Habib University
Operating Systems - CS232

Lab 07: Static and Dynamic Libraries

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Exercise: Convert the codes for the linked list in Lab04 into functions and expose them in the form of a dynaically linked-library.

The Lab 04 code has been modified for the purpose of this lab. "node.h" and "node.c" files have been created that create a node header seperately that can be included within the stack, linked list, and main files. The "node.h" file contains the following code:

```
#ifndef NODE_H
#define NODE_H

struct node{
    int val;
    struct node* next;
};

#endif // !NODE_H
```

Listing 1: Node Header

The "node.c" just simply includes the header, and nothing else. This, along with the headers for the stack and linked list, are included in the main file.

The stack, dynamic list and main files have been submitted along with this PDF.

A "Makefile" has been created for the purpose of compiling, creating the library, and linking the main file to the library. The library is created dynamically. The "Makefile" is as follows:

```
build:
  gcc -Wall -fPIC -c node.c
  gcc -Wall -fPIC -c my_stack.c
  gcc -Wall -fPIC -c dynamic_list.c
  gcc -shared -o mylib.so my_stack.o dynamic_list.o node.o
  cp mylib.so /usr/lib
  ldconfig
  gcc -Wall -c main.c
  gcc -Wall -o a.out main.o mylib.so
  ldd a.out

run:
  ./a.out
```

```
14
15 clean:
16   rm -f *.o *.so a.out
```

Listing 2: Makefile

1. **Build:** To build the library and link it to the main program, write the following command in the terminal ‘‘`sudo make build`’’, here sudo is important as the library is being copied to the `/usr/lib` directory, and configured by `ldconfig` which both require `sudo` access.
2. **Run:** To run the program, write the following command in the terminal ‘‘`make run`’’.
3. **Clean:** To clean or remove the created files and library, write the following command in the terminal ‘‘`make clean`’’.