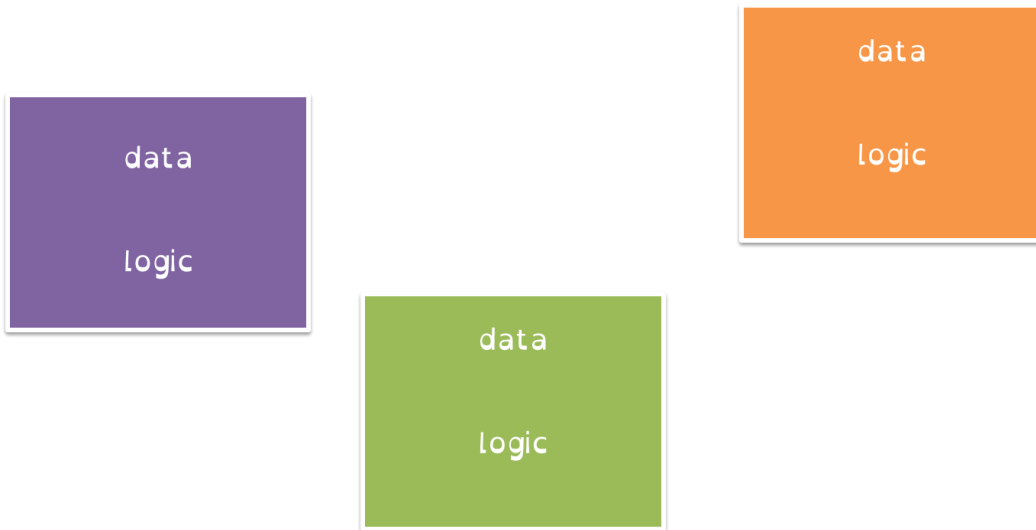


Object Oriented Programming



Revision Workbook

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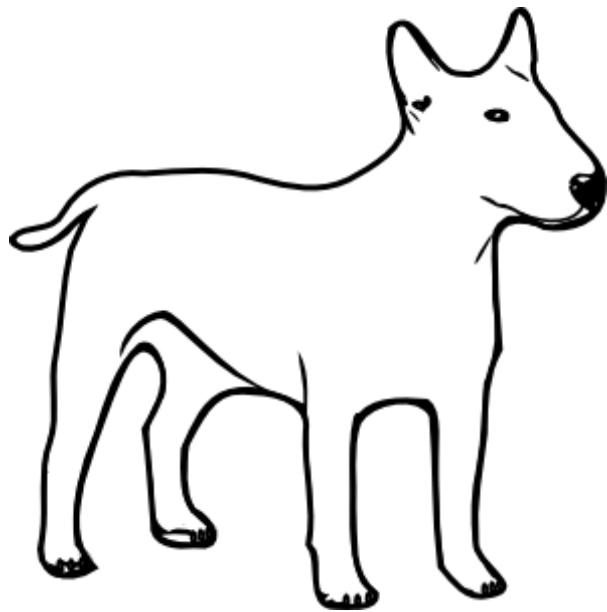
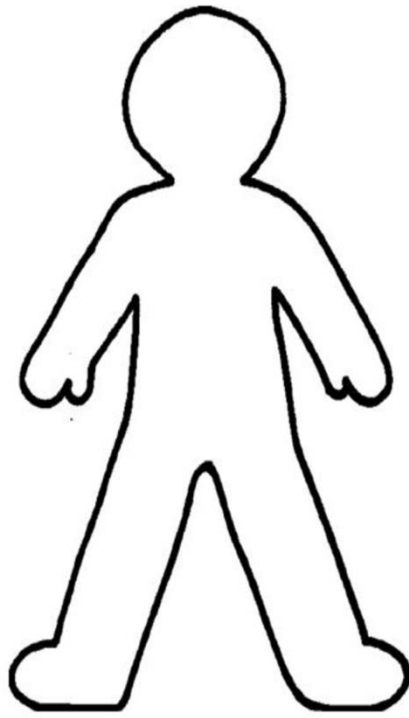
Presentation notes

Key Terminology

Object Oriented Programming	
Class	
Object	
Instantiation	
Inheritance	
Encapsulation	
Over riding	

Example of an Inheritance Diagram

Blueprints



Inheritance Diagram questions

An object-oriented program is being written to store details of and play digital media files that are stored on a computer. A class `MediaFile` has been created and two subclasses, `VideoFile` and `MusicFile` are to be developed. The classes `VideoFile` and `MusicFile` are related to `MediaFile` by single inheritance.

1. Draw an inheritance diagram for the three classes. (2 marks)

An object-oriented program is being written to store details of the hardware devices that are connected to a computer network in a college. This will be used by the network manager to perform an audit of the equipment that the college owns. Two different types of devices are connected to the network. They are printers and computers. The computers are categorised as being laptops, desktops or servers. A class `Device` has been created and two subclasses, `Printer` and `Computer` are to be developed. The `Computer` class will have three subclasses: `Laptop`, `Desktop` and `Server`.

2. Draw an inheritance diagram for the six classes (3 marks)

Success Criteria for an Inheritance Diagram

An Inheritance diagram must have:

Writing Class definition questions

The MediaFile class has data fields Title and Duration.

The class definition for MediaFile is:

```
MediaFile = Class
    Public
        Procedure PlayFile
        Function  GetTitle
        Function  GetDuration
    Private
        Title : String
        Duration : Real
End
```

Note that the class does not have procedures to set the values of the variables as these are read automatically from data stored within the actual media file.

The MusicFile class has the following additional data fields:

- Artist: Stores the name of the band or singer that recorded the music.
- SampleRate: Stores the rate at which the music has been sampled.
- BitDepth: Stores the number of bits in which each sampled value is represented.

1. Write the class definition for MusicFile. (4 marks)

The Device class has data fields MACAddress, DeviceName and Location.

The class definition for Device is:

```
Device = Class
    Public
        Procedure AddDevice
        Function GetMACAddress
        Function GetDeviceName
        Function GetLocation
    Private
        MACAddress: String
        DeviceName: String
        Location: String
End
```

The Computer class has the following additional data fields:

- ProcessorName: Stores the name of the company that manufactured the processor.
- RAMCapacity: Stores the capacity of the RAM installed in the computer, in gigabytes.
- HDDCapacity: Stores the capacity of the Hard Disk Drive installed in the computer, in gigabytes.

2. Write the class definition for Computer. (4 marks)

The Laptop class has the additional data field BluetoothInstalled. This field will indicate whether or not the laptop is fitted with a Bluetooth module.

3. Write the class definition for Laptop (2 marks)

Success Criteria for Class definitions

A class definition must have:

June 2014 – Question 8

An event-driven, object-oriented programming language lets the programmer create a Graphical User Interface (GUI) from components such as forms and buttons. The components of the GUI are implemented using a class hierarchy and inheritance.

1) Explain what is meant by inheritance (1 mark)

2) One important feature of an object-oriented programming language is the facility to override methods (functions and procedures). Explain what is meant by overriding when writing programs that involve inheritance. (2 marks)

One GUI component is a Selector. Selectors come in two different types: ComboBox and ListBox.

Selector Type	Description
ComboBox	A combo box lets the user make an input either by typing into the box or by picking a single item from a list.
ListBox	A list box lets the user select options from a list. The user cannot type into a list box. There are two different types of list box: <ul style="list-style-type: none">• SingleSelectionListBox: The user can only select one item from a list. Whenever an item is selected, the previously selected item is deselected.• MultipleSelectionListBox: The user can select one or more items from a list. Whenever an item is selected, it is added to the list of selected items.

3) Draw an inheritance diagram for the classes: Selector, ComboBox, ListBox, SingleSelectionListBox and MultipleSelectionListBox. (3 marks)

The Selector class has data fields Items and NumberOfItemsInList:

- Items: an array that stores the list of strings that will appear in the selector.
- NumberOfItemsInList: a number that indicates how many items there are in the selector.

It also has a procedure that the programmer can call to add an item to the list of strings (AddItemToList) and a procedure that is called by the operating system whenever the user selects an item from the list (SelectItemFromList).

The Selector class does not include a procedure to display the items in the list as the way items are displayed is different for each type of selector.

The class definition for Selector is:

```
Selector = Class
    Public
        Procedure AddItemToList
        Procedure SelectItemFromList
    Private
        Items: Array of String
        NumberOfItemsInList: Integer
    End
```

A class is to be created for the ComboBox type of selector.

The ComboBox class needs the following additional data fields:

- TextTyped: Stores the characters that have been typed by the user if they have made their input by typing rather than picking an option from the list.
- SelectedItemNumber: Stores the position in the list of the item that has been selected by the user, if one has been selected.
- AllowNonListInputs: A True or False value that indicates whether the user should be allowed to type in text that is not one of the items in the list.

The class will need to implement the operation of selecting an item from the list differently from the way the Selector class implements this operation, but the operation of adding an item to the list will be implemented in the same way by both of these classes.

The class must provide subroutines to:

- display the combo box
- respond to the operating system's notification of a key press
- return the text that has been typed in
- return the selected item number

- set the value of `AllowNonListInputs` flag to `True` or `False`, to indicate whether or not
- the user is allowed to type text that is not in the list.

4) Write the class definition for the `ComboBox` class (5 marks)