COP3530 17F Project 1

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By submitting this document, I affirm that all the work submitted is my solely my own and that in completing this project I did nothing contrary to either the spirit or the letter of the UF Honor Code

Section I

Implementation Summary

	SSLL	PSLL	SDAL	CDAL	CBL
My template class has the required name, file	37	37	37	17	37
extension, and template parameters. [y/n]	У	У	У	у	У
My template class was implemented <i>efficiently</i> using					
the required technique (e.g., linked list with a pool of	v	y	y	y	y
free nodes) as described in Part I and as amended in	y	y	y	y	y
the announcements. [y/n]					
I have implemented and throughly tested each of the					
methods described in Part I and they <i>all</i> behave	y	y	y	y	y
correctly. [y/n]					
I have implemented and throughly tested (on one of					
the official test machines) each of the <i>big five</i> member	n	n	n	n	n
functions and they <i>all</i> behave correctly. [y/n]					
I have implemented and throughly tested each of the	y	y	y	y	y
type members as described in Part II. [y/n]	y	y	y	y	<u> </u>
I have implemented and throughly tested <i>efficient</i>					
iterators (both const and non-const) over a list	у	у	у	у	у
instance's data and my list supports the iterator					
creation operations as described in Part II. [y/n]					
I have verified (by testing) that a const instance of my					
list class and the data it holds cannot be modified,	у	У	у	у	у
either through the list operations nor via iterator over					
the list's elements. [y/n]					
I wrote my tests using CATCH (not required, except	n	n	n	n	n
for the CBL class tests). [y/n]					
I have verified my template class is memory-leak free	n	n	n	n	n
using valgrind. [y/n]				**	
I certify that all of the responses I have given for	У	у	у	у	у
this list class are TRUE [HP]					

Section II

Entering this project, I briefly understood what a link list was, but did not know how to properly implement them; I learned how to effectively use pointers, references, and dereferences. Now my project is not perfect, and I understand that. I tried day and night on fixing some of the memory leaks I was getting and just overall bugs in my code, but I could not figure out all of them. Upon running my program, I had 20 total memory leaks in project 1. I tried my best to debug those memory leaks, but could only reduce them down to 13. I can proudly say that I have grown as a programmer because I have learned how to locate certain memory leaks and resolve them. Also, I did not know what copy and move constructors were until you announced we had to implement them in our project. I had to do a lot of reading on them and even then, I do not know if I did them correctly. On the bright side, I understand the purpose behind them and why we need them in our classes. By far the best learning experience in this project was creating the CDAL, and I am really proud of it, even though there are some memory leaks in it. It took me two weeks to property conceptualize and program it. It was not an easy class to create and it ate up all my time. On the other hand, the CBL was the most fun class to create because of its circular nature. At first it took a while to abstract it, but after that the code came out naturally. I am glad you gave this project because it just solidified my understanding of linked list and the different ways they can be abstracted and implemented. The only thing I regret about this project is not doing the CATCH for CBL because I did not have enough time with all my other classes hammering me down with assignments. Truly sorry about this.

Section III

COMMAND TO RUN:

```
g++ -o play SSLL_test.cpp
g++ -o play PSLL_test.cpp
g++ -o play SDAL_test.cpp
g++ -o play CBL_test.cpp
g++ -o play CDAL_test.cpp
```

SSLL STARTS HERE

```
1
1234
543
24
254
244
5
6
76543
56
100
1
100
[1, 1234, 543, 24, 254, 244, 5, 76543, 56, 100]
1
1[1234, 543, 24, 254, 244, 5, 76543, 56, 100]Program ended with exit code: 0
```

```
SDAL STARTS HERE
```

```
The list was empty so this (24) will be your first element
1234
543
24
254
244
5
76543
56
100
100
[1, 1234, 543, 24, 254, 244, 5, 76543, 56, 100]
Lenght is: 10
1[1234, 543, 24, 254, 244, 5, 76543, 56, 100]
Lenght is: 9
Program ended with exit code: 0
```

CDAL STARTS HERE

```
1
1234
543
24
254
254
244
5
76543
56
100
1
100
[1, 1234, 543, 24, 254, 244, 5, 76543, 56, 100]
1
it comes here 2
1[1234, 543, 24, 254, 244, 5, 76543, 56, 100]Program ended with exit code: 0
```

CBL STARTS HERE

```
The list was empty so 24 will be your first elemenet!
1234
543
24
254
244
5
76543
56
100
1
100
Tail: 9
Head: 49
50
[1, 1234, 543, 24, 254, 244, 5, 76543, 56, 100]
Head is: 49
Tail is: 9
1
1Tail: 8
Head: 49
[1234, 543, 24, 254, 244, 5, 76543, 56, 100]
Head is: 49
Tail is: 8
Program ended with exit code: 0
```

This is the proof that I used valgrind to test it, but couldn't resolve all memory leaks. This test is all the test files in one file for ease of convenience.

```
natched free() / delete / delete []
at 0x4C2F24B: operator delete(void*) (in /usr/lib/valgrind/v
by 0x405A5F: CBL<int>::maximize() (CBL.h:43)
by 0x404DF6: CBL<int>::push_back(int) (CBL.h:226)
by 0x40196E: main (main.cpp:155)
dress 0x5ab7e20 is 0 bytes inside a block of size 24 alloc'd
at 0x4C2E80F: operator new[](unsigned long) (in /usr/lib/valg
by 0x4059D3: CBL<int>::maximize() (CBL.h:29)
by 0x404B24: CBL<int>::insert(int, unsigned long) (CBL.h:209)
 by 0x40192D: main (main.cpp:152)
errors in context 3 of 13:
.smatched free() / delete / delete []
  at 0x4C2F24B: operator delete(void*) (in /usr/lib/valgrind/vgp
  by 0x405A5F: CBL<int>::maximize() (CBL.h:43)
  by 0x404B24: CBL<int>::insert(int, unsigned long) (CBL.h:209)
  by 0x40192D: main (main.cpp:152)
Address 0x5ab7dd0 is 0 bytes inside a block of size 16 alloc'd
   at 0x4C2E80F: operator new[](unsigned long) (in /usr/lib/valgri
   by 0x4048A1: CBL<int>::CBL(unsigned long) (CBL.h:68)
   by 0x4018E2: main (main.cpp:149)
1 errors in context 4 of 13:
    at 0x4023F8: SSLL<int>::remove(unsigned long) (SSLL.h:523)
Invalid read of size 8
  by 0x401332: main (main.cpp:55)
Address 0x5ab7398 is 8 bytes inside a block of size 16 free'd at 0x4C2F24B: operator delete(void*) (in /usr/lib/valgrind/vgpre by 0x4023EF: SSLL<int>::remove(unsigned long) (SSLL.h:522)
     by 0x401332: main (main.cpp:55)
     at 0x4C2E0EF: operator new(unsigned long) (in /usr/lib/valgrind/v
by 0x401F6A: SSLL<int>::push_front(int) (SSLL.h:[263)
   Block was alloc'd at
     by 0x401211: main (main.cpp:37)
 = ERROR SUMMARY: 13 errors from 13 contexts (suppressed: 0 from 0)
05:4%
```