RELATIONAL DATA LANGUAGES

Part 2_1

Union (denoted by U)

- RU S is a Binary Operation
- R and S should be type compatible
  - *R and S should have same number of attributes*
  - *Each pair of corresponding attributes must be type compatible (have same or compatible domains)*

- Tuples present in R or S or both are retrieved.
- Duplicate tuples are eliminated.

- Ex : Purchase_Invoice U Sales_Invoice

Union Example

- Find details of the books that were published in 2009 or belongs to NEWS category

ISBN	Title	Year	Category	Publ_code
B111	FISH	2007	ARTICLE	P010
B112	GLOW	2009	ARTICLE	P212
B110	FERT	2010	NEWS	P010
B113	FINE ARTS	2009	NEWS	P010
B114	INDU – THE MAID	2008	NOVEL	P201

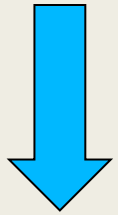
- Result1 <- ($\sigma_{year=2009}$ (Book)
- Result2 <- ($\sigma_{Category='NEWS'}$ (Book)
- Result <- Result1 U Result2

ISBN	Title	Year	Category	Publ_code
B112	GLOW	2009	ARTICLE	P212
B110	FERT	2010	NEWS	P010
B113	FINE ARTS	2009	NEWS	P010

Intersection

- Find the books that were published in 2009 and belongs to NEWS category
- Result1 <- ($\sigma_{year=2009}$ (Book)
- Result2 <- ($\sigma_{Category='NEWS'}$ (Book)
- Result <- Result1 ∩ Result2

ISBN	Title	Year	Category	Publ_code
B111	FISH	2007	ARTICLE	P010
B112	GLOW	2009	ARTICLE	P212
B110	FERT	2010	NEWS	P010
B113	FINE ARTS	2009	NEWS	P010
B114	INDU – THE MAID	2008	NOVEL	P201

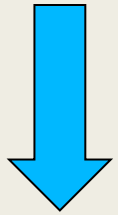


ISBN	Title	Year	Category	Publ_code
B113	FINE ARTS	2009	NEWS	P010

Set Difference

- Find details of the books that were published in 2009 and does not belong to NEWS category
- Result1 <- ($\sigma_{year=2009}$ (Book)
- Result2 <- ($\sigma_{Category='NEWS'}$ (Book)
- Result <- Result1 - Result2

ISBN	Title	Year	Category	Publ_code
B111	FISH	2007	ARTICLE	P010
B112	GLOW	2009	ARTICLE	P212
B110	FERT	2010	NEWS	P010
B113	FINE ARTS	2009	NEWS	P010
B114	INDU – THE MAID	2008	NOVEL	P201



ISBN	Title	Year	Category	Publ_code
B112	GLOW	2009	ARTICLE	P212

Set operations on different relations

P_Inv_No	Date	Publ_code
PI_1001	29/10/2009	P010
PI_2001	1/2/2001	P212
PI_1002	12/4/2007	P010
PI_1045	5/2/2006	P010

S_Inv_No	Date	Cust_code
SI_1001	29/10/2009	C010
SI_2001	1/2/2001	C212
SI_1002	12/4/2007	C010
SI_1045	5/2/2006	C010

Union

P_Inv_No	Date	Publ_code
PI_1001	29/10/2009	P010
PI_2001	1/2/2001	P212
PI_1002	12/4/2007	P010
PI_1045	5/2/2006	P010
SI_1001	29/10/2009	C010
SI_2001	1/2/2001	C212
SI_1002	12/4/200	C010

Properties of Union, Intersect, Difference

- Commutative
  - *Satisfied by Union and Intersect*
- Associative
  - *Satisfied by Union and Intersect*

- Distributive
  - *R U (S-T) = (R U S) – (R U T)*

- R-(R-S) = Which Operation ?
- (R U S) – ((R – S) U (S- R)) = Which operation ?
- R-S ≠ S-R

Cartesian Product

- Combine tuples from two different relations
- Combinatorial manner
- *R X S*
- R(A1, A2, . . ., An) **X** S(B1, B2, . . ., Bm)
- Q(A1, A2, . . ., An, B1, B2, . . ., Bm) is the result
- Number of columns in Q

  cQ = cR + cS
- Number of tuples in Q

  *nQ = nR * nS*

CARTESIAN PRODUCT

ISBN	Title	Category	Publ_code
B111	FISH	ARTICLE	P010
B112	GLOW	ARTICLE	P212
B110	FERT	NEWS	P010

Publ_code	Name	Address
P011	Pub1	Add1
P212	Pub2	Add2
P010	Pub3	Add3

Book X Publisher

ISBN	Title	Category	Publ_code
B111	FISH	ARTICLE	P010
B111	FISH	ARTICLE	P010
B111	FISH	ARTICLE	P010
B112	GLOW	ARTICLE	P212
B112	GLOW	ARTICLE	P212
B112	GLOW	ARTICLE	P212
.....			

Publ_code	Name	Address
P011	Pub1	Add1
P212	Pub2	Add2
P010	Pub3	Add3
P011	Pub1	Add1
P212	Pub2	Add2
P010	Pub3	Add3
.....		

Joins

- To give meaningful representation for the cartesian product.

ISBN	Title	Category	Publ_code
B111	FISH	ARTICLE	P010
B112	GLOW	ARTICLE	P212
B110	FERT	NEWS	P010

Publ_code	Name	Address
P011	Pub1	Add1
P212	Pub2	Add2
P010	Pub3	Add3

Book ⋈ Publisher

ISBN	Title	Category	Publ_code
B111	FISH	ARTICLE	P010
B112	GLOW	ARTICLE	P212
B110	FERT	NEWS	P010

Publ_code	Name	Address
P010	Pub3	Add3
P212	Pub2	Add2
P010	Pub3	Add3

Join (denoted by ⋈)

- Derivative of Cartesian product
- Allows to combine tuples from different relations based on some meaningful condition
- Θ-join
  - *Join based on any of the binary comparison operators (>,=,<,>=,>=,!= et. al)*
  - *Any boolean formula*

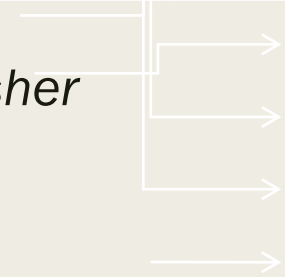
- $R \bowtie_{<F>} S$; F is a join condition
- $F = R.a\ \Theta\ S.b$
- Can you Express $R \bowtie_{F} S$ in terms of other operation ?

Join Example

- Get the publishers name of each book

ISBN	Title	Category	Pub_cd
B111	FISH	ARTICLE	P010
B112	GLOW	ARTICLE	P212
B110	FERT	NEWS	P010

Pbl_code	Publ_name	Publ_phone
P212	Pearson	3452198
P010	McGraw	8930287



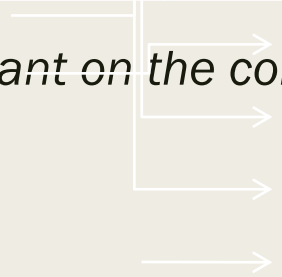
  - $Book \bowtie_{pub\_cd=pbl\_code} Publisher$

Natural Join

- Get the publishers name of each book

ISBN	Title	Category	Publ_code
B111	FISH	ARTICLE	P010
B112	GLOW	ARTICLE	P212
B110	FERT	NEWS	P010

Publ_code	Publ_name	Publ_phone
P212	Pearson	3452198
P010	McGraw	8930287



  - *Book * Publisher*
  - *The join condition is dependant on the columns with same attribute names*