Department of Computer Science and Information Technology
La Trobe University

CSE1OOF/4OOF Summer 1, 2018
Assignment Part A

5%

This is an individual Assignment. You are not permitted to work as a Pair Programming partnership or any other group when writing this assignment.

Due Date

Due : Thursday 29th November at 10.00 a.m.
Execution test: Friday 30th November at 1.00 p.m.

Delays caused by computer downtime cannot be accepted as a valid reason for a late submission without penalty. Students must plan their work to allow for both scheduled and unscheduled downtime. **There are no days late or extensions on this assignment as execution test marking will begin on** Friday 30th November 2018 **– in your normal lab (Week 4).** After the submit server has closed, NO assignments can be accepted. Non-attendance at the week 4 lab you have signed up for on the LMS page will also result in your assignment being awarded 0, except as detailed below.

Copying, Plagiarism

Plagiarism is the submission of somebody else's work in a manner that gives the impression that the work is your own. The Department of Computer Science and Information Technology treats academic misconduct seriously. When it is detected, penalties are strictly imposed. Refer to the subject guide for further information and strategies you can use to avoid a charge of academic misconduct.

Assessment Objectives

- To practise using the **String** class. (Lecture/Workshop 2)
- To practise using if, if-else statements (Lecture 5 and 6, Lecture/Workshop 3)
- To practise reading from a text file. (Lecture 4, Lab 3)

Submission Details and marking

Full instructions on how to submit electronic copies of your source code files from your latcs8 account are given on **page 2**. All assignments in OOF are marked, face to face, in the lab, in an execution test. This means that we mark running code. Your code must compile and display a result to the screen. Regrettably, we don't have the time or resources to look at code. The smallest amount of code that produces and displays a correct result will gain more marks than lots of code that doesn't compile, run or display something to the screen. If you cannot attend the lab you have signed up for on the LMS page, please email me (m.felicetti@latrobe.edu.au) to arrange another time.

Marking summary

This assignment is worth **5%** of your final mark in this subject.
Implementation **(Execution of code) 80%, explanation of code 20%**

Instant zeros or heavily reduced marks	**Not submitting code** **Not attending marking session** **Not able to explain code that has not been taught yet** **Does not run on latcs8** **Uses System.exit()**
Power.java	**30%**
PowerFile.java	**40%**
RealReactivePower.java	**30%**

Using code not taught in OOF

Please also note carefully that whilst we encourage innovation and exploring java beyond what has been presented in the subject to date, **above all, we encourage understanding**.

All of the Tasks that follow can be solved using techniques that have been presented in lectures, lecture / workshops and labs so far.

These are the techniques and knowledge that we will later be examining in the Real Time Test (20 marks) and the exam (50 marks).

Code and techniques that are outside the material presented will not be examined, of course.

You are free to solve the Tasks below in any way, with one exception and one condition.

Any assignment that uses code that is outside what has been presented to this point **must be fully explained at the marking execution test**. Not being able to **fully** explain code outside what has been presented in the subject so far will **result in the assignment being awarded a mark of 0**, regardless of the correctness of the program.

Submitting an assignment with code outside what has been presented so far and not attending the marking execution test will result in an automatic mark of 0, regardless of the correctness of the submission.

An example would be the **`split( )`** method in the **`String`** class. The reason being that this method returns an array and we haven't studied arrays yet. So using the **`split( )`** method would require you to be prepared to explain to the marker how arrays worked in Java.

Electronic Submission of the Source Code

- Submit all the Java files that you have developed in the tasks above.
- The code has to run under Unix on the latcs8 machine.
- You submit your files from your latcs8 account. Make sure you are in the same directory as the files you are submitting. Submit each file separately using the **`submit`** command.

submit OOF Power.java
submit OOF PowerFile.java
submit OOF RealReactivePower.java

After submitting the files, you can run the following command that lists the files submitted from your account:

verify

You can submit the same filename as many times as you like before the assignment deadline; the previously submitted copy will be replaced by the latest one.

Please make sure that you have read page 1 about the submission close off date and time and the compulsory requirement to attend the execution test in Week 4

Failure to do both of these things will result in your assignment be awarded a mark of 0, regardless of the correctness of the program.

Execution test marks are provisional and subject to final plagiarism checks and checks on the compliance of your code to this assignment document.

As such, final assignment marks may be lower or withdrawn completely.

Background - Task

You are tasked with writing **three** Java programs related to power in electronic circuits. In the first task you will calculate power based on the information given by a user. In the second task you will calculate power based on information in a file. And in the third task you will calculate power using methods from the Math class and information from the user.

Background – DC Power

In electronics, resistance (R) is measured in Ohms, current (I) in amps and voltage (V) in volts.
In a DC circuit, we can find the amount of power measured in Watts (W) the circuit draws using two of the three above values.
The formulas for DC power given two of the three variables are as follows:

$$P = I^2R$$
$$P = \frac{V^2}{R}$$
$$P = VI$$

Background – AC Power

In AC we represent power in terms of real power measured in Watts(W) and reactive power in Volt-Amps Reactive(VAR). Further, to calculate we require the magnitude of the voltage and current, and the phase angle of the voltage and current. The phase angle can be given in degrees or radians.
The formulas for AC power are as follows:

$$Real\ Power = \frac{V_m I_m}{2}\cos(\varphi_v - \varphi_i)\ W$$
$$Reactive\ Power = \frac{V_m I_m}{2}\sin(\varphi_v - \varphi_i)\ VAR$$

Background - Limitations and Notes

Decimal places:

We have not yet learnt how to control the number of decimal places that are displayed so this will not be an issue.

Error checking:

In this program you can assume that the data in the input files are without errors and are in the specified format. Unless otherwise specified.

Converting integers from Strings

We have not yet learnt a high level method for converting integers from Strings, and hence the method used in lecture/workshop 2 is to be applied.

File name

The input must accept any file name, i.e. do not hard code the file name.

Background – Math class

You will need to use the Math class as you have done in the labs for some calculations.
You can find information on the suitable methods here:

https://docs.oracle.com/javase/9/docs/api/java/lang/Math.html

Background –Converting integers from Strings

We have not yet learnt a high level method for converting integers from Strings, and hence the method used in lecture/workshop 2 is to be applied.

If we have the String as follows:

```
String number = "354";
```

To convert one of the digits to an int, we can use the charAt method and subtract '0'

```
int tens = number.charAt(1) - '0';
```

You will need to think about how you would convert "354" as a String to 354 as an integer using the above techniques.

You must use this technique for full marks

Task 1 – Power.java

Follow the steps to complete the task using the steps and information above. (Note indentation indicates that the indented parts are contained within the previous step. Eg. All steps within an if statement are indented)

1. The program prints to the screen the student number, student name and the assignment number. This is enclosed by double asterisks. Ensure you follow the below format.

```
*** John Smith 11117777 ***
```
(Replace with your details)

2. 3 integer variables are created and are initialized to 0:
    a. resistance
    b. current
    c. voltage

    (These are not the only variables needed in the program, you will need to work out the rest)
3. The program then asks the user if they know the resistance of the appliance
4. If the user enters "yes" (**ignore case**) then
    a. The program then asks the user for the resistance value of the appliance
    b. Store in a variable that the resistance is known
5. Repeat steps 3 to 4 for current and voltage
6. Using the DC Power formulas in the background information find the power based on the known values
7. If there is not enough known values (1 or 0) then a message should be printed to the screen that indicates that the power cannot be calculated
8. Else the power is printed to the screen
9. The program ends appropriately

Solution length

The code should be around 40-70 lines of code (without comments). If your code is significantly larger, you may want to reconsider your approach.

Example output

```
*** John Smith 11117777 ***
Do you know the resistance of the appliance?
Yes
Enter the reistance value in ohms:
5
Do you know the current of the appliance?
no
Do you know the voltage of the appliance?
no
The power drawn from the appliance can not be calculated from the given information
```

```
*** John Smith 11117777 ***
Do you know the resistance of the appliance?
No
Do you know the current of the appliance?
yes
Enter the current value in amps:
10
Do you know the voltage of the appliance?
yeS
Enter the voltage value in volts:
240
Power drawn by the appliance is 2400.0W.
```

```
*** John Smith 11117777 ***
Do you know the resistance of the appliance?
YeS
Enter the reistance value in ohms:
10
Do you know the current of the appliance?
YES
Enter the current value in amps:
5
Do you know the voltage of the appliance?
No
Power drawn by the appliance is 250.0W.
```

Task 2 – PowerFile.java

Follow the steps to complete the task using the steps and information above. (Note indentation indicates that the indented parts are contained or related to the previous step. Eg. All steps within an if statement are indented)

1. The program prints to the screen the student number, student name and the assignment number. This is enclosed by double asterisks. Ensure you follow the below format.

```
*** John Smith 11117777 ***
```

(Replace with your details)

2. The program then asks the user to enter a file name
3. Thee program opens the file
4. The program then reads two lines from the file and stores each in two separate String objects.

Each line contains, the voltage, the current and the appliance name
The format of a line in the file is:

VaaaIbbbcccc
Where a is the voltage, always 3 characters
Where b is the current, always 3 characters
Where c is the appliance name and can be any length (Will not contain spaces)

Example:
V023I100Dishwasher

Has a voltage of 23V, a current of 100A and the appliance is a dishwasher.

5. The program stores the voltages from both lines into suitable variables. The technique of converting the string to an int for the voltage must be as explained in the background information.
6. The program stores the current from both lines into suitable variables. The technique of converting the string to an int for the current must be as explained in the background information.
7. The power is calculated for each appliance using the DC Power formulas in the background information.
8. Print the power of both appliances, such that the appliance that draws the **most power is printed first**
9. The program ends appropriately

Solution length

The code should be around 40-70 lines of code (without comments). If your code is significantly larger, you may want to reconsider your approach.

Example output

Given the file named “a.txt”

```
1  V240I001Toaster
2  V120I002Fridge
```

The following output is given

```
*** John Smith 11117777 ***
Enter file name:
a.txt
The Fridge draws 240W.
The Toaster draws 240W.
```

Given the file named “a.txt”

```
1  V024I020Generator
2  V020I012Stereo
```

The following output is given

```
*** John Smith 11117777 ***
Enter file name:
b.txt
The Generator draws 480W.
The Stereo draws 240W.
```

Example input files

Two example input file for Task 1 and 2 may be copied from the csilib area

don't forget the dot

```
cp /home/student/csilib/cse1oof/assignSum18/assignAsum18/a.txt .
cp /home/student/csilib/cse1oof/assignSum18/assignAsum18/b.txt .
cp /home/student/csilib/cse1oof/assignSum18/assignAsum18/c.txt .
```

Be aware these do not cover all cases; hence you are likely to want to make your own test input files.

Task 3 – RealReactivePower.java

Follow the steps to complete the task using the steps and information above. (Note indentation indicates that the indented parts are contained or related to the previous step. Eg. All steps within an if statement are indented)

1. The program prints to the screen the student number, student name and the assignment number. This is enclosed by double asterisks. Ensure you follow the below format.

```
*** John Smith 11117777 ***
```
(Replace with your details)

2. The program asks the user for the magnitude of the voltage and current and stores the responses appropriately
3. The program asks the user for the phase angles in degrees of the voltage and current and stores the responses appropriately
4. The program converts the phase angles from degrees to radians using a static method from the Math class (Refer to background information)
5. Calculate and store the real and reactive power using the AC Power formulas in the background information. (You will need the Math class)
6. Print the real and reactive power as shown in the example output
7. The program ends appropriately

Example output

```
Enter the magnitude of the voltage:
5
Enter the magnitude of the current:
5
Enter the phase angle of the voltage in degrees:
45
Enter the phase angle of the current in degrees:
45
Real power = 12.5W
Reactive power = 0.0VAR
```

```
Enter the magnitude of the voltage:
60
Enter the magnitude of the current:
2
Enter the phase angle of the voltage in degrees:
0
Enter the phase angle of the current in degrees:
60
Real power = 30.000000000000007W
Reactive power = -51.96152422706631VAR
```

Transferring files between Windows and Unix

Be very careful transferring files from Windows to Unix. If you do transfer a file from Windows to Unix open the file, in Unix, using vi.
For example, if you transferred a file named **`b.txt`** from Windows to Unix

open the file in Unix with the command

vi –b b.txt

you will (might) see a lot of **`^M`**'s at the end of each line.

These MUST be removed using the command shown below or else your input file will have too many newline characters and will not translate properly. That is, your code will not correctly read the input file for Tasks 1 and 2.

Your code will work on Windows but NOT on Unix.

Still in vi, in command mode (press the Esc key first) do the following

:%s/ctrl-v ctrl-m//g

`ctrl-v ctrl-m` means hold down the control key and with the control key down press v then press m.

Final notes

There will be consultation sessions for the assignment, the times will be posted on LMS, if you have problems come to consultation.

Do a little bit every night; before you know it you will be finished. The assignment is marked with running code, so you are better to have 1 or 2 Tasks completed that actually compile and run, rather than a whole lot of code that doesn't compile.

The execution test is done on latcs8 so please make sure that your code runs on latcs8 before you submit.