10: Data Structures

Property

Collections

📖 Group of items that we want to treat as a conceptual unit. (can be homogeneous or heterogeneous)

1. Linear Collection (ordered by position)
2. Heirarchial Collection (upside down tree)
3. Graph Collection
4. Unordered Collection (discrete nodes)

Operations include: Traversal, Search, Insertion, Removal, Length

Abstract Data Types

📖 Class of objects whose logical behavior is defined by a set of values and a set of operations.

Array: Sequence of items of the same data type (homogeneous)

1. Static Allocation of Memory (Array)

   📖 Determined at compile time, once allocated cannot be changed (constant)

2. Dynamic Allocation of Memory (Linked Structure)

📖 Done during program execution, memory allocated can be changed dynamically

Stack Application: Evaluating Arithmetic Expressions

1. Infix Form (34 + 22)
2. Postfix Form (34 22 +)

📖 Whenever you encounter an operator, evaluate the preceding 2 terms with the operator. Repeat.

Stack Application: Memory Management

📖 When a function is called, an **activation record** (stack frame) is created to store the **current environment** for that function. (parameters, variables, return address and return value)

Note: this is called a **run-time stack*

This is beneficial because: the control can return to the next instruction when the function finishes execution.