc/shadow

```
B0QZ4Y:$1$Qh8FBkSS$NPFHHeP4naTAwy64YU0Bb/:16845:0:99999:7:::
O3O6AB:$1$1e8L6tNV$NoF4hOShLuuWJFfdsDFax0:16845:0:99999:7:::
```

/etc/passwd

```
RHPY5Y:x:1918:112:Tóth Dzsenifer:/home/2016/RHPY5Y:/bin/bash
NU70VQ:x:1919:200:Tóth Nóra:/home/2016/NU70VQ:/bin/bash
CDAV40:x:1920:1921:Tóth Tamás:/home/2016/CDAV40:/bin/bash
```

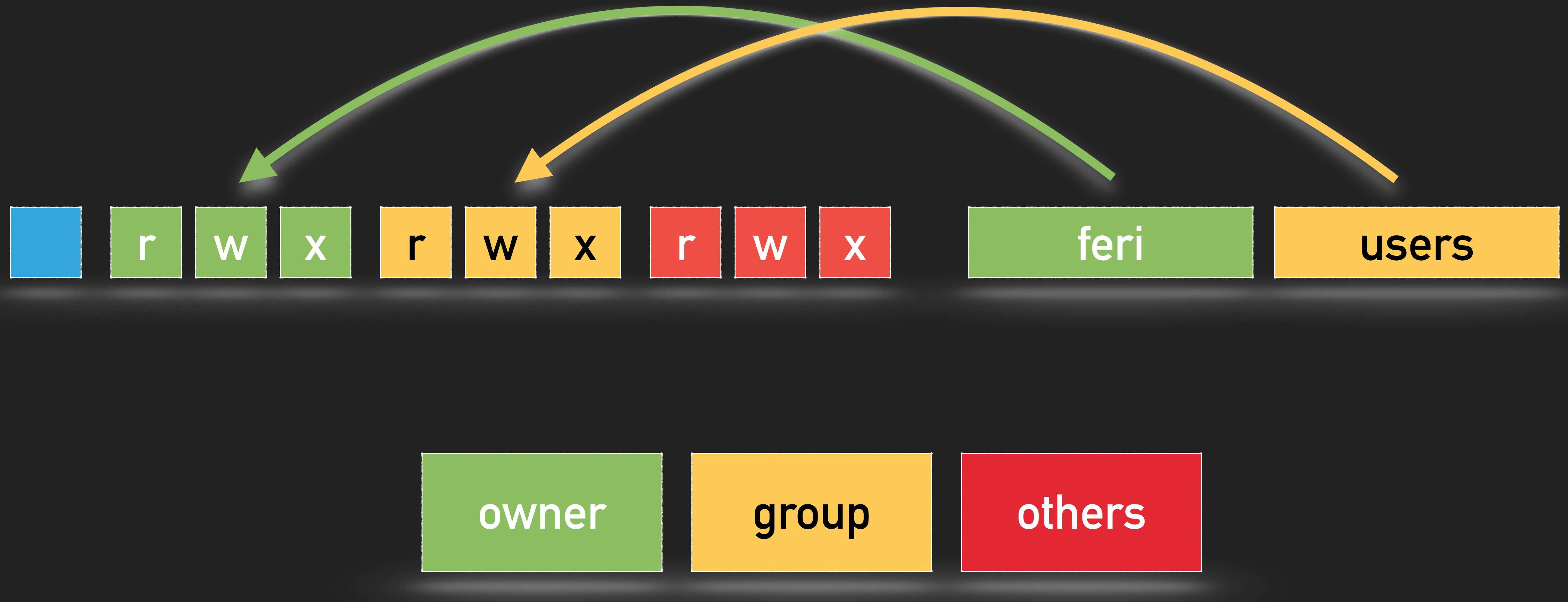


/etc/group

```
riders:x:112:
programmers:x:200:RHPY5Y,B6WSLG
CDAV40:x:1921:
```

ACCESS RIGHTS IN THE FILESYSTEM

```
-rw-r--r-- 1 feri users 1653 jan   12 07:50 test.txt
```



THE TRADITIONAL PERMISSION SYSTEM

File rights

r The **CONTENT** of the file is readable for the owner.

w The **CONTENT** of the file is writable for the owner.

x The file is a program which is e**X**ecutable.
The program rights **MATCH** the owner.

Folder rights

r The **CONTENT** of the folder is readable for the owner.
The content is the list of files and folders.

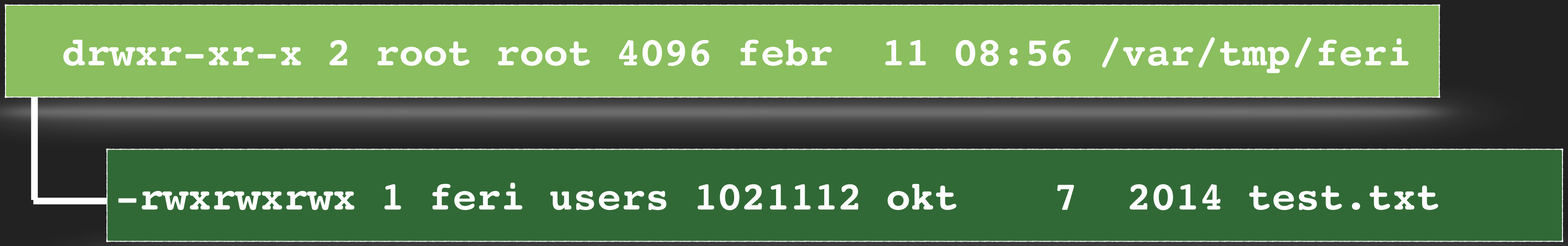
w The **CONTENT** of the folder is writable for the owner. The content is the list of files and folders.

x The user can enter into that folder.

THE TRADITIONAL PERMISSION SYSTEM

WHEN CAN A FILE OR A FOLDER BE DELETED?

If the folder which contains them is writable!



```
drwxr-xr-x 2 root root 4096 febr  11 08:56 /var/tmp/feri
    -rwxrwxrwx 1 feri users 1021112 okt     7   2014 test.txt
```

SETING RIGHTS

chmod UGO object [-R]

4	2	1	4	2	1	4	2	1
r	w	x	r	w	x	r	w	x

```
rwx:  4+2+1  =  7
r-x:  4+0+1  =  5
rw-:  4+2+0  =  6
```

```
chmod 750 apple.txt
```

chmod who operand right object [-R]

```
u+r:  user + read
g-w:  group - write
a=rw: világ: rw-
```

```
chmod u+r apple.txt
```

THE TRADITIONAL PERMISSION SYSTEM

CHANGING THE OWNER OR GROUP

```
-rw-r--r-- 1 feri users 1653 jan   12 07:50 test.txt
```

```
chown owner object [-R]
chgrp owner object [-R]
```

It works only for the root!

```
chown feri /var/tmp/apple.txt
```

```
chgrp users /var/tmp/apple.txt
```

THE PROBLEM OF QUOTA

```
drwxr-xr-x 2 root root 4096 febr  11 08:56 /var/tmp/feri
```

```
-rwxrwxrwx 1 feri users 1021112 okt    7  2014 test.txt
```

SPECIAL PERMISSIONS

SETUID

```
-r--r----- 1 root shadow 24962 febr  18 13:24 /etc/shadow
```

```
B0QZ4Y:$1$Qh8FBkSS$NPFHHeP4naTAwy64YU0Bb/:16845:0:99999:7:::
O3O6AB:$1$1e8L6tNV$NoF4hOShLuuWJFfdsDFax0:16845:0:99999:7:::
```

```
-rwsr-xr-x 1 root root 47032 jan   27 01:50 /usr/bin/passwd
```

The program matches ITS OWNER'S rights.

SETGID

```
-rwxr-sr-x 1 root root    125222 febr  18 21:26 runMe
```

The program matches ITS GROUP'S rights.

A SETUID EXAMPLE

1

```
root@columbo:/var/tmp# ls -l
-rwxr-xr-x 1 root root 14622 febr  28 13:40 sDemo

root@columbo:/var/tmp# ./sDemo
root:$6$nn20QLBRlcw8c6fsYJrl9HSENkiT4S/
Y7omU.kc6nUt/:16623:0:99999:7:::
daemon:*:16623:0:99999:7:::
```

2

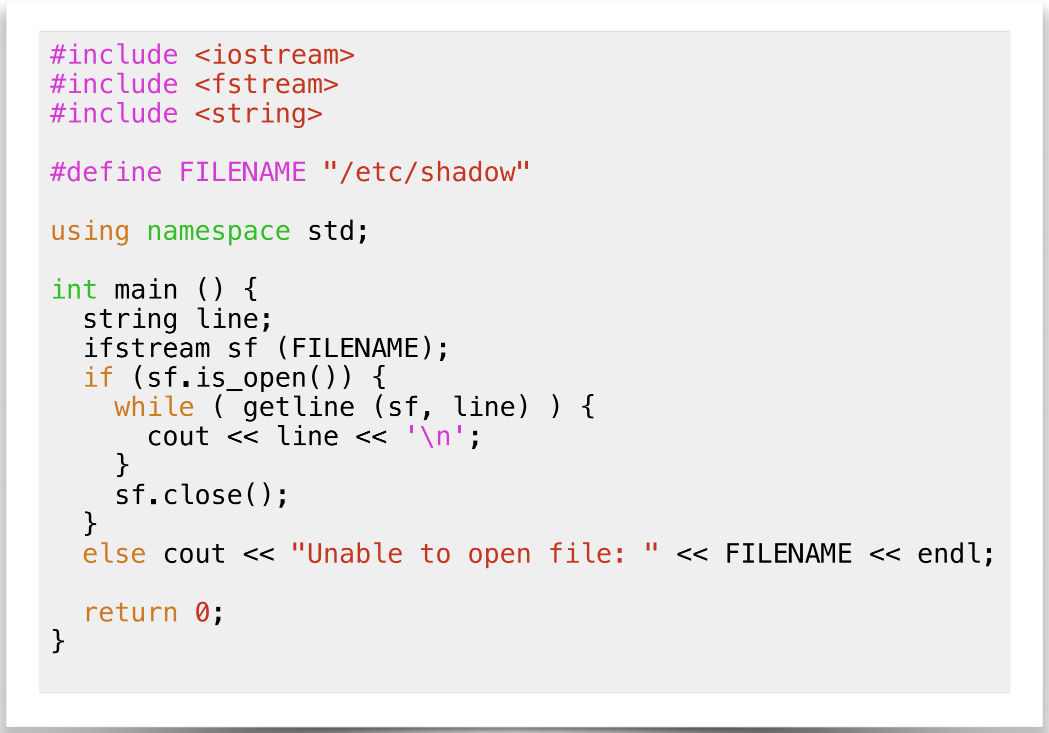
```
feri@columbo:/var/tmp$ ./sDemo
Unable to open file: /etc/shadow
```

3

```
root@columbo:/var/tmp# chmod 4755 sDemo
root@columbo:/var/tmp# ls -l
összesen 16
-rwsr-xr-x 1 root root 14622 febr  28 13:40 setUidDemo
```

4

```
feri@columbo:/var/tmp$ ./sDemo
root:$6$nn20QLBRlcw8c6fsYJrl9HSENkiT4S/
Y7omU.kc6nUt/:16623:0:99999:7:::
daemon:*:16623:0:99999:7:::
```



```cpp
#include <iostream>
#include <fstream>
#include <string>

#define FILENAME "/etc/shadow"

using namespace std;

int main () {
  string line;
  ifstream sf (FILENAME);
  if (sf.is_open()) {
    while ( getline (sf, line) ) {
      cout << line << '\n';
    }
    sf.close();
  }
  else cout << "Unable to open file: " << FILENAME << endl;

  return 0;
}
```

STICKY BIT

C:\users\username\AppData\Local\Temp

Writable only for the owner

/tmp

Writable for all users

```
drwxrwxrwt 55 root root 12288 febr  18 21:50 /tmp
```

r w t

If the sticky bit is turned on,
files in that folder are writable only for their owners

SETTING SPECIAL RIGHTS

chmod SUGO object [-R]

4	2	1	4	2	1	4	2	1	4	2	1
s	s	t	r	w	x	r	w	x	r	w	x

```
rwx:  4+2+1  =  7
r-x:  4+0+1  =  5
rw-:  4+2+0  =  6
```

```
chmod 4755 /tmp/bash
```

chmod who operand right object [-R]

```
g+s:  group setuid
u-s:  user setuid
o+t:  other sticky bit
```

```
chmod g+s /tmp/bash
```

INHERITING GROUP RIGHTS

Inheriting rights is possible with setting setGID and deleting Execute bit.

4	2	1	4	2	1	4	2	1	4	2	1
-	s	-	r	w	-	r	w	-	r	w	-

```
chmod 2660 mail
drw-rwS--- 2 mail users 4096 febr  18 22:31 mail

touch mail/testFile

ls -l mail
-rw-r----- 1 root users    0 febr  18 23:32 testFile
```

UMASK

What rights does a brand new file have? It determines the umask command.

Warning!
In the parameter of umask you must specify rights which you DON'T want to enable!

umask 027

4	2	1	4	2	1	4	2	1
r	w	x	r	-	x	-	-	-

```
umask 027
drwxr-x--- 2 root root  4096 febr  18 23:10 Data
-rw-r----- 1 root root     0 febr  18 23:11 test.txt
```

ATTRIBUTES IN EXT4 FILE SYSTEM

Attributes are extra values which COULD implement special services or functions.

Example: prevent modifying a file or folder:

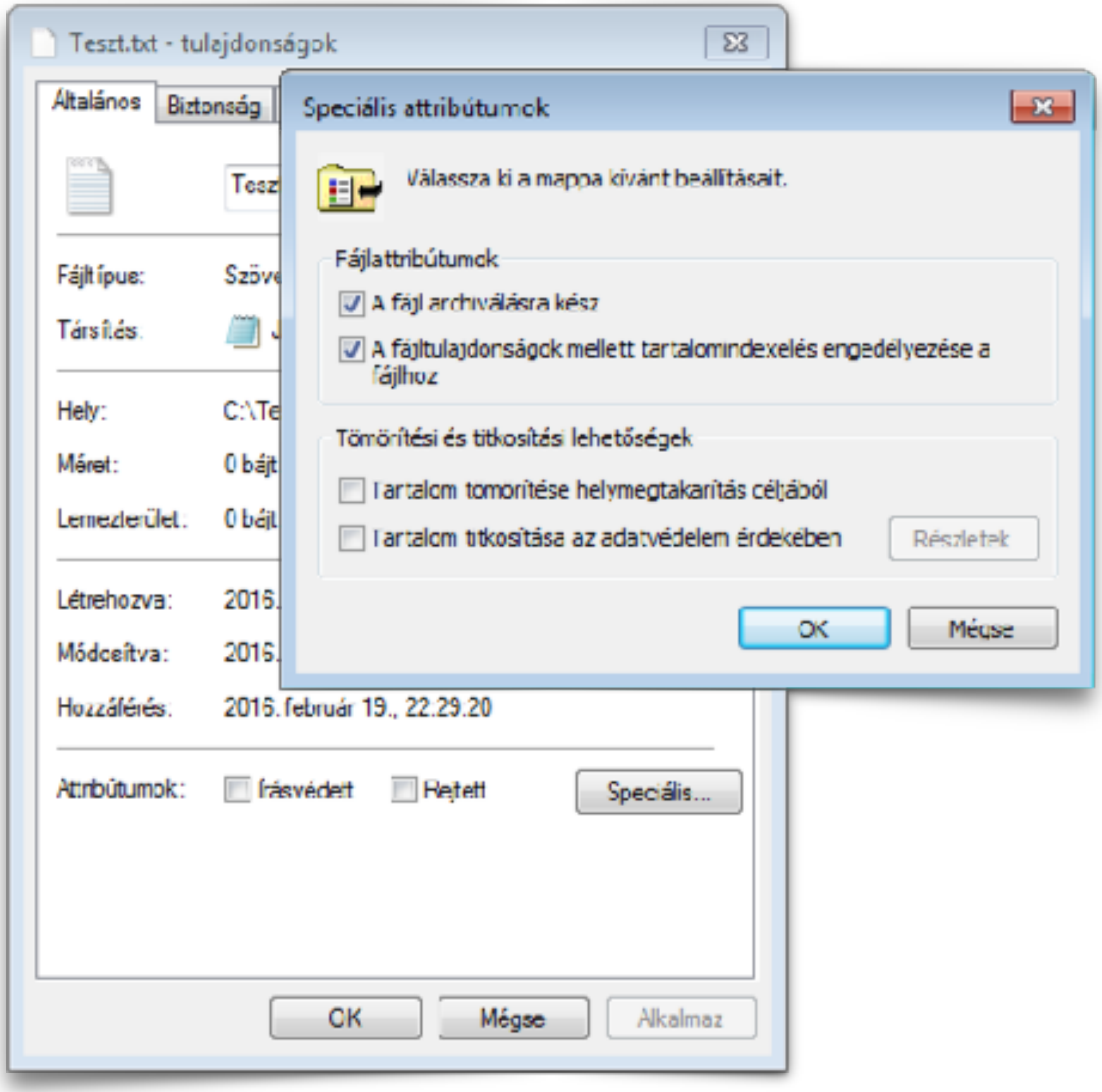
```
lsattr zh.txt
-------------e-- ./test.txt
chattr +i zh.txt

lsattr
----i--------e-- ./test.txt

rm test.txt
-bash: test.txt: Permission denied
```

- append only (a)
- compressed (c)
- no dump (d)
- extent format (e),
- immutable (i),
- data journalling (j),
- secure deletion (s)
- no tail-merging (t),
- undeletable (u),
- no atime updates (A),
- no copy on write (C),
- synchronous directory updates (D),
- synchronous updates (S),
- top of directory hierarchy (T).

ATTRIBUTES IN WINDOWS

Content of write protected files are unchangeable.

Meaning of the **Archive** attribute.



Teszt.txt - tulajdonságok

Fájltípus: Szöve

Társítás:

Hely: C:\Te

Méret: 0 bájt

Lemezterület: 0 bájt

Létrehozva: 2016.

Módosítva: 2016.

Hozzáférés: 2016. február 19., 22.29.20

Attribútumok: □ Írásvédett □ Rejtett

Speciális attribútumok

Válassza ki a mappa kívánt beállításait.

Fájlattribútumok

☑ A fájl archiválásra kész

☑ A fájltulajdonságok mellett tartalomindexelés engedélyezése a fájlhoz

Tömörítési és titkosítási lehetőségek

□ Tartalom tömörítése helymegtakarítás céljából

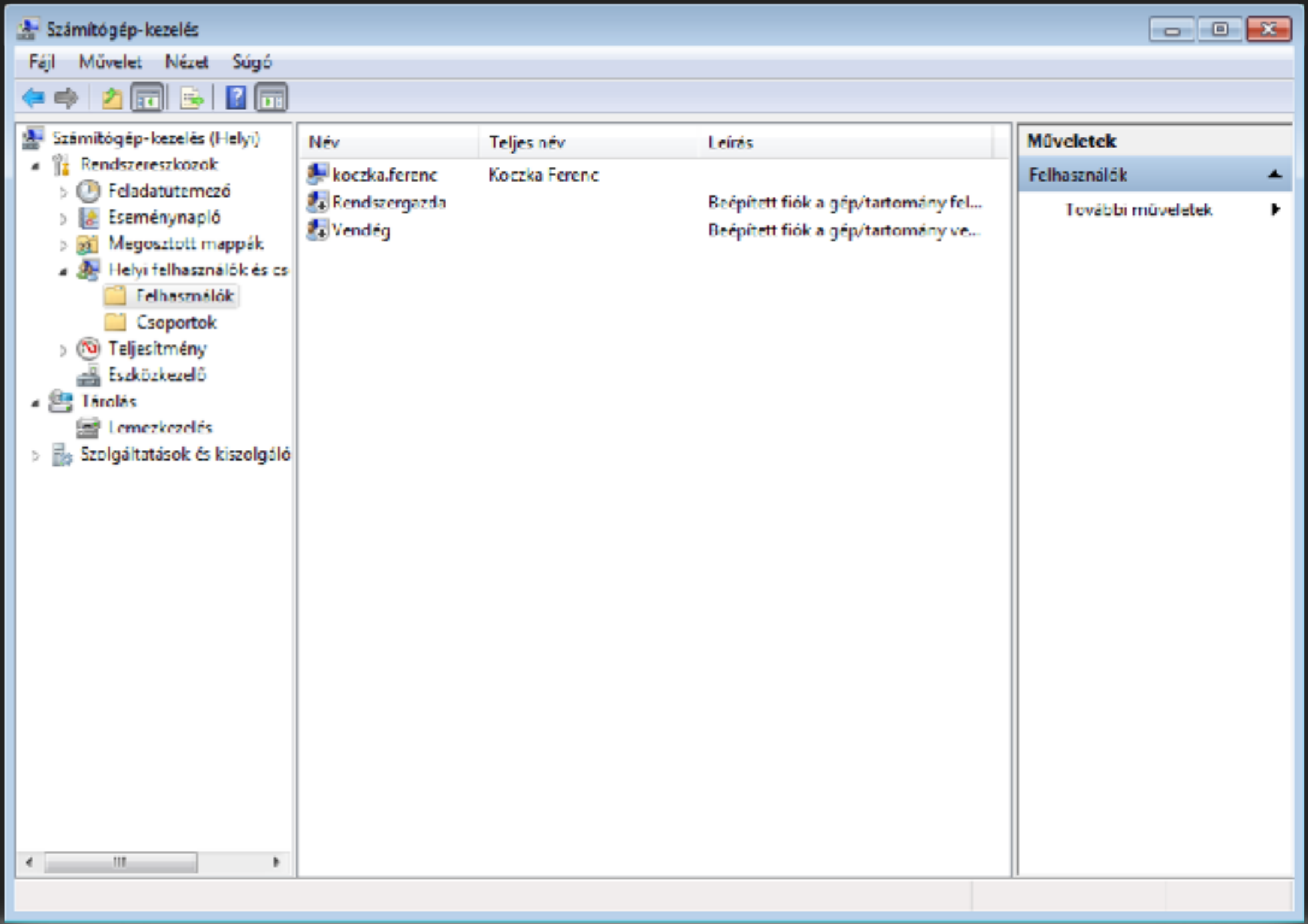
□ Tartalom titkosítása az adatvédelem érdekében

PERMISSION SYSTEM IN

WINDOWS

WINDOWS

User, groups and rights in Windows.



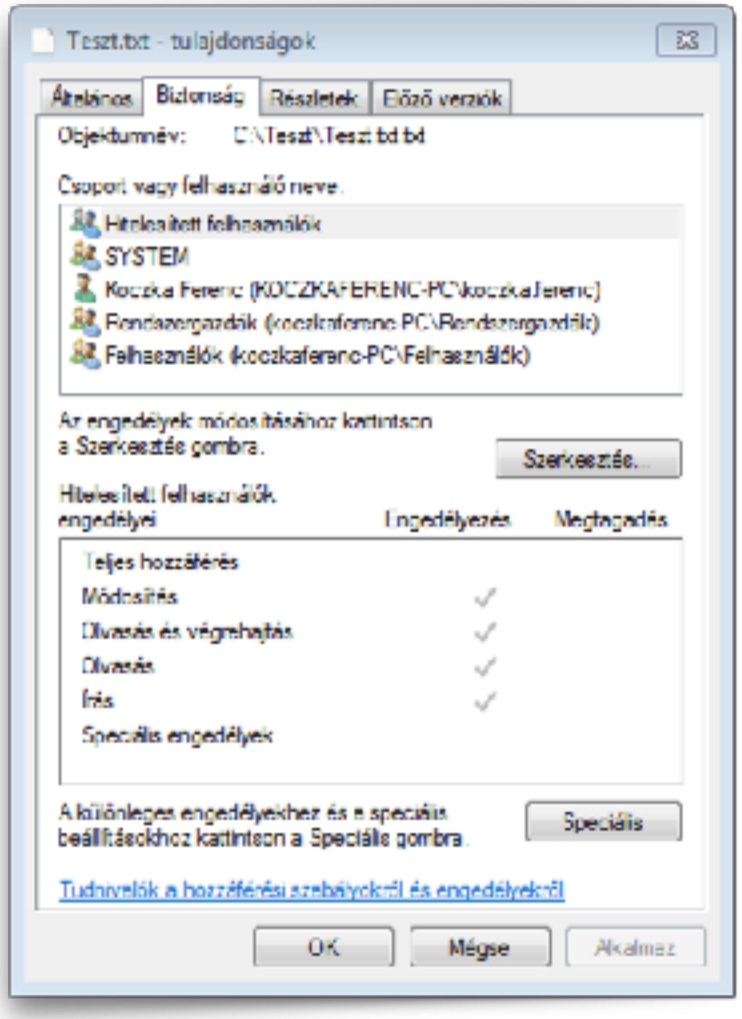
Név	Teljes név	Leírás
koczka.ferenc	Koczka Ferenc	
Rendszergazda		Beépített fiók a gép/tartomány fel...
Vendég		Beépített fiók a gép/tartomány ve...

SETTING RIGHTS

Rights in NTFS are more sophisticated.

Every object could have more users and groups attached, the administrator can assign different rights for each of them.

There are options for prohibition, they are “stronger” then permissions.



Objektumnév: C:\Teszt\Teszt.txt.txt

Csoport vagy felhasználó neve:

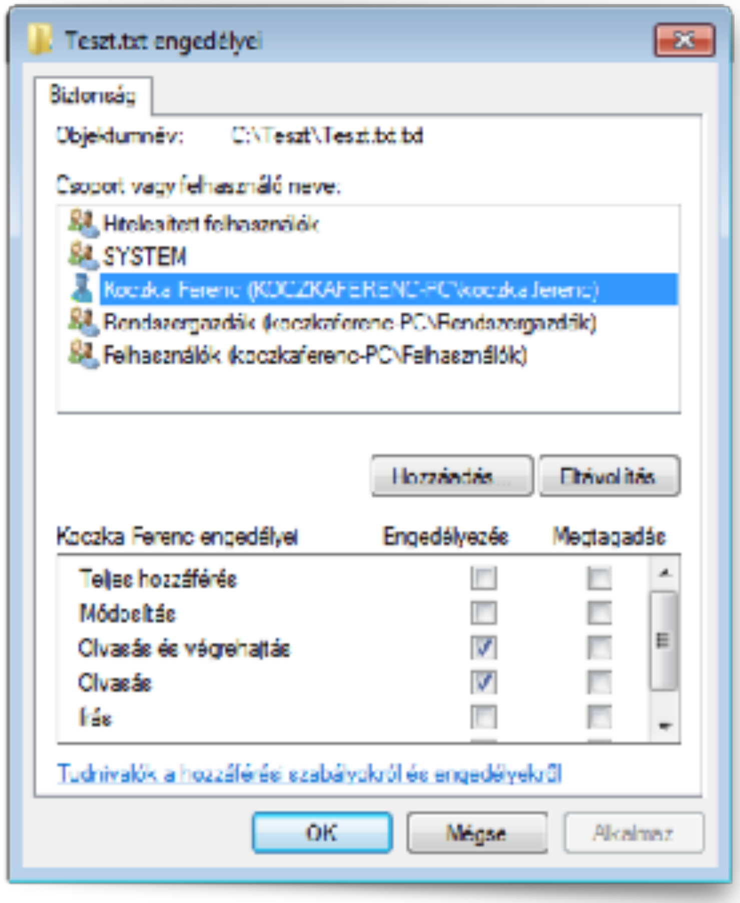
- Hitelesített felhasználók
- SYSTEM
- Koczka Ferenc (KOCZKAFERENC-PC\koczka.ferenc)
- Rendszergazdák (koczkaferenc-PC\Rendszergazdák)
- Felhasználók (koczkaferenc-PC\Felhasználók)

Az engedélyek módosításához kattintson a Szerkesztés gombra.

Hitelesített felhasználók engedélyei	Engedélyezés	Megtagadás
Teljes hozzáférés		
Módosítás	✓	
Olvasás és végrehajtás	✓	
Olvasás	✓	
Írás	✓	
Speciális engedélyek		

A különleges engedélyekhez és a speciális beállításokhoz kattintson a Speciális gombra.

Tudnivalók a hozzáférési szabályokról és engedélyekről



Objektumnév: C:\Teszt\Teszt.txt.txt

Csoport vagy felhasználó neve:

- Hitelesített felhasználók
- SYSTEM
- Koczka Ferenc (KOCZKAFERENC-PC\koczka.ferenc)
- Rendszergazdák (koczkaferenc-PC\Rendszergazdák)
- Felhasználók (koczkaferenc-PC\Felhasználók)

Koczka Ferenc engedélyei	Engedélyezés	Megtagadás
Teljes hozzáférés	□	□
Módosítás	□	□
Olvasás és végrehajtás	☑	□
Olvasás	☑	□
Írás	□	□

Tudnivalók a hozzáférési szabályokról és engedélyekről