ACKNOWLEDGEMENT

We would like to express our special thanks to our computer teacher Mrs. Sumitha Suresh as well as our principal Mrs. Girija Baiju who gave us the golden opportunity to do this wonderful project in C++ to create our own Sudoku puzzle.

We would also like to thank our parents and friends who helped us a lot in finalizing and completing this project within the limited time frame.

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AIM

To use C++ to create a sudoku puzzle.

OVERVIEW

C++ is a statically typed, compiled, general purpose, case sensitive, free-form programming language that supports procedural, object-oriented, and generic programming.

It is regarded as a middle-level programming language as it comprises a combination of both high-level and low-level language features.

C++ was developed by Bjarne Stroustrup in 1979 at Bell Labs in Murray Hill, New Jersey, as an enhancement to the existing C language. It was originally named C with Classes but was later renamed to C++ in 1983. It is a superset of C, and virtually, any legal C program is a legal C++ program.

SYNOPSIS

We have used C++ to create a Sudoku game in which the player is given three lives.

REQUIREMENTS

(HARDWARE AND SOFTWARE)

WINDOWS	
HARDWARE	
RECOMMENDED	Intel Core ™ 2 Duo processor or Intel Xeon processor or higher
MINIMUM REQUIREMENTS	One of the following: • Intel Pentium 4 processor family and higher • Intel ® Xeon Pha[m] coprocessor • Non-Intel processors compatible with above processors

SOFTWARE	
RECOMMENDED	○ Intel Parallel Studio XE 2013 SPI ○ Intel Parallel Studio XE 2015 Professional Edition
MINIMUM REQUIREMENTS	• One of the following OS: ○ Microsoft Windows 8, 8.1 ○ Microsoft Windows 7 SP 1 ○ Microsoft Windows Server 2012 ○ Microsoft Windows 2008 ○ Microsoft Windows HPC Server • One of the following compilers: ○ Intel C++ Compiler 13.1 and higher ○ Microsoft Visual Compiler 2010 and higher

LINUX

HARDWARE	
RECOMMENDED	• Intel Core 2 Duo processor or higher • Intel Xeon Phi coprocessor

MINIMUM REQUIREMENTS	• One of the following:
	  ○ Intel Pentium 4 processor family
	  ○ Intel® Xeon coprocessor or higher
	  ○ Non-Intel but corresponding processors

SOFTWARE	

MINIMUM REQUIREMENTS	• One of the following OS:
	  ○ Red Hat Enterprise Linux 5, 6, 7
	  ○ Fedora 20
	  ○ Debian 6.0, 7
	  ○ Intel Cluster Ready
	• One of the following compilers:
	  ○ Intel C++ Compiler 13.1
	  ○ Parallel Studio XE 2013

RECOMMENDED	• Intel Parallel Studio XE 2013 SP1 • Intel Parallel Studio XE 2015 Professional Studio

HEADER FILES

The following header files were included in the program:

- iostream.h: To include cin, cout.
- conio.h: To include clrscr(), getch().
- process.h: To include exit().

FUNCTIONS

The following built-in functions are used in the program:

- clrscr(): Function to clear the output.
- getch(): Function to hold the output window until hitting any key from the keyboard.
- exit(): Function to exit the program.

A function was defined to display the Sudoku puzzle after each entry of the answer.

```
void display(char s[][25])
{
  cout<<"\n---------------------------------";
  for(int i=0;i<6;i++)
  {
    cout<<"\n";
    for(int j=0;j<25;j++)
       cout<<s[i][j];
    if(i==1||i==3)
      cout<<"\n---------------------------------";
  }
 cout<<"\n---------------------------------";
 return;
}
```

ALGORITHM

Step 1: Start

Step 2: Create a Sudoku puzzle using a 2D character array

Step 3: life←3, count←24.

Step 4: Print the puzzle.

Step 5: Enter position and corresponding answer

Step 6: If the answer is correct then count=count-1. Print the puzzle with the answer in place of the position entered.

Step 7: Else, life←life-1, count←count-1.

Step 8: If the user enters 0, exit program.

Step 9: Else if life=0 or count=0, exit program.

Step 10: Else, go back to step 5.

Step 11: If count=0, print “Congratulations!”

Step 12: Else print “Better luck next time!”

Step 13: Stop.

SOURCE CODE

```
#include<iostream.h>
#include<conio.h>
#include<process.h>
void display(char s[][25])
{
 cout<<"\n------------------------";
 for(int i=0;i<6;i++)
 {
  cout<<"\n";
  for(int j=0;j<25;j++)
  cout<<s[i][j];
  if(i==1||i==3)
  cout<<"\n------------------------";
 }
 cout<<"\n------------------------"<<endl;
 return;
}
void main()
{
```

```
 clrscr();
 char s[6][25]={"|  4  A  B  |  C  D  3  |", "|  E  3  1  |  F  G  H  |",
                "|  I  J  K  |  3  6  L  |", "|  M  2  N  |  5  O  P  |",
                "|  1  Q  R  |  S  T  5  |", "|  U  V  3  |  W  2  X  |"};
 char pos, ans;
 int count=24, life=3;
 char sol[24]={'6', '5', '2', '1', '2', '4', '5', '6', '5', '1', '4', '2', '3'
                    ,'6', '4', '1', '4', '2', '6', '3', '6', '5', '1', '4'};
 do
 {
  clrscr();
  cout<<"\n SUDOKU:";
  cout<<"\n RULES:\n 1. Positions must be entered in uppercase only!";
  cout<<"\n 2. You have three lives which will decrease with a wrong answer.";
  cout<<"\n 3. Press enter to continue.";
  cout<<"\n 4. Enter 0 to quit.";
  cout<<"\n 5. ENJOY!";
  display(s);
```

```
cout<<"Enter position: ";
cin>>pos;
if (pos=='0')
{
 exit(0);
}
cout<<"Enter number: ";
cin>>ans;
switch(pos)
{
 case 'A': if(ans==sol[0])
           {
            s[0][6]=ans;
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
```

```
            break;
case 'B': if(ans==sol[1])
            {
             s[0][9]=ans;
             count--;
            }
            else
            {
             cout<<"Incorrect!";
             life--;
            }
            break;
case 'C': if(ans==sol[2])
            {
             s[0][15]=ans;
             count--;
            }
            else
            {
             cout<<"Incorrect!";
```

```
        life--;
        }
        break;
case 'D': if(ans==sol[3])
        {
        s[0][18]=ans;
        count--;
        }
        else
        {
        cout<<"Incorrect!";
        life--;
        }
        break;
case 'E': if(ans==sol[4])
        {
        s[1][3]=ans;
        count--;
        }
        Else
```

```
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'F': if(ans==sol[5])
        {
         s[1][15]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'G': if(ans==sol[6])
        {
         s[1][18]=ans;
         count--;
```

```
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'H': if(ans==sol[7])
        {
         s[1][21]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'I': if(ans==sol[8])
        {
```

```
            s[2][3]=ans;
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
           break;
case 'J': if(ans==sol[9])
           {
            s[2][6]=ans;
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
           break;
```

```
case 'K': if(ans==sol[10])
          {
           s[2][9]=ans;
           count--;
          }
          else
          {
           cout<<"Incorrect!";
           life--;
          }
          break;
case 'L': if(ans==sol[11])
          {
           s[2][21]=ans;
           count--;
          }
          else
          {
           cout<<"Incorrect!";
           life--;
```

```
        }
        break;
case 'M': if(ans==sol[12])
        {
         s[3][3]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'N': if(ans==sol[13])
        {
         s[3][9]=ans;
         count--;
        }
        else
        {
```

```
            cout<<"Incorrect!";
            life--;
           }
           break;
case 'O': if(ans==sol[14])
           {
            s[3][18]=ans;
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
           break;
case 'P': if(ans==sol[15])
           {
            s[3][21]=ans;
            count--;
           }
```

```
            else
            {
             cout<<"Incorrect!";
             life--;
            }
            break;
case 'Q': if(ans==sol[16])
            {
             s[4][6]=ans;
             count--;
            }
            else
            {
             cout<<"Incorrect!";
             life--;
            }
            break;
case 'R': if(ans==sol[17])
            {
             s[4][9]=ans;
```

```
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
           break;
case 'S': if(ans==sol[18])
           {
            s[4][15]=ans;
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
           break;
case 'T': if(ans==sol[19])
```

```
        {
         s[4][18]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'U': if(ans==sol[20])
        {
         s[5][3]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
```

```
        break;
case 'V': if(ans==sol[21])
        {
         s[5][6]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
         life--;
        }
        break;
case 'W': if(ans==sol[22])
        {
         s[5][15]=ans;
         count--;
        }
        else
        {
         cout<<"Incorrect!";
```

```
            life--;
           }
           break;
  case 'X': if(ans==sol[23])
           {
            s[5][21]=ans;
            count--;
           }
           else
           {
            cout<<"Incorrect!";
            life--;
           }
           break;

 }
 cout<<"\n Lives left: "<<life;
 getch();
} while((count!=0)&&(life!=0));
if (count==0)
```

```
{
 clrscr();
 display(s);
 cout<<"\nCONGRATULATIONS!";
 cout<<"\nYou Did It!";
}
else
cout<<"\n Better luck next time ";
getch();
}
```

OUTPUT

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  A  B  |  C  D  3  |
|  E  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: A
Enter number: 6

 Lives left: 3
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  B  |  C  D  3  |
|  E  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: B
Enter number: 2
Incorrect!
 Lives left: 2_
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  B  |  C  D  3  |
|  E  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: B
Enter number: 5

 Lives left: 2_
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  C  D  3  |
|  E  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: E
Enter number: 2

 Lives left: 2_
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  C  D  3  |
|  2  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: C
Enter number: 2

 Lives left: 2
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  2  D  3  |
|  2  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: D
Enter number: 1

 Lives left: 2
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  2  1  3  |
|  2  3  1  |  F  G  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: G
Enter number: 5

 Lives left: 2_
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  2  1  3  |
|  2  3  1  |  F  5  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: F
Enter number: 4

 Lives left: 2
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  2  1  3  |
|  2  3  1  |  4  5  H  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: H
Enter number: 6

 Lives left: 2
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  2  1  3  |
|  2  3  1  |  4  5  6  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: L
Enter number: 1
Incorrect!
 Lives left: 1_
```

```
 SUDOKU:
 RULES:
 1. Positions must be entered in uppercase only!
 2. You have three lives which will decrease with a wrong answer.
 3. Press enter to continue.
 4. Enter 0 to quit.
 5. ENJOY!
-------------------------
|  4  6  5  |  2  1  3  |
|  2  3  1  |  4  5  6  |
-------------------------
|  I  J  K  |  3  6  L  |
|  M  2  N  |  5  0  P  |
-------------------------
|  1  Q  R  |  S  T  5  |
|  U  V  3  |  W  2  X  |
-------------------------
Enter position: 0_
```

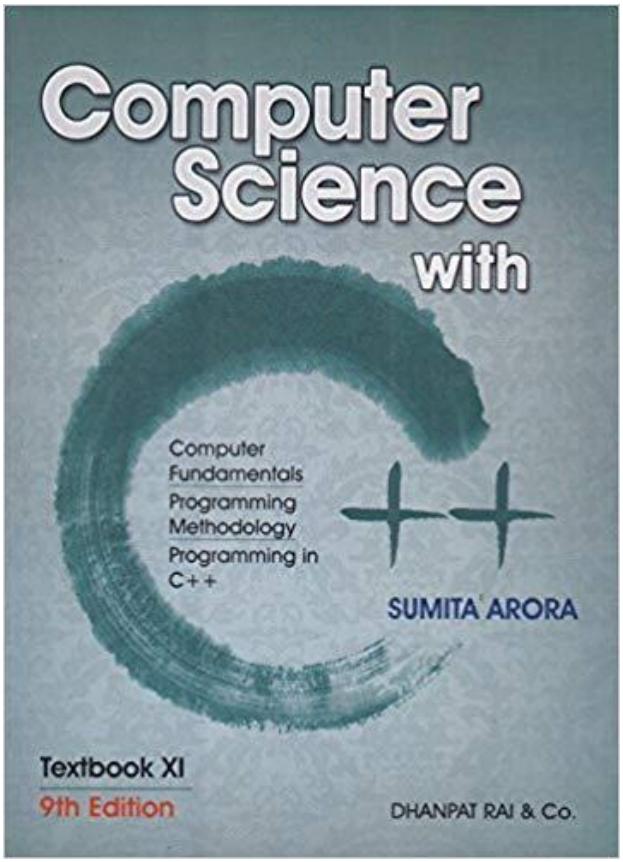
The game is quitted, and the program ends.

CONCLUSION

In the completion of this project, we have used different concepts of C++. We used do while loop, for loop, switch case, if statements, built in function like exit (0) and user defined function.

BIBLIOGRAPHY

1. Computer Science with C++ - Sumita Arora



2. Tips from computer teacher Mrs. Sumitha Suresh

PROJECT REPORT

This C++ project shows a sudoku game. It was an eye opener as it taught the many ways in which a C++ program could be made. The period of formulating algorithms, flowcharts and finally forming the program was exciting and full of surprises. The project gave us the courage to act independently while using our own ideas. It also strengthened teamwork and efficiency skills. This project helped to shape our C++ skills further and was highly beneficial.