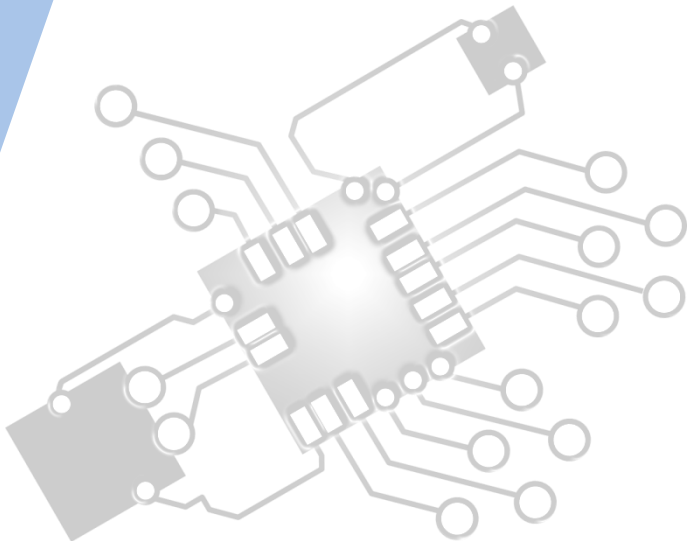




Abstract Data Structures

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



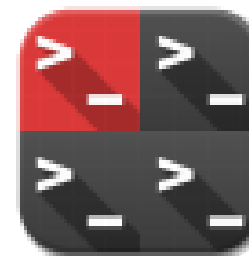
5: Abstract data structures



6: Resource management



7: Control



D: OOP

HL *only* 5 Overview

Thinking recursively

- 5.1.1 Identify a situation that requires the use of recursive thinking
- 5.1.2 Identify recursive thinking in a specified problem solution
- 5.1.3 Trace a recursive algorithm to express a solution to a problem

Abstract data structures

- 5.1.4 Describe the characteristics of a two-dimensional array
- 5.1.5 Construct algorithms using two-dimensional arrays
- 5.1.6 Describe the characteristics and applications of a stack
- 5.1.7 Construct algorithms using the access methods of a stack
- 5.1.8 Describe the characteristics and applications of a queue
- 5.1.9 Construct algorithms using the access methods of a queue
- 5.1.10 Explain the use of arrays as static stacks and queues

Linked lists

- 5.1.11 Describe the features and characteristics of a dynamic data structure
- 5.1.12 Describe how linked lists operate logically
- 5.1.13 Sketch linked lists (single, double and circular)

Trees

- 5.1.14 Describe how trees operate logically (both binary and non-binary)
- 5.1.15 Define the terms: parent, left-child, right-child, subtree, root and leaf
- 5.1.16 State the result of inorder, postorder and preorder tree traversal
- 5.1.17 Sketch binary trees

Applications

- 5.1.18 Define the term dynamic data structure
- 5.1.19 Compare the use of static and dynamic data structures
- 5.1.20 Suggest a suitable structure for a given situation



1: System design

2: Computer Organisation



3: Networks

4: Computational thinking



5: Abstract data structures

6: Resource management

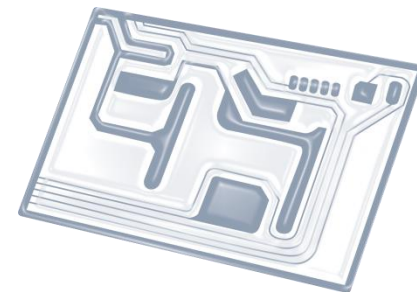


7: Control

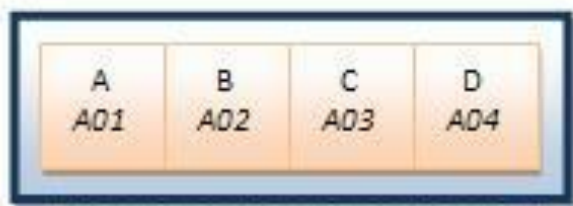
D: OOP



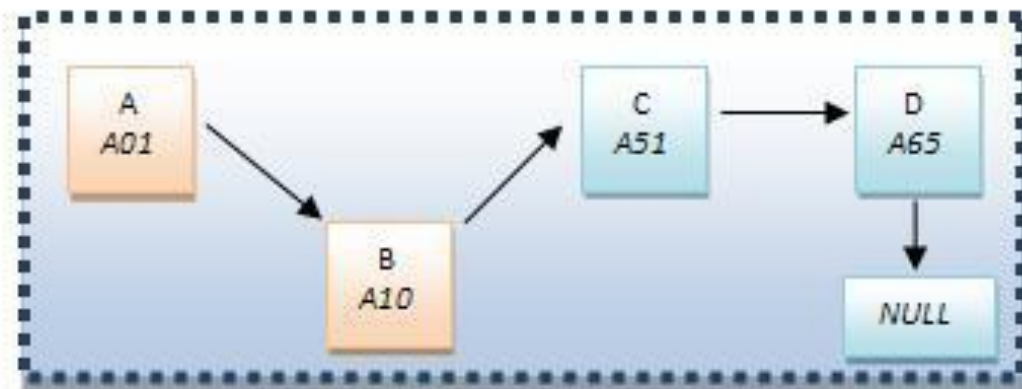
Topic 5.1.18



Define the term: **dynamic data structure**



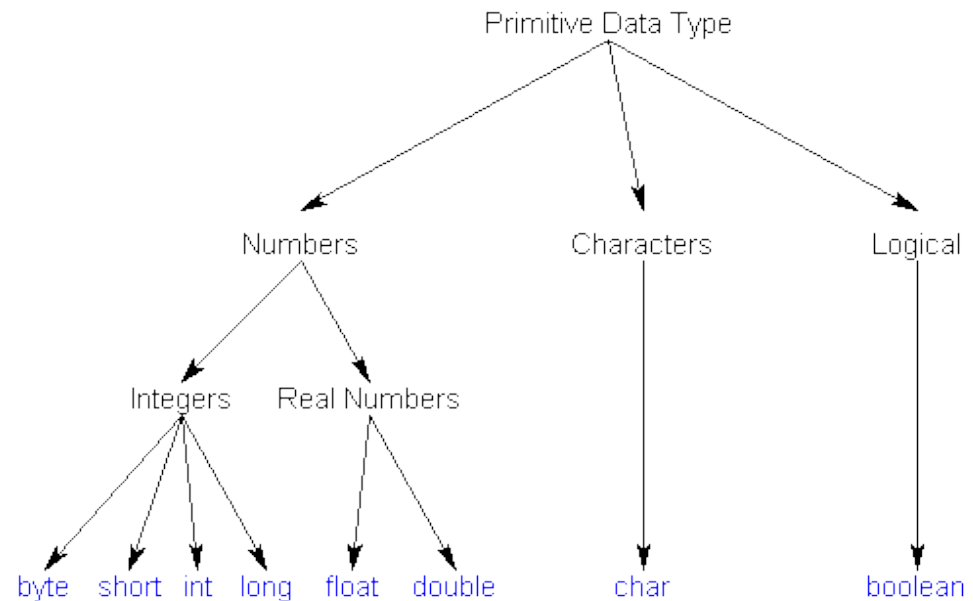
Static Data Structure



Dynamic Data Structure

Abstract Data Structures (ADTs)

- 2D array
- **Stack**
- **Queue**
- **Linked List**
- **(Binary) Tree**
- Recursion



Dynamic data structures

- These data structures can **change size** during the execution of a program
- Dynamic data structures **grow and shrink** as required by the program
- The size of the structure is determined during run-time
- They are a very **efficient use** of memory space