UNIVERSITY OF DODOMA

COLLEGE OF INFORMATICS AND VIRTUAL EDUCATION.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING.

INDIVIDUAL ASSIGNMENT

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PROGRAM NAME: SOFTWARE ENGINEERING (SE).

COURSE NAME: INTRODUCTION TO HIGH LEVEL PROGRAMMING

COURSE CODE: CP 123

INSTRUCTOR:Prof Mselle

ASSIGNMENT DEADLINE: 6TH APR 20

Question:
Create a program using recurcive functions and disect it using RAM DIAGRAMS line by line.

ANSWER:
The following program created using recurcive functions.
It performs addition of the students names in a string to create a single line string of names.
The user will be prompt to enter the number of the students and then will be directed to the fuction to enter that list of names depending on the number entered.

C++ CODE FOR A PROGRAM:

```
#include <iostream>
#include <string>
using namespace std;

void inputNames(string& names,int numStudents)
 {
 if(numStudents == 0)
 {
 return;
  }
 string name;
 cout<<"Enter the name of student"<<numStudents<< ": ";
 cin>>name;
 names+=name + ", ";
 inputNames(names, numStudents -1);

 }

 int main()
 {
 int numStudents;
 string names;
 cout<<"Enter number of students: ";
 cin>>numStudents;

 inputNames(names, numStudents);
 cout<<"The name of Students are :"<<names<<endl;
 }
```

DISSECTION OF A PROGRAM USING RAM DIAGRAM

This section gives out visual understanding on how RAM in a computer works as the program executes/run

LINE BY LINE DISSECTION:

Initially the program will start with pre processors:

#include <iostream> - include a library for standard input and output

#include <string> - include the library for string class and its associated function

using namespace std; - provide a set of functions,class and objects for common task such as input and output.

here the RAM will apper to be free and no any room reserved for a data to be stored.

RAM
FREE
FREE
FREE
FREE
FREE
FREE

Execution of main function;

After that the program will start to execute the main function where it will reserve space in a RAM that has been declared in a main function as well as inputNames function.

execution: int numStudents;

RAM	NAME OF VARIABLES
RESERVED	numStudents
FREE	
FREE	
FREE	
FREE	
FREE	

execution: string names;

RAM	NAME OF VARIABLES
RESERVED	numStudents
RESERVED	names
FREE	
FREE	
FREE	
FREE	

execution: cout<<"Enter number of students: ";
This will prompt the user with a message"Enter number of students : "

execution: cin>>numStudents;
This will allow the user to enter value to the variable called numStudents;
Assume the user enter : 4

RAM	NAME OF VARIABLES
4	numStudents
RESERVED	names
FREE	
FREE	
FREE	
FREE	

Execution: inputNames(names, numStudents);
In this section the main function will call the function called " inputNames" and put values in a function
Therefore the function will start to excutes its statements

inside the function the first thing will check the condition

```
if(numStudents == 0)
 {
 return;
  }
```

This condition will only be the user enter the numStudents = 0 where the program will close and return nothing since there is non number of student to be written.

Execution: string name; this will reserve the space in a RAM called name.

RAM	NAME OF VARIABLES
4	numStudents
RESERVED	names
RESERVED	name
FREE	
FREE	
FREE	

Execution: cout<<"Enter the name of student"<<numStudents<< ": ";
In this line the program will prompt user to Enter the name of student with a last number 4

Execution: cin>>name;
The program will alow the user to input the value to the variable name.
Assume the user enter: ELIA

RAM	NAME OF VARIABLES
4	numStudents
RESERVED	names
ELIA	name
FREE	
FREE	
FREE	

Execution: names+=name + ", ";
This statement will assign the value of name to names and add some text which is " ,"

RAM	NAME OF VARIABLES
4	numStudents
ELIA,	names
ELIA	name
FREE	
FREE	
FREE	

Execution: inputNames(names, numStudents -1);
This statement will recall the function holding the value of names and numStudent where it is reduced by 1

RAM	NAME OF VARIABLES
3	numStudents
ELIA,	names
ELIA	name
FREE	
FREE	
FREE	

The program will start to execute the function again for the second time. and will follow the same procedure as the first

Execution: cout<<"Enter the name of student"<<numStudents<< ": ";
In this line the program will prompt user to Enter the name of student again with number 3

Execution: cin>>name;
The program will alow the user to input the value to the variable name for another time.
Assume the user enter: JAMES

RAM	NAME OF VARIABLES
3	numStudents
ELIA,	names
JAMES	name
FREE	
FREE	
FREE	

Execution: names+=name + ", ";
This statement now will add the value of name to names .

RAM	NAME OF VARIABLES
3	numStudents
ELIA, JAMES,	names
JAMES	name
FREE	
FREE	
FREE	

Execution: inputNames(names, numStudents -1);
This statement will recall the function holding the value of names and numStudent where it is reduced by 1

RAM	NAME OF VARIABLES
2	numStudents
ELIA, JAMES,	names
JAMES,	name
FREE	
FREE	
FREE	

Execution: cout<<"Enter the name of student"<<numStudents<< ": ";
In this line the program will prompt user to Enter the name of student again with number 2

Execution: cin>>name;
The program will alow the user to input the value to the variable name for another time.
Assume the user enter: NAOMI

RAM	NAME OF VARIABLES
2	numStudents
ELIA, JAMES, NAOMI	names
NAOMI	name
FREE	
FREE	
FREE	

Execution: names+=name + ", ";
This statement now will add the value of name to names .

RAM	NAME OF VARIABLES
2	numStudents
ELIA, JAMES, NAOMI	names
NAOMI	name
FREE	
FREE	
FREE	

Execution: inputNames(names, numStudents -1);
This statement will recall the function holding the value of names and numStudent where it is reduced by 1

RAM	NAME OF VARIABLES
1	numStudents
ELIA, JAMES, NAOMI	names
NAOMI	name
FREE	
FREE	
FREE	

Execution: cout<<"Enter the name of student"<<numStudents<< ": ";
In this line the program will prompt user to Enter the name of student again with number 1

Execution: cin>>name;
The program will alow the user to input the value to the variable name for another time.
Assume the user enter: LEAH

RAM	NAME OF VARIABLES
1	numStudents
ELIA, JAMES, NAOMI	names
LEAH	name
FREE	
FREE	
FREE	

Execution: names+=name + ", ";
This statement now will add the value of name to names .

RAM	NAME OF VARIABLES
1	numStudents
ELIA, JAMES, NAOMI	names
LEAH	name
FREE	
FREE	
FREE	

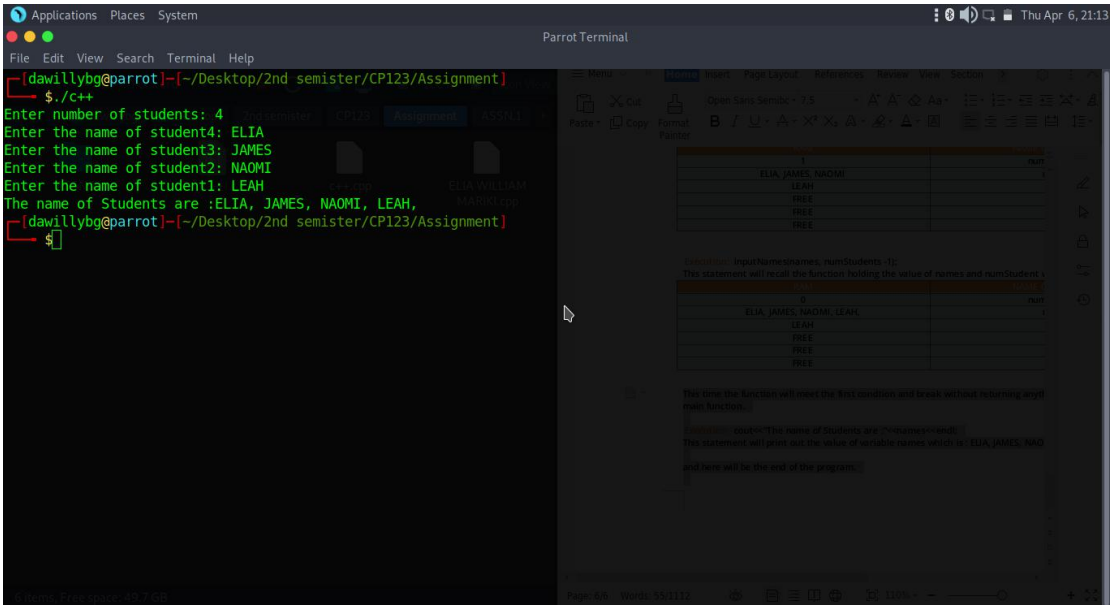
Execution: inputNames(names, numStudents -1);
This statement will recall the function holding the value of names and numStudent where it is reduced by 1

RAM	NAME OF VARIABLES
0	numStudents
ELIA, JAMES, NAOMI, LEAH,	names
LEAH	name
FREE	
FREE	
FREE	

This time the function will meet the first condtion and break without returning anything and will move on to the main function.

Execution: cout<<"The name of Students are :"<<names<<endl;
This statement will print out the value of variable names which is : ELIA, JAMES, NAOMI, LEAH,

and here will be the end of the program.


Applications Places System
Thu Apr 6, 21:13
Parrot Terminal
File Edit View Search Terminal Help
[dawillybg@parrot]-[~/Desktop/2nd semister/CP123/Assignment]
$./c++
Enter number of students: 4
Enter the name of student4: ELIA
Enter the name of student3: JAMES
Enter the name of student2: NAOMI
Enter the name of student1: LEAH
The name of Students are :ELIA, JAMES, NAOMI, LEAH,
[dawillybg@parrot]-[~/Desktop/2nd semister/CP123/Assignment]
$