

KATHMANDU UNIVERSITY

DHULIKHEL, NEPAL



COMP 202: Lab 2 Report

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SUBMITTED TO

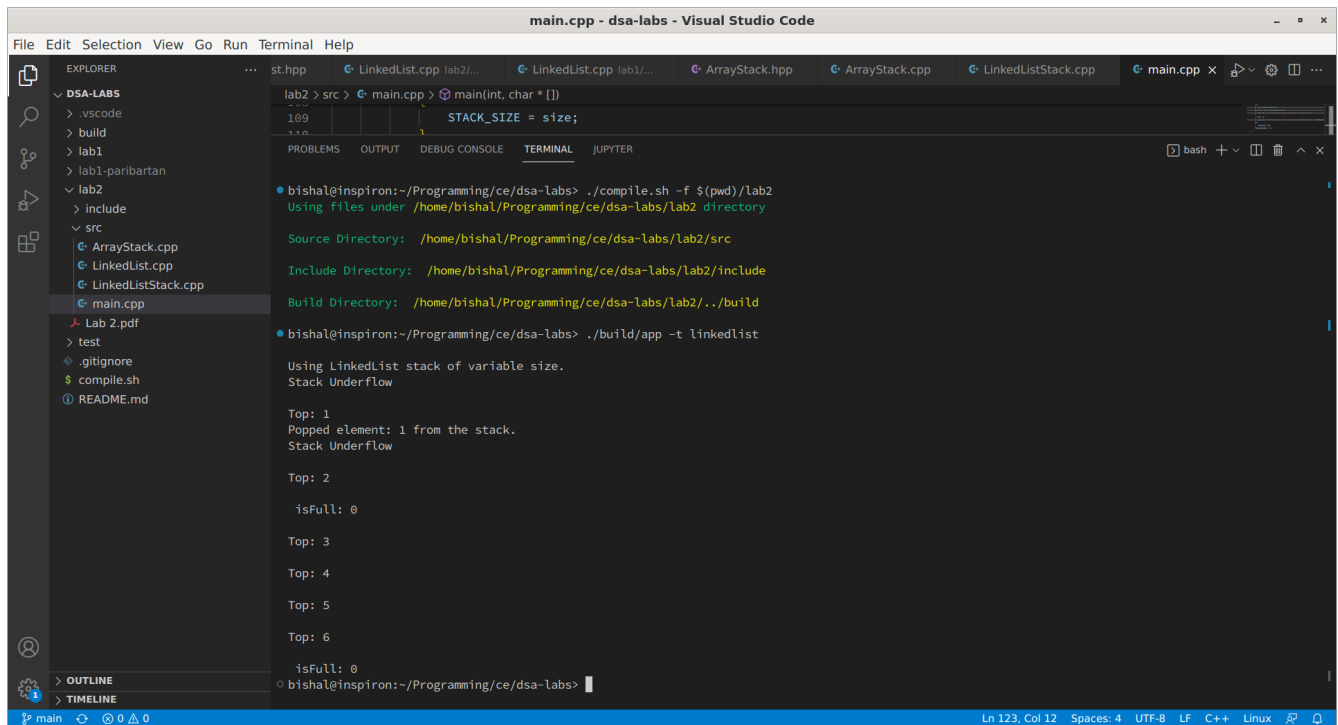
Rajani Chulyadyo, PhD

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Department of Computer Science and Engineering

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Output



```
main.cpp - dsa-labs - Visual Studio Code
File Edit Selection View Go Run Terminal Help

EXPLORER
  DSA-LABS
    .vscode
    build
    lab1
    lab1-paribartan
    lab2
    include
    src
      ArrayStack.cpp
      LinkedList.cpp
      LinkedListStack.cpp
      main.cpp
    Lab 2.pdf
    test
    .gitignore
    compile.sh
    README.md

main.cpp
lab2 > src > main.cpp > main(int, char * [])
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PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
bishal@inspiron:~/Programming/ce/dsa-labs> ./compile.sh -f $(pwd)/lab2
Using files under /home/bishal/Programming/ce/dsa-labs/lab2 directory

Source Directory: /home/bishal/Programming/ce/dsa-labs/lab2/src
Include Directory: /home/bishal/Programming/ce/dsa-labs/lab2/include
Build Directory: /home/bishal/Programming/ce/dsa-labs/lab2/build

bishal@inspiron:~/Programming/ce/dsa-labs> ./build/app -t linkedlist

Using LinkedList stack of variable size.
Stack Underflow

Top: 1
Popped element: 1 from the stack.
Stack Underflow

Top: 2
isFull: 0

Top: 3

Top: 4

Top: 5

Top: 6
isFull: 0
bishal@inspiron:~/Programming/ce/dsa-labs>
```

Image 1: Compilation and execution with stack type set as variable linked list stack

Here, compilation is done through by using a shell script. The scripts accepts three arguments, one is the parent directory containing include and src folder which should be followed by -f flag, another is the build directory which should be followed by -b flag and the last one is -r flag which determines if the executable created must be executed or not.

Example usage: `./compile.sh -f lab2 -b build -r`

This will set the parent directory to `./lab2` build folder to `./build` and will run the executable after compilation.

The program also utilized command line arguments passed to the main function. Here the possible arguments are:

- --type or -t which is used to specify the type of stack, if linked-list is passed then it will use linked-list stack else it will always use array stack.
- --size or -s which is used to specify the size of the created stack, if nothing is passed then fixed sized stack of predefined size is used in case of array stack and dynamic sized stack is used which don't have fixed size in case of linked-list stack

Here, setting of the stack sized is done dynamically at runtime with Dynamic Memory Allocation.

```
● bishal@inspiron:~/Programming/ce/dsa-labs> ./build/app -t linkedlist

Using LinkedList stack of variable size.
Stack Underflow

Top: 1
Popped element: 1 from the stack.
Stack Underflow

Top: 2

isFull: 0

Top: 3

Top: 4

Top: 5

Top: 6

isFull: 0
```

Image 2: Linked list stack of variable size

Here, `./build/app -t linkedlist` runs the compiled binary by setting the stack type as dynamically sized linkedlist.

The main program also consists of test functions to test the different functions of a stack. The above output shows the testing of `top()`, `push(data)`, `isEmpty()`, `pop()` and `isFull()` functions.

The top value is checked after each push and pull, if the stack is empty and we try to pop, stack underflow exception is thrown and likewise, if the stack is full and we try to push, stack overflow exception is thrown, both of which are printed to the console.

```
● bishal@inspiron:~/Programming/ce/dsa-labs> ./build/app --type linkedlist --size 5

Using LinkedList stack of size 5.
Stack Underflow

Top: 1
Popped element: 1 from the stack.
Stack Underflow

Top: 2

    isFull: 0

Top: 3

Top: 4

Top: 5

Top: 6

    isFull: 1
Stack Overflow

Top: 6
○ bishal@inspiron:~/Programming/ce/dsa-labs> █
```

Image 3: Linked list stack of fixed size

Here, `./build/app --type linkedlist --size 5` runs the compiled binary by setting the stack type as fixed sized linked-list stack of size 5.

The last `isFull()` function returns true as the stack is fixed sized and after pushing 5 elements, it is full.

Any subsequent efforts to push element into the stack will result in stack overflow error.

```
Top: 0
● bishal@inspiron:~/Programming/ce/dsa-labs> ./build/app --size 5

Using Array stack of size 5.
Stack Underflow

Top: 1
Popped element: 1 from the stack.
Stack Underflow

Top: 2

    isFull: 0

Top: 3

Top: 4

Top: 5

Top: 6

    isFull: 1
Stack Overflow

Top: 6
○ bishal@inspiron:~/Programming/ce/dsa-labs> █
```

Here, `./build/app --size 5` runs the compiled binary by setting the stack type as fixed stack array stack of size 5. If anything is passed in `--type` or `-t` argument other than `linkedlist`, array stack is used.

The setting of size of array stack is also done at runtime through DMA, this makes it possible to change the size of stack without recompiling the program files.