CS34800 Information Systems

Views

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Views: Idea

- Properly normalized tables not always "convenient"

Career	*Last*	*First*	*Address*	*Course*
clifton	Clifton	Chris	LWSN 2142F	CS34800
clifton	Clifton	Chris	LWSN 2142F	CS54100

- Career → Last First Address

Career	*Last*	*First*	*Address*
clifton	Clifton	Chris	LWSN 2142F

Career	*Course*
clifton	CS34800
clifton	CS54100

Views: Idea

- Properly normalized tables not always “convenient”

Career	*Last*	*First*	*Address*	*Course*
clifton	Clifton	Chris	LWSN 2142F	CS34800
clifton	Clifton	Chris	LWSN 2142F	CS54100

- select * from course where course = ‘CS34800’
  - *Seems simpler than a join*

Views: Idea

- Start with normalized tables

Career	*Last*	*First*	*Address*
clifton	Clifton	Chris	LWSN 2142F

Career	*Course*
clifton	CS34800
clifton	CS54100

- Create “view” for convenience
  - create view courseList as
    select i.Career, Last, First, Address, Course
    from instructors I, courses c
    where i.Career = c.Career

Career	*Last*	*First*	*Address*	*Course*
clifton	Clifton	Chris	LWSN 2142F	CS34800
clifton	Clifton	Chris	LWSN 2142F	CS54100

Views: Idea

- create view courseList as
  select i.Career, Last, First, Address, Course
  from instructors I, courses c
  where i.Career = c.Career

Career	*Last*	*First*	*Address*	*Course*
clifton	Clifton	Chris	LWSN 2142F	CS34800
clifton	Clifton	Chris	LWSN 2142F	CS54100

- courseList can now be used in a query just like a table!

View: Semantics

- Contents of view are current *at the time it is used*
  - If base tables are updated, view is updated
- Equivalent to replacing the view with a subquery

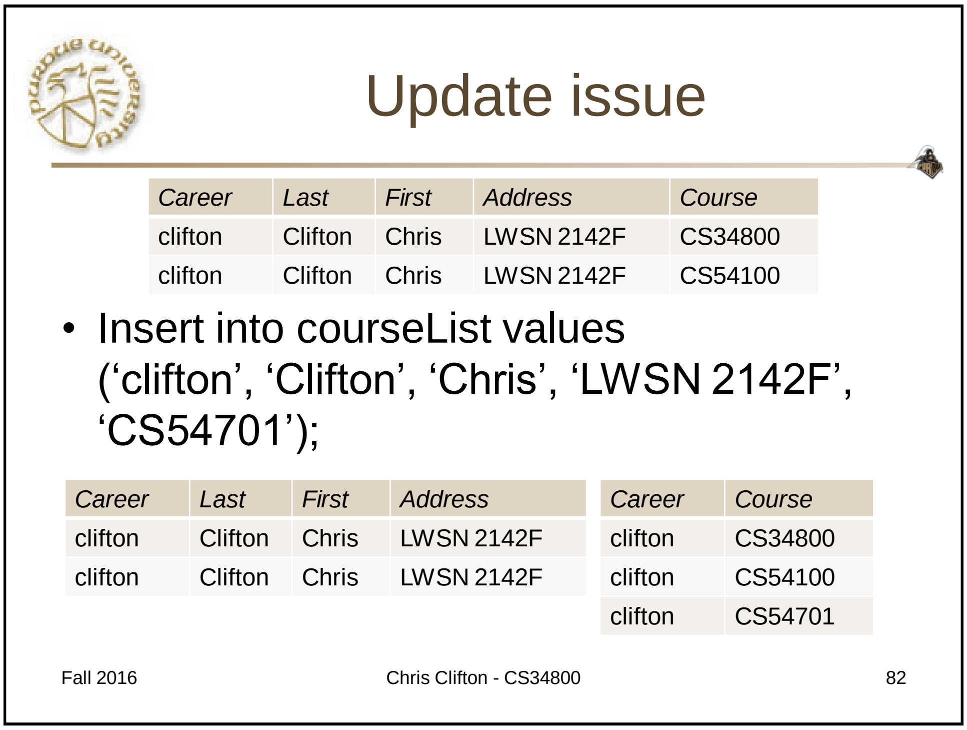
```
select * from courseList where course='CS34800' ≡
select * from
  (select i.Career, Last, First, Address, Course
  from instructors I, courses c
  where i.Career = c.Career)
where course='CS34800'
```

Views: Uses

- Clarity for user / developer
  - Users see what they expect/want
  - Different views for different users/uses
    - *Multiple logical views of database*
- Simplification
  - "abstraction" for query
- ~~Performance~~
  - ~~Don't need to re-run the query~~
- **Access Control**
  - Give access only to view, not entire data

SQL Access Control

- grant select on <table> to <user>;
  - grant insert, delete, update
  - with grant option
    - *Allows "passing on" privileges*
- <table> can also be a view
  - But some caveats on updating/insert/delete



Update issue

Career	Last	First	Address	Course
clifton	Clifton	Chris	LWSN 2142F	CS34800
clifton	Clifton	Chris	LWSN 2142F	CS54100

- Insert into courseList values ('clifton', 'Clifton', 'Chris', 'LWSN 2142F', 'CS54701');

Career	Last	First	Address
clifton	Clifton	Chris	LWSN 2142F
clifton	Clifton	Chris	LWSN 2142F

Career	Course
clifton	CS34800
clifton	CS54100
clifton	CS54701

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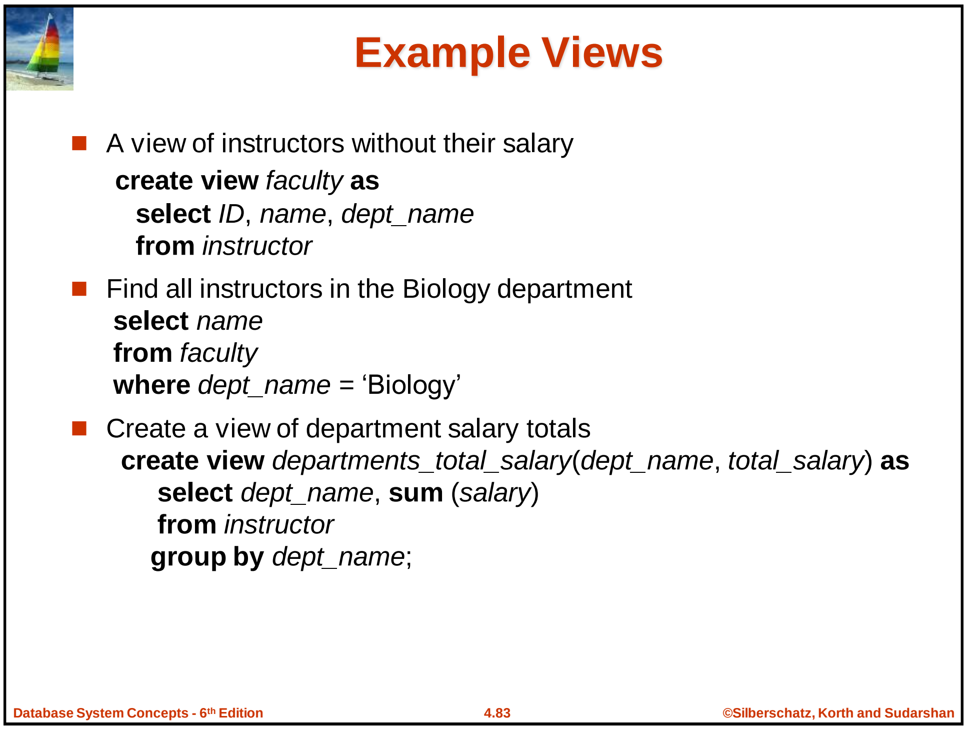


Example Views

- A view of instructors without their salary

  create view *faculty* **as**
  select *ID*, *name*, *dept_name*
  from *instructor*

- Find all instructors in the Biology department

  select *name*
  from *faculty*
  where *dept_name* = 'Biology'

- Create a view of department salary totals

  create view *departments_total_salary*(*dept_name*, *total_salary*) **as**
  select *dept_name*, **sum** (*salary*)
  from *instructor*
  group by *dept_name*;

Database System Concepts - 6th Edition 4.83 ©Silberschatz, Korth and Sudarshan

Views Defined Using Other Views

- **create view** *physics_fall_2009* **as**
  select *course*.*course_id*, *sec_id*, *building*, *room_number*
  from *course*, *section*
  where *course*.*course_id* = *section*.*course_id*
  and *course*.*dept_name* = ’Physics’
  and *section*.*semester* = ’Fall’
  and *section*.*year* = ’2009’;
- **create view** *physics_fall_2009_watson* **as**
  select *course_id*, *room_number*
  from *physics_fall_2009*
  where *building*= ’Watson’;

Update of a View

- Add a new tuple to *faculty* view which we defined earlier

  insert into *faculty* **values** (’30765’, ’Green’, ’Music’);

  This insertion must be represented by the insertion of the tuple

  (’30765’, ’Green’, ’Music’, null)

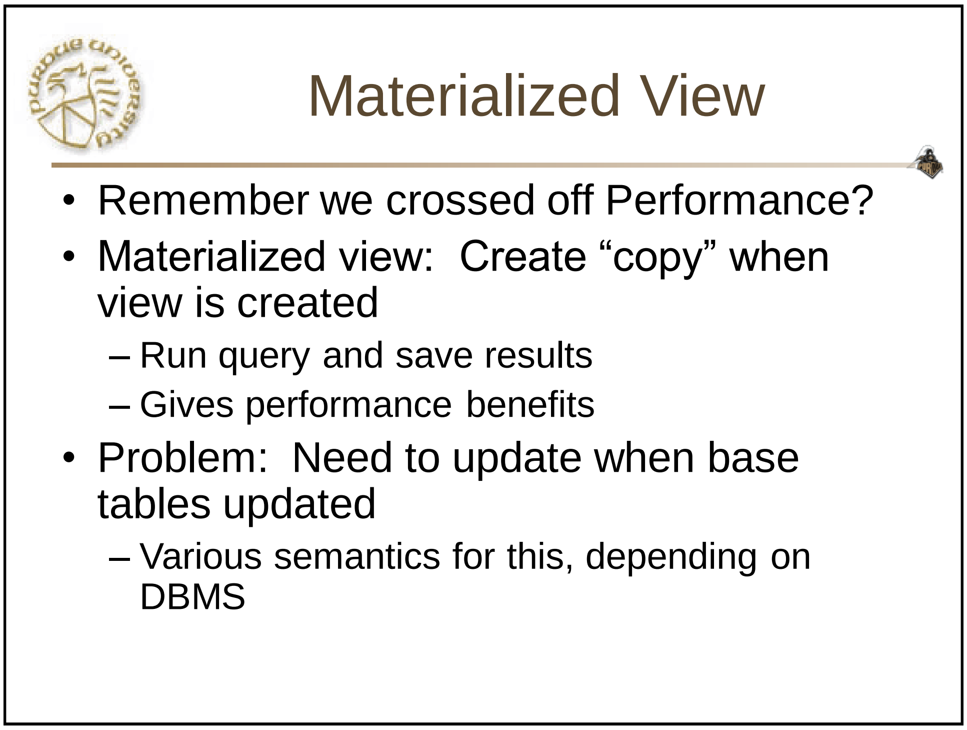
  into the *instructor* relation

Some Updates cannot be Translated Uniquely

- **create view** *instructor_info* **as**
  select *ID*, *name*, *building*
  from *instructor*, *department*
  where *instructor*.*dept_name*= *department*.*dept_name*;
- **insert into** *instructor_info* **values** ('69987', 'White', 'Taylor');
  - which department, if multiple departments in Taylor?
  - what if no department is in Taylor?
- Most SQL implementations allow updates only on simple views
  - The **from** clause has only one database relation.
  - The **select** clause contains only attribute names of the relation, and does not have any expressions, aggregates, or **distinct** specification.
  - Any attribute not listed in the **select** clause can be set to null
  - The query does not have a **group** by or **having** clause.

And Some Not at All

- **create view** *history_instructors* **as**
  select *
  from *instructor*
  where *dept_name*= 'History';
- What happens if we insert ('25566', 'Brown', 'Biology', 100000) into *history_instructors?*



Materialized View

- Remember we crossed off Performance?
- Materialized view: Create “copy” when view is created
  - Run query and save results
  - Gives performance benefits
- Problem: Need to update when base tables updated
  - Various semantics for this, depending on DBMS