CMSC 132: OBJECT-ORIENTED PROGRAMMING II

Collections

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Collection

- Programs represent and manipulate abstractions (chunks of information)
  - **Examples:** roster of students, deck of cards
- One of the most universal abstractions is a collection
  - Represents an aggregation of multiple objects
  - Plus, perhaps, a relation between elements
  - **Examples:** list, set, ordered set, map, array, tree
  - Supporting different operations

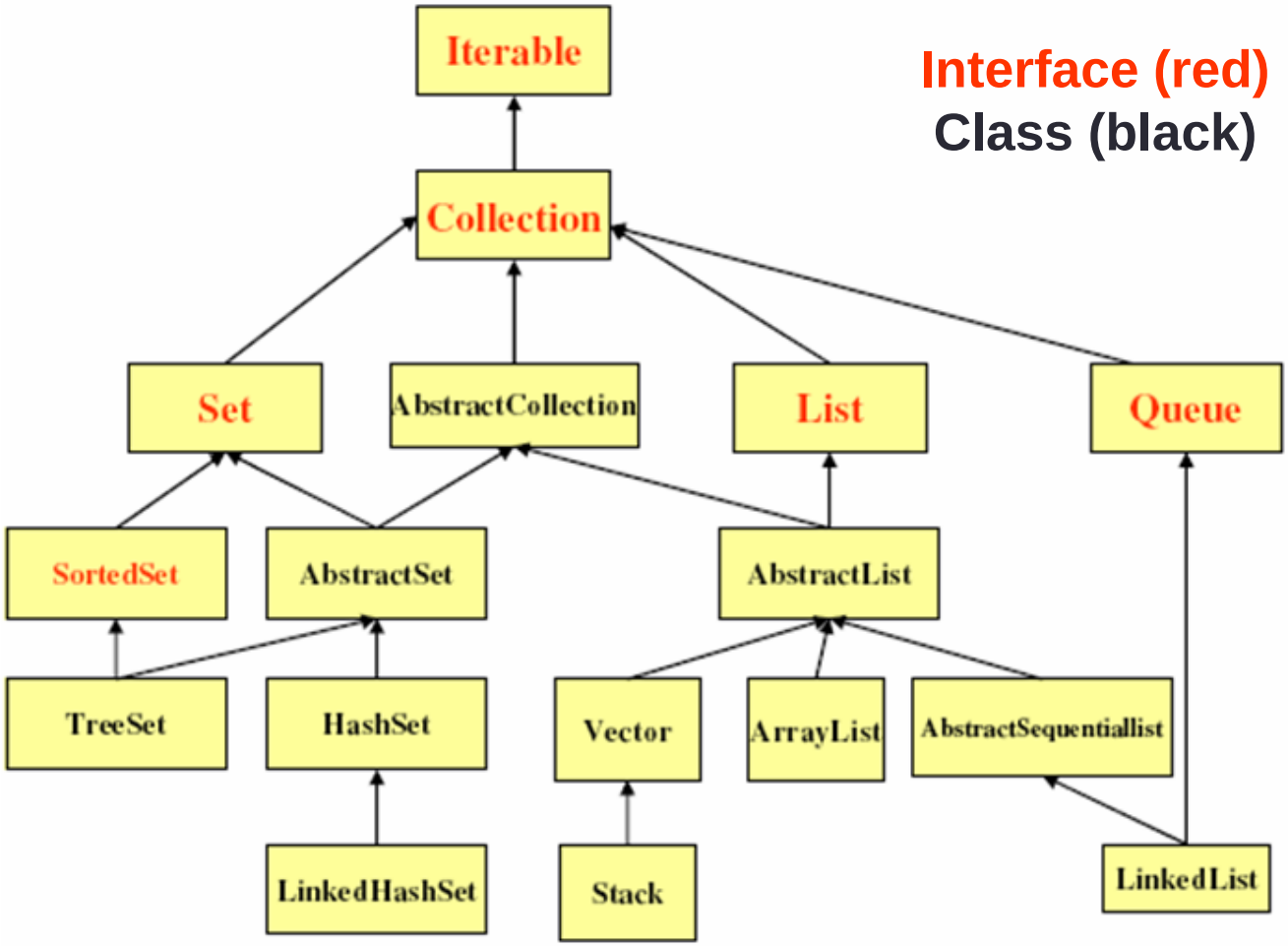
Data Structures

- **Data structure**
  - A way of representing & storing information
- **Choice of data structure affects**
  - Abstractions supported
  - Amount of storage required
  - Which operations can be efficiently performed
- Collections may be implemented using many different data structures

Java Collection Framework (JCF)

- Java provides several interfaces and classes for manipulating & organizing data
  - Example: List, Set, Map interfaces
- Java Collection Framework consists of
  - Interfaces
    - Abstract data types
  - Implementations
    - Reusable data structures
  - Algorithms
    - Reusable functionality

Collection Hierarchy



Collection Interface

- https://docs.oracle.com/en/java/javase/11/docs/api/java.base/java/util/Collection.html
- Core operations
  - Add element
  - Remove element
  - Determine size (# of elements)
  - Iterate through all elements
- Additional operations supported by some collections
  - Find first element
  - Find k^{th} element
  - Find largest element
  - Sort elements
- Collection vs. Collections
  - Collections is a class