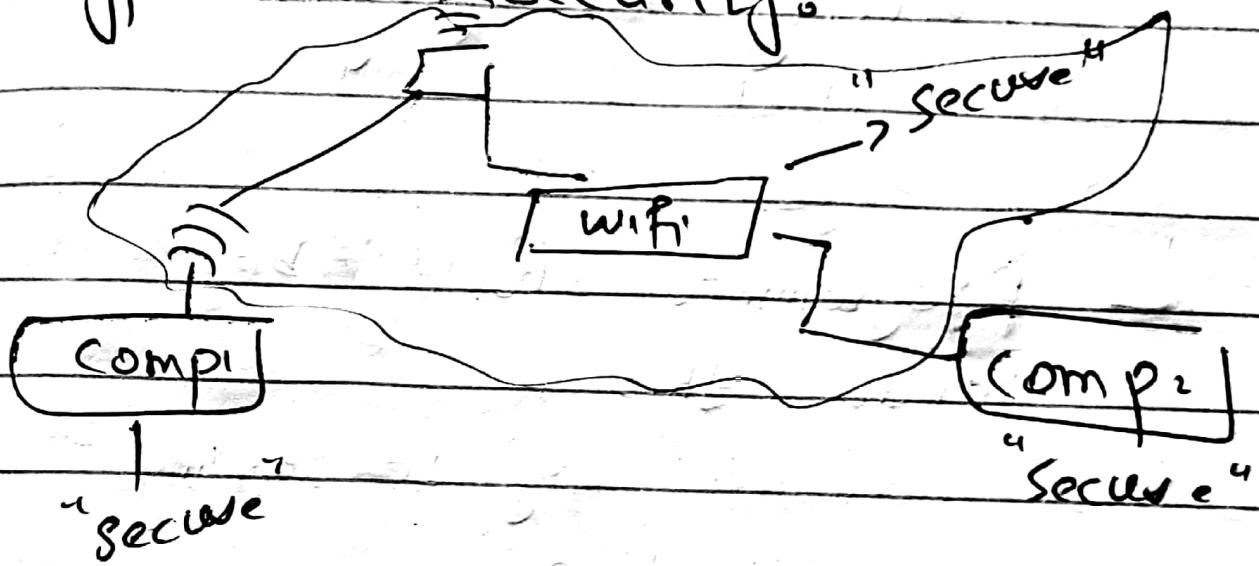


# Operating System Design

## ⑯ Protection

↳ Some security

Types of security:



Network security

↳ when the Computer

Computer communicate to other computer

→ Systems Security:

↳ "Authorization"

↳ "Encryption"

↳ "Malware Stuff"

"Authorization is important for  
in the Industry who one who  
can do

Security  $\Rightarrow$  Policy

- Malicious attack
- Accidental access
  - ↳ Programmers should be  
know this
- The access operation may be reading  
destruction or Alteration

Projection  $\Rightarrow$  mechanism

## Principle of Least privilege

↳ Scope of damage is limited

Role	Function	Access level
t1	=	Access level to the function khab hota hei to wo sifat
t2	=	function keo ho khab
t3	=	kar steady gha jaw ko Proxy system 120 ~

"they give the user right at least

"till do it's perform operation"

"With the help of this concept"

We will achieve our goal

• Authentication "لیڈریں"

• Confidentiality

"Not everyone access the data unless  
you allow him"

• Integrity

"Verify the data not be  
compromised: deleted, modified  
added"

## \* Availability

- Ensure that the system is accessible

Who one can access the system

## The operating System

Subject      Object

The os have some Subject & Object

④ and object and rights. R  $\Rightarrow$  Right

Object are resources and files

Subjects are components. By

using these concept we will

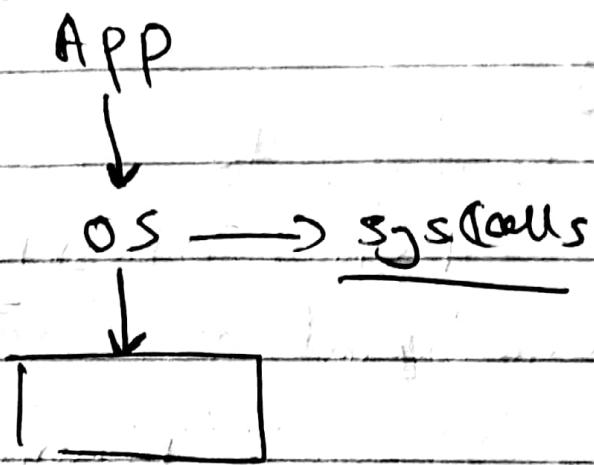
secure the system. For example

when you are installing app

usually popout and ask you

for permission then when

the Application need Scanno / otie file they initiate the Syscall for that.



### Domain & Protection

↳ Process interact with objects

Human have their process for protection

Domain duty Hci

for example is Dean instructor LAs  
and HOD

mean HOD Specific task has

Sakthi over Instructor Specific  
Team has Sakthi Hci

## Modeling Protection: Access Matrix

Do : Bilal, Usman

Di : Farooq

### objects

Fo

	Fo	F.	Printer	- Desktop
D0	read	real write	print	=
D1	real write			Documents
D2	real exec			=
D3		read	Print F1	
D4			print	Vow =

### Domain Token

Do → HOD → distinguish task

Di → Instructor → distinguish task

HOD change int Di

We can change the Domain from High priority to low priority

### Additional Operation

↳ owner is fed pass handle up  
Bridged Note: Hui

### Implementing an Access matrix

Single table is impractical

↳ big size # Domain

we are not used Matrix we

use CVL -

CVL

To - 'Do' : [owner, read],

'D.' is [read, write, exec].

}

Industry may have CUL use  
factory Hainan

→ Default Deny

↳ for proxy on uni

There are three Domain for wifi

① Faculty

② Staff

③ Student

→ In Sub to Default Deny

↳

→ over PhD Staff or Student to  
allow

Access Control Model

QUESTION

## DAC (Discretionary Access Control)

For example you created file.txt. You have decided what who can good because you are the owner. This is called DAC and other one

## MAC (Mandatory Access Control)

⇒ Policy is centrally controlled  
for example: In Military base system. General created the file. His wish no want to watch or not of other that system say ok keep them. I will send the policy.

→ Organization policy decide its own

## Authentication

→ For Verify the Identity  
Eg: login

### Get Authentication



### Validate



### set Pwd



### echo (small login)

## password Authentication protocol (PAP)

- Reusable passwords

### password breach

All the user save password in the server in anyhow tomorrow

This server will make then all user will A password they can access

"MySecurePassword123#"

Password File

Name : MySecure  
---  
---  
---

SHA - 256

Hash  
Name : AEHDH

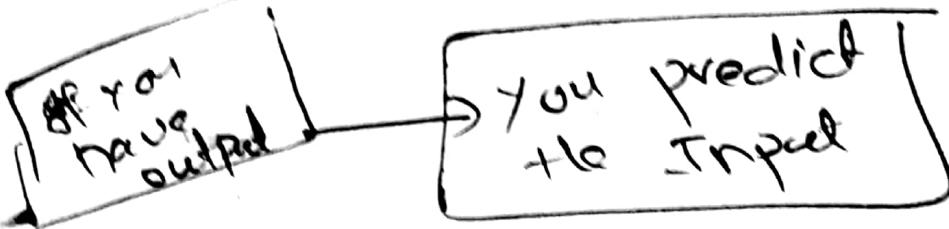
Hash

$$9 \bmod 9 = 0$$

$$5 \bmod 9 = 5$$

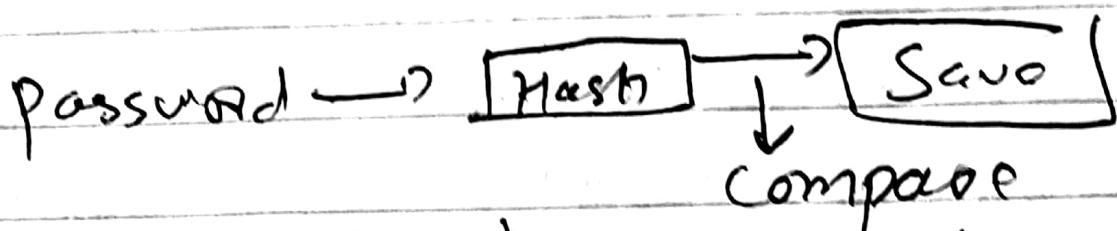
$$17 \bmod 9 = 5$$

= Collision  
Output same  
and its irreversible

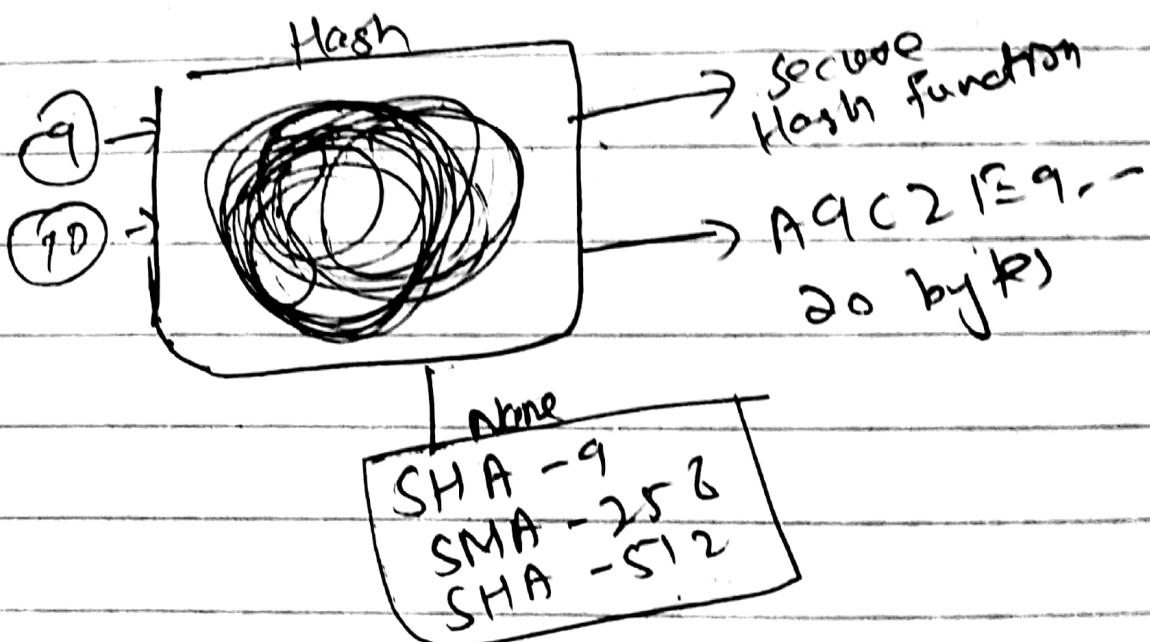


## # Hash Functions

- It's bad because collision
- reversible



$$\text{Sup}(\text{pass}) == \text{refine}(\text{password})$$



If the password is Apple then easily  
break

This is called Dictionary attack on  
the file

Optional

↳ If our Hash is AF9—  
then you add one Valid  
Number in this Hash

Hash(E2D7 + 296)

Salt

"Never ever store  
password in plaintext"  
— Every

In Dictionaries

User	Password
Name	Apple

insert —

Value (password (pass)) /

also use when matching  
the pas

password (pass) == password (password)

## Authentication

Three factors of authentication

↳ Something you have (key, card, phone)

- Can be stolen

→ Something you know

- Can be guessed, shared, stolen

→ Something you are

- Costly, can be copied (sometimes)

Factors may be combined

→ ATM Machine

↳ ATM card

↳ PIN

## Versus Authorization

If I know usman is our

User So ye banda

Ianya kriya kar Sakta Hain

The Four Core Security ??

i) Authentication

(ii) Authorization → allow

(iii) Accountability → logging file

④ Adulity sous ce

⑤ Adulity