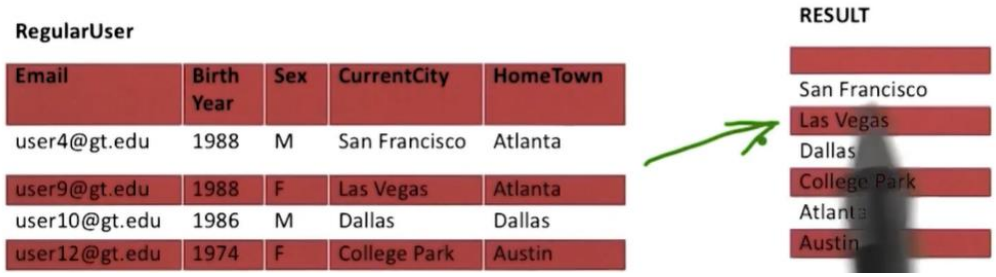
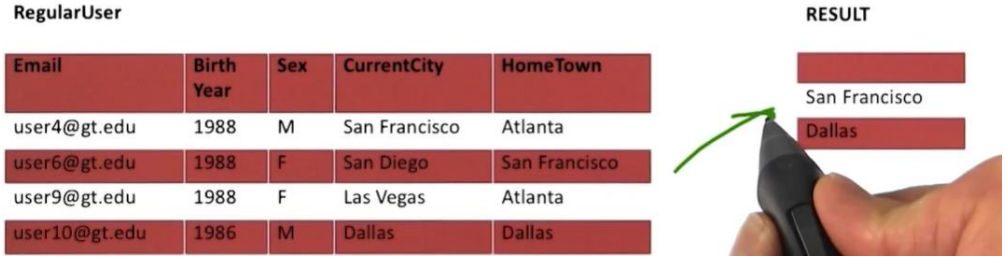
- Big O = SELECT operation is denoted by $\sigma_{<\text{selection condition}>}(R)$ where σ (sigma) denotes the SELECT operator and the selection condition is a Boolean expression specified on the attributes of relation R.
- Pie = PROJECT Denoted by $\pi_{<\text{attribute list}>}(R)$ where π (pi) represents the PROJECT operation and is the desired sub list of attributes from the relation R
    - Duplicate Elimination – does not output (removes) duplicate tuples
- Union = U
    - Find all cities that are a current city or a HomeTown for some user
    - $\pi_{\text{CurrentCity}}(\text{RegularUser}) \cup \pi_{\text{HomeTown}}(\text{RegularUser})$
    - 
RegularUser

Email	Birth Year	Sex	CurrentCity	HomeTown
user4@gt.edu	1988	M	San Francisco	Atlanta
user9@gt.edu	1988	F	Las Vegas	Atlanta
user10@gt.edu	1986	M	Dallas	Dallas
user12@gt.edu	1974	F	College Park	Austin

RESULT

San Francisco
Las Vegas
Dallas
College Park
Atlanta
Austin
- Intersection = $\cap$
    - Find all cities that are a currentCity for someone and a HomeTown for so RegularUser
    - $\pi_{\text{CurrentCity}}(\text{RegularUser}) \cap \pi_{\text{HomeTown}}(\text{RegularUser})$
    - 
RegularUser

Email	Birth Year	Sex	CurrentCity	HomeTown
user4@gt.edu	1988	M	San Francisco	Atlanta
user6@gt.edu	1988	F	San Diego	San Francisco
user9@gt.edu	1988	F	Las Vegas	Atlanta
user10@gt.edu	1986	M	Dallas	Dallas

RESULT

San Francisco
Dallas
    - SF is a part of both, appears in result, Same as Dallas.

OPERATION	PURPOSE	NOTATION
SELECT	Selects all tuples that satisfy the selection condition from a relation R.	$\sigma_{\text{<selection condition>}}(R)$
PROJECT	Produces a new relation with only some of the attributes of R, and removes duplicate tuples.	$\pi_{\text{<attribute list>}}(R)$
THETA JOIN	Produces all combinations of tuples from R_1 and R_2 that satisfy the join condition.	$R_1 \bowtie_{\text{<join condition>}} R_2$
EQUIJOIN	Produces all the combinations of tuples from R_1 and R_2 that satisfy a join condition with only equality comparisons.	$R_1 \bowtie_{\text{<join condition>}} R_2$, OR $R_1 \bowtie_{\text{(<join attributes 1>), (<join attributes 2>)}} R_2$
NATURAL JOIN	Same as EQUIJOIN except that the join attributes of R_2 are not included in the resulting relation; if the join attributes have the same names, they do not have to be specified at all.	$R_1 *_{\text{<join condition>}} R_2$, OR $R_1 *_{\text{(<join attributes 1>), (<join attributes 2>)}} R_2$ OR $R_1 * R_2$
UNION	Produces a relation that includes all the tuples in R_1 or R_2 or both R_1 and R_2; R_1 and R_2 must be union compatible.	$R_1 \cup R_2$
INTERSECTION	Produces a relation that includes all the tuples in both R_1 and R_2; R_1 and R_2 must be union compatible.	$R_1 \cap R_2$
DIFFERENCE	Produces a relation that includes all the tuples in R_1 that are not in R_2; R_1 and R_2 must be union compatible.	$R_1 - R_2$
CARTESIAN PRODUCT	Produces a relation that has the attributes of R_1 and R_2 and includes as tuples all possible combinations of tuples from R_1 and R_2.	$R_1 \times R_2$
DIVISION	Produces a relation $R(X)$ that includes all tuples $t[X]$ in $R_1(Z)$ that appear in R_1 in combination with every tuple from $R_2(Y)$, where $Z = X \cup Y$.	$R_1(Z) \div R_2(Y)$

**1st ping

Correct Mapping Of

Voted relationship	Voted(Name, BillNumber, How)
DISTRICT entity	District(DNum, SName)
COUNTY entity with its associated relationships, via foreign keys, to a relation then how many non- NULL foreign keys will the relation have	2
map the COUNTY entity with its associated relationships via foreign keys, then which of the following statements will be true about the County relation?	The relation will have two columns associated with the SName of STATE.
create one relation to represent the combination of the Voted and Sponsored relationships?	No

**Second image

Item relation	ItemID and UnitPrice is a superkey ItemID is primary

violate the referential integrity constraint	Insert |45|103|2011-05-21|Null| into Order

Statement about null values - a tuple in the OrderDetail relation cannot have a null value for ItemID

True	False
Several attributes in a relation may have the same domain	
From the mathematical definition of a relation, reordering of tuples does not change the relation state	
The relation state would change more frequently than the relation schema.	

OID 44 – Deletions are propagated - only two tuples from OrderDetail must be deleted

Single tuple w/ value of 5:	UnitPrice(ItemID=1(Item)) QOnHand(ItemID=4(Item)) QOrdered(ItemID>2 and OID >43(OrderDetail))
How many -> ItemID(OrderDetail)	4
How many - > Customer*Order*OrederDetail*Item	9
OID(Order)XItemID(Item))-(OID,ItemID(OrederDetail)	11
Right outer join between OrderDetail(left) and Item(Right)	10
customers' Id and Phone number for customers who dont have any orders	(CID(Customer)-(CID(Order)))*(CID,Phone(Customer))

Same Relation Produced:

True	False
OrderDetail.OID=Order.OID(OrderDetail X Order)	OrderDetail ⋈OrderDetail.OID=Order.OID Order
	OrderDetail * Order

Returned By Query

CID(Customer) – CID(Order)	(1)a relation with one column and two tuples whose values are 102 and 106 (2)a relation with IDs of customers who did not place any orders
Cname(Qordered>3(Order*OrderDetail*Customer)	Brown, Smith
Customer-((CID(Date='2011-06-02'(Order)))*Customer)	returns the CID, Cname, Phone and City of customers who did not place an order on 2011-06-02
OID((OID(Order)XItemID(Item))-(OID,Item(OrderDetail)	returns the OID of orders that dont include all items from the Item relation
OID = 44	(1)OID(CID=105 Order*OrederDetail) (2)OID(OrderDetail)-OID((CID<105 Order) (3)OID(QOredered>4 and ItemID=3(OrderDetail))
{CID, c.Cname|Customer(c) AND (Ed)(Order(d) and d.Date='2011-06-02' AND c.CID=d.CID)}	(1)Is writted using tuple calculus (2)105 | Brown
{d.OID, d.ItemID|OrderDetail(d) AND (Et)(Item(t) and d.ItemID=t.ItemID AND d.QOrdered=t.QOnHand)}	finds the OID, ItemID pairs where item is ordered for a quantity that equals the quantity on hand.
Left outer join – customers and order, Customers is left operand and Orders is right operand.	(1)include customer Doe and Green (2)6 tuples in result

END

E 1 Diagram (Same as previous)

attributes of the relation HANGAR resulting from mapping the entity type HANGAR	(1)Number, (2)Location, (3)Capacity
relation results from mapping the entity type PERSON?	Person-nicknames Person
attributes of the relation PERSON resulting from mapping the entity type PERSON	(1)SSN, (2)Phone, (3) Address, (4)Owner-ID
attributes of the relation SERVICE resulting when mapping the weak entity type SERVICE?	Reg#, Date, Workcode, Hours
key of the relation SERVICE resulting when mapping the weak entity type SERVICE	Reg#, Date, Workcode
key of the relation EMPLOYEE resulting from mapping the entity type EMPLOYEE?	Ssn
attributes of the relation WORKS-ON resulting from mapping the many-many relationship type WORKS-ON	Model,SSN
attributes of the relation AIRPLANE	(1)Model, (2) Reg#, (3)Number

resulting from mapping the entity AIRPLANE	
foreign key attributes of the relation AIRPLANE resulting from mapping the entity AIRPLANE	(1)Model, (2)NUmber
Min and max number of attributes of a superkey in the relation AIRPLANE?	1 and 3
many-many relationship type OWNS, which relation will the attribute Pdate belong to	OWNS

E2 Diagram

Relation

Must have at least one key

Contains no duplicate tuples

Must have at least one superkey

INTERSECTION = relational algebra operator requires type compatibility

City,Type(Membership)	5
Club*Meeting	5
Club X Member	
Left outer natural join between Club and Meeting (Club is left)	7
{m.Mid|Membership(m)}	6
{c|Club(c) AND c.Fee>25	2
Returns Club CID for clubs that held no meeting	Cid(Club_-Cid(Meeting)
Name(Member*dType='office' and CID>13(Membership))	Don Black
Name(Name,City(City='Atlanta'(Name,City,Fee(Club))) && Name(City='Atlanta'(Club))	True
Returns the Mids of persons who are members of all Clubs in Atlanta	(Cid,Mid(Membership)) % Cid(City='Atlanta(Club))
tuple calculus query returns the Cid and Name for clubs that did not have any meetings	{c.Cid,c.Name | Club (c) And (Am)(NOT(Meeting(m) OR NOT (m.cid=c.cid)))}
{c.Name,m.Name | Club(c) AND Member(m) AND (Eb)(Membership(b) AND b.Mid=m.Mid AND b.Cid=c.Cid AND b.Type='officer')}	Chess,Don Black – Chess, David Gray – Auto, David Gray – Movie, Don Black

**

Mapping the SECTION entity type to a relation	Ssn, C#

Mapping MINOR to the relational model	Including DEPARTMENT Dname in the STUDENT relation
Mapping PERSON, FACULTY, STUDENT to relations – reduce NULL values	3 relations – PERSON,FACULTY, STUDENT
Mapping CHAIRS to the relational mod	Either would work
Mapping TRANSCRIPT to the r mod	Separate relation for TRANSCRIPT
What happens multi-value Degree attribute when mapping to r mod	Separate relation created SSN, College, Degree, Year

ItemID,Qty)OrderItem)	6
Degree of rel - UnitPrice>15(Item*OrderItem)	4
Cardinality - UnitPrice>15(Item*OrderItem)	1
ItemID(Item) ∩ ItemID(OrderItem)	4
ItemID(Item) U ItemID(OrderItem)	5
Left outer join, item is left and OrderItem is right.	8
{s.ItemId, s.UnitPrice, t.orderID, t.Qty | Item(s) AND OrderItem(t) AND s.ItemID=t.ItemID AND s.UnitPrice>15	1
ItemID(Item)-ItemID(OrderItem)	Returns itemId of items that do not appear on any order
CustID(Oreder*qty>2(OrderItem))	11 and 12
CustID=11(UnitPrice<10(Qty>2(Order*Item*OrderItem)))	Both
Only consider relational db schema, which is true	ItemID(OrderItem) will never return more tuples than ItemId(Item)
Jack Black | Atlanta	Cname(CustID=13(Customer)) x city(CustID=11(Customer))
|R| represents cardinality, which is true	|OrderItem*OrderItem|=|OrderItem U OrederItem|
Projection of a list of attributes from a relation R return same number of tuples as relation R	When the list of attributes is a superkey for R
s.CustID, s.Cname, S.City, t.ItemIDmt.UnitPrice | Customer(s) AND Item(t)	Customer X Item
{t.City|Customer(t) AND (Es) (Order(s) AND t.CustID=s.CustID)}	Atlanta | Marietta

SQL

DROP TABLE User Cascade	(1)two foreign keys constraints are removed from RegularUser and AdminUser (2)Table def is removed from catalog (3)6 Tuples are updated
DELETE FROM User	(1)6 Tuples are deleted

	(2)Deletion is rejected due to foreign key costraints (3)the 2 foreign key constraints are removed from RegularUser and AdminUser
INSERT INTO Users VALUES ('leo1@gt', 'abc', 'Mark'	The tuple is inserted
INSERT INTO User VALUES ('leo@gt', 'stu', 'Leo');	rejected because of redundant email
INSERT INTO User VALUES ('john@gt', 'john', 'John')	The tuple is inserted
Attributes - SELECT * FROM RegularUser	5
Tuples - SELECT DISTINCT CurrentCity FROM RegularUser;	2
Tuples - SELECT Sex FROM RegularUser	4
Tuples - SELECT CurrentCity FROM RegularUser UNION SELECT Hometown FROM RegularUser	2
Tuples - SELECT CurrentCity FROM RegularUser UNION ALL SELECT Hometown FROM RegularUser;	8
Attributes - SELECT * FROM Employer, Jobs	4
Tuples - SELECT UserName FROM User WHERE Email LIKE '%y@gt';	2
Attributes - SELECT * FROM Jobs NATURAL JOIN Employer	3
Tuples - SELECT DISTINCT Email FROM Jobs NATURAL LEFT OUTER JOIN Employer;	3
Tuples - SELECT * FROM RegularUser WHERE CurrentCity='Atlanta' AND Sex='F';	2
SELECT * FROM USER NATURAL JOIN USER	6
SELECT Email FROM Jobs ORDER BY Email	ed@gt, ed@gt, mary@gt, mary@gt, mary@gt, rocky@gt
SELECT EmpName, COUNT (Email) FROM Jobs GROUP BY EmpName HAVING COUNT (*) >= 2 ORDER BY EmpName	GT 3, UFL 2
SELECT DISTINCT Email FROM Jobs WHERE JobTitle IN (Programmer, Professor, Researcher)	ed@gt, rocky@gt
SELECT Email FROM Jobs X WHERE NOT EXISTS ((SELECT EmpName FROM Employer) EXCEPT (SELECT EmpName FROM Jobs Y WHERE X.Email=Y.Email));	mary@gt, mary@gt, mary@gt
SELECT DISTINCT Email FROM Jobs X WHERE EXISTS ((SELECT EmpName FROM Employer) EXCEPT (SELECT EmpName FROM Jobs Y WHERE X.Email=Y.Email));	ed@gt, rocky@gt
Which query returns hightes number of tuples	(1) SELECT * FROM USER UNION SELECT * FROM USER (2) SELECT * FROM USER NATURAL JOIN USER (3) SELECT * FROM USER INTERSECT SELECT * FROM USER
CREATE VIEW GTUsers AS SELECT Email, UserName FROM User WHERE Email LIKE '%@gt	The definition of the view is inserted

SELECT UserName FROM GTUsers	The SQL query is modified using the View definition, then the modified query is executed
Rows - select startdate from reservation intersect select enddate from reservation	2
Rows-select rid from reservetools	7
Columns- select * from reservation, reservetools, customer where customer.cemail = reservation.cemail and reservation.rid = reservetools.rid;	9
Rows- select * from reservation, reservetools, customer where customer.cemail=reservation.cemail and reservation.rid=reservetools.rid	7
Rows - select startdate from reservation union all select enddate from reservation	10
Columns - select * from reservation natural join (reservetools natural join customer);	7
Rows - select * from reservation natural join (reservetools natural join customer);	7
Rows - select * from (reservation natural join reservetools) natural join customer	7
Rows - select distinct r.cemail from reservation r, reservation s where r.cemail = s.cemail and (r.startdate - s.enddate) = 1;	1
select cname from (customer natural join reservation) 5/18/2020 Exam 3: DB Sys Concepts& Design - CS-6400-OAN https://gatech.instructure.com/courses/111492/quizzes/948899/21 where city = 'Marietta' and enddate > '13-AUG2017'	John Smith
select toolid from tools t where not exists (select * from reservetools where toolid = t.toolid	The toolid for tools that have not been reserved
Rows - select * from customer, reservation	20
Possible null values - select * from (tools natural left outer join reservetools)	rid
select cname from customer order by cname asc	Jane Doe
select cemail, rid from (reservation natural join reservetools) group by cemail,rid having count(*) > 1	jb@hotmail, 2 sb@gmail, 1
select cname from customer where cemail in (select cemail from reservation where rid in (select rid from reservetools where toolid in (select toolid from tools where originalprice > 2000)))	Jane doe, john smith
select rid from reservation where cemail like '%@_mail%'	4, 1
select rid from reservetools where toolid in (101, 105)	1, 3, 4, 5
Which of the following sets of Create Table statements would be appropriate for the relational schema	Create Table Customer (CEmail varchar(30), Cname varchar(30), City varchar(30), Primary key (CEmail));

	Create Table Reservation (RID int, StartDate date, EndDate date, CEmail varchar(30), Primary key (RID), Foreign key (CEmail) references Customer (CEmail)); Create Table Tools (TooLID int, RentalPrice int, OriginalPrice int, Deposit int, Primary Key (ToolID)); Create Table ReserveTools (RID int, TooLID int, Primary Key (RID,ToolID), Foreign Key (RID) references Reservation (RID), Foreign Key ToolID references Tools (ToolID))
Required in a syntactically correct SQL SELECT	Select and From
none of the attributes in the relational schema are set as NOT NULL – Which statement	insert into tools (toolid) values (108)
update Tools set deposit = deposit * 0.5 where originalprice > 2000 and toolid not in (select toolid from reservetools);	toolId, rentalPrice, OriginalPrice, Deposit 101, 50, 2000, 100 102, 30, 1000, 60 103, 30, 800, 60 104, 40, 1500, 80 105, 50, 2200, 100 106, 30, 800, 60 107, 70, 3000, 70
Select toolid from tools where deposit > 65 and deposit < 95	104 and 107
create view rentalcost(rid, cost) as select r.rid, (1 + enddate - startdate) * rentalprice from reservation r, reservetools s, tools t where r.rid = s.rid and s.toolid = t.toolid ; What would the following query return? select rid, sum(cost) from rentalcost group by rid order by sum(cost) desc;	RID, SUM(Cost) 1, 400 2, 280 4, 200 5, 150 3, 50