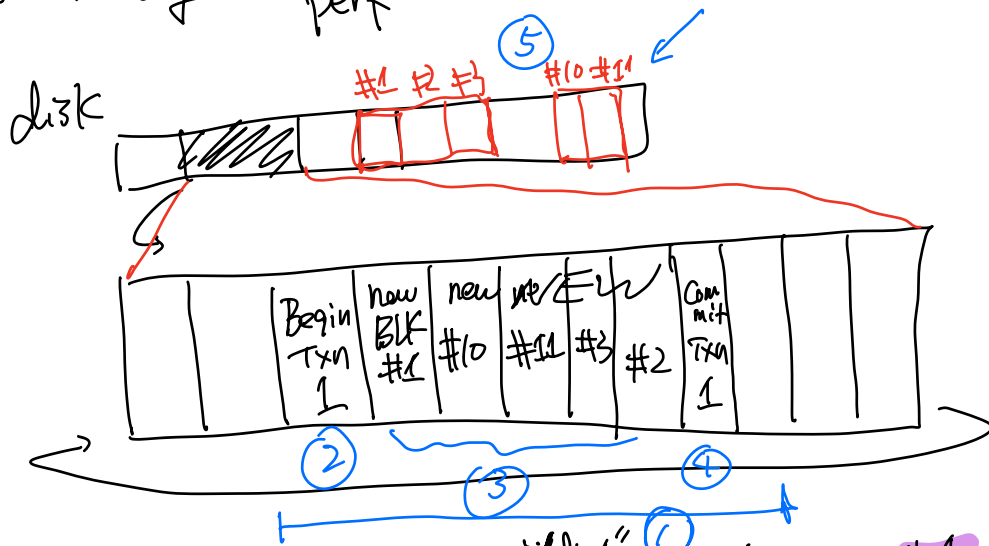
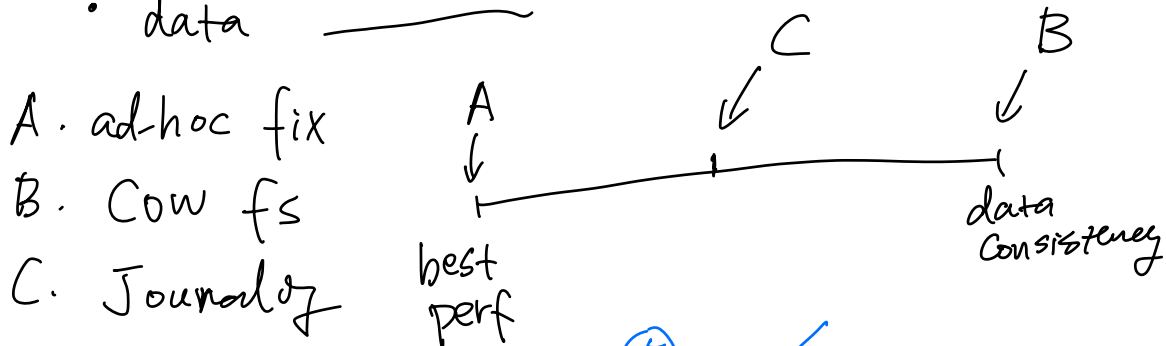


1. Journaling (continued)
 2. authentication
 3. access control
-

Crash recovery

- metadata consistency ←
- data



"/dir1" (1)
 mkdir → {
 .bitmap #1
 dir1 inode #10
 dir1 data block #11
 "/" data block #3
 "/" inode #2

* normal operations (redo log):

- OK Step 1: planning
- OK Step 2: begin txn
- OK Step 3: journal write
- OK Step 4: commit txn
- Step 5: checkpointing

Q: step 1 || step 2 ? YES
 Q: step 2 || step 3 ? YES

* recovery (redo log):

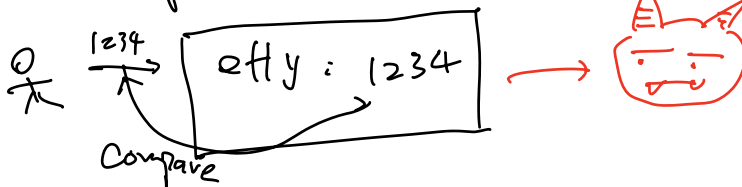
- Step 1: scanning the log
- Step 2: find a TxnBegin entry:
searches for the corresponding TxnEnd
- Step 3: if matching TxnEnd, do the transaction
by applying the changes (possibly again)
- Step 4: done when the entire log is scanned

Authentication

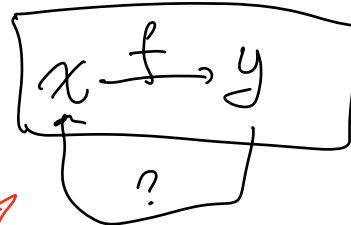
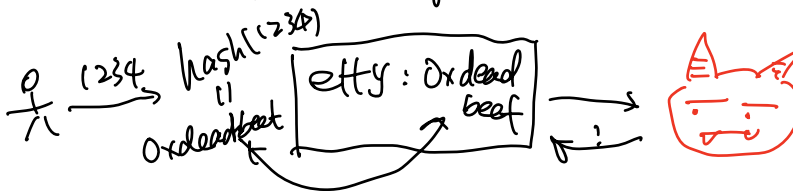
Verify your identity

• approach 1: based on what you know

• password

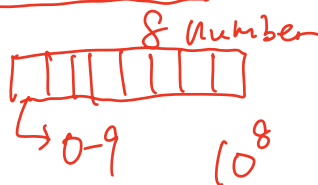


• hashed password



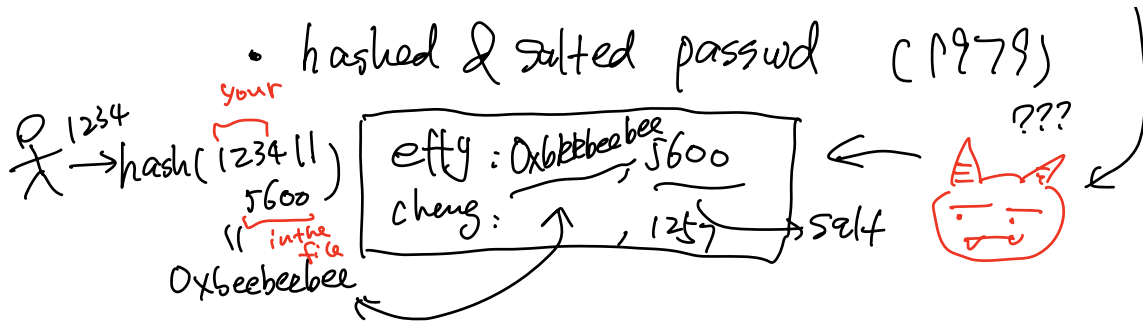
- MD5,
- SHA1

• rainbow table attack

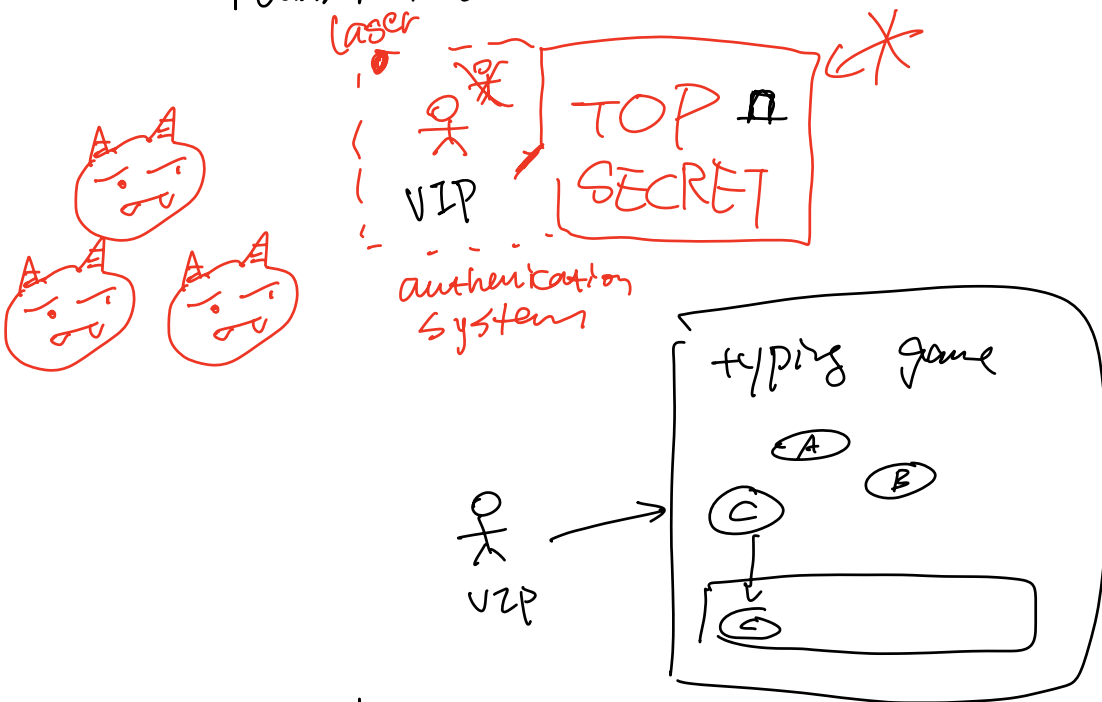


0xdeadbeef

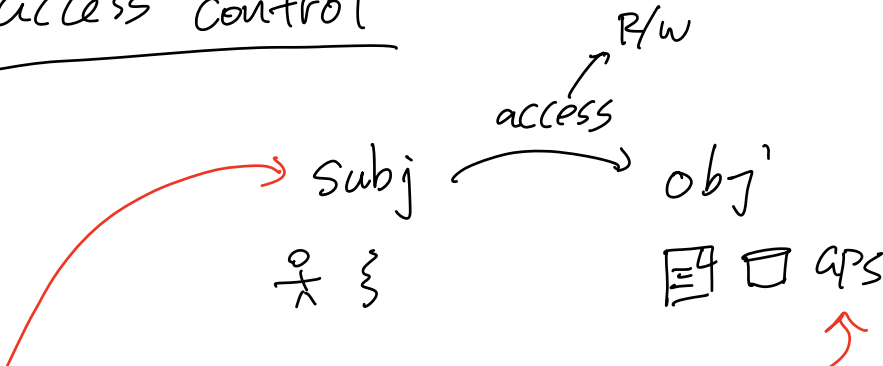
hash	passw
hash1	00000000
hash2	00000001
hash?	60000002
0xdeadbeef	1234
hash n	99999999
(15-1)	



- approach 2: based on what you have
two-factor auth
- approach 3: based on what you are
"rubber hose attack"

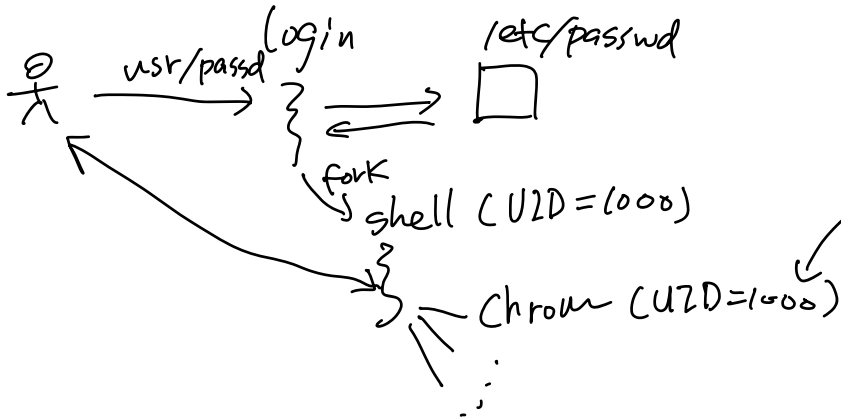


access control



- access control list (ACL) ←
- Capability-based approaches (\$ man capabilities)

- subj: user, process



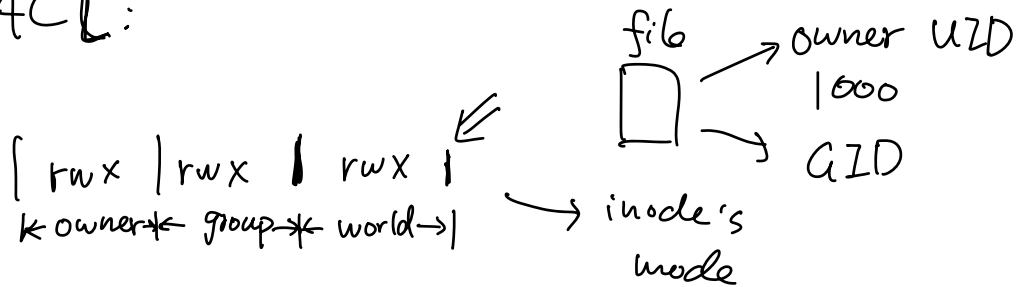
UID = 0 (root)

= global naming space

- Obj: "files"

/dev/tty

- ACL:



• file:

r: read ; w: write ; x: executable

"file" ← ./file

• dir: "dir1"

- r: read

- w: write

- x: "walk through", "cd" \Rightarrow if access inodes in this dir

x set: cd dir1 \Rightarrow okay

x not set: cd dir1 \Rightarrow fail; ls dir1 \Rightarrow fail

{ dir1/f1
dir1/f2

dir1: "r--"

\$ ls dir1 \Rightarrow f1 f2 ERRMSG

dir1: "r-x"

\$ ls dir1 \Rightarrow f1 f2

"--x"

\$ ls dir1 \Rightarrow

ERROR

dir1: "-w-"

\$ rm dir1/f1 \Rightarrow okay

\$ ls dir1 \Rightarrow ERROR

etty

UNIX

sudo
↳ root

U2D
1000

login

fork

shell [U2D=1000]

Vim

chrom

youtube

[U2D=1000]

mak

etc

lab5

f55600

[rax]

owner=1000

f55600.c

↑↓
[rw-rwxrwx]

passwd

frise

