In-Class Exercise #2 Solution
How to Draw ERDs

1. Read the entire scenario from end to end, before you start drawing anything.

2. Identify the entities and attributes
   • Use the four steps we practiced in ICE #1.
   • Make sure every entity has a unique ID (primary key).

3. Identify the relationships.

4. Draw the cardinality of those relationships.
   • Sometimes described in the scenario
   • Other times you will have to make assumptions.

5. Deal with any weird attributes that are left over.
   • For an attribute that depends on a combination of entities, you must tie it to the relationship between entities.
Problem 1: Inventory and Parts

Checklist:
- Entities
- Entity attributes
  - Primary key
  - Non-key attributes
- Relationships
  - Minimum cardinality
  - Maximum cardinality
- Relationship attributes
Problem 1: Relationships

• Order and Part

Minimum Cardinality:
- Assumption: Each order has \textbf{at least} one part (mandatory)
- Assumption: Each part is included in \textbf{at least} one order (mandatory)

Maximum: many-to-many
- “Each order can contain \textit{multiple} parts”
- “a part can be part of \textit{more than one} order. “

• Part and Supplier

Minimum Cardinality:
- Assumption: Each part has \textbf{at least} one supplier (mandatory)
- Assumption: Each supplier sells \textbf{at least} one part (mandatory)

Maximum: many-to-many
- “A part may be sourced from \textit{several} suppliers”
- “a supplier can sell \textit{multiple} parts to the Monster Car Company. “
The ERD can be further normalized by adding an entity as **ContactPerson**, with attributes **ContactID**, First name, Last name, Email, Department, and Phone. If you want to normalize even further, you could add one more entity as **Department**.
Problem 2: Housing Authority

Checklist:
• Entities
• Entity attributes
  ✓ Primary key
  ✓ Non-key attributes
• Relationships
  ✓ Minimum cardinality
  ✓ Maximum cardinality
• Relationship attributes
Problem 2: Relationships

• Development and Unit

  Minimum Cardinality
  - Assumption: Each development has \textbf{at least} one unit (mandatory)
  - Assumption: Each unit belongs to \textbf{at least} one development (mandatory)

  Maximum: \textbf{one-to-many}
  - Assumption: Each development can have \textbf{multiple} units
  - Assumption: Each unit can only belong to development

• Unit and Household

  Minimum Cardinality
  - Assumption: Each unit has \textbf{at least} one household (mandatory)
  - Assumption: Each household lives in \textbf{at least} one unit (mandatory)

  Maximum: \textbf{many-to-many}
  - “Multiple households will occupy a unit over time.”
  - Assumption: Each household can live in \textbf{different} units over time

You may have more reasonable assumptions.
Problem 2: Relationships (cont’d)

- Development and Unit

Minimum Cardinality
- Assumption: Each household has at least one resident (mandatory)
- Assumption: Each resident belongs to at least one household (mandatory)

Maximum: one-to-many
- “Each household can be made up of one or more residents”
- “a resident can only be part of one household”