

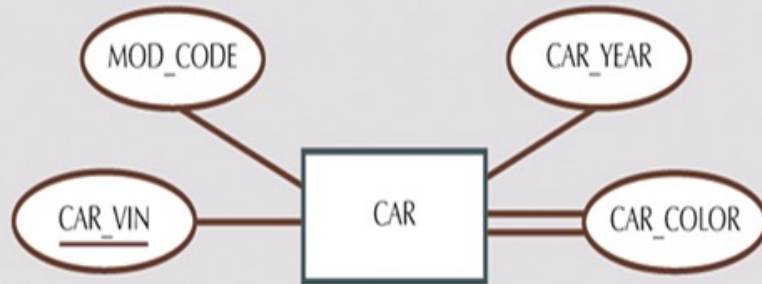
# Types of Attributes

- **Simple**
  - Cannot be subdivided
  - Age, gender, marital status
- **Composite**
  - Can be subdivided into additional attributes
  - Address into street, city, zip
- **Single-valued**
  - Can have only a single value
  - A person has one medicare number
- **Multi-valued**
  - Can have many values
  - Person may have several college degrees
- **Derived**
  - Can be derived with algorithm
  - Age can be derived from date of birth

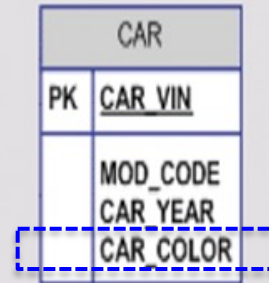
# A Multivalued Attribute in an Entity

A multivalued attribute in an entity

Chen Model



Crow's Foot Model

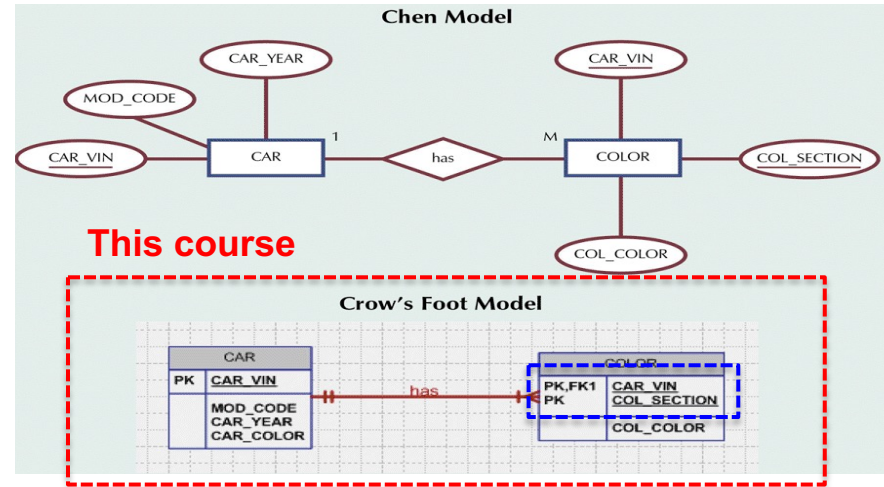
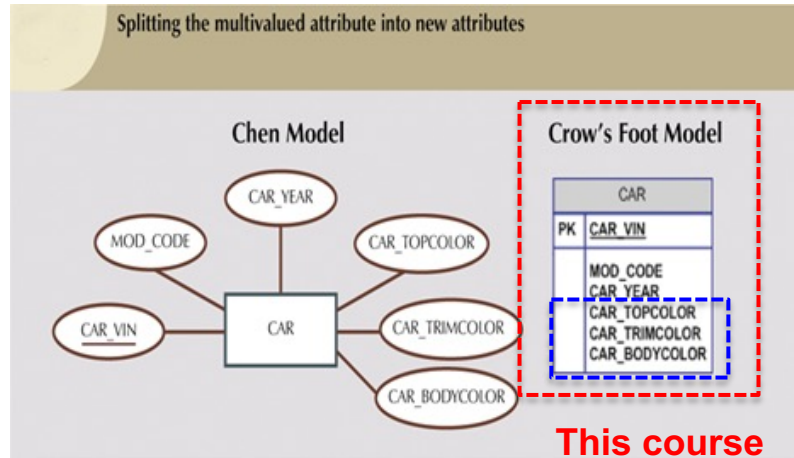


**This course**

So, Crow's Foot model **cannot** express multi-valued attributes!

# Resolving Multivalued Attribute Problems

- Although the **conceptual model** can depict multivalued attributes, you **cannot implement** them directly in the relational model. Instead, we can:
  - Within original entity, create several new attributes**, one for each of the original multivalued attribute's components
    - Can lead to **major structural problems** in the table
  - Or better, **create a new entity** composed of original multivalued attribute's components



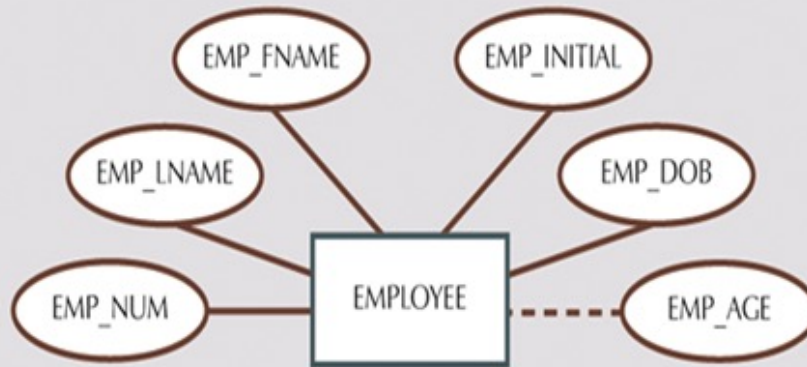
Ask yourself:

- Is Colour a Weak entity?
- Is the relationship strong or weak?

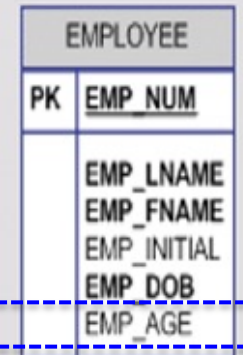
# Derived/Computed Attribute

Depiction of a derived attribute

Chen Model



Crow's Foot Model



This course

So, Crow's Foot model **cannot** express derived attributes!

TABLE  
4.2

Advantages and Disadvantages of Storing Derived Attributes

	DERIVED ATTRIBUTE	
	STORED	NOT STORED
<b>Advantage</b>	<ul style="list-style-type: none"><li>Saves CPU processing cycles</li><li>Data value is readily available</li><li>Can be used to keep track of historical data</li></ul>	<ul style="list-style-type: none"><li>Saves storage space</li><li>Computation always yields current value</li></ul>
<b>Disadvantage</b>	<ul style="list-style-type: none"><li>Requires constant maintenance to ensure derived value is current, especially if any values used in the calculation change</li></ul>	<ul style="list-style-type: none"><li>Uses CPU processing cycles</li><li>Adds coding complexity to queries</li></ul>

Thank you