Java interview preparation

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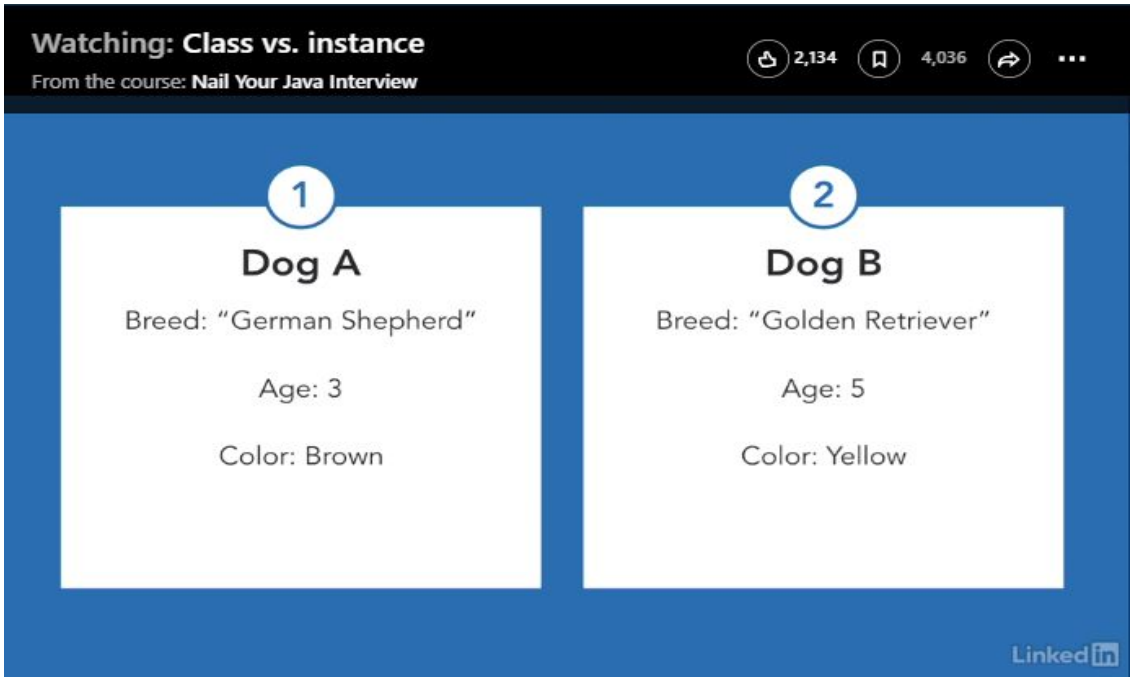
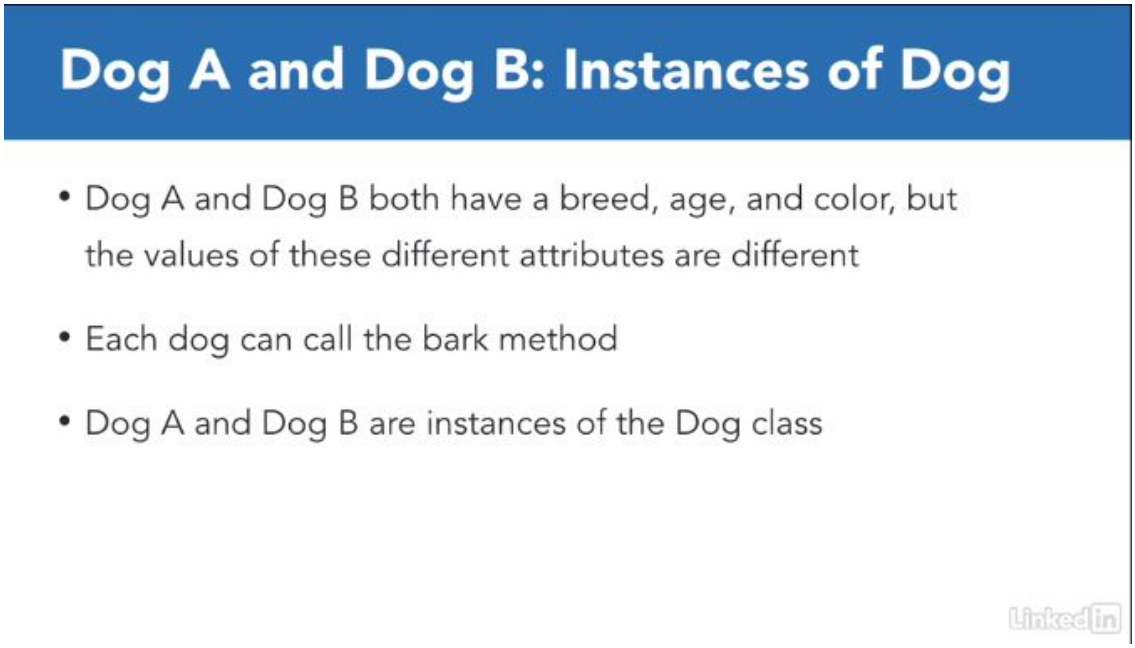
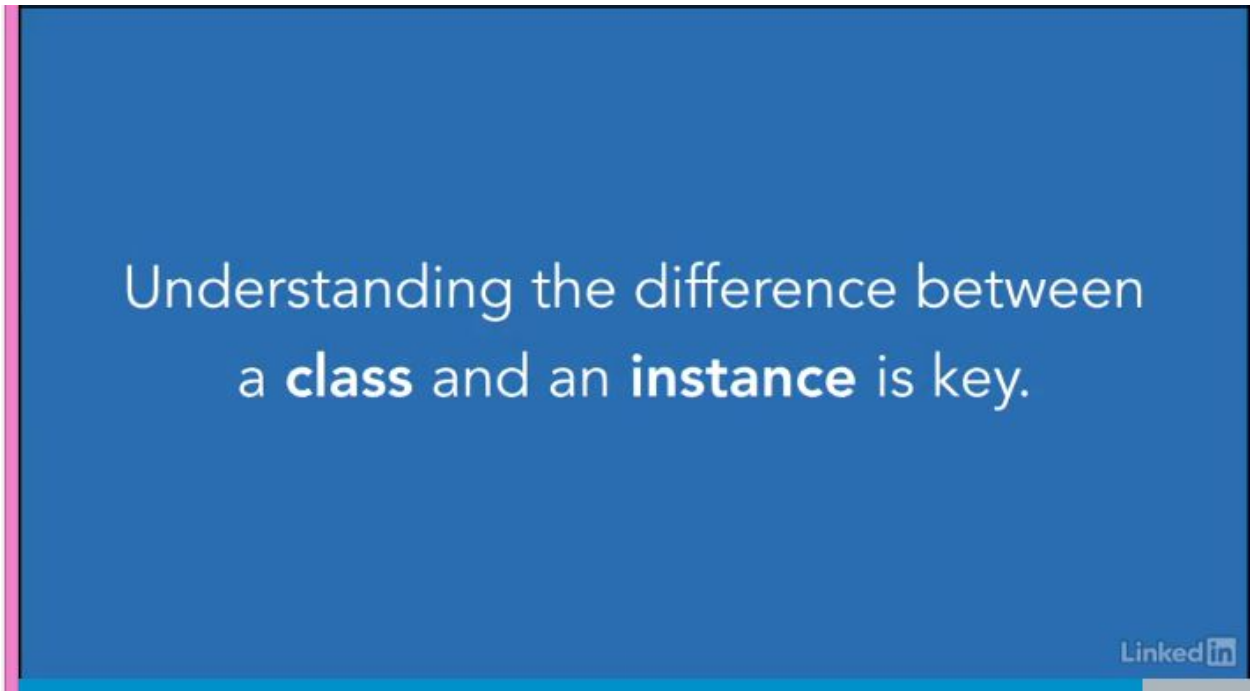
Classes vs Instances
Classes are blueprints

Class dog
Attributes :String bread,Int age,String color
Methods:Bark()







Static and Non Static methods

Static vs. Nonstatic Methods

Static method

- Class method
- Belongs to the class itself
- Do not need an instance in order to use a static method
- Method depends on class

Nonstatic method

- Instance method
- Belongs to each object generated from the class
- Need an instance to use
- Method depends on individual characteristics of the object

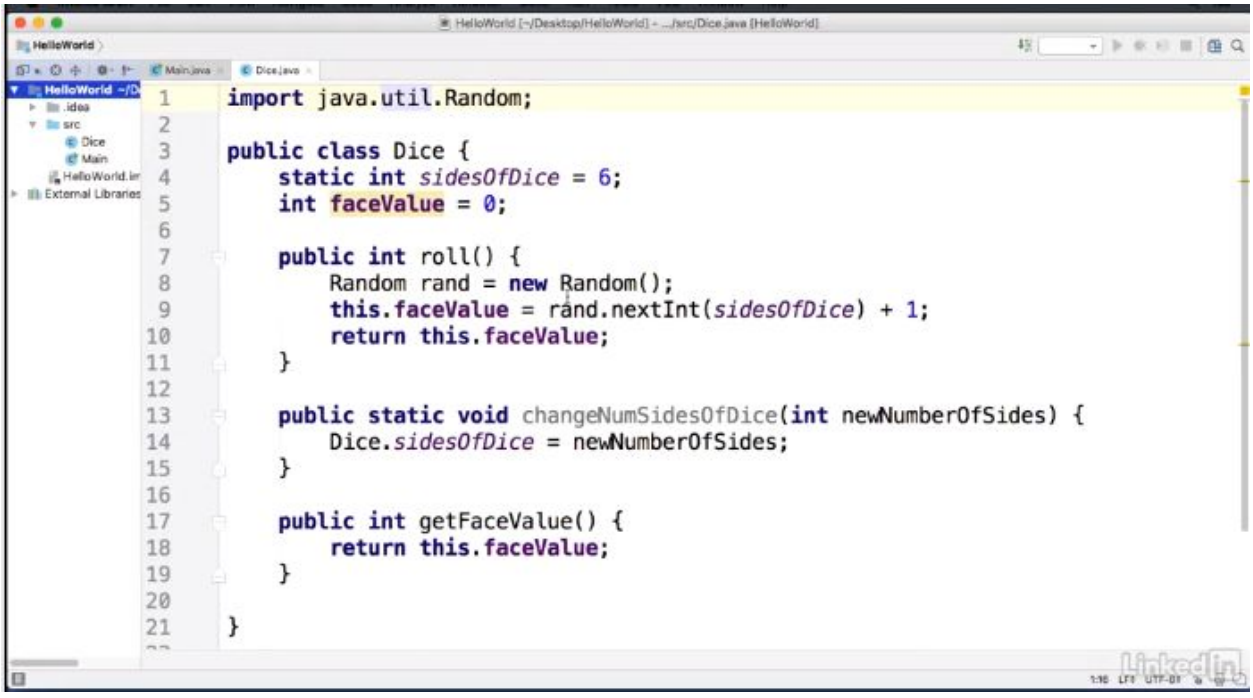
When to Use Nonstatic Methods

- Nonstatic methods can access nonstatic and static variables
- If your method is related to an object's attributes, it should be nonstatic

When to Use Static Methods

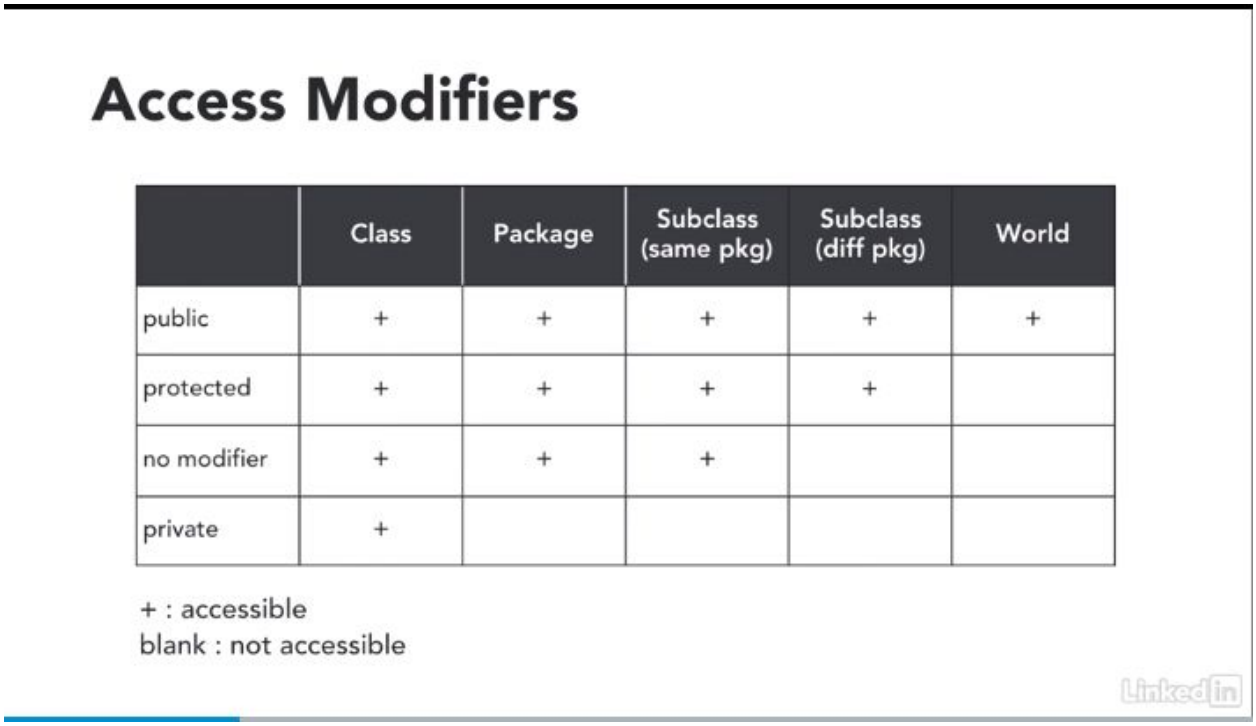
- If you want to use a method without creating an instance of the class, static methods are the way to go
- Static methods can only access class variables

Example



Access Modifiers

Access modifiers determine how certain variables and methods can be accessed



String manipulation in Java

String: A Definition

- A string is comprised of a set of characters, including letters, numbers, and spaces
- String s = "abc";
- String name = "Shelly Parker";
- String identifier = "19Y7W248E"

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String Literals

- String A = "abc";
- String B = "abc";
- Live in string constant pool
- Strings A and B reference the same object and value

2

String Objects

- String A = new String("abc");
- String B = new String("abc");
- Live in the heap
- String A and B reference two separate objects

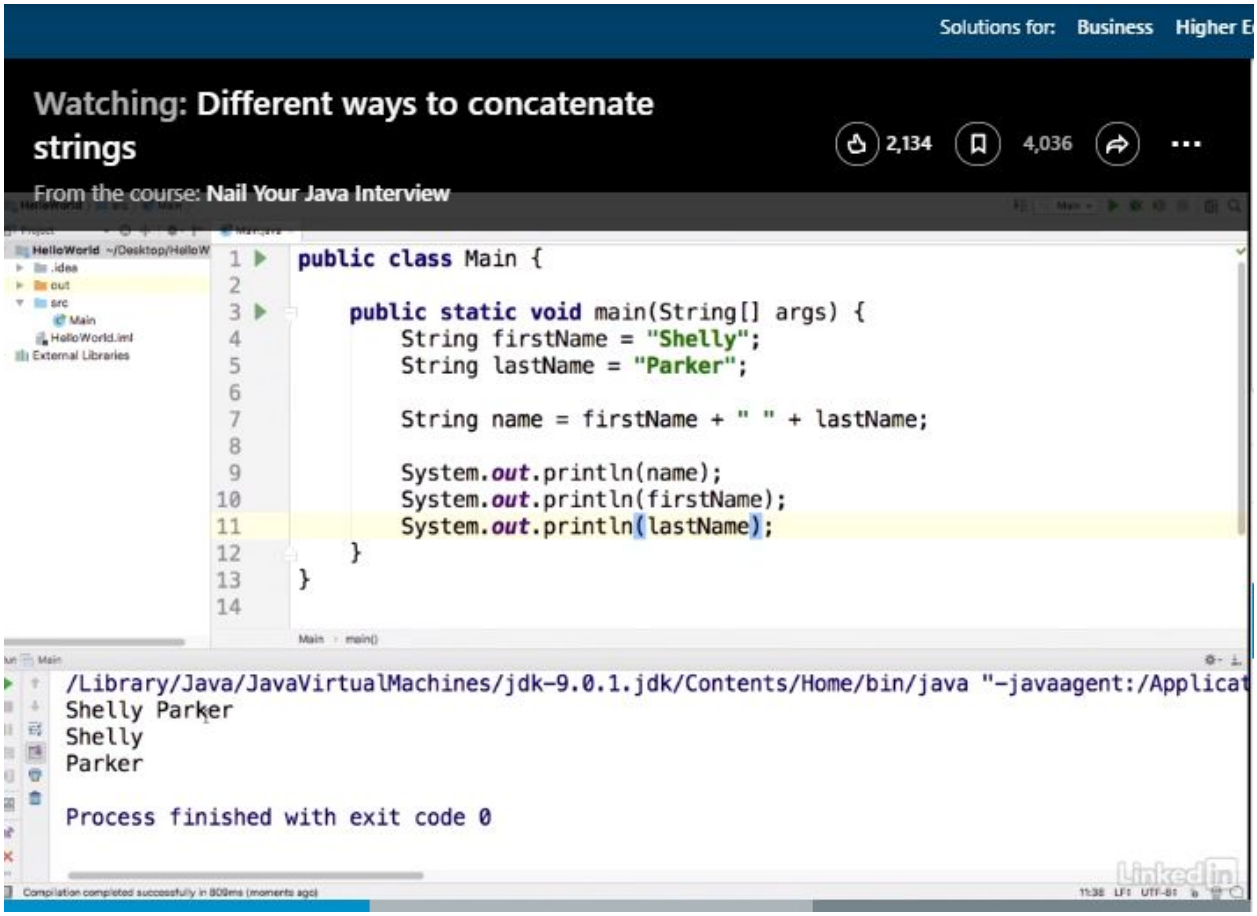
Create string literals rather than string objects.

If String A and String B have the same content, then it is nice to just have one place where it is stored (**string literals**) rather than multiple (**string objects**).

Important Facts about Strings

- Strings are immutable in Java
- Classes like StringBuilder and StringBuffer allow you to make string-like objects that are mutable
- StringBuffer is thread-safe because it has synchronized methods

Different ways to concatenate Strings



Data Structure
Array

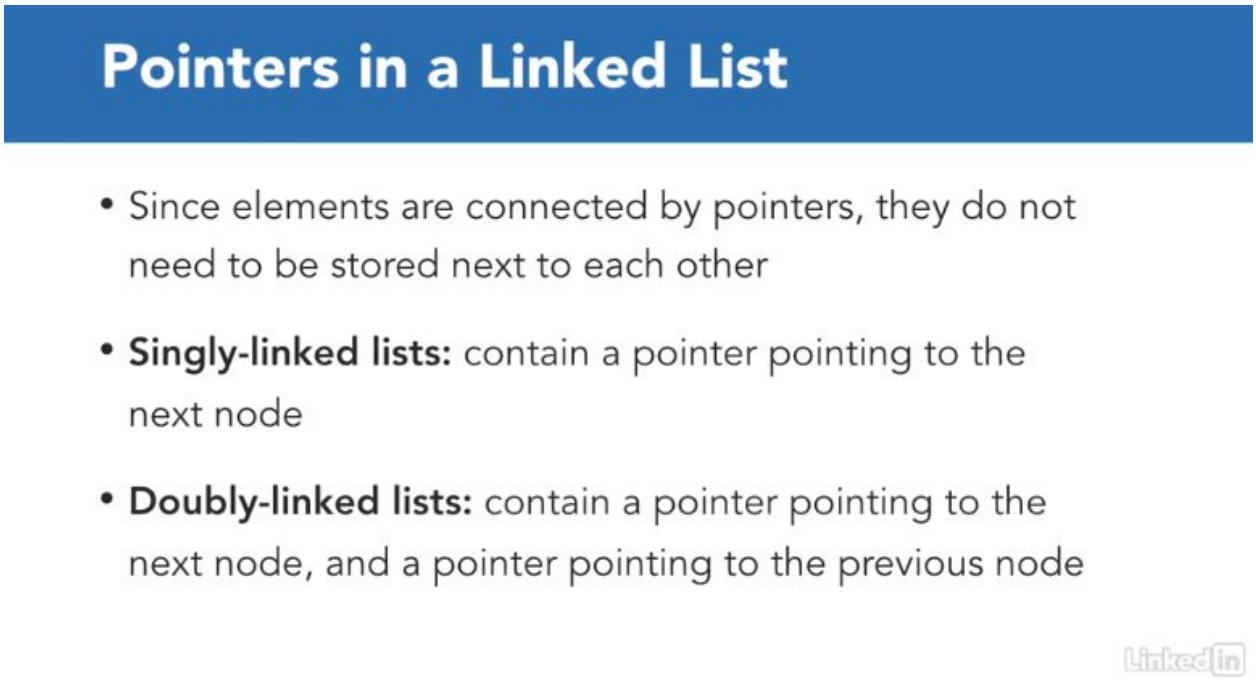
What Is an Array?

- A collection of objects of the same data type
- Size cannot be changed after allocation since items are stored contiguously
- Access items by index, starting at 0
- Ability to add and remove objects from an array

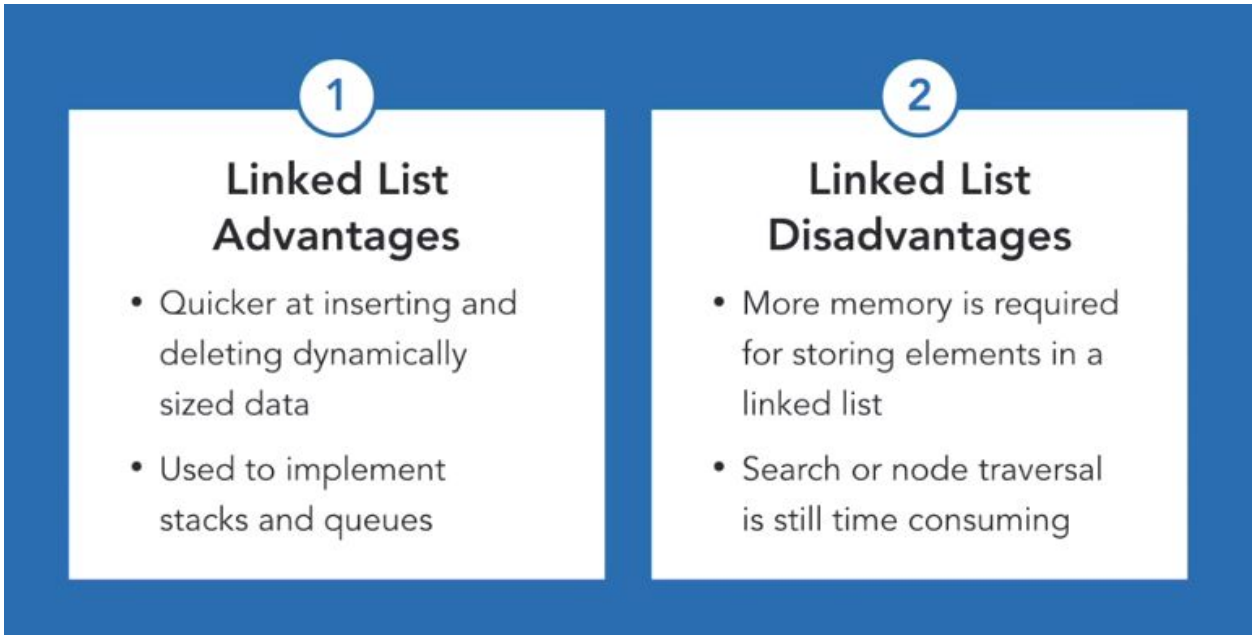
How to use Linked list

What Is a Linked List?

- A linear data structure where elements containing data of the same type are linked using pointers
- Each item in the linked list is called a node
- A node contains data, as well as a pointer pointing to the next element in the linked list
- If a next pointer is null, then it is the last item in the list



Pointers in a List



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How to use Queue

What Is a Queue?

- An ordered list of objects where elements are inserted (enqueued) at the end of the queue, and removed (dequeued) from the beginning of the queue
- First in first out —> FIFO

Queue Interface in Java

- java.util.Queue interface
- You must instantiate a concrete implementation of the interface in order to use it
- Linked list is the standard queue implementation

Using Queues

- Good for storing order of processes
- Enqueue/dequeue takes very little time
- Only advantageous to use this data structure when you want to use it in a manner where the first item in is the first item out

How to use stack

Using Stacks

- A stack is an ordered list of objects that are inserted and removed following a last-in-first-out (LIFO) policy
- Insert items with a push() method
- Delete items with a pop() method

A stack is an ordered list of objects inserted and removed following a last-in-first-out (LIFO) policy.

Why Use Stacks

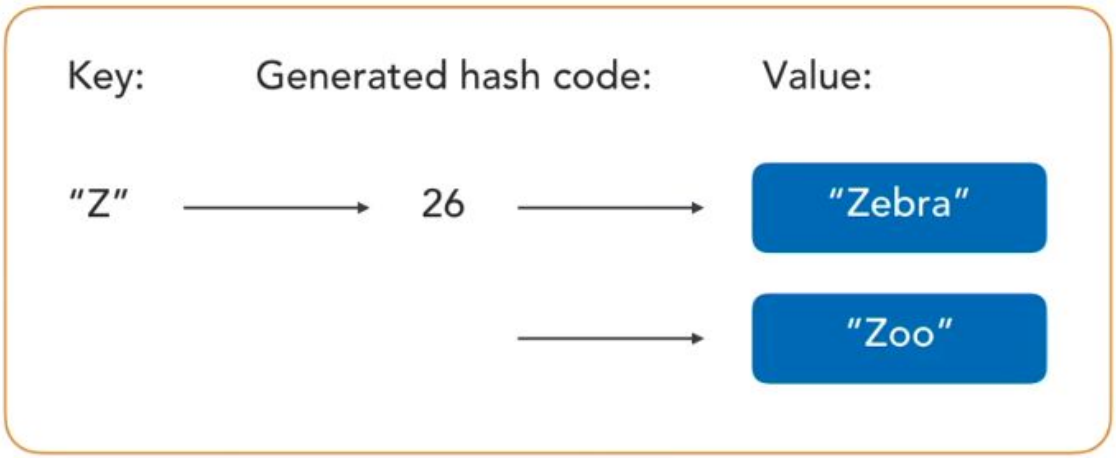
- Great for reversing things
- Imagine pushing all the characters from a string onto a stack—if we pop them all off and create a resulting string, this resulting string has the reversed characters of the original string

Hash Map

What are Hash Maps?

- **Hash maps** use key-value pairs and a hashing function to store and organize their data
- A **hashing function** maps a key or object to a specific hash
- This **hash** determines where the object is stored
- As long as you have the key, retrieving the object is fast

How Hashmaps Work: Hash Collisions



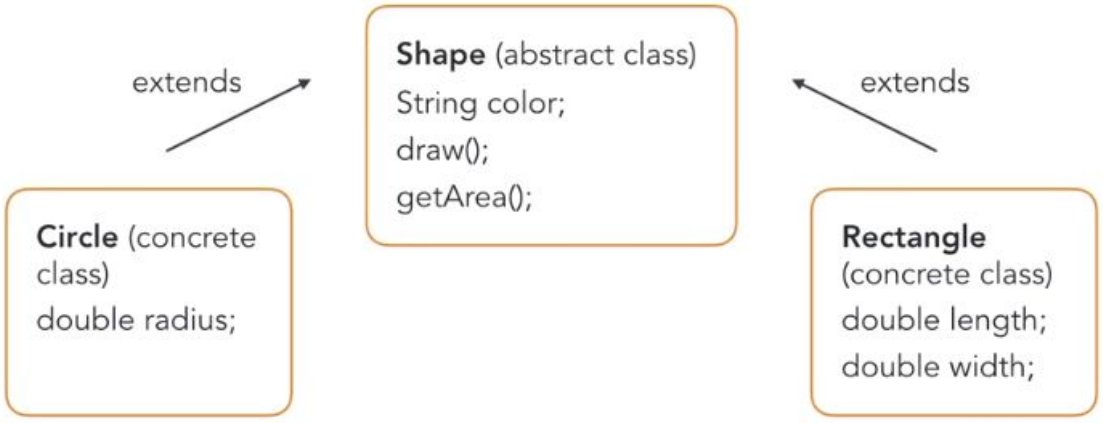
Searching is faster with a hash map, but a hash map takes up more space.

Abstract

What Is Abstraction?

- Abstraction hides implementation complexity so we can achieve generalization
- All the user needs to know is an example, input, out, and a broad description of what the function does—this allows the function to be used for multiple purposes
- Consider pressing the gas pedal on a car…

Abstraction Example



Why Use Abstraction?

- Abstraction allows only essential details to be displayed to the user so that the feature can be used in more ways rather than in one super specific way
- It also lets you focus on the required characteristics and ignore irrelevant implementation details, providing generalization to the program

Encapsulation

What Is Encapsulation?

- Binding an object's state and behaviors together
  (In Java, fields and methods)
- A way of wrapping data and code acting on the data into a single unit
  (In Java, a class)
- Keeps classes separated and prevents coupling

With data private and methods public, we allow other classes to access hidden data, but they can only do so indirectly with a public method.

What Is Encapsulation?

- With encapsulation, a class' data is hidden from other classes and can only be accessed through specific methods of its own class—this is called data hiding
- In Java, we achieve encapsulation by declaring **all the fields in a class as private and writing public methods** in the class to set and get the values of variables

Disadvantages of Inheritance

- The main disadvantage of inheritance is that the superclass and subclass can become tightly coupled, meaning they cannot be used independently of each other
- The program extends increased effort to jump through all the levels of implementation to get to the appropriate functionality

Compile Time Polymorphism

- **Compile time polymorphism** is achieved through method overloading
- **Method overloading** is a feature that allows a class to have more than one method having the same name, if their argument lists are different
- Again, this is similar to before where one method or function has many different forms

Why Encapsulation?

- We use encapsulation so that the user has no idea of the inner implementation of a given class and the data it contains
- It allows you to hide how values are stored within a given class

Encapsulation differs from abstraction.

Abstraction provides generalization.

Encapsulation hides unwanted implementation details from the users of an object.

Inheritance

What Is Inheritance?

- Inheritance is the process where one class acquires the fields and methods of another
- With inheritance, we can write the common properties and functionality in one class and have other classes with unique features all extend this one class, making code more reusable

What Is Inheritance?

- Instead of writing the same common implementation multiple times, we can write it once and then have whatever class needs this functionality extend this class

Why Use Inheritance?

- The main advantage of inheritance is minimizing the amount of duplicate code
- Inheritance allows data hiding, where the super base class can keep some data private, and this data cannot be accessed by the subclass

Polymorphism

What Is Polymorphism?

- Polymorphism is the ability for an object or function to take many forms
- **Runtime polymorphism** is achieved through method overriding
- **Compile time polymorphism** is achieved through method overloading