323.36 Project 1: Linked list implementation of Stack and Queue

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Algorithm Steps

Step 0: **inFile ->open** from argv[1] outFile1, outFile2->open from argv[2], argv[3].
Step 1: S->creates a LLStack using constructor.
Step 2: buildStack(S, inFile, outFile1)
Step 3: close inFile
Step 4: re-open inFile
Step 5: Q->creates a LLQueue using constructor.
Step 6: buildQueue (inFile, outFile2) // Algorithm steps is given below

Step 7: close inFile

Source Code

```cpp
#include <iostream>
#include <fstream>


using namespace std;



class listNode{


  public:
     string data;
     listNode *next;
     listNode(string value){


        this->data = value;
        this->next = NULL;


     }


  void printNode(ofstream *output){


     *output << this->data;
```

```cpp
    }

};


class LLStack{

    public:
        listNode *top;

        LLStack(){

            listNode *dummy = new listNode("dummy");
            this->top = dummy;

        }

        void push(listNode *newNode){

            newNode->next=top->next;
            top->next = newNode;

        }


        bool isEmpty(){

            if(top->next == NULL){
                return true;
            }
            return false;
        }


        listNode *pop(){

            listNode *popped = new listNode("hi");
```

```cpp
    if(isEmpty())
        return NULL;


    //popped = top
    //top = top.next
    //popped.next = null we do this to ensure that we dont return the whole list


    popped = top->next;
    top->next = top->next;
    top->next = popped->next;
    popped->next = NULL;
    return popped;


}

void buildStack(LLStack *stack, ifstream *input, ofstream *output){


    char c;
    string name;


    while(*input >> c >> name){


        *output<<"data coming in is:   " << c << name << endl;


        if(c== '+'){
            //put data in stack
            listNode *node = new listNode(name);
            stack->push(node);


        }else{
            //pop data in stack but make sure its not empty


            listNode *node = stack->pop();


            if(node != NULL){
```

```cpp
                free(node);
            }else{
                *output<<"stack is empty" << endl;
            }

        }

            stack->printStack(output);

    }

    void printStack(ofstream *output){
        listNode *curr = top;

        while (curr != NULL)
        {
            curr->printNode(output);
            *output << "==>";
            curr = curr->next;
        }
        *output << "NULL" << endl;
    }

};


class LLQueue{

    public:

        listNode *head;
        listNode *tail;
```

```cpp
LLQueue(){

    listNode *dummy = new listNode("dummy");
    this->head = dummy;
    this->tail = dummy;

}


void insertQ(listNode *node){

    tail->next = node;
    tail = node;
}


listNode *deleteQ(){

    if(this->isEmpty())
        return NULL;

    listNode *node = head->next;
    head->next = node->next;
    node->next = NULL;



    return node;

}


bool isEmpty(){
    if(head->next == tail){
        return true;
    }
    return false;
}


void buildQueue(LLQueue *queue, ifstream *input, ofstream *output){
```

```cpp
    char c;
    string name;

    while(*input >> c >> name){

        *output<<"data coming in is:   " << c << name << endl;

        if(c== '+'){
            //put data in stack
            listNode *node = new listNode(name);
            queue->insertQ(node);

        }else{
            //pop data in stack but make sure its not empty

            listNode *node = queue->deleteQ();

            if(node != NULL){
                free(node);
            }else{
                *output<<"Queue is empty" << endl;
            }

        }

        queue->printQueue(output);


    }
}

void printQueue(ofstream *output){
    listNode *curr = head;

    while(curr!=NULL){
        curr->printNode(output);
```

```cpp
            curr = curr->next;
            *output << "=> ";
        }


        *output << "NULL" << endl;
    }

};




int main(int argc, const char* argv[]){


    ifstream inputFile;
    inputFile.open(argv[1]);

    if (!inputFile.is_open()) {
        cout << "Unable to open file" << endl;
        exit(1);
    }

    // stack
    ofstream outFile1;
    outFile1.open(argv[2]);


    LLStack *stack= new LLStack();
    stack->buildStack(stack, &inputFile, &outFile1);
    inputFile.close();

    // queue
    inputFile.open(argv[1]);
    ofstream outFile2;
    outFile2.open(argv[3]);
```

```
LLQueue *queue= new LLQueue();

queue->buildQueue(queue, &inputFile, &outFile2);

inputFile.close();




}
```

Program output

StackOutput.txt

data coming in is: +Mohammad
dummy==>Mohammad==>NULL
data coming in is: +Diego
dummy==>Diego==>Mohammad==>NULL
data coming in is: +Daniel
dummy==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Alex
dummy==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +AlAmin
dummy==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Cole
dummy==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Jia
dummy==>Jia==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NUL
L
data coming in is: -Liwen
dummy==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Jesse
dummy==>Jesse==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>N
ULL
data coming in is: -Ning
dummy==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Asadbek
dummy==>Asadbek==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad=
=>NULL
data coming in is: -Jesrhythm
dummy==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Ryan

dummy==>Ryan==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Tsering
dummy==>Tsering==>Ryan==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Tshetrim
dummy==>Ryan==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Yiqing
dummy==>Cole==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Manana
dummy==>AlAmin==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Ivan
dummy==>Alex==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Tania
dummy==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Aniss
dummy==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Erik
dummy==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Kevin
dummy==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Arben
dummy==>Arben==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +David
dummy==>David==>Arben==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Benjamin
dummy==>Arben==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Fahim
dummy==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Hengtuo
dummy==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Siliang
dummy==>Siliang==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Seungwon
dummy==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: +Yahav
dummy==>Yahav==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is: -Jurgen

```
dummy==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==
>NULL
data coming in is:   +Gildian
dummy==>Gildian==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Moh
ammad==>NULL
data coming in is:   -Seong
dummy==>Hengtuo==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==
>NULL
data coming in is:   -Auyon
dummy==>Kevin==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   -Frederick
dummy==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   +Aviraj
dummy==>Aviraj==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   +Shaxzod
dummy==>Shaxzod==>Aviraj==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==
>NULL
data coming in is:   +Imran
dummy==>Imran==>Shaxzod==>Aviraj==>Erik==>Aniss==>Daniel==>Diego==>Moha
mmad==>NULL
data coming in is:   +Zai
dummy==>Zai==>Imran==>Shaxzod==>Aviraj==>Erik==>Aniss==>Daniel==>Diego=
=>Mohammad==>NULL
data coming in is:   +Jonathan
dummy==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>Erik==>Aniss==>Danie
l==>Diego==>Mohammad==>NULL
data coming in is:   +Sean
dummy==>Sean==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>Erik==>Aniss
==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   +Brandon
dummy==>Brandon==>Sean==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>E
rik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   +Juan
dummy==>Juan==>Brandon==>Sean==>Jonathan==>Zai==>Imran==>Shaxzod==>Av
iraj==>Erik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   -Steven
dummy==>Brandon==>Sean==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>E
rik==>Aniss==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   -Tim
dummy==>Sean==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>Erik==>Aniss
==>Daniel==>Diego==>Mohammad==>NULL
data coming in is:   -Matthew
dummy==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>Erik==>Aniss==>Danie
l==>Diego==>Mohammad==>NULL
data coming in is:   +Natasha
dummy==>Natasha==>Jonathan==>Zai==>Imran==>Shaxzod==>Aviraj==>Erik==>An
iss==>Daniel==>Diego==>Mohammad==>NULL
```

QueueOutput.txt

data coming in is: +Mohammad
dummy=> Mohammad=> NULL
data coming in is: +Diego
dummy=> Mohammad=> Diego=> NULL
data coming in is: +Daniel
dummy=> Mohammad=> Diego=> Daniel=> NULL
data coming in is: +Alex
dummy=> Mohammad=> Diego=> Daniel=> Alex=> NULL
data coming in is: +AlAmin
dummy=> Mohammad=> Diego=> Daniel=> Alex=> AlAmin=> NULL
data coming in is: +Cole
dummy=> Mohammad=> Diego=> Daniel=> Alex=> AlAmin=> Cole=> NULL
data coming in is: +Jia
dummy=> Mohammad=> Diego=> Daniel=> Alex=> AlAmin=> Cole=> Jia=> NULL
data coming in is: -Liwen
dummy=> Diego=> Daniel=> Alex=> AlAmin=> Cole=> Jia=> NULL
data coming in is: +Jesse
dummy=> Diego=> Daniel=> Alex=> AlAmin=> Cole=> Jia=> Jesse=> NULL
data coming in is: -Ning
dummy=> Daniel=> Alex=> AlAmin=> Cole=> Jia=> Jesse=> NULL
data coming in is: +Asadbek
dummy=> Daniel=> Alex=> AlAmin=> Cole=> Jia=> Jesse=> Asadbek=> NULL
data coming in is: -Jesrhythm
dummy=> Alex=> AlAmin=> Cole=> Jia=> Jesse=> Asadbek=> NULL
data coming in is: +Ryan
dummy=> Alex=> AlAmin=> Cole=> Jia=> Jesse=> Asadbek=> Ryan=> NULL
data coming in is: +Tsering
dummy=> Alex=> AlAmin=> Cole=> Jia=> Jesse=> Asadbek=> Ryan=> Tsering=> NULL
data coming in is: -Tshetrim
dummy=> AlAmin=> Cole=> Jia=> Jesse=> Asadbek=> Ryan=> Tsering=> NULL
data coming in is: -Yiqing
dummy=> Cole=> Jia=> Jesse=> Asadbek=> Ryan=> Tsering=> NULL
data coming in is: -Manana
dummy=> Jia=> Jesse=> Asadbek=> Ryan=> Tsering=> NULL
data coming in is: -Ivan
dummy=> Jesse=> Asadbek=> Ryan=> Tsering=> NULL
data coming in is: -Tania
dummy=> Asadbek=> Ryan=> Tsering=> NULL
data coming in is: +Aniss
dummy=> Asadbek=> Ryan=> Tsering=> Aniss=> NULL
data coming in is: +Erik
dummy=> Asadbek=> Ryan=> Tsering=> Aniss=> Erik=> NULL
data coming in is: +Kevin
dummy=> Asadbek=> Ryan=> Tsering=> Aniss=> Erik=> Kevin=> NULL

```
data coming in is:   +Arben
dummy=> Asadbek=> Ryan=> Tsering=> Aniss=> Erik=> Kevin=> Arben=> NULL
data coming in is:   +David
dummy=> Asadbek=> Ryan=> Tsering=> Aniss=> Erik=> Kevin=> Arben=> David=>
NULL
data coming in is:   -Benjamin
dummy=> Ryan=> Tsering=> Aniss=> Erik=> Kevin=> Arben=> David=> NULL
data coming in is:   -Fahim
dummy=> Tsering=> Aniss=> Erik=> Kevin=> Arben=> David=> NULL
data coming in is:   +Hengtuo
dummy=> Tsering=> Aniss=> Erik=> Kevin=> Arben=> David=> Hengtuo=> NULL
data coming in is:   +Siliang
dummy=> Tsering=> Aniss=> Erik=> Kevin=> Arben=> David=> Hengtuo=> Siliang=>
NULL
data coming in is:   -Seungwon
dummy=> Aniss=> Erik=> Kevin=> Arben=> David=> Hengtuo=> Siliang=> NULL
data coming in is:   +Yahav
dummy=> Aniss=> Erik=> Kevin=> Arben=> David=> Hengtuo=> Siliang=> Yahav=>
NULL
data coming in is:   -Jurgen
dummy=> Erik=> Kevin=> Arben=> David=> Hengtuo=> Siliang=> Yahav=> NULL
data coming in is:   +Gildian
dummy=> Erik=> Kevin=> Arben=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=>
NULL
data coming in is:   -Seong
dummy=> Kevin=> Arben=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> NULL
data coming in is:   -Auyon
dummy=> Arben=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> NULL
data coming in is:   -Frederick
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> NULL
data coming in is:   +Aviraj
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> NULL
data coming in is:   +Shaxzod
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=> NULL
data coming in is:   +Imran
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=>
Imran=> NULL
data coming in is:   +Zai
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=>
Imran=> Zai=> NULL
data coming in is:   +Jonathan
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=>
Imran=> Zai=> Jonathan=> NULL
data coming in is:   +Sean
dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=>
Imran=> Zai=> Jonathan=> Sean=> NULL
data coming in is:   +Brandon
```

dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=> Imran=> Zai=> Jonathan=> Sean=> Brandon=> NULL

data coming in is: +Juan

dummy=> David=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=> Imran=> Zai=> Jonathan=> Sean=> Brandon=> Juan=> NULL

data coming in is: -Steven

dummy=> Hengtuo=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=> Imran=> Zai=> Jonathan=> Sean=> Brandon=> Juan=> NULL

data coming in is: -Tim

dummy=> Siliang=> Yahav=> Gildian=> Aviraj=> Shaxzod=> Imran=> Zai=> Jonathan=> Sean=> Brandon=> Juan=> NULL

data coming in is: -Matthew

dummy=> Yahav=> Gildian=> Aviraj=> Shaxzod=> Imran=> Zai=> Jonathan=> Sean=> Brandon=> Juan=> NULL

data coming in is: +Natasha

dummy=> Yahav=> Gildian=> Aviraj=> Shaxzod=> Imran=> Zai=> Jonathan=> Sean=> Brandon=> Juan=> Natasha=> NULL