TEMPLE UNIVERSITY

Digital Systems

12.1 Loops

FOX MIS

Loops

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Motivations

- So, what if you wanted to say Hello World ten times?

Source: https://lh3.googleusercontent.com/ALTNv-dmwvGK0MTCa4XTQ9mCD1PMZZNfsaWSCt7PF9gbhpzol1hsHN5x-C6PXvjVldlkbek=s151

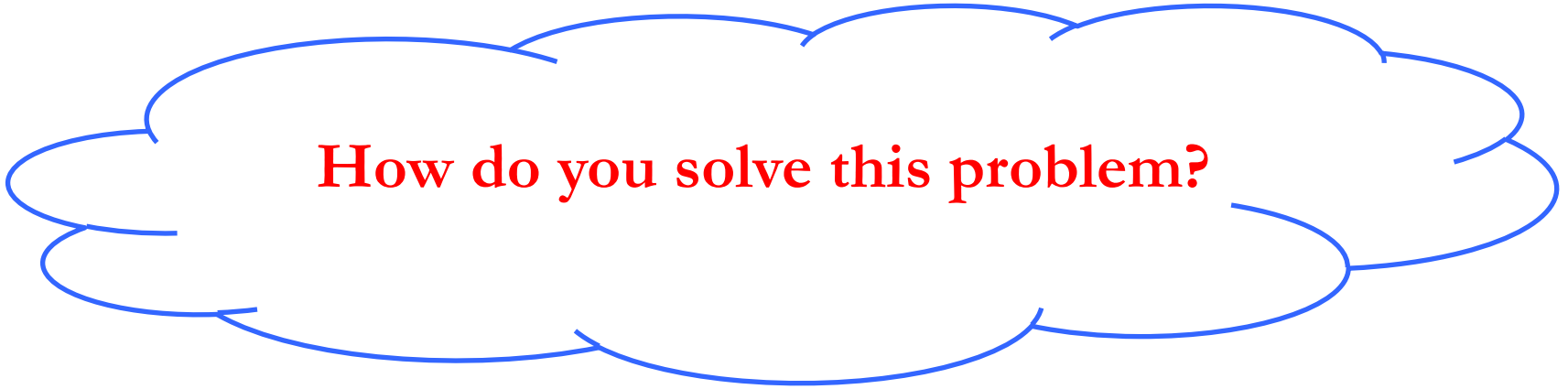
Source: https://lh3.googleusercontent.com/b7Cy0wGI1lYwR4mUZ7jpBLGxd0h0K_qBsK4zh61CXoEd2d1E5d4SV4KVh8a02KIH-tSy=s85

Motivations

10 times

```
1   <!DOCTYPE html>
2   <html>
3   <body>
4
5       <title> Steve Sclarow </title>
6   <script>
7
8   alert ("Hello World");
9   alert ("Hello World");
10  alert ("Hello World");
11  alert ("Hello World");
12  alert ("Hello World");
13  alert ("Hello World");
14  alert ("Hello World");
15  alert ("Hello World");
16  alert ("Hello World");
17  alert ("Hello World");
18
19  </script>
20  </body>
21  </html>
```

Motivations



Motivations

Wouldn't this be easier?

```
for (let i = 0; i < 10; i++)
{
    alert("Hello World!");
}
```

Enter the loop

- A sequence of instructions that is repeated until a certain condition is reached.

- An operation is done, such as getting an item of data and changing it, and then some condition is checked such as whether a counter has reached a prescribed number.

Source: https://lh3.googleusercontent.com/ID3-M72vTnUEBpUxd_l835K2WC_ZUVjSkp7shlUbyX8jRDwPb2i7G-e7e9axmD19FbUEwg=s85

You will often want to repeat some code many MANY times.

A LOOP will help you out.

Meet the loops!

- There are three types of loops you can use to repeat some code:

  - **for** loop
  - **while** loop
  - **do-while** loop

Source: https://lh3.googleusercontent.com/JSm2SSzaaB-sCwjg17mUWXPnca7FtOFItKZPsRby1DolGhyb_Kq_Nx7XB_AV4mMLluY8=s111

for Loop

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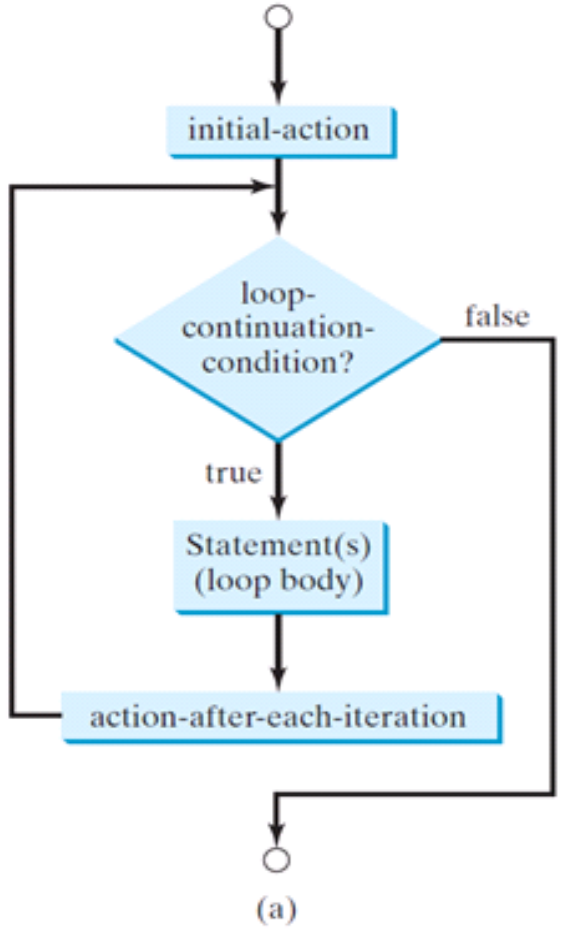
Introducing for Loop

```
let sum=0;

for(let number=1;number<5;number++){
      sum=sum+number;
}
alert("The sum is "+sum);
```

for Loop Flow Chart

```
for (initial-action; loop-continuation-condition; action-after-each-iteration)
{
  // loop body;
  Statement(s);
}
```



(a)

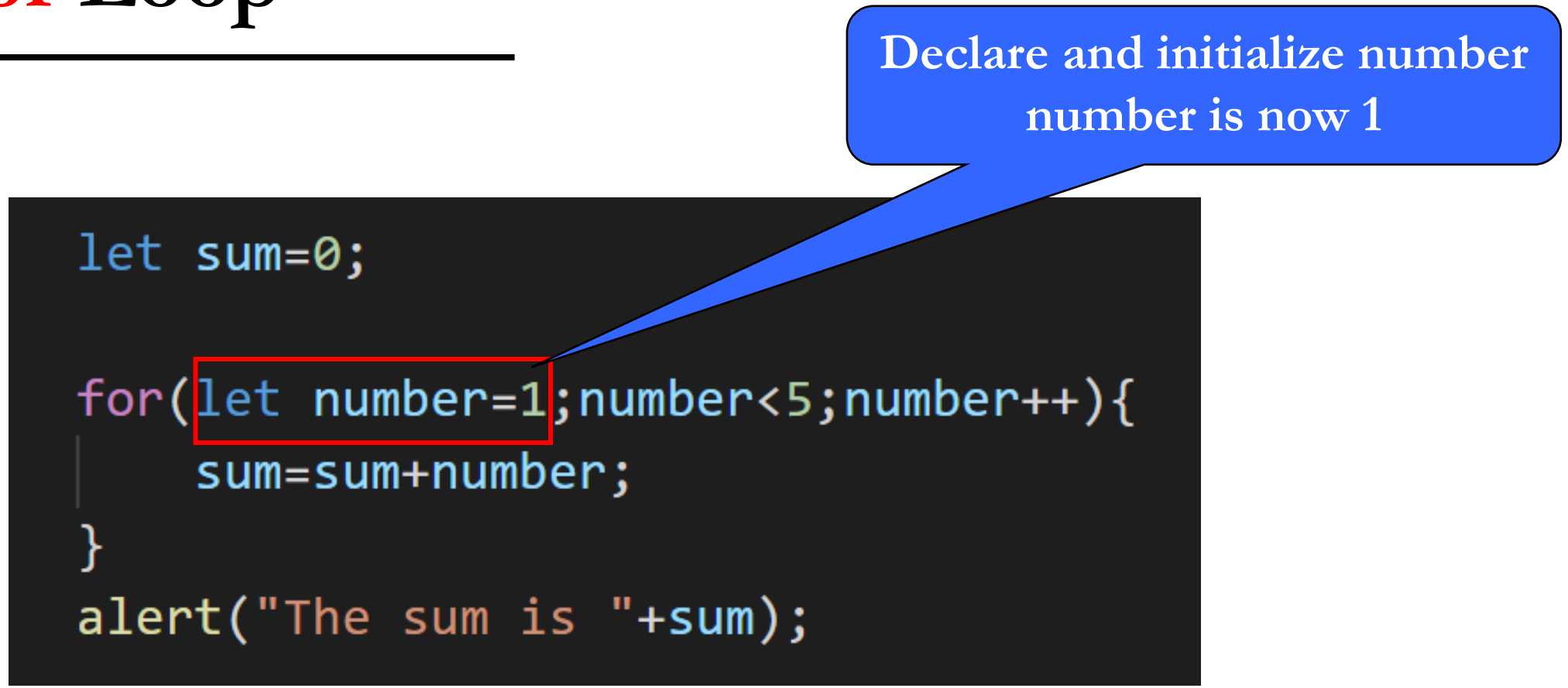
Trace for Loop

Declare and initialize sum
sum is now 0

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop



Trace for Loop

(number < 5) is true since number is 1

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

Add the current value of sum (0) to current value of number (1), and assign it to sum. sum now is 1

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

Execute adjustment statement number now is 2

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

(number < 5) is true since number is 2

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

Add the current value of sum (1) to current value of number (2), and assign it to sum. sum now is 3

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

Execute adjustment statement number now is 3

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

(number < 5) is true since number is 3

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

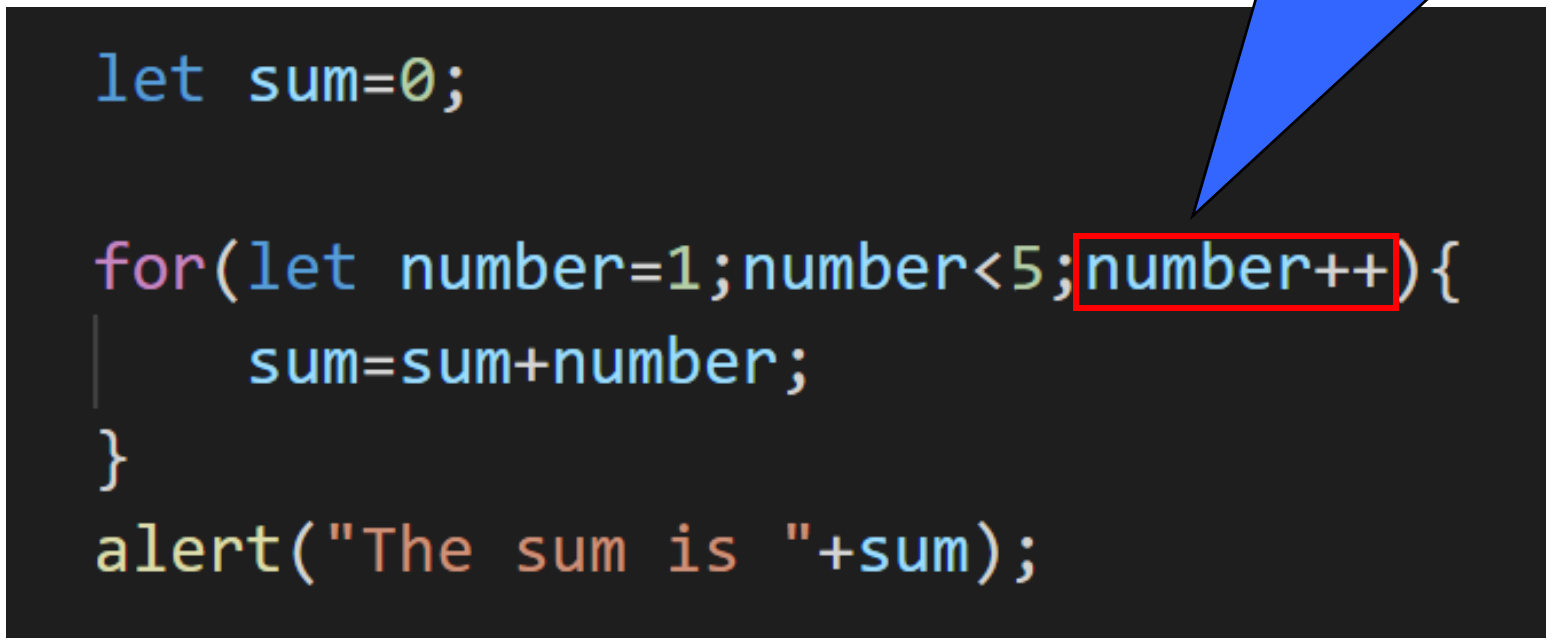
Trace for Loop

Add the current value of sum (3) to current value of number (3), and assign it to sum. sum now is 6

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop



Trace for Loop

(number < 5) is true since number is 4

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

Add the current value of sum (6) to current value of number (4), and assign it to sum. sum now is 10

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

Execute adjustment statement number now is 5

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

(number < 5) is false since the number is now 5

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Trace for Loop

```
let sum=0;

for(let number=1;number<5;number++){
    sum=sum+number;
}
alert("The sum is "+sum);
```

Exit the Loop and display The sum is 10.

while Loop

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Introducing while Loop

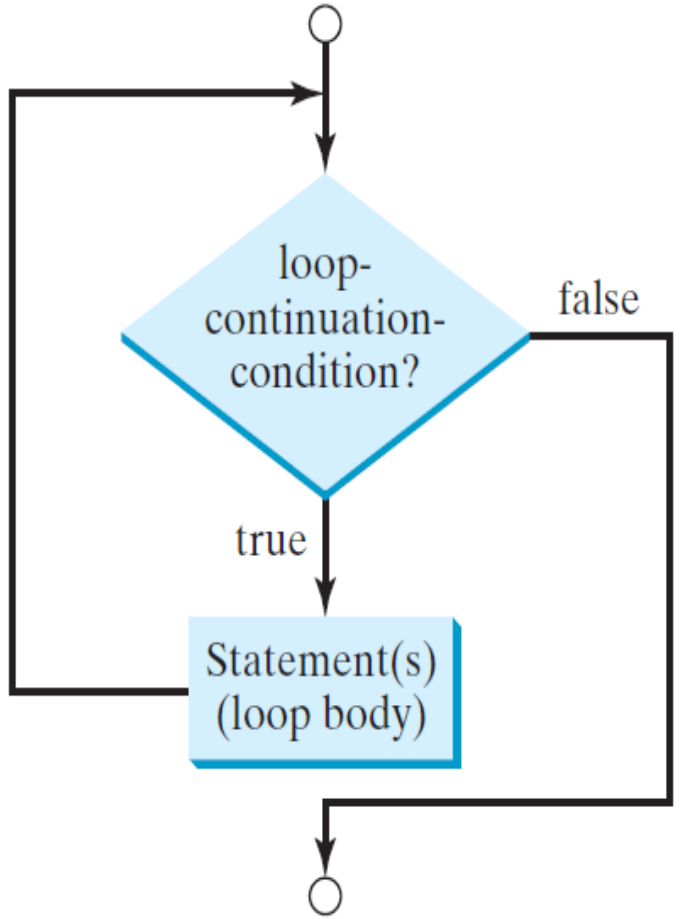
```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

The while loop will run until its looping condition evaluates to being false.

while Loop FlowChart

```
while (loop-continuation-condition)
{
  // loop-body;
  Statement(s);
}
```



Trace while Loop

Declare and initialize count
count is now 0

```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

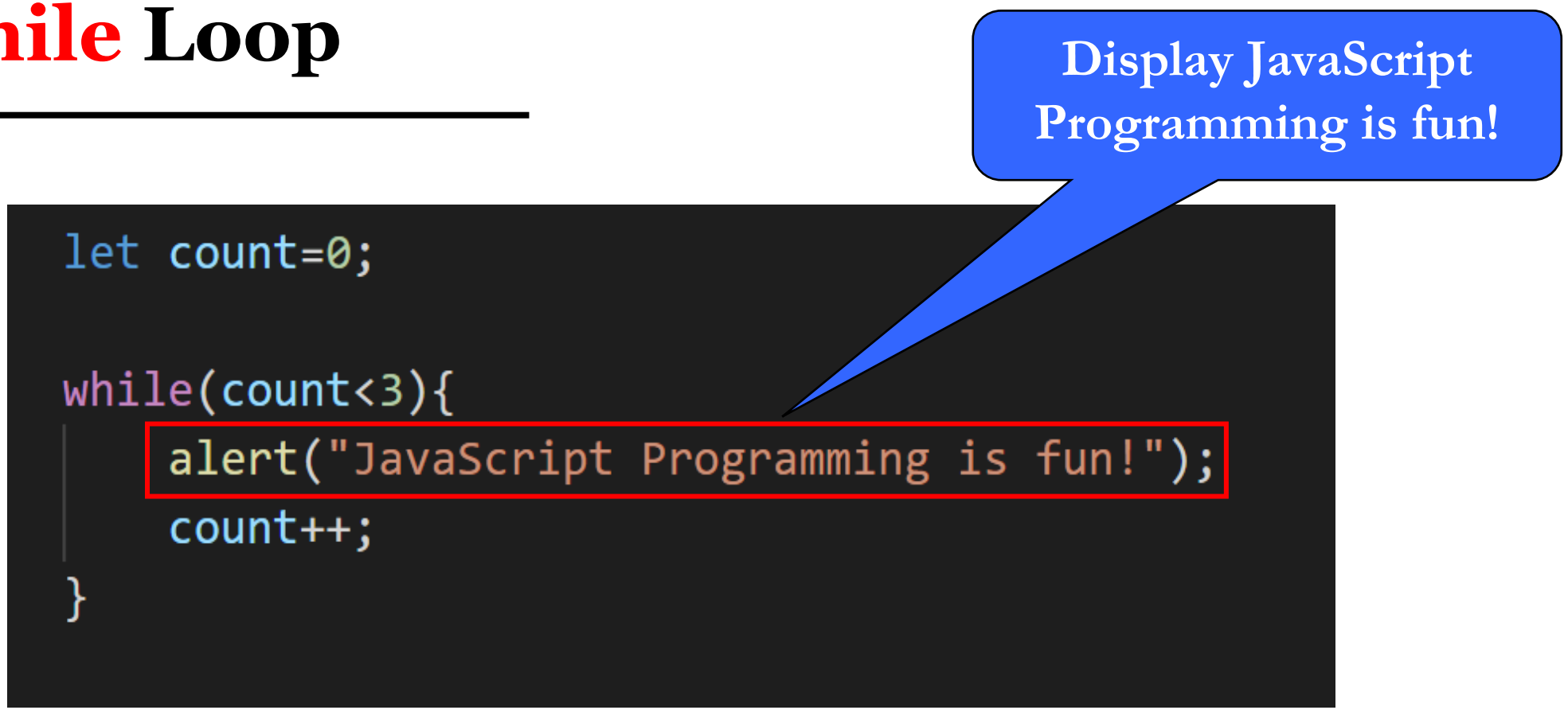
Trace while Loop

(count < 3) is true.
Since count is 0

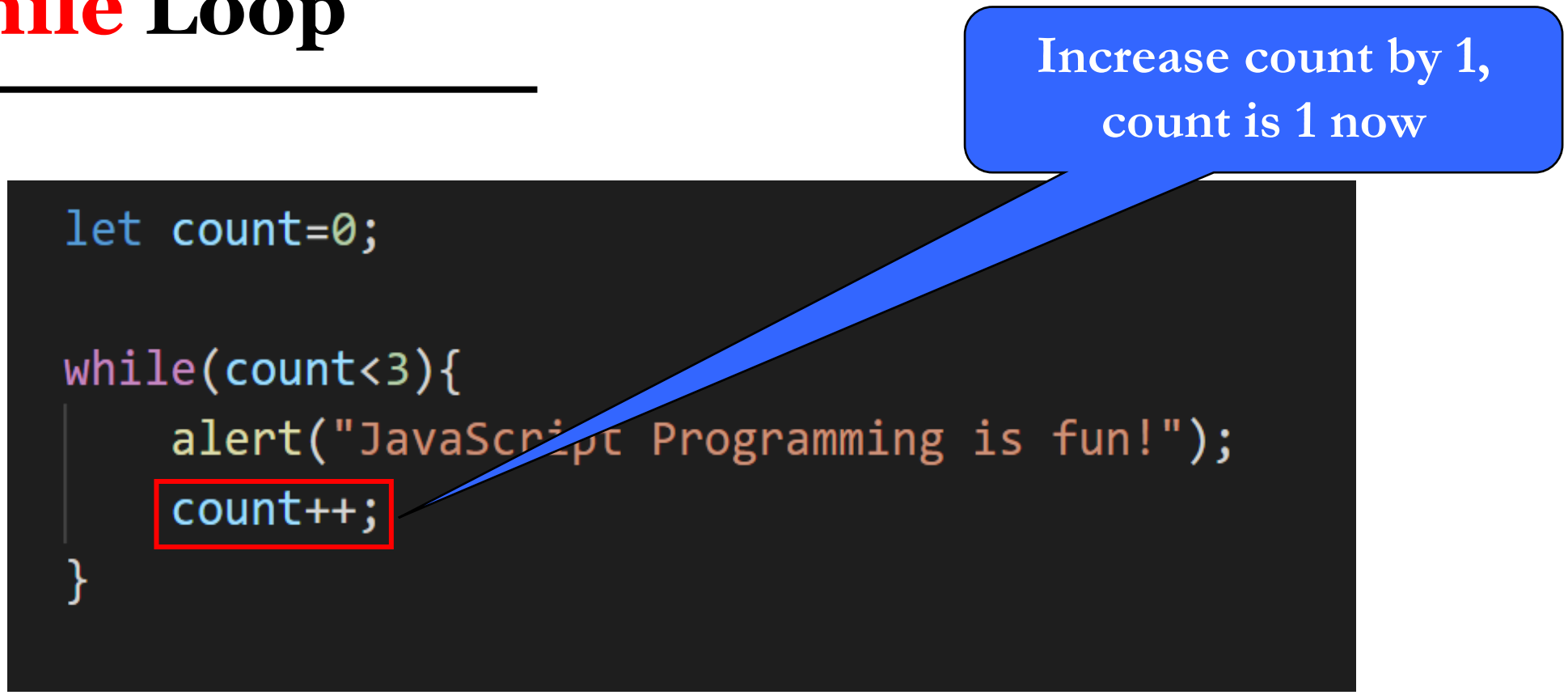
```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

Trace while Loop



Trace while Loop



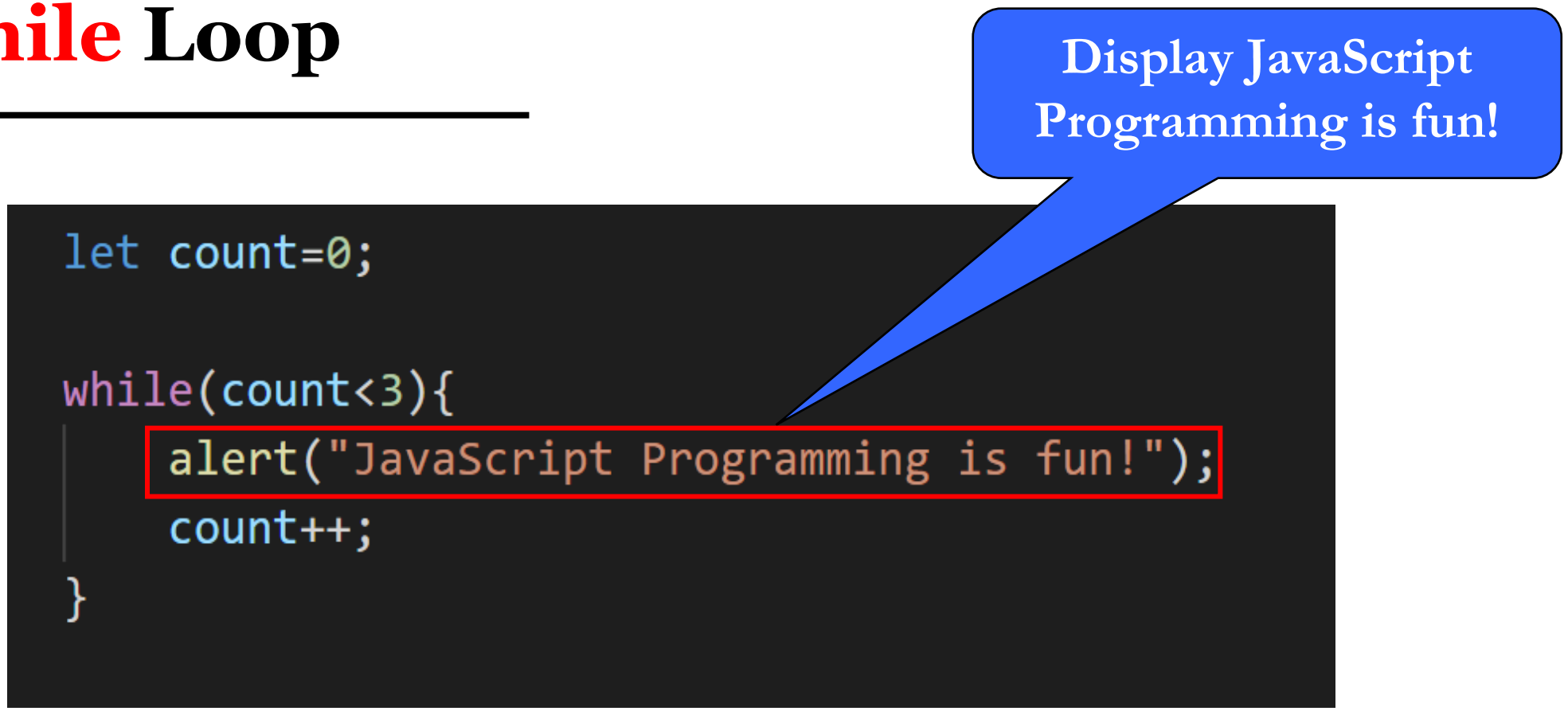
Trace while Loop

(count < 3) is true.
Since count is 1

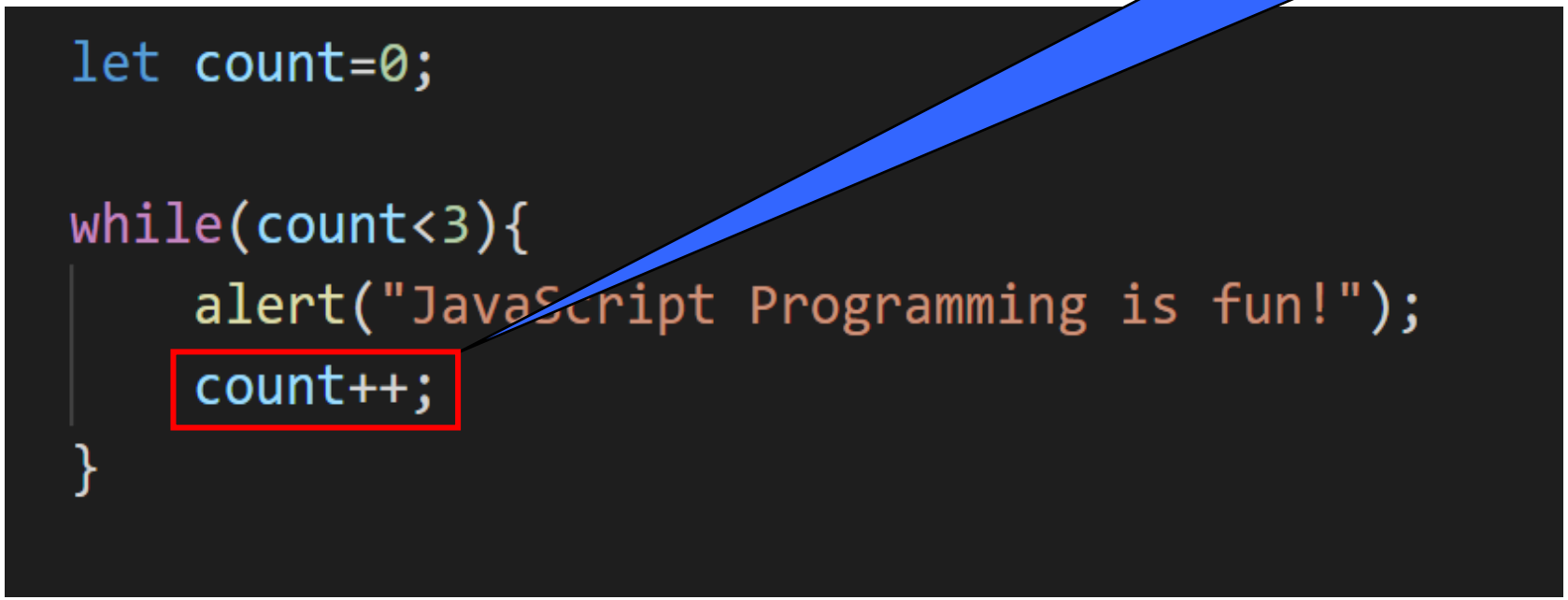
```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

Trace while Loop



Trace while Loop



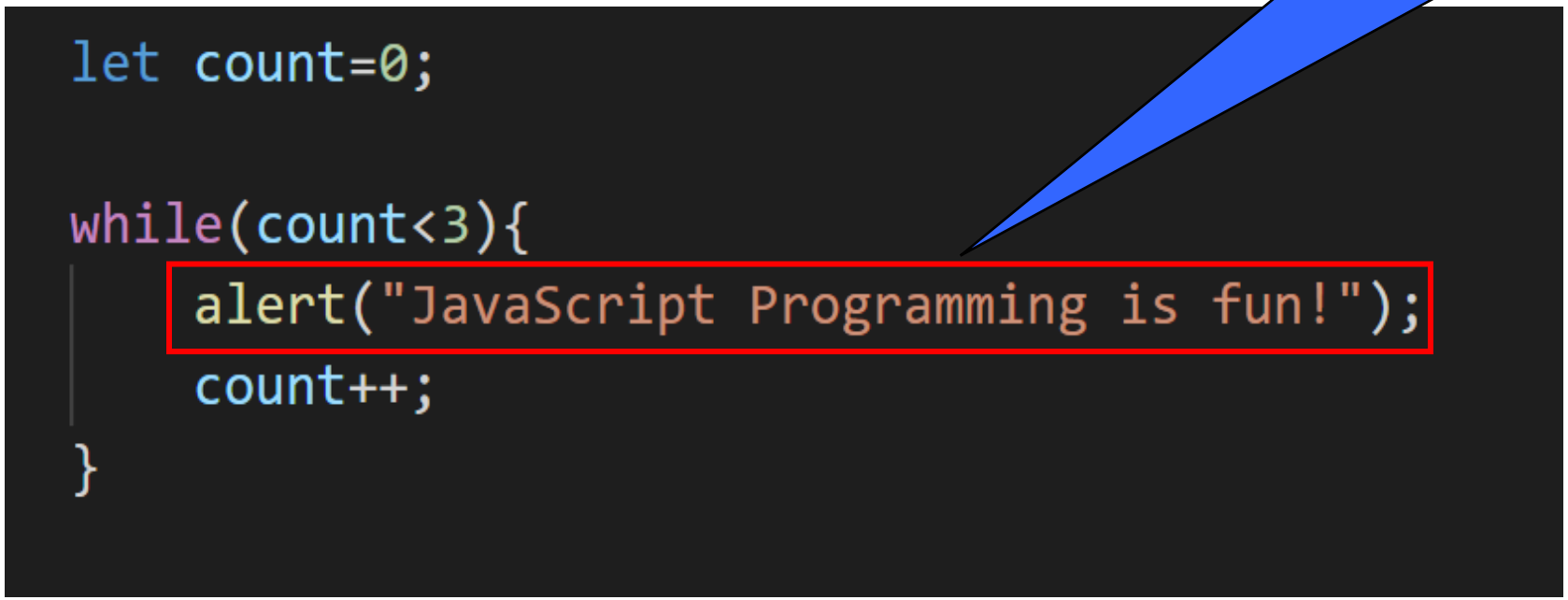
Trace while Loop

(count < 3) is true.
Since count is 2

```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

Trace while Loop



Trace while Loop

Increase count by 1, count is 3 now

```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

Trace while Loop

(count < 3) is false.
Since count is 3

```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

Trace while Loop

```
let count=0;

while(count<3){
    alert("JavaScript Programming is fun!");
    count++;
}
```

The loop exits. Execute the next statement after the loop.

do-while Loop

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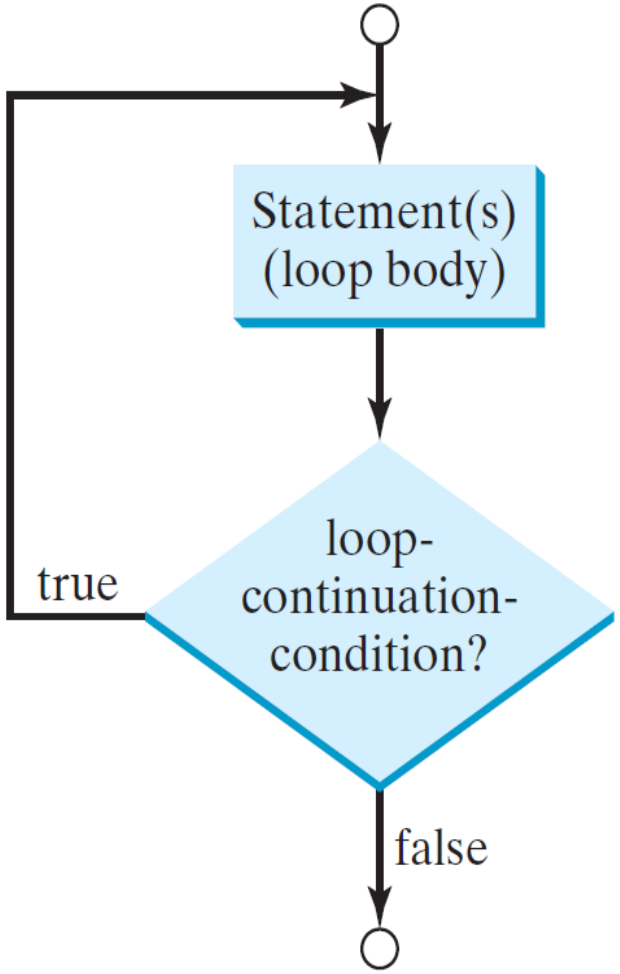
Introducing do-while Loop

```
let count=0;

do{
    alert("JavaScript Programming is fun!");
    count++;
} while(count<3);
```

do-while Loop FlowChart

```
do {
 // Loop body;
  Statement(s);
} while (loop-continuation-condition);
```



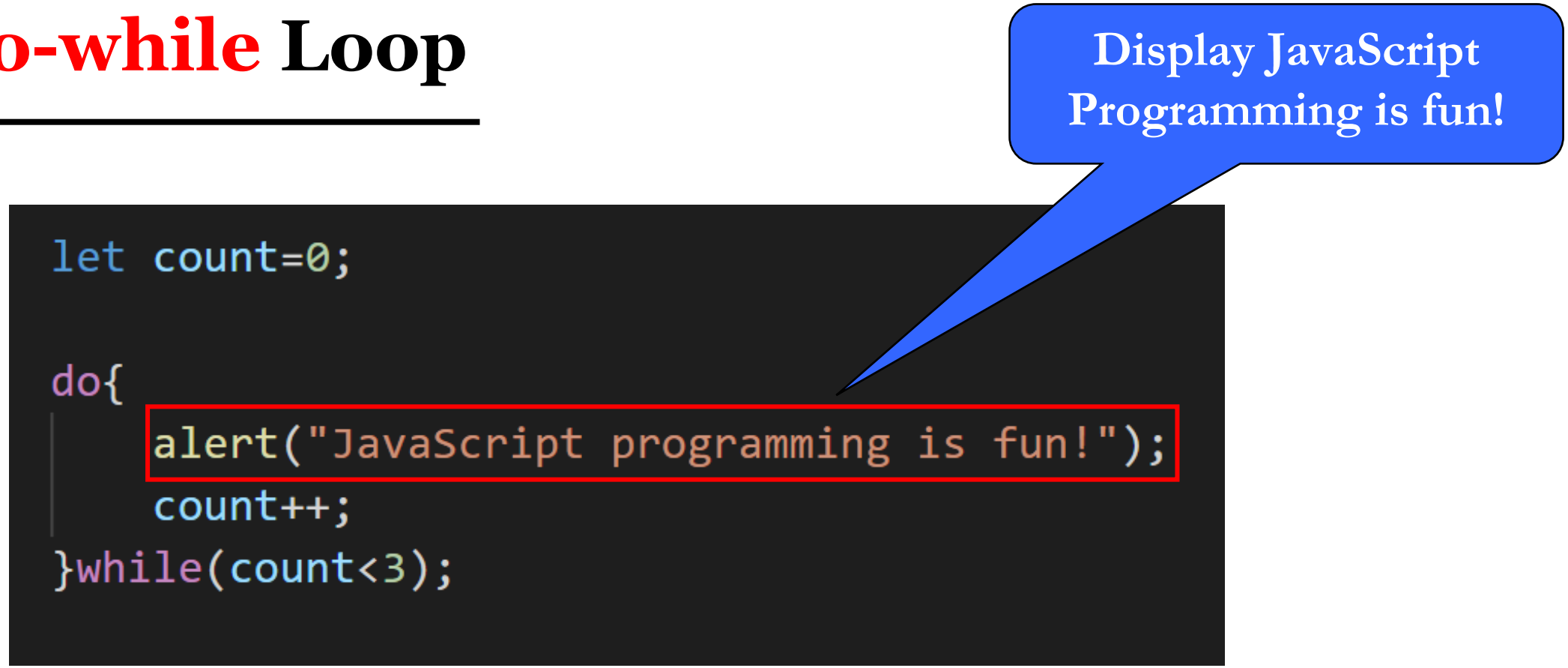
Trace do-while Loop

Declare and initialize count
count is now 0

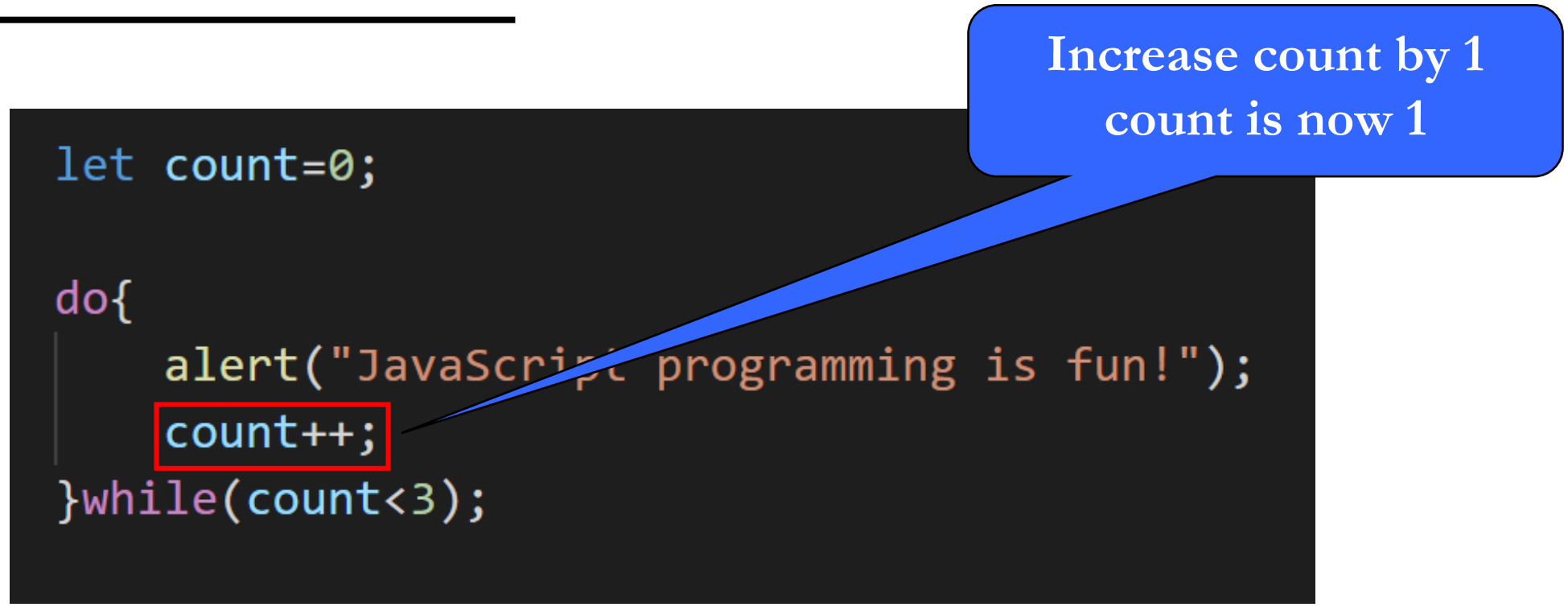
```
let count=0;

do{
    alert("JavaScript programming is fun!");
    count++;
}while(count<3);
```

Trace do-while Loop



Trace do-while Loop



Trace do-while Loop

```
let count=0;

do{
    alert("JavaScript programming is fun!");
    count++;
}while(count<3);
```

(count < 3) is true.
Since count is 1

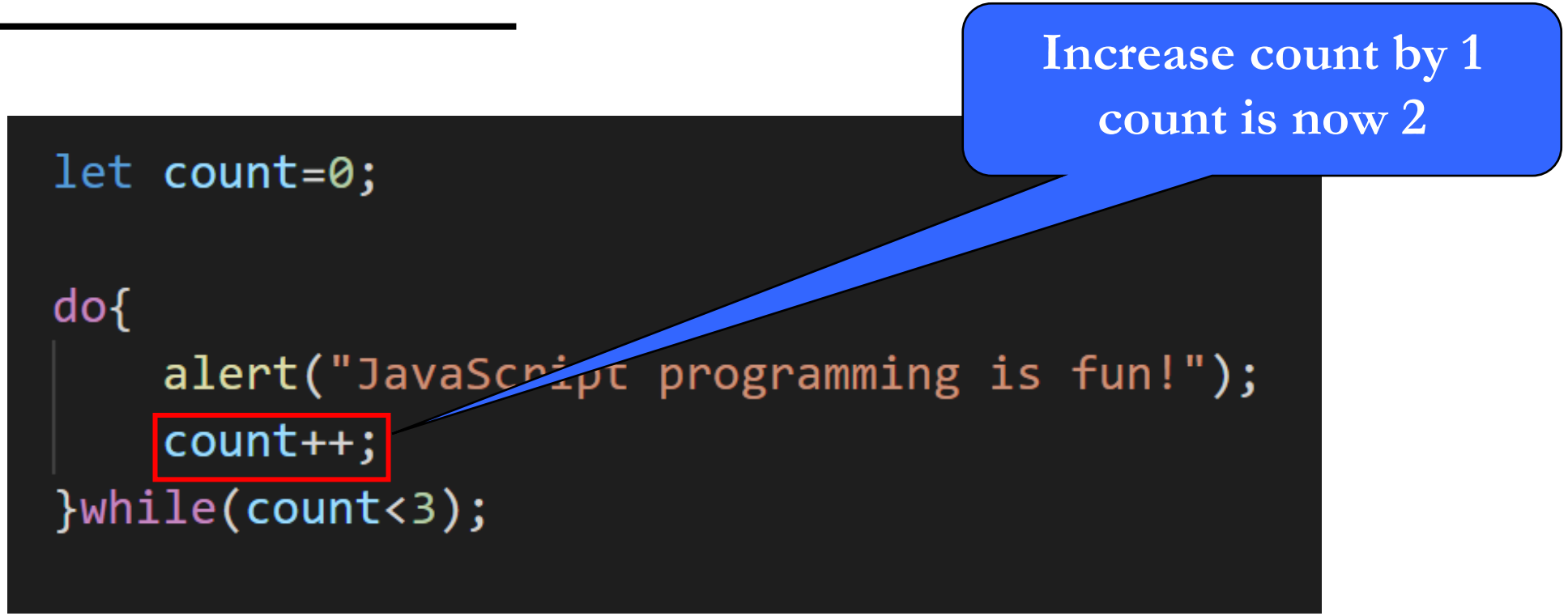
Trace do-while Loop

Display JavaScript Programming is fun!

```
let count=0;

do{
    alert("JavaScript programming is fun!");
    count++;
}while(count<3);
```

Trace do-while Loop



Trace do-while Loop

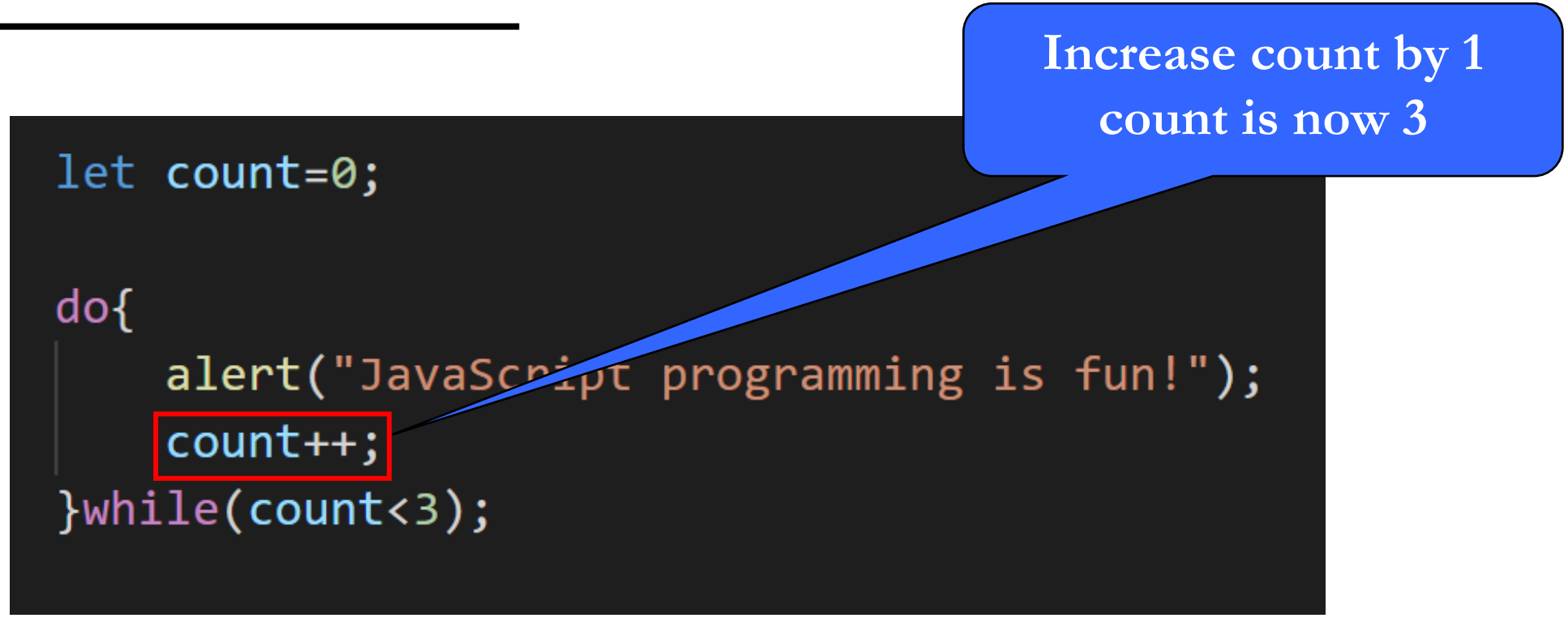
```
let count=0;

do{
    alert("JavaScript programming is fun!");
    count++;
}while(count<3);
```

(count < 3) is true.
Since count is 2

Trace do-while Loop

Trace do-while Loop



Trace do-while Loop

```
let count=0;

do{
    alert("JavaScript programming is fun!");
    count++;
}while(count<3);
```

(count < 3) is false.
Since count is 3

Trace do-while Loop

```
let count=0;

do{
    alert("JavaScript programming is fun!");
    count++;
}while(count<3);
```

The loop exits. Execute the next statement after the loop.

Time for “Challenges”!

Challenges

- BugCollector
- CaloriesBurned
- BudgetAnalysis
- DistanceTraveled
- C2FTable
- GuessANumber

Homework

- **Write the 1st function for Riley's Ranking Calculator:**
  - function totalAssets()
- **Write the 2nd function for Riley's Ranking Calculator:**
  - function totalDebt()

Diamond Peer Teacher
Quinten Powers

Bug Collector Intro Walkthrough

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Lauren Quinn

Debugger Video 4 (Developer Tools Breakpoints)

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Diamond Peer Teacher
Anna Boykis

Guess A Number Walkthrough

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Lauren Quinn

Sum of Numbers Walkthrough

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Diamond Peer Teacher
Quinten Powers

Average Rainfall Walkthrough

FOX
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Diamond Peer Teacher Quinten Powers

Pennies For Pay Walkthrough

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More to Come

Prepare with Readings & Videos before our next class!!!