

# OBJECT ANALYSIS

CSCI 467 Introduction to Software Engineering

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## 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



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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.
- The method then will have impacted the state of the car’s gas tank.



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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 President 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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