Abstract Data Types

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Abstract Data Types

Array   Fixed-size sequence of elements

List   Sequence of elements

Set   Unique collection of elements

Map   Unique keys paired to values

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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)

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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

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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

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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

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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

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Size and the Three Fs

- **Fixed**   means its size cannot change after initialized

- **Flexible**   means it 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

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Questions?

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