WEEK 2

TERMINOLOGY FOR RELATIONS AND THE RELATIONAL DATABASE

STUDENT OBJECTIVES

- Upon completion of this video, you should be able to:
  - Define the following terms that are used when describing relational databases: Domain, Relation, Table, Attribute, Column, Row, Tuple
  - Given two or more sets of values over given domains, give the Cartesian Product of the sets.

- ***A Domain D*** is a set of atomic values, Example: USA_Phone_Numbers, Employee_Ages, Department IDs
  - Set of 10 digit phone numbers valid in Canada
  - Possible ages of employees
  - A *data type* is specified for each domain like 10 char string or positive integer
- ***A Relation Schema R*** denoted by R(A1, A2, ...An) is made up of a ***relation name*** and a list of attributes. Each attribute Aj is the name of a role played by some domain D in the relation schema R.
- A ***Relation (or relation state)***
  - r of a relation schema R(A1, A2, ... An) also denoted by r(R) is a set of n-tuples r = {t1, t2, ... tm}. Each n-tuple t is an order list of n values t=< v1, v2, ... **_,vn_**> , where each value vi, 1<=i<=n, is an element of dom(Ai) or a special null value.
- R is called the name of the relation schema
- ***Attribute*** is a named column in a relation schema
- ***Tuple*** is a row of a relation
- ***Degree of a relation*** is the number of attributes it contains
- ***Cardinality of a relation*** is the number of tuples it contains

Relation, Tuple and Cardinality of the Relation

Domain for

Tuple is a row

Tuple 1 is <"To Kill A Mockingbird", A781,"Harper Lee", 1960, "Warner Books">

Cardinality of Relation Book is 4

BOOK

Title	ISBN	Author	YearPublished	Publisher
To Kill A Mockingbird	A781	Harper Lee	1960	Warner Books
The Hunger Games	B765	Suzanne Collins	2008	Scholastic Press
Harry Potter and the Sorcerer's Stone	B123	J.K. Rowlings	1997	Scholastic Press
All The Light We Cannot See	A777	Anthony Doerr	2014	Scribner

- ***Mathematical Relations:***
  - Suppose we have 2 set D1 = {2,4} and D2 = {1,3,5}. The Cartesian product D1 X D2 represents all possible ordered pairs:
    - {(2,1), (2,3), (2,5), (4,1), (4,3), (4,5)}

      Any subset of D1 X D2 represents a relation →

      R = {(2,5), (4,1)}
  - We could have three sets: D1, D2 and D3 and build a relation on D1 X D2 X D3

QUESTION: If we have:

- **D1= {Simpson, Flanders, Smithers}**
- **D2 = {Homer, Ned}**
- **D3 = {40,30}**

What would D1 X D2 X D3 give us:

A Relation R is any possible

R2 could be:

{(*Simpson, Homer, 40*),
(Simpson, Ned, 30),
(Flanders, Ned, 40),
(Flanders, Homer, 40),
(Smithers, Ned, 40) }
(Flanders, Homer, 40), }

D1 X D2 X D3 is:

{(Simpson, Homer, 40), (Simpson, Homer, 30), (Simpson, Ned, 40), (Simpson, Ned, 30), (Flanders, Homer, 40), (Flanders, Homer, 30), (Flanders, Ned, 40), (Flanders, Ned, 30), (Smithers, Homer, 40), (Smithers, Homer, 30), (Smithers, Ned, 40), (Smithers, Ned, 30)}

D1	D2	D3
Simpson	Homer	40
Simpson	Ned	30
Flanders	Ned	40
Flanders	Homer	40
Smithers	Ned	40

REVIEW

- Relation → table
- Attribute → column
- Tuple → row
- Cartesian Product → all POSSIBLE tuples that can be produced with all possible attributes over the whole domain for each attribute.