Relations, Attributes, Tuples
(Tables, Headers, Rows).

Domain - D
- Logical Definition
- Data type
- Format

Unit of Measurement

Relation Name - R
Ordered List of Attributes
- R(A1, A2, ..., Am)

Relation Schema
R(A1, A2, ..., Am)

PERSON

PersonId	Weight

Relation State
r(R) - {t1, t2, ..., tm}

ti = <v1, v2, ..., vn> (n-tuple)

What should be true about v1?

v1 should be in the domain of A1*

|dom(A1)| x |dom(A2)| x, ..., x |dom(Am)|

Types of Constraints
- Model based constraints (implicit) - inherent to the data model.
- Schema based constraints (explicit) - specified in the schema of the data model, specified in the DDL.
- Application based constraints (semantic constraints) - constraints that are expressed in the application programs i.e. your API's (generally can't be expressed in the Schema of the data model*).

Schema Based Constraints
- Domain constraint - specifies within a tuple valid range of values for attribute Ai is in dom(Ai).
- Constraints on NULL values - why are they problematic? (Ambiguous).

What is a key (superkey)?

We can use keys (superkeys) to uniquely identify tuples*

Superkey - SK (subset of attributes)

For two distinct tuples t1, t2

t1[SK] != t2[SK]

What is a default superkey for a relation R?
- The set of all attributes of R.

t1 = <1, 160>

t2 = <2, 150>

SK = {PersonId}

Superkeys

SK = {PersonId, Weight}

SK = {Weight}

Keys

K = {PersonId}

K = {Weight}

K = {PersonId, Weight} (Not a Key because I can remove PersonId and it's still a Superkey).

Key - subset of attributes K (which is a Superkey) such that removing any attribute A makes it not a Superkey).

What is the point of a key?
- Uniquely identify our tuples*

Primary Key - key attribute chosen by the database designer to uniquely identify tuples.

When Choosing Keys (what should we consider)?
- With minimal number of attributes.
- Attributes are time invariant - over time the chances of having the same value are miniscule.

Relational Database Schema

S = {R1, R2, ..., Rm} - Set of Relation Schemas.

IC - Integrity Constraints

COMPANY = {PERSON}

IC

Relational Database State

DB = {r1, r2, ..., rm}

satisfies what?
Integrity Constraints - IC

Entity Integrity Constraint
- Primary keys cannot be NULL.