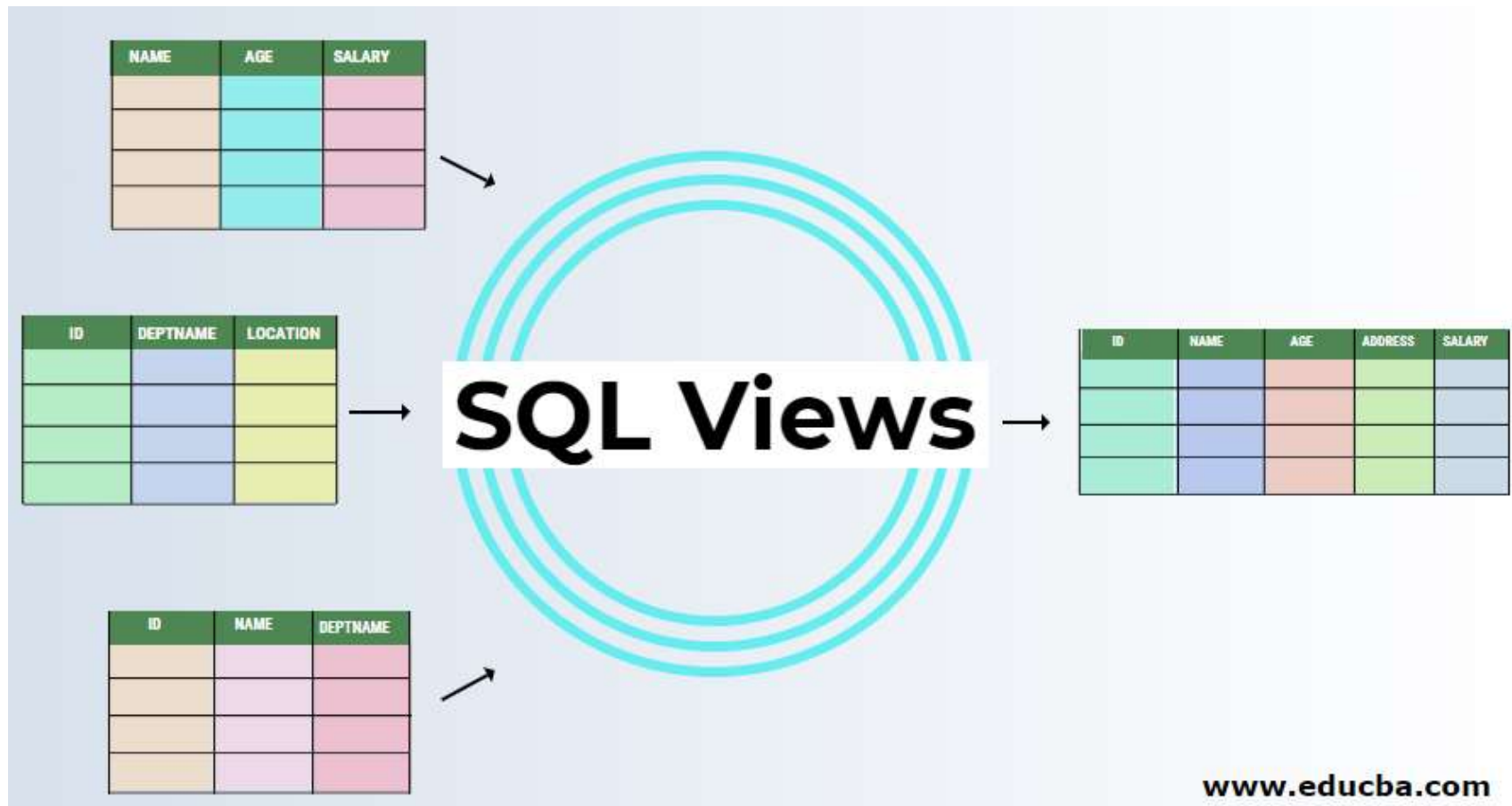# Views in SQL

- A view is a **"virtual" table** that is derived from other tables

Views in SQL

- A view is a **"virtual" table** that is derived from other tables
- Allows for **limited update operations** (since the table may not physically be stored)
- **Allows full query operations**
- A convenience for expressing certain operations
  - simplify complex queries, and
  - define distinct conceptual interfaces for different users.

SQL Views: An Example

EMPLOYEE

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO

PROJECT

PNAME	PNUMBER	PLOCATION	DNUM

WORKS_ON

ESSN	PNO	HOURS

CREATE VIEW WORKS_ON1 **AS**

SELECT FNAME, LNAME, PNAME, HOURS

FROM EMPLOYEE, PROJECT, WORKS_ON

WHERE SSN=ESSN AND PNO=PNUMBER

WORKS_ON1

Fname	Lname	Pname	Hours

SQL Views: An Example2

EMPLOYEE

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO

DEPARTMENT

DNAME	DNUMBER	MGRSSN	MGRSTARTDATE

DEPT_INFO

Dept_name	No_of_emps	Total_sal

```
CREATE VIEW     DEPT_INFO(Dept_name, No_of_emps, Total_sal)
AS SELECT       Dname, COUNT (*), SUM (Salary)
     FROM        DEPARTMENT, EMPLOYEE
     WHERE       Dnumber=Dno
     GROUP BY    Dname;
```

Query using a Virtual Table

WORKS_ON1

Fname	Lname	Pname	Hours

- We can specify SQL queries on a newly created view:

    SELECT FNAME, LNAME

    FROM WORKS_ON1

    WHERE PNAME='ProductX';

- DBMS is responsible to keep view always up-to-date
- When no longer needed, a view can be dropped:

    DROP WORKS_ON1;

Efficient View Implementation

Query modification: present the view query in terms of a query on the underlying base tables

SELECT FNAME, LNAME
FROM **WORKS_ON1**
WHERE PNAME='ProductX'

WORKS_ON1

Fname	Lname	Pname	Hours

SELECT FNAME, LNAME
FROM (**EMPLOYEE** JOIN **PROJECT** on SSN=ESSN) JOIN
        WORKS_ON on PNO=PNUMBER
WHERE PNAME='PRODUCTX'

Disadvantage:
Inefficient for views defined via complex queries
Esp. if additional queries are to be applied within a short time period

Efficient View Implementation

View materialization: involves physically creating and keeping a temporary table

- assumption: other queries on the view will follow
- concerns: maintaining correspondence between the base table and the view when the base table is updated
- strategy: incremental update

WORKS_ON1			
Fname	Lname	Pname	Hours

View Update

Single view without aggregate operations:

- update may map to an update on the underlying base table

Views involving joins:

- an update *may* map to an update on the underlying base relations
- not always possible

EXAMPLE – Complex View Update

- **Example:**

  UPDATE WORKS_ON1

  SET PNAME=COMPUTERIZATION

  WHERE FNAME='JOHN AND

        LNAME='SMITH' AND
        PNAME='PRODUCTX'

WORKS_ON1

Fname	Lname	Pname	Hours

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

EXAMPLE – Complex View Update

UPDATE WORKS_ON1

SET PNAME=COMPUTERIZATION

WHERE FNAME='JOHN AND LNAME='SMITH' AND PNAME='PRODUCTX'

WORKS_ON1

Fname	Lname	Pname	Hours

A) UPDATE PROJECT
   SET PNAME='COMPUTERIZATION'
      WHERE PNAME='PRODUCTX'

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

WORKS_ON

Essn	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987654321	30	20.0
987654321	20	15.0
888665555	20	NULL

View Update

UPDATE WORKS_ON1

SET PNAME=COMPUTERIZATION

WHERE FNAME='JOHN AND LNAME='SMITH' AND PNAME='PRODUCTX'

- B)**UPDATE WORKS_ON**

  SET PNO = (SELECT PNUMBER

  FROM PROJECT

  WHERE PNAME='COMPUTERIZATION')

  WHERE ESSN IN (SELECT SSN

  FROM EMPLOYEE

  WHERE   LNAME='SMITH' AND FNAME='JOHN')

  AND

  PNO = (SELECT PNUMBER FROM PROJECT

  WHERE PNAME='PRODUCTX')

Un-updatable Views

- Views defined using groups and aggregate functions are not updateable

```
UPDATE DEPT_INFO
SET        Total_sal=100000
WHERE      Dname='Research';
```

DEPT_INFO

Dept_name	No_of_emps	Total_sal

- Views defined on multiple tables using joins are generally not updateable