# Week 2 Lab

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## **Section 1**

*2pts each for a total of 20pts*

1. **What is an entity? How is it represented on an ERD?**

* An entity is a real-life notion that is stored into a relational database. Entities represented as rectangles with entity name inside the rectangle that helps to identify entities.

1. **What is an attribute, and how is it represented on an ERD?**

An attribute is a feature of an entity that provides more context for the things. An oval is used to connect the attribute to the entity by a line.

1. **Explain what a unique attribute is. Can multiple entity instances share a unique attribute value?**

* A unique attribute is a characteristic that is specific to an entity that is identifiable only by itself. No, because it would not be unique anymore if multiple entity instances share that attribute

1. **Why do you think it is important that each entity has an attribute that makes it unique?**

* It is ensured that every record can be identified by a unique characteristic by avoiding duplicate records, unique attributes contribute to maintaining of data integrity.

1. **Why do we do ER modeling?**

We use ER modeling to give a clear picture of the database structure, which facilitates understanding the connections between various parts.

1. **What is a relationship in an ERD and how is it depicted?**

* A relationship in an entity-relationship diagram shows the connection between two or more entities. Relationship establishes how data in one entity relates to data in another and shows the associations between entities. It is depicted using lines and cardinality.

1. **Relationships typically have cardinality constraints, briefly describe what a cardinality constraint is, and how it affects the relationship between two entities.**

* Cardinality constraint is several instances of one entity that can or must be associated with each instance of another entity. For a database to define the type of relationship between entities and its rules, these constraints are vital.
* For example, **one-to-one (1:1)** Assures that all entities communicate strictly one to one.

**One-to-Many (1:N):** Enables several instances of one entity to be linked to it.

**many-to-many (M:N)** Enables several instances of one entity to be connected to several instances of another.

1. **What are the three classifications of relationship cardinality types?**

Relationship cardinality can be categorized into three groups: one-to-one (1:1), one-to-many (1:N), and many-to-many (M:N).

1. **A weak entity is described as an entity with no unique attribute, in this instance the relationship that the entity is a part of would be the defining attribute. What is one solution to ensuring that an entity has a unique attribute (even if none of the attributes by themselves are unique)?**

* One common solution to ensure that a weak entity has a unique attribute is to combine two or more attributes that uniquely identify an entity instance.

1. **Aside from regular attributes, what are some other forms of attributes commonly found in an ERD?**

* Derived Attributes
* Multivalued Attributes
* Composite Attributes
* Optional Attributes

## Section 2

*10pts*

## The following is an ER Diagram for the ExoProtect Employees’ Computer Database. Write out all of the database requirements needed to create this ERD

1. **Entity**
   * **SOFTWARE PACKAGE**: SPID (Unique Attribute), SPName, NoOfInstallations.
   * **COMPUTER**: CompID (Unique Attribute), CompModel, CompMake.
   * **EMPLOYEE**: EmpID (Unique Attribute), EmpName, EmpSkill.
2. **Relationships and Attributes**:
   * **Installed At**: Connects SOFTWARE PACKAGE to COMPUTER with DateOfInstall as an attribute.
   * **IsAssignedTo**: Connects COMPUTER to EMPLOYEE.
   * **Maintains**: Connects SOFTWARE PACKAGE to EMPLOYEE with CertifiedToUse as an attribute.
3. Cardinality

* **SOFTWARE PACKAGE to COMPUTER (Installed At):** One-to-Many: A single software package can be installed on multiple computers, but each installation record is associated with one specific computer.
* **COMPUTER to EMPLOYEE (IsAssignedTo**) Many-to-One: Multiple computers can be assigned to a single employee, but each computer is assigned to only one employee.
* **SOFTWARE PACKAGE to EMPLOYEE** (Maintains): Many-to-Many: Multiple employees can maintain multiple software packages, and each software package can be maintained by multiple employees.

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## Section 3

*10pts*

1. Create an Entity - Relation Diagram for Snooty Fashions. The database requirements are outlined below:

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A diagram of a company

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## Section 4

*10pts for the ERD, 10pts for the questions (2pts ea), Total of 20pts*

* Create an ERD for the following database requirements, and answer the questions below
  + *This database will be keeping track of Pokemon, Pokeballs, Trainers, and Gym Badges*
  + *For Pokemon: Each pokemon has the following: a type, number, name, a nickname, whether it can evolve (some pokemon do not), and a generation (for those of you unfamiliar, a generation is essentially which “ show season or show region” that pokemon came out)*
  + *For Pokeballs: Each pokeball has a cost, a type, and a unique serial number*
  + *For Trainer: TrainerID, Trainer Name, Hometown, Age, and Number of Pokemon Gym Badges Obtained*
  + *For Badges: Gym Type, Gym Leader, Badge Name, Date Acquired*
  + *Each pokemon must have one, and only one Trainer. Each trainer must have at least one pokemon, but may have many pokemon*
  + *Each pokemon belongs (is housed) in exactly one pokeball, and each pokeball is either new (unused) or has exactly one pokemon living inside of it*
  + *A Trainer must have at least one (unused/new) pokeball but may have many pokeballs. Each pokeball belongs to one Trainer*
  + *A Trainer may have many gym badges, or none at all. Each unique gym badge (instance) belongs to one person. For this exercise assume gym leaders have a box of badges in the backroom, so some may go unused.*

**Questions:**

1. **Identify a one to one (1:1) relationship in the above ERD**

* Pokemon-Pokeball

1. **Identify a one to many (1:M) relationship in the ERD**

* Trainer-Pokémon
* Trainer-Pokeball
* Trainer-Badge

1. **Are there any attributes that are composite, derived, multivalued, or optional? Please identify them in the following format -> Entity\_Name:Attribute(s)::Type**

* Trainer:NumberOfGymBadges:Derived:
* Pokemon:Nickname:Optional:
* Badge:DateAcquired:Optional:

1. What are the four possible cardinality constraints?

* One to one
* One to many
* Many to one
* Many to many

1. What are the three types of relationships (maximum-cardinality-wise)?

* One to one
* One to many
* Many to many