

Relational Algebra

Sony P

MEC

Unary Relational Operations: SELECT σ

- The **SELECT** operation is denoted by σ (sigma) and is used to select a *subset* of the tuples from a relation based on a selection condition.
- $\sigma_p (R)$
- R is the Relation Name
- P is the Condition or predicate

College Database

- Student(sName, RollNo, Class, AdmNNo)
- Course(CourseName, Cid, offered`dept)
- CourseRoom(Cid, RoomNo)
- Faculty(Fname, Fid, F.Dept)
- Department(Dname, Did, HoD)
- Room(Roomno, RoomLocation)
- Platform(PlatformName, Link, Cid)
- Subtaught(Fid, Cid, Modeofteach)

Student Schema

- Student(sName, RollNo, Class, AdmNNo, Age)

| sName | RollNo | ClassName | AdmNNo | Age |
|---------|--------|-----------|--------|-----|
| Anwar | 48 | c4B | 9875 | 18 |
| Deon | 22 | c4A | 8569 | 18 |
| Gautham | 19 | c4B | 9854 | 20 |
| Jabira | 33 | c4A | 7894 | 19 |
| Jyothis | 28 | c4B | 5894 | 24 |
| Megha | 57 | c4A | 7526 | 22 |
| Nevin | 38 | C4 B | 4856 | 23 |

COURSE

- Course(CourseName,Cid,offereddept)

| CourseName | Cid, | offereddept |
|----------------|--------|-------------|
| DBMS | Cs204 | Cse |
| OS | CS206 | CSE |
| MP | EC315 | ECE |
| IOT | EE386 | EEE |
| LINEAR ALGEBRA | MA 201 | ASE |
| MECHANICS | ME106 | ME |

Faculty(Fname,Fid,F.Dept,Salary)

| Fname | Fid | Dept | Salary |
|----------------|------|------|----------|
| Arun Prasad | F208 | EEE | 1,30,000 |
| Mini | F107 | BM | 1,70,000 |
| Remya S | F298 | ECE | 90,000 |
| Silpa M | F234 | ECE | 25,000 |
| Sajeesh M | F321 | ECE | 90,000 |
| Sreekumar K | F212 | CSE | 98,000 |
| Viji Mohan A | F231 | CSE | 56,000 |
| Cinu T S | F345 | CSE | 45,000 |
| Krishnadas | F111 | ASE | 1,89,000 |
| Remadevi | F098 | ASE | 1,98,000 |
| Sandya P Gopal | F134 | ME | 99,000 |

Q. Retrieve the student tuple whose age is 18

- $\sigma_{\text{age}=18}(\text{student})$

| sName | RollNo | ClassName | AdmNNo | Age |
|-------|--------|-----------|--------|-----|
| Anwar | 48 | c4B | 9875 | 18 |
| Deon | 22 | c4A | 8569 | 18 |

- $\sigma_{\text{Class}=\text{C4B}}(\text{student})$

SELECT Operation Properties

- The SELECT operation $\sigma_p(R)$ produces a relation S that has the same schema (same attributes) as R

SELECT σ is commutative:

$$\sigma_{\langle \text{cond1} \rangle}(\sigma_{\langle \text{cond2} \rangle}(R)) = \sigma_{\langle \text{cond2} \rangle}(\sigma_{\langle \text{cond1} \rangle}(R))$$

- Because of commutativity property, a cascade (sequence) of SELECT operations may be applied in any order:
- $\sigma_{\langle \text{cond1} \rangle} \sigma_{\langle \text{cond2} \rangle} (\sigma_{\langle \text{cond3} \rangle}(R)) = \sigma_{\langle \text{cond2} \rangle} (\sigma_{\langle \text{cond3} \rangle} (\sigma_{\langle \text{cond1} \rangle}(R)))$
- A cascade of SELECT operations may be replaced by a single selection with a conjunction of all the conditions:
- $\sigma_{\langle \text{cond1} \rangle}(\sigma_{\langle \text{cond2} \rangle}(\sigma_{\langle \text{cond3} \rangle}(R))) = \sigma_{\langle \text{cond1} \rangle \text{ AND } \langle \text{cond2} \rangle \text{ AND } \langle \text{cond3} \rangle}(R))$
- The number of tuples in the result of a SELECT is less than (or equal to) the number of tuples in the input relation R

Q.Retrieve the students who are studying in
c4A and their age is less than 20

One possibility

- $\sigma_{\text{age} < 20} (\sigma_{\text{className} = \text{"C4A"}} (\text{student}))$

Write Other Possibilities

Another one

- $(\sigma_{\text{className}=\text{"C4A"}}(\sigma_{\text{age}<20}(\text{student})))$

Another one

- $\sigma ((\text{className} = \text{"C4A"}) \text{ and } (\text{age} < 20) (\text{student}))$

Another one

- $\sigma((\text{className} = \text{"C4A"}) \wedge \sigma(\text{age} < 20))(\text{student})$

Unary Operation : Project(π)

- This operation is used for selecting a column or set of columns(attributes) from a relation.
- Project operation creates vertical partition
 - $\pi_{\text{Attribute list}}$ (Relation)
Project Operation removes any duplicate tuples

Q.Retrieve the name of students from student table

- $\Pi_{sName}(\text{Student})$

| sName |
|---------|
| Anwar |
| Deon |
| Gautham |
| Jabira |
| Jyothis |
| Megha |
| Nevin |

Retrieve the name of student Who are
Studying in Class C4B

Retrieve the name of student Who are
Studying in Class C4B

- $\Pi_{sName}(\sigma_{Class=C4B}(student))$

- $\Pi_{sName}(\sigma_{Class=C4B}(student))$

Q. Retrieve the student names whose age is 18

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- $\Pi_{sName}(\sigma_{age=18}(\text{student}))$