

# Authorization

---

## Database Authorization

- Make sure users see only the data they're supposed to see
- Guard the database against modifications by malicious users

## Database Authorization

Users have privileges; can only operate on data for which they are authorized

- select on R or select( $A_1, \dots, A_n$ ) on R
- insert on R or insert( $A_1, \dots, A_n$ ) on R
- update on R or update( $A_1, \dots, A_n$ ) on R
- delete on R

# Authorization

```
Update Apply  
Set dec = 'Y'  
where sID In (Select sID  
                From Student  
                where GPA > 3.9)
```

Apply: update(dec), select(sID)

Student: select(sID, GPA)

College

cName	state	enr

Student

sID	sName	GPA	HS

Apply

sID	cName	major	dec

```
Delete From Student  
Where SID Not In  
  (Select SID From Apply)
```

*Student: Delete, Select(SID)*

*Apply: Select(SID)*

College

cName	state	enr

Student

sID	sName	GPA	HS

Apply

sID	cName	major	dec

*Select student info for Stanford applicants only*

```
Create View SS As  
  Select * From Student ←  
  Where SID In  
    (Select sID From Apply ←  
     Where cName = 'Stanford')
```

*Select (SS)*

College

cName	state	enr

Student

sID	sName	GPA	HS

Apply

sID	cName	major	dec

*Delete Berkeley applications only*

Create View **BA** As

Select \* From **Apply** ←

where **cName** = 'Berkeley' ←

*BA: Delete*

College

cName	state	enr

Student

sID	sName	GPA	HS

Apply

sID	cName	major	dec

## Obtaining Privileges

- Relation creator is owner ✓
- Owner has all privileges and may grant privileges

Grant privs On R To users  
 [ with Grant Option ]

select(A,B,C)  
 select(A,B)

select(sid), Delete

grant same or lesser  
 to others

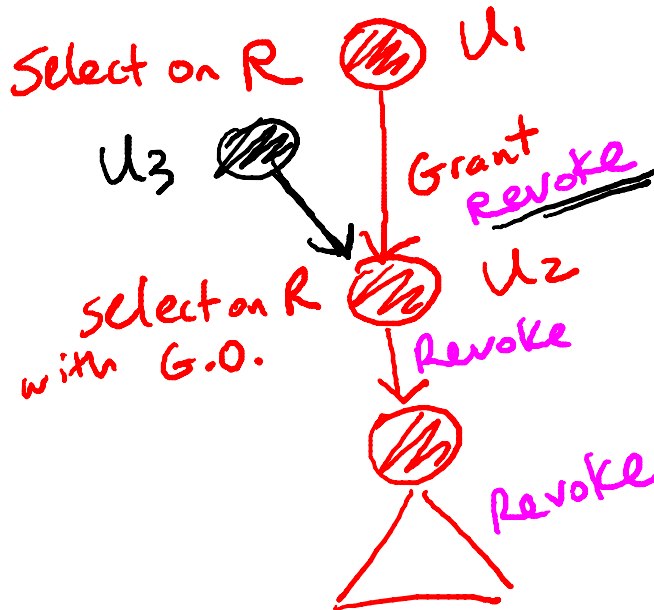
public



## Revoking Privileges

Revoke privs On R From users  
[ Cascade | Restrict ]

"Grant Diagram"



## Revoking Privileges

```
Revoke privs On R From users  
[ Cascade | Restrict ]
```

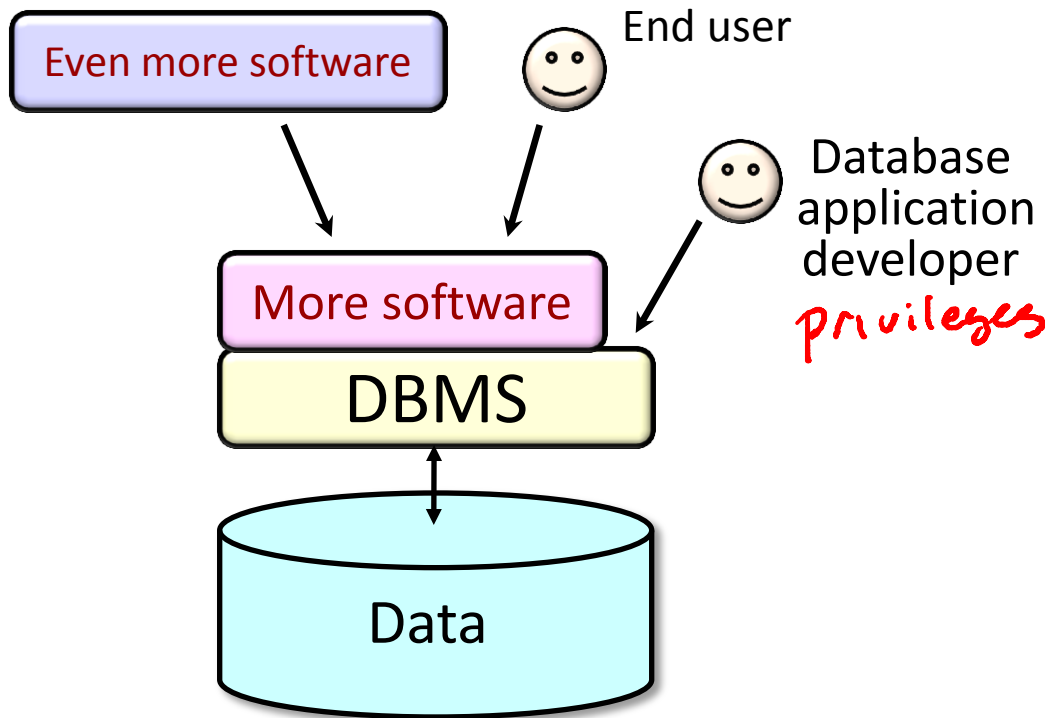
**Cascade:** Also revoke privileges granted from privileges being revoked (transitively), unless also granted from another source

## Revoking Privileges

```
Revoke privs On R From users  
[ Cascade | Restrict ] ←
```

**Restrict:** Disallow if Cascade would revoke any other privileges

## Where Privileges Reside



## Database Authorization

- Make sure users see only the data they're supposed to see
- Guard the database against modifications by malicious users
- Users have privileges; can only operate on data for which they are authorized
- Grant and Revoke statements
- Beyond simple table-level privileges: use views