#### **OBJECT ANALYSIS**

CSCI 467 Introduction to Software Engineering

# Today

- Basic Object Orientation Concepts
- Identify objects and use cases from complete functional requirement statements.

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# What is an object?

Business Community

> people, places, things

Technical Community

A data structure or function of a data structure. Has properties.

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# What is an Object



Updated by K. Rush

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# What is an Object?



A thing or something you want to do with that thing.

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#### Instance

- You have a particular car that was manufactured in a factory.
- Your car has a vehicle identification number (VIN) that uniquely identifies it.
- Your particular car is an **instance** of a car.



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# Class and Object

- Car is the name of the class from which this instance was created.
- Each time a new car is manufactured, a new instance from the class of cars is created, and each instance of the car is referred to as an object.



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# Object

- An instance of a class of cars
- Your car might be the color red, have a black interior, be a convertible or hardtop, and so on.

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# What can you do with an object?

- What can you do with your car?
- You perform certain actions with your car:

Drive it
Fill it with gas
Wash it
Service it



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#### Instance and Methods

- A unique occurrence of a class is an instance, and the actions that are performed on the instance are called methods.
- In some cases, a method can be applied to an instance of a class or to a class itself.

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#### **Instance and Methods**

• For example, washing *your* car applies to an instance.

• All these methods can be considered **instance** 

methods:

drive\_it()
fill\_with\_gas()
wash\_it()
Service\_it()



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#### Instance and Methods

• Finding out how many types of cars a manufacturer makes would apply to the class, so it would be a **class method**.



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## **Properties**

Suppose there are **two cars** that came off the assembly line and are **almost identical**:

Same interior
Same paint color, etc



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## **Object Properties**

They might start out the same, but as each car is used by its respective owner, its unique characteristics or properties change.



One car may end up with a scratch on it, and the other might have more miles on it.

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#### **Object Properties**

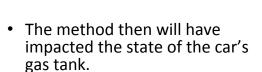
 Each instance has initial characteristics acquired from the factory, plus its current characteristics.

 Object characteristics can change dynamically. As you drive your car, the gas tank becomes depleted, the car gets dirtier, and the tires get a little more worn.

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## **Object State**

- Applying a method to an object can affect the state of that object.
- If your method is to "fill up my car with gas," after that method is performed, your car's gas tank will be full.





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### **Object Orientation Concepts**

 Objects are unique representations from a class, and each object contains some information (data) that is typically private to that object.

 Methods provide the means of accessing and changing that data.

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# Identifying Objects using Noun-Verb Analysis

- Look/listen for nouns or noun phrases
- Nouns are words that represent people, places, things, or ideas.
- Nouns are words that identify:
  - That person is *John*
  - That place is a warehouse
  - That things is a bike
  - That idea is responsibility

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#### **Review: Nouns**

- Proper noun = name of particular noun and are spelled with capital letter
  - New York City, Babe Ruth
- Common nouns = do not name particular person, places or things
  - city, athlete, nurse, building
- Abstract noun = identifies an idea, quality, or state of mind
  - liberty, intelligence, happiness

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#### **Nouns**

- **Plural nouns** = more than one, noun ends in s, x, ch, z, sh, or ss
  - books, buses, foxes, lunches, waltzes, dishes, bosses
- Possessive nouns = nouns that show ownership:
  - Tom's book (possessive of singular noun)
  - Authors' books (possessive of plural noun)
  - Men's race, Children's hour

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#### **Nouns**

 Collective noun = a group of persons, places or things

- class, band, team, audience, United States
- Predicate noun = used as a subject complement and follows a linking verb
  - John F. Kennedy was the <u>President</u> back then.

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#### Verbs

- A verb is a word that expresses action or a state of being
  - Action: enters, issues, approves
  - State of being: looks, is, were, seems
- Active verb = when the object is performing an action.
  - Ron enters the customer data.
- Transitive verb = action verb that "transmits" the action from the subject to the direct object.
  - The buyer issued three purchase orders.

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## Results from Noun-Verb Analysis

- Nouns may/will become objects
- Verb may/will become use cases
- Can you quickly identify objects and a use case from this complete functional requirement statement?

"The ePurchase system must allow authorized buyers to create a new item in the item master. Each item contains a unique item number, description, minimum order quantity, purchase price, effective date, and preferred vendor."

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#### Summary

We've learned...

- Object Orientation Concepts
- How to quickly identify objects and use cases from a complete functional requirement statement.

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