Views

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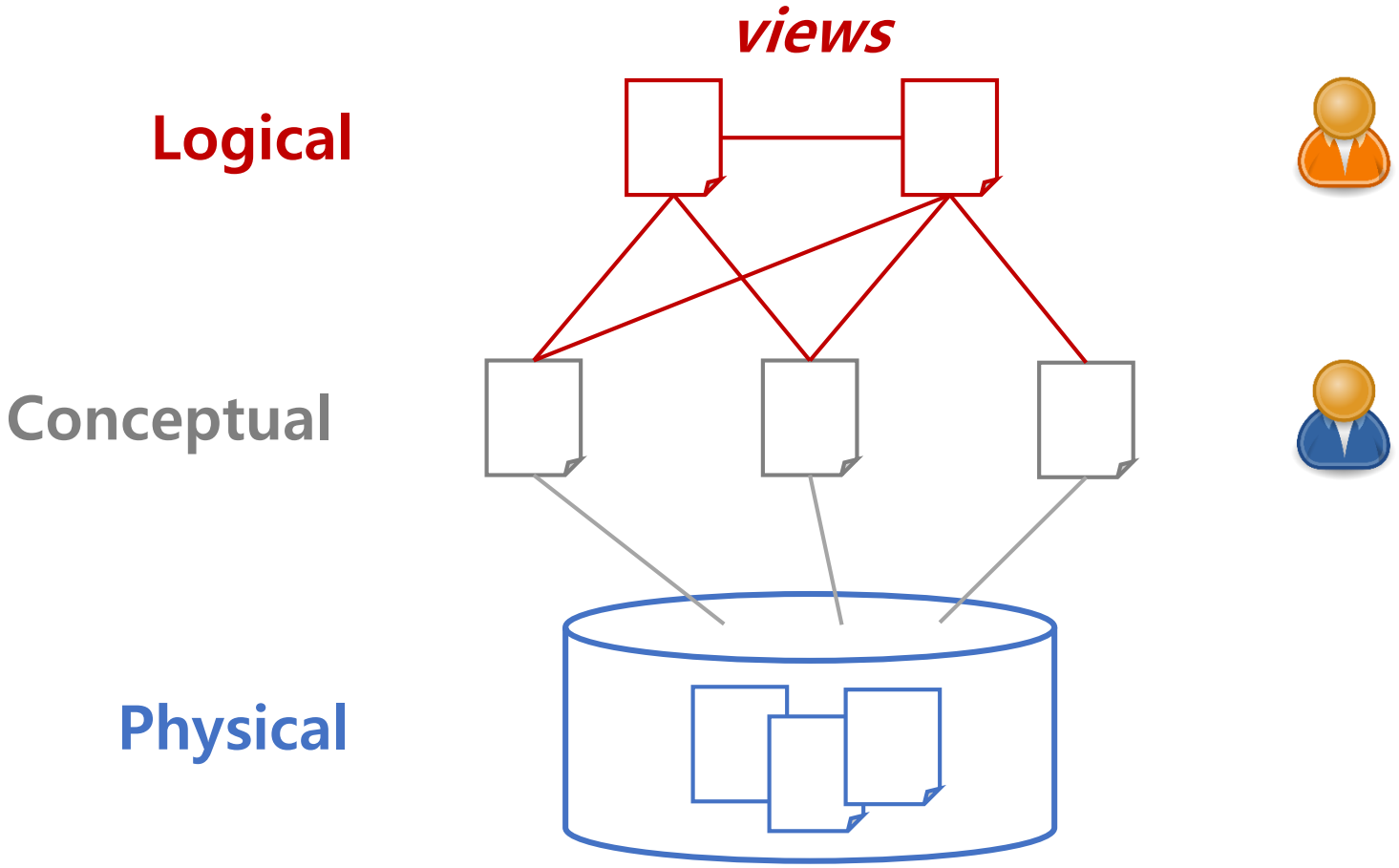
Three-level vision of database

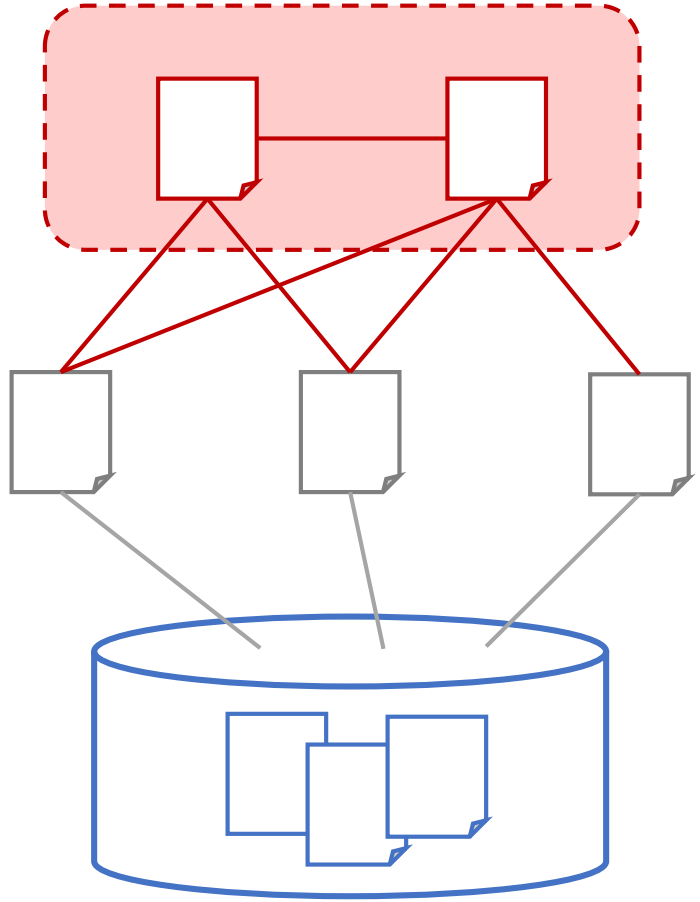
- Physical – Conceptual – Logical



Why use views?

- Hide some data from some users
- Make some queries easier / more natural
- Modularity of database access

Real applications tend to use lots and lots (and lots and lots!) of views



Defining and using views

- View V = ViewQuery(R_1, R_2, …, R_n)
- Schema of V is schema of query result

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V := ViewQuery(R1,R2,…,Rn)
Evaluate Q
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Evaluate Q
```

- In reality, Q rewritten to use R_1,…,R_n instead of V
- Note: R_i could itself be a view

SQL Syntax

```
CREATE VIEW viewName AS
<QUERY>
```

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```
CREATE VIEW viewName(A1, A2, …, An) AS
<QUERY>
```

Demo: simple college admissions database

College(cName, state, enrollment)

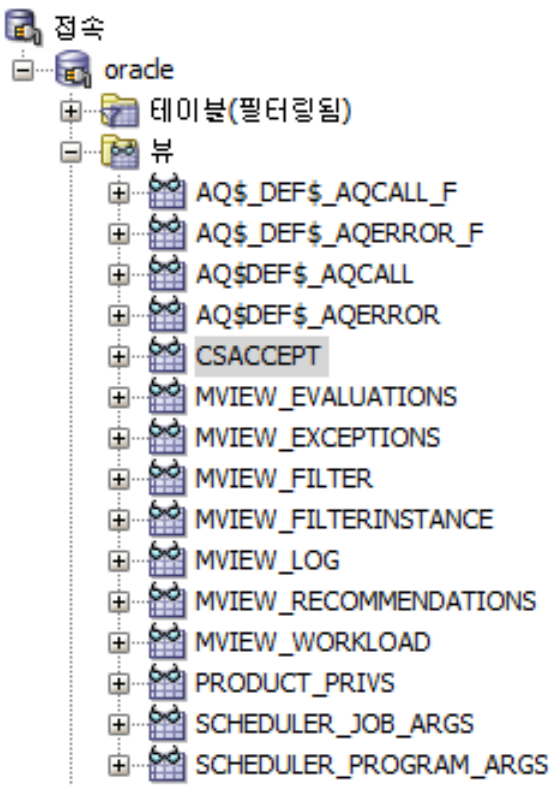
Student(sID, sName, GPA, sizeHS)

Apply(sID, cName, major, decision)

SQL

```
CREATE VIEW CSaccept AS
SELECT   sID, cName
FROM     Apply
WHERE    major = 'CS'
  AND    decision = 'Y';
```

Result



	SID	CNAME
1	123	Stanford
2	123	Berkeley
3	345	Cornell
4	987	Stanford
5	987	Berkeley

SQL

```
SELECT   Student.sID, sName, GPA
FROM     Student, CSaccept
WHERE    Student.sID =
         CSaccept.sID
  AND    cName = 'Stanford'
  AND    GPA < 3.8;
```

Result

	SID	SNAME	GPA
1	987	Helen	3.7

SQL

```
CREATE TABLE T AS
SELECT   sID, cName
FROM     Apply
WHERE    major = 'CS'
  AND    decision = 'Y';
```

```
SELECT * FROM T;
```

```
SELECT   Student.sID, sName, GPA
FROM     Student, T
WHERE    Student.sID = T.sID
  AND    cName = 'Stanford'
  AND    GPA < 3.8;
```

```
DROP TABLE T;
```

Result

	SID	CNAME
1	123	Stanford
2	123	Berkeley
3	345	Cornell
4	987	Stanford
5	987	Berkeley

	SID	SNAME	GPA
1	987	Helen	3.7

SQL

```
SELECT   Student.sID, sName, GPA
FROM     Student,
( SELECT   sID, cName
  FROM     Apply
  WHERE    major = 'CS'
    AND    decision = 'Y‘
) CSaccept
WHERE    Student.sID =
         CSaccept.sID
  AND    cName = 'Stanford'
  AND    GPA < 3.8;
```

Result

	SID	SNAME	GPA
1	987	Helen	3.7

SQL

```
SELECT   Student.sID, sName, GPA
FROM     Student, Apply
WHERE    Student.sID = Apply.sID
  AND    cName = 'Stanford'
  AND    GPA < 3.8;
```

Result

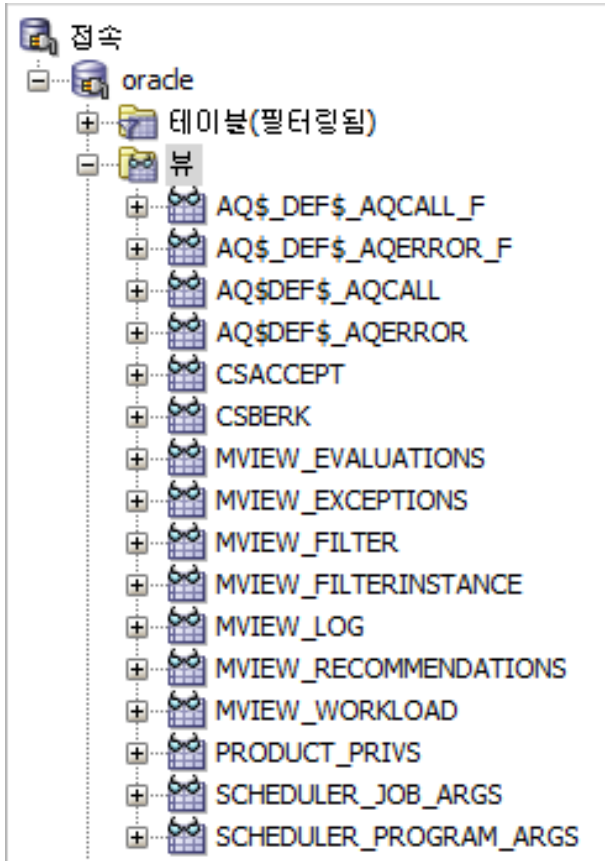
	SID	SNAME	GPA
1	987	Helen	3.7
2	765	Jay	2.9

SQL

```
CREATE VIEW CSberk AS
SELECT   Student.sID, sName, GPA
FROM     Student, CSaccept
WHERE    Student.sID =
         CSaccept.sID
  AND    cName = 'Berkeley'
  AND    sizeHS > 500;
```

```
SELECT * FROM CSberk;
```

Result



	SID	SNAME	GPA
1	123	Amy	3.9
2	987	Helen	3.7

SQL

```
SELECT   *
  FROM   CSberk
WHERE    GPA > 3.8;
```

Result

	SID	SNAME	GPA
1	123	Amy	3.9

SQL

```
SELECT  * FROM
( SELECT  Student.sID,
          sName, GPA
    FROM  Student,
  ( SELECT  sID, cName
      FROM  Apply
    WHERE   major = 'CS'
      AND   decision = 'Y'
  ) CSaccept
  WHERE   Student.sID =
          CSaccept.sID
    AND   cName = 'Berkeley'
    AND   sizeHS > 500
) CSberk
WHERE GPA > 3.8;
```

Result

	SID	SNAME	GPA
1	123	Amy	3.9

SQL

```
CREATE VIEW Mega AS
SELECT   College.cName, state,
         enrollment, Student.sID,
         sName, GPA, sizeHS,
         major, decision
FROM     College, Student, Apply
WHERE    College.cName =
         Apply.cName
  AND    Student.sID = Apply.sID;
```

```
SELECT * FROM Mega;
```

Result

	CNAME	STATE	ENROLLMENT	SID	SNAME	GPA	SIZEHS	MAJOR	DECISION
1	Cornell	NY	21000	123	Amy	3.9	1000	EE	Y
2	Berkeley	CA	36000	123	Amy	3.9	1000	CS	Y
3	Stanford	CA	15000	123	Amy	3.9	1000	CS	Y
4	Stanford	CA	15000	123	Amy	3.9	1000	EE	N
5	Berkeley	CA	36000	234	Bob	3.6	1500	biology	N
6	Cornell	NY	21000	345	Craig	3.5	500	bioengineering	N
7	Cornell	NY	21000	345	Craig	3.5	500	CS	Y
8	Cornell	NY	21000	345	Craig	3.5	500	EE	N
9	MIT	MA	10000	345	Craig	3.5	500	bioengineering	Y
10	Stanford	CA	15000	678	Fay	3.8	200	history	Y
11	Berkeley	CA	36000	987	Helen	3.7	800	CS	Y
12	Stanford	CA	15000	987	Helen	3.7	800	CS	Y
13	MIT	MA	10000	876	Irene	3.9	400	biology	Y
14	MIT	MA	10000	876	Irene	3.9	400	marine biology	N
15	Stanford	CA	15000	876	Irene	3.9	400	CS	N
16	Cornell	NY	21000	765	Jay	2.9	1500	history	N
17	Cornell	NY	21000	765	Jay	2.9	1500	psychology	Y
18	Stanford	CA	15000	765	Jay	2.9	1500	history	Y
19	MIT	MA	10000	543	Craig	3.4	2000	CS	N

SQL

```
SELECT   sID, sName, GPA, cName
FROM     Mega
WHERE    GPA > 3.5
  AND    major = 'CS'
  AND    enrollment > 15000;
```

Result

	SID	SNAME	GPA	CNAME
1	123	Amy	3.9	Berkeley
2	987	Helen	3.7	Berkeley

SQL

```
SELECT   Student.sID, sName, GPA,
         College.cName
FROM     College, Student, Apply
WHERE    College.cName =
         Apply.cName
  AND    Student.sID = Apply.sID
  AND    GPA > 3.5
  AND    major = 'CS'
  AND    enrollment > 15000;
```

Result

	SID	SNAME	GPA	CNAME
1	123	Amy	3.9	Berkeley
2	987	Helen	3.7	Berkeley