

Abstract Data Types

CS 272 Software Development

Abstract Data Types

Array Fixed-size sequence of elements

List Sequence of elements

Set Unique collection of elements

Map Unique keys paired to values

Basic Properties

- All **sequences** have an index (or position, offset)
- All of these are **finite** and have a size (or length)
- All of these store elements of the **same type***
- All are **abstract data types** (speed of operations depend on the specific implementation)



Arrays

- Stores a **sequence** of elements
 - Each element has an associated index
- Allows **duplicate** elements of same type
- Size is **fixed** and may NOT change after initialization
- Often implies sequential **memory** allocation



Lists

- Stores a **sequence** of elements
 - Each element has an associated index
- Allows **duplicate** elements of same type
- Size **flexible** and MAY grow or shrink after initialization
- Usually **slower** than arrays



Sets

- Stores a **collection** of elements
 - No indices, but still has a size
- Stores **unique** elements of same type
- Size **flexible** and MAY grow or shrink after initialization
- Usually **faster** at finding or searching than lists



Maps

- Stores a **collection** of key, value pairs
 - No indices, but still has a size
- Stores **unique** key elements
- Allows **duplicate** value elements
- Size **flexible** and MAY grow or shrink after initialization

Size and the Three Fs

- **Fixed** means its size cannot change after initialized
- **Flexible** means its size can change (shrink or grow)
- **Finite** means it has a size or length (not infinite size)

Summary

Type	Index	Size	Unique	Other
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Summary

Type	Index	Size	Unique	Other
Array	Yes	Fixed	No	Lower-level type
List	Yes	Flexible	No	Searching is slow
Set	No	Flexible	Yes	Searching is fast
Map	No	Flexible	Keys	Maps (key, value) pairs



Questions?

