Data Structures

Basic Types

Sophie Engle ◆ sjengle@cs.usfca.edu
Department of Computer Science

Basic Types

- **Array**

- **List**

- **Set**

- **Map**

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Sophie Engle ⬥ sjengle@cs.usfca.edu
Department of Computer Science

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Basic 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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Department of Computer Science

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Basic Properties

- All **sequences** have an index/position/offset

- All are of **finite**; have a size/length property

- All store elements of the **same type***

- All **abstract data types**; speed of operations dependent on specific implementation

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Sophie Engle ◆ sjengle@cs.usfca.edu
Department of Computer Science

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Arrays

- Stores a **sequence** of elements
  - Each element has an associated index

- Allows **duplicate** elements of same type

- Size may **NOT** change after initialization

- Often implies sequential **memory** allocation

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Department of Computer Science

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Lists

- Stores a **sequence** of elements
  - Each element has an associated index

- Allows **duplicate** elements of same type

- Size **MAY** grow or shrink after initialization

- More **flexible** but slightly slower than arrays

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Department of Computer Science

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Sets

- Stores a **collection** of elements
  – No indices, but still has a size

- Stores **unique** elements of same type

- Size **MAY** grow or shrink after initialization

- Usually **faster** at 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 **MAY** grow or shrink after initialization

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Department of Computer Science

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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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