# Design and Analysis of Algorithms

## T01a: Overview: Java Basics Programming

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# Resources

- https://introcs.cs.princeton.edu/java/11hello/
- https://swayam.gov.in/nd1_noc20_cs27/ preview
- Coursera:

# Programming Errors

- First programming goal: Identify errors
- Compile time errors
  - Easy to detect and fix
  - Don't ignore the warnings (can be more harmful)
- Runtime errors
  - Occurs when program runs (invoked)
  - Program performs an invalid operation, e.g.
    - Divide by zero
    - Accessing invalid memory location
    - Permissions violations etc.
- Logical errors
  - Most difficult to debug
  - Existence known when output is incorrect

# HelloWorld.java

```java
public class HelloWorld {
   public static void main(String[] args){
   // Displays "Hello, World".
   // First intro java program
      System.out.println("Hello, World!");
   }
}
```

# Exercise 1

- Write a program `Initials.java` to print your initials using 9 rows with corresponding initial letter, e.g.

```
RRRRR              PPPPP              RRRRR
RR    RR           PP    PP           RR    RR
RR      RRR        PP      PPP        RR      RRR
RR      RRR        PP      PPP        RR    RRR
RR    RR           PP    PP           RR    RR
RRRRR              PPPPP              RRRRR
RR    RR           PP                 RR    RR
RR      RR         PP                 RR        RR
RR          RR     PP                 RR          RR
```

# Initials.java (RPR) - v1

```java
public class Initials {
  public static void main(String[] args) {
    System.out.println("RRRRR          PPPPP          RRRRR ");
    System.out.println("RR    RR        PP   PP        RR    RR");
    System.out.println("RR      RRR      PP     PPP      RR     RRR ");
    System.out.println("RR      RRR      PP     PPP      RR    RRR ");
    System.out.println("RR    RR        PP    PP        RR    RR ");
    System.out.println("RRRRR          PPPPP          RRRRR   ");
    System.out.println("RR    RR        PP              RR    RR");
    System.out.println("RR       RR      PP              RR       RR");
    System.out.println("RR           RR  PP              RR          RR");
  }
}
```

# Initials.java (RPR) v2

```
public class Initials {
  public static void main(String[] args) {
    System.out.println("RRRRR           PPPPP           RRRRR        ");
    System.out.println("RR   RR         PP   PP         RR   RR      ");
    System.out.println("RR     RRR      PP     PPP      RR     RRR   ");
    System.out.println("RR     RRR      PP     PPP      RR   RRR     ");
    System.out.println("RR   RR         PP   PP         RR   RR      ");
    System.out.println("RRRRR           PPPPP           RRRRR        ");
    System.out.println("RR   RR         PP              RR   RR      ");
    System.out.println("RR     RR       PP              RR     RR    ");
    System.out.println("RR         RR   PP              RR       RR  ");
  }
}
```

# Back of Envelope Calucations

- How long (time) it will take you to walk to Yellachennahalli metro from KSIT?

- You (both sections) are asked to go to Seminar hall (opp admin/finance). How long (time) will it take for all of you to occupy your seat there?

- How much money you spent last year (2019) eating outside your home/hostel?

- What is the cost per hour you (individually) are paying for each class.

- An uber driver claims that in last one year, he has driven 100,000 KMs. How do you verify?

# Basic Java Quiz

- Answer the set of 25 questions on basics of java.
  - DAA-Quiz-01.pdf

- Answers to Quiz-01.

# Programming Overview

```
int f(int n) {
    int answer = 0;
    for (int i = 1; i < n; i++) {
        answer = answer + i;
    }
    return answer;
}
```

- What value does `f(0)` returns
- For which value of `n`, `f(n)` returns 6?
- What changes in the function is required to return the sum $1+2+...+n$

# Programming Overview

```
int f(int n) {
    int answer;
    for (int i = 1; i < n; i++) {
        answer = answer + i;
    }
    return answer;
}
```

- What value does f(1) returns

# Prog Exercise (Home)

- P1: Write the program that output your initials in the nine rows using the same letter

- P2: Write the program that takes initials as input (command line argument) and outputs them in the nine rows using the same letter e.g.
  ```
  java Initials RPR
  ```

- P3: Given input N, generate following output

```
        1                   =1**2
      1+2+1                 =2**2
    1+2+3+2+1              =3**2
  1+2+3+4+3+2+1           =4**2
1+2+3+4+5+4+3+2+1       =5**2
```