**PROG10082 Object Oriented Programming 1 – JAVA**

**Assignment 1**

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**Instructor: Muhammad Shafique**

**Date: September 19, 2022**

**Problem**

A jogger jogs some distance in certain time. The jogger keeps record of distance in meters and time as three numbers: hour, minute, and second.

Develop a Java application that can be used by the jogger to compute speed in meters per second, and speed in kilometers per hour.

**Requirements**

Requirements to develop a solution to the problem are:

1. Analyse the problem

2. Develop an algorithm to solve the problem,

3. write java code to implement the algorithm,

4. Test your program for the following two test cases:

**Test case 1:**

Input: Distance: 1000 meters time: 0 hour 4 minutes 10 second Expected outcomes: speed as meters per second: 4 meters per second

speed as kilometers per hour: 14.40 kilometers per hour

**Test case 2**:

Input: distance=2069 meters time= 0 hour 15 minutes 20 seconds

Expected outcomes: speed as meters per second: 2.25 meters per second

speed as kilometers per hour: 8.08 kilometers per hour

**Sample run for case 1:**

Please enter distance jogged in meters:

1000

Please enter time as hours, minutes, and seconds, separate values with a space

0 4 10

Distance in meters: 1000.0

Time in seconds: 250

Speed as meters per second: 4.0

Speed as kilometers per hour: 14.399999999999999

Thank you for using the application.

**Solution:**

**Solution**

1. **Analysis**

Input: For Distance in meters, I get it in type int. For Time as three numbers: hour, minute, and second, I get them in type int.

Time in second is (hour\*3600)+(min\*60)+second, call it TimeInSecond.

Divide the distance by time in second needs to divide the distance by TimeInSecond. But since both time and distance are in type int, the result of division would be in int which gives a wrong answer. Thus, I cast the time and distance with double, then, made the division.

Similarly for the Speed in KM per Hour, I did the cast to double. I divided the distance in meter by 1000 to have distance in Kilometer. For hours also I divided the whole TimeInSecond by 3600,number of second per hour. Then, this distance in Kilometer divided by Time in hour. Note that Time in hour is double.

The final step is to print the results.

1. **Algorithm**

A) Get Distance and Time as an integer number from the user.

B) Compute the time in second by multiply the hour by 3600 and multiply the minute by 60 and sum the answers by seconds

C) Compute the speed in meters per second by dividing distance by the time in seconds which we find already. Note that I did casting to double to have the correct result for division.

D) Compute speed in kilometers per hour: first we should convert the distance in meters to kilometers by dividing by 1000. And then we divide the time obtained in seconds by 3600 to convert it to hours. Finally, we should divide Km distance by time in hour to get speed in kilometers per hour.

E) Output the number of speeds as meters per second.

F) Output the number of speeds as kilometers per hour.

1. **Source code**

package assignment;

import java.util.Scanner;

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\* Assignment 1 (Jogger problem)

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\* Date: septamber 19, 2022

\* This application that can be used by the jogger to compute

\* speed in meters per second, and speed in kilometres per hour.

\*/

public class Assignment01Jogger {

public static void main(String[] args) {

Scanner sc=new Scanner(System.***in***);

System.***out***.print("Please enter distance jogged in meters: ");

int distance= sc.nextInt();

System.***out***.print("Please enter time as hours, minutes, and seconds, separate values with a space: ");

int hour= sc.nextInt();

int min= sc.nextInt();

int second= sc.nextInt();

int timeInSecond=(hour\*3600)+(min\*60)+second;

double speedMeterPerSecond = (double)distance/(double)timeInSecond;

//every hour is 60\*60=3600 second

double speedKilometerPerHour = ((double)distance/1000)/((double)timeInSecond/3600);

System.***out***.println("Distance in meters: "+distance);

System.***out***.println("Time in seconds: "+timeInSecond);

System.***out***.println("Speed as meters per second: "+speedMeterPerSecond);

System.***out***.println("Speed as kilometers per hour: "+speedKilometerPerHour);

System.***out***.println("Thank you for using the application.");

}

}

Sample run for test case 1

Please enter distance jogged in meters: 1000

Please enter time as hours, minutes, and seconds, separate values with a space: 0 4 10

Distance in meters: 1000

Time in seconds: 250

Speed as meters per second: 4.0

Speed as kilometers per hour: 14.399999999999999

Thank you for using the application.

Text

Description automatically generated

Sample run for test case 2

Please enter distance jogged in meters: 2096

Please enter time as hours, minutes, and seconds, separate values with a space: 0 15 20

Distance in meters: 2096

Time in seconds: 920

Speed as meters per second: 2.2782608695652176

Speed as kilometers per hour: 8.201739130434783

Thank you for using the application.

}

Text

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}