CS3353: Data Structures and Algorithm Analysis I
Spring 2024

Homework #2

- Full name only: _____
- Release date: 4:00 PM, Feb 7, 2024 (Wednesday)
- Due date: **2:30 PM, Feb 21, 2024 (Wednesday)**
- It should be done INDIVIDUALLY; Show ALL your work; Submit your source code and results through Canvas.
- Please refer to the course syllabus (Course Requirements and Grading Policy - Assignment, page 3) for the policy of submission, late submission, missing submission, and wrong submission.
- Total: 20 pts
- **Grading Policy**
  - Single linked list: 9 pts
    - IH (Insert Head): 1.5 pts
      - Correct output: 1.5 pts
      - Incorrect output:
        - The idea/logic of algorithm is wrong: -1
          - Partial points (e.g., 0.5 pts) are deducted depending on the degrees of wrongness.
            - For example, extreme scenario (e.g., empty list) is not considered.
    - IT (Insert Tail): 1.5 pts
      - Same as the above grading policy
    - DH (Delete Head): 1.5 pts
      - Same as the above grading policy
    - DT (Delete Tail): 1.5 pts
      - Same as the above grading policy
    - SD (Search & Delete): 1.5 pts
      - Same as the above grading policy
    - PS (Print Single Linked List): 1.5 pts
      - Same as the above grading policy
  - Double linked list: 9 pts
    - IH (Insert Head): 1.5 pts
      - Same as the above grading policy
    - IT (Insert Tail): 1.5 pts
      - Same as the above grading policy
    - DH (Delete Head): 1.5 pts
      - Same as the above grading policy
    - DT (Delete Tail): 1.5 pts
      - Same as the above grading policy
    - SD (Search & Delete): 1.5 pts
      - Same as the above grading policy
    - PD (Print Double Linked List): 1.5 pts
      - Same as the above grading policy
  - Self-testing results: 2 pts
    - No testing conducted / No WORD document: -2
  - Using Linked List library/package in Java and C++ is **Not Allowed** to use:
    - Deduct 10 pts first. Then TA needs to evaluate the program and apply the above grading policy.
  - No homework submission: 0 pts
  - Students will not receive 0 pts if students spent time and effort on program and make the submission.

        - If the program has issues/problems, TA needs to evaluate student's program and gives partial points depending on the quality/completion of program.
    - The instructor will decide the grade policy of any scenario which is not covered by the above list. Meanwhile, please kindly contact the instructor if you have any questions regarding the grading policy.

1. Write a program that can **insert**, **delete**, **search**, and **print** nodes using **single linked lists** and **double linked lists**. Here is a set of requirements to follow:

- Type the homework number and your full name at the top in your source code.

```
/* Homework #2, James Bond */
```

- Your program should be menu**-driven** and **execute the chosen operation**. If you type 12, then exit the program. An example of menu is below. Here, IH (Insert Head), IT (Insert Tail), DH (Delete Head), DT (Delete Tail), SD (Search & Delete), PS (Print Single Linked List), and PD (Print Double Linked List).

```
                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                    Choose?
```

- Each node consists of two (single linked list) or three (double linked list) components: value (integer or character), pointer to previous node (double linked list only), and pointer to next node.
- Display an "error" message when a node to be searched or deleted does not exist. Or try to delete a node in the empty list.
- For example,

```
                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                    Choose? 0  a

                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                    Choose? 1  b


                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                    Choose? 0  c
```



```
                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                     Choose? 5

c    a    b

                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                     Choose? 4  b

                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                     Choose? 5

c    a
                    M E N U

SLL: IH(0), IT(1), DH(2), DT(3), SD(4), PS(5)
DLL: IH(6), IT(7), DH(8), DT(9), SD(10), PD(11)
Exit Program (12)

                     Choose? 4 d

There is no such node in the list!
```

- Submit your source code and self-testing results (e.g., readable and clear screenshots) through Canvas before the due date, **2:30 PM, Feb 21, 2024 (Wednesday)**. The TA will **build and run your source code and test with random input**. **Linked List library/package in Java and C++ is *Not Allowed* to use.**
  - **Source code (one file only)** – The file name should be "your name + homework number", e.g., james_bond_2.cpp or james_bond_2.java.
  - **Self-testing Results** (e.g., readable and clear screenshots) **in WORD** document.

