Views

INF 551

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Views

- A view is a “virtual table,” a relation that is defined in terms of the contents of other tables and views.
- Declare by:

  CREATE VIEW <name> AS <query>;
- In contrast, a relation whose value is really stored in the database is called a *base table*.

Example: View Definition

- CanDrink(drinker, beer) is a view "containing" the drinker-beer pairs such that the drinker frequents at least one bar that serves the beer:
- Recall Frequents(drinker, bar), Sells(bar, beer, price)

```
CREATE VIEW CanDrink AS
SELECT distinct drinker, beer
FROM Frequents, Sells
WHERE Frequents.bar = Sells.bar;
```

Example: Accessing a View

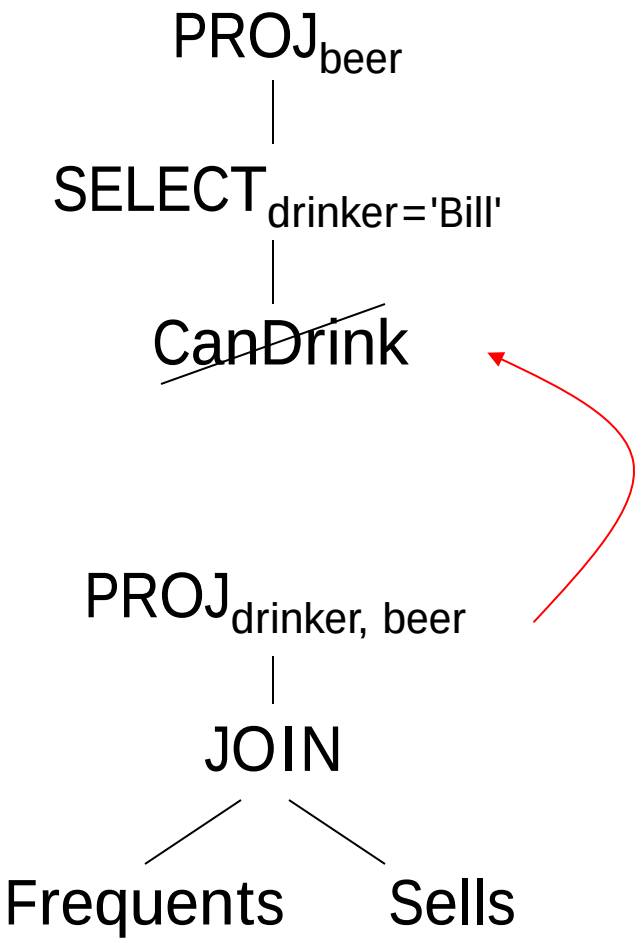
- You may query a view as if it were a base table.
  - There is a limited ability to modify views if the modification makes sense as a modification of the underlying base table.
- Example:

```
select * from CanDrink
where drinker = 'Bill';
```

What Happens When a View Is Used?

- The DBMS starts by interpreting the query as if the view were a base table.
  - Typical DBMS turns the query into something like relational algebra.
- The queries defining any views used by the query are also replaced by their algebraic equivalents, and “spliced into” the expression tree for the query.

Example: View Expansion

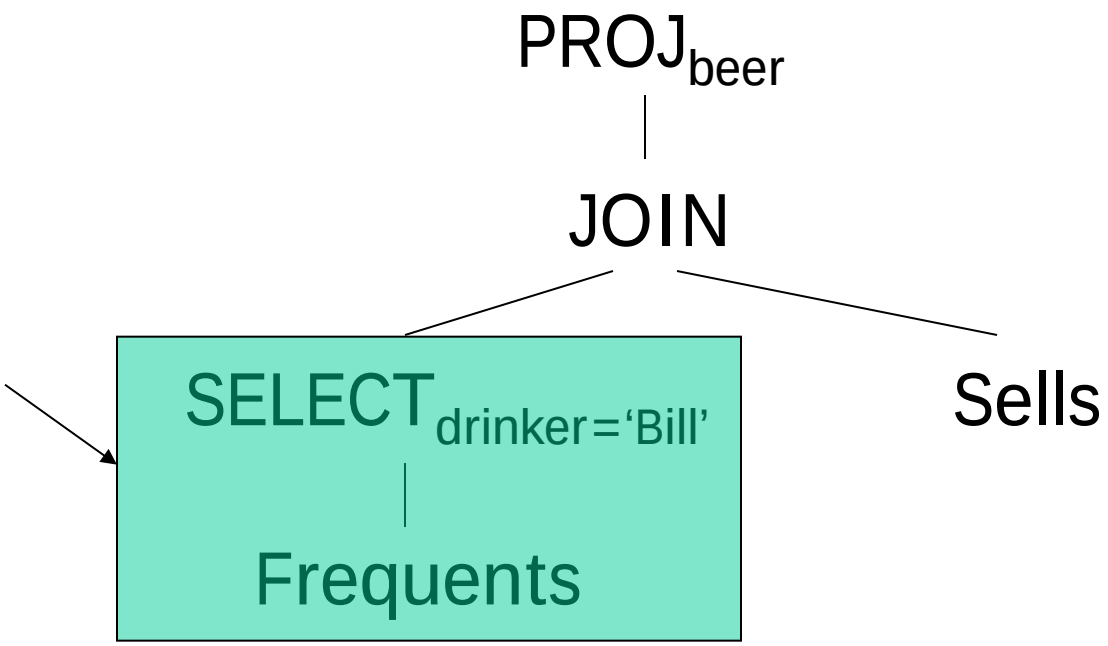


DMBS Optimization

- It is interesting to observe that the typical DBMS will then “optimize” the query by transforming the algebraic expression to one that can be executed faster.
- Key optimizations:
  1. Push selections down the tree.
  2. Eliminate unnecessary projections.

Example: Optimization

Notice how most tuples are eliminated from Frequents before the expensive join.



More Examples: Defining Views

Views are relations, except that they are not physically stored.

Can be used for presenting different information to different users

Employee(ssn, name, department, project, salary)

```
CREATE VIEW  Developers AS
   SELECT name, project
   FROM  Employee
   WHERE department = 'Development'
```

Payroll has access to all Employees, others only to Developers

A Different View

Purchase(buyer, seller, product, store)
Product(name, maker, category)
Person(name, city, phone)

```
CREATE VIEW  LA-view  AS

        SELECT  buyer, seller, product, store
        FROM    Person, Purchase
        WHERE   Person.city = 'LA'    AND
                Person.name = Purchase.buyer
```

We have a new virtual table:
LA-view(buyer, seller, product, store)

A Different View

We can later use the view:

```
SELECT   name, store
FROM     LA-view, Product
WHERE    LA-view.product = Product.name  AND
         Product.category = 'shoes'
```

What Happens When We Query a View ?

Recall: LA-view(buyer, seller, product, store)

```
SELECT   name, LA-view.store
FROM     LA-view, Product
WHERE    LA-view.product = Product.name  AND
         Product.category = 'shoes'
```

```
SELECT  name, Purchase.store
FROM    Person, Purchase, Product
WHERE   Person.city = 'LA'    AND
        Person.name = Purchase.buyer   AND
        Purchase.product = Product.name  AND
        Product.category = 'shoes'
```

Types of Views

- Virtual views:
  - Computed only on-demand – slow at runtime
  - Always up to date
- Materialized views
  - Precomputed offline – fast at runtime
  - Common in data warehouses
  - May have stale data

Reusing a Materialized View

- Suppose I have **only** the result of LAView:

```
SELECT  buyer, seller, product, store
FROM    Person, Purchase
WHERE   Person.city = 'LA'    AND
        Person.name = Purchase.buyer
```

- and I want to answer the query

```
SELECT  buyer, seller
FROM    Person, Purchase
WHERE   Person.city = 'LA'    AND
        Person.name = Purchase.buyer AND
        Purchase.product='gizmo'.
```

Can I answer the query using only the view?

Query Rewriting Using Views

Rewritten query:

```
SELECT  buyer, seller
FROM    LAView
WHERE   product= ‘gizmo’
```

Original query:

```
SELECT  buyer, seller
FROM    Person, Purchase
WHERE   Person.city = ‘LA’    AND
        Person.name = Purchase.buyer AND
        Purchase.product=‘gizmo’.
```

Another Example

- I still have **only** the result of LAView:

```
SELECT  buyer, seller, product, store
FROM    Person, Purchase
WHERE   Person.city = 'LA'    AND
                Person.name = Purchase.buyer
```

- but I want to answer the query

```
SELECT  buyer, seller
FROM    Person, Purchase
WHERE   Person.city = 'LA'    AND
                Person.name = Purchase.buyer AND
                Person.phone  LIKE '206 543 %'.
```

And Now?

- I still have **only** the result of (slightly different) LAView:

```
SELECT  buyer, seller, product, store
FROM    Person, Purchase, Product
WHERE   Person.city = 'LA'    AND
        Person.name = Purchase.buyer AND
        Purchase.product = Product.name
```

- but I want to answer the query

```
SELECT  buyer, seller
FROM    Person, Purchase
WHERE   Person.city = 'LA' AND
        Person.name = Purchase.buyer
```

And Now?

- I still have **only** the result of:

```
SELECT  seller, buyer, Sum(Price)
FROM    Purchase
WHERE   Purchase.store = ‘The Bon’
Group By seller, buyer
```

- but I want to answer the query

```
SELECT  seller, Sum(Price)
FROM    Purchase
WHERE   Purchase.store = ‘The Bon’
Group By seller
```

And what if it’s the other way around?

Finally…

- I still have **only** the result of:

```
SELECT  seller, buyer, Count(*)
FROM    Purchase
WHERE   Purchase.store = ‘The Bon’
Group By seller, buyer
```

- but I want to answer the query

```
SELECT  seller, Count(*)
FROM    Purchase
WHERE   Purchase.store = ‘The Bon’
Group By seller
```