

Algorithm performance



Counting operations

By the end of this video you will be able to...

- Count the number of operations executed when running a code snippet on given input

How many operations get executed?


Search for the letter

a


in the word

"San Diego"

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```



```
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}
```

Linear search

```
public static boolean hasLetter (String word, char letter)
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        {
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}
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Linear search


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{
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    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Linear search

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

0	1	2	3	4	5	6	7	8
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public static boolean hasLetter (String word, char letter)
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```

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```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 1

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
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    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
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}
```

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 2

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 3

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 4

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 5

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 6

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

Total so far: 7

Is the number of operations the same
every time we run

`hasLetter(String word, char letter)?`

IVQ

```
public static boolean hasLetter (String word char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

IVQ

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

How many operations get executed?

Search for the letter

'x'

in the word

"San Diego"

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
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        {
            return true;
        }
    }
    return false;
}
```

How many operations get executed?

For a single iteration:

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
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    }
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}
```

How many operations get executed?

For a single iteration:

```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
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}
```

3

0	1	2	3	4	5	6	7	8
S	a	n		D	i	e	g	o

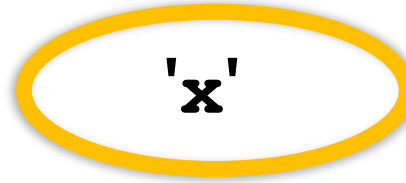
```
public static boolean hasLetter (String word, char letter)
{
    for (int i = 0; i < word.length(); i++)
    {
        if (word.charAt(i) == letter)
        {
            return true;
        }
    }
    return false;
}
```

**2 iterations
when look
for 'a'**

How many iterations of loop?

Search for the letter

in the word

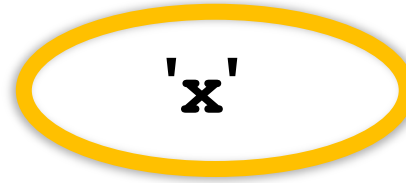


"San Diego"

```
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}
```


How many iterations of loop?

Search for the letter
in the word



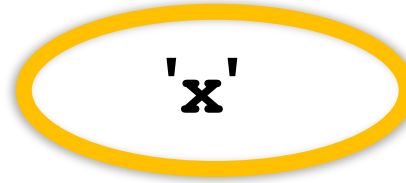
"San Diego"

9 iterations

```
public static boolean hasLetter (String word, char letter)
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    for (int i = 0; i < word.length(); i++)
    {
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        {
            return true;
        }
    }
    return false;
}
```

How many iterations of loop?

Search for the letter
in the word



"San Diego"

**9 iterations
so
29 operations**

```
public static boolean hasLetter (String word, char letter)
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        }
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```

Thought question

- What counts as an operation?