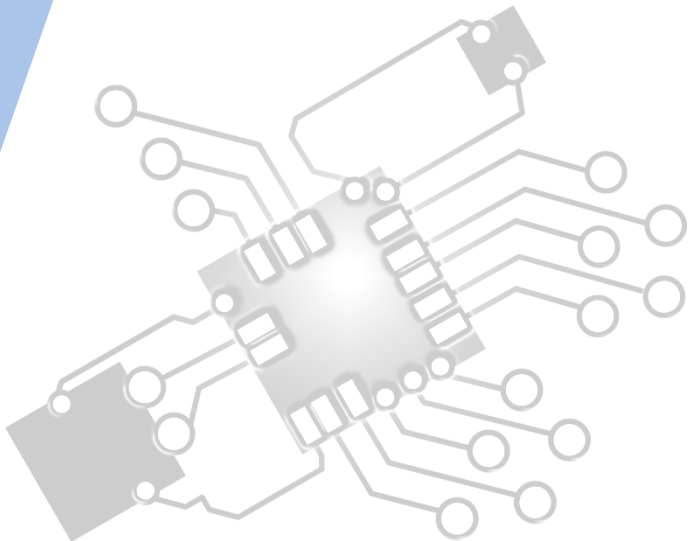




Objects as a programming concept

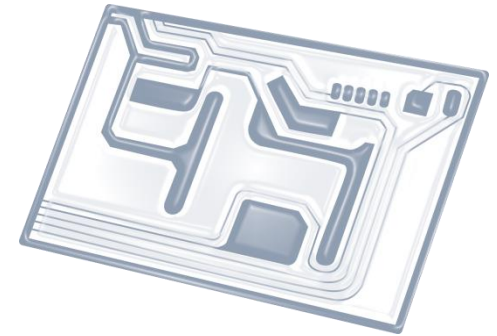
IB Computer Science



*Content developed by
Dartford Grammar School
Computer Science Department*



HL Topics 1-7, D1-4



1: System design



2: Computer Organisation



3: Networks



4: Computational thinking



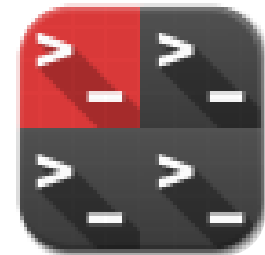
5: Abstract data structures



6: Resource management



7: Control



D: OOP

HL & SL D.1 Overview

D.1 Objects as a programming concept

D.1.1 Outline the general nature of an object

D.1.2 Distinguish between an object (definition, template or class) and instantiation

D.1.3 Construct unified modelling language (UML) diagrams to represent object designs

D.1.4 Interpret UML diagrams

D.1.5 Describe the process of decomposition into several related objects

D.1.6 Describe the relationships between objects for a given problem

D.1.7 Outline the need to reduce dependencies between objects in a given problem

D.1.8 Construct related objects for a given problem

D.1.9 Explain the need for different data types to represent data items

D.1.10 Describe how data items can be passed to and from actions as parameters



1: System design

2: Computer Organisation



3: Networks

4: Computational thinking



5: Abstract data structures

6: Resource management

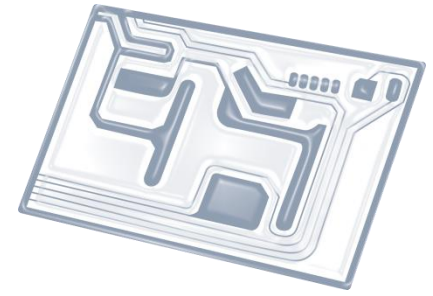


7: Control

D: OOP



Topic D.1.2



Distinguish between an **object** (definition, template or class) and **instantiation**

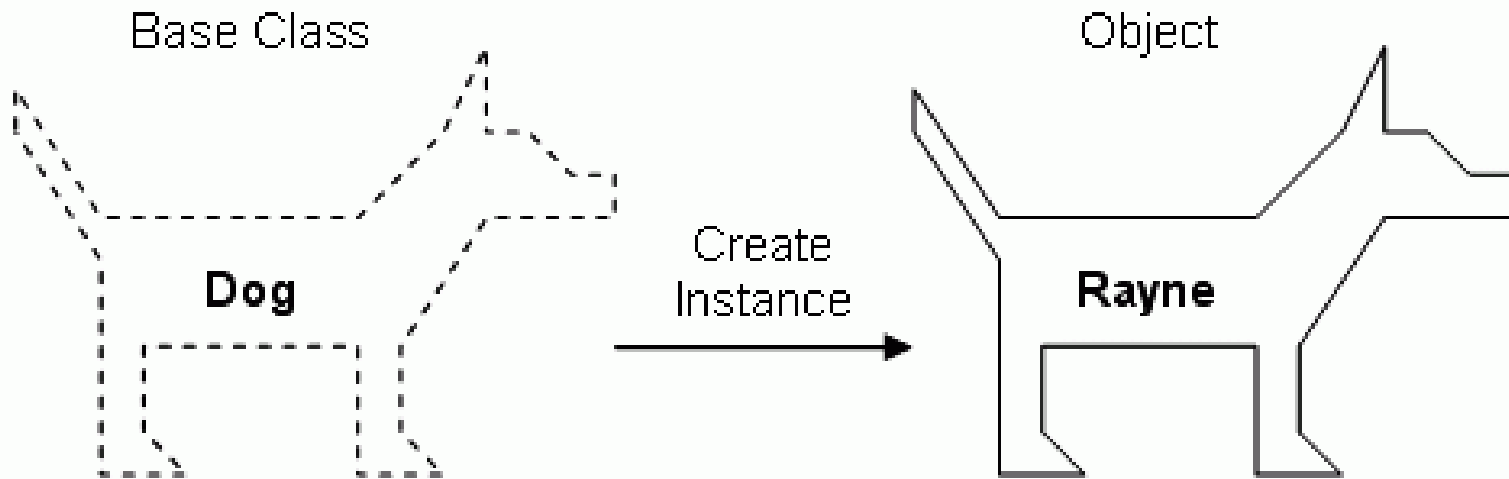


Class



Objects

Class vs. Object



Properties

Color
Eye Color
Height
Length
Weight

Methods

Sit
Lay Down
Shake
Come

Property values

Color: Gray, White, and Black
Eye Color: Blue and Brown
Height: 18 Inches
Length: 36 Inches
Weight: 30 Pounds

Methods

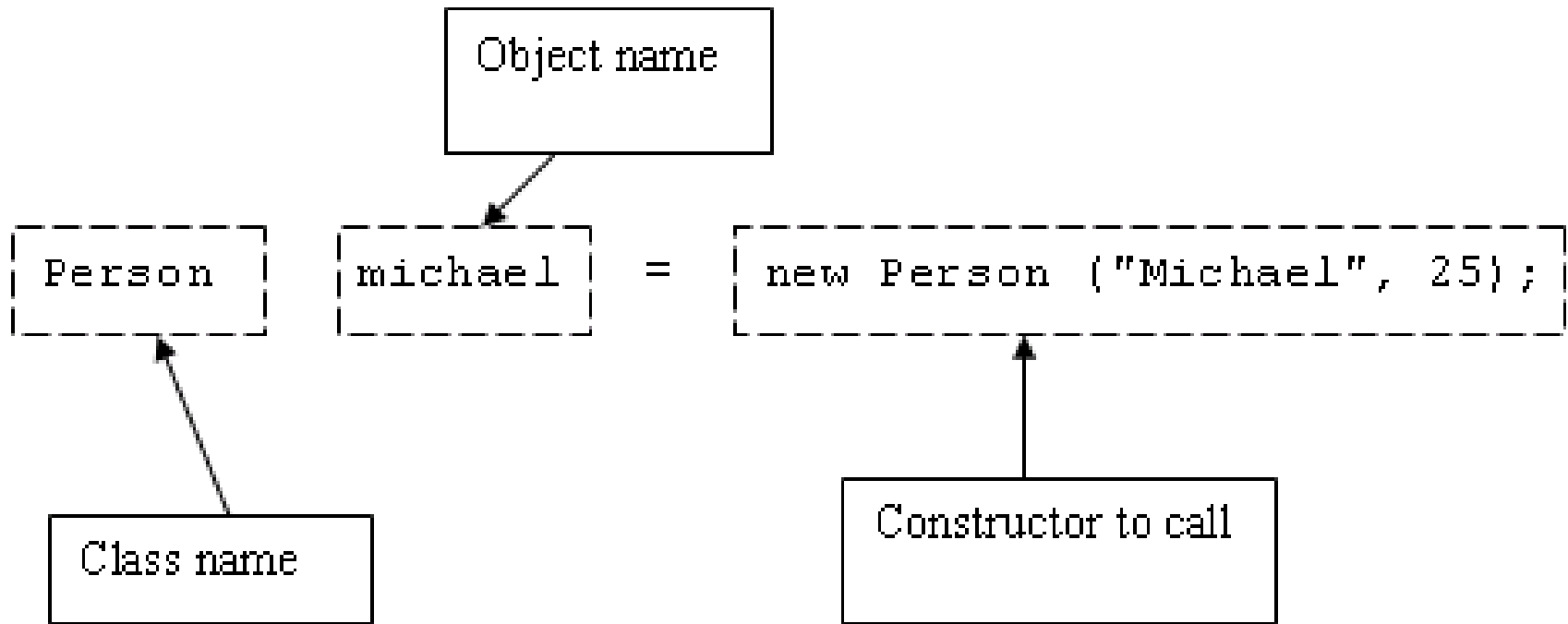
Sit
Lay Down
Shake
Come

Reminder: Steps in object creation

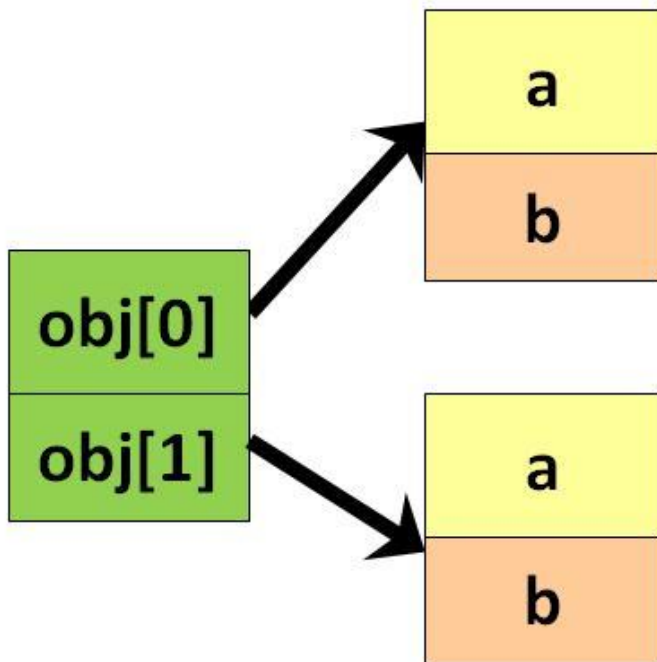
- A class provides the **blueprints** for objects.
- An **object** is created from a **class**.
- In Java, the ***new*** key word is used to create new objects.
- There are three steps when creating an object from a class:
 - **Declaration**: A variable declaration with a variable name with an object type.
 - **Instantiation**: The 'new' key word is used to create the object.
 - **Initialization**: The 'new' keyword is followed by a call to a constructor. This call initializes the new object.



Declare > Instantiate > Initialize



Instantiating objects uses RAM

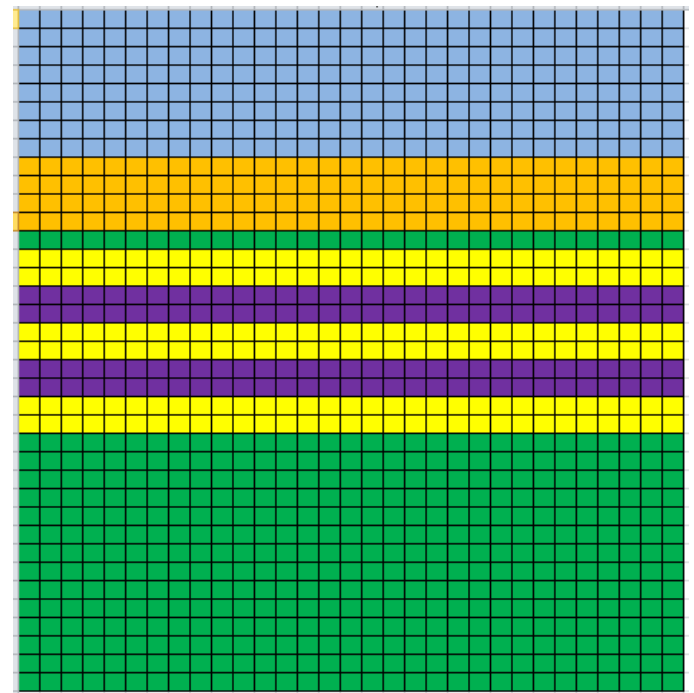
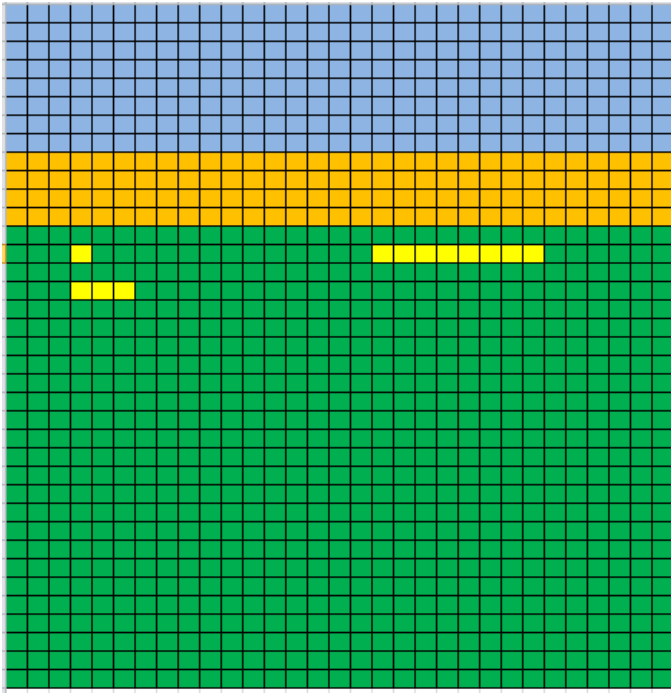


Every time a new object is instantiated from a base class, a space equivalent to the WHOLE object is **reserved in RAM**.

Depending on the number of states in the object, a lot of RAM can be wasted / **reserved but not used**.

Therefore, it is best to use the most **memory efficient** variable types.

Variable in RAM vs. Object in RAM



The more RAM being used by a program, the more processor time is needed to read/write/process the data. The more processor cycles being used, the more 'sluggish' the computer would be to the user.

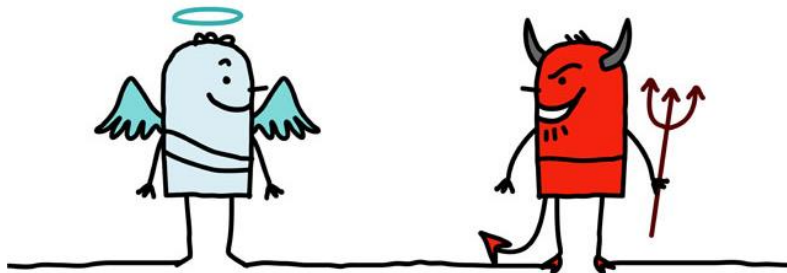
Basic point: More RAM used = slower response

Good idea

Creating a linked list
(**dynamic data type**) of
objects

Why is this good?

Only memory actually
being used is reserved



Bad idea

Creating an array
(**static data type**) of
objects

Why is this bad?

Potential memory could
be wasted in reserving
space that might not be
needed.