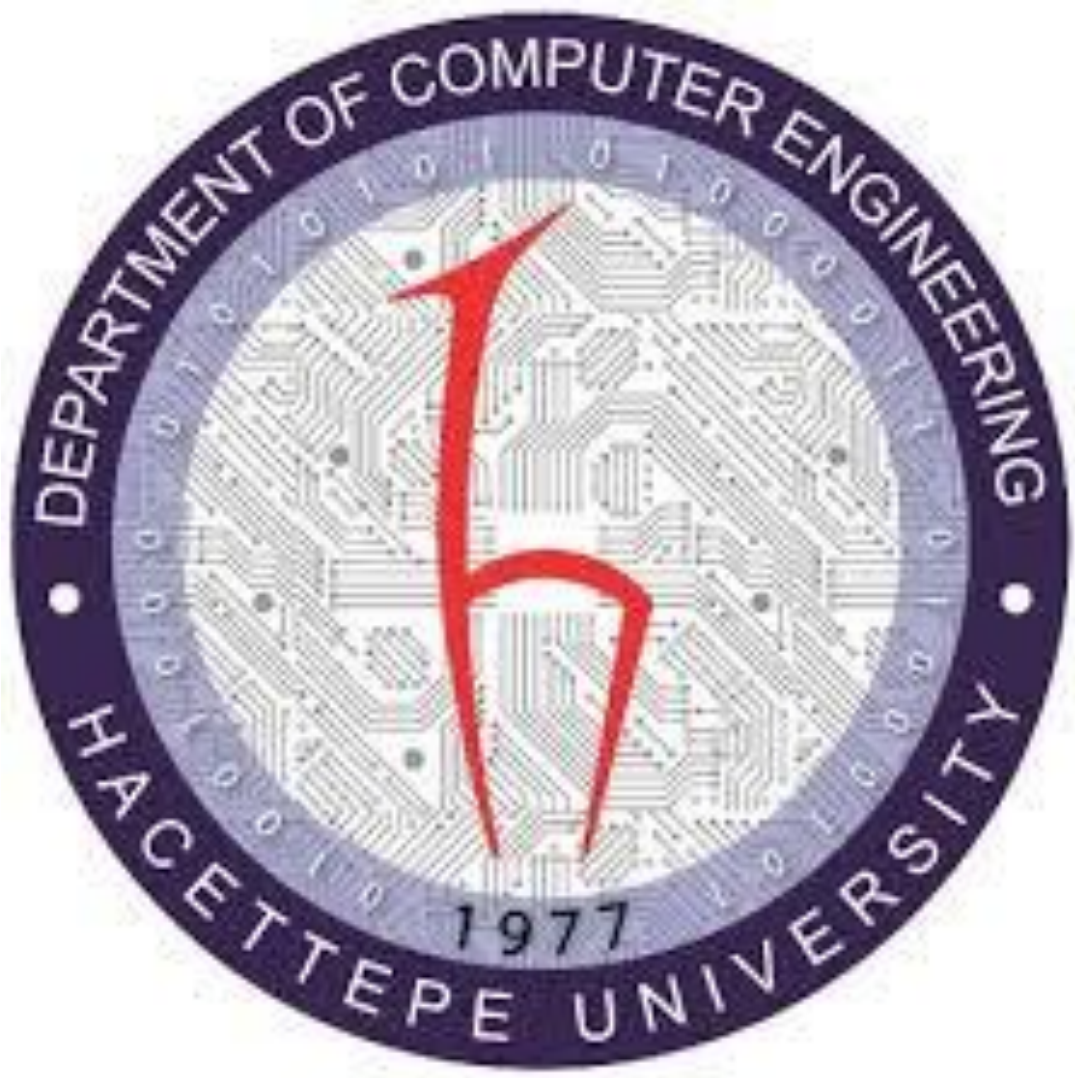

PROGRAMMING ASSIGNMENT 2
HÜBMB Computer Networking

Subject: Stack, Queue, and Dynamic Memory Allocation
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Programming Language: C
Due Date: 25.11.2018 (23:59:59

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INTRODUCTION / AIM:

In this assignment we are expected to gain knowledge on C language including read-write files,arrays,stacks,recursion,queues and dynamic memory allocation.

PROBLEM DEFINITION:

In this assignment our task is to design a simple version of network communication between peers withina network; that is, to implement a highly simplified computer networking protocol family similar to the Internet protocol suite.

How Program Starts?:

My program starts by taking command line arguments, storing them into their original type and opening given input files to get the information in them.I already created my structs because i will use them with the input files.My program creates dynamic client array and stores them into that array.And updates their attributes with the given inputs.After that i arrange their routings which helps to rotate them.After that my loop starts which looks at the commands and performs the wanted action and this goes on until the end of command file.

How do I store things?

I have used dynamic memory allocation to allocate enough memory for my both struct attributes.I have 2 arrays which hold objects created from structs.

I also use dynamic frames and dynamic outgoing and incoming queues for them to store the frames.My program allocates enough memory if i know the size of something.By doing that we dont waste any unnecessary space.Also for my client logs, i use dynamic memory allocation.Other than i also have static arrays with the known sizes which holds temporarly values.I also have other variables to store spesific values,pointers to use them in my functions.

My Functions:

This is my recursive findTarget function which finds the target from the routing table,updates the both clients incoming,outgoing queues,updates their logs,checks if it reached its target or its target is unreachable or not.

```
void findTarget(Node array[],int indexOfFrom,int indexOfTo,int
numOfFrame,int numOfNodes,int* hopptr,int* checkptr,char
message[],Frames frame[],int* frameptr,int holder)
```

And this is my remove function which removes the given frame from the clients outgoing queue

```
Frames removeq(Node array[],int from,int i)
```

And this is my insert function which adds the given frame to clients incoming queue.

```
void insertq(Node array[],Node array2[],int to,int i,int from)
```

This is my pushLayer function which push the layer into my layer stack because in stacks first in leaves last.This function checks the layer and pushes in into frame stack.

---

pushLayer(Frames frame[],char string,char* string2,char* string3,int* layer,int findex)*

My pop function to pop frames and perform some required actions with them and loads it into the clients needed queue.

Frames pop(Frames frame[],int frameptr)*

My queue adder function works like insert function but this time only adds the given pointer.İnsert adds between clients, this one adds frame to senders outgoing.

---

void addqueue(Node array[],int indexOfFrom,int i,Frames frame[],int numOfFrame,int frameptr)*

My Structs

My frame struct which has 4 attiribute and all of them are dynamic allocated.I create a frame and uptade their attributes with this struct structure.

---

typedef struct Frames{

*char** physical;*

*char** network;*

*char** transport;*

```
char** application;

} Frames;
```

My Nodes struct which holds all information about clients,their routings,logs,their incoming and outgoing queues.

```
typedef struct Nodes{
```

```
char ID[5];

char IP[20];

char MAC[20];

char* destination;

char* neighbor;

Frames* inqueue;

Frames* outqueue;

int isiEmpty;

int isoEmpty;

char ***log;

} Node;
```

My Detailed Algorithm

My program starts with taking command line arguments.After that i open input files and start to fill my structure with the informations given in the input files.I update my node struct with the client and routing files.After that i open the command file get the size of the message and how many frames will i use in this assignment.With these variables, i open my structer arrays which holds the objects created from my structs.After that i start reading commands, i do that in one while loop which takes the line,splits the line and than searches through the if statements to find the right action.If the wanted command is message command, i split the line into tokens,take the sender and the destination from tokens,split the message into wanted message size,and update my array which hold frame objects with the informations i took from the line and also the clients attributes.I do the updating part with the pushLayer function which implies to my stack.After than i write the all frames attributes to show that my code works correct and it splits,updates them correctly.After updating the frames, i just update the senders outgoing queue with the pop operation.But if command is show frame info i just take clients id, incoming or outcoming information and the wanted frame.If the wanted frame is outgoing,i check that if that clients wanted queue is empty or not.If not empty and the wanted size is lesser than my number of frames, program just writes the information about that queue.If the command is queue info, i check if it is empty or not if empty we just print number of frames which is zero at that case,if not i just check and print the number of frames that client have in his outgoing or incoming queue.If the command is send,i just call my recursive send function which takes array of clients,array of frame,sender and reciever's id,number of frames,message and other variables which help me check certain sitations.What send function does is it checks if sender can reach reciever

direcly or with another client if it reaches with another client finds that client that client becames receiver and it updates its incoming queue with the senders outgoing queue, and it also allocates and updates their log.After that receiver becames sender, and we find that if sender reaches target with a client or directly and these steps go on until it reaches to target with no helper client.We check that condition from their routing table if it is destination and the neighbor are the same that means it can reach directly to that client.I aslo check that if that target is reachable or not if not, packets are dropped after perfoming certain actions.And if program fails to receive that message, it says after the function ends and prints the given message.If the command is print log, program takes the wanted clients id, finds that id and checks if that clients have done anything or not,If client made some transporting, if prints that clients log which includes local time, senders id, receivers id,number of hops,activity and success.And if the command is something else which is considered as invalid command and prints invalid command in screen.This is my algorithm works under different sitations and always ready to transport the messages between clients.