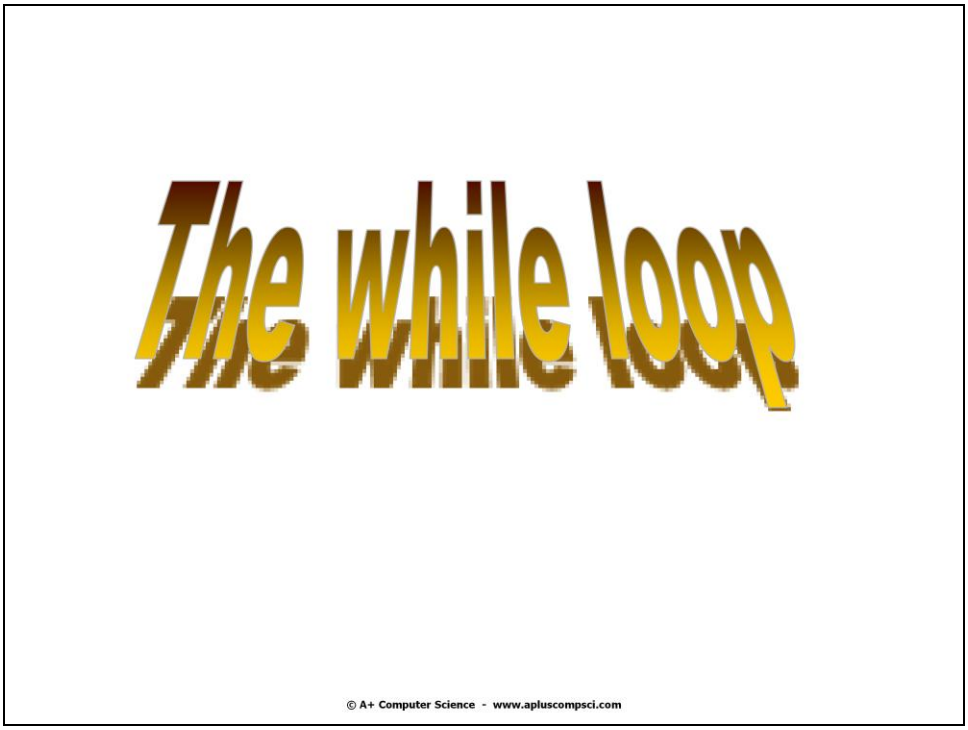
while and do while loops


The while loop
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While Loop Definition

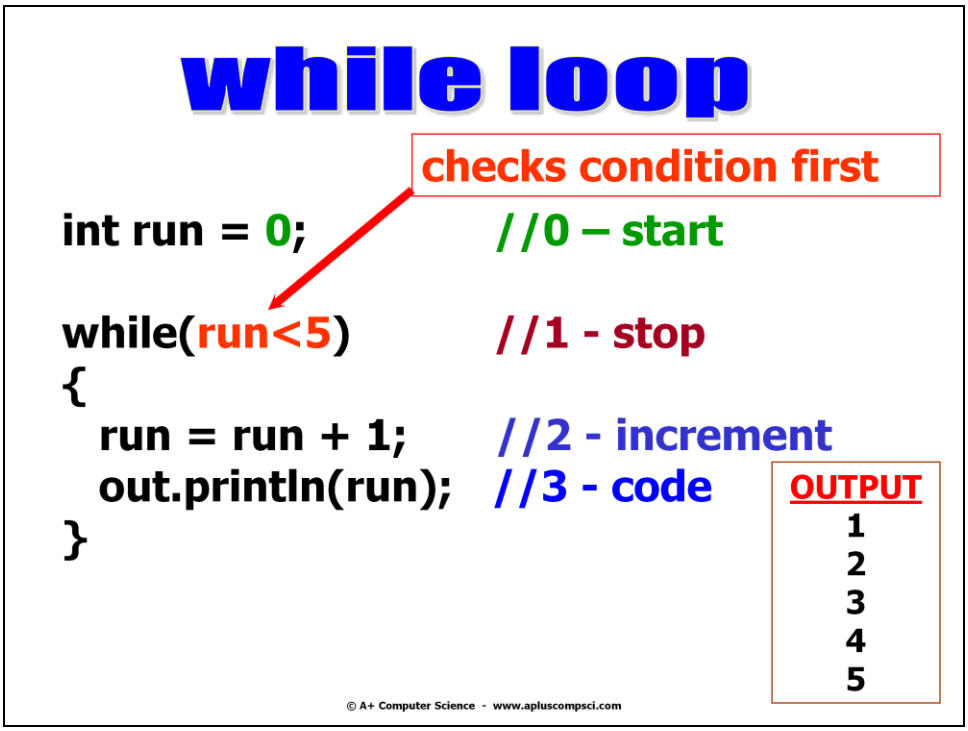
A while loop is a block of code associated with a condition. As long as the condition is true, the loop will continue to run the block of code.

the while loop

```
while(  boolean condition placed here  )
{
  do something 1;
  do something 2;
}
```

As long as the condition is true, `do something 1` and `do something 2` will occur.

If the condition is false, `do something 1` and `do something 2` do not occur.



As long as run is less than 5 (`run<5`), the loop will iterate. For each iteration, run is increased by 1 and run is displayed.

run begins with the value 0

Iteration 1 – run = 0 + 1 print(1)

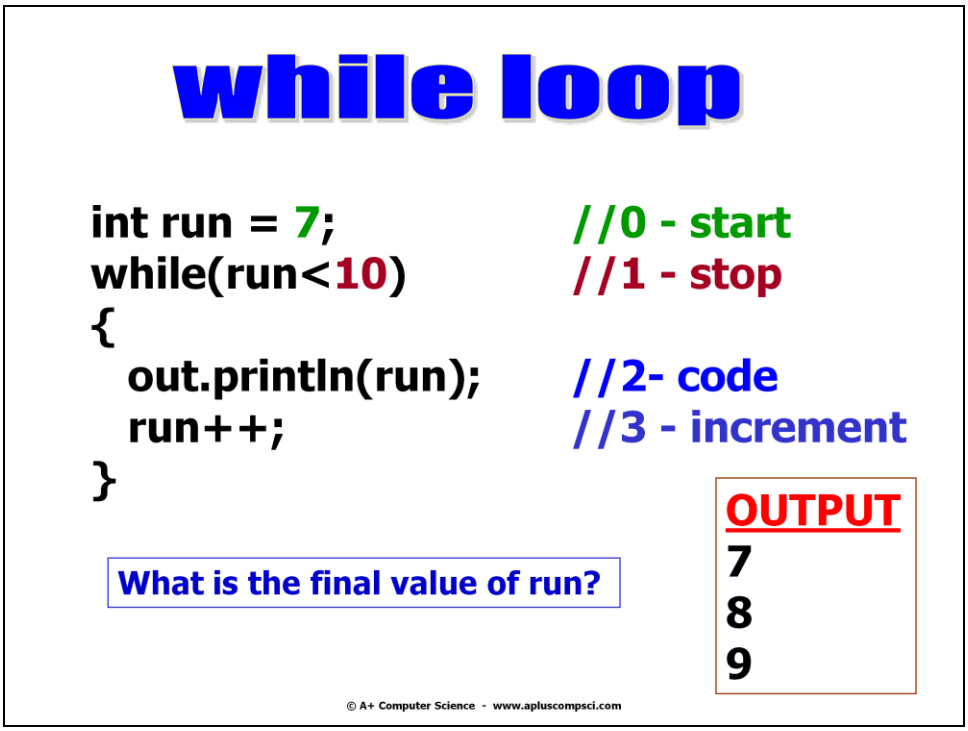
Iteration 2 – run = 1 + 1 print(2)

Iteration 3 – run = 2 + 1 print(3)

Iteration 4 – run = 3 + 1 print(4)

Iteration 5 – run = 4 + 1 print(5)

The loop condition fails when run reaches the value 5 as 5 is not less than 5.



As long as run is less than 10 (`run<10 )`, the loop iterates. For each iteration, run is displayed and then increased by 1.

The loop condition fails when run reaches the value 10 as 10 is not less than 10.

run begins with the value 7

Iteration 1 – print(7) run = 7 + 1

Iteration 2 – print(8) run = 8 + 1

Iteration 3 – print(9) run = 9 + 1

The loop condition fails when run reaches the value 10 as 10 is not less than 10.

Open whileone.java

while loop 2

```
int run=25;
while(run>=10)
{
  out.println(run);
  out.println("loop");
  run=run-5;
}
```

OUTPUT

```
25
loop
20
loop
15
loop
10
loop
```


As long as run is less than or equal to 10 `( run<=10 )`, the loop will iterate. For each iteration, run is displayed, `loop` is displayed, and run is decreased by 5.

run begins with the value 25

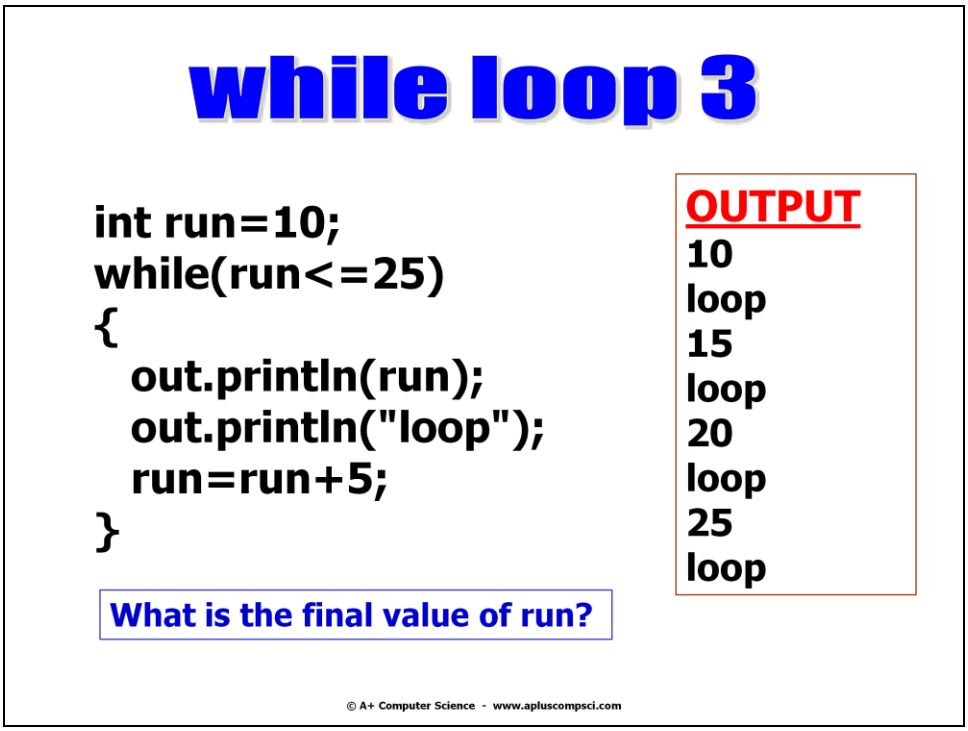
Iteration 1 – print(25) print(loop) run = 25-5

Iteration 2 – print(20) print(loop) run = 20-5

Iteration 3 – print(15) print(loop) run = 15-5

Iteration 4 – print(10) print(loop) run = 10-5

The loop condition fails when run reaches the value 5 as 5 is not greater than or equal to 10.



As long as run is less than or equal to 25 `( run<=25 )`, the loop will iterate. For each iteration, run is displayed, `loop` is displayed, and run is increased by 5.

run begins with the value 10

Iteration 1 – print(10) print(loop) run = 10+5

Iteration 2 – print(15) print(loop) run = 15+5

Iteration 3 – print(20) print(loop) run = 20+5

Iteration 4 – print(25) print(loop) run = 25+5

The loop condition fails when run reaches the value 30 as 30 is not less than or equal to 25.

tracing a while loop

```
int total=0,x=1;
while(x<6)
{
  total=total+x;
  x++;
}
out.println(total);
```

TRACE

x	total	output
	0	
1	1	
2	3	
3	6	
4	10	
5	15	
6		15

As long as x is less than 6 (`x<6`), the loop will iterate. For each iteration, total is increased by the value of x and x is increased by 1.

total begins with the value 0 and x begins with the value of 1

Iteration 1 – total = 0 + 1 x=1+1

Iteration 2 – total = 1 + 2 x=2+1

Iteration 3 – total = 3 + 3 x=3+1

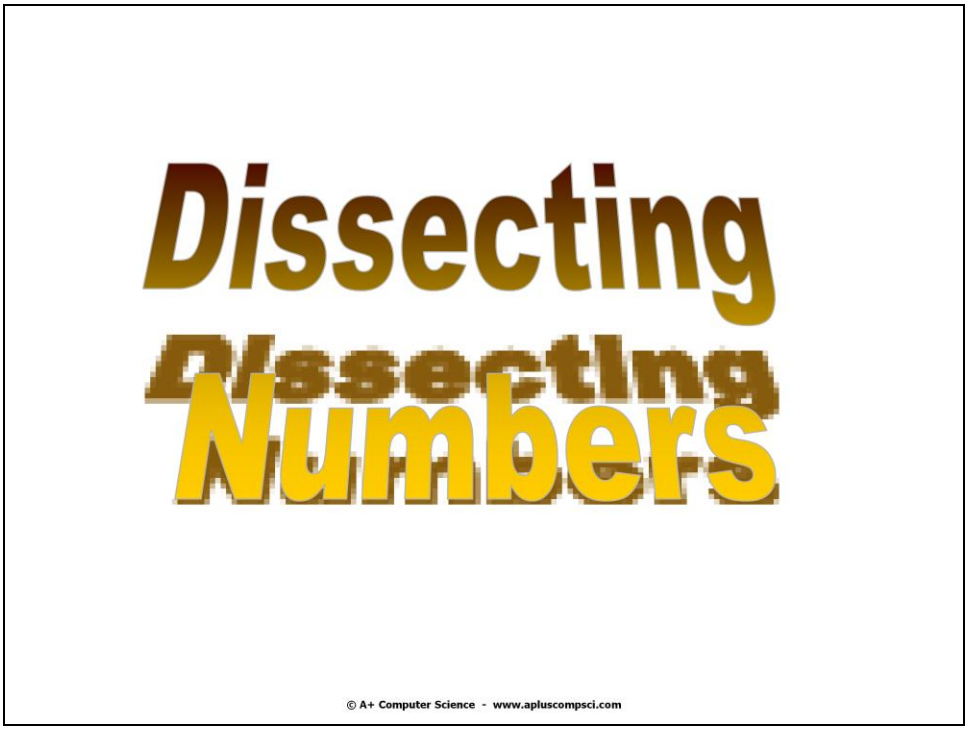
Iteration 4 – total = 6 + 4 x=4+1

Iteration 5 – total = 10 + 5 x=5+1

The loop condition fails when x reaches the value 6 as 6 is not less than 6.

Open whiletwo.java

Open whilethree.java


Dissecting
Numbers
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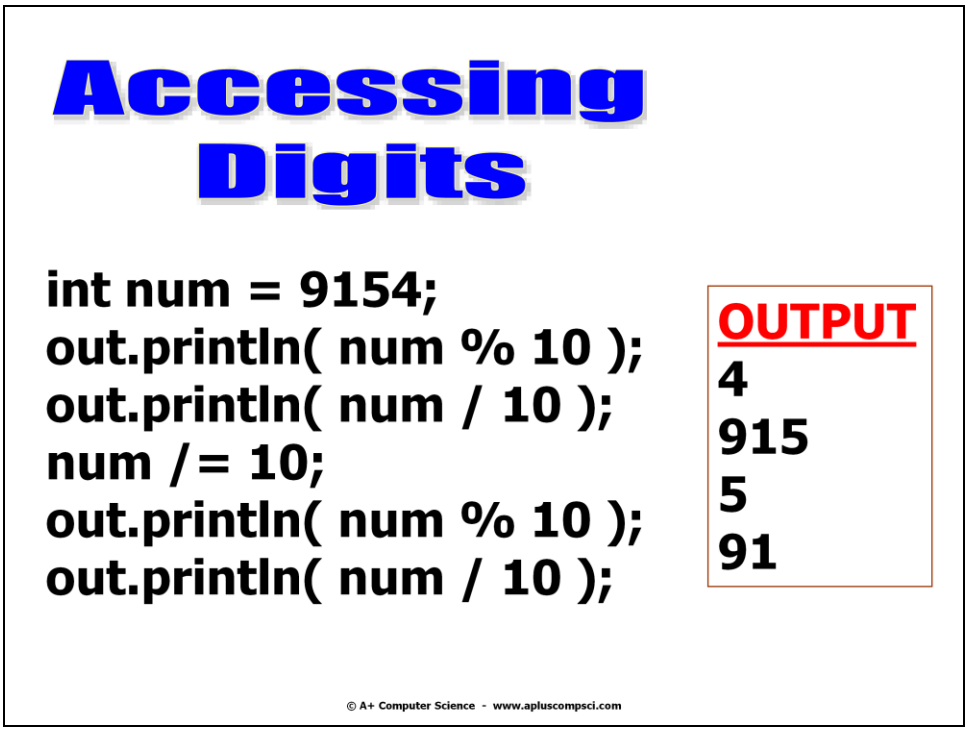
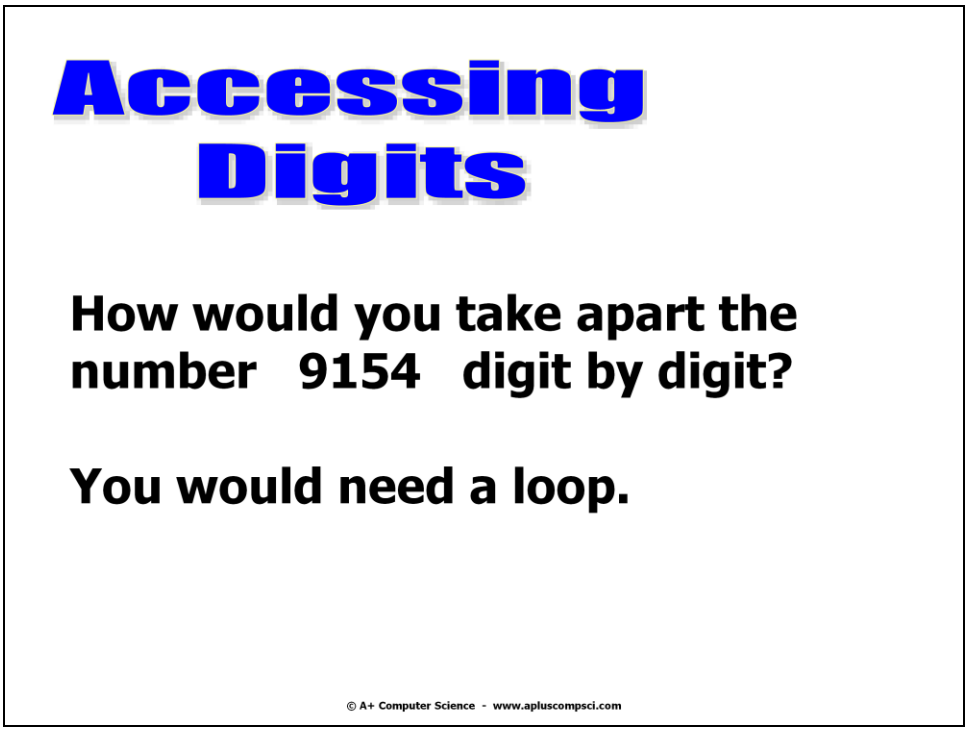
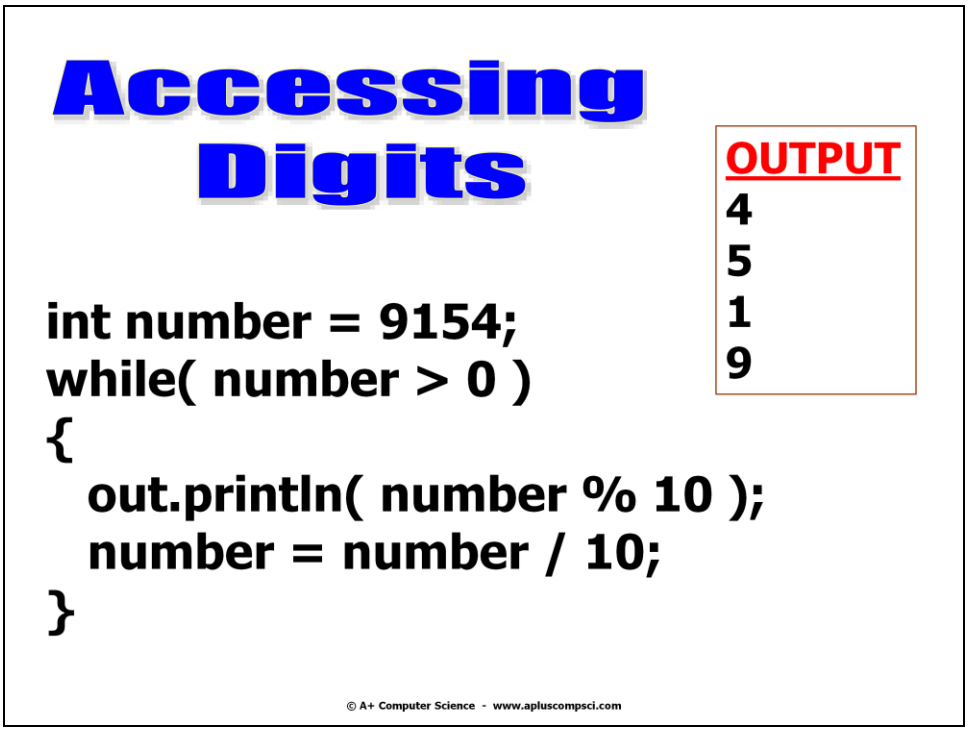


% is used to access the remainder of division.
In the case above, % 10 is being used on a base 10 number to access the right most digit.
/ 10 is being used to chop off the right most digit.



In this example, the loop iterates as long as number is larger than 0.
Each time the loop iterates, the right most digit of the number is printed. % 10 is used to access the right most digit.
The number is also reduced by removing the right digit using / 10 and assigning that value back to number.



In this example, the loop iterates as long as number is larger than 0.
Each time the loop iterates, the right most digit of the number is printed. % 10 is used to access the right most digit.
The number is also reduced by removing the right digit using / 10 and assigning that value back to number.

Open accessingdigits.java

Summing Digits

set total to 0

while num is greater than 0
  add right most digit to total
  remove right most digit

print out the total

Open summingdigits.java

Complete the code

Open averagingdigits.java

Complete the code


Common
Common
Errors
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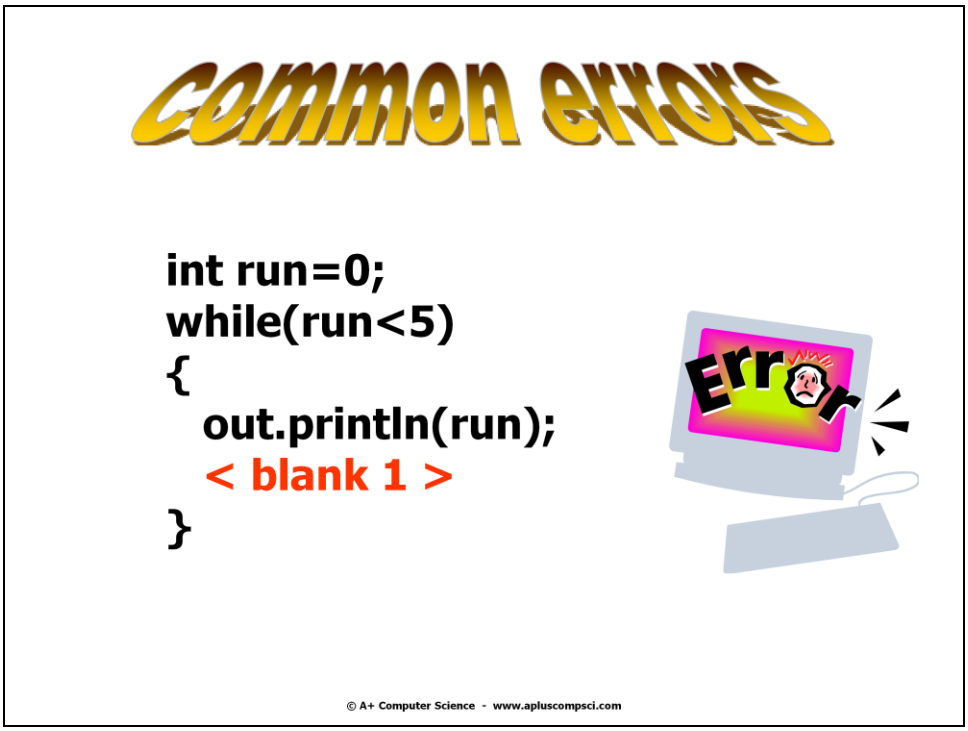
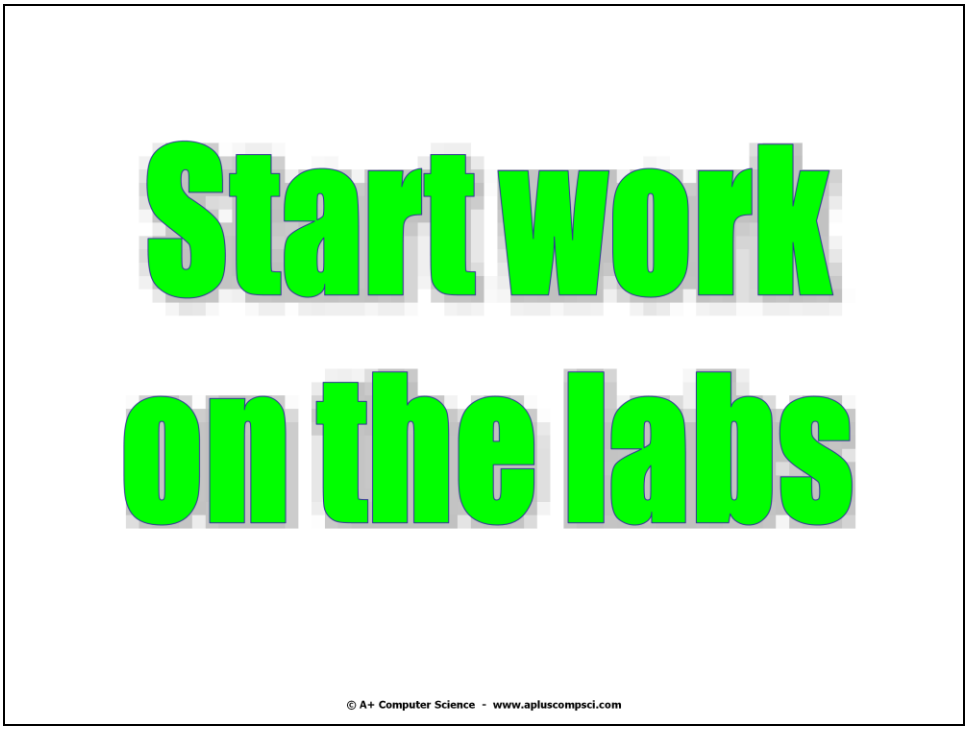


This loop will run forever as there is no code to change the value of variable run. run begins with the value of 0 and run never changes. 0 is less than 5; thus the loop will never terminate as the condition will never fail.


Start work
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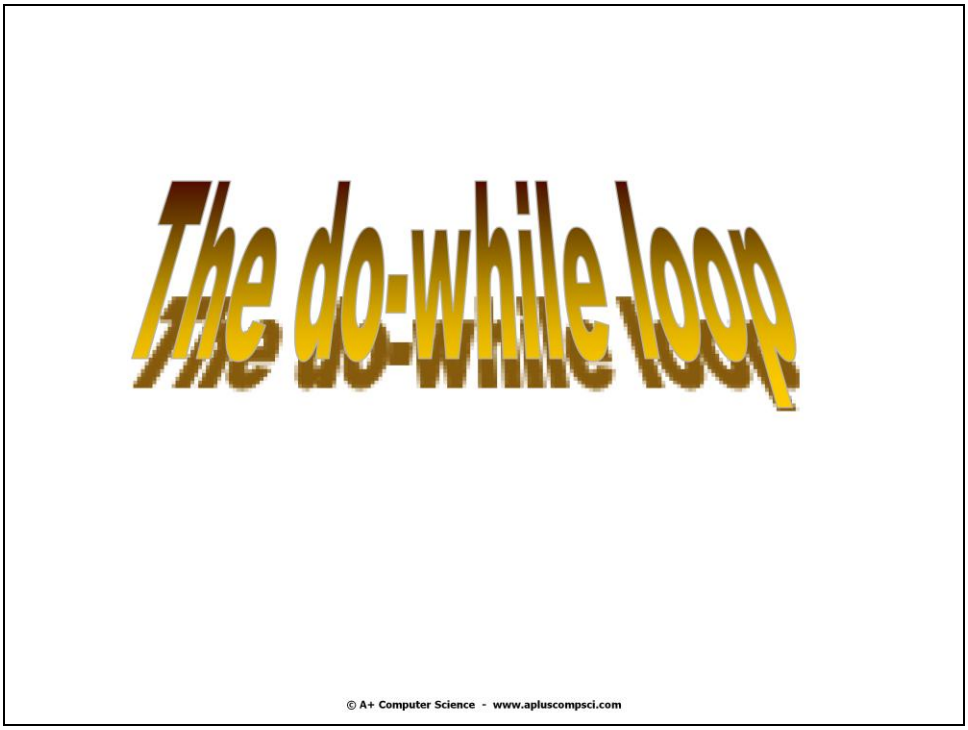
The do-while loop
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Do While Loop Definition

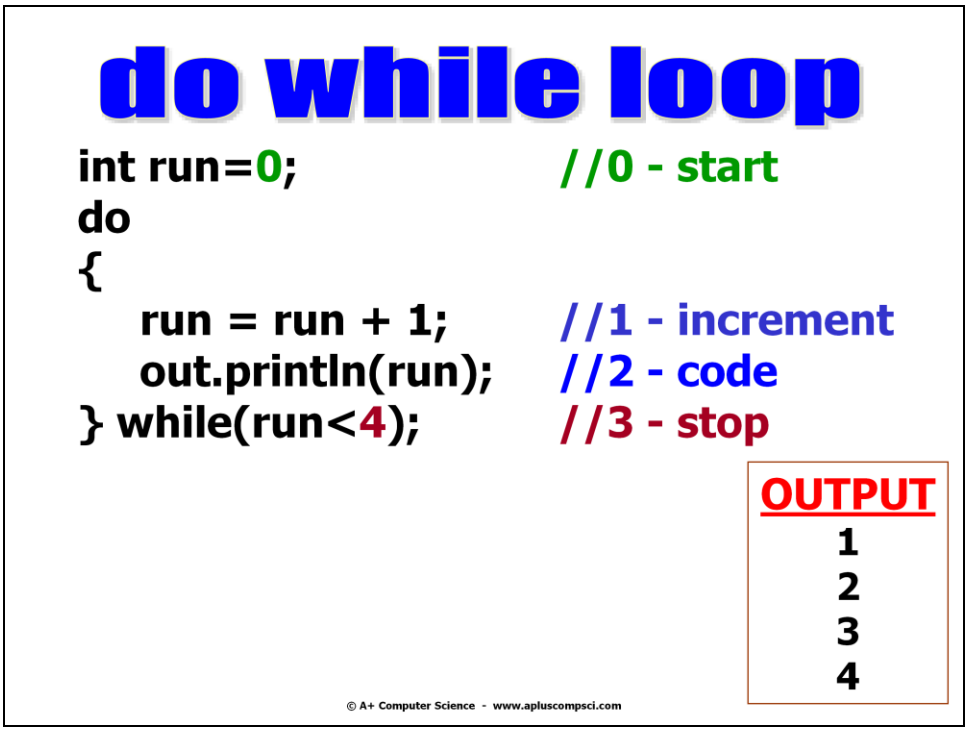
A do while loop is a group of statements that will run once before checking the loop condition. If the condition is true, the loop will run again. This run and check process will continue until the condition evaluates false.

the do while loop

```
do{
  do something 1;
  do something 2;
}while( boolean condition placed here );
```

`do something 1` and `do something 2` will occur before the loop condition is evaluated. If the loop condition is true, `do something 1` and `do something 2` will occur again.

`do something 1` and `do something 2` will occur at least once and will continue to occur as long as the loop condition is true.



Before the loop condition is evaluated, run is increased by 1 and run is displayed.

As long as run is less than 4 (`run<4`), the loop will continue to iterate.

run begins with the value 0

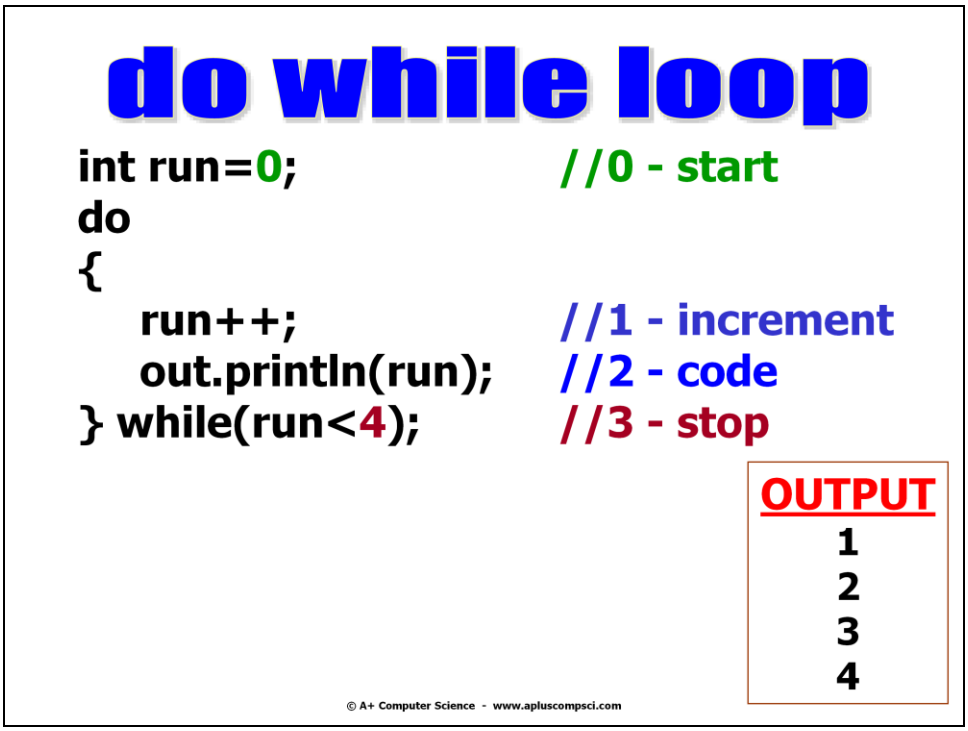
Iteration 1 – run = 0 + 1 print(1)

Iteration 2 – run = 1 + 1 print(2)

Iteration 3 – run = 2 + 1 print(3)

Iteration 4 – run = 3 + 1 print(4)

The loop condition fails when run reaches the value 4 as 4 is not less than 4.



Before the loop condition is evaluated, run is increased by 1 and run is displayed.

As long as run is less than 4 (`run<4`), the loop will continue to iterate.

run begins with the value 0

Iteration 1 – run = 0 + 1 print(1)

Iteration 2 – run = 1 + 1 print(2)

Iteration 3 – run = 2 + 1 print(3)

Iteration 4 – run = 3 + 1 print(4)

The loop condition fails when run reaches the value 4 as 4 is not less than 4.

do while loop

```
int run= 4;                 //0 - start
do
{
    out.println(run);       //1 - code
    run--;                  //2 – decrement
} while(run>0);             //3 - stop
```

OUTPUT

4
3
2
1

Before the loop condition is evaluated, run is displayed and decreased by 1.

As long as run is greater than 0 (`run>0`), the loop will continue to iterate.

run begins with the value 4

Iteration 1 – print(4) run = 4 - 1

Iteration 2 – print(3) run = 3 - 1

Iteration 3 – print(2) run = 2 - 1

Iteration 4 – print(1) run = 1 - 1

The loop condition fails when run reaches the value 0 as 0 is not greater than 0.

Open dowhileone.java

do while loop 2

```
int run=25;
do{
   out.println(run);
   out.println("loop");
   run=run-5;
} while(run>=10);
```

What is the final value of run?

OUTPUT

```
25
loop
20
loop
15
loop
10
loop
```


Before the loop condition is evaluated, run is displayed, loop is displayed, and run is decreased by 5.

As long as run is greater than or equal to 10 `( run>=10 )`, the loop will continue to iterate.

run begins with the value 25

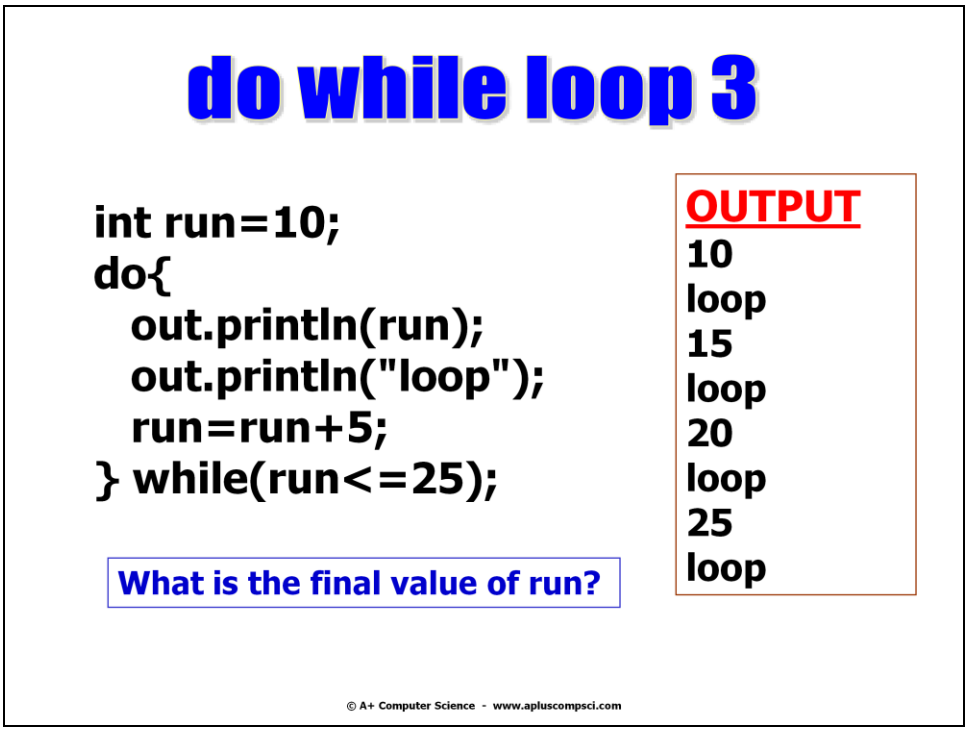
Iteration 1 – print(25) print(loop) run = 25 - 5

Iteration 2 – print(20) print(loop) run = 20 - 5

Iteration 3 – print(15) print(loop) run = 15 - 5

Iteration 4 – print(10) print(loop) run = 10 - 5

The loop condition fails when run reaches the value 5 as 5 is not greater than or equal to 10.



Before the loop condition is evaluated, run is displayed, loop is displayed, and run is increased by 5.

As long as run is less than or equal to 25 `( run<=25 )`, the loop will continue to iterate.

run begins with the value 10

Iteration 1 – print(10) print(loop) run = 10 + 5

Iteration 2 – print(15) print(loop) run = 15 + 5

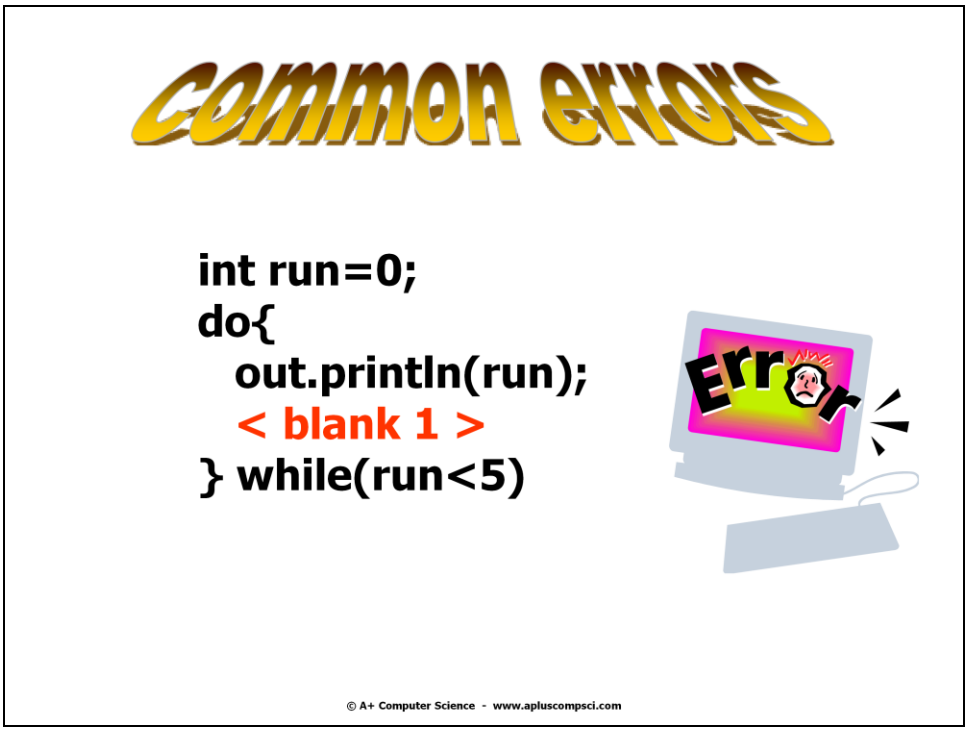
Iteration 3 – print(20) print(loop) run = 20 + 5

Iteration 4 – print(25) print(loop) run = 25 + 5

The loop condition fails when run reaches the value 30 as 30 is not less than or equal to 25.

Open dowhiletwo.java

Open dowhilethree.java



This loop will run forever as there is no code to change the value of variable run. run begins with the value of 0 and run never changes. 0 is less than 5; thus the loop will never terminate as the condition will never fail.


Continue work
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