

SdPd/java Lab Exam 3

Objective: Corrib Water Customer Usage Maintenance

Corrib Water maintains customer water usage data using sequential text files and arrays.

1. **Download** the lab exam 3 zip file and extract the folder, **Save** in your root Network account (U: drive) – **not** your desktop, local C drive or USB
 - Rename the **LastNameFirstName18LabEx3** folder & starter java file as per your own name
 - E.g. **AgnewGerry18LabEx3** folder and **AgnewGerry18LabEx3.java** file
 - To be **verified** by your lab supervisor
 - Verify that the 2 input **data files** required for the assignment contain the necessary data
2. Add your **Program Id, Name & Program Description** as **comments** at the top of the program
3. **Warning:** marks will be deducted for **bad programming practices** such as:
 - Lacking meaningful identifier names, white-space, indentation, etc.
 - Ensure that redundant code is deleted prior to program submission
 - Ensure that non-working code is commented out otherwise severe penalties will be incurred
4. **Constants/Files/Arrays/Variables**
 - Declare constants, file objects, file variables, 1 & 2 dim arrays & any other variables required
 - Using meaningful names and appropriate data types in the standard order expected
5. **File Organisation:** verify using NotePad (or equivalent)
 - The number of Water master file records (max 70) and tx file records are unknown
 - Both data files are **un-ordered** and terminated with a dummy **EOF/-1** integer sentinel
6. **Customer Water Master file layout/content:** see screenshot 1 on page 4
Each record consists of the following details about each customer in the order listed:

custNum (int) *	e.g. 1234	Un-ordered unique 4 digit Customer number
custType (char)	e.g. 'P'	Customer Type: p/Personal, b/Business, f/Farmer
custRegion (String)	e.g. west	Customer Region: north, south, east or west
custStatus (char)	e.g. 'A'	Customer Status: a/Active, x/Ex Customer, s/Suspended
custUsage (int) *	e.g. 123	Last 4 quarterly water Usage amounts
custName (String)	"Gerry Agnew"	Combined Customer First name + Last name (trim ?)
<i>Asterisk marked fields are saved in a 2 dim custUsage array and the rest in 1 dim arrays</i>		

7. **Customer Water Tx file layout/content:** see screenshot 2 on page 4
Each record consists of the following details about customer transactions in the order listed which are subsequently applied to update the Customer arrays:

txCustNum (int)	e.g. 1234	Un-ordered non-unique 4 digit Customer number
txCode (String)	e.g. "set"	3 character (case insensitive) transaction code
txQuarter (int)	e.g. 3	tx Quarter in the range 1..4 where applicable otherwise 0
txAmount (int)	e.g. 123	tx Amount associated with the transaction code
txName (String)	"Gerry Agnew"	New tx Customer name (optional)
<i>The above fields are not saved in any arrays</i>		

8. **Header Output:** see screenshot 3 on page 4
 - Output the lab exam headers including **your name** as specified

9. Valid Customer Tx Codes/Rules Table

A tx is initially rejected if the Tx Customer number is not found in column 0 of the Usage array
Likewise, a tx is also rejected if the corresponding tx Code/Quarter are not listed below

tx Code	Description/Rules
“set” “add” “sub”	Set, Add or Sub/tract (minimum 0 post subtract) the tx Amount (provided) to/from the associated tx Quarter (provided) in the Usage array Otherwise, tx rejected if the tx Quarter is not in the range 1..4
“nil”	Reset all this customer Usage array quarter values to zero
“fix”	Assign all this customer Usage array quarter values to the tx Amount (provided)
“reg”	Change the existing Region array according to a new tx Region quarter (provided): 1➔ north, 2➔ south, 3➔ east & 4➔ west Otherwise, tx rejected if the tx Quarter is not in the range 1..4
“nme”	Change the existing Name array to the new tx Name (provided) Otherwise, tx rejected if the new name is blank or more than 30 characters long
“st”	Change the existing Status array to a new tx Status (provided) 1➔ s/Suspended, 2➔ x/Ex Customer Otherwise, tx rejected if the tx Quarter is not in the range 1..2

10. Water File Input into associated Arrays: see screenshot 3 on page 4

- Using an initial/**while**/subsequent file read and **EOF/-1** sentinel controlled loop
- Read each customer record from the master text file until EOF is encountered
- Store the data in multiple appropriately named/typed **1** and **2-dim** arrays
- The 5 integer values should be stored in a 2-dim integer array (inner for) while the customer Type, Region, Status and Name should be stored in appropriate single dimension arrays
- Arrays should only be populated with a/Active records i.e. exclude non-A status records (note: you can complete the assignment initially without excluding any customer records)
- Output the associated record counts only, as shown, without any line output initially

11. Output/Verify Customer Arrays see screenshot 4 on page 4

- Using nested **for loops** line output formatted customer **arrays** details as shown
- To verify that the arrays have been correctly populated

12. Water Tx File Input (no arrays): see screenshot 5 on page 5

- Using an initial/**while**/subsequent file read and **EOF/-1** sentinel controlled loop
- Read each customer tx record from the tx file into file variables until EOF is encountered
- Line output formatted customer tx details from the file variables to verify that the records are read correctly including the associated record counts as shown

13. Water Tx File Reprocessing

- Remember to first close and then re-open the tx file otherwise tx records are not available
- Duplicate the previous **outer while** loop to re-read the customer tx file records again
- Then search the Usage array efficiently (inner **while**) for the tx Customer number

14. Successful/Unsuccessful Customer Number Search: see screenshots 6 & 7 on page 5

- If successful then update the corresponding arrays with the transactions as detailed above
- If unsuccessful mismatched Customer number records (in tx file & not in usage array) are not displayed and should be rejected/reported using the Mismatched Rejected Tx Report file
- Beware that some transactions may also be rejected after a successful search according to the rules specified in the Valid tx Codes & Descriptions/Rules table listed above
- Line output formatted valid customer tx details to verify that the records are processed correctly including the associated record counts as shown

15. **Output Updated Customer Arrays:** (nested for's as before) see screenshot 8 on page 5
- To verify that the tx file changes have been correctly applied to the Customer arrays
16. **Customer Name Search:** see screenshot 9 on page 5
- Using an **outer** initial/**while**/subsequent keyboard read loop
 - Prompt/input the Customer name (First name + Last name) to be found
 - Until the “**Quit**” string sentinel is encountered (case insensitively) to terminate the loop
17. **Unsuccessful Customer Name Search:** see screenshot 9 on page 5
- Using an **inner while** loop search the Customer Names array (trim ?) case insensitively for the Find Customer name entered
 - If unsuccessful output an error message and prompt/input another Find Customer name
18. **Successful Customer Name Search:** see screenshot 9 on page 5
- If successful prompt/input the required character menu option/action to be performed
Select **A**dd, **N**ame, **R**egion, **S**earch, **V**iew or **eX**it:
 - Then process/validate (switch) the character option/action (case insensitively)
 - Output/Prompt/Input/Amend the corresponding array element with the new value entered
 - Otherwise, must be **A**dd, **N**ame, **R**egion, **S**earch, **V**iew or **eX**it error message
19. **Menu Options:** see screenshots 10, 11, 12, 13 & 14 on page 6
- Option a/A: Add a new customer to the arrays with the number, defaults and name provided
See new Customer 1234 (screenshot 15 on page 6) for more default details
New customers with duplicate Customer numbers should not be added to the arrays
 - Option n/N: Change the Customer name (min 1..30 max characters and not blank)
 - Option r/R: Change the customer Region (1/north, 2/south, 3/east or 4/west)
 - Option s/S: Search/display customers based on partial name criteria (e.g. names with “Uck”)
 - Option v/V: View current customer details only (clone existing code)
 - Option x/X: eXit the operation and resume with another prompt/input Find Customer name
20. **Exception Validation**
- Validate new/changed Customer names: cannot be blank (max 30) with **do..while** validation
 - Validate the Region number in the range 1..4 with **do..while** validation and map/switch the associated Region name
21. **Output Updated Customer Arrays:** (nested for's as before) see screenshot 15 on page 6
- To verify that the manual menu changes have been correctly applied to the Customer arrays
22. **Copy/Compare Customer Usage Array:** see screenshot 16 on page 6
- Copy the 2 dim Water Usage array into a new 2 dim array before any tx are applied within the first nested for loops
 - Compare the updated Usage array with the original Usage array copy quarter by quarter
 - Highlighting any usage quarter values that have changed with identifying quarter, Customer Id and name details
23. **Save – The End:** when finished Save and Exit TextPad
- Zip (R/click: Send Compressed) your **LastNameFirstName18LabEx3** folder
 - Upload your **LastNameFirstName18LabEx3** zip file to the Moodle link provided
 - Remember to submit your “Named” Algorithm sheet
 - Sign the **attendance sheet**

Customer Water Master File – Screenshot 1

```

WaterMaster - Notepad
File Edit Format View Help
1001 p north A 1001 1002 1003 1004 Pippa Pig
2002 f south a 2001 2002 2003 2004 Bugs Bunny
3003 b EAST A 3001 3002 3003 3004 Yogi Bear
0001 p west x 0001 0002 0003 0004 Aaa Aaaaaa
0002 p north X 0001 0002 0003 0004 Bbb Bbbbbbb
4004 P west a 4001 4002 4003 4004 Daffy Duck
5005 F north A 5001 5002 5003 5004 Boo Boo
0003 s south s 0001 0002 0003 0004 Ccc Cccccc
0004 S east S 0001 0002 0003 0004 Ddd Ddddddd
6006 B west a 6001 6002 6003 6004 Donald Duck
7007 p north A 7001 7002 7003 7004 Lucky Lou
8008 B west a 8001 8002 8003 8004 Micky Mouse
-1

```

Customer Water Tx File – Screenshot 2

```

WaterTx - Notepad
File Edit Format View Help
1001 seT 4 0004
1001 set 0 9999
1001 seX 1 9999
2002 ADD 1 0001
2002 add 2 0002
2002 Add 3 0003
2002 addD 4 0004
2002 add 5 9999
2002 adX 1 9999
0002 SET 1 9999
3003 SUB 1 0001
3003 sub 2 0002
3003 Sub 3 0003
3003 suB 4 4000
3003 suX 9 9999
4004 nil 0 0000
5005 fix 0 5555
6006 reg 1 0000
7007 reg 0 0000
6006 nme 0 0000 New Duck
7007 nme 0 0000
7007 nme 0 0000 very long new name
8008 st 1 0000
8008 st 0 0000
8008 st 3 0000
0003 SET 1 9999
-1

```

Customer Arrays Populated Counts – Screenshot 3

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Customer Count: 12 Rejected: 4 Accepted: 8

Customer Arrays Output – Screenshot 4

Cust Num	Cust Stat	Cust Type	Cust Region	Q1 Usage	Q2 Usage	Q3 Usage	Q4 Usage	Cust Name
1001	A	P	north	1001	1002	1003	1004	Pippa Pig
2002	A	F	south	2001	2002	2003	2004	Bugs Bunny
3003	A	B	east	3001	3002	3003	3004	Yogi Bear
4004	A	P	west	4001	4002	4003	4004	Daffy Duck
5005	A	F	north	5001	5002	5003	5004	Boo Boo
6006	A	B	west	6001	6002	6003	6004	Donald Duck
7007	A	P	north	7001	7002	7003	7004	Lucky Lou
8008	A	B	west	8001	8002	8003	8004	Micky Mouse

Before & After Customer Tx File Output – Screenshots 5 & 6

Cust Num	Tx Code	Tx Qtr	Tx Amt	New Name
1	set	1	9999	
1001	set	1	1	
1001	set	2	2	
1001	set	3	3	
1001	set	4	4	
1001	set	0	9999	
1001	sex	1	9999	
2002	add	1	1	
2002	add	2	2	
2002	add	3	3	
2002	add	4	4	
2002	add	5	9999	
2002	adx	1	9999	
2	set	1	9999	
3003	sub	1	1	
3003	sub	2	2	
3003	sub	3	3	
3003	sub	4	4000	
3003	sux	9	9999	
4004	nil	0	0	
5005	fix	0	5555	
6006	reg	1	0	
7007	reg	0	0	
6006	nme	0	0	New Duck
7007	nme	0	0	
7007	nme	0	0	very long new name
8008	st	1	0	
8008	st	0	0	
8008	st	3	0	
3	set	1	9999	

Tx: 30 Reject: 0 Accept: 30

Cust Num	Tx Code	Tx Qtr	Tx Amt	New Name
1001	set	1	1	
1001	set	2	2	
1001	set	3	3	
1001	set	4	4	
2002	add	1	1	
2002	add	2	2	
2002	add	3	3	
2002	add	4	4	
3003	sub	1	1	
3003	sub	2	2	
3003	sub	3	3	
3003	sub	4	4000	
4004	nil	0	0	
5005	fix	0	5555	
6006	reg	1	0	
6006	nme	0	0	New Duck
8008	st	1	0	

Tx: 30 Reject: 13 Accept: 17

Mismatched/Rejected Tx Report File – Screenshot 7

WaterRejected - Notepad

File Edit Format View Help

Mismatched Rejected Tx Report

Cust Num	Tx Code	Tx Qtr	Tx Amt	New Name	
1	set	1	9999		- Mismatched Customer Id
1001	set	0	9999		- Invalid Quarter: 0
1001	sex	1	9999		- Invalid Tx code: sex
2002	add	5	9999		- Invalid Quarter: 5
2002	adx	1	9999		- Invalid Tx code: adx
2	set	1	9999		- Mismatched Customer Id
3003	sux	9	9999		- Invalid Tx code: sux
7007	reg	0	0		- Invalid Quarter: 0
7007	nme	0	0		- Invalid Name must be 1..30 long:
7007	nme	0	0	very long new name	more than 30 - Invalid Name must be 1..30
8008	st	0	0		- Invalid Status: must be 1/Suspended or 2/Ex
8008	st	3	0		- Invalid Status: must be 1/Suspended or 2/Ex
3	set	1	9999		- Mismatched Customer Id

Updated Customer Arrays Output – Screenshot 8

Cust Num	Cust Stat	Cust Type	Cust Region	Q1 Usage	Q2 Usage	Q3 Usage	Q4 Usage	Cust Name
1001	A	P	north	1	2	3	4	Pippa Pig
2002	A	F	south	2002	2004	2006	2008	Bugs Bunny
3003	A	B	east	3000	3000	3000	0	Yogi Bear
4004	A	P	west	0	0	0	0	Daffy Duck
5005	A	F	north	5555	5555	5555	5555	Boo Boo
6006	A	B	north	6001	6002	6003	6004	New Duck
7007	A	P	north	7001	7002	7003	7004	Lucky Lou
8008	S	B	west	8001	8002	8003	8004	Micky Mouse

Customer Name Unsuccessful / Successful Search – Screenshot 9

Enter Customer Name (or Quit): Gerry Agnew
 Sorry Customer name not found - please try again.

Enter Customer Name (or Quit): pIpPa PiG
 Select A/dd, N/ame, R/egion, S/earch, V/iew or eXit:

Options: A/dd – Screenshot 10

```
Select A/dd, N/ame, R/egion, S/earch, V/iew or eXit: a
Enter new Customer Id & Name (1..30): 1234
Enter new Name (1..30): Winnie ThePoo
```

Options: N/ame – Screenshot 11

```
Select A/dd, N/ame, R/egion, S/earch, V/iew or eXit: N
Current Name: Pippa Pig
Enter new Name (1..30): very very very long name more 30
Current Name: Pippa Pig
Enter new Name (1..30): New Piggy
```

Options: R/egion – Screenshot 12

```
Select A/dd, N/ame, R/egion, S/earch, V/iew or eXit: r
Current Region: south
Enter new Region (1/North, 2/South, 3/East, 4/West): 5
Current Region: south
Enter new Region (1/North, 2/South, 3/East, 4/West): 4
```

Options: S/earch – Screenshot 13

```
Select A/dd, N/ame, R/egion, S/earch, V/iew or eXit: S
Enter partial search Name: Uck
```

Cust Num	Cust Stat	Cust Type	Cust Region	Q1 Usage	Q2 Usage	Q3 Usage	Q4 Usage	Cust Name
4004	A	A	west	0	0	0	0	Daffy Duck
6006	A	A	north	6001	6002	6003	6004	New Duck
7007	A	A	north	7001	7002	7003	7004	Lucky Lou

Options: V/iew – Screenshot 14

Cust Num	Cust Stat	Cust Type	Cust Region	Q1 Usage	Q2 Usage	Q3 Usage	Q4 Usage	Cust Name
1001	A	P	north	1	2	3	4	new piggy

Updated Customer Arrays Output – Screenshot 15

Cust Num	Cust Stat	Cust Type	Cust Region	Q1 Usage	Q2 Usage	Q3 Usage	Q4 Usage	Cust Name
1001	A	A	north	1	2	3	4	New Piggy
2002	A	A	west	2002	2004	2006	2008	Bugs Bunny
3003	A	A	east	3000	3000	3000	0	Yogi Bear
4004	A	A	west	0	0	0	0	Daffy Duck
5005	A	A	north	5555	5555	5555	5555	Boo Boo
6006	A	A	north	6001	6002	6003	6004	New Duck
7007	A	A	north	7001	7002	7003	7004	Lucky Lou
8008	S	A	west	8001	8002	8003	8004	Micky Mouse
1234	A	P	north	0	0	0	0	Winnie ThePoo

Copy/Compare Usage Arrays (auto tx only) – Screenshot 16

Quarter	Before Use	After Use	Cust Id	Name
1	1001	1	1001	Pippa Pig
2	1002	2	1001	Pippa Pig
3	1003	3	1001	Pippa Pig
4	1004	4	1001	Pippa Pig
1	2001	2002	2002	Bugs Bunny
2	2002	2004	2002	Bugs Bunny
3	2003	2006	2002	Bugs Bunny
4	2004	2008	2002	Bugs Bunny
1	3001	3000	3003	Yogi Bear
2	3002	3000	3003	Yogi Bear
3	3003	3000	3003	Yogi Bear
4	3004	0	3003	Yogi Bear
1	4001	0	4004	Daffy Duck
2	4002	0	4004	Daffy Duck
3	4003	0	4004	Daffy Duck
4	4004	0	4004	Daffy Duck
1	5001	5555	5005	Boo Boo
2	5002	5555	5005	Boo Boo
3	5003	5555	5005	Boo Boo
4	5004	5555	5005	Boo Boo