Phil Nevins

ECE 361

HW4  
Nov 19th, 2023

**Short answers are added in before the transcript of the required sections. Any time gaps are from debugging from errors encountered when going from my IDE to Moba command line execution**

**General introduction**

 19/11/2023   14:52.39   /home/mobaxterm/hw4/My Code/RPN Calculator   master  whoami

pnevi

✓

 19/11/2023   14:52.43   /home/mobaxterm/hw4/My Code/RPN Calculator   master  ls

LinkedList.c LinkedList.h RPN\_Calculator.c longestLineHelper.c longestLineHelper.h longestLineHelper.o stackADT\_LL.c stackADT\_LL.h test\_LinkedList.c test\_stackADT\_LL.c

✓

**Problem 1 Linked List & Stack ADT**

Based on our tests of the Linked List and Stack ADT, we can say that our Stack ADT is working as expected. We were able to use the existing code as building blocks for the ADT, to build a stack. We can also use the testing of our RPN calculator to show that our stack ADT works, because the RPN calculator would not work at all if our stack ADT did not work.

 19/11/2023   14:52.44   /home/mobaxterm/hw4/My Code/RPN Calculator   master  gcc -c LinkedList.c -o LinkedList.o

✓

 19/11/2023   14:53.52   /home/mobaxterm/hw4/My Code/RPN Calculator   master  gcc -std=c99 -Wall test\_LinkedList.c LinkedList.o -o test\_LinkedList

✓

 19/11/2023   14:54.21   /home/mobaxterm/hw4/My Code/RPN Calculator   master  ./test\_LinkedList.exe

Linked List ADT test program (RK)

Created a new Linked List

Number of nodes in List: 0

Inserting 5 and 2 into list...

Data from the Linked list nodes are: node(1)= 5, node(2)= 2

ERROR: LinkedList ADT(getNodeDataInLList): Position 3 is not in the list

Number of nodes in List: 2

List contents: 5 2

Deleting a node from list...

Number of nodes in List: 1

List contents: 2

 19/11/2023   14:55.04   /home/mobaxterm/hw4/My Code/RPN Calculator   master  gcc -c stackADT\_LL.c -o stackADT\_LL.o

✓

 19/11/2023   14:55.26   /home/mobaxterm/hw4/My Code/RPN Calculator   master  ls

LinkedList.c LinkedList.o longestLineHelper.c longestLineHelper.o stackADT\_LL.h test\_LinkedList.c test\_stackADT\_LL.c

LinkedList.h RPN\_Calculator.c longestLineHelper.h stackADT\_LL.c stackADT\_LL.o test\_LinkedList.exe

✓

 19/11/2023   14:55.29   /home/mobaxterm/hw4/My Code/RPN Calculator   master  gcc -std=c99 -Wall test\_stackADT\_LL.c stackADT\_LL.o LinkedList.o -o test\_stackADT\_LL

✓

 19/11/2023   14:56.23   /home/mobaxterm/hw4/My Code/RPN Calculator   master  ./test\_stackADT\_LL

Minimal test program for the stack ADT

Current working directory: /home/mobaxterm/hw4/My Code/RPN Calculator

Top element is 10

Stack size is 11

Popped element is 10

Popped element is 9

Popped element is 8

Popped element is 7

Popped element is 6

Popped element is 5

Popped element is 4

Popped element is 3

Popped element is 2

Popped element is 1

Popped element is 0

Stack is empty ✓

**Problem 2 RPN Calculator**

 19/11/2023   15:09.51   /home/mobaxterm/hw4/My Code/RPN Calculator   master  gcc -std=c99 -Wall RPN\_Calculator.c LinkedList.o stackADT\_LL.o longestLineHelper.o -o RPN\_Calculator

RPN\_Calculator.c: In function ‘main’:

RPN\_Calculator.c:75:9: warning: variable ‘len’ set but not used [-Wunused-but-set-variable]

75 | int len;

| ^~~

✓

 19/11/2023   15:09.53   /home/mobaxterm/hw4/My Code/RPN Calculator   master  ./RPN\_Calculator

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 + +

Result of the RPN expression: 6

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 +

Invalid RPN expression. Not enough operands.3

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 + + +

Invalid RPN expression. Too many operands.2

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 + + =

Result of the RPN expression: 6

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 \* + =

Result of the RPN expression: 7

Enter a valid RPN equation to calculate (or type 'exit' to quit): 5 8 \* 4 0 - / =

Result of the RPN expression: 10

Enter a valid RPN equation to calculate (or type 'exit' to quit): 5 8 \* 4 9 - / =

Result of the RPN expression: -8

Enter a valid RPN equation to calculate (or type 'exit' to quit): 5 0 /

Division by zero is not allowed.

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 4 5 + + + + + =

Invalid RPN expression. Too many operands.2

Enter a valid RPN equation to calculate (or type 'exit' to quit): 1 2 3 4 5 + + + + =

Result of the RPN expression: 15

Enter a valid RPN equation to calculate (or type 'exit' to quit): exit

✓

**Problem 3 Temperature and Humidity Sensor**

We can say that our program is working because we get the expected outputs at each step of the program. First, we have random float values generated, stored in the appropriate arrays and then printed to the display along with the index numbers. Then we sort the arrays (low to high) and print them to the display again, with their new index numbers, showing that the array is now sorted low to high. Then we add all of the floats in the array together and display the total. Then we calculate the average and print it to the display.

When hand calculating all of the random float values that are generated, we can see that our program produces the correct outputs.

 19/11/2023   15:24.00   /home/mobaxterm/hw4/My Code   master  ls

RPN Calculator stack ADT LL temp\_humidity\_sensor transcript\_full.txt

✓

 19/11/2023   15:24.01   /home/mobaxterm/hw4/My Code   master  cd temp\_humidity\_sensor

✓

 19/11/2023   15:24.10   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  ls

float\_rndm.c float\_rndm.h iom361\_r2.c iom361\_r2.h main.c

✓

 19/11/2023   15:24.12   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  gcc -c float\_rndm.c -o float\_rndm.o

✓

 19/11/2023   15:24.44   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  gcc -c iom361\_r2.c -o iom361\_r2.o

✓

 19/11/2023   15:24.58   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  ls

float\_rndm.c float\_rndm.h float\_rndm.o iom361\_r2.c iom361\_r2.h iom361\_r2.o main.c

✓

 19/11/2023   16:26.53   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  gcc -std=c99 -Wall main.c iom361\_r2.o float\_rndm.o -o Temp\_Humidity\_Sensor

main.c: In function ‘main’:

main.c:91:13: warning: this ‘if’ clause does not guard... [-Wmisleading-indentation]

91 | if (humidity\_readings[i] != -1)

| ^~

main.c:93:17: note: ...this statement, but the latter is misleadingly indented as if it were guarded by the ‘if’

93 | printf("\n");

| ^~~~~~

✓

 19/11/2023   16:27.10   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  ./Temp\_Humidity\_Sensor

ECE361 HW4 Problem 3

Utilize IOM361\_r2 to manipulate random temp and humidity values

By Phil Nevins (pnevins@pdx.edu)

Current working directory: /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor

Initializing the I/O registers...

\_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_

RedDC= 0% ( 0), GrnDC= 0% ( 0), BluDC= 0% ( 0) Enable=OFF

Initialized successfully!

Adding (00078A44) 44.251C to temp\_readings[1] and (000C910D) 78.541 to humidity\_readings[1]...

Adding (0007BBA8) 46.663C to temp\_readings[2] and (000BF33D) 74.688 to humidity\_readings[2]...

Adding (0007A623) 45.612C to temp\_readings[3] and (000C37E2) 76.364 to humidity\_readings[3]...

Adding (0007A5DD) 45.599C to temp\_readings[4] and (000C3055) 76.180 to humidity\_readings[4]...

Adding (00080882) 50.415C to temp\_readings[5] and (000C5079) 76.965 to humidity\_readings[5]...

Adding (00082421) 51.764C to temp\_readings[6] and (000D0747) 81.428 to humidity\_readings[6]...

Adding (0007C11E) 46.930C to temp\_readings[7] and (000DF390) 87.196 to humidity\_readings[7]...

Adding (00080B8B) 50.564C to temp\_readings[8] and (000C9335) 78.594 to humidity\_readings[8]...

Sorting temperature and humidity readings into Low to High...

Temp Table: (Low to High)

temp\_readings[1]: Temperature 44.251C (00078A44)

temp\_readings[2]: Temperature 45.599C (0007A5DD)

temp\_readings[3]: Temperature 45.612C (0007A623)

temp\_readings[4]: Temperature 46.663C (0007BBA8)

temp\_readings[5]: Temperature 46.930C (0007C11E)

temp\_readings[6]: Temperature 50.415C (00080882)

temp\_readings[7]: Temperature 50.564C (00080B8B)

temp\_readings[8]: Temperature 51.764C (00082421)

Averaging readings...

Total: 381.80

Average Temperature: 47.725C

Humidity Table: (Low to High)

humidity\_readings[1]: Humidity 74.688% (000BF33D)

humidity\_readings[2]: Humidity 76.180% (000C3055)

humidity\_readings[3]: Humidity 76.364% (000C37E2)

humidity\_readings[4]: Humidity 76.965% (000C5079)

humidity\_readings[5]: Humidity 78.541% (000C910D)

humidity\_readings[6]: Humidity 78.594% (000C9335)

humidity\_readings[7]: Humidity 81.428% (000D0747)

humidity\_readings[8]: Humidity 87.196% (000DF390)

Averaging readings...

Total: 629.96

Average Humidity: 78.745%

✓

 19/11/2023   16:27.11   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  ./Temp\_Humidity\_Sensor

ECE361 HW4 Problem 3

Utilize IOM361\_r2 to manipulate random temp and humidity values

By Phil Nevins (pnevins@pdx.edu)

Current working directory: /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor

Initializing the I/O registers...

\_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_

RedDC= 0% ( 0), GrnDC= 0% ( 0), BluDC= 0% ( 0) Enable=OFF

Initialized successfully!

Adding (0007CBD4) 47.453C to temp\_readings[1] and (000D71E4) 84.031 to humidity\_readings[1]...

Adding (0007BF30) 46.835C to temp\_readings[2] and (000CA8E2) 79.123 to humidity\_readings[2]...

Adding (0007FD77) 49.876C to temp\_readings[3] and (000D838B) 84.462 to humidity\_readings[3]...

Adding (00081792) 51.151C to temp\_readings[4] and (000DA39A) 85.244 to humidity\_readings[4]...

Adding (00078874) 44.163C to temp\_readings[5] and (000D6F8C) 83.973 to humidity\_readings[5]...

Adding (0007F93C) 49.670C to temp\_readings[6] and (000C3D44) 76.496 to humidity\_readings[6]...

Adding (0007E42B) 48.641C to temp\_readings[7] and (000C3288) 76.234 to humidity\_readings[7]...

Adding (0007BD91) 46.756C to temp\_readings[8] and (000D70B7) 84.002 to humidity\_readings[8]...

Sorting temperature and humidity readings into Low to High...

Temp Table: (Low to High)

temp\_readings[1]: Temperature 44.163C (00078874)

temp\_readings[2]: Temperature 46.756C (0007BD91)

temp\_readings[3]: Temperature 46.835C (0007BF30)

temp\_readings[4]: Temperature 47.453C (0007CBD4)

temp\_readings[5]: Temperature 48.641C (0007E42B)

temp\_readings[6]: Temperature 49.670C (0007F93C)

temp\_readings[7]: Temperature 49.876C (0007FD77)

temp\_readings[8]: Temperature 51.151C (00081792)

Averaging readings...

Total: 384.54

Average Temperature: 48.068C

Humidity Table: (Low to High)

humidity\_readings[1]: Humidity 76.234% (000C3288)

humidity\_readings[2]: Humidity 76.496% (000C3D44)

humidity\_readings[3]: Humidity 79.123% (000CA8E2)

humidity\_readings[4]: Humidity 83.973% (000D6F8C)

humidity\_readings[5]: Humidity 84.002% (000D70B7)

humidity\_readings[6]: Humidity 84.031% (000D71E4)

humidity\_readings[7]: Humidity 84.462% (000D838B)

humidity\_readings[8]: Humidity 85.244% (000DA39A)

Averaging readings...

Total: 653.56

Average Humidity: 81.695%

✓

 19/11/2023   16:29.19   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  ./Temp\_Humidity\_Sensor

ECE361 HW4 Problem 3

Utilize IOM361\_r2 to manipulate random temp and humidity values

By Phil Nevins (pnevins@pdx.edu)

Current working directory: /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor

Initializing the I/O registers...

\_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_

RedDC= 0% ( 0), GrnDC= 0% ( 0), BluDC= 0% ( 0) Enable=OFF

Initialized successfully!

Adding (00078C57) 44.353C to temp\_readings[1] and (000D02C1) 81.317 to humidity\_readings[1]...

Adding (0007D0D0) 47.696C to temp\_readings[2] and (000C92C8) 78.584 to humidity\_readings[2]...

Adding (0007D959) 48.113C to temp\_readings[3] and (000D3ADE) 82.687 to humidity\_readings[3]...

Adding (00080D42) 50.647C to temp\_readings[4] and (000C45B4) 76.702 to humidity\_readings[4]...

Adding (00081AA7) 51.301C to temp\_readings[5] and (000C44BC) 76.678 to humidity\_readings[5]...

Adding (0008274D) 51.919C to temp\_readings[6] and (000D0AAA) 81.510 to humidity\_readings[6]...

Adding (000777A5) 43.342C to temp\_readings[7] and (000D3B26) 82.694 to humidity\_readings[7]...

Adding (00077828) 43.367C to temp\_readings[8] and (000DAF99) 85.537 to humidity\_readings[8]...

Sorting temperature and humidity readings into Low to High...

Temp Table: (Low to High)

temp\_readings[1]: Temperature 43.342C (000777A5)

temp\_readings[2]: Temperature 43.367C (00077828)

temp\_readings[3]: Temperature 44.353C (00078C57)

temp\_readings[4]: Temperature 47.696C (0007D0D0)

temp\_readings[5]: Temperature 48.113C (0007D959)

temp\_readings[6]: Temperature 50.647C (00080D42)

temp\_readings[7]: Temperature 51.301C (00081AA7)

temp\_readings[8]: Temperature 51.919C (0008274D)

Averaging readings...

Total: 380.74

Average Temperature: 47.592C

Humidity Table: (Low to High)

humidity\_readings[1]: Humidity 76.678% (000C44BC)

humidity\_readings[2]: Humidity 76.702% (000C45B4)

humidity\_readings[3]: Humidity 78.584% (000C92C8)

humidity\_readings[4]: Humidity 81.317% (000D02C1)

humidity\_readings[5]: Humidity 81.510% (000D0AAA)

humidity\_readings[6]: Humidity 82.687% (000D3ADE)

humidity\_readings[7]: Humidity 82.694% (000D3B26)

humidity\_readings[8]: Humidity 85.537% (000DAF99)

Averaging readings...

Total: 645.71

Average Humidity: 80.714%

✓

 19/11/2023   16:29.20   /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor   master  ./Temp\_Humidity\_Sensor

ECE361 HW4 Problem 3

Utilize IOM361\_r2 to manipulate random temp and humidity values

By Phil Nevins (pnevins@pdx.edu)

Current working directory: /home/mobaxterm/hw4/My Code/temp\_humidity\_sensor

Initializing the I/O registers...

\_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_

RedDC= 0% ( 0), GrnDC= 0% ( 0), BluDC= 0% ( 0) Enable=OFF

Initialized successfully!

Adding (000819A7) 51.253C to temp\_readings[1] and (000C939D) 78.604 to humidity\_readings[1]...

Adding (0007E271) 48.557C to temp\_readings[2] and (000C7CAE) 78.044 to humidity\_readings[2]...

Adding (0007B53B) 46.349C to temp\_readings[3] and (000CF232) 80.913 to humidity\_readings[3]...

Adding (000802F2) 50.144C to temp\_readings[4] and (000D41EB) 82.859 to humidity\_readings[4]...

Adding (0007E00E) 48.440C to temp\_readings[5] and (000D7408) 84.083 to humidity\_readings[5]...

Adding (00078890) 44.168C to temp\_readings[6] and (000DD80F) 86.525 to humidity\_readings[6]...

Adding (0007D7EB) 48.043C to temp\_readings[7] and (000BE9A8) 74.454 to humidity\_readings[7]...

Adding (0007FF8C) 49.978C to temp\_readings[8] and (000DEE7B) 87.072 to humidity\_readings[8]...

Sorting temperature and humidity readings into Low to High...

Temp Table: (Low to High)

temp\_readings[1]: Temperature 44.168C (00078890)

temp\_readings[2]: Temperature 46.349C (0007B53B)

temp\_readings[3]: Temperature 48.043C (0007D7EB)

temp\_readings[4]: Temperature 48.440C (0007E00E)

temp\_readings[5]: Temperature 48.557C (0007E271)

temp\_readings[6]: Temperature 49.978C (0007FF8C)

temp\_readings[7]: Temperature 50.144C (000802F2)

temp\_readings[8]: Temperature 51.253C (000819A7)

Averaging readings...

Total: 386.93

Average Temperature: 48.366C

Humidity Table: (Low to High)

humidity\_readings[1]: Humidity 74.454% (000BE9A8)

humidity\_readings[2]: Humidity 78.044% (000C7CAE)

humidity\_readings[3]: Humidity 78.604% (000C939D)

humidity\_readings[4]: Humidity 80.913% (000CF232)

humidity\_readings[5]: Humidity 82.859% (000D41EB)

humidity\_readings[6]: Humidity 84.083% (000D7408)

humidity\_readings[7]: Humidity 86.525% (000DD80F)

humidity\_readings[8]: Humidity 87.072% (000DEE7B)

Averaging readings...

Total: 652.55

Average Humidity: 81.569%