

Programming in Java



Rationale

- ◆ Object-oriented concepts form the base of all modern programming languages.
- ◆ Understanding the basic concepts of object-orientation helps a developer to use various modern day programming languages.
- ◆ Java is an object-oriented language that enables you to create real-world applications.
- ◆ The code reusability feature of Java enables the software developers to upgrade the existing applications without rewriting the entire code.
- ◆ The concept of working with files and I/O streams enables the software developers to store and retrieve the information from a flat or a text file.
- ◆ Packages enable the reusability of classes and methods across various applications.

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Objectives

- ◆ In this session, you will learn to:
 - ◆ Identify the Object-oriented methodology
 - ◆ Identify the advantages of the object-orientation
 - ◆ Identify the features of the object-oriented approach

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Defining Object Orientation

- ◆ Object orientation:
 - ◆ Software development methodology
 - ◆ Relates to the real world
 - ◆ Consists of classes
 - ◆ Consists of objects:
 - ◆ Example:
 - ◆ Employee
 - ◆ Window
 - ◆ Car
 - ◆ Objects can have inter-relationships
 - ◆ Involves splitting the software system into component parts
 - ◆ Arranges the parts in a hierarchy

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The Foundation of Object Orientation

- ◆ Object-oriented program:
 - ◆ Consists of classes and objects
 - ◆ Objects communicate with each other through messages



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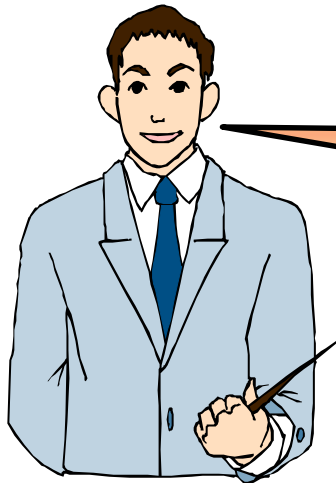
Objects

- ◆ Object :
 - ◆ Means a material thing
 - ◆ Presented physically
 - ◆ Has a state
 - ◆ Displays behavior
 - ◆ Has a unique identity

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Objects (Contd.)

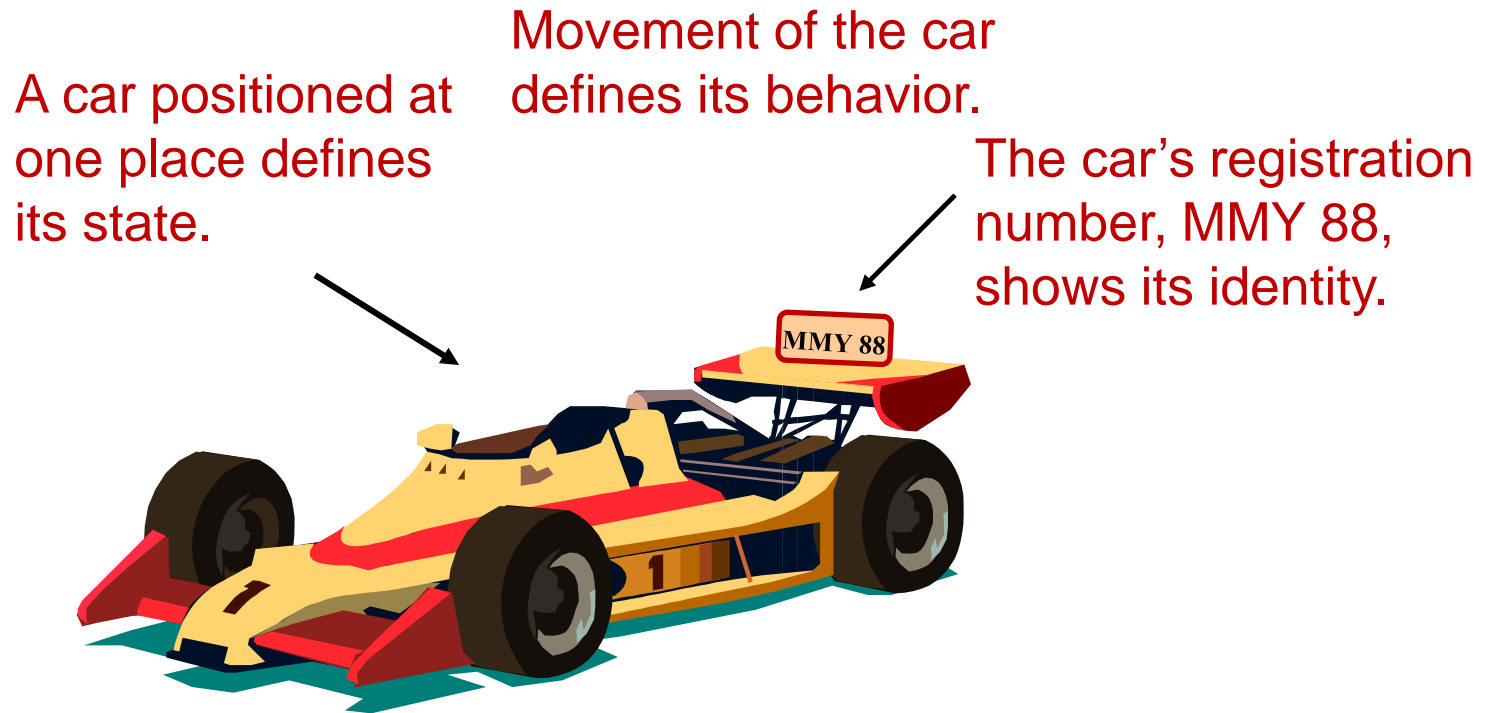
- ◆ Two objects:
 - ◆ May have the same behavior and state
 - ◆ Can never have the same identity



Let us consider an example.

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Objects (Contd.)



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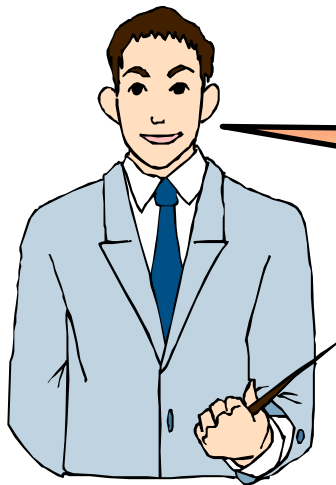
Classes

- ◆ Class:
 - ◆ Consists of a set of objects
 - ◆ Objects share a common structure and behavior
- ◆ Object programming terminology:
 - ◆ Data within an object represents its state:
 - ◆ Data is termed as attribute
- ◆ Methods:
 - ◆ Have a behavior
 - ◆ Contain code to implement behavior
 - ◆ Associated using objects
 - ◆ Have a set of instructions
 - ◆ Have a unique purpose
 - ◆ Implement behavior of the object

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Classes (Contd.)

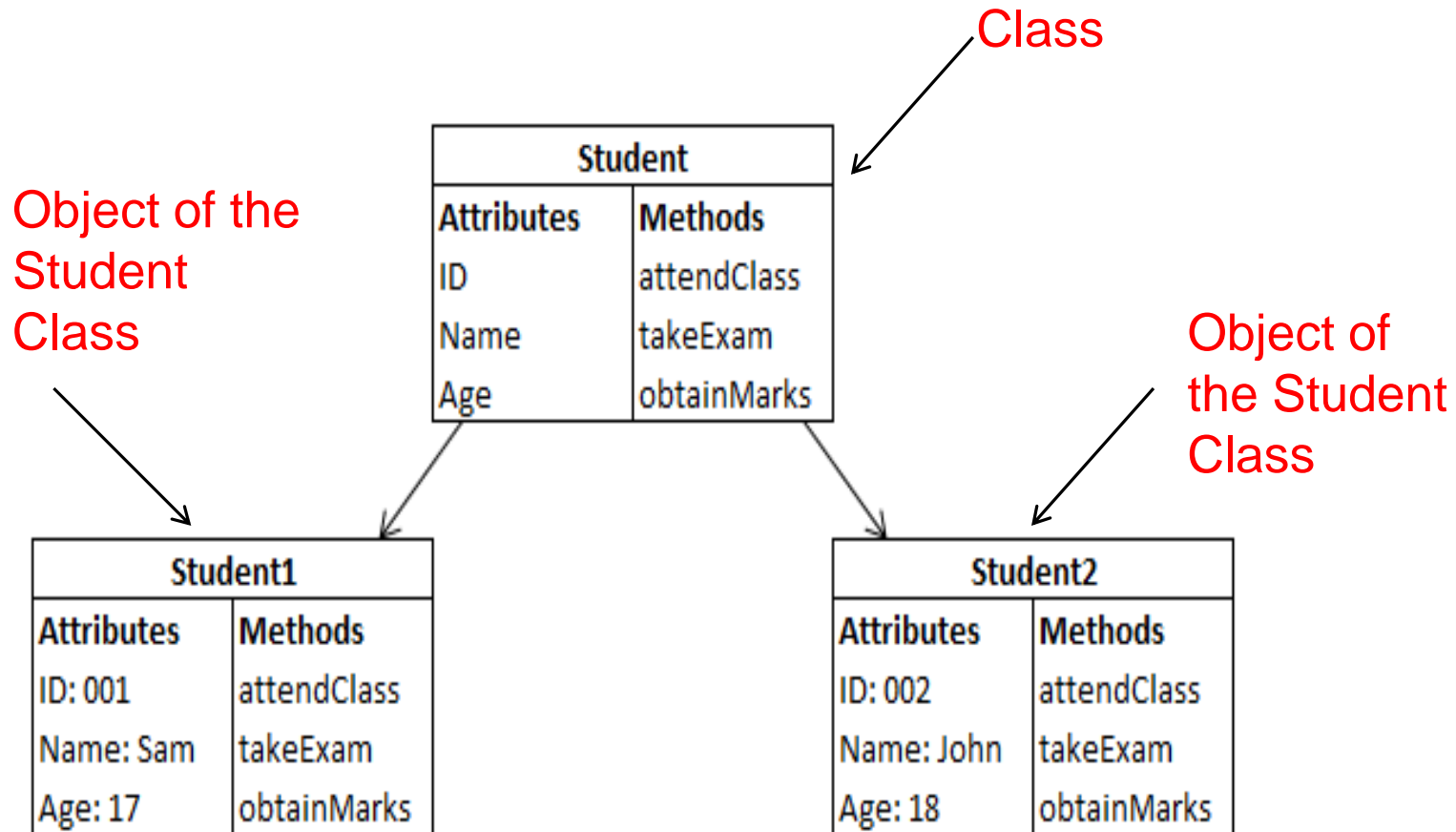
- ◆ An object is an instance of a class.



Let us consider an example.

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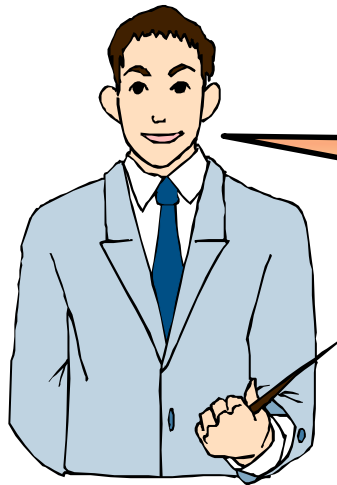
Classes (Contd.)



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Messages and Methods

- ◆ Messages are used for communication between objects.

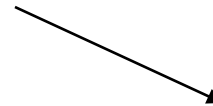


Let us consider an example.

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Messages and Methods (Contd.)

A car is flashing its lights to pass messages to the other car.



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Quiz

Get Ready for the Challenge



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Quiz (Contd.)

◆ Identify the possible states of the following objects:

- ◆ A mobile phone
- ◆ An MP3 player

◆ Solution:

- ◆ States of a mobile phone: Off, Ring, Vibrate, and Call
- ◆ States of an MP3 Player: Play, Stop, Rewind, and Forward

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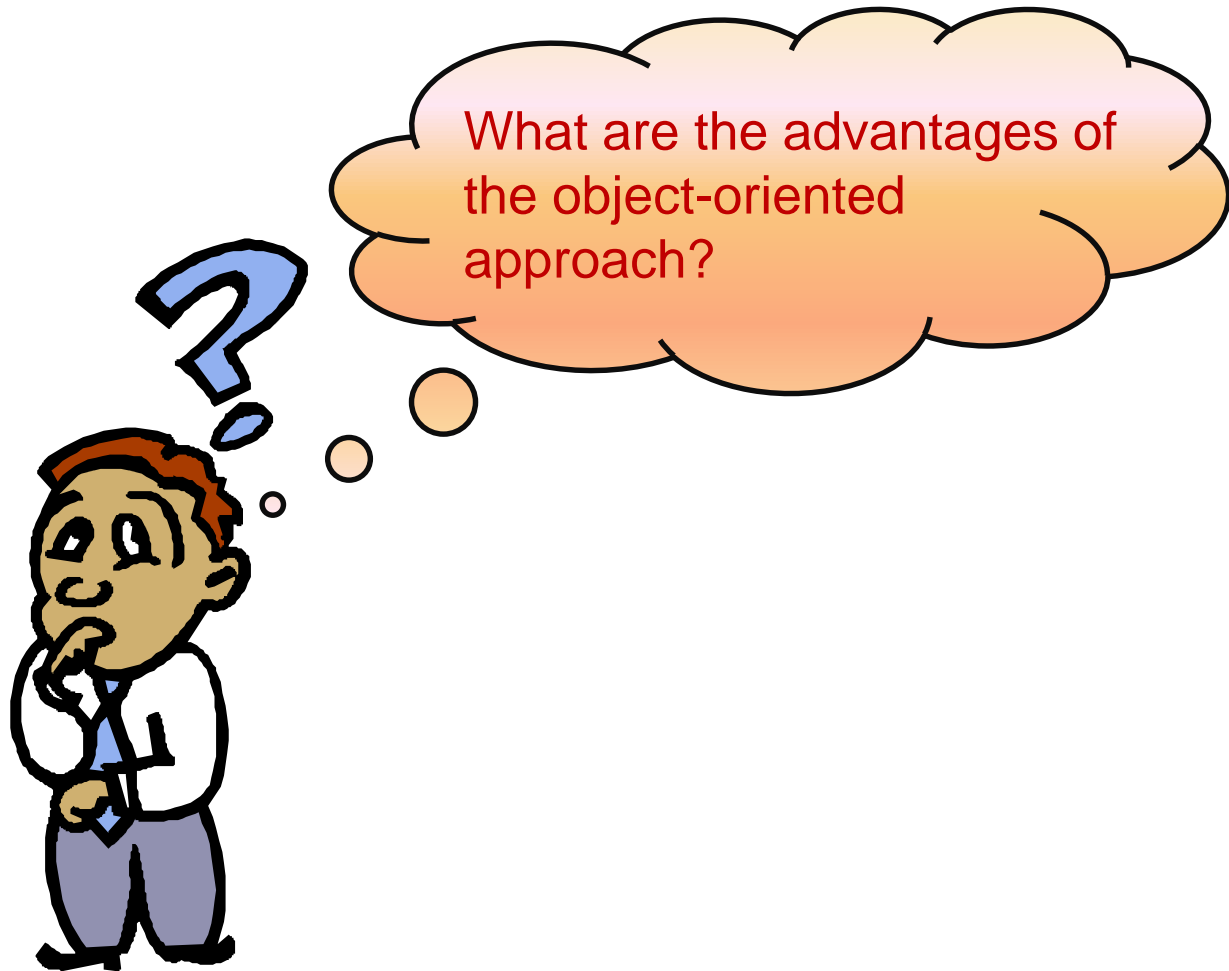
Quiz (Contd.)

- ◆ John went to a shopping mall to buy some clothes. The door of the shopping mall was automatic, which opened as soon as John stepped near it and closed as soon as John entered the mall. Identify the following:
 - ◆ The possible receiver of the message.
 - ◆ The possible method that the receiver can use.

- ◆ Solution:
 - ◆ The receiver of the message will be the door of the shopping mall.
 - ◆ The door will use the method, Open Door, when John steps near it and Close Door when he enters the mall.

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Advantages of Object Orientation



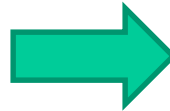
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Advantages of Object Orientation (Contd.)

- ◆ Realistic modeling:
 - ◆ Models the real world



↑
Real-world object



Car	
Attributes	Methods
Registration Number	accelerate
Model	deccelerate

↑
Object-oriented
representation of the
real-world object

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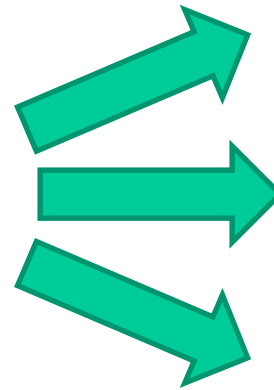
Advantages of Object Orientation (Contd.)

◆ Reusability:

- ◆ Allows to reuse existing classes or objects

Employee	
Attributes	Methods
Emp Code	updateDepartment
Name	updateSalary
Department	
Salary	

Employee Class



Payroll application

Leave accounting
application

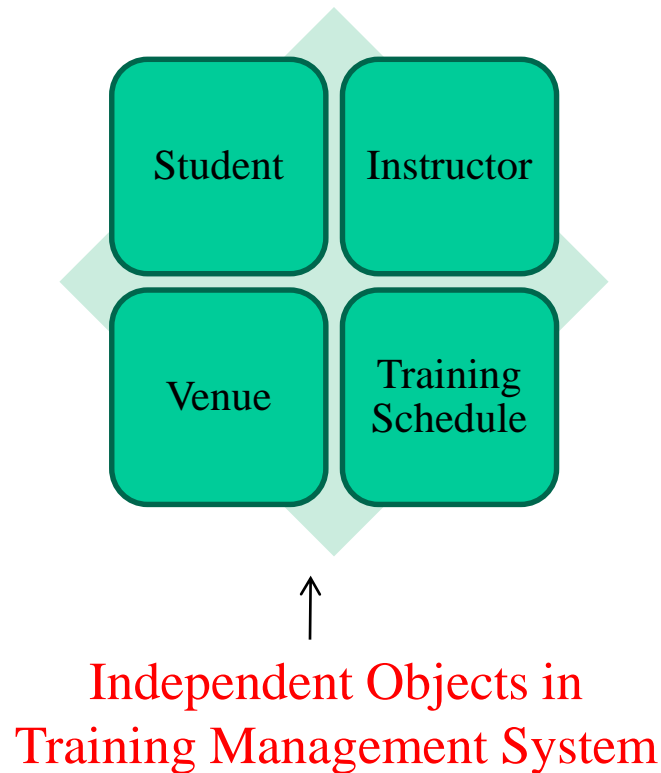
Employee recruitment
application

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Advantages of Object Orientation (Contd.)

◆ Modularity:

- ◆ Allows objects to be maintained independent of each other

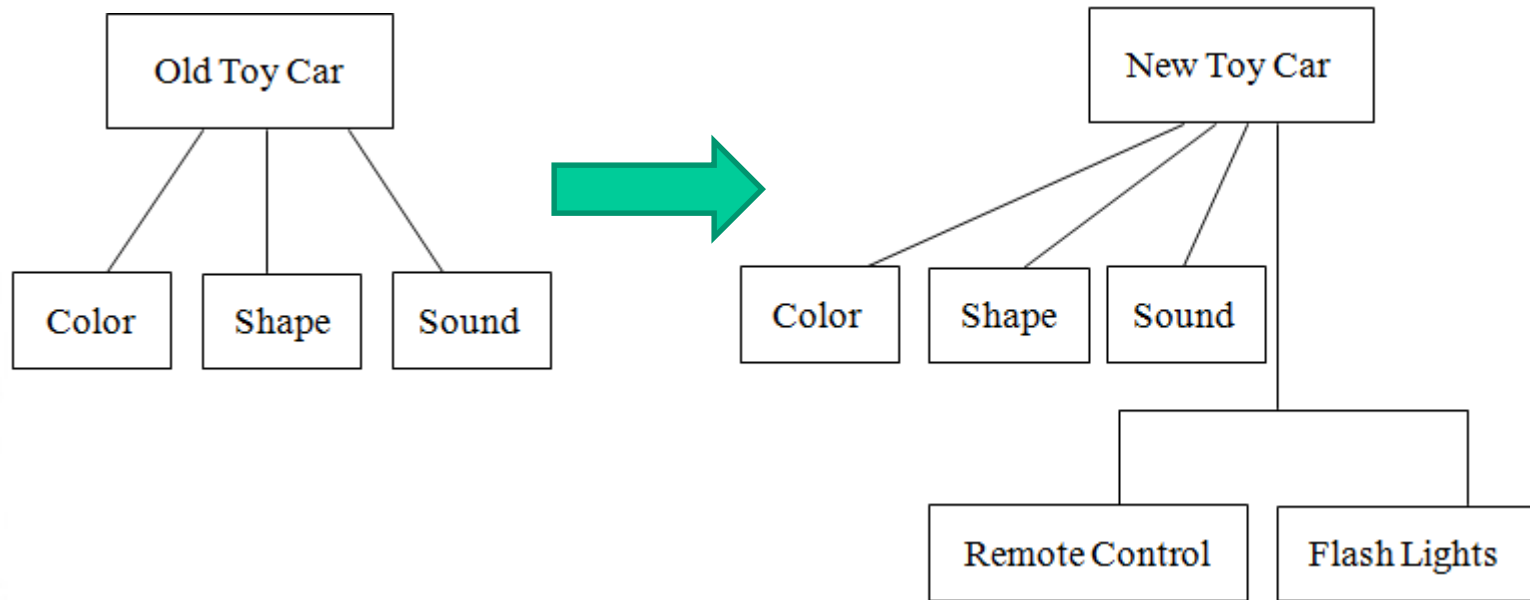


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Advantages of Object Orientation (Contd.)

◆ Flexibility to change:

- ◆ Allows to create a new class
- ◆ New class can add features to an existing class



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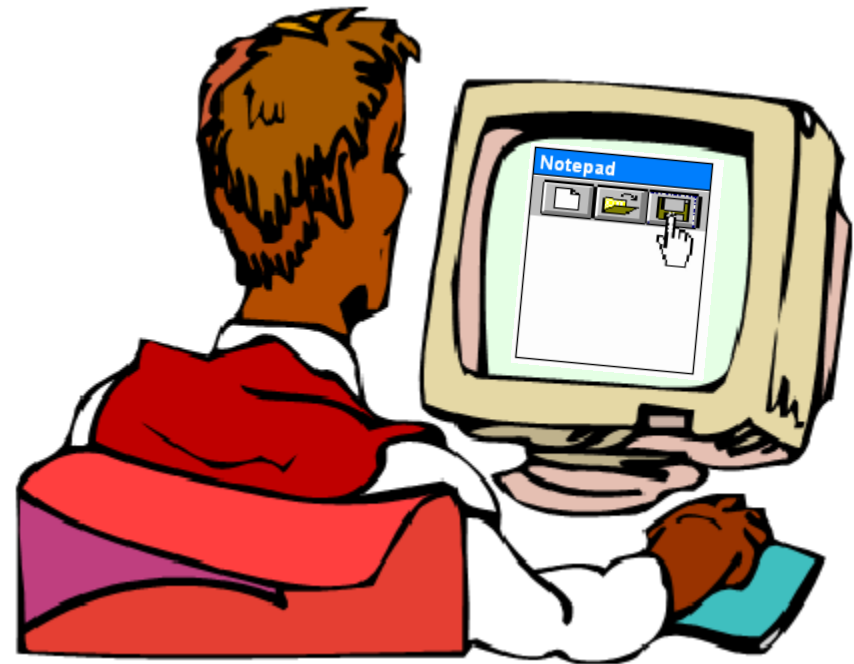
Advantages of Object Orientation (Contd.)

◆ Information hiding:

- ◆ Allows programmers to limit the access to information

A person who is saving a file on a computer does not know how the computer saves the file on the hard disk.

The person just knows that clicking the Save button will save the file.



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Summary

- ◆ In this session, you learned that:
 - ◆ Object orientation is a software development methodology that relates to the real world.
 - ◆ An object is an instance of a class.
 - ◆ The advantages of the object-oriented approach are:
 - ◆ Realistic modeling
 - ◆ Reusability
 - ◆ Modularity
 - ◆ Flexibility to change
 - ◆ Information hiding