SQL Data Definition: View Creation

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ISYS 464 – Spring 2003
Topic 12

Student Course Database
Student (Student Number, Student Name, Major)
Course (Course Number, Course Name, Day, Time)
Student Course (Student Number, Course Number)

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Student Name</th>
<th>Major</th>
<th>Course Number</th>
<th>Course Name</th>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>Joe</td>
<td>IS</td>
<td>ISYS 365</td>
<td>Adv C++</td>
<td>MW</td>
<td>12:30</td>
</tr>
<tr>
<td>234</td>
<td>Fred</td>
<td>IS</td>
<td>ISYS 464</td>
<td>Database</td>
<td>TTh</td>
<td>9:30</td>
</tr>
<tr>
<td>345</td>
<td>Mary</td>
<td>Acct</td>
<td>ISYS 464</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>456</td>
<td>Sue</td>
<td>Mgmt</td>
<td>ISYS 565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>567</td>
<td>Lee</td>
<td>Acct</td>
<td>ISYS 464</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

Student Course

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>234</td>
<td>IS 405</td>
<td>TTh</td>
<td>14:00</td>
</tr>
<tr>
<td>234</td>
<td>IS 405</td>
<td>TTh</td>
<td>14:00</td>
</tr>
<tr>
<td>567</td>
<td>IS 464</td>
<td></td>
<td></td>
</tr>
<tr>
<td>678</td>
<td>IS 365</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conceptual and External Database Views

- Conceptual view of database:
  - Created with CREATE TABLE statements
  - Each table created by a CREATE TABLE statement is called a base table
  - The conceptual view of a database consists of a set of related base tables

- External views of database:
  - Created with CREATE VIEW statements
  - The result of each CREATE VIEW statement is called a view
  - An external view of a database consists of a set of related views

Summary of Terminology

<table>
<thead>
<tr>
<th>Terminology</th>
<th>SQL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-level model</td>
<td>SQL</td>
</tr>
<tr>
<td>Conceptual view (type of logical view)</td>
<td>Set of related base tables (created by CREATE TABLE statements)</td>
</tr>
<tr>
<td>External view (type of logical view)</td>
<td>Set of related views (created by CREATE VIEW statements)</td>
</tr>
</tbody>
</table>

CREATE VIEW Statement

- Syntax:
  CREATE VIEW viewname AS subquery

- Creates a view of table(s) based on subquery
- Example: View of IS students only
  CREATE VIEW IS_Student_View AS
  SELECT Student_Number, Student_Name
  FROM Student
  WHERE Major = 'IS'
View Access

- A view can be accessed the same way as a table, including joining views or joining views and tables.
- Data in view is not stored separately in database.
- Data in view is retrieved when view is accessed.
- Examples:
  ```sql
  SELECT * FROM IS_Student_View
  SELECT Student_Name, Course_Number
  FROM IS_Student_View, Student_Course
  WHERE IS_Student_View.Student_Number = Student_Course.Student_Number
  ```
- Data in a view will change with each update to base tables.

View Creation

- A view can be created from a single base table.
- A view can be created by joining multiple base tables (join view).
- A view can be created from other views (restricted).
- Most features of the SELECT statement can be used in a view.
- Example:
  ```sql
  CREATE VIEW Course_List_View AS
  SELECT Course_Number, Student.Student_Number, Student_Name
  FROM Student_Course, Student
  WHERE Student_Course.Student_Number = Student.Student_Number
  ORDER BY Course_Number
  ```

CREATE VIEW vs. CREATE TABLE

What is the difference between Example A and Example B?
- Example A: CREATE VIEW
  ```sql
  CREATE VIEW IS_Student_View AS
  SELECT Student_Number, Student_Name
  FROM Student
  WHERE Major = 'IS'
  ```
- Example B: CREATE TABLE and INSERT
  ```sql
  CREATE TABLE IS_Student
  (Student_Number INT,
   Student_Name CHAR(20))
  INSERT INTO IS_Student
  SELECT Student_Number, Student_Name
  FROM Student
  WHERE Major = 'IS'
  ```

Updating Base Tables Through Views

- If a view is derived from a single base table, then usually the base table can be updated through the view if the view contains the columns to be updated.
- Example: Add a new IS student to Student by added row to IS_Student_View
  ```sql
  INSERT INTO IS_Student_View
  VALUES (678,'Nick')
  ```
  - New row (678, 'Nick', null) is inserted into Student table.
  - Can delete a row from Student by deleting row from IS_Student_View.
  - Can change Student_Name in Student by changing name in IS_Student_View.
  - Cannot change Major in Student through IS_Student_View because Major is not in view.
- Cannot update base table in a view that uses GROUP BY, group functions, or DISTINCT.

DROP VIEW Statement

- Syntax: DROP VIEW viewname
- Deletes a view.
- Example:
  ```sql
  DROP VIEW IS_Student_View
  ```

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Creating an External View of a Database

- An external view of a database consists of one or more views created by one or more CREATE VIEW statements.
- Example: IS Student Data External View - external view of all data about IS students only.

```sql
CREATE VIEW IS_Student_View AS
    SELECT Student_Number, Student_Name
    FROM Student
    WHERE Major = 'IS';

CREATE VIEW IS_Student_Course_View AS
    SELECT Student_Course.Student_Number, Course_Number
    FROM Student_Course, IS_Student_View
    WHERE Student_Course.Student_Number = IS_Student_View.Student_Number;

CREATE VIEW IS_Course_View AS
    SELECT DISTINCT Course.Course_Number, Course_Name, Day, Time
    FROM Course, IS_Student_Course_View
    WHERE Course.Course_Number = IS_Student_Course_View.Course_Number;
```

### IS Student Data External View

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>123</td>
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</tr>
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<td>Fred</td>
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<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISYS 365</td>
<td>Advanced C++</td>
<td>MW</td>
<td>12:30</td>
</tr>
<tr>
<td>FIN 350</td>
<td>Finance</td>
<td>MW</td>
<td>14:00</td>
</tr>
<tr>
<td>MGMT 405</td>
<td>Organizational Behavior</td>
<td>MW</td>
<td>15:30</td>
</tr>
<tr>
<td>MKTG 431</td>
<td>Marketing</td>
<td>TTh</td>
<td>8:00</td>
</tr>
</tbody>
</table>

### IS Student Course View

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