

1- Write a program that prompts the user for a command (either "star," "space," or "line") and a number, and then executes the command the specified number of times.

اكتب برنامجًا يطلب المستخدم بإصدار أمر (إما "نجمة" أو "مسافة" أو "سطر") ورقم، ثم ينفذ الأمر لعدد محدد من المرات.

Input

```
Enter command and count: star 5
```

Output

```
*****
```

Solution

```
// www.gammal.tech

#include<iostream>
using namespace std;

int main() {
    string command;
    int count;

    cout << "Enter command and count: ";
    cin >> command >> count;

    for (int i = 0; i < count; i++) {
        if (command == "star")
            cout << "*";
        else if (command == "space")
            cout << " ";
        else if (command == "line")
            cout << endl;
    }

    return 0;
}
```

2- Modify the previous program to include an exit option.
The program should continue accepting commands and counts until the user enters "exit."

تعديل البرنامج السابق ليشمل خيار الخروج. يجب أن يستمر البرنامج في قبول الأوامر والحسابات حتى يقوم المستخدم بإدخال "الخروج".

Input & Output

```
Enter command and count ('exit' to end): 3 star
***
Enter command and count ('exit' to end): 2 space
Enter command and count ('exit' to end): 5 exit
```

Solution

```
// www.gammal.tech

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

int main() {
    string command;
    int count;

    cout << "Enter command and count ('exit' to end): ";
    while (cin >> count >> command && command != "exit") {
        for (int i = 0; i < count; i++) {
            if (command == "star")
                cout << "*";
            else if (command == "space")
                cout << " ";
            else if (command == "line")
                cout << endl;
        }

        cout << "\nEnter command and count ('exit' to end): ";
    }

    return 0;
}
```

3- Extend the program to store commands and counts using vectors. Continue accepting input until the user enters "exit."

قم بتوسيع البرنامج لتخزين الأوامر والأعداد باستخدام vectors. استمر في قبول الإدخال حتى يقوم المستخدم بإدخال "الخروج".

Input & Output

```
Enter command and count ('exit' to end): 3 star
Enter command and count ('exit' to end): 1 space
Enter command and count ('exit' to end): 5 star
Enter command and count ('exit' to end): 0 exit
*** *****
```

Solution

```
// www.gammal.tech

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

int main() {
    vector<string> commands;
    vector<int> counts;
    string command;
    int count;

    cout << "Enter command and count ('exit' to end): ";
    while (cin >> count >> command && command != "exit") {
        commands.push_back(command);
        counts.push_back(count);

        cout << "\nEnter command and count ('exit' to end): ";
    }

    for (int q = 0; q < commands.size(); q++) {
        for (int i = 0; i < counts[q]; i++) {
            if (commands[q] == "star")
                cout << "*";
            else if (commands[q] == "space")
                cout << " ";
            else if (commands[q] == "line")
                cout << endl;
        }
    }

    return 0;
}
```

4- Refactor the previous program to use a function to handle the printing logic. The function should take a command and count as parameters.

أعد بناء البرنامج السابق لاستخدام function للتعامل مع منطق الطباعة. يجب أن تأخذ function أمرًا ويتم احتسابها parameters.

Input & Output

```
Enter command and count ('exit' to end): 3 star
Enter command and count ('exit' to end): 1 line
Enter command and count ('exit' to end): 2 star
Enter command and count ('exit' to end): 0 exit
***
**
```

Solution

```
// www.gammal.tech

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

void executeCommand(const string& command, int count) {
    for (int i = 0; i < count; i++) {
        if (command == "star")
            cout << "*";
        else if (command == "space")
            cout << " ";
        else if (command == "line")
            cout << endl;
    }
}

int main() {
    vector<string> commands;
    vector<int> counts;
    string command;
    int count;

    cout << "Enter command and count ('exit' to end): ";
    while (cin >> count >> command && command != "exit") {
        commands.push_back(command);
        counts.push_back(count);

        cout << "\nEnter command and count ('exit' to end): ";
    }

    for (int q = 0; q < commands.size(); q++) {
        executeCommand(commands[q], counts[q]);
    }

    return 0;
}
```

5- Extend the previous program to handle a new command "triangle." When the user inputs "triangle," the program should print a triangle made of stars.

قم بتوسيع البرنامج السابق للتعامل مع الأمر الجديد "المثلث". عندما يقوم المستخدم بإدخال "مثلث"، يجب على البرنامج طباعة مثلث مصنوع من النجوم.

Input & Output

```
Enter command and count ('exit' to end): 5 star
Enter command and count ('exit' to end): 1 line
Enter command and count ('exit' to end): 4 triangle
Enter command and count ('exit' to end): 0 exit
*****
*
**
***
****
```

Solution

```
// www.gammal.tech

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

void executeCommand(const string& command, int count) {
    if (command == "triangle") {
        for (int i = 1; i <= count; i++) {
            for (int j = 1; j <= i; j++) {
                cout << "*";
            }
            cout << endl;
        }
    } else {
        for (int i = 0; i < count; i++) {
            if (command == "star")
                cout << "*";
            else if (command == "space")
                cout << " ";
            else if (command == "line")
                cout << endl;
        }
    }
}

int main() {
    vector<string> commands;
    vector<int> counts;
    string command;
    int count;

    cout << "Enter command and count ('exit' to end): ";
    while (cin >> count >> command && command != "exit") {
        commands.push_back(command);
        counts.push_back(count);

        cout << "\nEnter command and count ('exit' to end): ";
    }

    for (int q = 0; q < commands.size(); q++) {
        executeCommand(commands[q], counts[q]);
    }

    return 0;
}
```

6- Extend the program to provide more user-friendly output messages. When the user inputs a command, display a message indicating the action being performed.

قم بتوسيع البرنامج لتوفير المزيد من رسائل الإخراج سهلة الاستخدام. عندما يقوم المستخدم بإدخال أمر، قم بعرض رسالة تشير إلى الإجراء الذي يتم تنفيذه.

Input & Output

```
Enter command and count ('exit' to end): 3 triangle
Enter command and count ('exit' to end): 2 star
Enter command and count ('exit' to end): 0 exit
Drawing a triangle with 3 rows:
*
**
***
Executing 2 star(s):
**
```

Solution

```
// www.gammal.tech

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

void executeCommand(const string& command, int count) {
    if (command == "triangle") {
        cout << "Drawing a triangle with " << count << " rows:\n";
        for (int i = 1; i <= count; i++) {
            for (int j = 1; j <= i; j++) {
                cout << "*";
            }
            cout << endl;
        }
    } else {
        cout << "Executing " << count << " " << command << "(s):\n";
        for (int i = 0; i < count; i++) {
            if (command == "star")
                cout << "*";
            else if (command == "space")
                cout << " ";
            else if (command == "line")
                cout << endl;
        }
    }
}

int main() {
    vector<string> commands;
    vector<int> counts;
    string command;
    int count;

    cout << "Enter command and count ('exit' to end): ";
    while (cin >> count >> command && command != "exit") {
        commands.push_back(command);
        counts.push_back(count);

        cout << "\nEnter command and count ('exit' to end): ";
    }

    for (int q = 0; q < commands.size(); q++) {
        executeCommand(commands[q], counts[q]);
    }

    return 0;
}
```

7- Improve the previous program by adding error handling. If the user entered an invalid command, display an error message and prompt for input again.

تحسين البرنامج السابق بإضافة معالجة الأخطاء. إذا أدخل المستخدم أمرًا غير صالح، فأعرض رسالة خطأ وطلب بالإدخال مرة أخرى.

Input

```
Enter command and count ('exit' to end): 1 hash
Enter command and count ('exit' to end): 5 star
Enter command and count ('exit' to end): 0 exit
```

Output

```
Error: Invalid command 'hash'. Please enter 'star,' 'space,' 'line,' or 'triangle.'
Executing 5 star(s):
*****
```


Solution

```
// www.gammal.tech

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

void executeCommand(const string& command, int count) {
    if (command == "triangle") {
        cout << "Drawing a triangle with " << count << " rows:\n";
        for (int i = 1; i <= count; i++) {
            for (int j = 1; j <= i; j++) {
                cout << "*";
            }
            cout << endl;
        }
    } else if (command == "star" || command == "space" || command == "line") {
        cout << "Executing " << count << " " << command << "(s):\n";
        for (int i = 0; i < count; i++) {
            if (command == "star")
                cout << "*";
            else if (command == "space")
                cout << " ";
            else if (command == "line")
                cout << endl;
        }
    } else {
        cout << "Error: Invalid command '" << command << "'. Please enter 'star,' 'space,' 'line,' or 'triangle.'\n";
    }
}

int main() {
    vector<string> commands;
    vector<int> counts;
    string command;
    int count;

    cout << "Enter command and count ('exit' to end): ";
    while (cin >> count >> command && command != "exit") {
        commands.push_back(command);
        counts.push_back(count);

        cout << "\nEnter command and count ('exit' to end): ";
    }

    for (int q = 0; q < commands.size(); q++) {
        executeCommand(commands[q], counts[q]);
    }

    return 0;
}
```

8- Write a program that prompts the user to enter the number of rows and then generates a number pyramid. The program should print numbers in each row from 1 to the row number, separated by a space.

اكتب برنامجًا يطلب من المستخدم إدخال عدد الصفوف ثم يقوم بإنشاء هرم رقمي.
يجب أن يقوم البرنامج بطباعة الأرقام في كل صف من 1 إلى رقم الصف،
مفصولة بمسافة.

Input

```
Enter the number of rows: 5
```

Output

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

Solution

```
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    // Declare variables
    int rows;

    // Get user input
    cout << "Enter the number of rows: ";
    cin >> rows;

    // Generate and print the number pyramid
    for (int i = 1; i <= rows; ++i) {
        for (int j = 1; j <= i; ++j) {
            cout << j << " ";
        }
        cout << "\n";
    }

    return 0;
}
```

9- Modify the previous program to generate a pyramid with numbers in descending order on each row. The program should print numbers from the row number down to 1, separated by a space.

قم بتعديل البرنامج السابق لتوليد هرم يحتوي على أرقام بترتيب تنازلي في كل صف. يجب أن يقوم البرنامج بطباعة الأرقام من رقم الصف إلى 1، مفصولة بمسافة.

Input

```
Enter the number of rows: 5
```

Output

```
1
2 1
3 2 1
4 3 2 1
5 4 3 2 1
```

Solution

```
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    // Declare variables
    int rows;

    // Get user input
    cout << "Enter the number of rows: ";
    cin >> rows;

    // Generate and print the enhanced number pyramid
    for (int i = 1; i <= rows; ++i) {
        for (int j = i; j >= 1; --j) {
            cout << j << " ";
        }
        cout << "\n";
    }

    return 0;
}
```

10- create the program to generate a pyramid where each row displays the square of the row number. The program should print the square of numbers in ascending order on each row, separated by a space.

قم بإنشاء برنامج لإنشاء هرم حيث يعرض كل صف مربع رقم الصف. يجب أن يقوم البرنامج بطباعة مربع الأرقام بترتيب تصاعدي في كل صف، مفصولة بمسافة.

Input

```
Enter the number of rows: 5
```

Output

```
1
1 4
1 4 9
1 4 9 16
1 4 9 16 25
```

Solution

```
// www.gammal.tech

#include <iostream>
using namespace std;

int main() {
    // Declare variables
    int rows;

    // Get user input
    cout << "Enter the number of rows: ";
    cin >> rows;

    // Generate and print the modified number pyramid
    for (int i = 1; i <= rows; ++i) {
        for (int j = 1; j <= i; ++j) {
            cout << j * j << " ";
        }
        cout << "\n";
    }

    return 0;
}
```