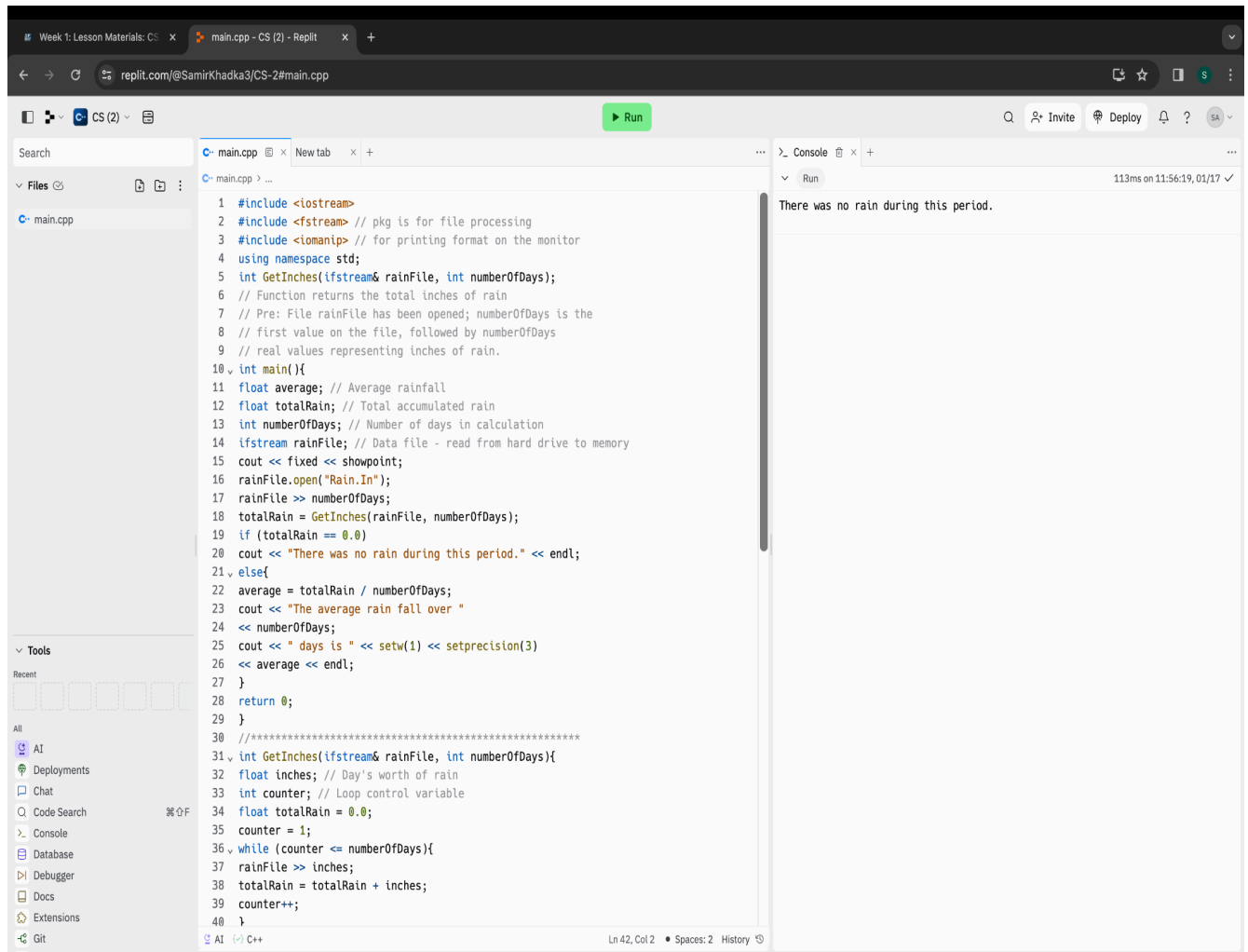


1. Create your personal account of C++ online compiler at the following link and run the first program on it.



The screenshot shows a web-based C++ compiler interface. The browser address bar displays `replit.com/@SamirKhadka3/CS-2#main.cpp`. The interface includes a file explorer on the left, a code editor in the center, and a console on the right. The code in `main.cpp` is as follows:

```
1 #include <iostream>
2 #include <fstream> // pkg is for file processing
3 #include <iomanip> // for printing format on the monitor
4 using namespace std;
5 int GetInches(ifstream& rainFile, int numberOfDays);
6 // Function returns the total inches of rain
7 // Pre: File rainFile has been opened; numberOfDays is the
8 // first value on the file, followed by numberOfDays
9 // real values representing inches of rain.
10 int main(){
11     float average; // Average rainfall
12     float totalRain; // Total accumulated rain
13     int numberOfDays; // Number of days in calculation
14     ifstream rainFile; // Data file - read from hard drive to memory
15     cout << fixed << showpoint;
16     rainFile.open("Rain.In");
17     rainFile >> numberOfDays;
18     totalRain = GetInches(rainFile, numberOfDays);
19     if (totalRain == 0.0)
20     cout << "There was no rain during this period." << endl;
21     else{
22         average = totalRain / numberOfDays;
23         cout << "The average rain fall over "
24         << numberOfDays;
25         cout << " days is " << setw(1) << setprecision(3)
26         << average << endl;
27     }
28     return 0;
29 }
30 //*****
31 int GetInches(ifstream& rainFile, int numberOfDays){
32     float inches; // Day's worth of rain
33     int counter; // Loop control variable
34     float totalRain = 0.0;
35     counter = 1;
36     while (counter <= numberOfDays){
37         rainFile >> inches;
38         totalRain = totalRain + inches;
39         counter++;
40     }
```

The console output shows the result of running the program: `There was no rain during this period.` The execution time is noted as 113ms on 11:56:19, 01/17.

2. Enter the editor and key in the following program. And explain the meanings of each statement.

```
1 // Program Area calculates the area of a square.
2 // The user is prompted to enter the number of inches on each
3 // side. Note that "endl" in line 7 ends in the letter "l", not
4 // the number one.
5 #include <iostream> //input/output stream library, allowing the program to use input
6 // and output operations.
7 using namespace std; //using the standard namespace
8
9 int main() {
10     int inches; // Declaring an integer variable 'inches' to store the side length of
11     // the square.
12     // Prompting to enter the number of inches on a side.
13     cout << "Enter the number of inches on a side " << endl;
14     // Displaying a message to instruct to press the return key.
15     cout << "Press the return key." << endl;
16     // Reading input (side length) and store it in the 'inches' variable.
17     cin >> inches;
18     // Displaying the calculated area of the square using the entered side length.
19     cout << endl << "The area is " << inches * inches << "." << endl;
20     // Returning 0 to indicate successful execution of the program.
21     return 0;
22 }
```

Console output:

```
Enter the number of inches on a side
Press the return key.
9
The area is 81.
```

- `#include <iostream>`: Includes the input/output stream library, letting the program use input and output operations.
- `using namespace std;`: Declares that the program will use the standard namespace (includes the standard C++ library components.)
- `int main() {`: Starting point of the program.
- `int inches;`: Declares an integer variable named 'inches' to store the side length of the square.
- `cout << "Enter the number of inches on a side " << endl;`: Prints a message, prompts the user to enter the number of inches on a side.
- `cout << "Press the return key." << endl;`: Instructs the user to press the return key.
- `cin >> inches;`: Reads the user input (side length) from the console and stores it in the 'inches' variable.
- `cout << endl << "The area is " << inches * inches << "." << endl;`: Calculates and prints the area of the square using the entered side length.
- `return 0;`: Indicates successful execution.

3. Write the program to check leap year as the first programming exercise, and verify your program by the following cases

a. The input prompt is "Enter a year AD, for example, 1997"

b. Change the prompt so that the example year is 2005

main.c

Save

Run

Output

```

1 #include <stdio.h>
2
3 int main() {
4     int year;
5
6     // Prompt the user to enter a year
7     printf("a. Enter a year AD, for example, 1997: ");
8     scanf("%d", &year);
9
10    // Check if it's a leap year
11    if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)) {
12        printf("%d is a leap year.\n", year);
13    } else {
14        printf("%d is not a leap year.\n", year);
15    }
16
17    // Prompt with changed example year
18    printf("b. Enter a year AD, for example, 2005: ");
19    scanf("%d", &year);
20
21    // Check if it's a leap year
22    if ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)) {
23        printf("%d is a leap year.\n", year);
24    } else {
25        printf("%d is not a leap year.\n", year);
26    }
27
28    return 0;
29 }

```

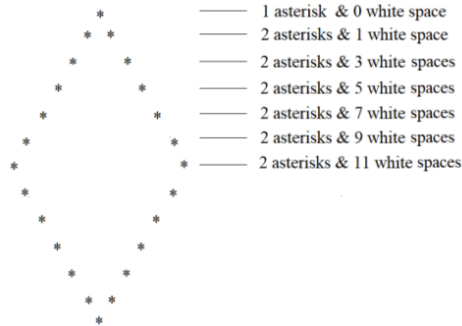
```

/tmp/YnKcilq0Yp.o
a. Enter a year AD, for example, 1997: 1997
1997 is not a leap year.
b. Enter a year AD, for example, 2005: 2006
2006 is not a leap year.

```

4.

Figure out the program to print the following pattern by **loop** structure



CS (2)

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main.cpp

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main.cpp

```
1 #include <stdio.h>
2
3 int main() {
4     int n = 7, rows, columns;
5
6
7     for (rows = 1; rows <= n; rows++) {
8
9         for (columns = n; columns > rows; columns--) {
10             printf(" ");
11         }
12
13         printf("**");
14
15         for (columns = 1; columns < (rows - 1) * 2; columns++) {
16             printf(" ");
17         }
18
19         if (rows > 1) {
20             printf("**");
21         }
22         printf("\n");
23     }
24     for (rows = n - 1; rows >= 1; rows--) {
25         for (columns = n; columns > rows; columns--) {
26             printf(" ");
27         }
28         printf("**");
29         for (columns = 1; columns < (rows - 1) * 2; columns++) {
30             printf(" ");
31         }
32         if (rows > 1) {
33             printf("**");
34         }
35         printf("\n");
36     }
37
38     return 0;
39 }
```

Console

Run

80ms on 12:24:43, 01/17

