CS101 - Data Abstraction
Basic Computational Constructs

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- Where is Data coming from?
- How does your Program access Data?

There should be a standard way to do this ...

How do you represent Data in a Program?

- Variables
- Arrays
- Class and Objects
- Array List
- Hash Map
- and so on $\cdots$

What is a Data Type?

- **Data type:** a data type is a classification of data which tells the compiler or interpreter how the programmer intends to use the data.
- Primitive and Reference Data Types.

- **Primitive data type:** a primitive data type is the most basic data type available within a programming language.
- There are 8 primitive data types in Java: boolean, byte, char, short, int, long, float and double. These types serve as the building blocks of data manipulation in Java.

- **Reference data type:** A reference data type is associated with Class and Objects. The possible values of a class are the objects. The data representation is a reference (pointer), stored in the stack, to a block of storage in the heap.

Let us talk about this more later ...

Type Conversion

- Converting data from one type to another
- Convert int to float
- Convert int to String
- Convert byte to short
- and so on ....

If, Else If, Else, Switch Case

Conditional Constructs

```java
import java.util.Scanner;
public class Weather{
  public static void main(String[] args){
    Scanner in = new Scanner(System.in);
    System.out.println("Enter the temperature:");
    int temp = in.nextInt();
    if (temp >= 80)
      System.out.println("It's Hot...");
    else if (temp > 60 && temp < 80)
      System.out.println("It's nice weather ...");
    else
      System.out.println("It's cold ...");
  }
}
```

Conditional Constructs

```java
import java.util.Scanner;
public class Days{
  public static void main(String[] args){
    Scanner in = new Scanner(System.in);
    System.out.println("Enter number from 1-7 (inc):");
    int day = in.nextInt();
    switch(day){
      case 1:
        System.out.println("Monday");
        break;
      case 2:
        System.out.println("Tuesday");
        break;
      —— ADD MORE Cases ——
      default:
        System.out.println("Invalid day ...");
        break;
    }
  }
}
```

For, While, Do-While

How is While and Do-While Different?

- A class defines behavior and data
- An object is an instance of a class
- Methods define behavior and variables store the data
- Access modifiers is a technique that allows data access in a protected manner.

GOAL: REUSABILITY

- **Solve Goodrich: R-1.10; Pg no 55**

  You may try to get the flower name, no of petals, and price from the user directly.

What is a Method?

- A method is a set of code which is referred to by name and can be called (invoked) at any point using its name.
- Methods have a signature
- Pass by value, and Pass by reference

Can we store multiple values in one unit?

- Arrays provide a structure to store fixed number of items.
- All items inside the array should be of the same data type [Homegeneous].
- Indexing an array can lead to out of bound exception if not properly accessed.

Coding challenge: Write a Java program that takes an array of student exam scores and find the minimum, maximum, and average exam score.

Note: This is a very important problem in computer science and if one gets comfortable with this, then any future array related tasks may become easier.

- GT Chapter 01