

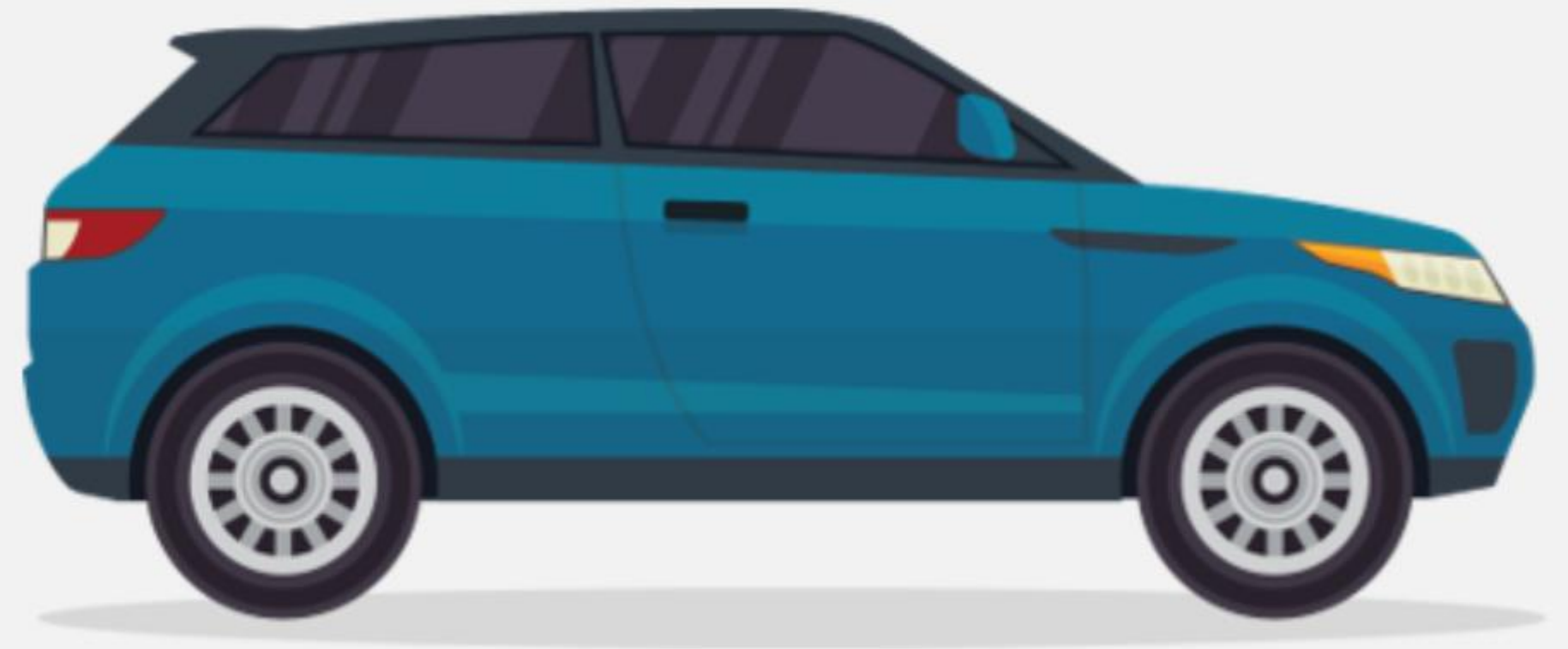


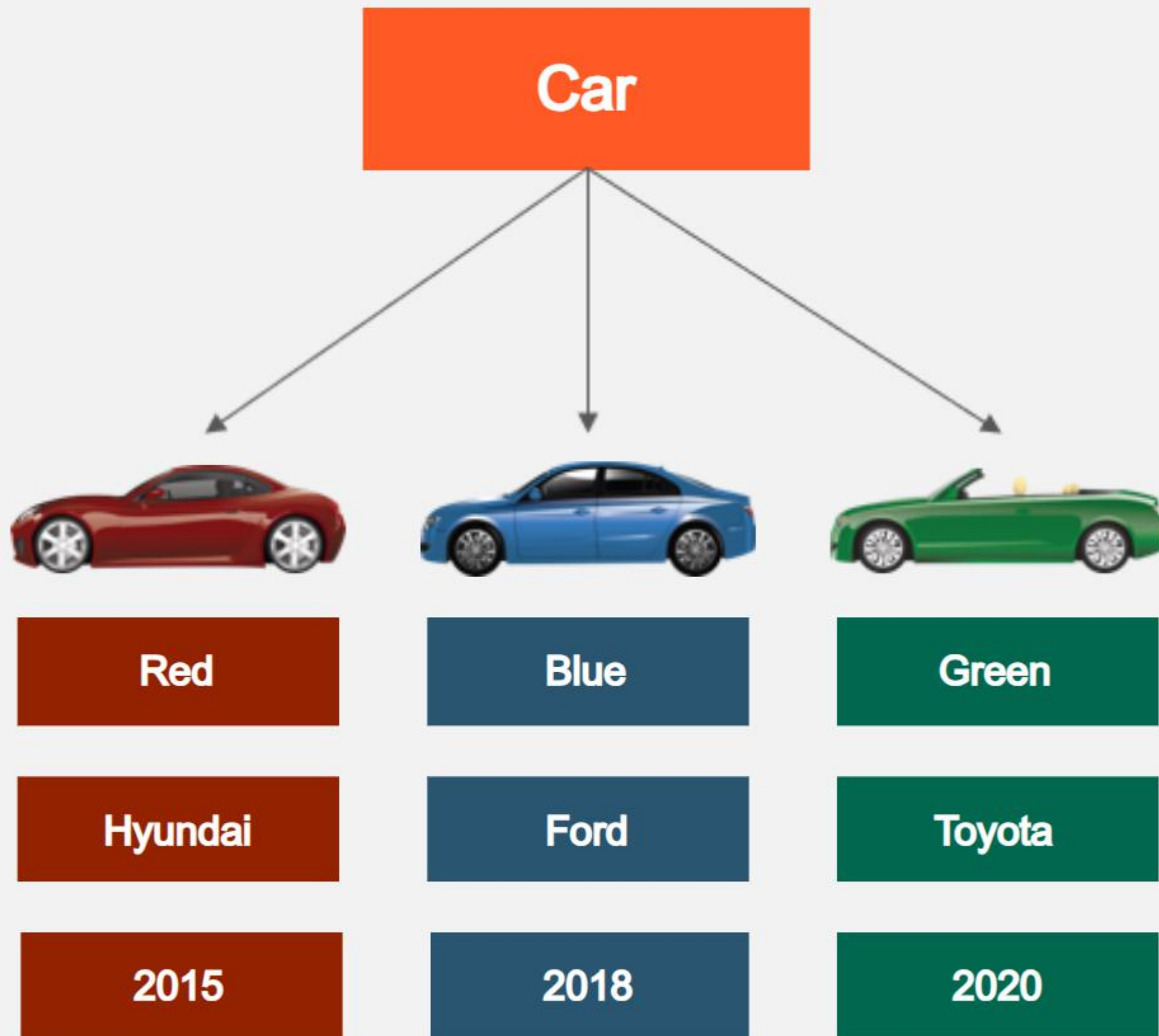
Think and Tell

- What comes to your mind when you hear the word “object”?

Objects Around Us

- Look at this object and describe its look, features, and purpose.





Where Do Objects Come From?

- What are the attributes and behaviors of objects?
- Where are the properties of the objects defined?
- How and where are these objects manufactured?

Introduction to Object-Oriented Programming





Learning Objectives

- Define "object"
- Compare objects in real life with objects in programming
- Explore object-oriented programming (OOP)
- Solve a problem using OOP
- Identify objects
- Identify attributes and behavior
- Create classes

Define "Object"

What Is an Object?

An object is something material that may be perceived by the senses.

- Real-world objects share two characteristics: They all have properties and behavior.
- Consider a bicycle, which is a real-world object.
- The properties and behaviors of the bicycle are:

Properties	Behavior
Color: Blue	Change gear
No. of gears: 7	Maintain current speed
Is the disk brake enabled? Yes	Change pedal cadence



Quick Check

What are the properties and behaviors of a cell phone?



Quick Check: Solution

What are the properties and behaviors of a cell phone?

Properties –

Model

1. IMEI number
2. Camera pixels
3. Color

Behaviors –

1. Place a call
2. Answer a call
3. Send a text message
4. Receive text messages



Quick Check

What are the properties and behaviors of a television?



Quick Check: Solution

What are the properties and behaviors of a television?

Properties –
Model

1. Size
2. Color

Behaviors –

1. Stream channels
2. Tune in for a show



Quick Check

What are the properties and behaviors of an ATM?



Quick Check: Solution

What are the properties and behaviors of an ATM?

Properties –

1. Model
2. Registration number
3. Type of machine

Behaviors –

1. Change PIN
2. Withdraw cash
3. Deposit cash or check
4. Check balance



Think and Tell

- Do objects exist only in the real world?
- Can we identify objects in applications that are created through programming?



Compare Objects in Real Life With Objects in Programming

Customer as an Object

- A customer who visits an e-commerce website is a tangible object.
- The customer has properties like name, age, eye color, nationality, address, etc.
- The customer can perform actions like buy products, pay for products bought, etc.
- The customer can be defined as an object in a program using the above properties, and all the actions can also be defined that will help in building the application.





Employee as an Object

- The details of all the employees in an organization are stored in an application.
- An employee is a tangible object in the real world, with properties such as name, ID, salary, date of joining, etc., associated with them.
- These details are necessary when you build an application.
- The employee is an object in the real world and can be modelled as an object in a program.

Bank Account as an Object

- Objects need not be only tangible.
- A bank account is not a tangible object, yet when you perform a banking transaction, it is necessary.
- Thus, a bank account can be considered an object in the real world.
- When you develop a banking application, the real-world object (i.e., bank account), can be modeled as an object in a program.



Explore Object-Oriented Programming (OOP)

Object-Oriented Programming

- Object-oriented programming (OOP) models software design by drawing an analogy from real-world objects.
- Just as an object can be described in the real world, programs can be defined and described with an object-oriented programming language like Java.
- OOP organizes code as a collection of objects that consist of both attributes and behaviors.
- Understanding the objects that make up a software application is key to designing applications using OOP.

Solve a Problem Using OOP

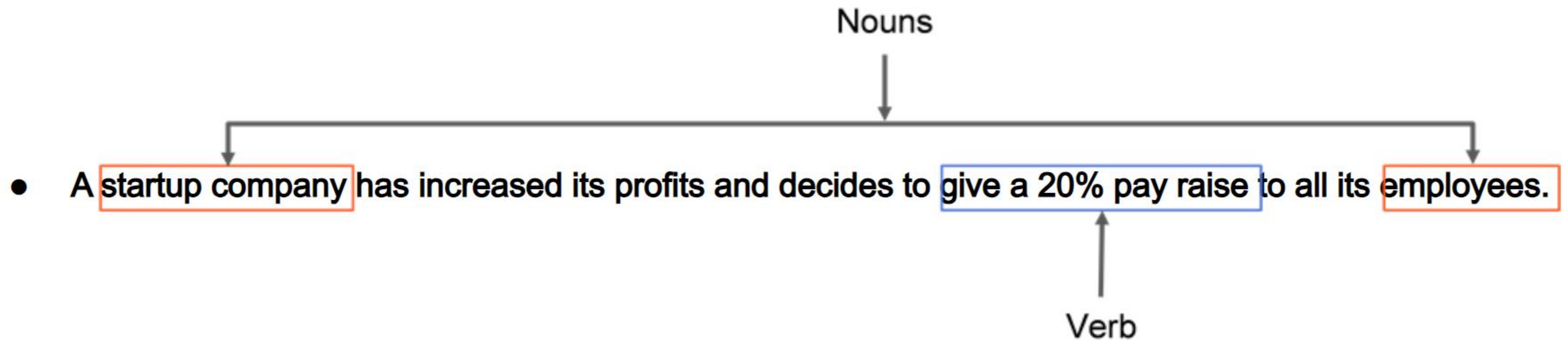
How Can You Solve a Problem Through OOP?

- A startup company has increased its profits and decides to give a 20% pay raise to all its employees.
- You, as a software programmer, need to design the application that manages employee compensation benefits.
- Design a model of the application using OOP.

Steps to Solve the Problem Using OOP

- Read the problem statement.
 - Identify the nouns and noun phrases.
 - Identify the verbs.

Identifying Nouns and Verbs



Quick Check

Identify the nouns and verbs in the problem statement.

Sam, a librarian at a college, is struggling to get his books organized. The college library contains books on various courses offered by the college. The various books are catalogued with a unique Id.

As part of an initiative to reorganize the library and make it more accessible for students, the college has decided to create a library management system to provide an online platform to search for and access the various books. As a part of this, Sam must help create such a management system.



Quick Check: Solution

Identify the nouns and verbs in the problem statement.

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Nouns

1. Librarian
2. College
3. Books
4. Courses

Verbs

1. Create a library management system
2. Reorganize the library
3. Catalogued using a unique ID



Identify Objects

Identifying Objects

- The nouns and noun phrases in the problem statement relate to the objects that will be modeled.

Object = Noun

- The nouns identified are:
 - Startup company.
 - Employee.

Identify Attributes and Behavior

Identifying Attributes

- Attributes help to uniquely identify objects.
- The attributes of the objects employee and startup company are as below:

An employee is uniquely identified by employee ID, name, age, etc.

A company is uniquely identified by company ID, name, registration details, address, etc.

Identifying Behavior

- Behavior is defined as something an object can do; therefore, behaviors are verbs.

Behavior = Verb

- Startup company: The startup company gives a pay raise to its employees — this is specific to the startup company that gives a 20% hike, so the behaviour can be placed here.
- Employee: An employee can calculate the annual salary — this is specific to the employee.

Library

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Tasks

1. Identify the objects.
2. Identify the attributes and behaviors for each of the objects identified.

DEMO



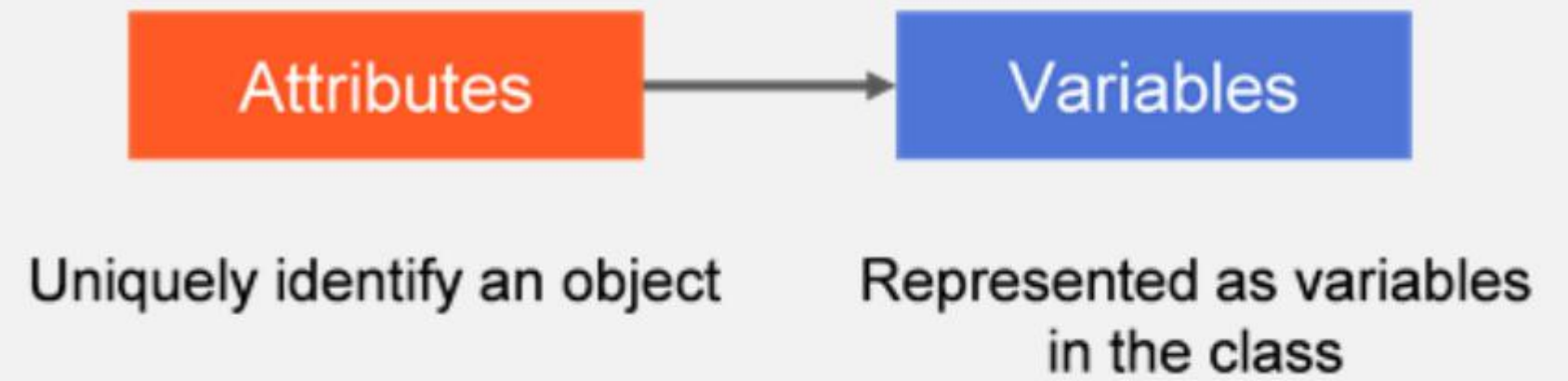
Create Classes

Class: Manufacturing Objects

- A class is the detailed description of what an object will be.
- It contains the blueprint of building an object and information about what defines an object.
- Once we define a class, we can create as many objects from it as we want.
- The class is the manufacturer of objects.
- Since objects can be created from classes, the class contains the attributes and the behavior of an object.

Attributes in a Class

- The class name is Employee.
- Attributes are modeled as variables in the class.



```
public class Employee {  
    String employeeName;  
    int employeeCode;  
    int age;  
    String dob;  
    double salary;  
}
```

Behavior



Methods

An action performed by
the object

Represented as methods in
the class

```
double calculateSalaryHike(float hikePercentage){  
    return employee.salary + (employee.salary * hikePercentage/100);  
}
```

Behavior in a Class

- Behaviors are modeled as methods in the class.

Startup Organization

A startup company has increased its profits and decides to give a 20% pay raise to all its employee.

Tasks

1. Create an Employee class.
2. Model the attributes of the class.
3. Model the behavior of the Employee class.

Click here for the [solution](#).

Use IntelliJ IDE for the demonstration.

DEMO

