**Please read the following instructions carefully before solving & submitting assignment, otherwise no email regarding deduction of marks will be entertained.**

**Uploading Instructions:**

* For compilation purpose, you can either use the online compiler (i.e., <https://www.onlinegdb.com/online_java_compiler>) or download the Java Development Kit (JDK) from <https://bit.ly/3sjJ9vs>, install it in your Laptop/PC and then use it for compilation purpose.
* Submit your solution at VULMS as a Microsoft Word file containing all the required code written and output as screenshot.
* No solution file will be replaced once it is submitted on VULMS.
* No assignment will be accepted through email.

**Rules for Marking:**

**You will get Zero (0) marks in assignment if,**

* The assignment is submitted after the due date.
* The assignment is fully or partially copied from other student(s) or it is ditto copy from handouts or the Internet; strict disciplinary action will be taken in this case.
* The submission does not contain your own Student ID or contain anything Student ID other than yours. Zero Marks will be awarded, and no excuse will be accepted in any case.
* The submitted code is not readable during evaluation, the submitted code will be checked using compilers. If code is not runnable / executable due to wrong format or syntax / logical errors, then ZERO marks will be awarded, and no excuses will be accepted in this regard.

**Note:** Do not place any query on MDB regarding this assignment, if you have any query do email at [CS508@vu.edu.pk](mailto:CS508@vu.edu.pk)

**Lectures Covered: This assignment covers Lectures 27 to 30.**

**Problem Statement:**

Among several, two key ideas in Java are concurrency and multithreading, which are used to improve performance in multitasking applications and make effective use of system resources.

In order to implement concurrency and multithreading at basic level, you must create a Java project and meet the necessary requirements.

1. Create a Java project having two files named as “fruitsbasket.java” and “fruitsRunnable.java”. There are three fruits named as; Apple, Guava and Orange in this project.
2. In “fruitsRunnable.java” file;
   1. Write a class named as “fruitsRunnable”.
   2. Create a string type data member as “thread\_Fruit”.
   3. Create three counters for three fruits of type static int named “Count\_A”, “Count\_G”, “Count\_O”.
   4. Write a default constructor of this class that initializes data members.
   5. Override run () method to create two elements of each thread for fruit in it, also it should print the counter of each fruit and increment the respective counter after execution.
3. In FruitsBasket.java file;
   1. Print your **Student ID**.
   2. Inside main method;
      1. Instantiate three objects of fruitsRunnable class by giving names as “af\_runnable”, “gf\_runnable”, “of\_runnable”.
      2. Create three objects of Thread class “Thread\_af”, “Thread\_gf”, “Thread\_of” by passing objects of fruitsRunnable.
      3. If threads are created successfully then Print the message, “Threads are created successfully”.
      4. Call “fruits\_basket” method as defined below.
   3. Define a function after main method, named” fruits\_basket” that takes three objects of threads created above as parameters and inside this function;
      1. Set the priority of Threads of Apple and Guava as maximum.
      2. Set the priority of Thread of Orange as minimum.
      3. Start all threads.

Note: Make sure to print your own student VU Student ID at the top of the output screen. If any other Student ID is found or wrong Student ID is found, you will get Zero marks in the assignment.

**Output:** For reference, see the sample Screenshot given below. **It is important to note that your actual output may vary due to multithreading and concurrency as it depends upon several factors including operating system, scheduler, allocated resources etc.**

**Sample Output Screenshot:**

A computer screen shot of a black screen

Description automatically generated

**Your Solution**

**Output Screenshot**

**Code for fruitsRunnable.java**

**Code for FruitsBasket.java**

Good Luck