

**OBJECTIVE** : Stack Exercises**Instructor** : Burcu LIMAN**Assistants** : Berk ÖNDER - Engin Zafer KIRAÇBEDEL**Copy the stack\_int.h file from Moodle to each of your local project folders and modify it when necessary!**

**Q1.** Write a C program that will read a number bigger than 10 and print all of its digits via usage of a stack.

**Project Name:** LG16\_Q1**File Name:** Q1.cpp**Example Run:**

```
Enter a number: 9
Enter a number: 4
Enter a number: 2
Enter a number: -96
Enter a number: -2
Enter a number: 13
Digits of 13 are 1 3
```

**Q2.** Make the necessary changes in the header file to create a **structure** stack. Structure will keep the **name** and **age** of a person.

Write a C program that reads some **commands** and **information (name and age)** from a file named "**commands.txt**". Program should do the following tasks according to commands from the file:

- "**Push**" push the person info into the stack
- "**Pop**" pop a person from the stack and give a message as in the example run.
- "**Display**" display all people in the stack without removing the items.

**Project Name:** LG16\_Q2**File Name:** Q2.cpp**Example Run:**

```
SULE and 33 is removed from the stack
AHMET and 12 is removed from the stack
```

```
Stack content is
AYLA      60
AYSE      32
```

```
CAN and 44 is removed from the stack
ELIF and 71 is removed from the stack
AYLA and 60 is removed from the stack
AYSE and 32 is removed from the stack
```

```
Sorry stack is empty!
```

```
BORA and 32 is removed from the stack
KAAN and 28 is removed from the stack
```

```
Stack content is
MERT      91
HASAN     52
ZEYNEP    51
BURCU     15
BERK      23
```

**commands.txt**

```
Push AYSE 32
Push AHMET 12
Push SULE 33
Pop
Pop
Push AYLA 60
Display
Push ELIF 71
Push CAN 44
Pop
Pop
Pop
Pop
Push BERK 23
Push BORA 32
Pop
Push BURCU 15
Push KAAAN 28
Pop
Push ZEYNEP 51
Push HASAN 52
Push MERT 91
Display
```

**Q3.** A **palindrome** is a word, phrase, number or other sequence of units that has the property of reading the same in either direction.

Write a C program that reads several sentences from a text file named **palindrome.txt**, finds and displays only the palindromes on the screen.

Make the necessary changes in the stack header file to create a **character** stack.

Write the following functions;

- **isLetter:** gets a character as parameter and checks whether the given character is a letter. If the character is a lowercase/uppercase letter the function returns 1, 0 otherwise.
- **removePunct:** gets a string as parameter removes all characters except the letters (punctuation etc.) from the string.
- **palindrome:** gets a string as parameter and returns 1 if the string is palindrome, 0 otherwise.

(**Hints:** Make the check by using a character stack. Use toupper function to ignore the case differences!)

**Example Run:**

```
TaCoCAT
EyedipAdanadaPideye
AmoreRoma
StepOnNOpeTS
Borroworrob
NeverODDoReVEN
WasitacaroracatIsaw
```

**Palindrome.txt**

```
TaCo CAT
StuDy hard
Ey edip Adanada Pide ye
Amore, Roma.
UFo taFu
Sun Shine
Step On NO peTS
Borrow or rob?
bAnana
Never ODD oR eVEN
cat Hate Water
Was it a car or a cat I saw?
```

**Project Name:** LG16\_Q3

**File Name:** Q3.cpp

**Q4.** Write a C program that reads several sentences (maximum size of a sentence 100 chrs) from the "**sentences.bin**", generates the reverse of each sentence by using the following function, then displays the reversed version on the screen.

Write the following function;

- **reverse:** gets a string as parameter, and returns the same string by reversing the order of the words making use of a stack. (e.g, If it takes the string "*microsoft visual studio*", it will return the same string as "*studio visual microsoft*")

**Project Name:** LG16\_Q4

**File Name:** Q4.cpp

**Example Run:**

```
The Original Sentence is : Carmakers strive to stay ahead of hackers
Reverse of the sentence is: hackers of ahead stay to strive Carmakers
```

```
The Original Sentence is : The sunset over the ocean was absolutely stunning
Reverse of the sentence is: stunning absolutely was ocean the over sunset The
```

```
The Original Sentence is : I love spending time with my family and friends
Reverse of the sentence is: friends and family my with time spending love I
```

```
The Original Sentence is : Learning a new language can be challenging but also rewarding
Reverse of the sentence is: rewarding also but challenging be can language new a Learning
```

## Additional Question

**AQ.** A project management firm stores the information of the projects in two binary files (projects' information in **projects.bin** and teams' information in **teams.bin**). For each project 3 teams works together. You will write a program to display a menu, read the user's choice and display the projects' information in detail or add a new project or remove a completed project from the list by using stack (If the given project name doesn't exist in the list, it will display an appropriate message).

Binary files' contents are as follows;

- **"teams.bin"** includes **teamCode** (int), **teamName** (20 chars) and **teamProject** (20 chars). **Ex:** 5000 Paladins Coding.
- **"projects.bin"** includes **projectName** (20 chars), **profit** (double) and **teamCodes** (int teams[3]).

**Ex:** TUBITAK 25000 5000 5004 5005

Write the following functions;

- **menu:** displays a menu, reads-validates and returns the user's choice.
- **projectsToStack:** gets a binary file pointer and a stack as parameters, reads the project information from the file and inserts them into the stack.
- **display:** gets a binary file pointer and a stack as parameters, displays the project information in the stack, finds the detailed team information in the binary file named **"teams.bin"** and displays these information as in the example run.

**Hint:** To read a team record from the file, you will need to determine its position on the file. This is easily done by subtracting 5000 from the team number and using the *fseek* function.

- **completeProject :** gets a stack and the project name which was completed, finds the given project in the stack, displays the profit for the project and deletes this project from the stack. The function returns 1 if the project was deleted from the stack, otherwise returns 0.
- **addNewProject :** gets a stack as parameter, reads the new project's information from the user, inserts this project to the stack and displays an appropriate message for the user.

**Project Name:** LG16\_AQ

**File Name:** AQ.cpp

### Example Run:

```
MENU
*****
1. Display all of the jobs
2. Complete the Project
3. Add a new project
4. Exit

Enter your choice: 1

Project: TAI, profit: 30000.00 TL
5000 Paladins Coding
5007 Rampage Test
5008 Scorpions Documentation
*****
Project: BILKENT, profit: 12000.00 TL
5003 Riot Coding
5001 Rams Test
5005 Railsplitters Documentation
*****
Project: EGO, profit: 3000.00 TL
5006 Raptors Coding
5001 Rams Test
5008 Scorpions Documentation
*****
Project: HAVELSAN, profit: 17000.00 TL
5003 Riot Coding
5007 Rampage Test
5002 The Curse Documentation
*****
Project: TUBITAK, profit: 25000.00 TL
5000 Paladins Coding
5004 Seawolves Test
5005 Railsplitters Documentation
*****

MENU
*****
1. Display all of the jobs
2. Complete the Project
3. Add a new project
4. Exit

Enter your choice: 2
Enter the project name to complete : ASELSAN
There is NO project belonging to the ASELSAN

MENU
*****
1. Display all of the jobs
2. Complete the Project
3. Add a new project
4. Exit

Enter your choice: 2
Enter the project name to complete : BILKENT

Congratulations :)
You finished the BILKENT's project.
You will get 12000.00 TL profit from this project.
```

```
MENU
*****
1. Display all of the jobs
2. Complete the Project
3. Add a new project
4. Exit

Enter your choice: 3

Enter the project name : ASELSAN
Enter the profit : 25000
Enter three team codes: 5003 5001 5005

New Job is added to the list.

MENU
*****
1. Display all of the jobs
2. Complete the Project
3. Add a new project
4. Exit

Enter your choice: 1

Project: ASELSAN, profit: 25000.00 TL
5003 Riot Coding
5001 Rams Test
5005 Railsplitters Documentation
*****
Project: TAI, profit: 30000.00 TL
5000 Paladins Coding
5007 Rampage Test
5008 Scorpions Documentation
*****
Project: EGO, profit: 3000.00 TL
5006 Raptors Coding
5001 Rams Test
5008 Scorpions Documentation
*****
Project: HAVELSAN, profit: 17000.00 TL
5003 Riot Coding
5007 Rampage Test
5002 The Curse Documentation
*****
Project: TUBITAK, profit: 25000.00 TL
5000 Paladins Coding
5004 Seawolves Test
5005 Railsplitters Documentation
*****

MENU
*****
1. Display all of the jobs
2. Complete the Project
3. Add a new project
4. Exit

Enter your choice: 4
```