Session 2-9 Building Data Model

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ERD Rules

- Every entity, relationship, and attribute should be named
  - A entity name is a noun phrase (e.g., EMPLOYEE)
  - A relationship is a (transitive) verb phrase (e.g., Assigned_to)
- Each entity may appear **only once** in an ERD
- Each entity must be connected to a relationship
- Each attribute must be connected to an entity or a relationship
- Each relationship must be connected to either at least 2 entities (binary or ternary) or to one entity twice (unary)

A Basic Approach to Data Modeling

1) Identify major entities
2) Identify Relationships (how entities are related)
   - Determine relationship cardinalities
3) Draw first draft of data model
4) Walkthrough and refine
   - Relationship to entity
   - Attribute to entity

Techniques for Building Data Models

- Analysis of ***sentences*** (business rules) describing business tasks

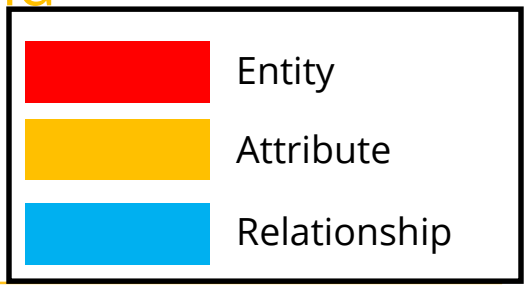
- Analysis of ***documents***, including transactions and reports used in performing business tasks

Sentence Analysis

- Given a problem statement, or business rules, you need to extract required information to develop a data model
- Of every sentence, identify subjects, objects, and verb phrases
  - *Subjects, Objects* → Entities
  - *Verb phrases* → Relationships
    - Relationship Descriptor from Subject to Object
    - A single valued fact about an Entity is an Attribute with the verb phrase explaining the meaning of the Attribute

Exercise: Identify entities, relationships, and attributes

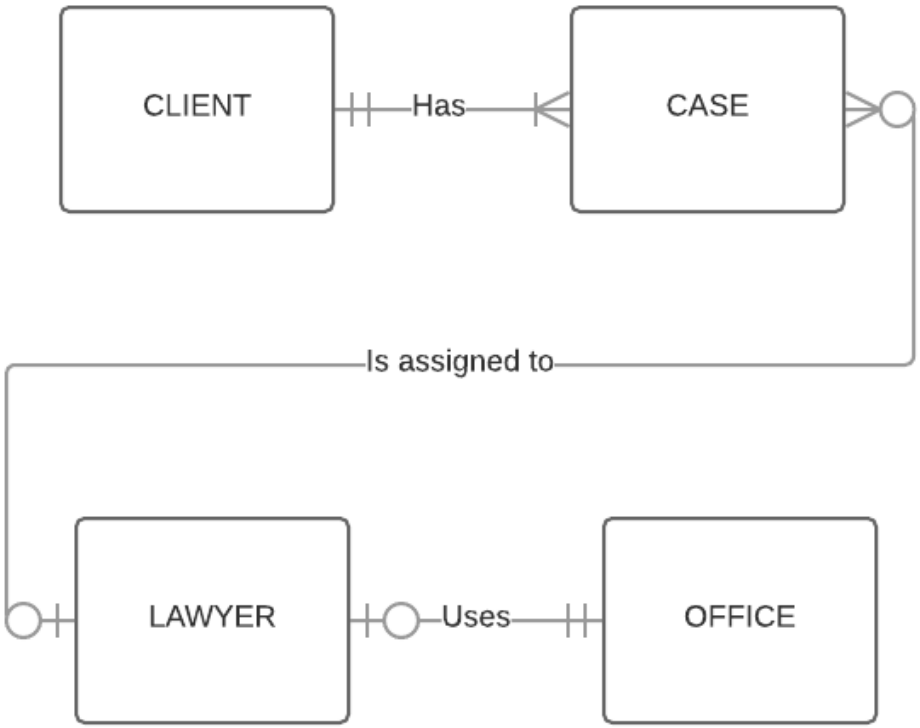
- Salespeople are assigned to Customers.
- Customers place Orders.
- Salespeople are given credit for Orders.
- Salespeople are identified by employee number.
- Each Salesperson has a commission rate.
- Each Salesperson has a phone number.
- Each Customer has a name, address and phone number.



Example - Building Data Model for Law Firm Database

- Every client has to have at least one case. A case can belong to only one client.
- Each case can be assigned to only one lawyer. It is possible that a case may not be assigned any lawyer and a lawyer may not be assigned any case. A lawyer can take many cases.
- Each lawyer uses an office. An office may or may not be assigned. An office can be assigned to only one lawyer.

Law Firm Example



Document Analysis

- Examine each heading on the document and classify it as representing
  - An Entity (its identifier)
  - An Attribute
- Establish Relationships

Invoice Example

INVOICE

Sample Company, Inc.
111 Any Street
Anytown, USA

Number	Date
157289	10/02/90

Bill To:
Customer Number: 0361

Local Grocery Store
132 Local Street
Localtown, USA

Customer PO: 3291
Terms: Net 30

Line No.	Product Number	Product Description	Unit of Sale	Quantity Order	Quantity Ship	Quantity Backord	Unit Price	Discount	Extension
1	2157	Cheerios	Carton	40	40	0	50.00	5 %	1900.00
2	2283	Oat Rings	Each	300	200	100	2.00	0 %	400.00
3	0579	Corn Flakes	Carton	30	30	0	40.00	10 %	1080.00

Order Gross	4380.00
Tax at 6 %	262.80
Freight	50.00
Order Net	4692.80

Headings-to-Entities

- Headings
  - Invoice Number, Invoice Date, Customer Number, Bill to Address, Customer PO, Terms, Line Number, Product Number, Product Description, Unit of Sale, Quantity Ordered, Quantity Shipped, Quantity Backordered, Unit Price, Discount, Extension, Order Gross, Tax, Freight, and Order Net.
- Entity Identifiers
  - Invoice Number, Customer Number, and Product Number
- Calculated Values
  - Order Gross, Tax, and Order Net
- Attributes
  - All remaining

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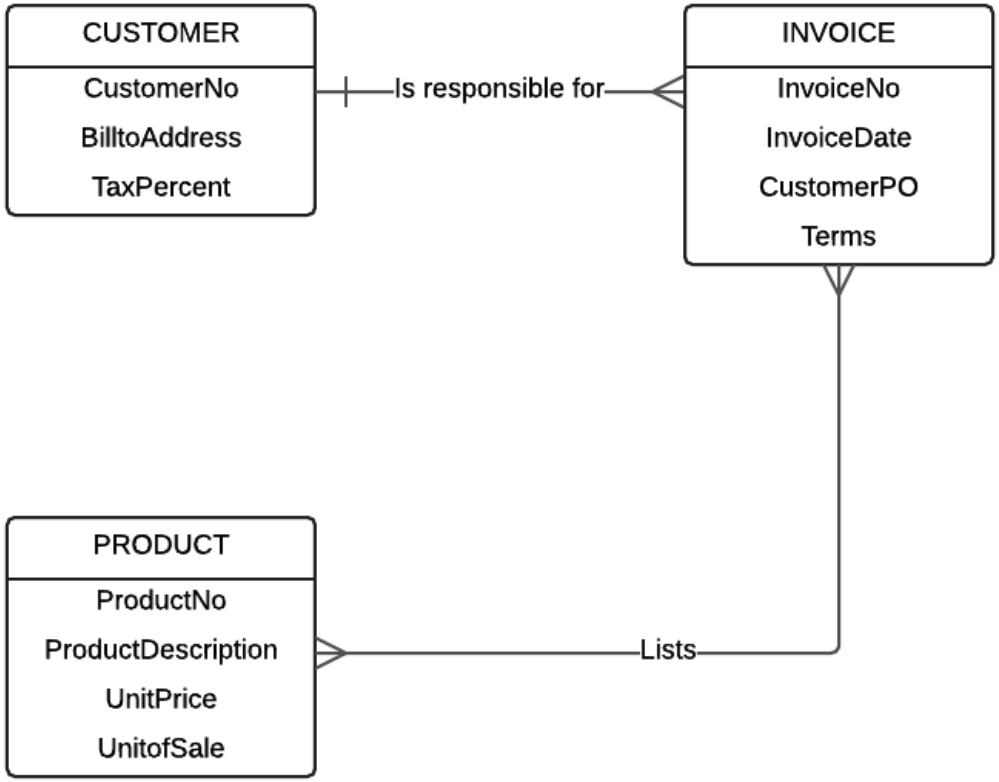
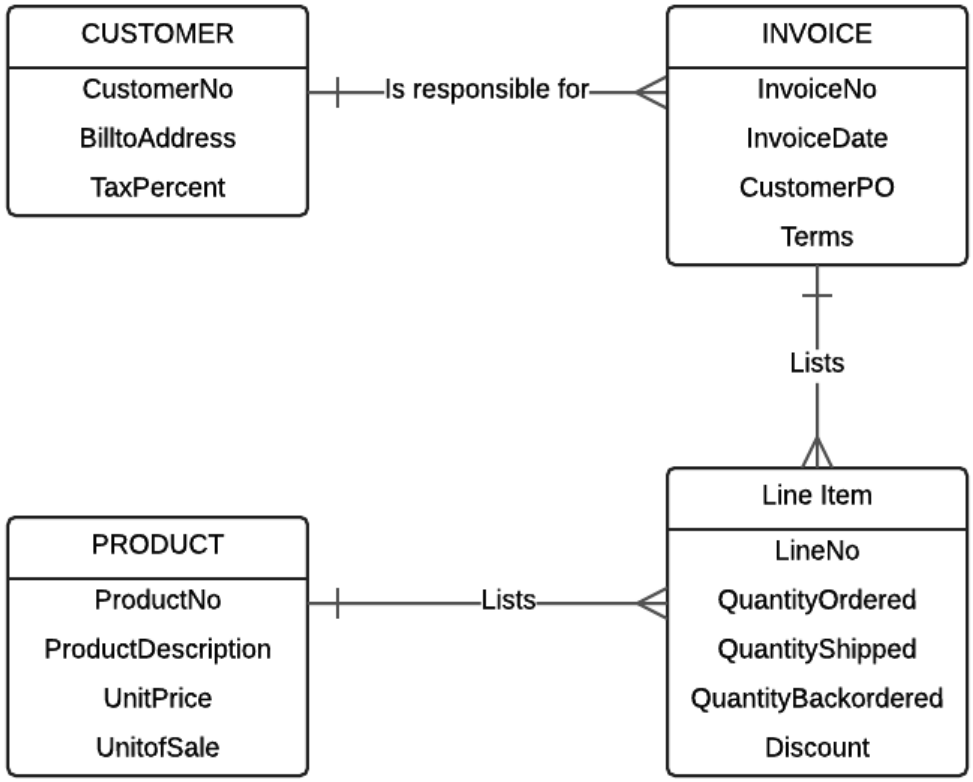
Relationships and Cardinalities

- Three entities: PRODUCT (product number), INVOICE (invoice number), and CUSTOMER (customer number)
- CUSTOMER relates to INVOICE in …
  - How many customers are responsible for a single invoice? → Exactly One (Mandatory one)
  - How many invoices can be the responsibility of one customer? → Zero or More (Optional many)

Resulting Data Model



Resulting Data Model



Associative Entity

Wrap-Up

- Techniques for building data models
  - Sentence analysis
  - Document analysis