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Group:group 1

Section:first year

COMPUTER PROGRAMMING LABORATORY

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TASK.

Write a program to play the Puzzle game. On N by M board there are M*N-1 numbered tiles and one missing space. It is randomly set up. To win the game, the player must slide tiles over to put the tiles back in order. The player should be able to choose any board size (in some range). Keep file with hall of fame for each board size.

PROJECT ANALYSIS.

Making a puzzle game of dimension of range from 3 to 6,the do-while loop is require with condition that dimension variable(row,col) must be equal,must not be less than 3 and must not be greater than 6: ((row!=col) || (col <3)||(col >6)).

Next step is using dynamic memory allocation to create a two-dimensional array variable(**puzzle) depending on the row and column inputed by the user,and also creating a similar two-diimensional array variable (puzzlechecher) which will be the one to check if the arranged puzzle are back in order and also depends on row and column inputed by the user.

The values of elements in variable (puzzlechecher) are filled in the way that the element is increasing from 1 to the product of row and column inputed by user minus one(row*col-1)and filling the last element of the 2-D array with 0.for example in case of order 3 by 3,this is how it looks internally.

1	2	3
4	5	6
7	8	0

Setting a random value to 2-D array variable (puzzle),a function (inside) accepting a 2-D array,row,column and temp value, returning interger is make to check the value of each element and make sure one value is not repeated twice with function rand().

In this form:

```
 int inside (int **arrays,int row,int col, int tmp)
{
            int i,j;
for(i = 0 ; i < row ; i++){
  for(j = 0 ; j < col ; j++){
   if(arrays[i][j]==tmp)
   return 1;
  }
}
return 0;
}
```

After this step the elements are randomly filled and one of this elements posses the value of (row*column) which we don’t require in our program,therefore another snippet of code is written to set this element to 0.for example incase the dimension is 3 by 3,the element that suppose to have the value 9 will be set to 0.

5	2	3
7	1	0
4	8	6

Next step is to print out the initial puzzle of imputed dimension using the function void(disp) which accept a pointer to 2-D array ,row and col.This function prints the elements and print a free space for any element having value 0.

```
void disp (int **arrays,int row,int col)
{
 int i,j;
 num=row*col;
gotoxy(15,5);
system("COLOR 0c");
 printf("\n");
 for(i=0;i<row;i++){
   for(j=0;j<col;j++){
        if(arrays[i][j]==0){
           printf(" ");
        }
        else {
            printf("%d",arrays[i][j]);
        }

        printf("\t");
  }
  puts("");
  printf("\n");
 }
}
```

Arrow keys to move are declare with character variable (arrowkey) in a while loop with function getch(),which allow the user to enter a key at a time and with condition that when letter ‘n ’ is press the game ends and while ‘w’ is press the free space swap the value with the element above on the same colomn,while ‘x ’ is press swap the value with the element below on the same column, while ‘a’ swap the value with element on the right and when ‘d’ with the element on left on the same row. It keeps repeating the getting the keys from the player until ‘n’ is press.

‘w’	UP
‘x’	DOWN
‘a’	RIGHT
‘d’	LEFT
‘n’	EXIT
ENTER	CONT

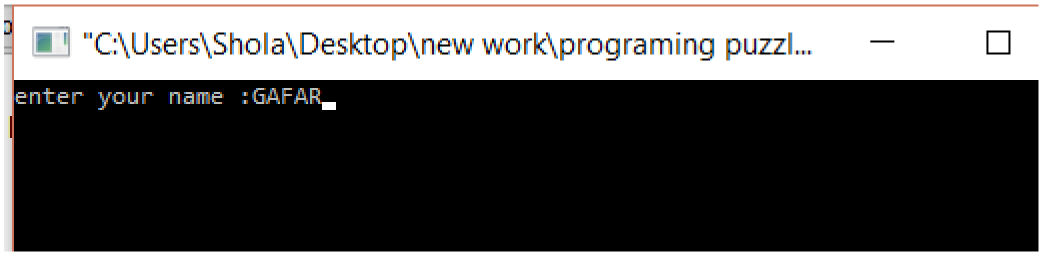
After every single key is press the program check if the elements are back in the right form with a function (Isdone) returning 1 or 0. if yes, the program just jump to the last parts and ends the game.also after every key is press the variable moves(storing the numbers of moves make) is increasing by 1.

To make a hall of fame for the game i am making use of a method of create a text file for every dimension,the file will be storing the name and the number of moves the player makes,i am using the format append so that the data in the file will not be clear each and everytime the code is run and for the first time user of the code the file is made with empty datas,variable (int a;) gets the best scores from the file in each and every case of the dimension.

If the player wins the game then his moves is compare with the best record,if he/she beat the record then he enters the hall of fame and vice versa.

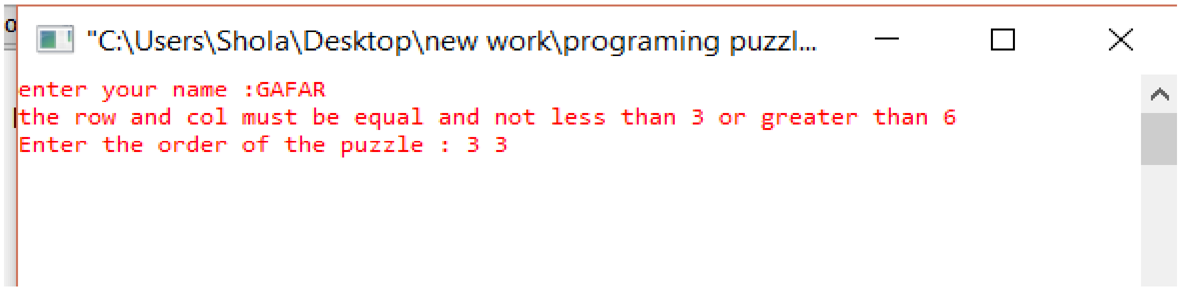
EXTERNAL SPECIFICATION.

The player should start by entering his/her name to the program in text format.



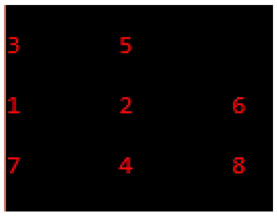
```
"C:\Users\Shola\Desktop\new work\programing puzzl...
enter your name :GAFAR
```

The player should enter the dimension of puzzle to play,note that the dimension must be in the range of 3 to 6 and the dimension must be equal and seperated with space or enter key.



```
"C:\Users\Shola\Desktop\new work\programing puzzl...
enter your name :GAFAR
the row and col must be equal and not less than 3 or greater than 6
Enter the order of the puzzle : 3 3
```

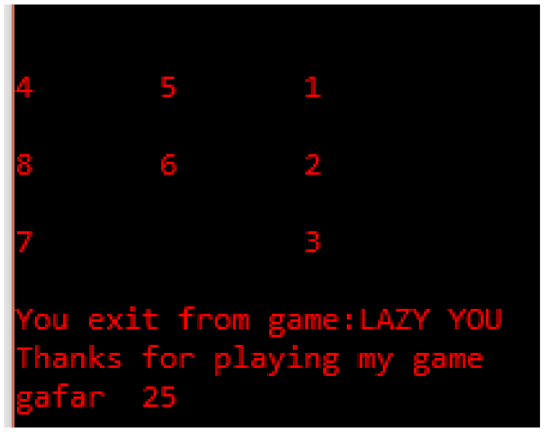
Incase of 3 by 3 this format of random number is printed on the screen.And also the text and the backgroud change with the use of an inboot function system('color fc').



```
3       5

1       2       6

7       4       8
```

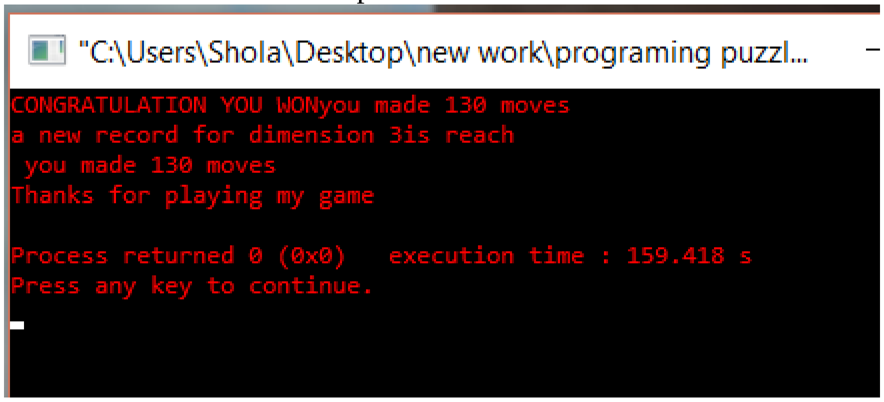
To move the numbers back in order the player will use the keys as provided above,after all the numbers are arrange back in order ,and the last element is free the player wins the game.

Incase the player press 'n ' to exit this is executed,that is end the running of the program.



```
4       5       1

8       6       2

7               3

You exit from game:LAZY YOU
Thanks for playing my game
gafar  25
```

And if he wins and attain a particular record score.



"C:\Users\Shola\Desktop\new work\programing puzzl...

```
CONGRATULATION YOU WONyou made 130 moves
a new record for dimension 3is reach
 you made 130 moves
Thanks for playing my game

Process returned 0 (0x0)   execution time : 159.418 s
Press any key to continue.
```

INTERNAL SPECIFICATION.

A variable of type character (arrowkey) is declare and letter attached with to the function getch() allow the user to input some keys from the keyboard and also perform some moves.
A file variable (fp1) is declare to store the best scores of players,A structure is form with member of character (to store the name of player),interger (to store their scores), and structure next to make a list from the file.

11 functions are declare in the program,each performing a different task.

- void disp (int **arrays,int row,int col),accepting a pointer to 2D array of type interger ,row and col,this function prints on the screen.

- int Isdone(int **puzzle1,int **puzzle2),this function accept two 2-D arrays and compare their elements with each other if the values are the same then it returns 1 if not it return 0.

- Void swapleft(int **array,int row,int col), the function basically swap the values with free space horizontal left while ‘a ’ is press.

- Void swapright(int **arry,int row,int col).the function performs similar tasks to swapleft,but in this case to the right while key ‘d ’ is press.

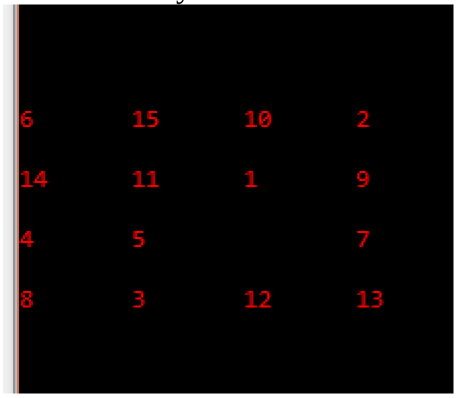
- Void swapdown(int **arra,int row, int col). The function swap the value with free space vertically up while key ‘x’ is press.

- Void swapup(int **arr,int row,int col). Perfoms similar operation to that of swapdown but in this case vertically up.

- Int inside(int **arrays,int row,int col, int tmp). Makes sure the same values are not repeated twice when using function rand().
- A structure is declare to make a record from our best scores and list of best players,having members of name and scores.
- Function add is define to make list of best players in desending order.
- Function reverse print to print them on screen when needed.

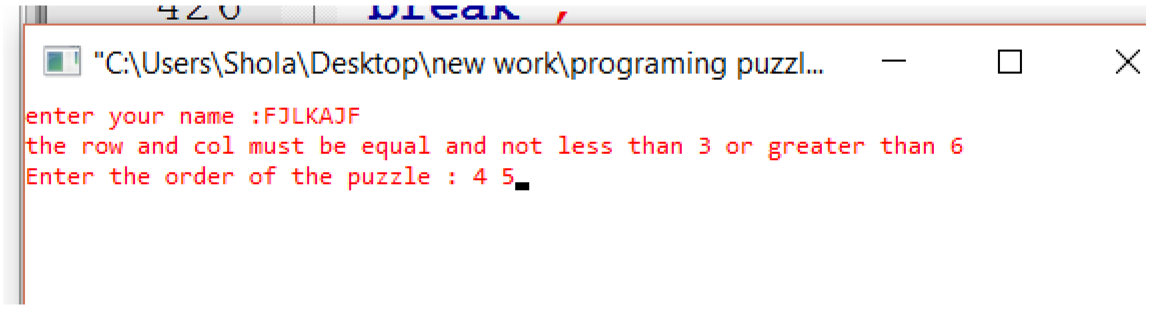
TESTING.

In case of 4 by 4 dimension.



```
6       15      10      2

14      11      1       9

4       5               7

8       3       12      13
```

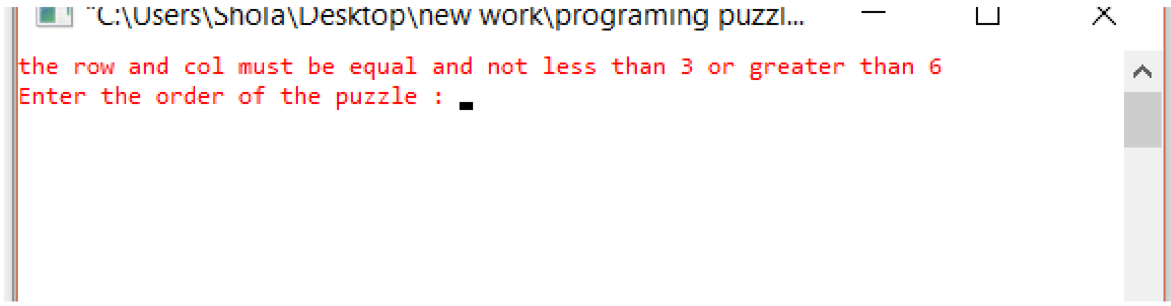
When the dimension enter is different.



"C:\Users\Shola\Desktop\new work\programing puzzl...

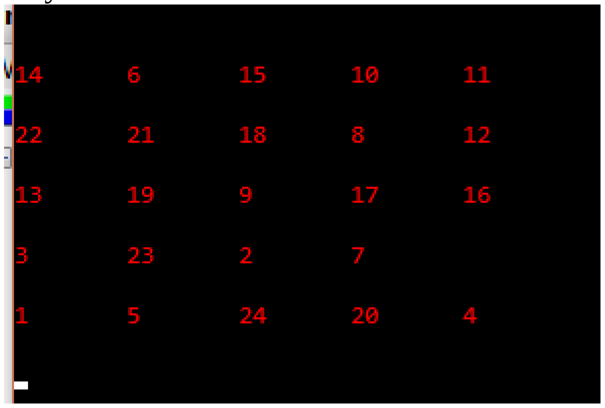
```
enter your name :FJLKAJF
the row and col must be equal and not less than 3 or greater than 6
Enter the order of the puzzle : 4 5
```

The program repeat the dimension request.



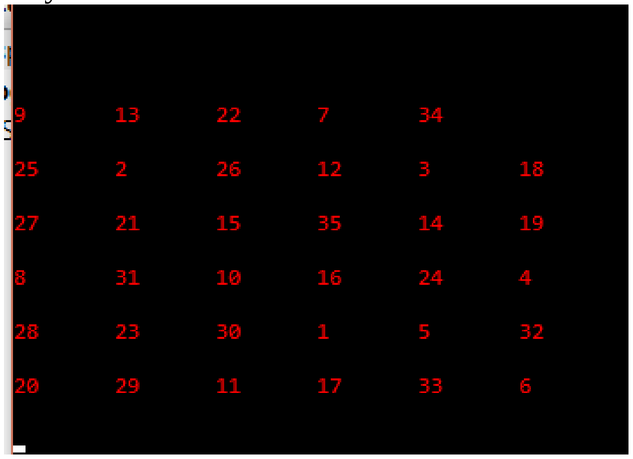
```
the row and col must be equal and not less than 3 or greater than 6
Enter the order of the puzzle :
```

5 by 5 dimension.



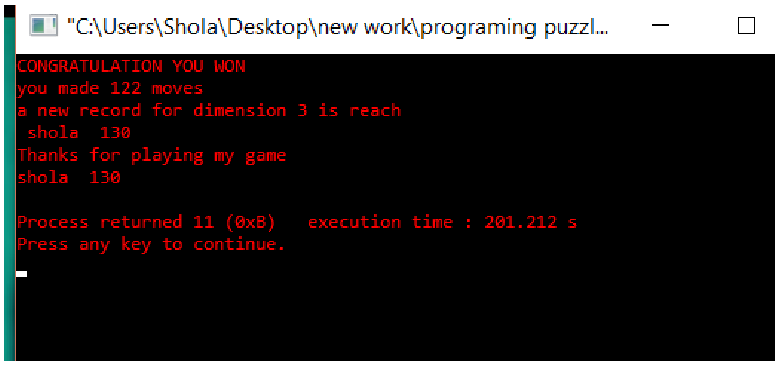
```
14      6       15      10      11

22      21      18      8       12

13      19      9       17      16

3       23      2       7

1       5       24      20      4
```

6 by 6 dimension.



```
9       13      22      7       34

25      2       26      12      3       18

27      21      15      35      14      19

8       31      10      16      24      4

28      23      30      1       5       32

20      29      11      17      33      6
```

Hall of fame. 3 by 3.



```
CONGRATULATION YOU WON
you made 122 moves
a new record for dimension 3 is reach
 shola  130
Thanks for playing my game
shola  130

Process returned 11 (0xB)   execution time : 201.212 s
Press any key to continue.
```