Databases Course
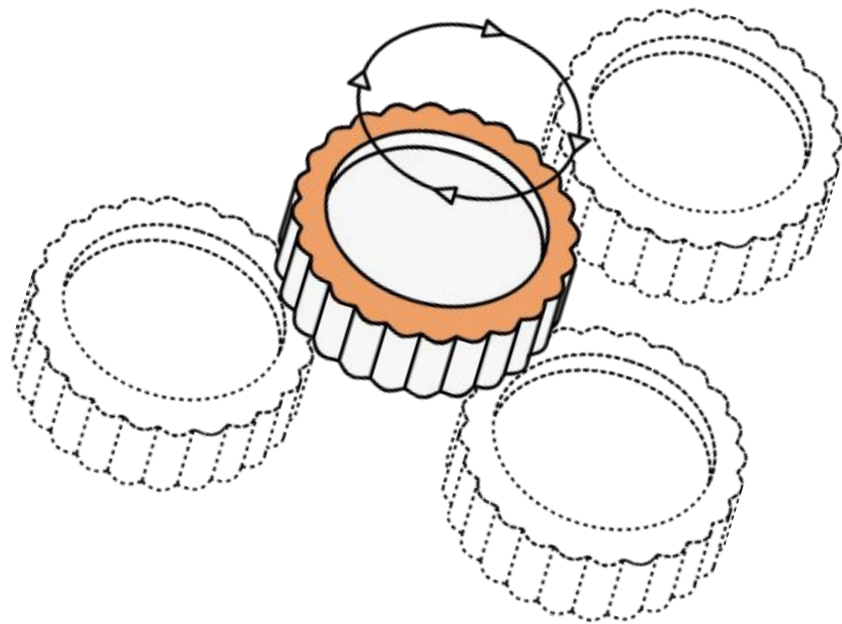[04] Relational Data Model

Jefferson A.
Escuela de Ingeniería de Sistemas y Computación (EISC).
Universidad del Valle

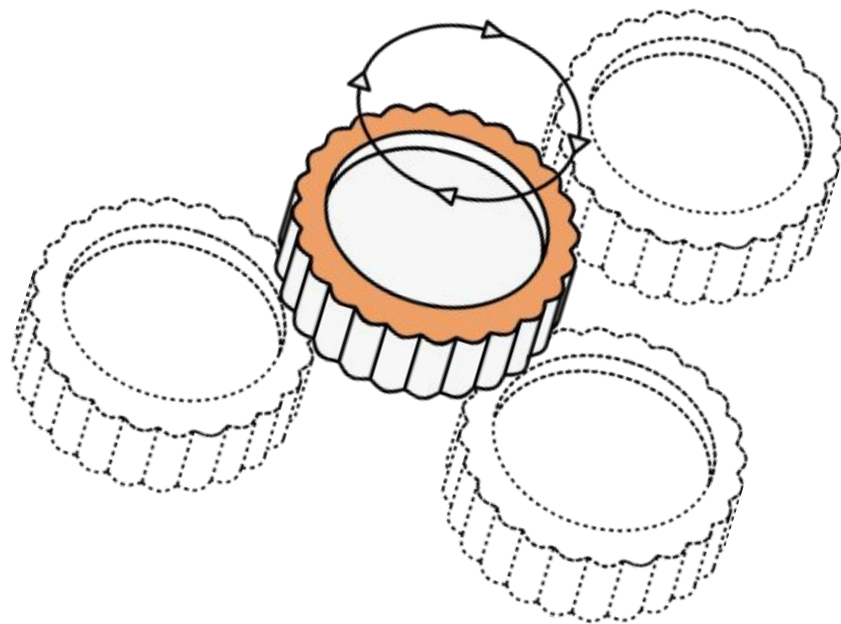GUIA
Grupo de Univalle en
Inteligencia Artificial

Universidad del Valle

Outline

Introduction to databases
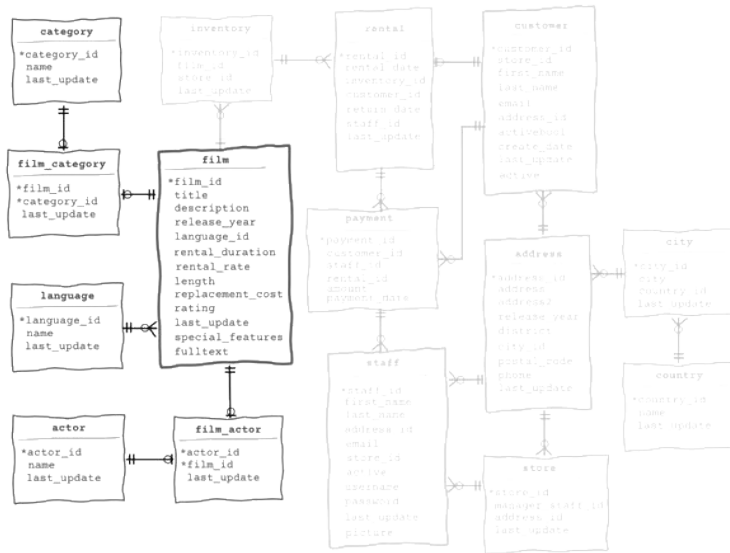
Outline

1. Relational model
   - Historical background
   - Logical model
   - Components
2. General Concepts
3. Characteristics of R
4. Notation

Relational model: Historical background

The relational model of database was introduced in 1970, by English Computer Scientist Edgar F. Codd.

The relational data model was developed for databases — that is, information stored over a long period of time in a computer system — and for database management systems, the software that allows people to store, access, and modify this information.

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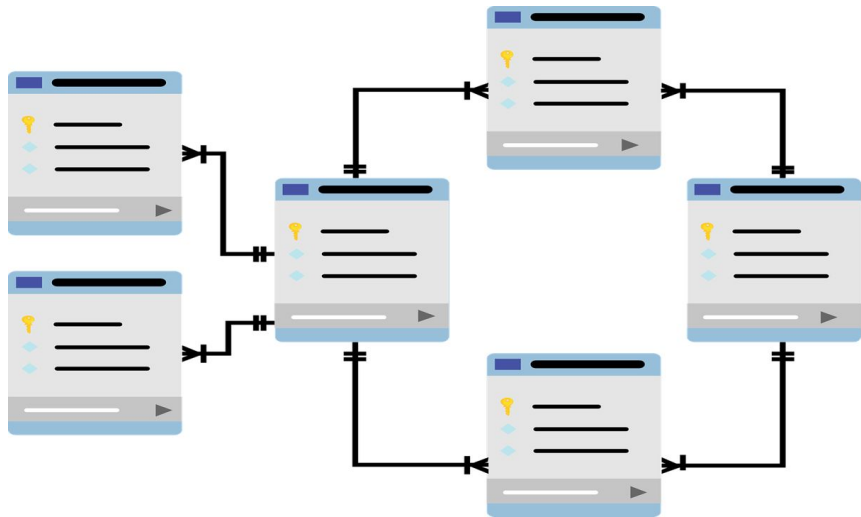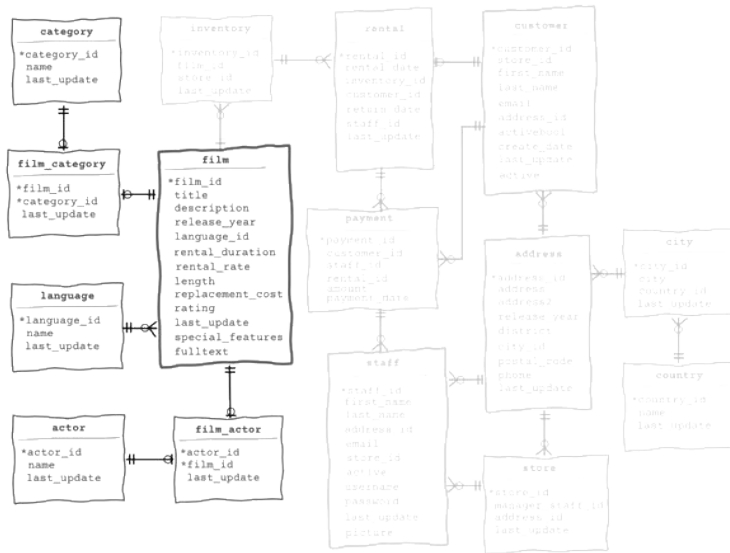
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Relational model

Storing and managing information is one of the most important tasks for computers. The way in which information is organized can have a profound effect on how easy it is to access and manage.

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The relational model is centered on this idea: the organization of data into collections of two-dimensional tables called "relations".
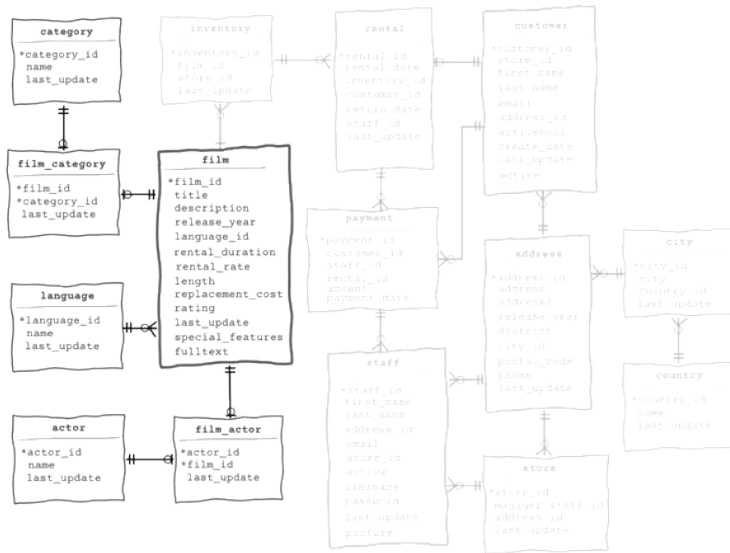
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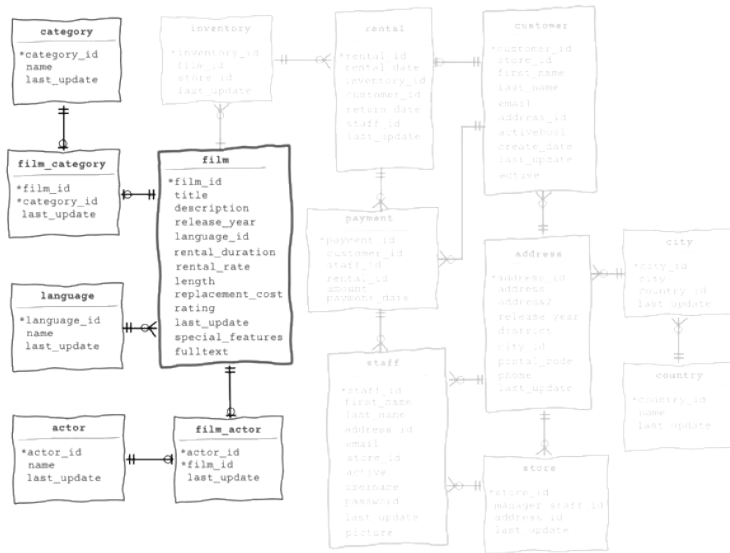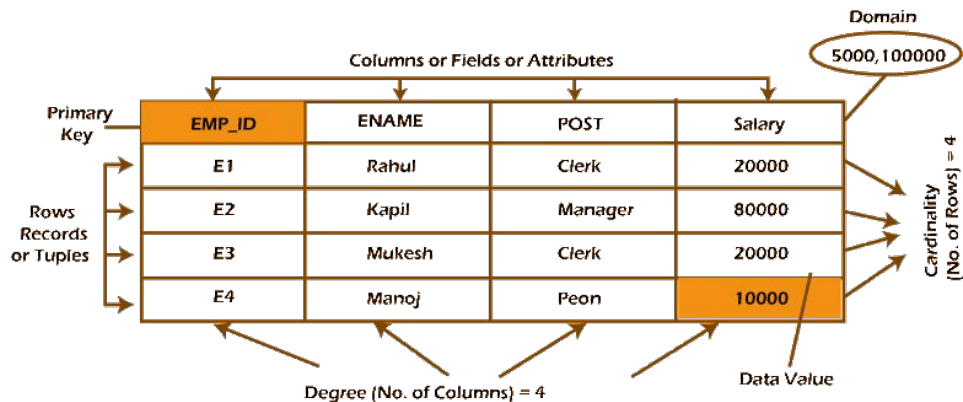
Relational model: Components

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Cardinality refers to the number of elements that the relation (Set) has, a tuple has a degree, and this is according to the number of attributes. NULL values represent unknown or missing values.

Domain

5000,100000

Columns or Fields or Attributes

Primary Key → EMP_ID	ENAME	POST	Salary
E1	Rahul	Clerk	20000
E2	Kapil	Manager	80000
E3	Mukesh	Clerk	20000
E4	Manoj	Peon	10000

Rows Records or Tuples

Cardinality (No. of Rows) = 4

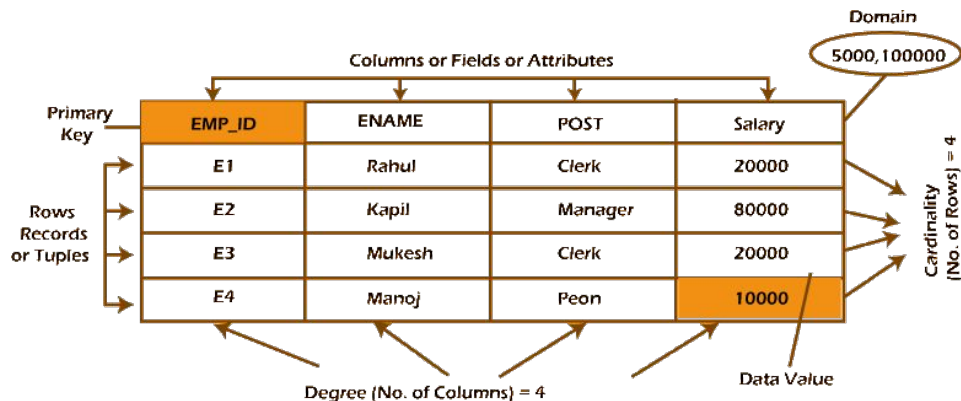Degree (No. of Columns) = 4

Data Value
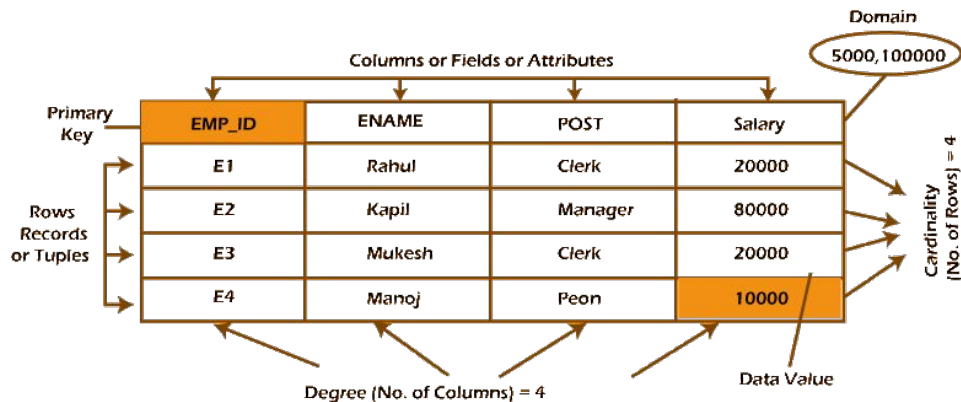
Relational model: Components

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The smallest unit of data in the table is the individual data item. It is stored at the intersection of tuples and attributes. Data items are atomic and for an attribute should be drawn from the same domain.

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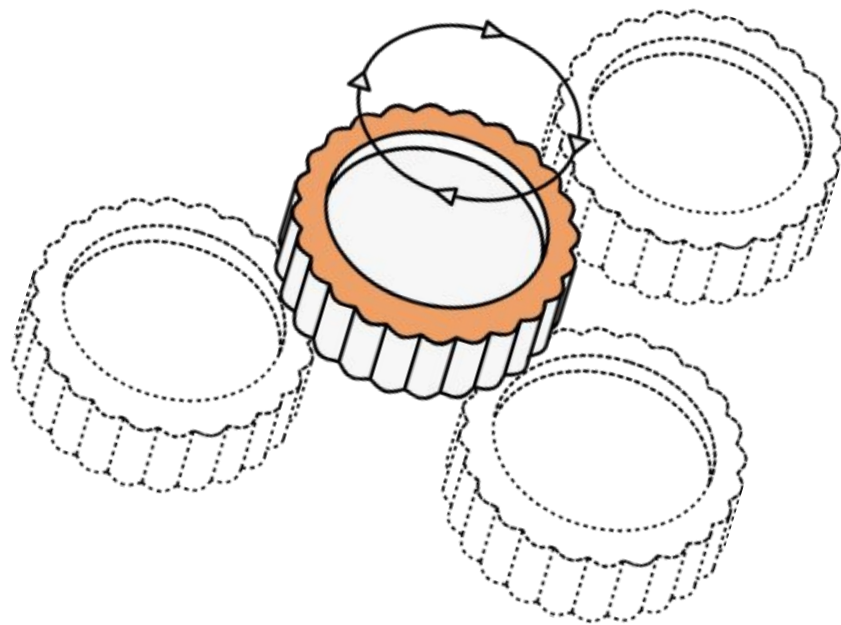The domain refers to the possible values each attribute can contain. It can be specified using standard data types such as integers, floating numbers, etc. For example, An attribute entitled Marital_Status may be limited to married or unmarried values.

EMP_ID	ENAME	POST	Salary
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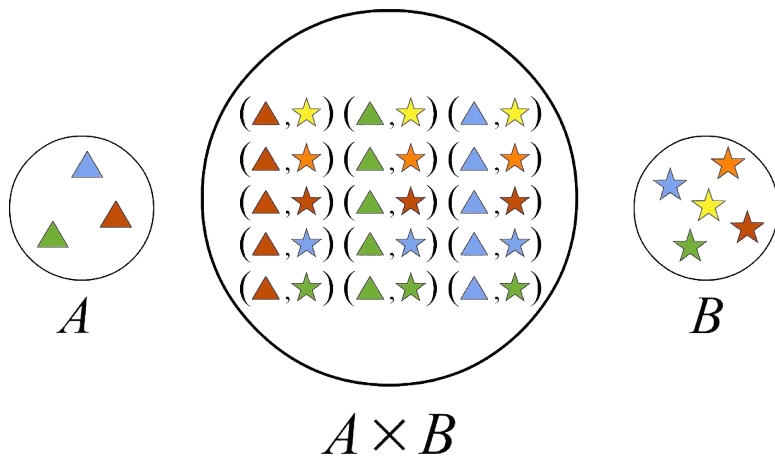Degree (No. of Columns) = 4

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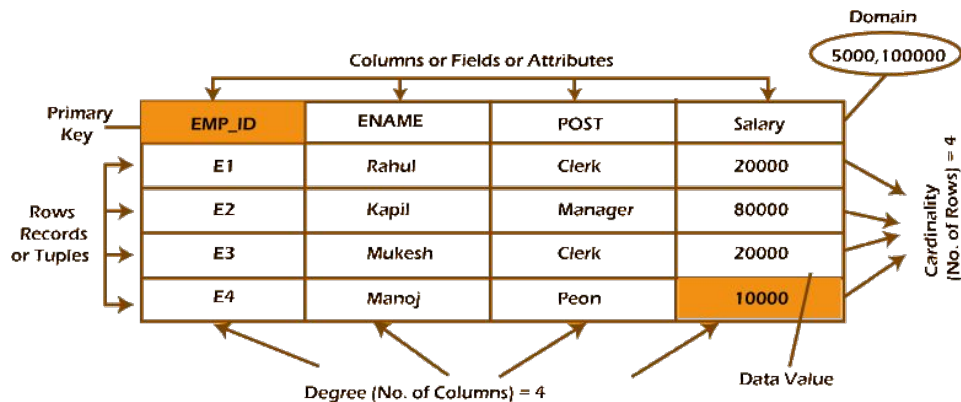
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1. Relational model
2. General Concepts
   - ○
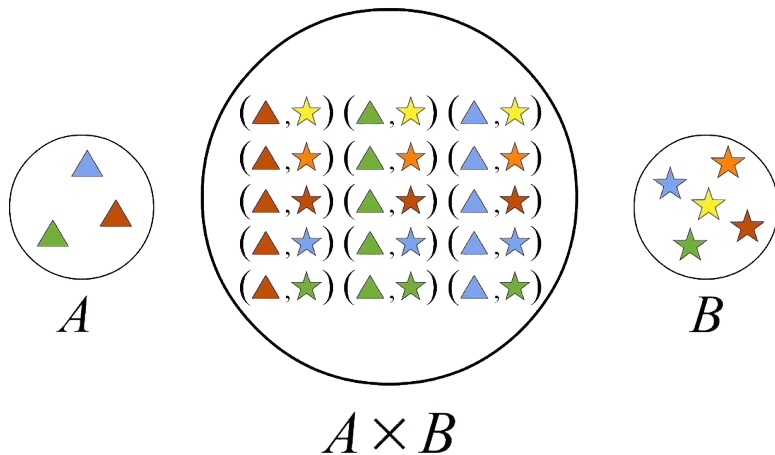3. Characteristics of R
4. Notation

General Concepts

The schema in the relational model is used to describe a relation R.

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R is denoted as R(A1, A2, A3, A4, ..., An), where R is the name of the relation, and A1, A2, A3, A4, ..., An are the attributes, each with its respective domain D1, D2, D3, D4, ..., Dn.

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The relation r of the schema R(A1, A2, A3, A4, ..., An) = r(R) is a set of n-tuples r = {t1, t2, t3, t4, ..., tn}. Each tuple t is an ordered list of n values t = <v1, v2, v3, ..., vn>.
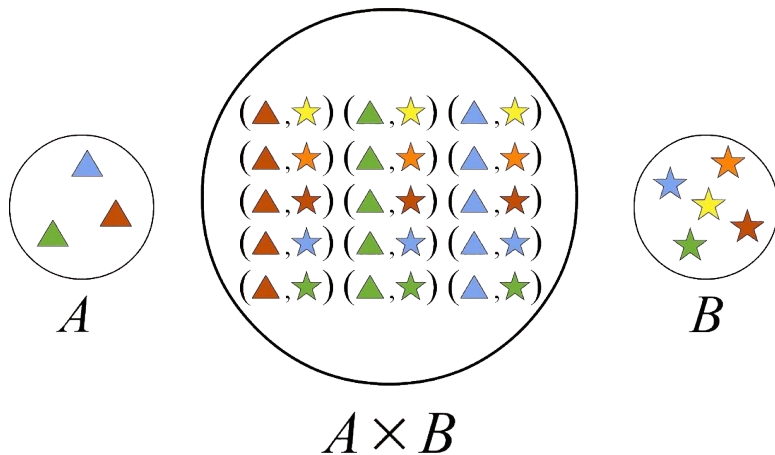
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A relation r(R) is a mathematical relation of degree n on the domains dom(A1), dom(A2), dom(A3), ..., dom(An), which is a subset of the Cartesian product of the sets that define R.
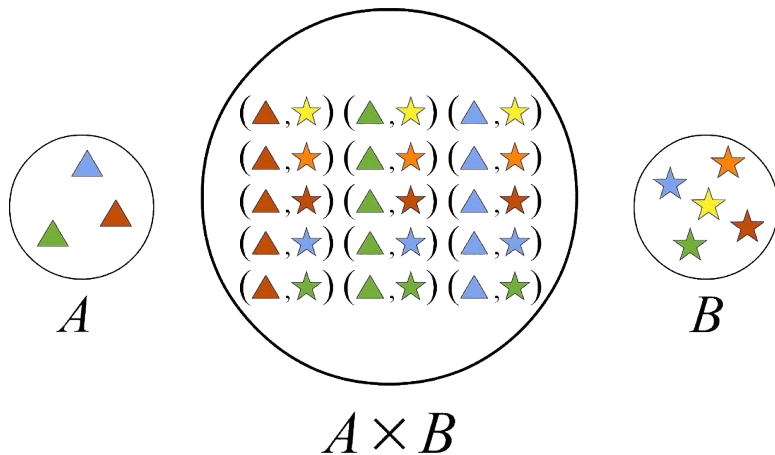
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Characteristics of Relations

The relation schema can be interpreted as a declaration or a type of assertion. Each tuple in the relation can then be interpreted as a fact or a particular instance of the assertion.

EMPLOYEE table
employee_ID (PK)
employee_name
employee_role
employee_department
computer_ID (FK)

COMPUTER table
computer_ID (PK)
computer_year
computer_brand
computer_operatingsystem

Characteristics of Relations

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A relation is defined as a set of tuples. The tuples in a relation do not have any particular order. In other words, a relation is not sensitive to the ordering of tuples. However, in a file, there always is an order among the records. Tuple ordering is not part of a relation definition because a relation attempts to represent facts at a logical or abstract level.

PEOPLE table
ID
ADDRESS
EMAIL
PASSWORD
NAME
CITY
LONGITUDE
STATE
SOURCE
BIRTH_DATE
ZIP
LATITUDE
CREATED_AT

ORDERS table
ID (PK)
USER_ID (FK)
PRODUCT_ID
SUBTOTAL
TAX
TOTAL
DISCOUNT
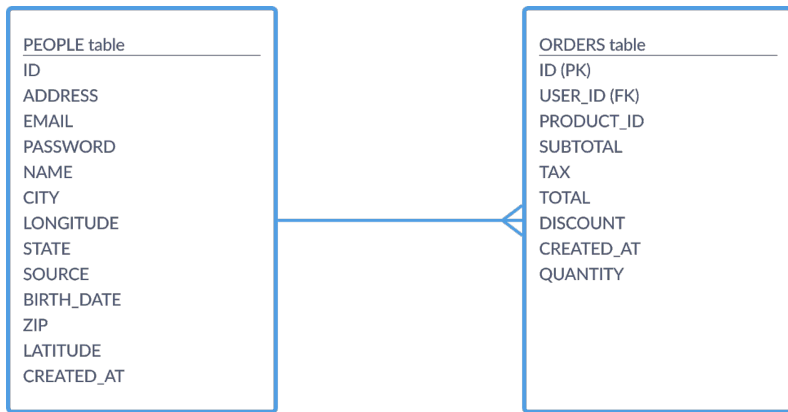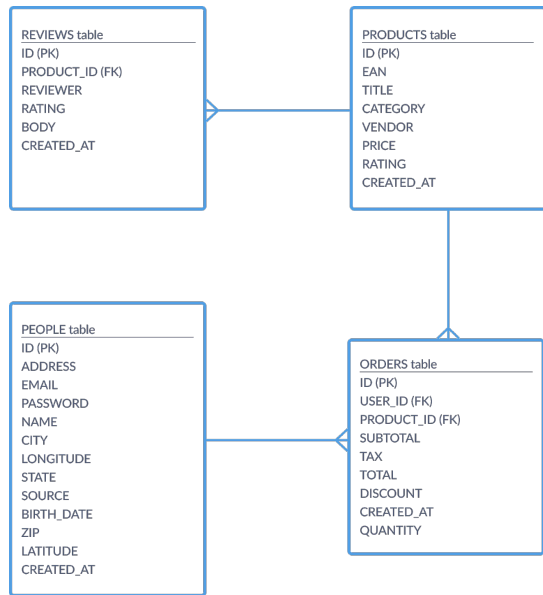CREATED_AT
QUANTITY

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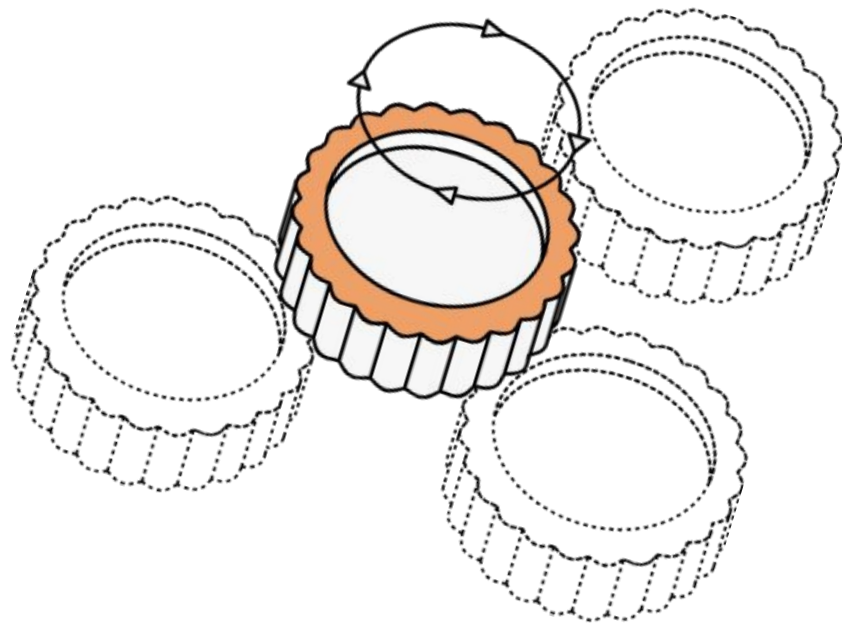
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The ordering of attributes is not important, because the attribute name appears with its value. There is no reason to prefer having one attribute value appear before another in a tuple.

REVIEWS table
ID (PK)
PRODUCT_ID (FK)
REVIEWER
RATING
BODY
CREATED_AT

PRODUCTS table
ID (PK)
EAN
TITLE
CATEGORY
VENDOR
PRICE
RATING
CREATED_AT

PEOPLE table
ID (PK)
ADDRESS
EMAIL
PASSWORD
NAME
CITY
LONGITUDE
STATE
SOURCE
BIRTH_DATE
ZIP
LATITUDE
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Introduction to databases

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Student number	Student name	Date of birth	Sex	Course number	Course name	Lecturer number	Lecturer name
12345	Heathcote,R	20-08-77	M	EC6654, EC9011 EC4521	A Level Computing, Math A level, Physics	T345267 T223459 T318743	Glover,T Todd,M Chapman
22433	Head,J	13-02-77	F	EC6654 AD6611 BM7634	A Level Computing Art French	T345267 T886554 T165555	Glover,T Lowry,B Burke,D
128867	Hargrave,R	13-09-54	M	EC6654 AD6611	A Level Computing Art	T345267 T886554	Glover,T Lowry,B

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