



# *Welcome to Programming Foundations FIT9131*

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## *Week 1: Introduction*

# *Unit Lecturers*

Wed 2-4 pm in K309 AND Wed 6-8 pm in K309

Mark Creado

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Assignment Project Exam Help

Wed 2-4pm in E224

<https://powcoder.com>

Jian Liew

[jian.liew@monash.edu](mailto:jian.liew@monash.edu)

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# Lecture 1 outline

- Introduction and expectations
- What is a computer?
- What is a computer program?  
~~Assignment Project Exam Help~~
- Programming languages  
<https://powcoder.com>
- Program translation
- Introduction to Java and BlueJ  
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- Introduction to object-oriented programming



# Aim and Learning Outcomes

The aim of FIT9131 is to provide you with a sound foundation in the *basic* design and development of reliable, maintainable and reusable programs.

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On successful completion of this unit, students should be able to:

<https://powcoder.com>

1. design, construct, test and document small computer programs using Java;
2. interpret and demonstrate software engineering principles of maintainability, readability, and modularisation;
3. explain and apply the concepts of the "object-oriented" style of programming.



# *Please keep in mind ...*

At the completion of this unit, you will NOT become:

- an expert programmer
- an ~~Assignment Project Exam Help Java programmer~~
- an expert in object-oriented programming  
<https://powcoder.com>
- to achieve ~~these levels of expertise~~ you need to do more advanced programming units.

# Lectures

Copies of the lecture slides will be made available on the FIT9131 Moodle site. Download and study them before attending the lectures.

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During the lecture:

- *LISTEN* to what is said.
- *THINK* about what is said.
- *ASK* questions when you do not understand.
- *WRITE* down what is important.
- *DO NOT TALK* amongst yourselves unless you are invited to do so.
- *TURN OFF YOUR MOBILE PHONE* (*or to silent mode*)





# Lecture Sessions

- for each week, there are 3 repeat lecture sessions
- the materials presented for the 3 lectures are *identical* - Assignment Project Exam Help  
<https://powcoder.com>
- you should be enrolled in ONE of the lectures (and attend that lecture only)
  - If possible you must attend a tutorial class after your allocated lecture.

# Tutorial/Lab classes

- held in computer laboratories for two hours per week
- group of approximately 18-20 students, plus a tutor

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- in these classes you will put into practice the concepts and techniques learnt in lectures  
<https://powcoder.com>
  - there is typically also some home work to be completed outside the tutorial classes.  
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- interactive – participation encouraged
- attendance at tutorial classes will be recorded.



# Off-Campus Learning (OCL)

If you are an OCL student :

- download and study the online lecture recordings every week **Assignment Project Exam Help**
- check the FIT9131 Moodle site regularly **<https://powcoder.com>**
- do the weekly lab exercises every week on schedule
- do the weekly **Add WeChat powcoder** homework every week on schedule
- participate in the FIT9131 discussions forums for OCL students
- seek help from teaching staff as needed (via emails or forums)

# Assignments (15%+25%)

You must :

- start working on your assignments as soon as the specifications are available
- show your work to your tutor regularly
- be able to explain and modify your code during assessments (via individual interviews)
- stick to the submission deadlines (there will be no extensions)  
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- seek help from teaching Staff as needed via:
  - Help Desk, email, tutorial classes (On-campus students)
  - forum, email (OCL students)

# Unit Tests

Please ensure to read the unit guide regarding the unit test in the week of the assignment submission.

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Assignment structures have been changed from previous offerings.

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Unit tests are hurdles to the overall assignment submission for both assignments in this unit.

# Online quizzes

There are online quizzes available for you to test your own understanding of the concepts learnt throughout the semester

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You are supposed to complete them within the allocated time period (typically 1-1.5 weeks)

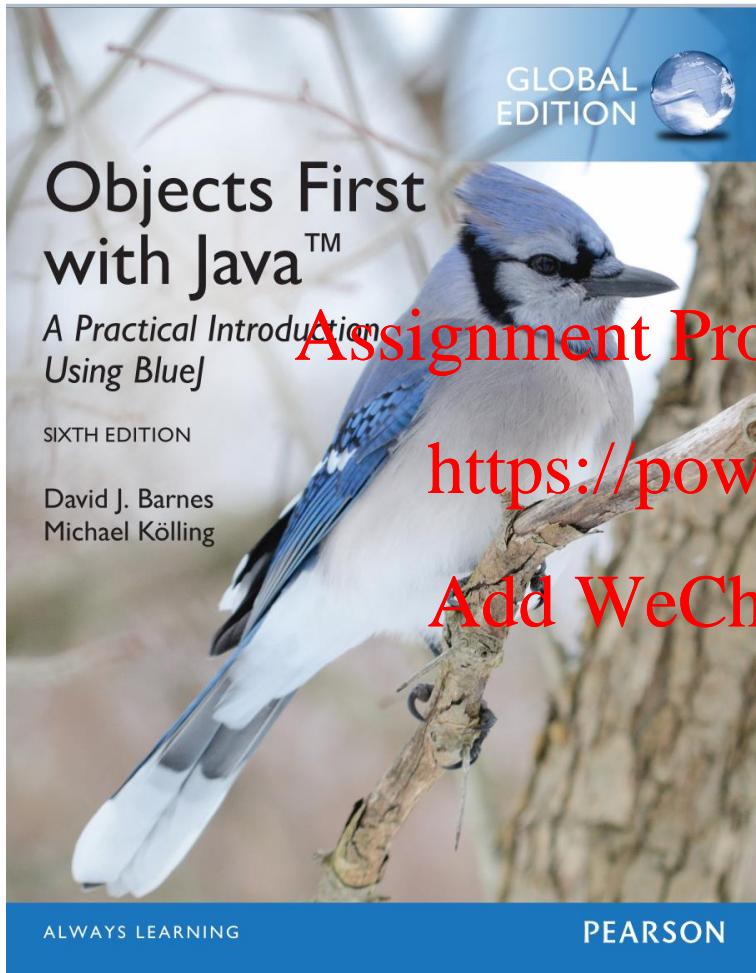
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They are not officially graded, but completing them (by yourself) will greatly help your understanding of the materials in this unit

# Resources

- Software - Java and BlueJ
- Hardware
- Moodle site accessible through My.Monash portal  
<http://my.monash.edu.au/>
- Unit Information Guide - available from unit's Moodle site
- Library <https://powcoder.com>
- Other FIT9131 students
- FIT9131 helpdesk (starting in Week 3)  
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- Staff

# Textbook



## Important :

You are expected to purchase a copy of this textbook.

<https://powcoder.com>

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All the weekly exercises will contain references to the book (both theory & actual exercises). Bring the book to each tutorial class.



# Assessment

Assessment for this unit will comprise:

- Two assignments (total 40%) due week 7 (Assignment 1, 15%) and week 12 (Assignment 2, 25%). This includes a unit test worth 5% of the total mark for each assignment.
- A final exam (60%) held during the examination period.  
<https://powcoder.com>

To pass the unit you must comply with the Faculty “**40%-rule**” and obtain: [Add WeChat powcoder](#)

- 40% or more in the unit’s examination and
- 40% or more in the unit’s non-examination assessment and
- an overall unit mark of 50% or more.

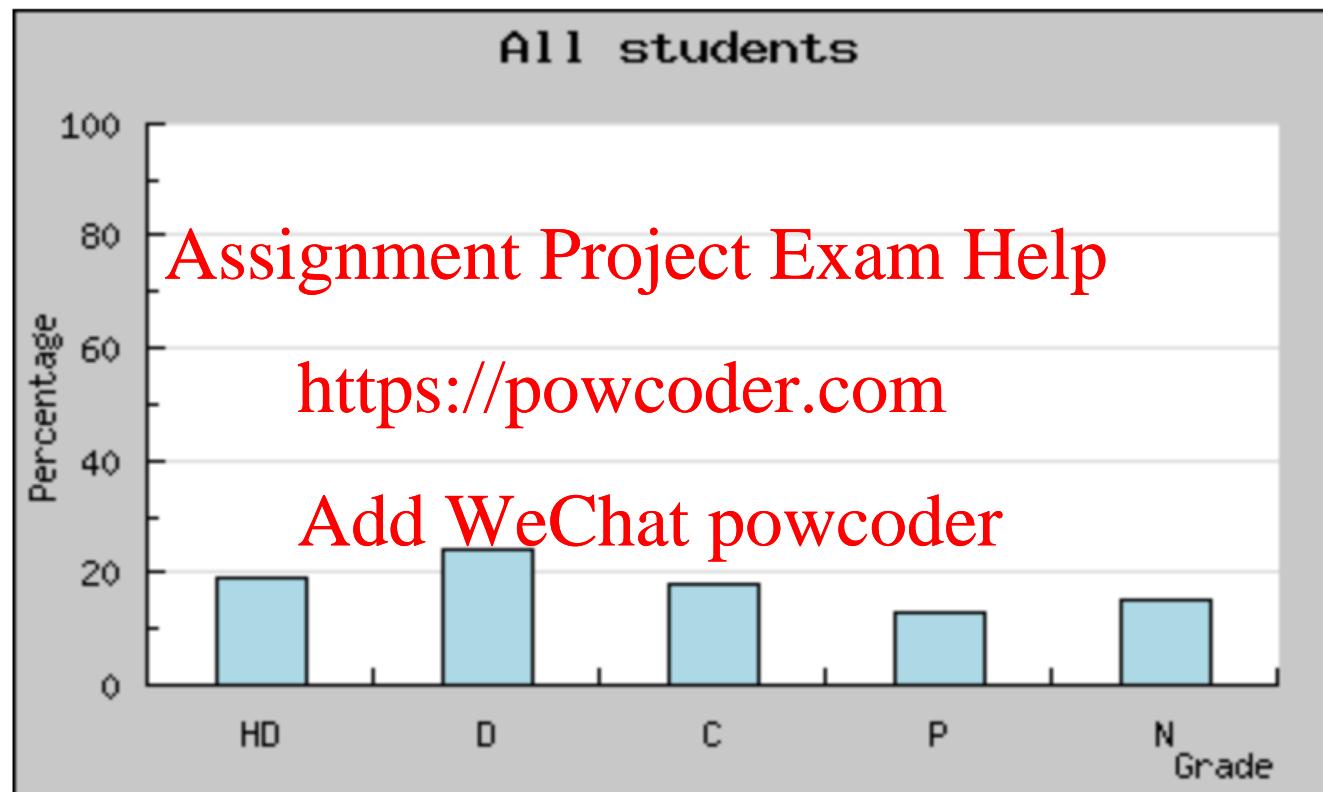


# Marks and Grades

Final mark	Grade
80-100	Assignment Project Exam Help High Distinction (HD)
70-79	<a href="https://powcoder.com">https://powcoder.com</a> Distinction (D)
60-69	Add WeChat powcoder Credit (C)
50-59	Pass (P)
< 50	Fail (N)

# A typical semester's results?

Grade distribution by location:



- Caulfield-Ocl
- Caulfield
- Malaysia
- All Students



# *Common Causes of Failing*

## For on-campus students :

- Not attending classes – **this is the number 1 cause**  
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- Not completing the weekly exercises (lab + homework) <https://powcoder.com>
  - as a rule, falling behind more than 2 weeks is not acceptable, as the weekly materials are almost always dependent on previous weeks' work
  - not seeking help early enough
- Plagiarism and Cheating

# Common Causes of Failing

## For off-campus (OCL) students :

- Not completing the weekly exercises (lab + homework) on time
  - as a rule, falling behind more than 2 weeks is not acceptable, as the weekly materials are almost always dependent on previous weeks
  - not seeking help early enough
  - you must be very disciplined when doing this unit in OCL mode
- Not participating in the online discussion forums
- Plagiarism and Cheating



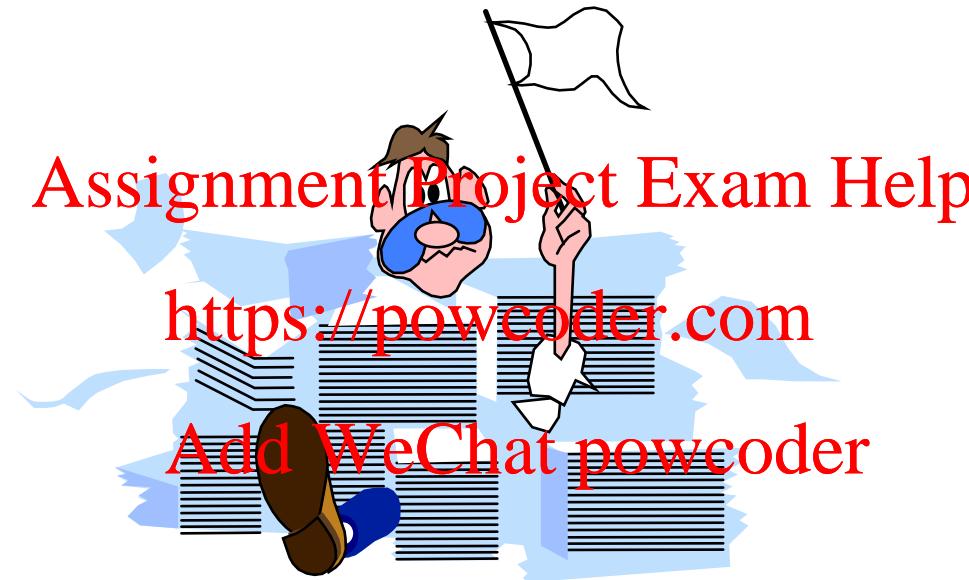
# Plagiarism and Cheating

- Monash University takes plagiarism and cheating very seriously and these incur severe penalties.
- Plagiarism is using someone else's work, but not acknowledging it. Cheating is pretending that someone else's work is your own, in order to gain an unfair advantage.  
*Assignment Project Exam Help  
https://powcoder.com*

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- It is OK to help each other with the assignment work, BUT each person must write the entire assignment alone and be able to explain and modify it on request.

# *Workload Management and Expectations*





# *Workload Management and Expectations*

- from the FIT9131 Unit Guide:

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Minimum total expected workload equals 12 hours per week comprising:

(a.) Contact hours for on-campus students:

2 hours of lectures

One 2-hour laboratory

- (b.) Study schedule for off-campus students:

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Off-campus students generally do not attend lecture and tutorial sessions, however should plan to spend equivalent time working through the relevant resources and participating in discussion groups each week.

- (c.) Additional requirements (all students):

A minimum of 8 hours independent study per week for completing lab and project work, private study and revision.

# *What is a computer?*

Early ‘computers’ were humans.



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<https://powcoder.com>

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The term ‘computing machine’ was used increasingly from the 1920s for machines that did the work of a human computer

# What did early computers look like?

One of the earliest stored program computer :  
Manchester ‘Baby’ (first ran on 21 June 1948)

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<https://powcoder.com>  
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A reconstruction of the Manchester Baby

# *Monash's First Computer: The Ferranti Sirius, 1962*



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# A modern Supercomputer



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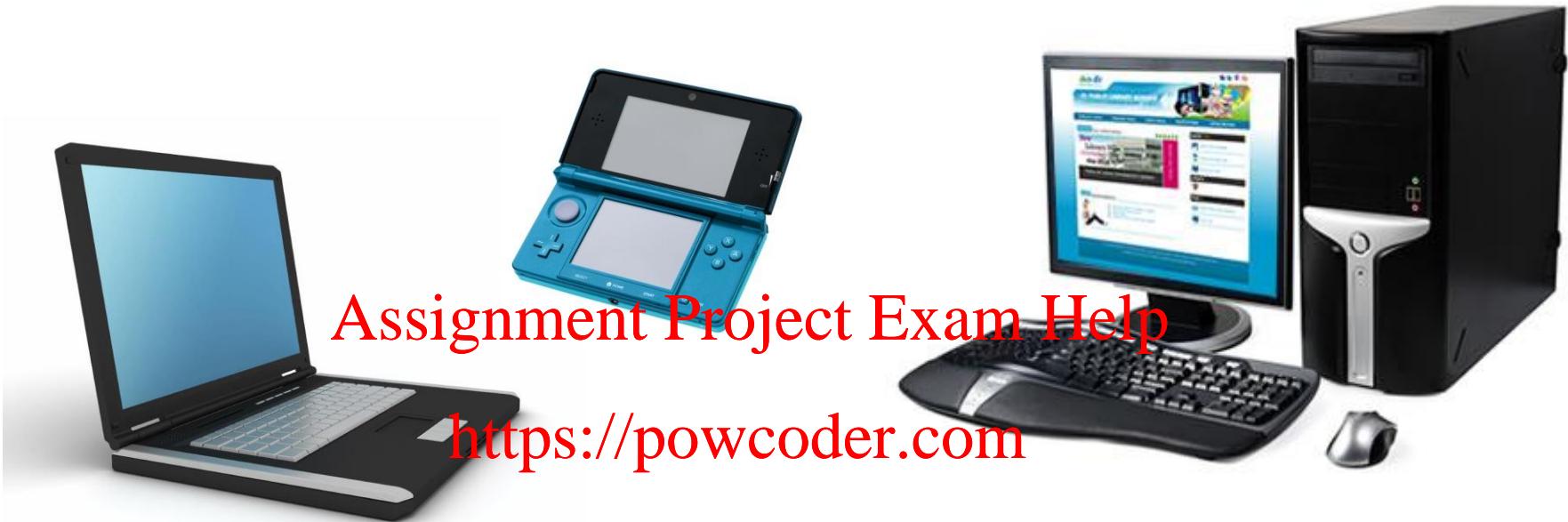
<https://powcoder.com>

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*Sunway TaihuLight*  
World's Fastest SuperComputer  
(June 2016)

# *What is a computer?*



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# Computer systems

A computer system has these components:

- Hardware
- Software
- Procedures
- Data
- People

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<https://powcoder.com>

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- *Hardware* is the machine itself.
- *Software* tells the hardware what to do.
- *Procedures* tell people how to use the system.

A computer processes *data* and produces *information* useful to people.



*OUTPUT*

???

*INPUT*

???

input  
device

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central  
<https://powcoder.com>  
unit (cpu)  
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output  
device

*STORAGE*

???

main  
memory

secondary  
storage  
device

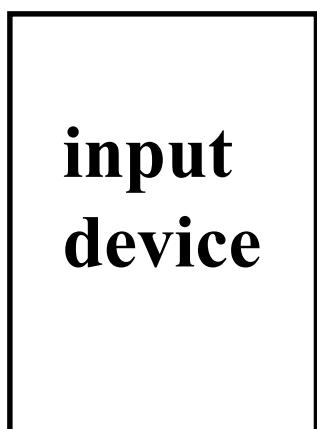




# *Hardware*

## *INPUT*

keyboard, mouse,  
joystick, bar code  
reader, scanner,  
paper tape, cards.



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central

https://powcoder.com

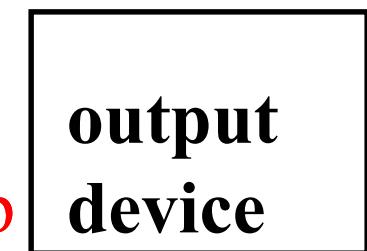
unit (cpu)

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main  
memory

## *OUTPUT*

screen, printer, plotter,  
speech synthesizer,  
paper tape...

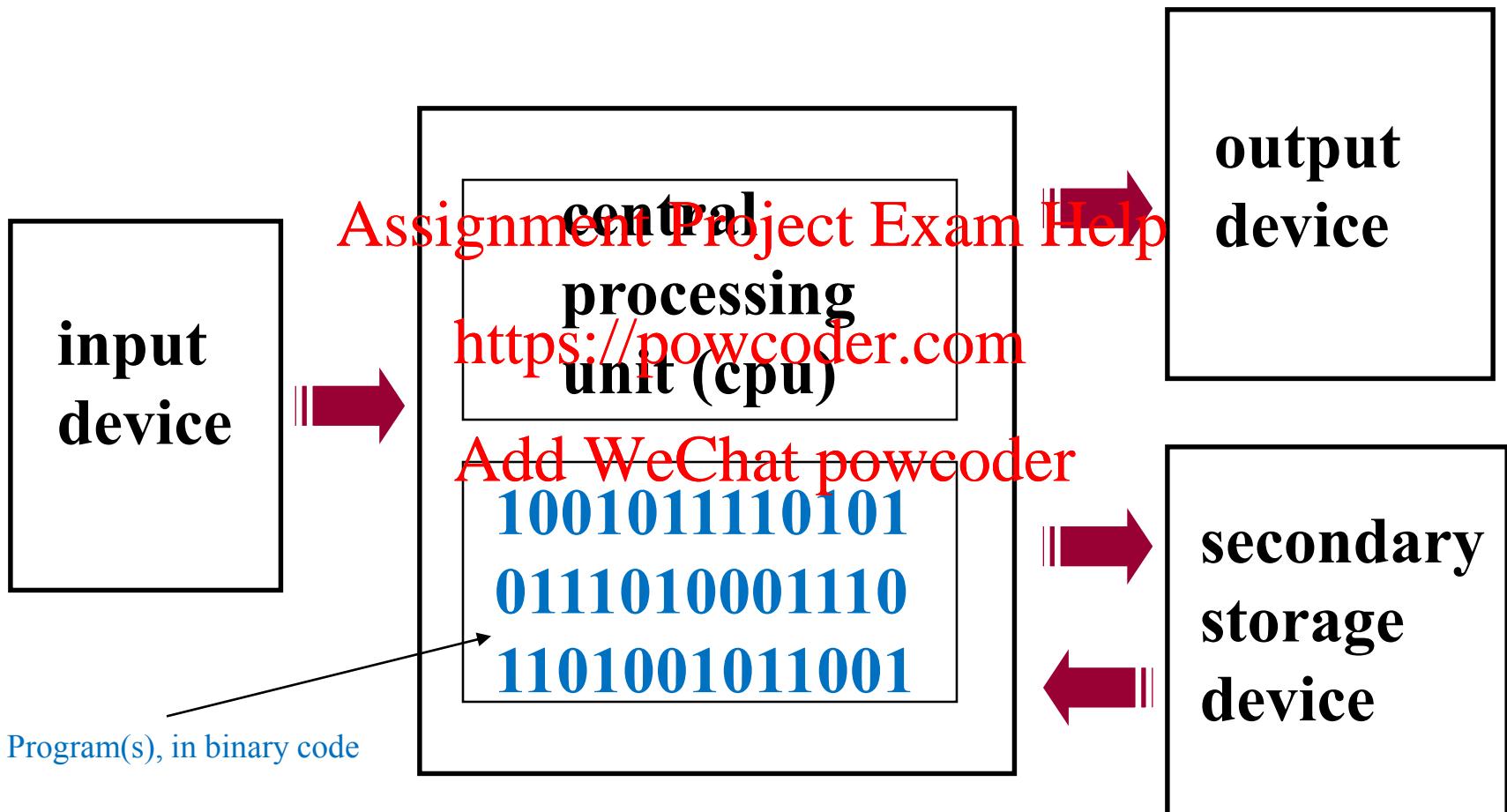


## *STORAGE*

magnetic disk, CD-  
ROM, USB flash  
disk, tape, ...



# Hardware





# Software

Two broad classifications:

*System software* – computer programs to control the computer and provide a user interface (e.g. operating system, windowing system, file management software)

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*Application software* – computer programs to perform specific tasks (e.g. word processor, database management system, web browser, your programs)



# *What is a computer program?*

- a set of **instructions** to be obeyed (or executed) in order to solve a problem

- typically **data** plus **processing**

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- purpose is to convert *data* into *information*

- particularly useful for large amounts of data  
<https://powcoder.com>  
and complicated processing

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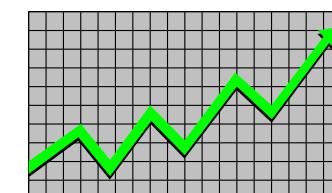
Program



Data

W%312a\$R56

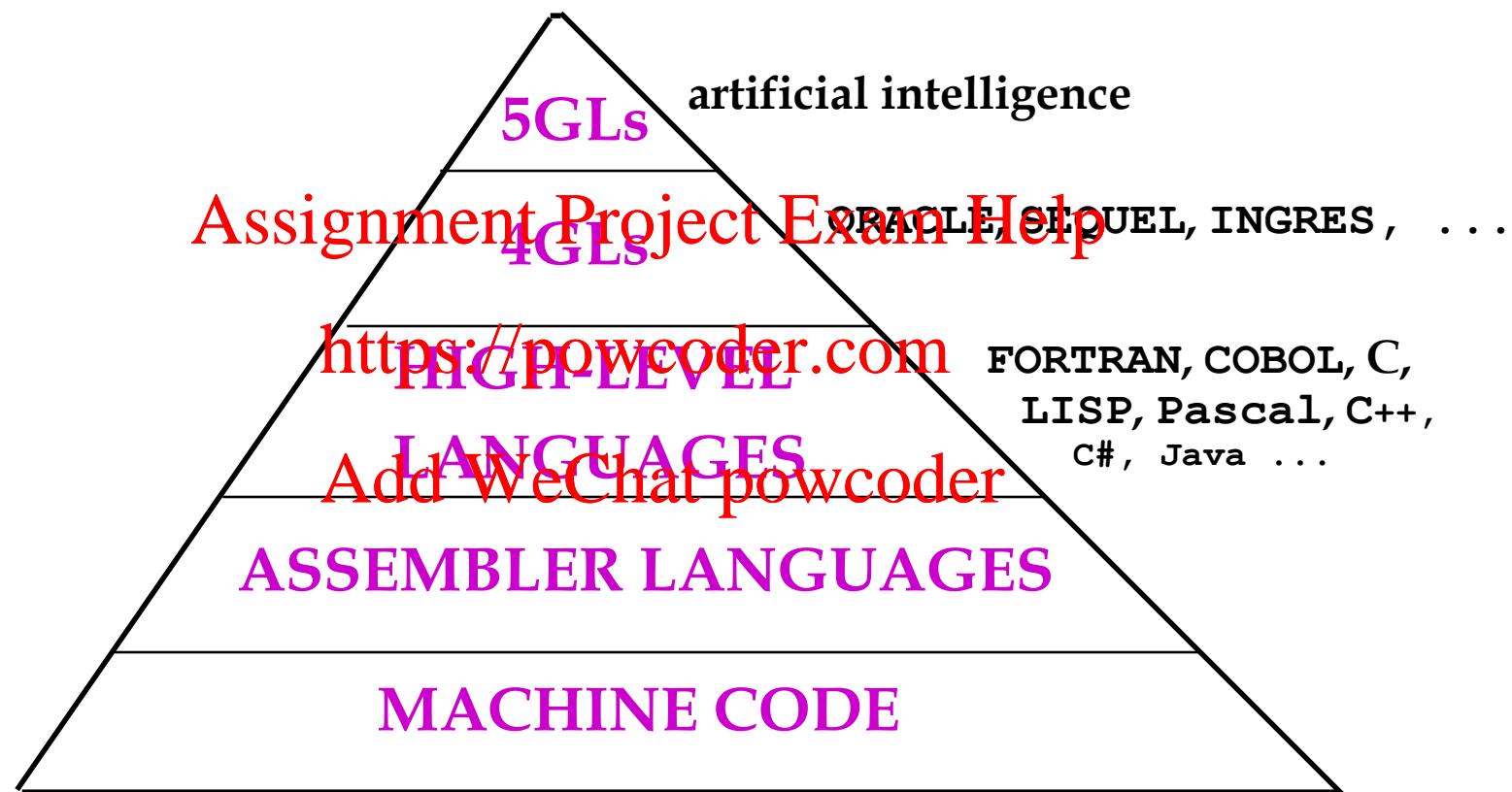
Computer



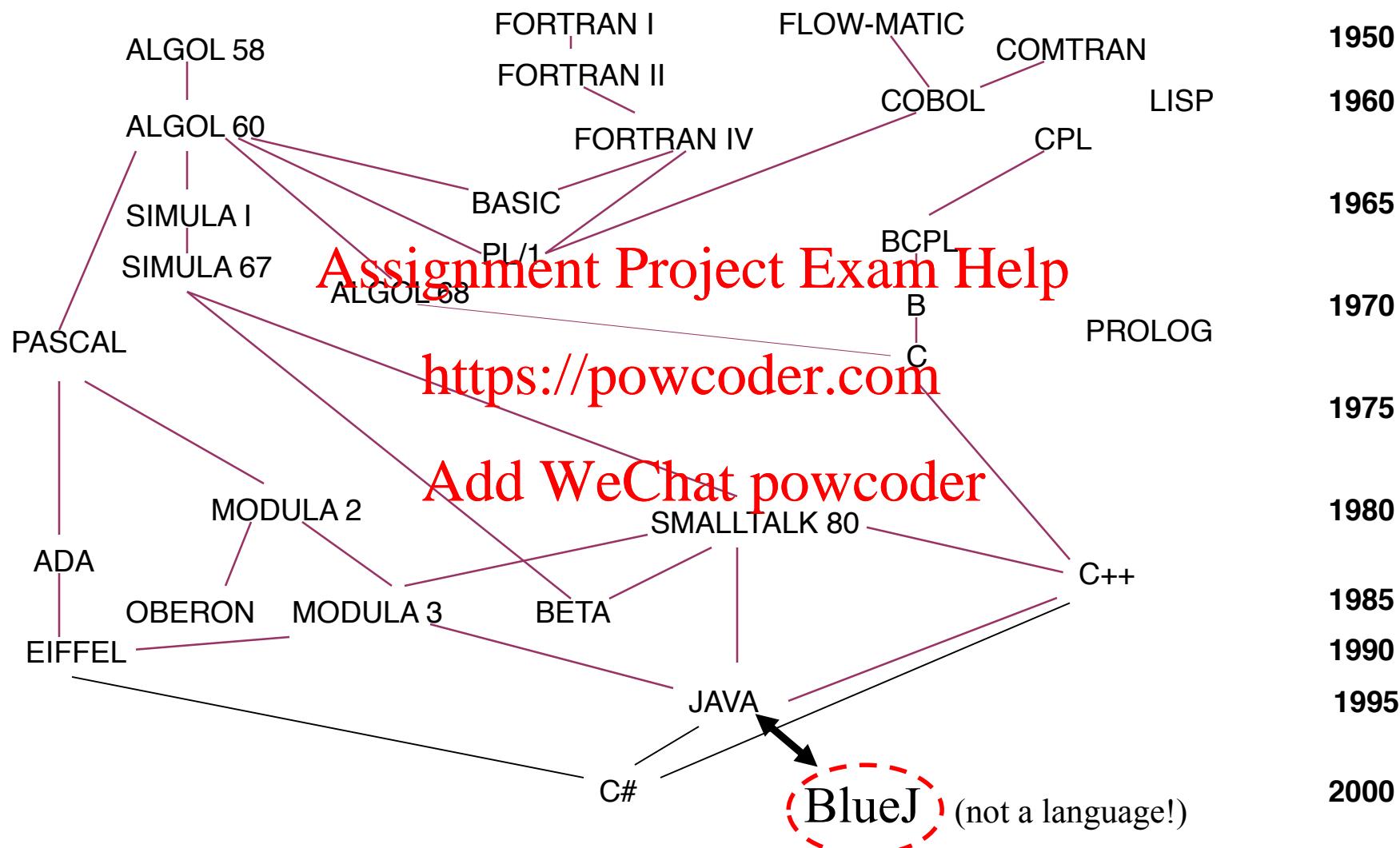
Output



# *History of programming languages*



# Language history





# *Different programming languages*

Low-level

**Machine code**

- 000 100C
- 006 300D
- 007 200D
- 100
- 110

**Assembler**

- LDA VALUE
- ADA TOTAL
- STA TOTAL
- DW1 TOTAL
- DW1 VALUE

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<https://powcoder.com>

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High-level

**COBOL**

ADD VALUE TO TOTAL  
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**FORTRAN**

TOTAL = TOTAL + VALUE

**LISP**

(set! total (+ total value))

**Pascal**

total := total + value

**Java**

total += value;

# Program translation

- a program written in a high-level language (such as Java) must be translated into machine code before the computer can run it (i.e. *execute* the instructions). This is because a computer can really only understand machine code.  
<https://powcoder.com>
- the translation is typically done by a process called a *compilation*. There is another similar process called *interpretation* which is also used to translate a program.

# Compiler vs. interpreter

The main difference between a *compiler* and an *interpreter*:

- a compiler attempts to translate an entire program at once, and gives a list of the problems it found (<https://powcoder.com>) in the end. This is usually a *batch* process.  
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- an interpreter, on the other hand, translates one instruction at a time and causes that instruction to be executed immediately. This is usually an *interactive* process.

# *Program translation*

**Source code**  
written in  
high-level  
language  
(eg. Pascal,  
C++, Java)

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<https://powcoder.com>

translators  
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(compilers,  
interpreters)

**Executable**  
code in  
binary  
(10110....)



# Java program translation

Program translation in Java involves two phases:

1. Java source code is (typically) *compiled* to something called *bytecodes*.  
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2. The bytecodes are then *interpreted* to machine code by a *Java Virtual Machine* (JVM).

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<https://powcoder.com>

The Java Virtual Machine is just a piece of software.

Each type of machine (e.g. PC, Mac) has its own Java Virtual Machine to convert bytecode to the native machine code.

# Java program translation

“machine-neutral”

**Source code  
written in  
Java**

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**Java compiler**  
<https://powcoder.com>

**Java**

by  
**(21416....)**

“machine-dependent”

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**Executable  
code in  
binary  
(10110.....)**

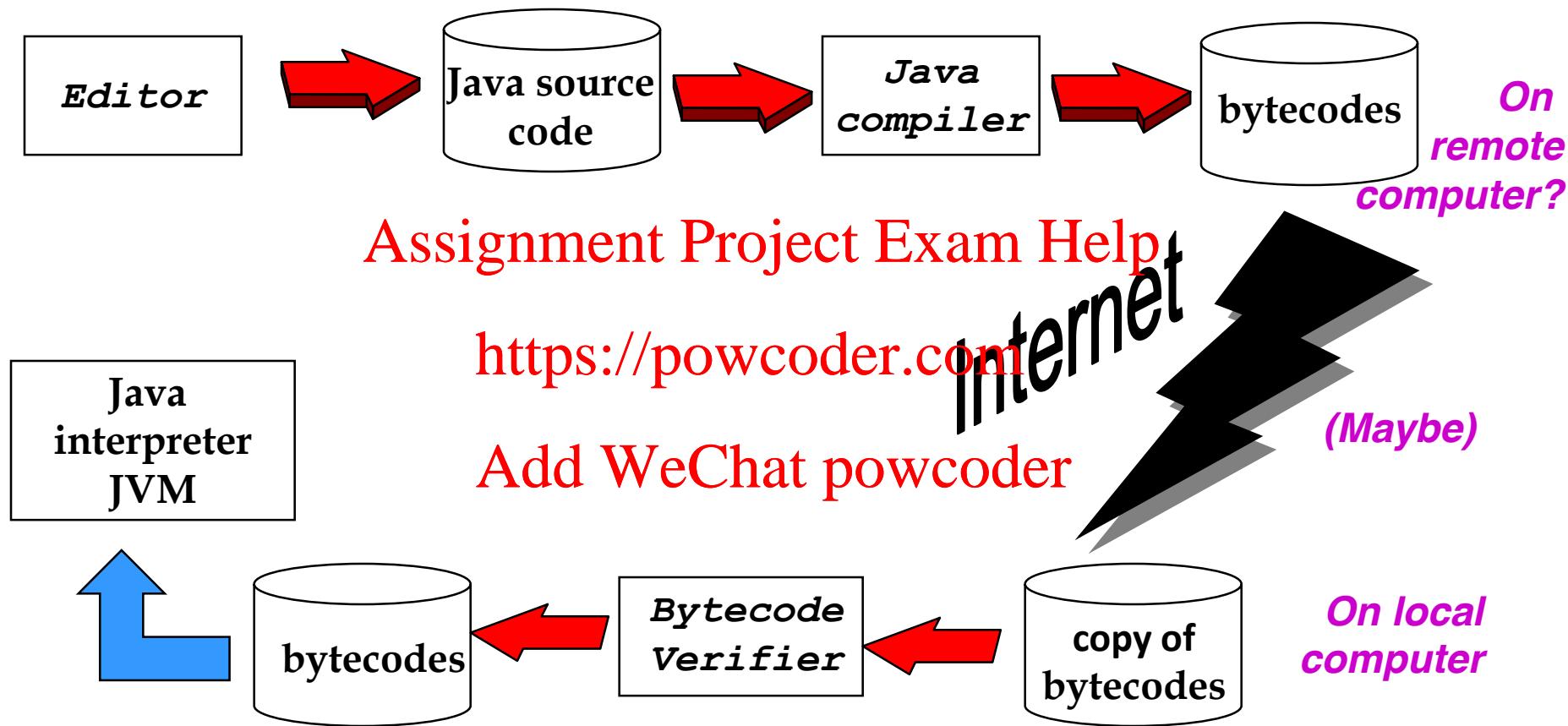
**Java  
interpreter  
(Java Virtual  
Machine)**



# Java : write once, run anywhere!

- Java programs are able to run on any kind of computer when downloaded from the Web.
- With ~~Assignment Project Exam Help~~ downloading source code for the program and having a compiler translate it into the machine code for your machine. The user would have to tell the ~~Add WeChat powcoder~~ source code before running the program.
- Java uses *bytecodes* to solve this problem.

# Executing a Java program



# A computer program (in Java)

```
public class InterestCalculator
{
    private int interestRate;
    private int balance;
    private int interest;
```

Assignment Project Exam Help  
public InterestCalculator()  
{  
 interestRate = 5;  
 balance = 1000;  
}  
  
public void calculateInterest()  
{  
 interest = balance \* interestRate / 100;  
}

```
}
```



# Java and BlueJ

In FIT9131 this semester we will learn Java using the *BlueJ* development environment. BlueJ was designed for teaching introductory object-oriented programming in Java. It provides:

- a full Java development environment
- visualisation of classes and objects
- an *editor*
- an *inspector* <https://powcoder.com>
- a *debugger*

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Both Java and BlueJ are free. You will be given instructions about how to use them in the computer labs and at home.

# Programming paradigms

There are several different *styles* of writing computer programs. These are called “*paradigms*”. Some common paradigms are: *procedural, functional, logic, object-oriented, and event-driven*. Different languages typically use different paradigms, to solve different kinds of problems. Some programming languages can use more than one paradigm.

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Java uses the *object-oriented* paradigm. This means that the basic building blocks of a program in Java are *objects* and *classes*.



# *Object-oriented programs*

The *object-oriented (OO)* programming paradigm uses *objects* to model a situation. A program can be written in a non-object-oriented way, but the object-oriented style is increasingly popular for three main reasons:

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- programs are becoming more and more complex, and the OO style handles this best
- the OO style makes it easy to re-use existing programs or parts of programs
- the OO style makes programs much easier to maintain

# Objects

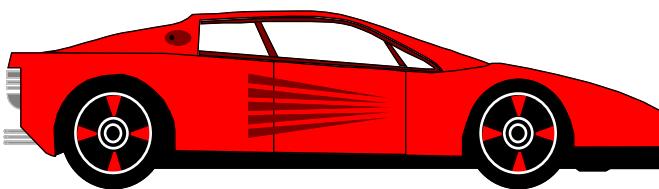
We are all familiar with the idea of an object in everyday life. We are surrounded by them: cars, books, people, houses, cats, etc.

Objects have *attributes*, e.g. colour, size, age, name.

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Objects also have *behaviour*. They can *do* things, e.g. grow, breathe, run, stop.

<https://powcoder.com>



# Attributes and Behaviour

Eg :

	Attributes	Behaviour
Car	Registration number Manufacturer Model Year Colour	Start Stop Turn Accelerate
Cat	Name Breed Colour Age Weight Registration number	Sleep Eat Purr Climb Scratch

# Classification

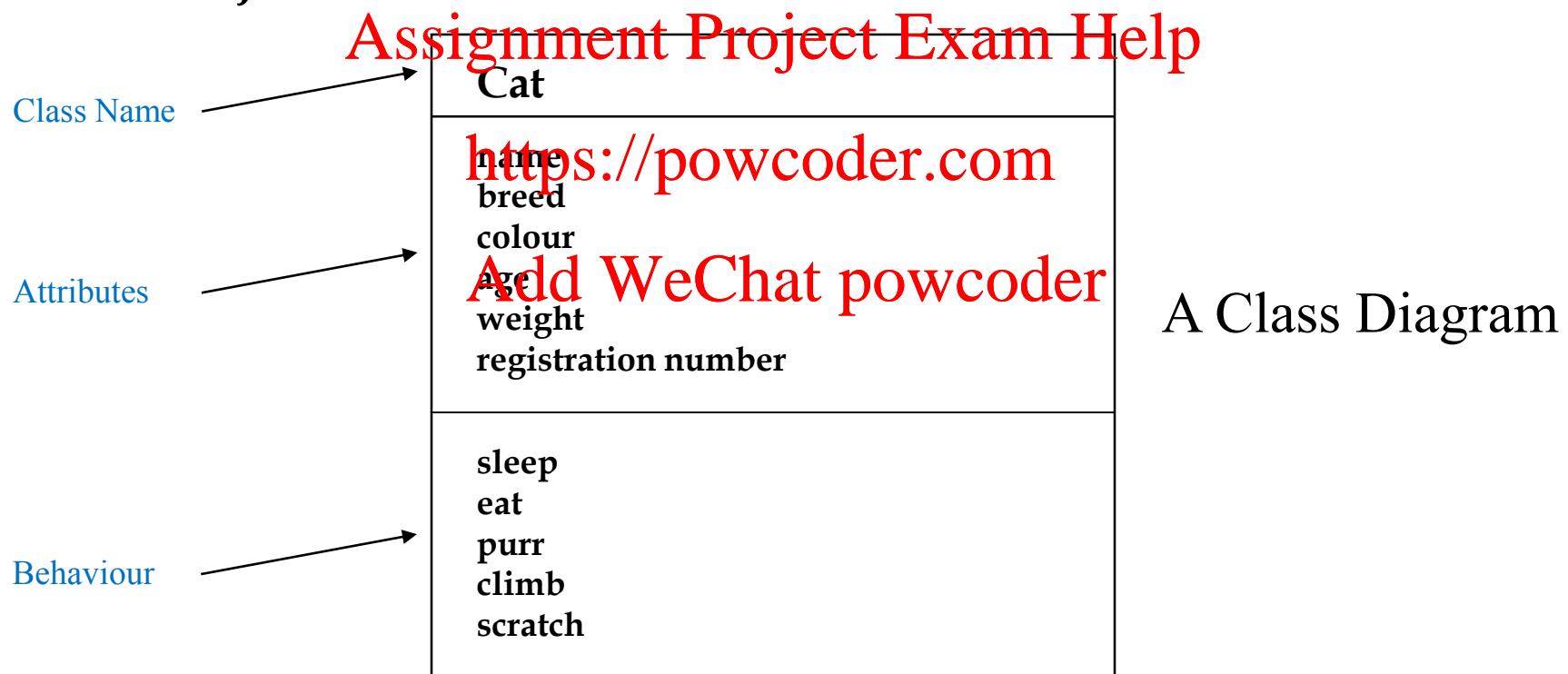
We can classify objects into groups according to their common attributes and behaviour.

Let's say we want to classify objects into cats and non-cats. What are the common attributes and behaviour of something we would classify as a cat? How would you recognise a cat if you saw one?



# Classes

In a computer program, we use *classes* to describe a group of similar objects. A *class* is a description of what an object would look like if we had one. It is based on common attributes and behaviour of objects.



# Instances of classes

A class is a *template* or *pattern* from which many objects can be created. It is a description of an object.

Each object created from a class is called an *instance* or an *object* of that class. This process is called *instantiation*.

We can have *multiple instances* (*objects*) of the same class. Each object has the same attributes and the same behaviour. However, the values of the attributes might be different.



# *State of an object*

The *state* of a particular object is the values of its attributes at any particular moment. For example, a cat might have the following state:

Name: Stimpy

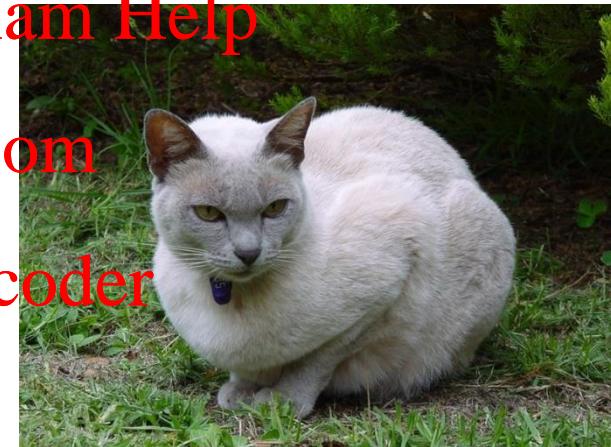
Breed: Burmese

Colour: Lilac

Age: 11 years, 4 months, 8 days

Weight: 3.6 kg

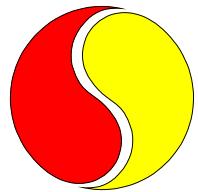
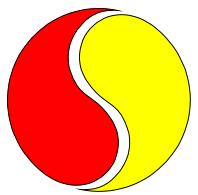
Registration number: 213



Some of these attributes change constantly. Others stay the same for long periods, or forever.

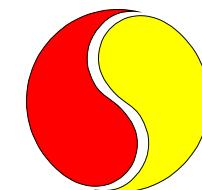
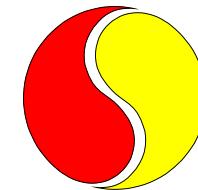
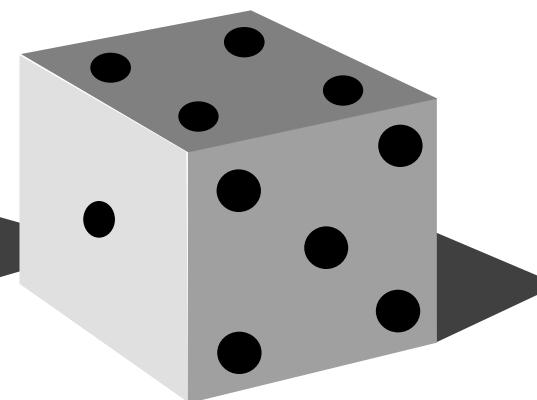
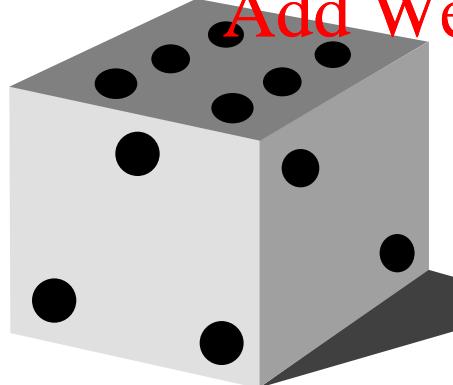
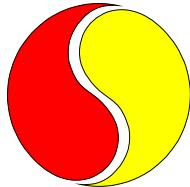
# Identity of an object

We can have several different objects that have the same attributes and behaviour (ie. the same state) but are still different objects.



An object ~~Assignment Project Exam Help~~. We can give it a name to distinguish it from the others (e.g. ball1, ball2).  
<https://powcoder.com>

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# Making something happen

If you have an existing class, in order to make something happen, you need to:

1. Create an object of that class.  
<https://powcoder.com>
2. Ask that object to do something that it knows how to. Add WeChat powcoder

You will experiment with doing this in *BlueJ* during the tutorial sessions.