ST0523 Fundamentals of Programming

Topic 3a
Selections (II)

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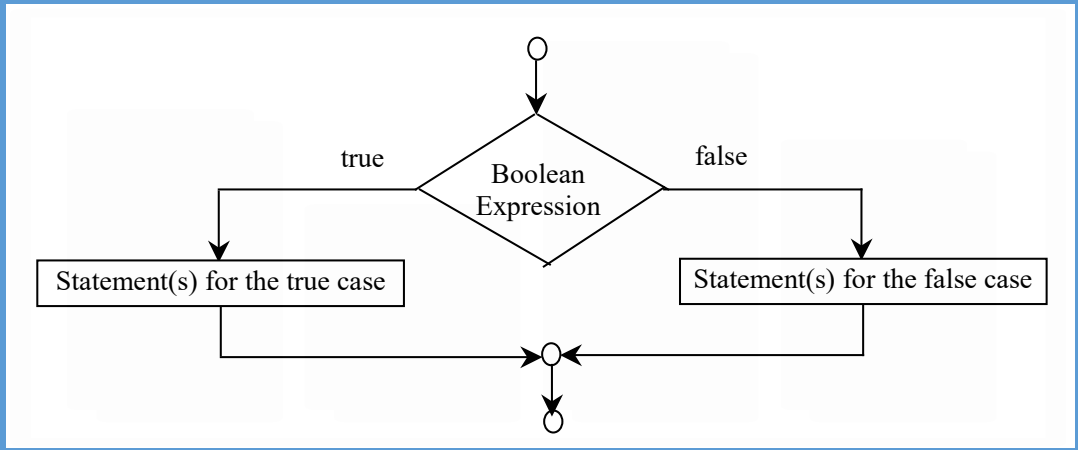
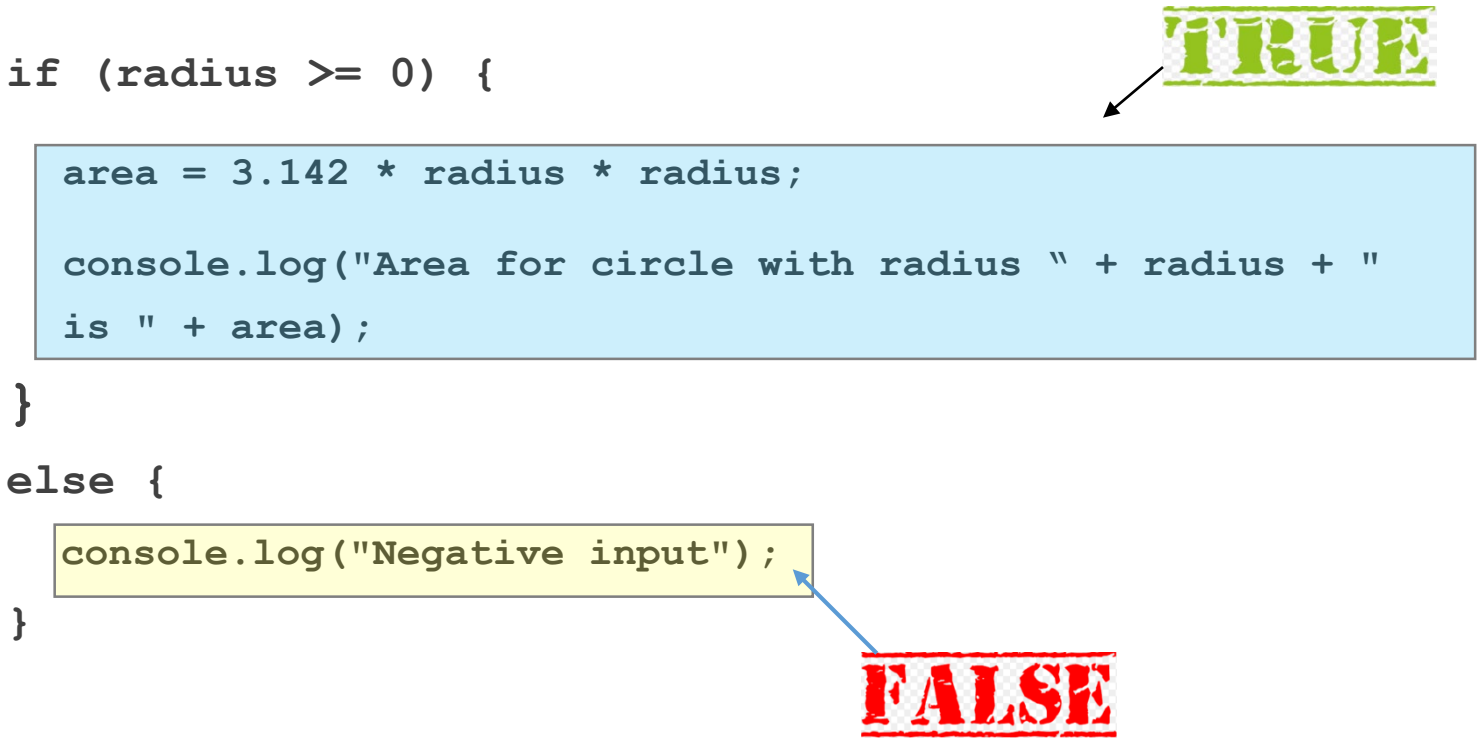
- To implement selection control using two-way if statements
- To implement selection control using nested if statements
- To implement selection control using switch statements

Two-Way `if` statement




```
if (condition is true) {
  statement(s)-for-the-true-case;
}
else {
  statement(s)-for-the-false-case;
}
```

Can you figure out the portion that will be executed when condition is true or false?



Test your understanding

(…resist….don't look at the answer first!)

Write an if..else statement to determine whether an integer i is even or odd

[Hint : use % operator]

Here's the solution :

```
if (i % 2 == 0) {
 console.log(i + " is even");
} else {
  console.log(i + " is odd");
}
```

Are the braces {} necessary? Reason(s)?

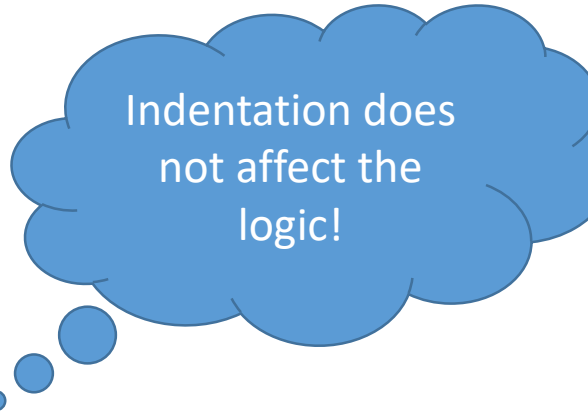
Braces can be omitted since there is only one statement

```
if (i % 2 == 0)
  console.log(i + " is even");
else
  console.log(i + " is odd");
```

Now view this video to learn concepts of if..else, nested if and coding in JavaScript

Reference ➔ https://www.youtube.com/watch?v=IsG4Xd6LlsM

Nested if Statements




```
if (score >= 90.0)
  grade = 'A';
else
  if (score >= 80.0)
    grade = 'B';
  else
    if (score >= 70.0)
      grade = 'C';
    else
      if (score >= 60.0)
        grade = 'D';
      else
        grade = 'F';
```

Equivalent

```
if (score >= 90.0)
  grade = 'A';
else if (score >= 80.0)
  grade = 'B';
else if (score >= 70.0)
  grade = 'C';
else if (score >= 60.0)
  grade = 'D';
else
  grade = 'F';
```

Nested if Statements

Suppose score is 70.0

The condition is false

```
if (score >= 90.0)
  grade = 'A';
else if (score >= 80.0)
  grade = 'B';
else if (score >= 70.0)
  grade = 'C';
else if (score >= 60.0)
  grade = 'D';
else
  grade = 'F';
```

Nested if Statements

Suppose score is 70.0

The condition is false

```
if (score >= 90.0)
  grade = 'A';
else if (score >= 80.0)
  grade = 'B';
else if (score >= 70.0)
  grade = 'C';
else if (score >= 60.0)
  grade = 'D';
else
  grade = 'F';
```

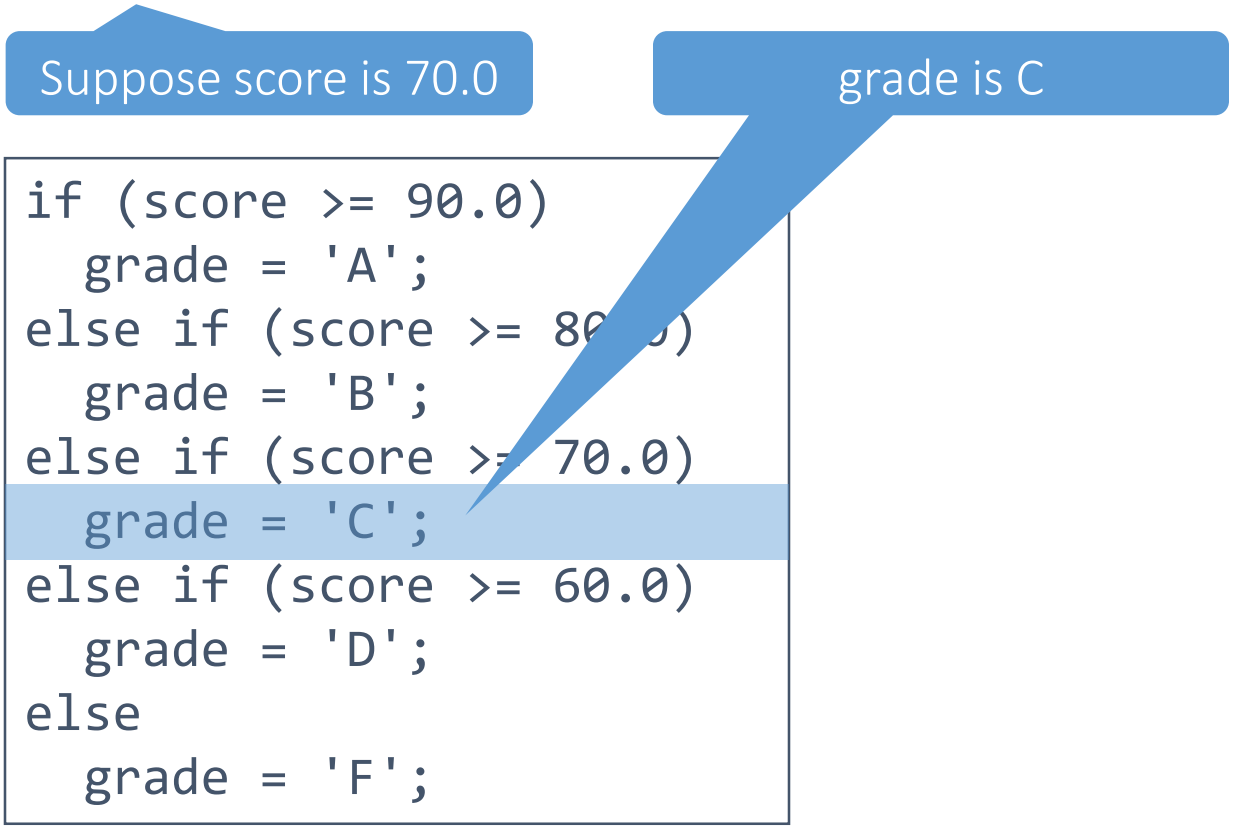
Nested if Statements

Suppose score is 70.0

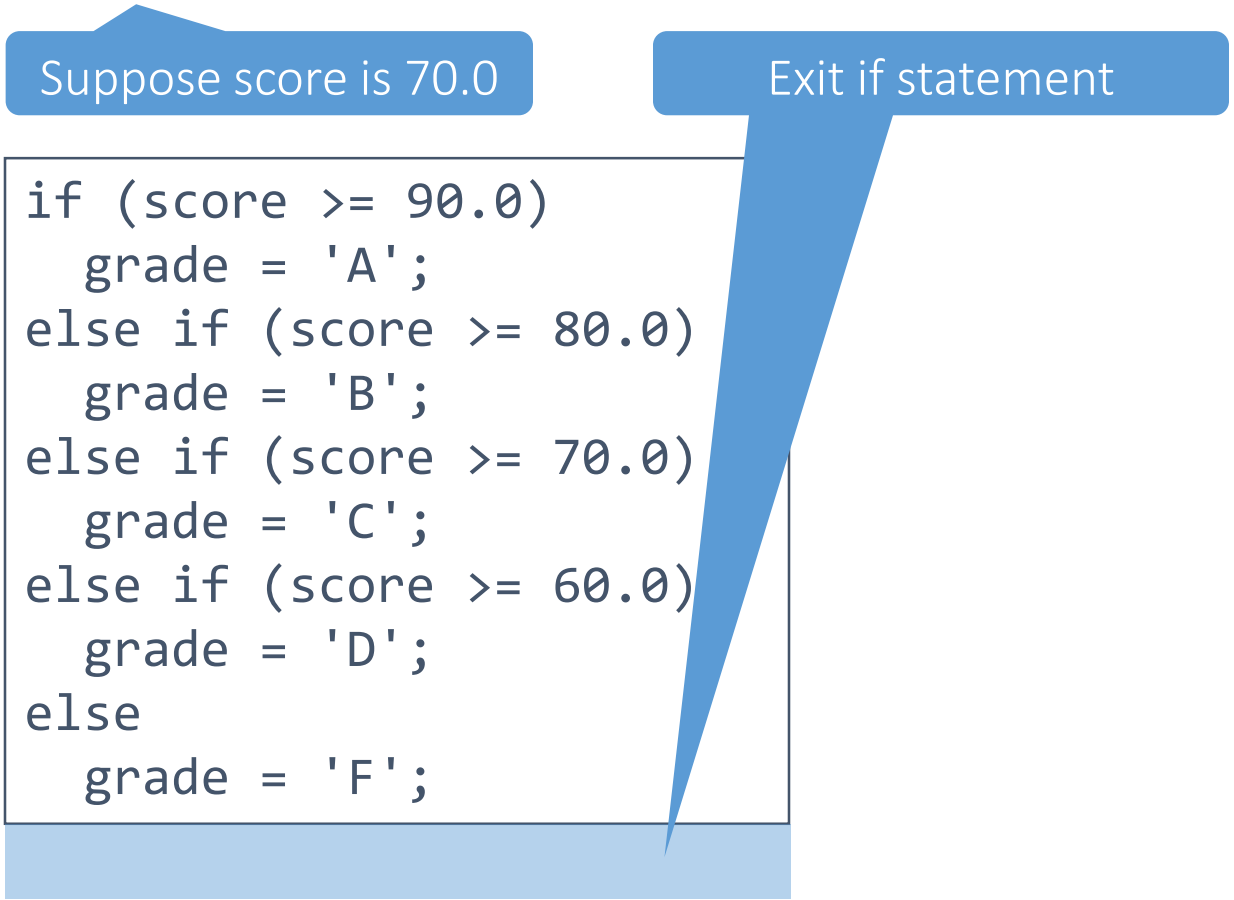
The condition is true

```
if (score >= 90.0)
  grade = 'A';
else if (score >= 80.0)
  grade = 'B';
else if (score >= 70.0)
  grade = 'C';
else if (score >= 60.0)
  grade = 'D';
else
  grade = 'F';
```

Nested if Statements



Nested if Statements



Nested if Statements

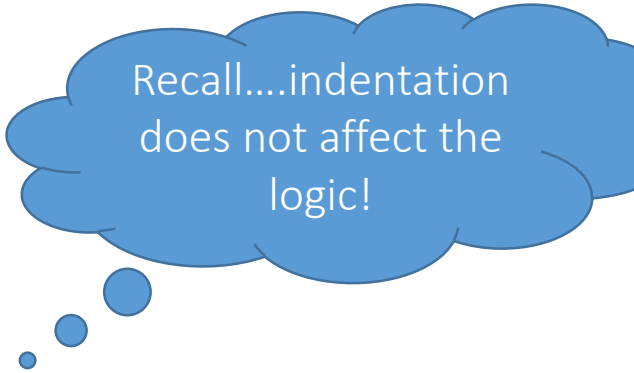
The sequence of the if..else statements is important.

If the codes are rewritten as follows, what will be the grade assigned if score is 100?

```
if (score < 60.0)
  grade = 'F';
else if (score >= 60.0)
  grade = 'D';
else if (score >= 70.0)
  grade = 'C';
else if (score >= 80.0)
  grade = 'B';
else if (score >= 90.0)
  grade = 'A';
```

Take note !!

The else clause matches the most recent if clause in the same block.




```
var i = 1;
var j = 2;
var k = 3;


if (i > j)
   if (i > k)
       console.log("A");
else
   console.log("B");
```

equivalent

```
var i = 1;
var j = 2;
var k = 3;


if (i > j)
   if (i > k)
       console.log("A");
   else
       console.log("B");
```

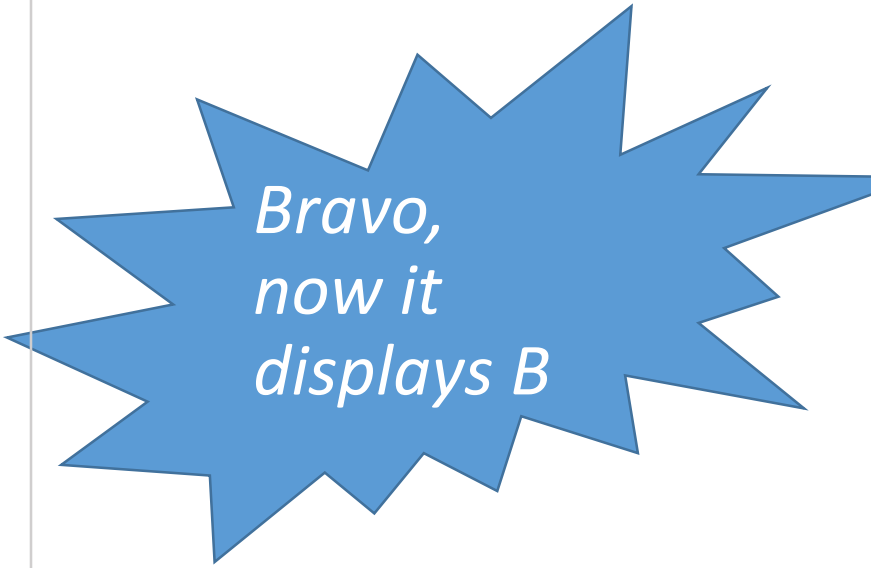
Nothing is printed by these statement.

What can you change to resolve this?

To force the else clause to match the first if clause, you must add a pair of braces:

```
var i = 1;
var j = 2;
var k = 3;

if (i > j) {
    if (i > k)
    console.log("A");
}
else
    console.log("B");
```



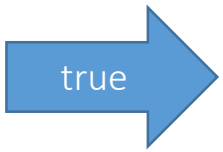
Trace these codes……

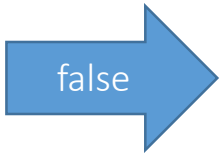
```
var x=2,y=3,z=0;;
if (x > 2) {
     if (y > 2) {
          z = x + y;
          console.log("z is " + z);
     }
}
else {
   console.log("x is " + x);
}
```

Output : x is 2

Review Question 3.4

Now, what is the output if x = 3 and y = 3?






```
var x = 3, y = 3, z = 0;
if (x > 2) {
    if (y > 2) {
        z = x + y;
        console.log("z is " + z);
    }
}
else {
    console.log("x is " + x);
}
```

Output is
z is 6

What is the output for the given codes below?

```
var num = 8;
var result = false;


if (num % 2 == 0)
   result= true;
else
    result = false;


console.log("Variable result contains  " + result );
```

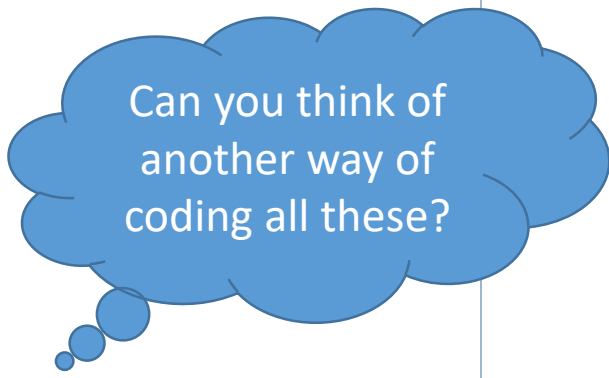
Output → Variable result contains true

What is the output for the given codes below?

```
var num = 8;
var result = false;


if (num % 2 == 0)
   result= true;
else
    result = false;


console.log("Variable result contains  " + result );
```



Output → Variable result contains true

Another way of coding ……

```
var num = 8;
//var result = false;


/*if (num % 2 == 0)
   result= true;
else
    result = false;
*/
console.log("Variable result contains " +(num % 2 == 0));
```

Output → Variable result contains true

```
var num = 8;
var result = false;
result = num % 2 == 0;
console.log("Variable result contains " + result );
```

Both produce the same output → Variable result contains true

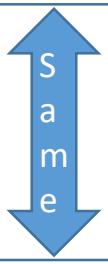
```
var num = 8;
var result = false;

if (num % 2 == 0)
    result= true;
else
    result = false;
console.log("Variable result contains " + result );
```

Do they produce the same output?

```
var result =true;


if (result == true)
   console.log("It is even.");
```




```
var result =true;


if (result)
   console.log("It is even.");
```

Yes, both have the same output → It is even

`switch` Statements

switch statement enables you to select from multiple choices based on a set of **fixed** values for a given expression.

Both produce the same output!

```
var txt = "SP"
if  (txt == "SP")
    console.log("Welcome to " +  txt) ;
```

```
switch (txt) {
    case "SP": console.log ("Welcome " +  txt ) ;
}
```

Output are the same → Welcome to SP

`switch` Statement Rules

The switch-expression must always be enclosed in parentheses.

The value1, …, valueN must have same data type as the value of the switch-expression. The resulting statements in the case statement are executed when the value in the case statement matches the value of the switch-expression.

```
switch (switch-expression) {
  case value1:  statement(s)1;
          break;
  case value2: statement(s)2;
          break;
  …
  case valueN: statement(s)N;
          break;
  default: statement(s)-for-default;
}
```

`switch` Statement Rules

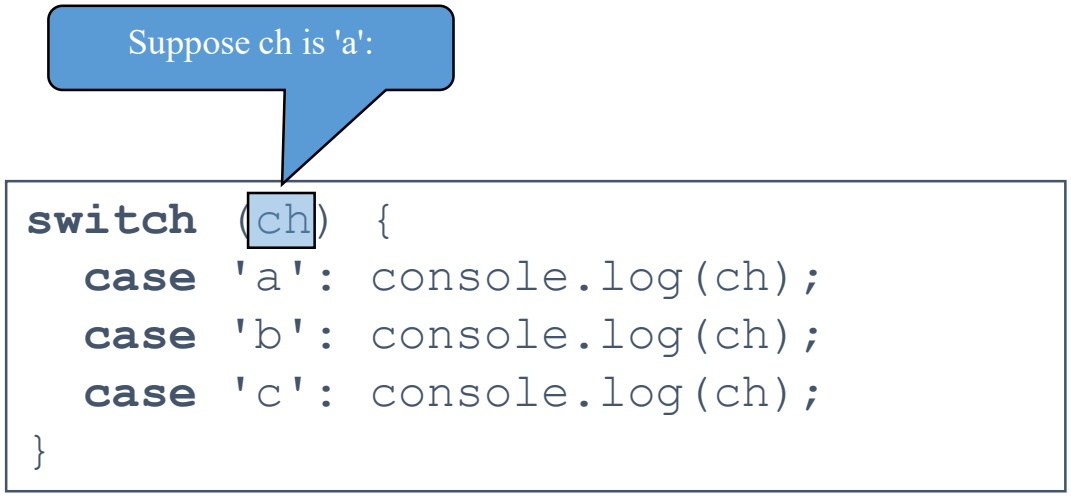
The break is optional, it is used to terminate the switch statement.
If the break statement is omitted, the next line will be executed.

```
switch (switch-expression) {
  case value1:  statement(s)1;
          break;
  case value2: statement(s)2;
          break;
  ...
  case valueN: statement(s)N;
          break;
  default: statement(s)-for-default;
}
```

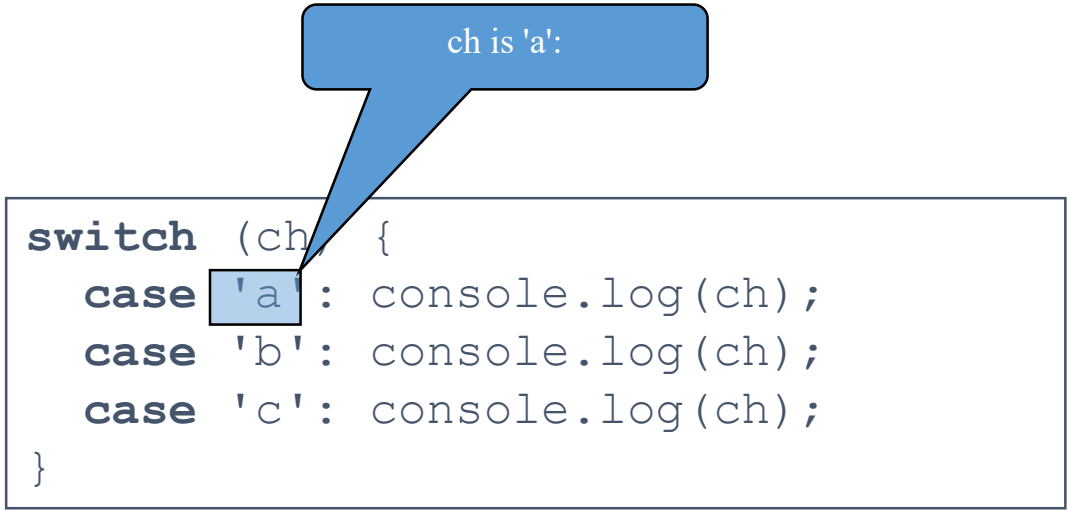
The default case is optional, it is used to perform actions when none of the specified cases matches the switch-expression.

The case statements are executed in sequential order, but the order of the cases (including the default case) does not matter. However, it is good programming style to follow the logical sequence of the cases and place the default case at the end.

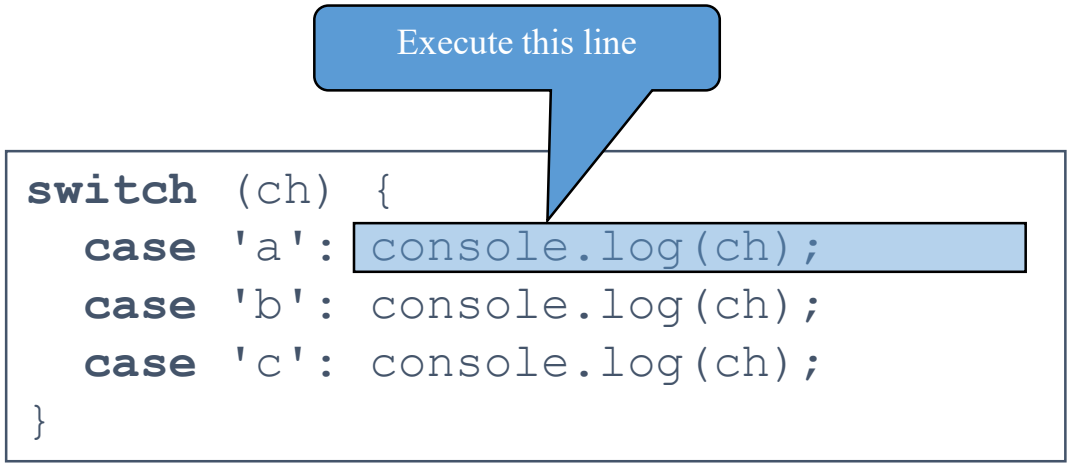
switch Statement Rules -- Example



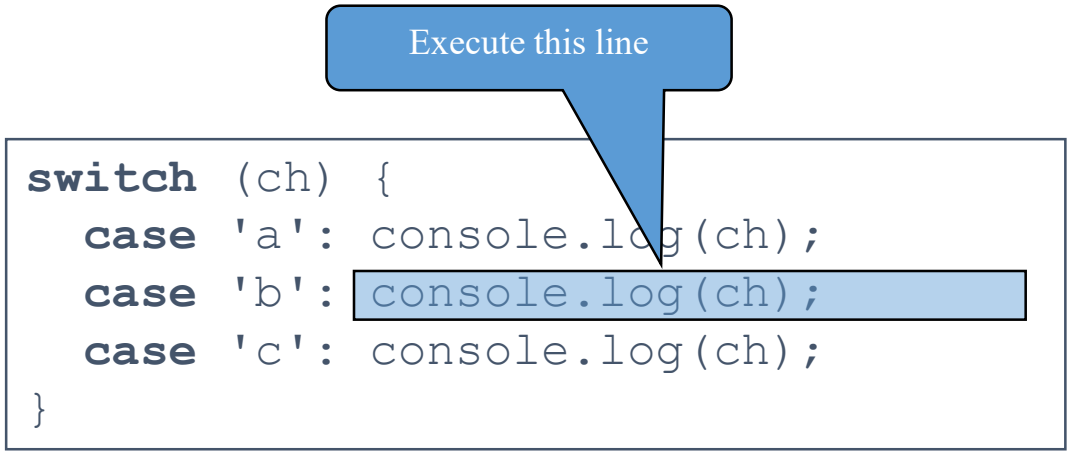
switch Statement Rules -- Example



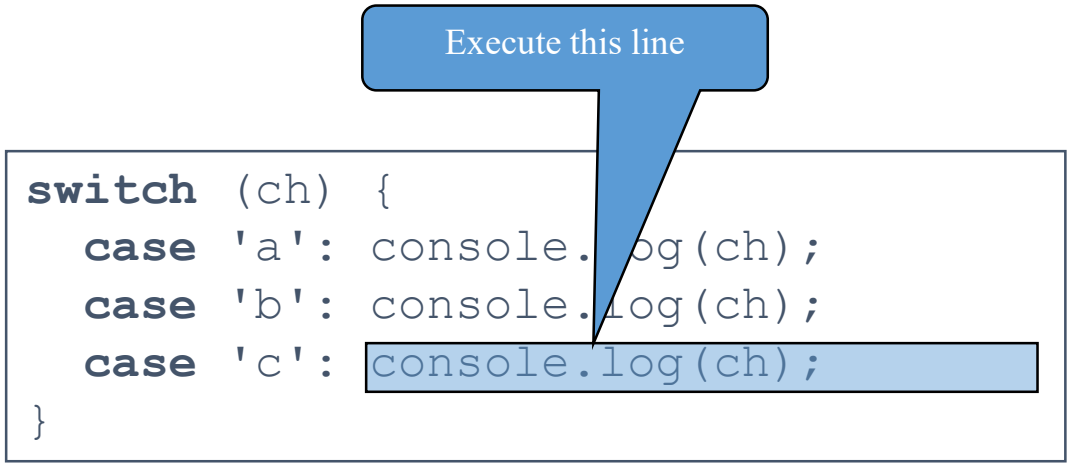
switch Statement Rules -- Example



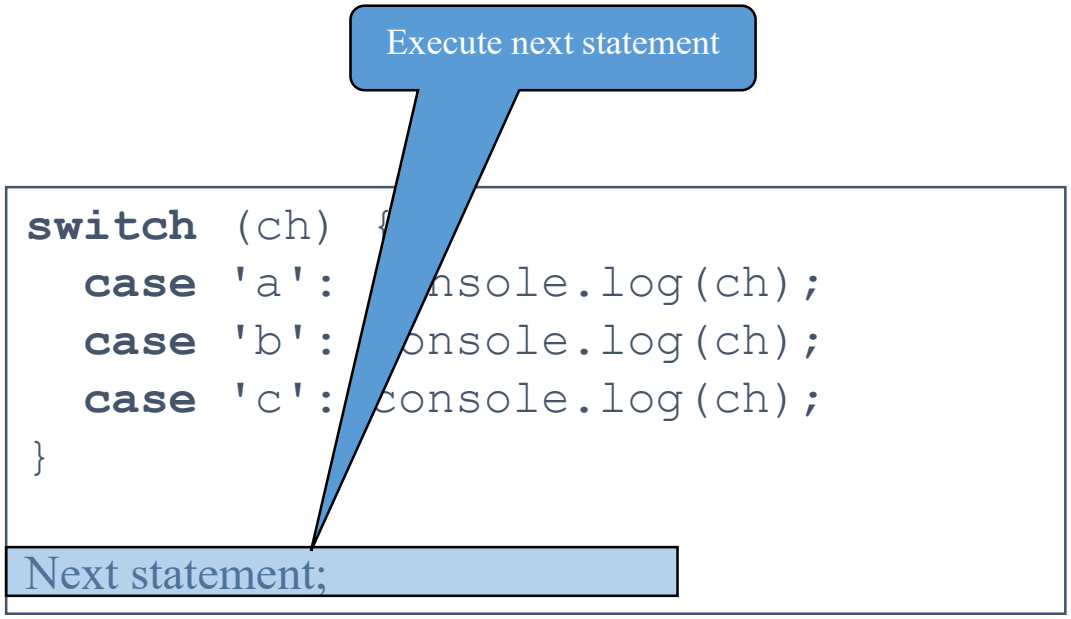
switch Statement Rules -- Example



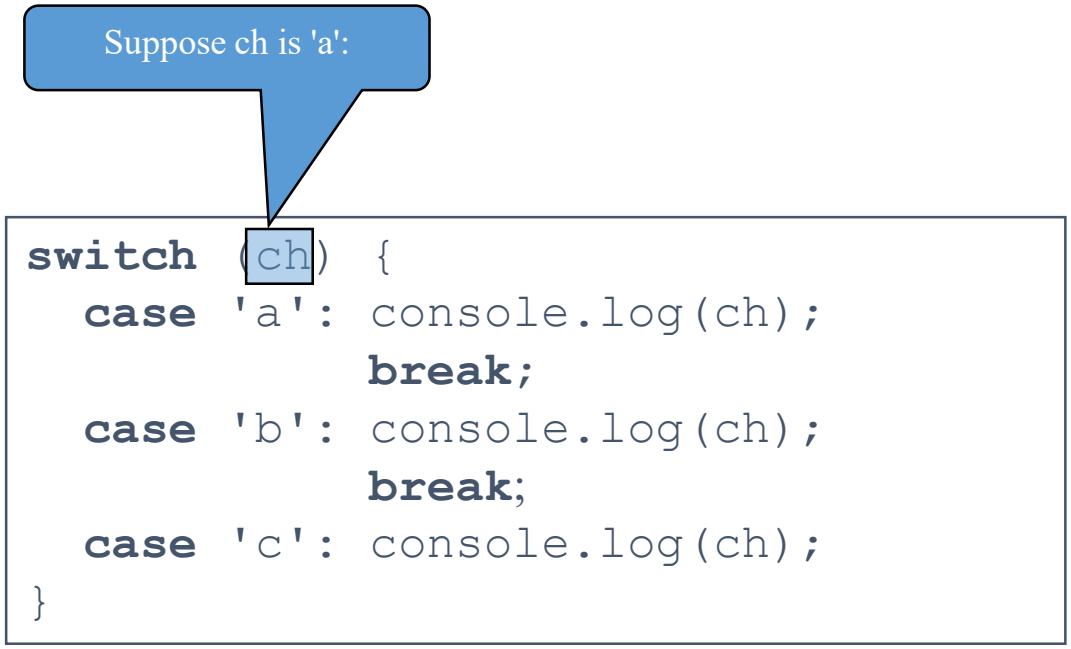
switch Statement Rules -- Example



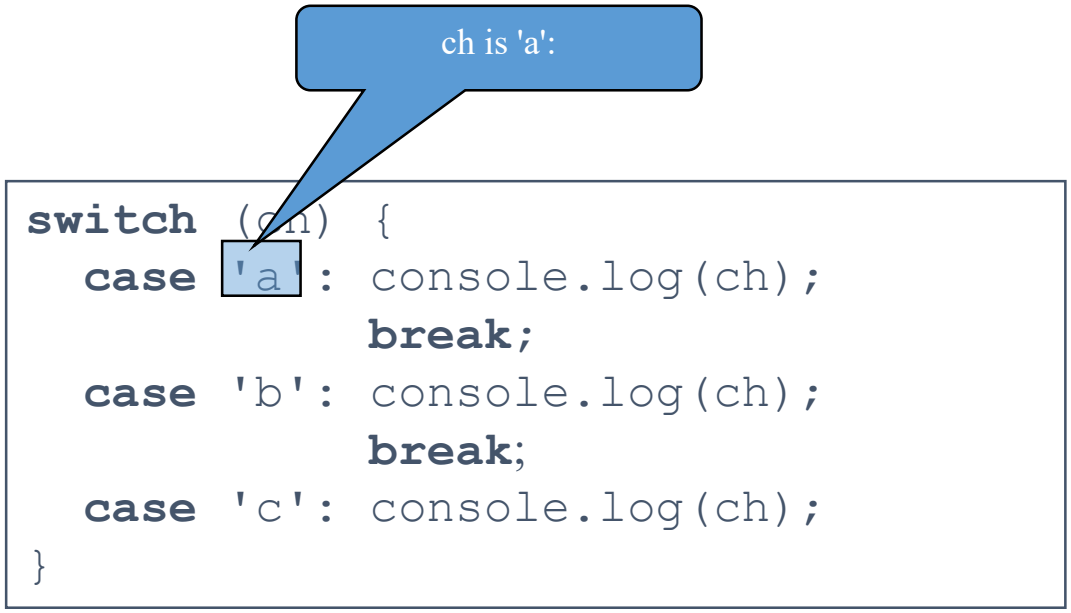
switch Statement Rules -- Example



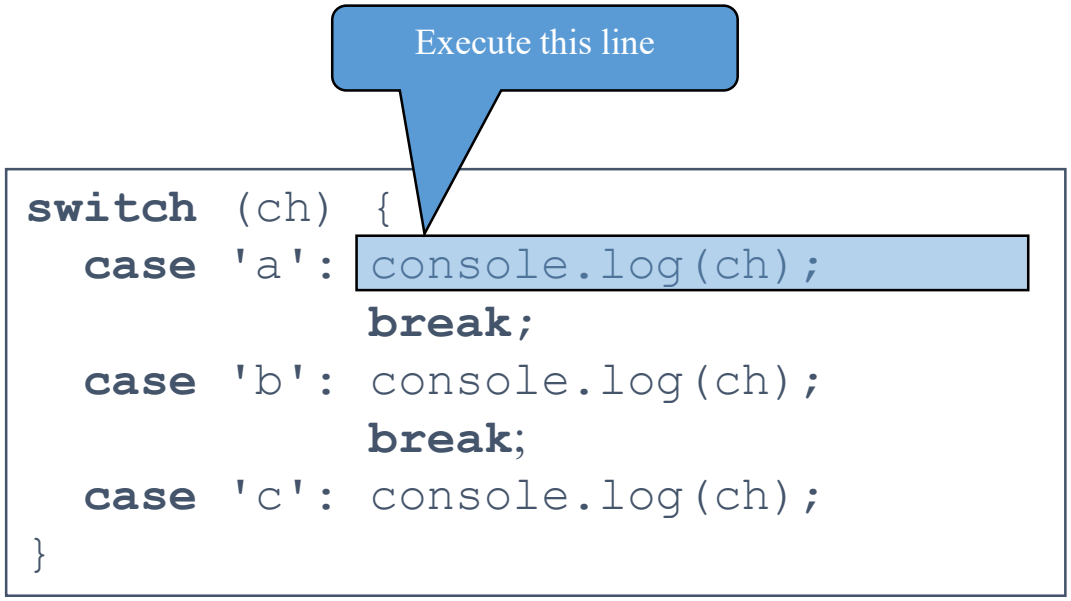
switch Statement Rules -- Example



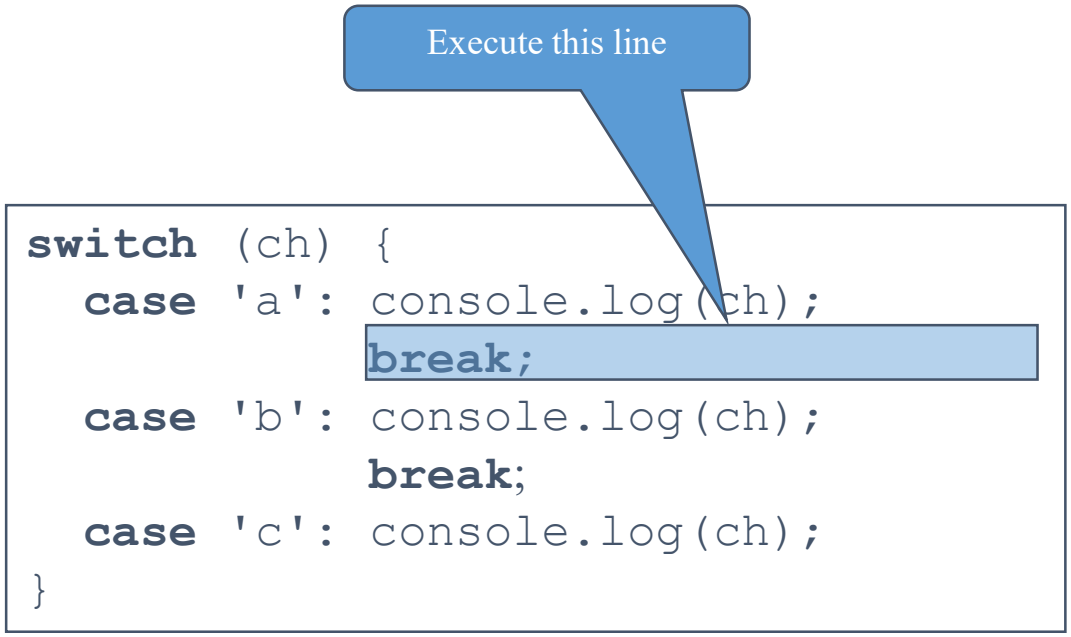
switch Statement Rules -- Example



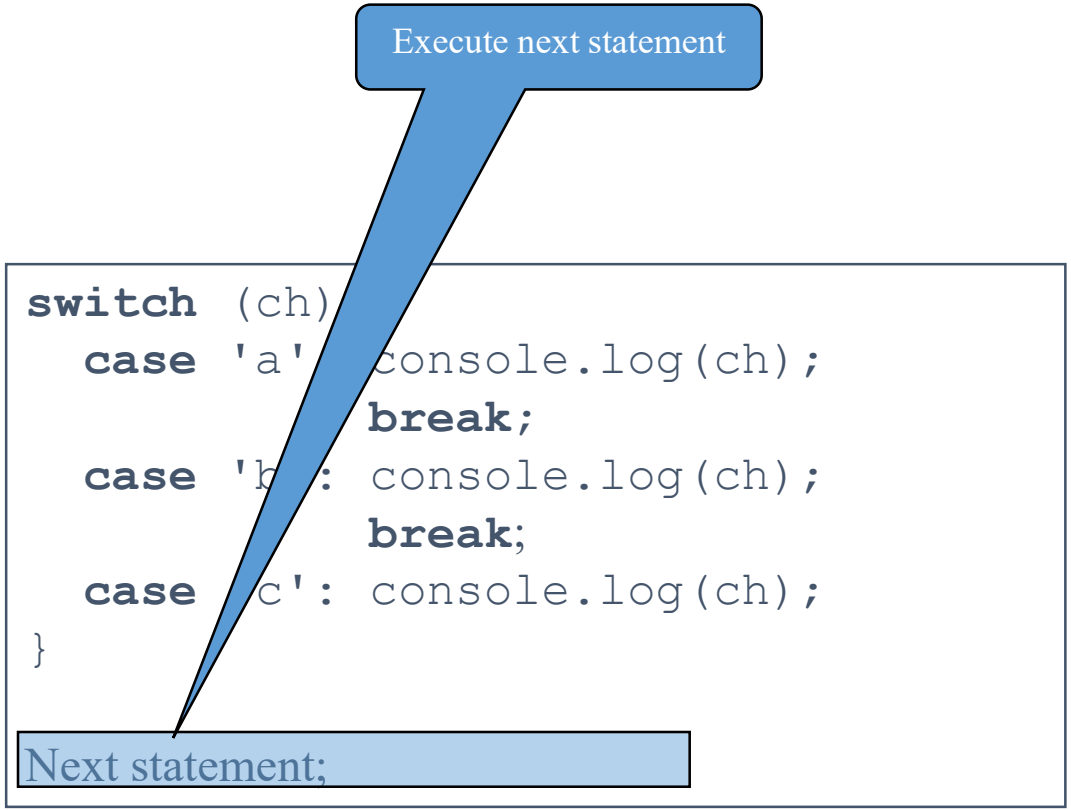
switch Statement Rules -- Example



switch Statement Rules -- Example



switch Statement Rules -- Example



Class Exercise: switch Statement

Review Question

a) What is the value of **y** after the following switch statement is executed?

```
var x = 3, y = 3;
switch (x + 3) {
      case 6 : y = 1;
      default: y += 1;
}
```

Class Exercise: switch Statement

Review Question (Solution)

a) What is the value of **y** after the following switch statement is executed?

```
var x = 3, y = 3;
switch (x + 3) {      //x+3=6
      case 6 : y = 1;    //y contains 1
      default: y += 1; //continue here y becomes 2
}
```

Class Exercise: switch Statement

Review Question

b) What if the case value is changed to 7?

```
var x = 3, y = 3;
switch (x + 3) {
      case 7 : y = 1;
      default: y += 1;
}
```

Class Exercise: switch Statement

Review Question (Solution)

b) What if the case value is changed to 7?

```
var x = 3, y = 3;
switch (x + 3) {       //x+3=6
      case 7 : y = 1;
      default: y += 1; //continue here y becomes 4
}
```

Class Exercise: switch Statement

Use a switch statement to rewrite the following **if** statement and display the value of x.

```
var a=1,x=0;
  if (a == 1)
        x += 5;
else if (a == 2)
        x += 10;
else if (a == 3)
        x += 16;
else if (a == 4)
        x += 34;
```

Solution

```
var a=1,x=0;
switch (a) {
    case 1 : x+=5;
             break;
    case 2 : x+=10;
             break;
    case 3 : x+=16;
             break;
    case 4 : x+=34;
}
console.log('Value of x is ' + x);
```

Summary for Topic 3a Selections (II)

- To implement selection control using two-way if statements
- To implement selection control using nested if statements
- To implement selection control using switch statements

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