MODLING ENTITIES AND ATTRIBUTES

An Entity: is a person, a place, an object, an event, or a concept in the user environment about which the organization wishes to maintain data.

- Entity type vs entity instance: entity type is a collection of entities that share common properties or characteristics while an entity instance is a singular occurrence of an entity type.
  - Example: entity type: EMPLOYEE, entity instance: would be two employees
- "a true data entity will have many possible instances, each with a distinguishing characteristic, as well as one or more other descriptive pieces of data."'

Strong vs Weak entity types:

- Strong entity type: is one that exists independently of other entity types. (Some data modeling software, in fact, use the term independent entity.) Examples include STUDENT, EMPLOYEE, AUTOMOBILE, and COURSE.
- *Weak entity type*: is an entity type whose existence depends on some other entity type. (Some data modeling software, in fact, use the term dependent entity).
  - The entity type on which the weak entity type depends is called the identifying owner (or simply owner for short).
  - Generally, on an E-R diagram, a weak entity type has an attribute that serves as a partial identifier.
  - During a later design stage, a full identifier will be formed for the weak entity by combining the partial identifier with the identifier of its owner or by representing the weak entity as a strong entity with a surrogate, nonintelligent identifier attribute and the partial identifier as a regular attribute of this entity.
  - In an E-R model an identifying relationship weak entity type to owner is shown by using double lines instead of singular lines b/w the two entities.

Naming and defining entity types:

Naming:

- Is a singular noun
- Should be specific to the organisation
- Should be consise
- Short name
- All the same entities should have the same name

Defining:

- Usually starts with "An X is…"
- Statement about what the unique characteristics is
- Make clear what entity instances are included and not included
  - "A customer is a person or organization that has placed an order for a product from us or one that we have contacted to advertise or promote our products. A customer does not include persons or organizations that buy our products only through our customers, distributors, or agents."
- includes a description of when an instance of the entity type is created and deleted.
  - "A customer ceases to be a customer if it has not placed an order for more than three years."
- Specify when an instance might change into an instance of another entity type
  - "A bid is a legal offer by our organization to do work for a customer. A bid is created when an officer of our company signs the bid document; a bid becomes an instance of contract when we receive a copy of the bid signed by an officer of the customer."
- Specify what history is to be kept about instances of the entity type

Attributes: is a property or characteristic of an entity type that is of interest to the organization.

- Some relationships also have attributes
- In naming attributes, we use an initial capital letter followed by lowercase letters. If an attribute name consists of more than one word, we use a space between the words and we start each word with a capital letter.
- In E-R diagrams, we represent an attribute by placing its name in the entity it describes
- **REQUIRED VERSUS OPTIONAL ATTRIBUTES:**
  - required attribute: An attribute that must be present for each entity instance
  - Optional attribute: whereas an attribute that may not have a value

Entity type: STUDENT				
Attributes	Attribute Data Type	Required or Optional	Example Instance	Example Instance
Student ID	CHAR (10)	Required	28-618411	26-844576
Student Name	CHAR (40)	Required	Michael Grant	Melissa Kraft
Home Address	CHAR (30)	Required	314 Baker St.	1422 Heft Ave
Home City	CHAR (20)	Required	Centerville	Miami
Home State	CHAR (2)	Required	OH	FL
Home Zip Code	CHAR (9)	Required	45459	33321
Major	CHAR (3)	Optional	MIS	

FIGURE 2-6 Entity type STUDENT with required and optional attributes

- **SIMPLE VERSUS COMPOSITE ATTRIBUTES:**
  - Composite attribute: is an attribute, such as Address, that has meaningful component parts, which are more detailed attributes.
    - Example: address is made up of multiple things like city, postal code, state, etc which are themselves attributes
  - A simple (or atomic) attribute: is an attribute that cannot be broken down into smaller components that are meaningful for the organization.
    - Example: for a vehicle entity: Vehicle ID, Color, and Weight are all simple attr. As they cannot be broken down
- SINGLE-VALUED VERSUS MULTIVALUED ATTRIBUTES
  - Multivalued attribute: is an attribute that may take on more than one value for a given entity (or relationship) instance.
    - For example, for the entity EMPLOYEE you might have an attribute called Skills which can be one or more things like c++, powerpoint, c#, agile dev., etc..
    - Typically showcased by squiggly bracket around attribute name
  - Single valued attribute: an attribute that takes only one single value like First Name
- **STORED VERSUS DERIVED ATTRIBUTES**
  - Derived attribute: is an attribute whose values can be calculated from related attribute values (plus possibly data not in the database, such as today's date, the current time, or a security code provided by a system user).
    - Example, If users need to know how many years a person has been employed, that value can be calculated using Date Employed and today's date.
    - It is essentially an attribute who depends on another piece of data to calculate itself
  - Stored attribute: is an attribute that is simply received and required no extra calculations or other attributes to create itself, its simply stored in the database as is
- **IDENTIFIER ATTRIBUTE**
  - Identifier: is an attribute (or combination of attributes) whose value distinguishes individual instances of an entity type.
    - Ex. Student ID, Social Security Number
    - Name would not be good since there could be potentially multiple people with the same name
  - composite identifier: is an identifier that con sists of a composite attribute.
    - Ex. the entity FLIGHT with the composite identifier Flight ID. Flight ID in turn has component attributes Flight Number and Date.
      - It is made up of two or more attributes who together give validity to the composite identifier
  - There are protocols or things you should consider when picking an identifier attribute