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# Programming Applications and Programming Languages

M30235
TB1&2

University of Portsmouth
BSc Computer Science
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# Contents

# Lecture - Introduction

14:00 22/01/24 Jiacheng Tan

- No content from TB1 is assessed as part of TB2

# Lecture - Introduction to Programming Languages

14:00 22/01/24 Jiacheng Tan

Since there are many different types of application, there are also many types of programming language. The main programming domains are as follows

- Scientific (e.g. ForTran)
- Business (e.g. COBOL)
- AI (e.g. LISP)
- Systems Programming (e.g. C, C++)
- Web Software (e.g. HTML, JavaScript)

## Language Categories

There are several ways to categorise programming languages, such as by uses, paradigms, abstraction level, etc

### Machine Languages

- Machine languages directly run on the hardware, using the instruction set of the processor
- Machine code is usually written in hexadecimal as this is a more efficient way of displaying the binary which represent the instructions
- It is very hard for programmers to directly write machine code, as it is not easy to remember instructions and it lacks features such as jump targets, subroutines, etc

### Assembly Languages

- A slight abstraction over machine languages
- Each instruction is replaced with an alphanumeric symbol which is easier for programmers to remember and understand
- They also include features such as subroutines, jump targets, etc which make it much easier to create complex programs

### System Programming Languages

- More abstracted from machine languages, but you are still concerned with low-level functions such as memory management
- Used to create operating systems, and for embedded applications where low system requirements do not allow the use of high-level languages

### High Level Languages

- Languages that are machine-independant (are not written directly in machine code, and are therefore portable between CPU architectures)
- Need to be compiled or otherwise translated from text to machine code before they can be run

### Scripting Languages

- Used to create programs which perform a single, simple task
- Thses are used for system administration
- Usually interpreted languages
- More akin to pseudocode than other programming languages

### Domain-Specific Languages

- Some languages are designed to perform a specific task much more efficiently
- The specific purpose could be just about anything, but are specific to that task and either cannot be used otherwise or are not well suited for it

## Programming Paradigms

There are several different paradigms which are used in programming

- Procedural
  - Most programming languages are procedural
  - A program is made up of one or more routines which are run in a specific order
- Functional
  - Applies mathematical functions to inputs to get a result
  - Useful for data processing applications such as data analysis or big data
- Logical

There are also two major types of programming languages, which are designed for different purposes

- Imperative Languages
  - Programs are defined as a sequence of commands for the computer to perform
  - Like a recipe for exactly how to get the desired output
- Declarative Languages
  - Programs describe the desired results without actually specifiying how the program should complete the task
  - Functional and logical programming langauges are examples of this