Relational Algebra

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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,offereddept)
- 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

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

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

- $\sigma_{Class=C4B}$(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:

$\sigma_{<cond1>}(\sigma_{<cond2>}(R)) = \sigma_{<cond2>}(\sigma_{<cond1>}(R))$

- Because of commutativity property, a cascade (sequence) of SELECT operations may be applied in any order:
- $\sigma_{<cond1>}\sigma_{<cond2>}(\sigma_{<cond3>}(R)) = \sigma_{<cond2>}(\sigma_{<cond3>}(\sigma_{<cond1>}(R)))$
- A cascade of SELECT operations may be replaced by a single selection with a conjunction of all the conditions:
- $\sigma_{<cond1>}(\sigma_{<cond2>}(\sigma_{<cond3>}(R)) = \sigma_{<cond1> \text{ AND } <cond2> \text{ AND } <cond3>}(R)))$
- 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

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

Write Other Possibilities

Another one

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

Another one

- σ (($_{\text{className=“C4A”}}$) and (age<20) (student))

Another one

- σ (($_{\text{className=“C4A”}}$)) (student)) ^ σ (($_{\text{(age<20)}}$ (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

- Π_{sName}(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

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

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

Q. Retrieve the student names whose age is 18

Q. Retrieve the student names whose age is 18

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