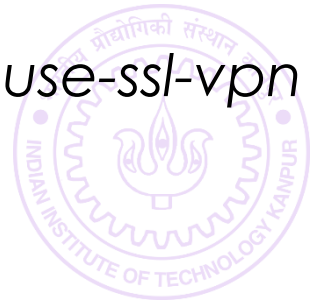
The Eloquent Mr C

ESC101: Foundations of Computing

Purushottam Kar

Announcements

- CHM101 sectioning has caused some clashes
  - This week we are allowing students to attend lab out of order
  - Met DoAA officials to resolve the matter – lets hope for the best ☺
- Unable to access the website?
  - Are you using a data plan on your smart phone?
  - Our course website, Prutor are *internal*, not accessible outside IITK
    - *Solution 1: use IITK computers (CC, NCL, hostel)*
    - *Solution 2: install a VPN app on your smart phone https://www.iitk.ac.in/ccnew/index.php/13-network/99-how-to-use-ssl-vpn*
  - Gradescope, Piazza are accessible from all places
  - Thanks to Nikita Awasthi (tutor) for pointing this out



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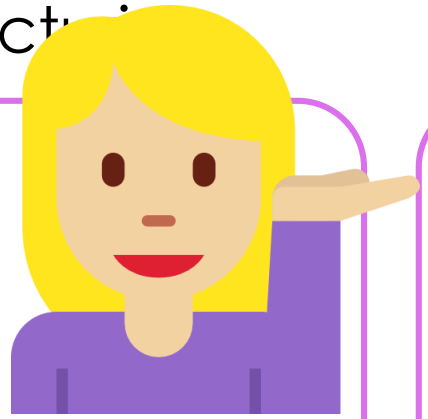

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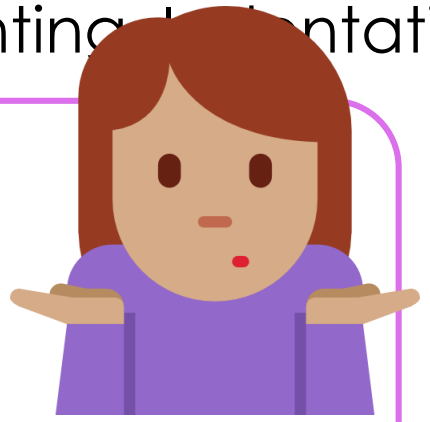

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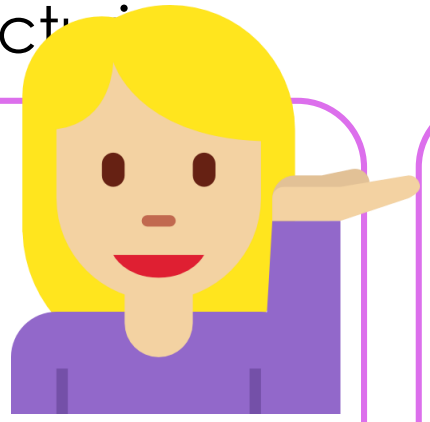

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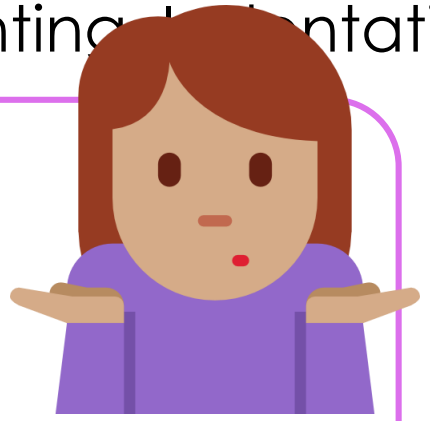

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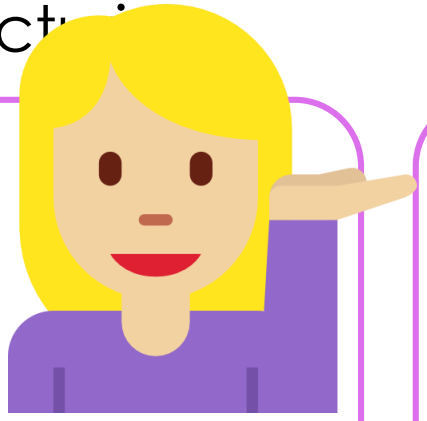

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A handy shorthand

HOW WE MUST SPEAK TO MR. COMPILER

HOW WE USUALLY SPEAK TO A HUMAN

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Hello

a is a variable.

b is another variable.

a = 5.

b = 4.

Please add them.

Goodbye

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a and b are two variables.

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Explore, practice. It will take only few days to internalize. No need to mug!

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How will I remember all this?

Printing the sum of two numbers

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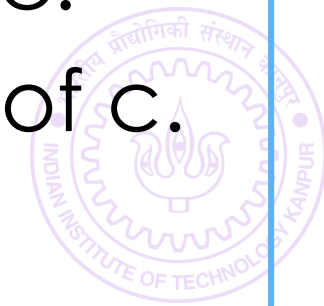

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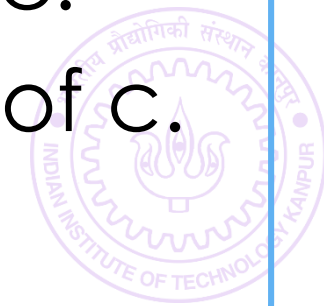

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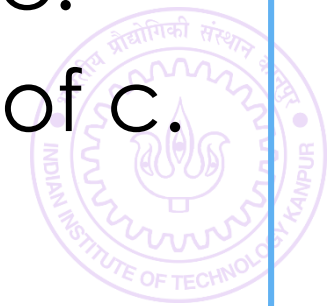

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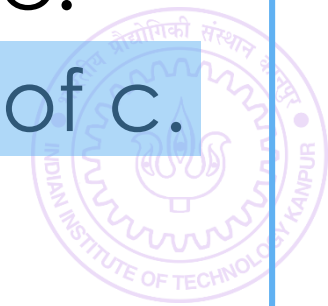

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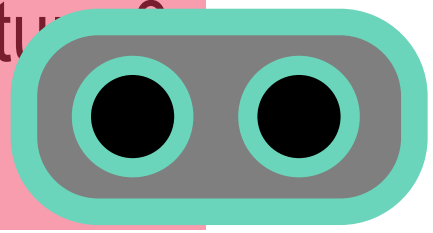

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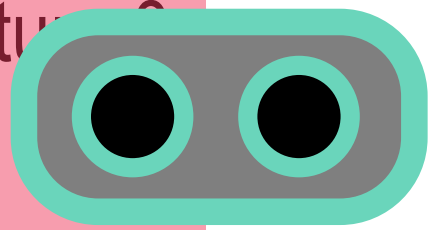

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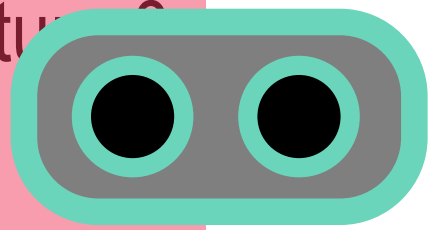

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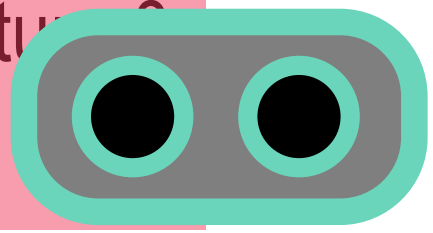

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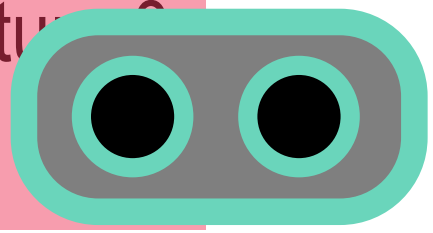

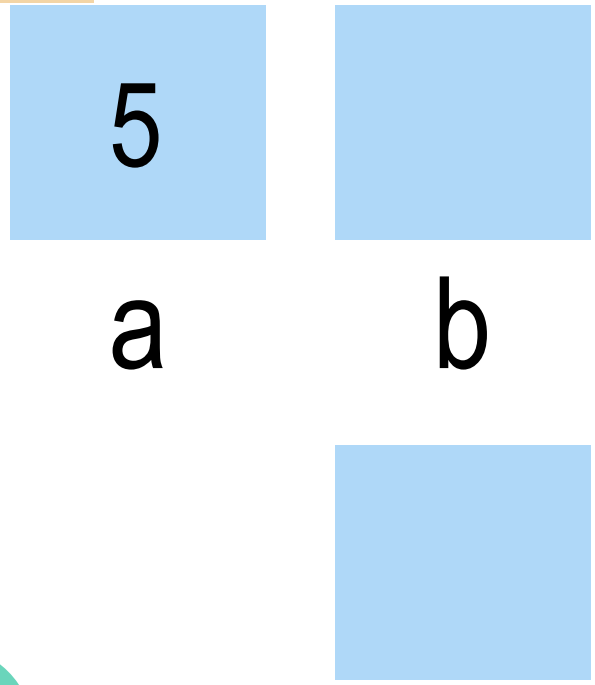

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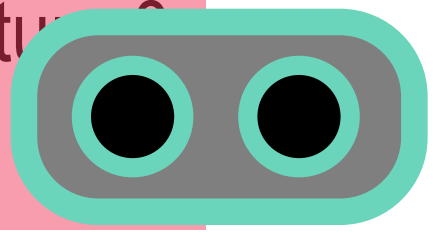
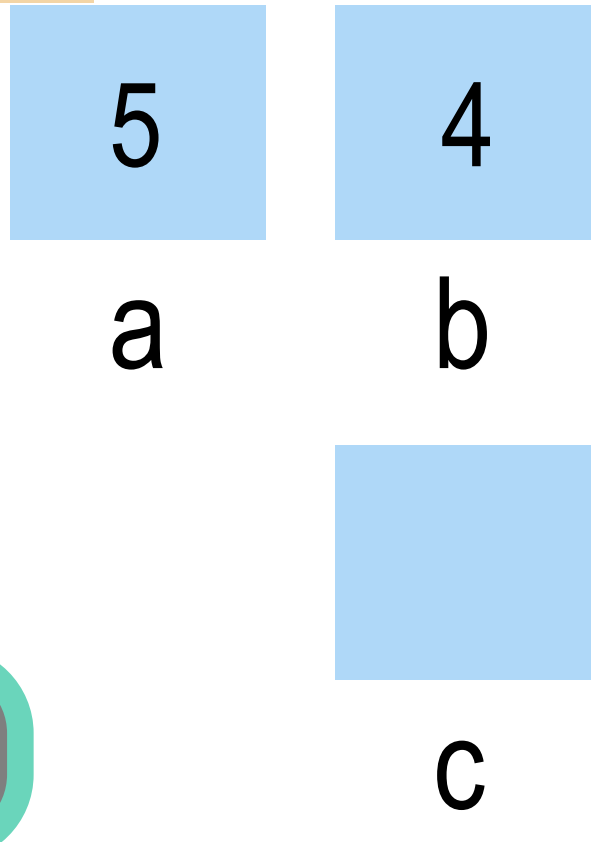




HOW WE USUALLY SPEAK TO A HUMAN

Do you speak English?

Hello

a,b,c are variables.

a = 5 and b = 4.

Please add them and put the result in variable c.

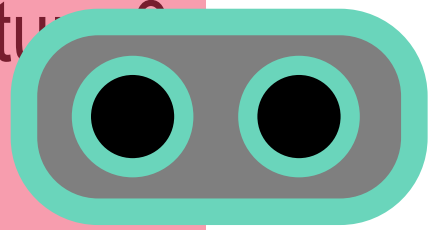
Please tell me value of c.

Goodbye

Printing the sum of two numbers

HOW WE MUST SPEAK TO MR. COMPILER

```
#include<stdio.h>
int main(){
int a, b, c;
a = 5, b = 4;
c = a + b;
printf("%d",c);
retu
}
```



5	4
a	b

9
c

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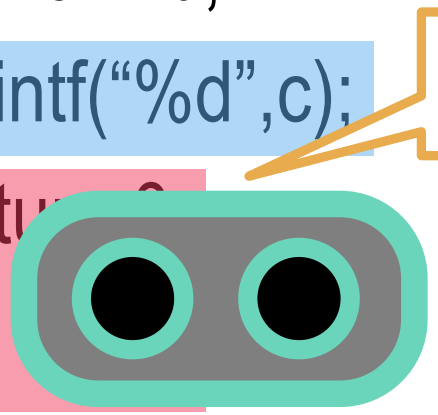

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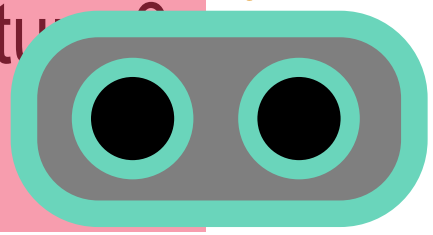
5	4
a	b

9
c

9



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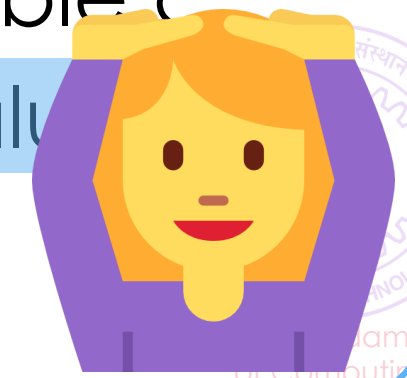
Please tell me valu

Goodbye



Printing the sum of two numbers

HOW WE MUST SPEAK TO MR. COMPILER

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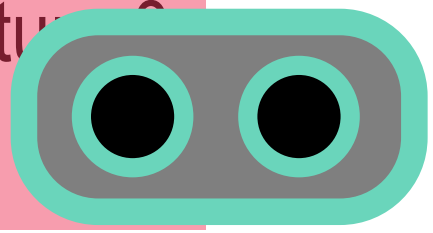
printf("%d",c);
retu
}
```

5	4
a	b
9	9
	c



HOW WE USUALLY SPEAK TO A HUMAN

Do you speak English?

Hello

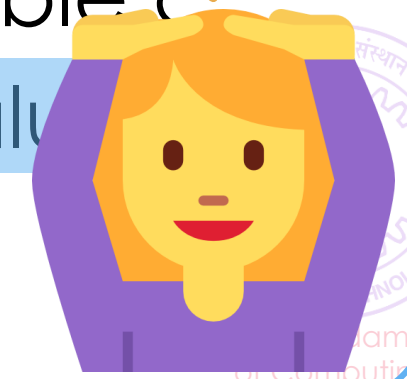
Mr C is happy now. He did not have to throw away the value 9 ☺

s.

d put the result in variable c

Please tell me valu

Goodbye



The true power of printf

The true power of printf

We have seen how to make Mr. C

The true power of printf

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- Say things like “Hello”

The true power of printf

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- Say things like “Hello”
- Tell us the value of an integer variable

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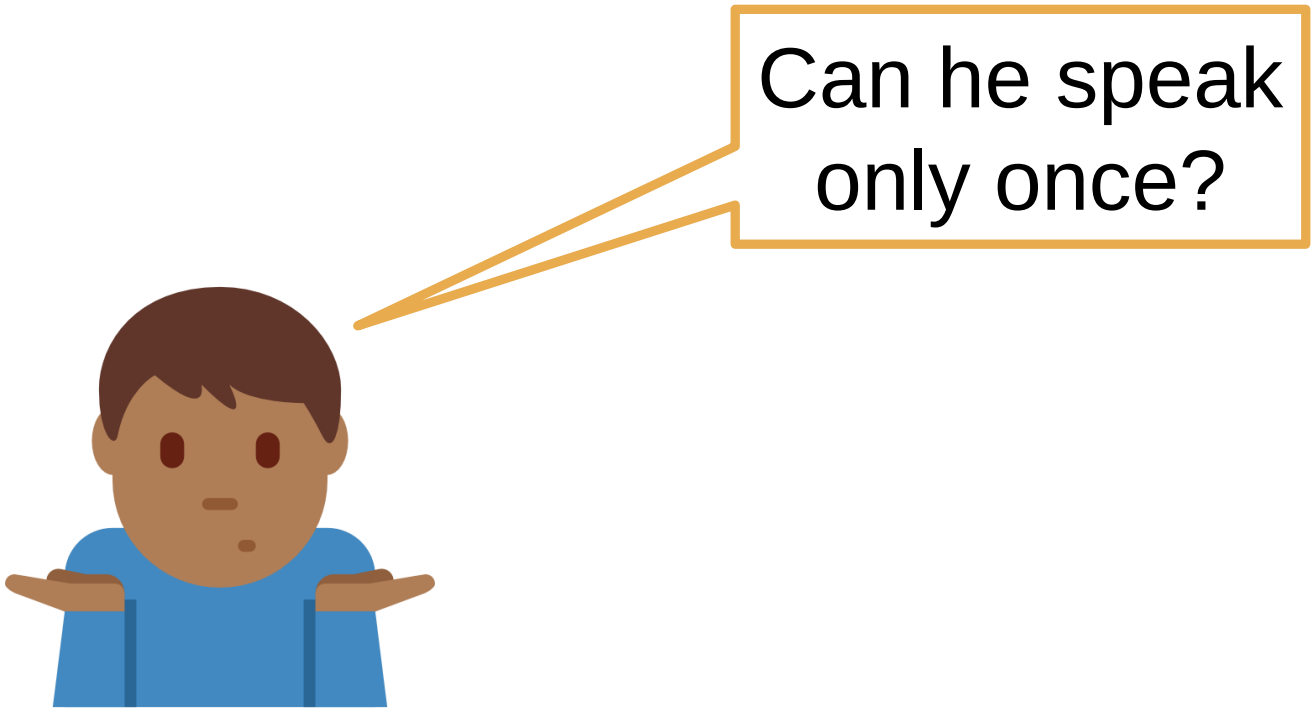

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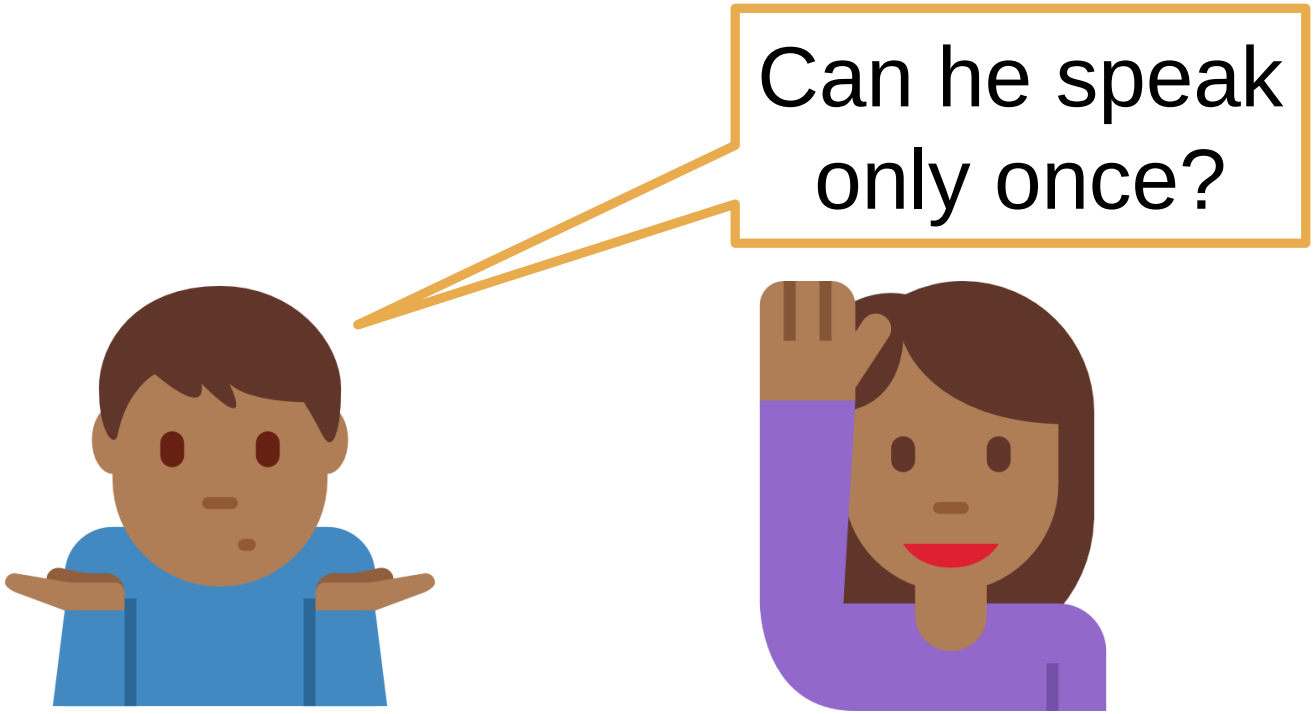

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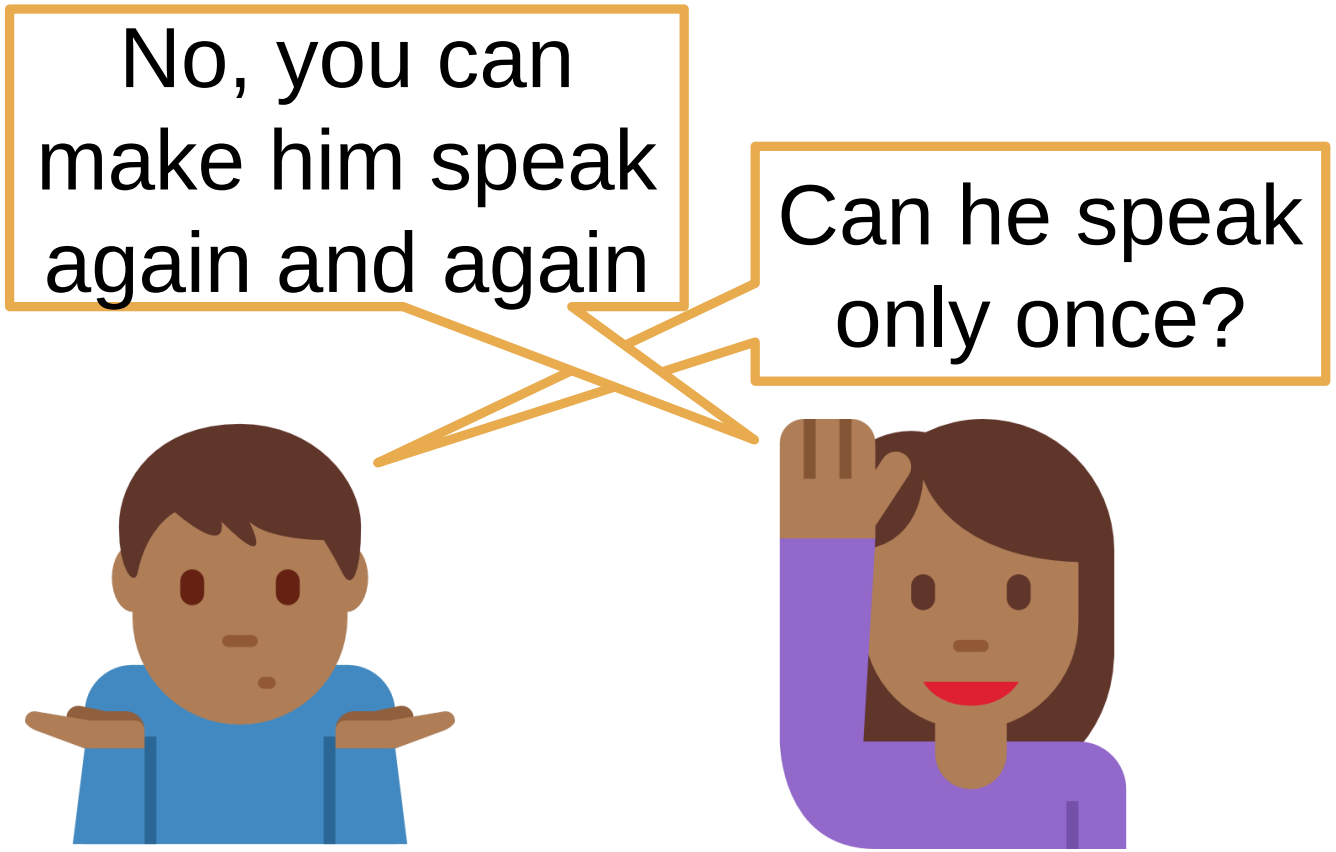

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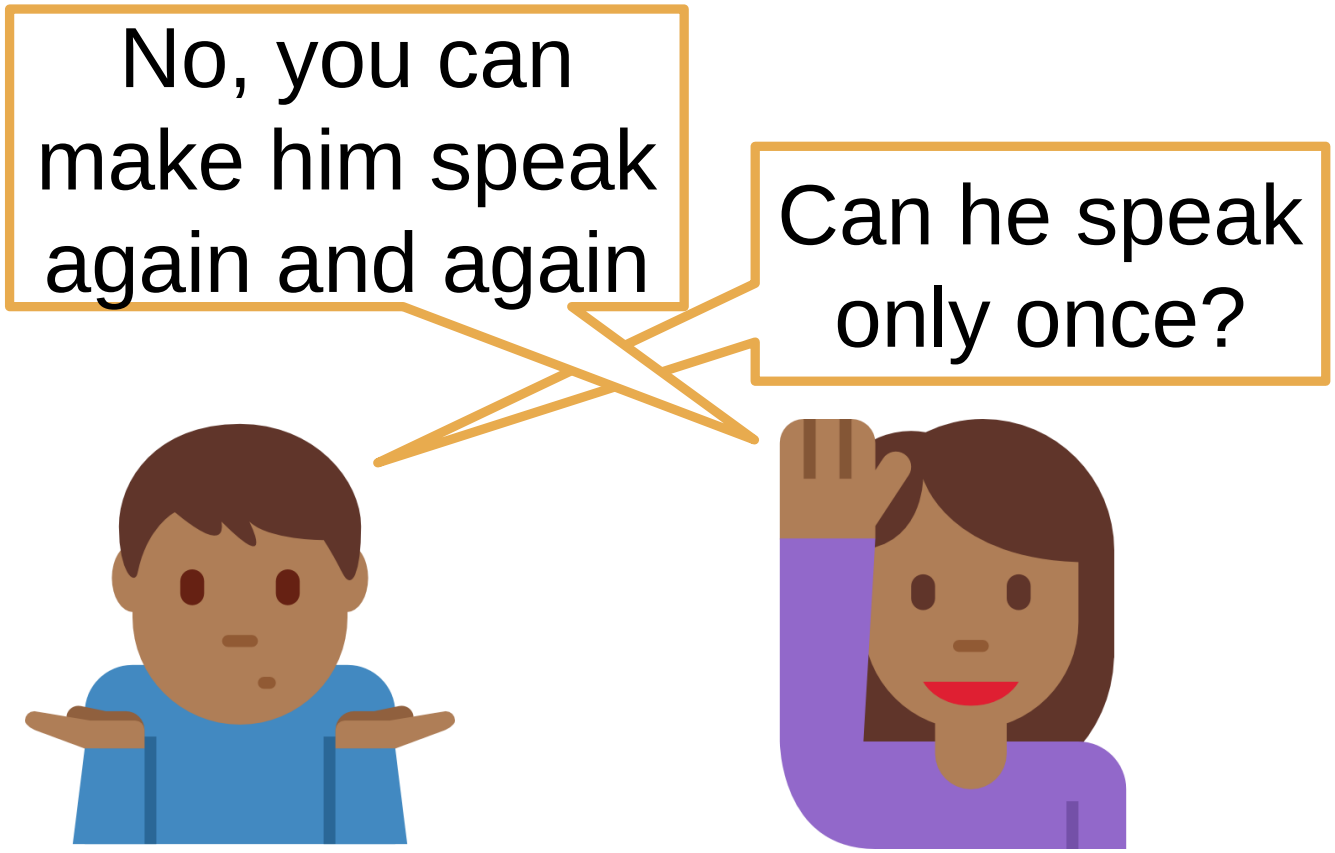

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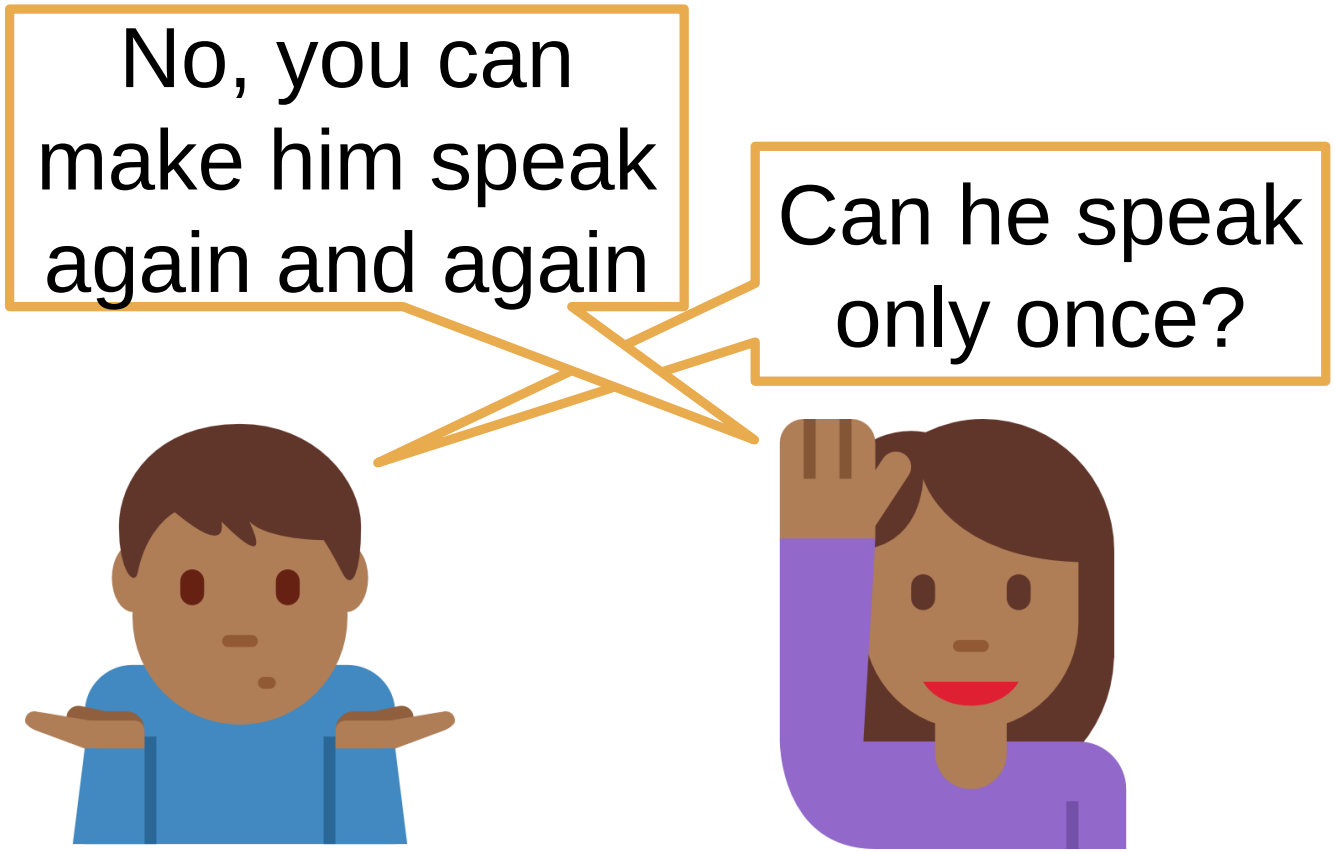


```
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```

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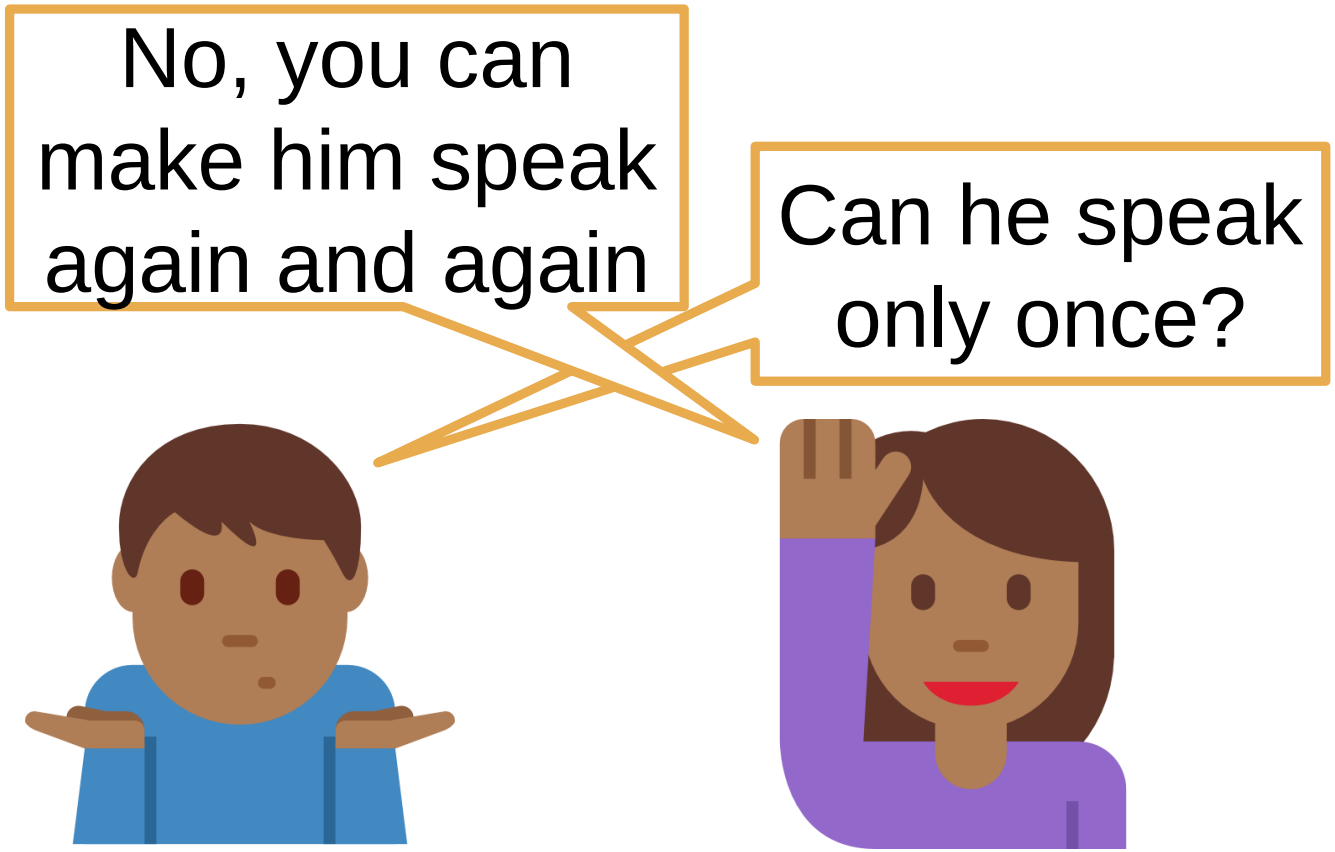


```
#include<stdio.h>
int main(){
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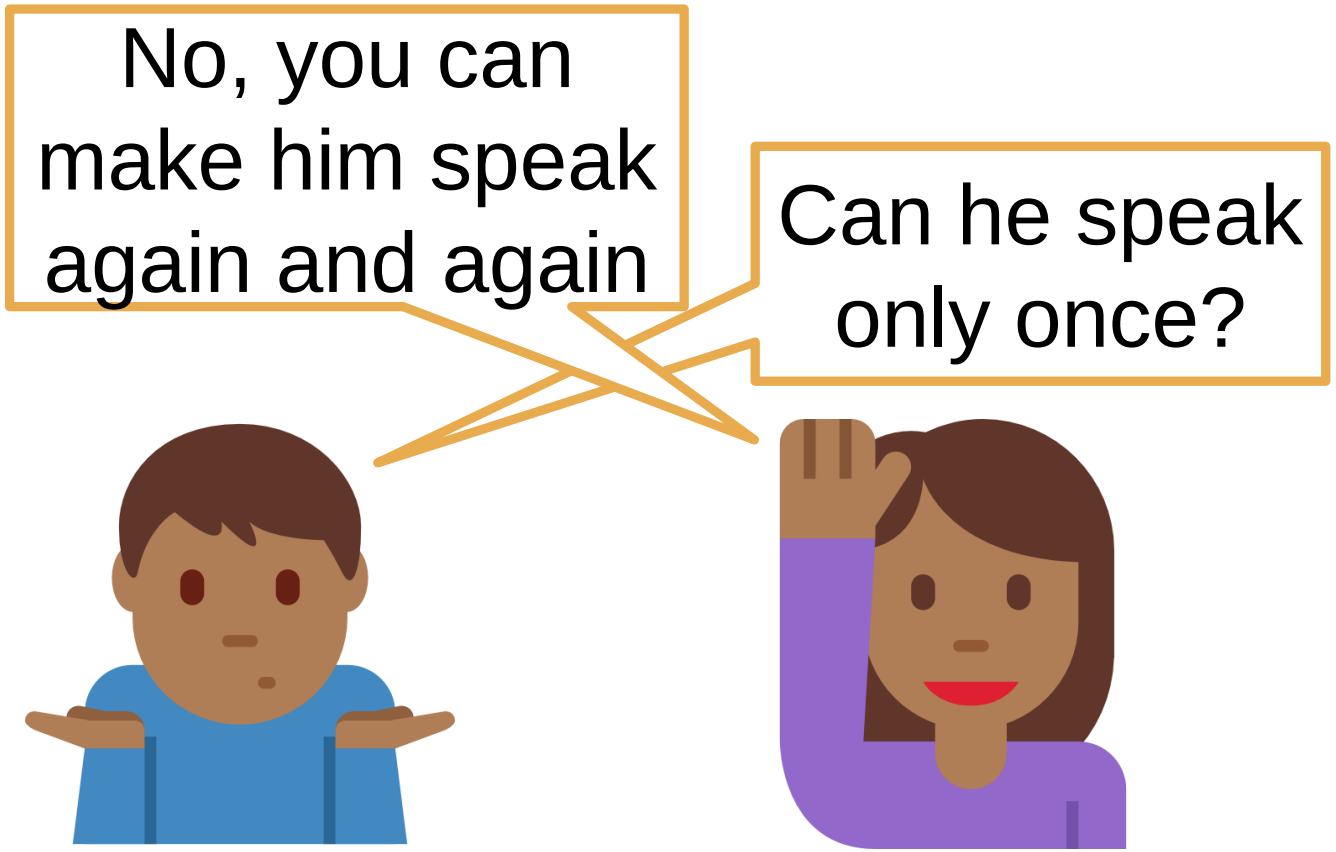


```
#include<stdio.h>
int main(){
int a = 5, b = 4;
```

The true power of printf

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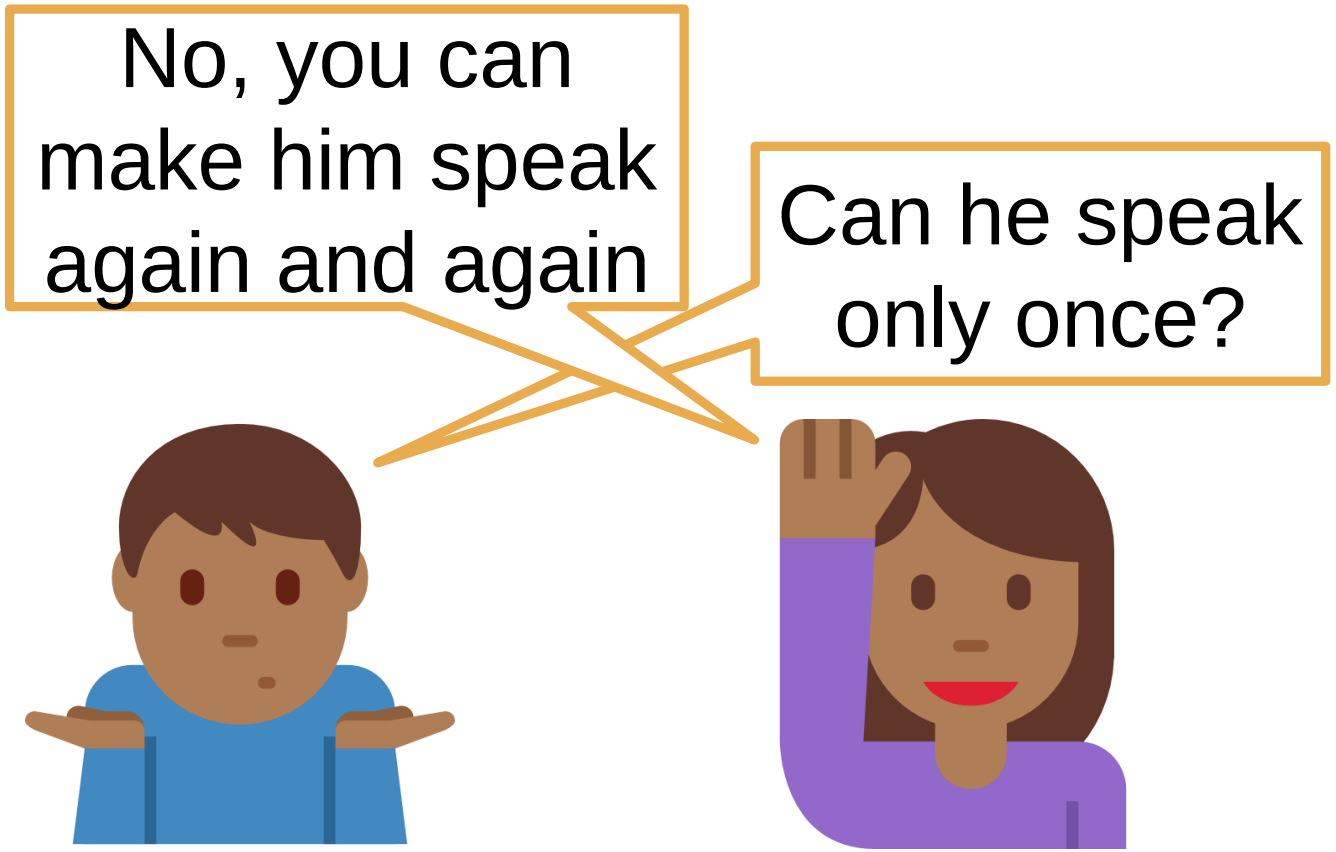


```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf(“Hello”);
```

The true power of printf

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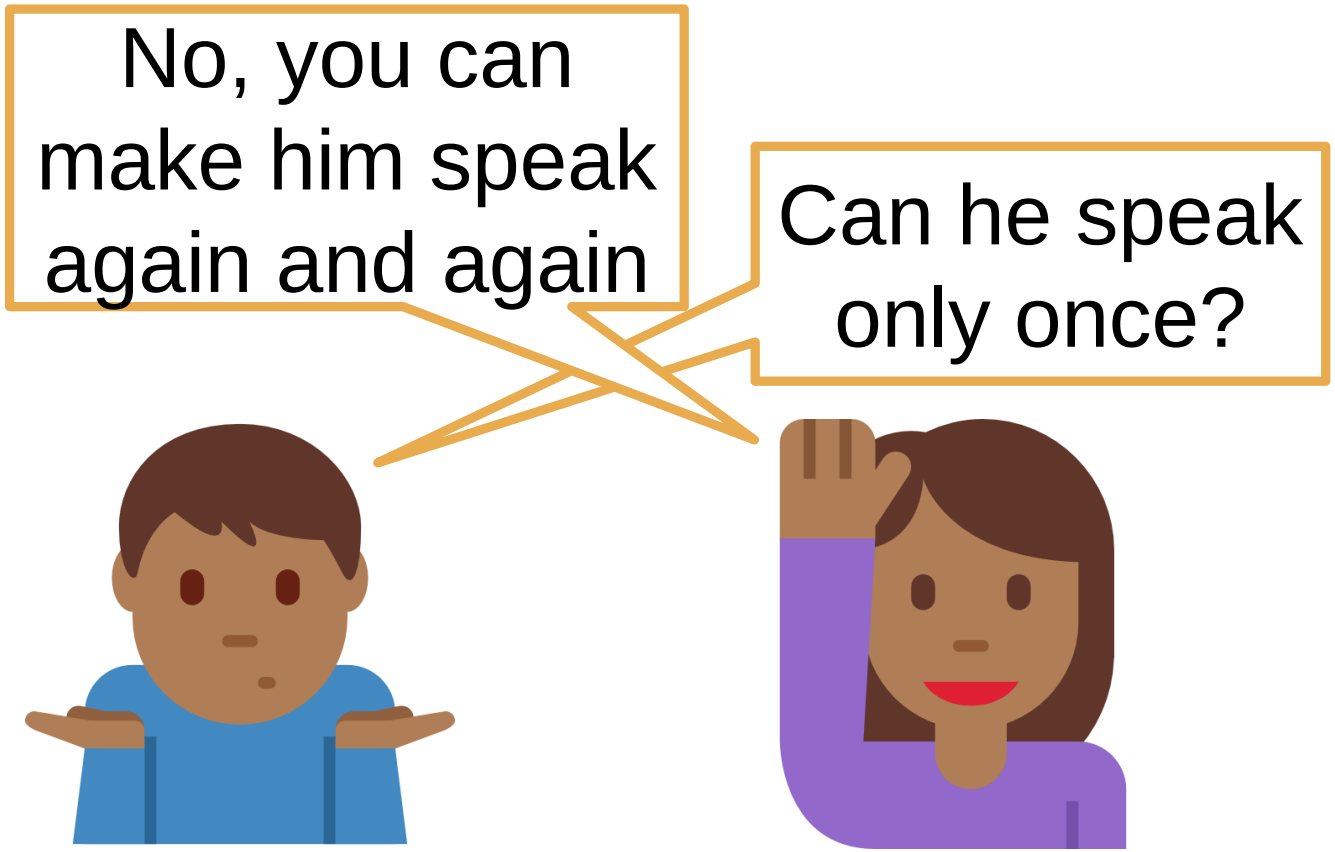


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#include<stdio.h>
int main(){
int a = 5, b = 4;
printf(“Hello”);
printf(“%d”,a);
```

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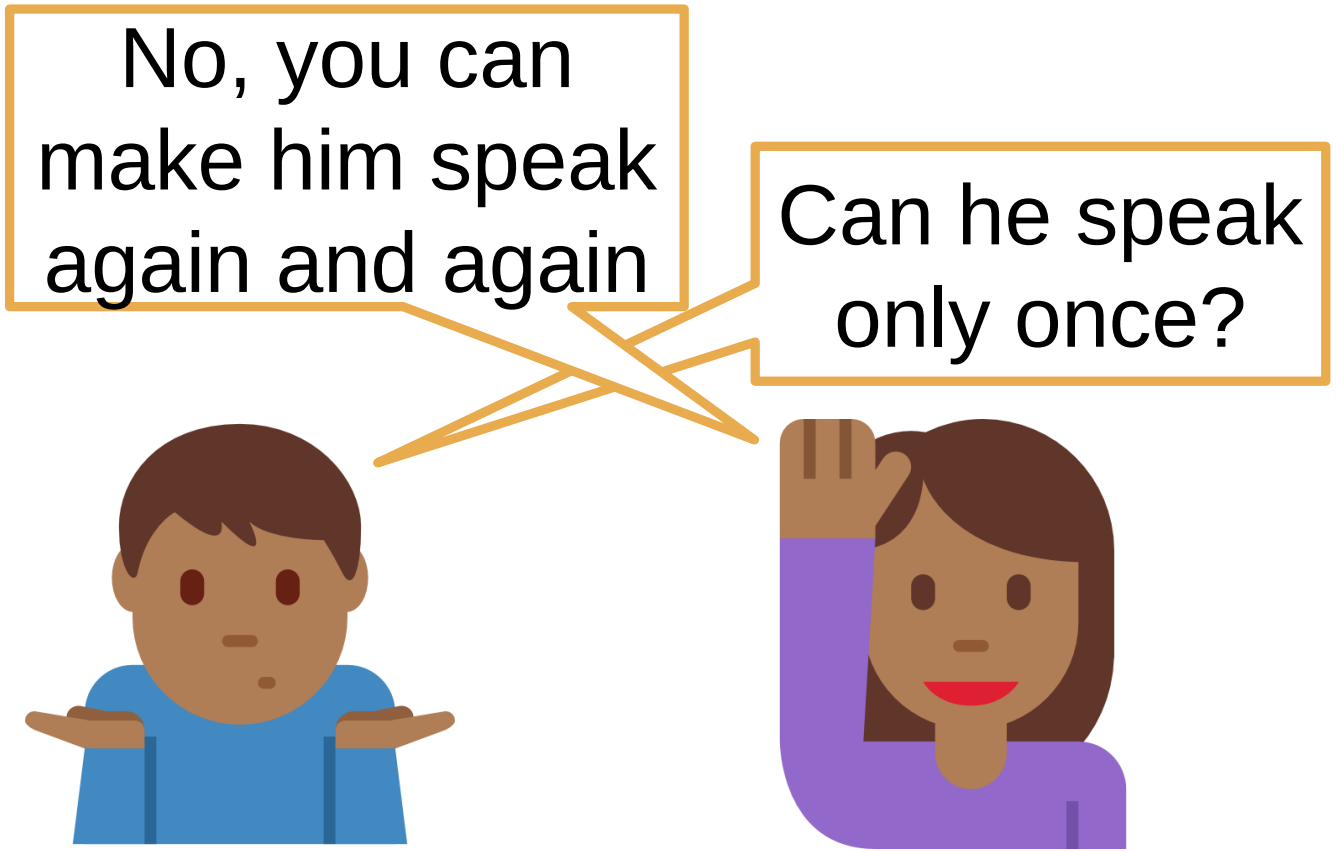


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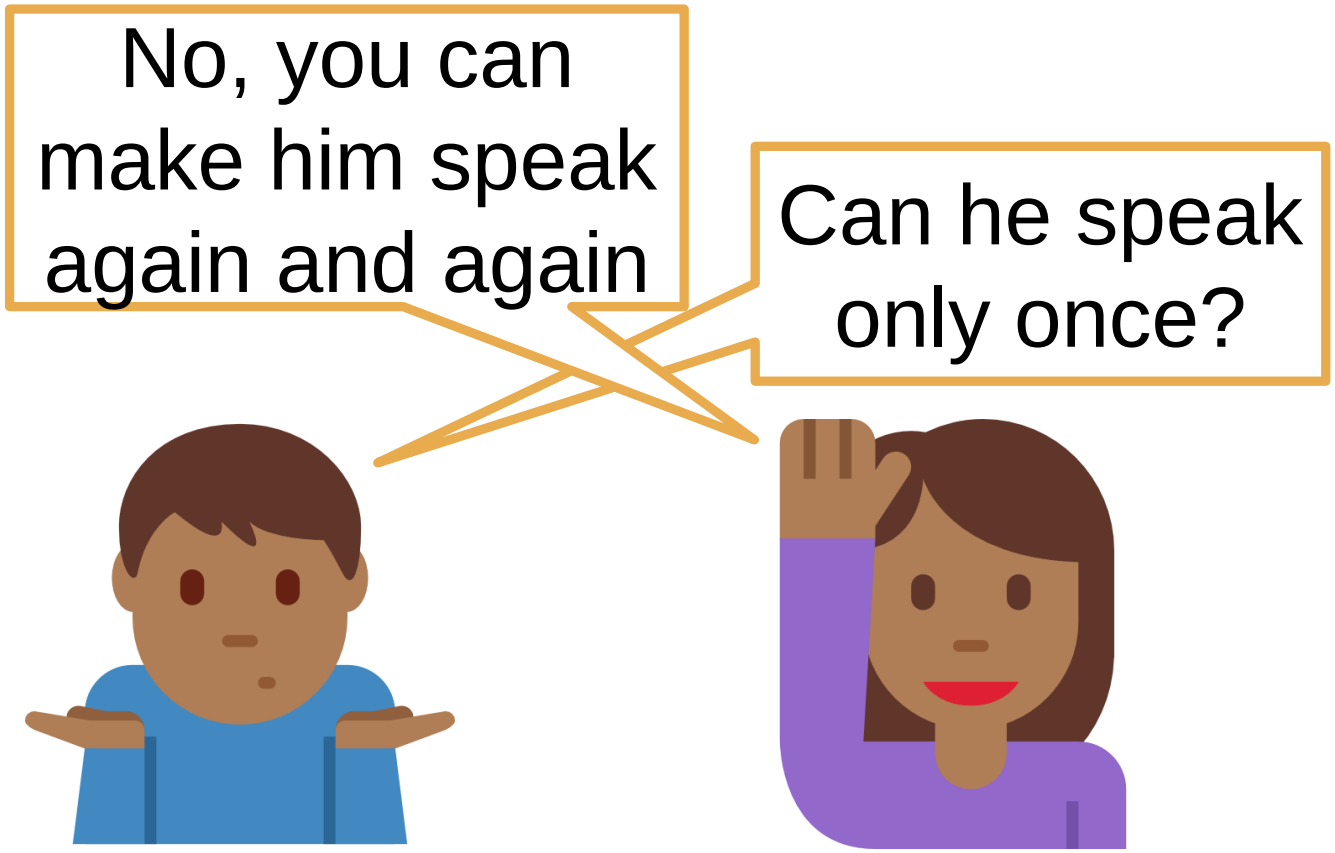


```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf(“Hello”);
printf(“%d”,a);
printf(“%d”,b);
return 0;
```

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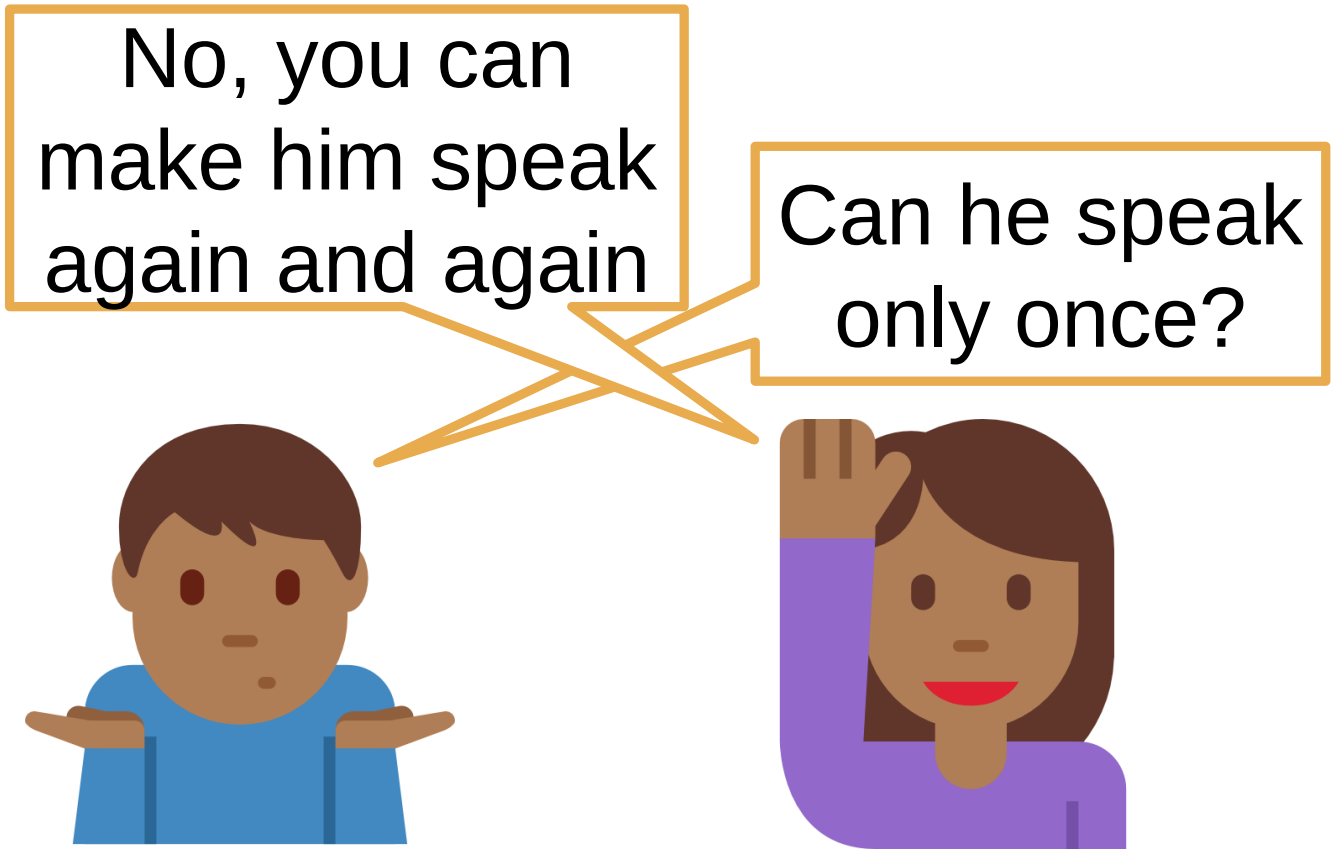


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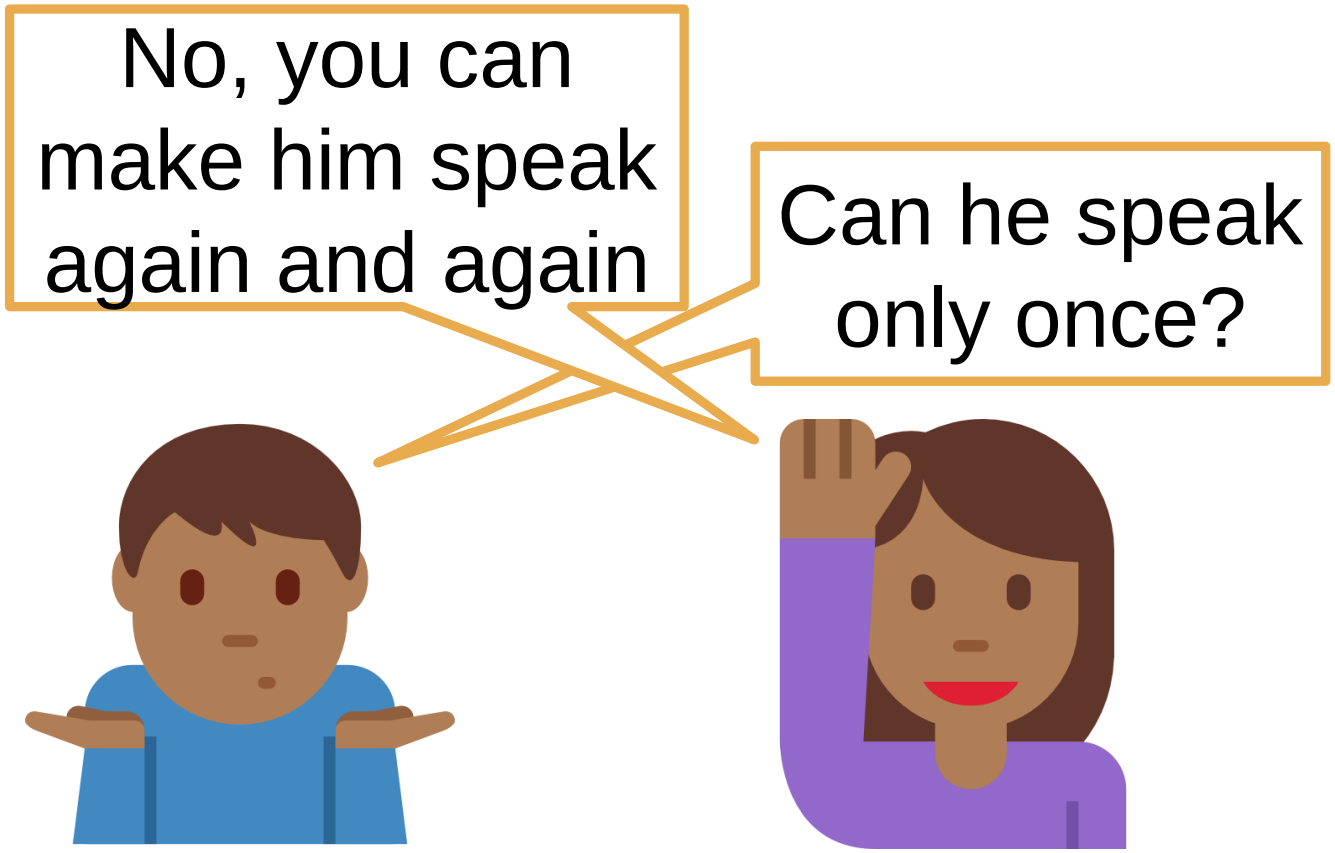


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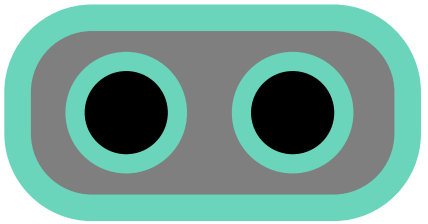

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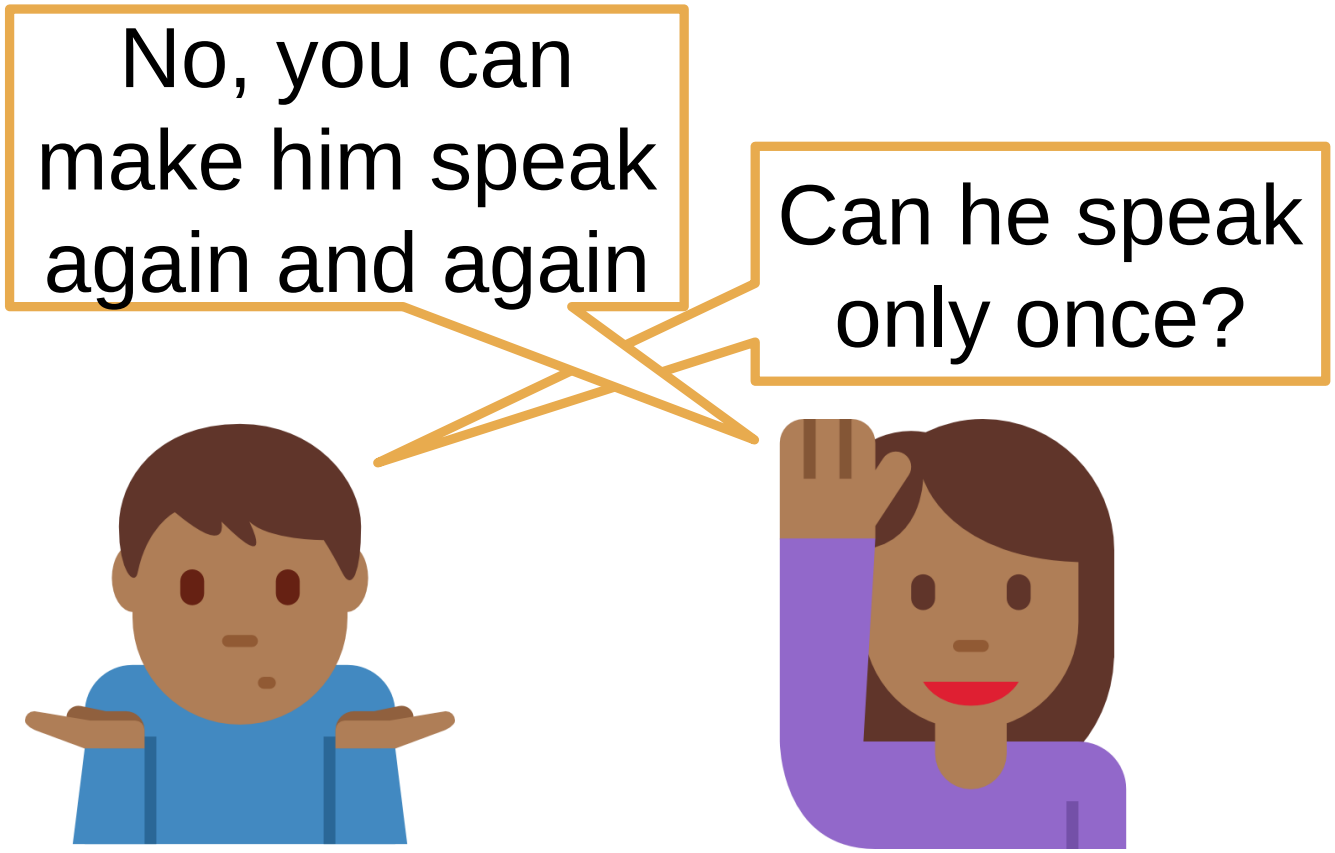


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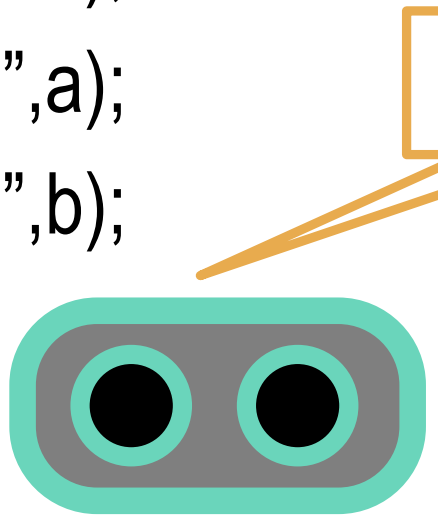

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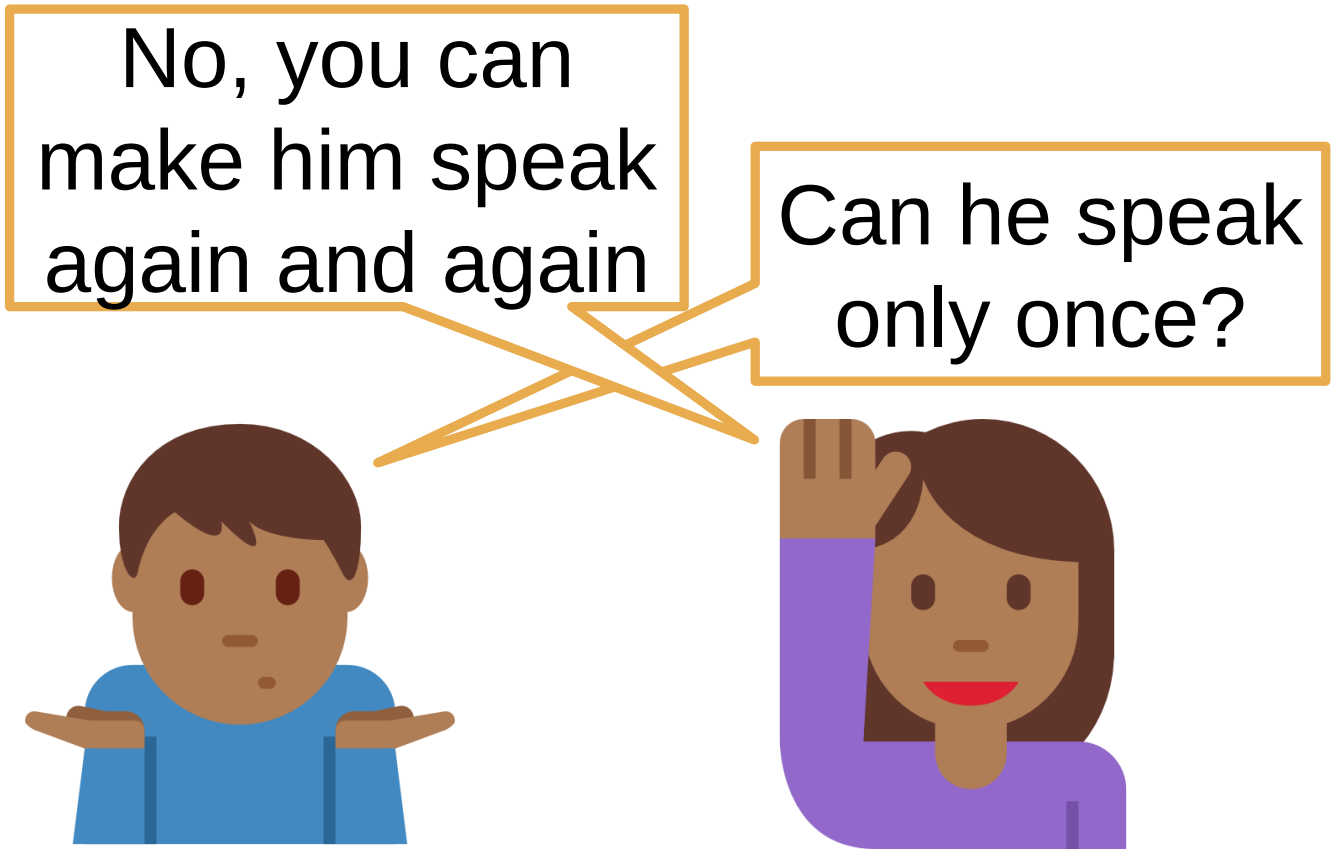


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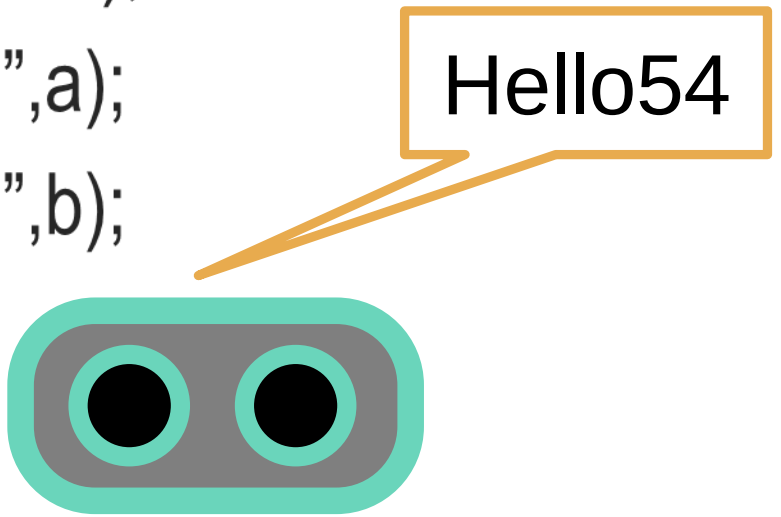

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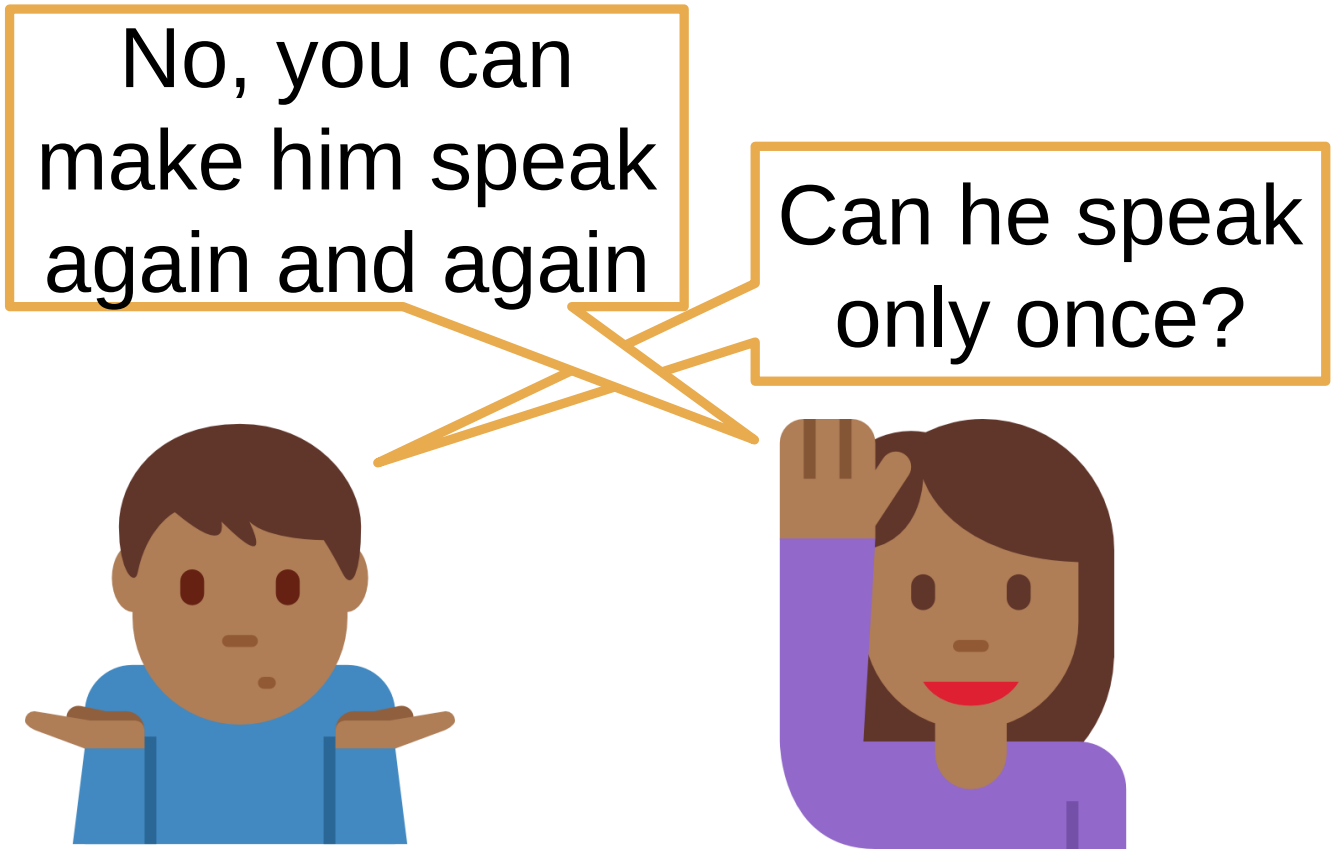


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printf(“%d”,a);
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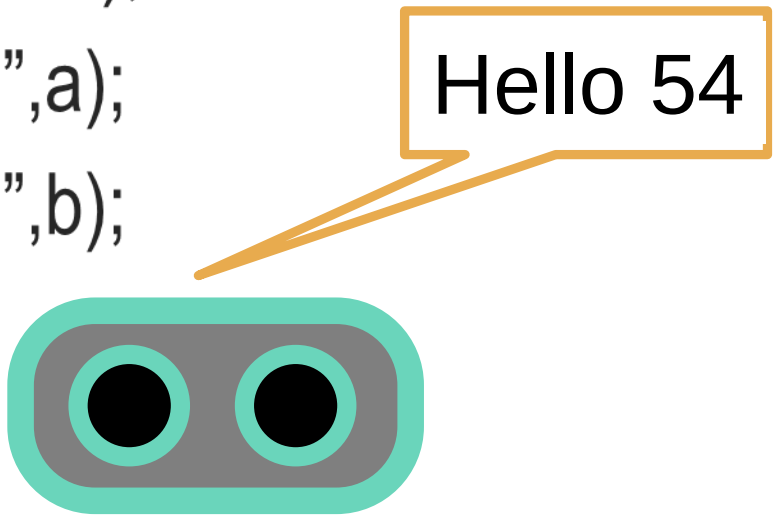


The true power of printf

We have seen how to make Mr. C

Say things like "Hell

Tell us the value of

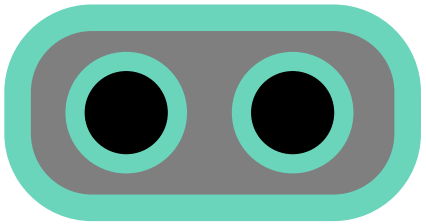
Don't be afraid to experiment

No, you can make him speak again and again

Can he speak only once?

```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf("Hello ");
printf("%d",a);
printf("%d",b);
return 0;
}
```

Hello 54



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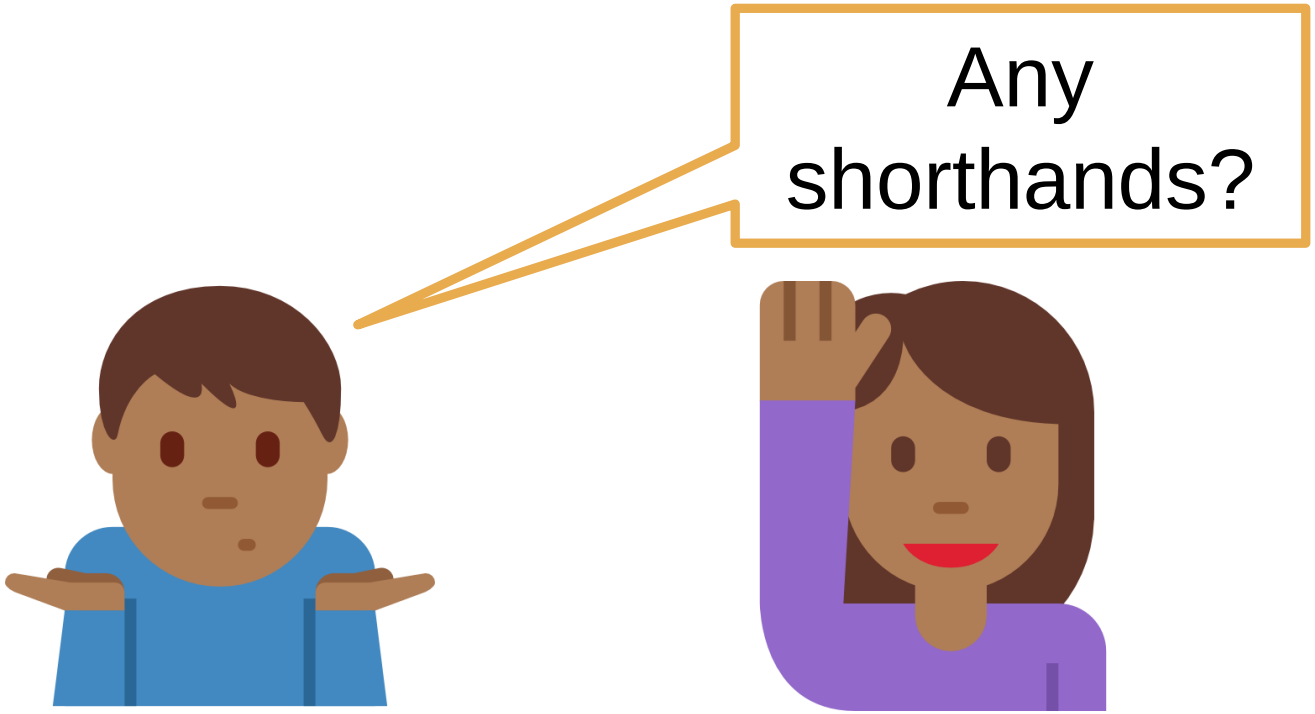

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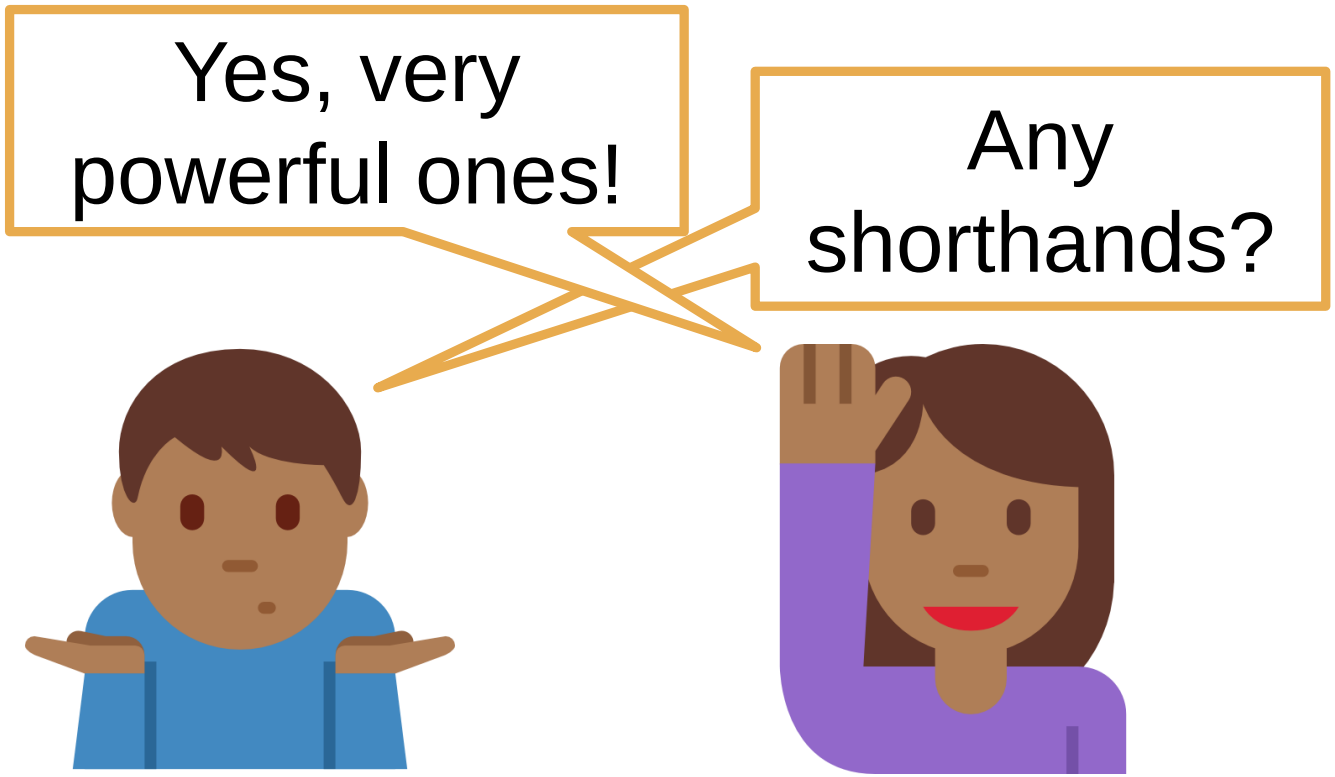

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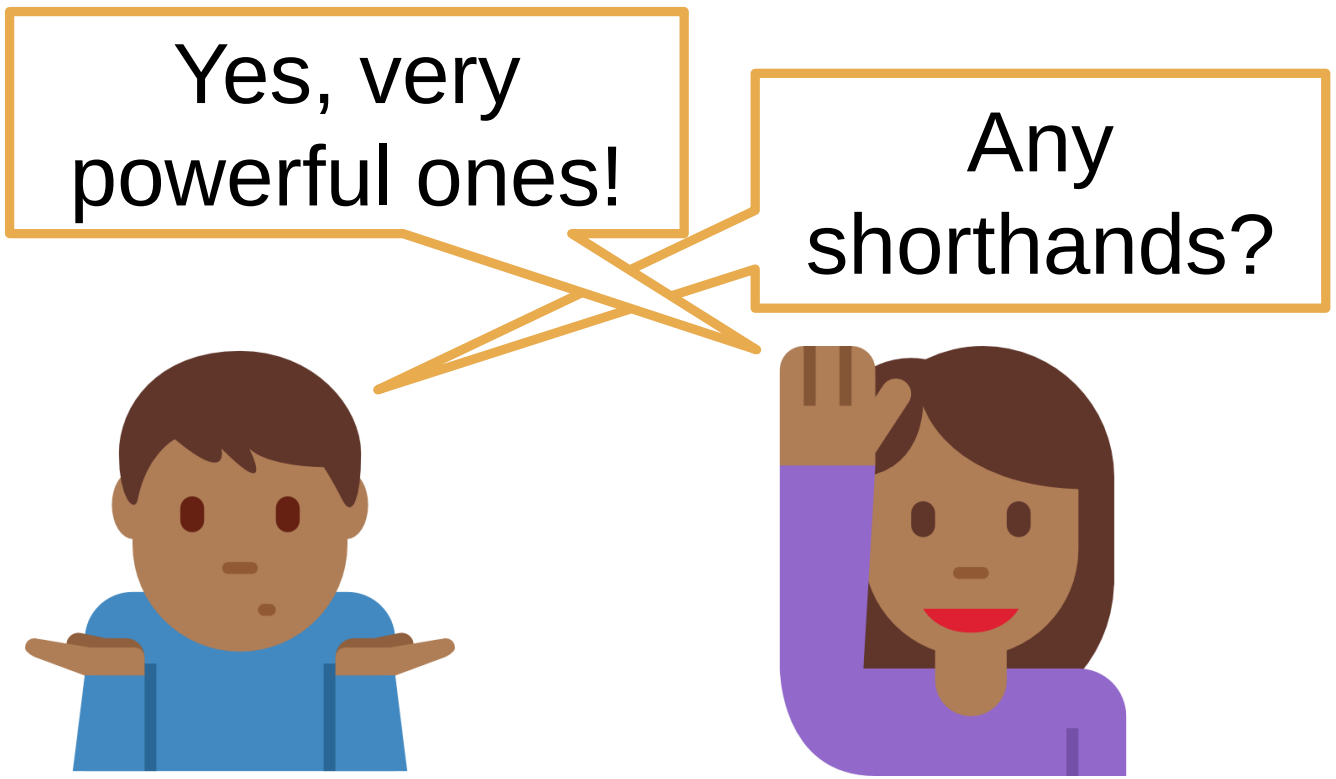

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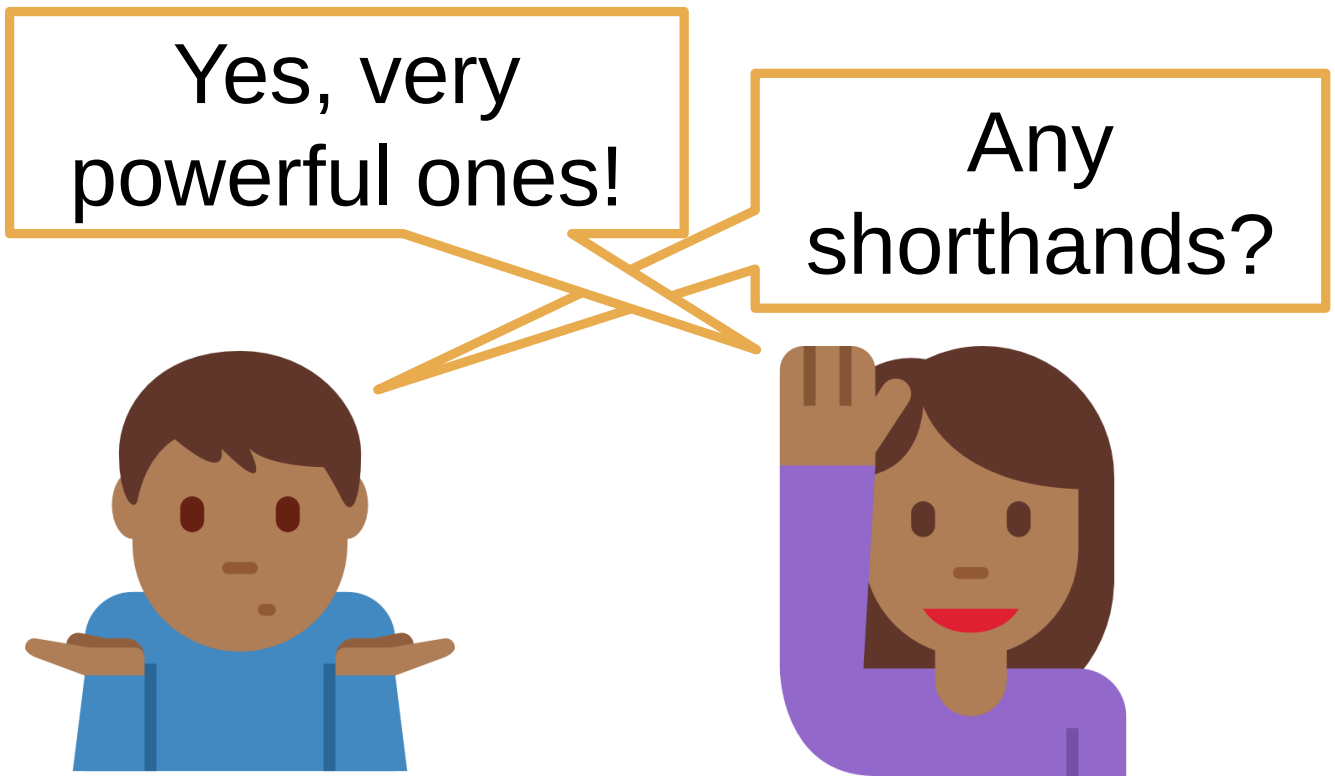


```
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```

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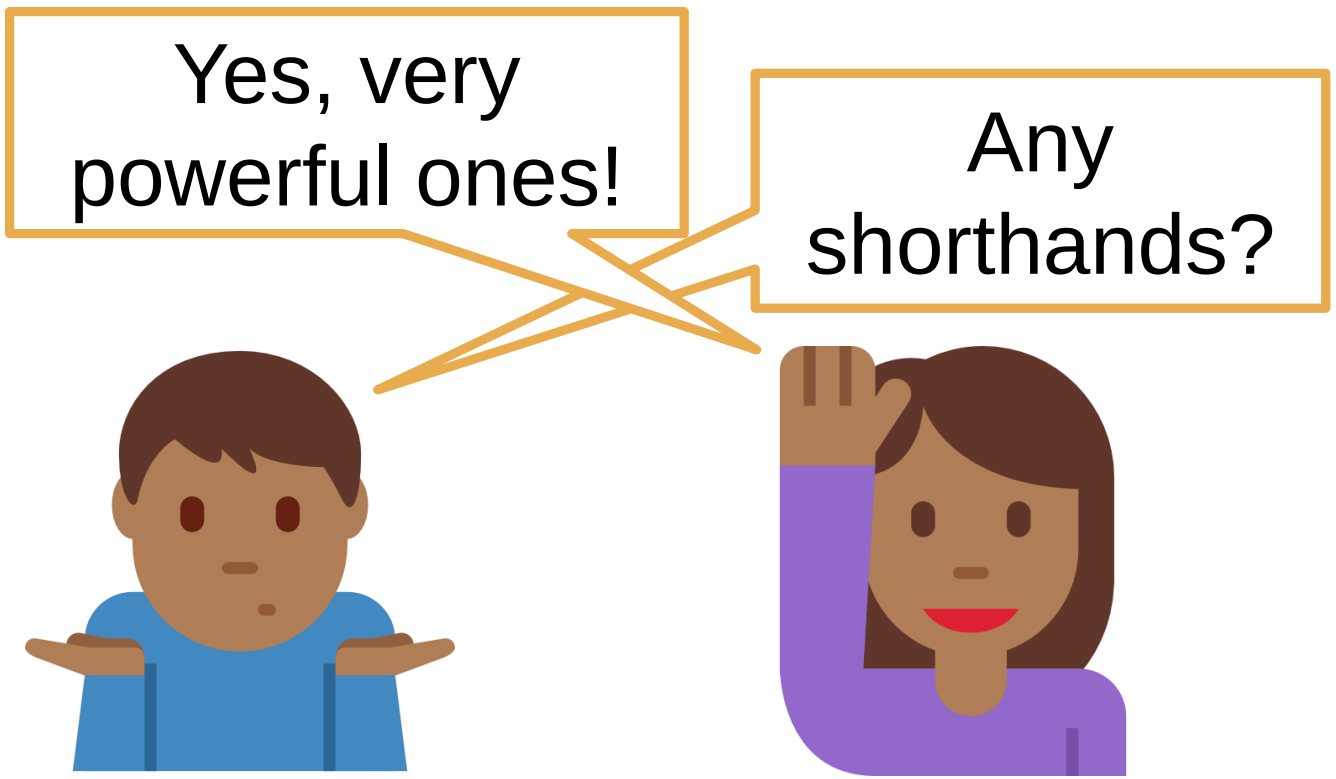


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int main(){
```

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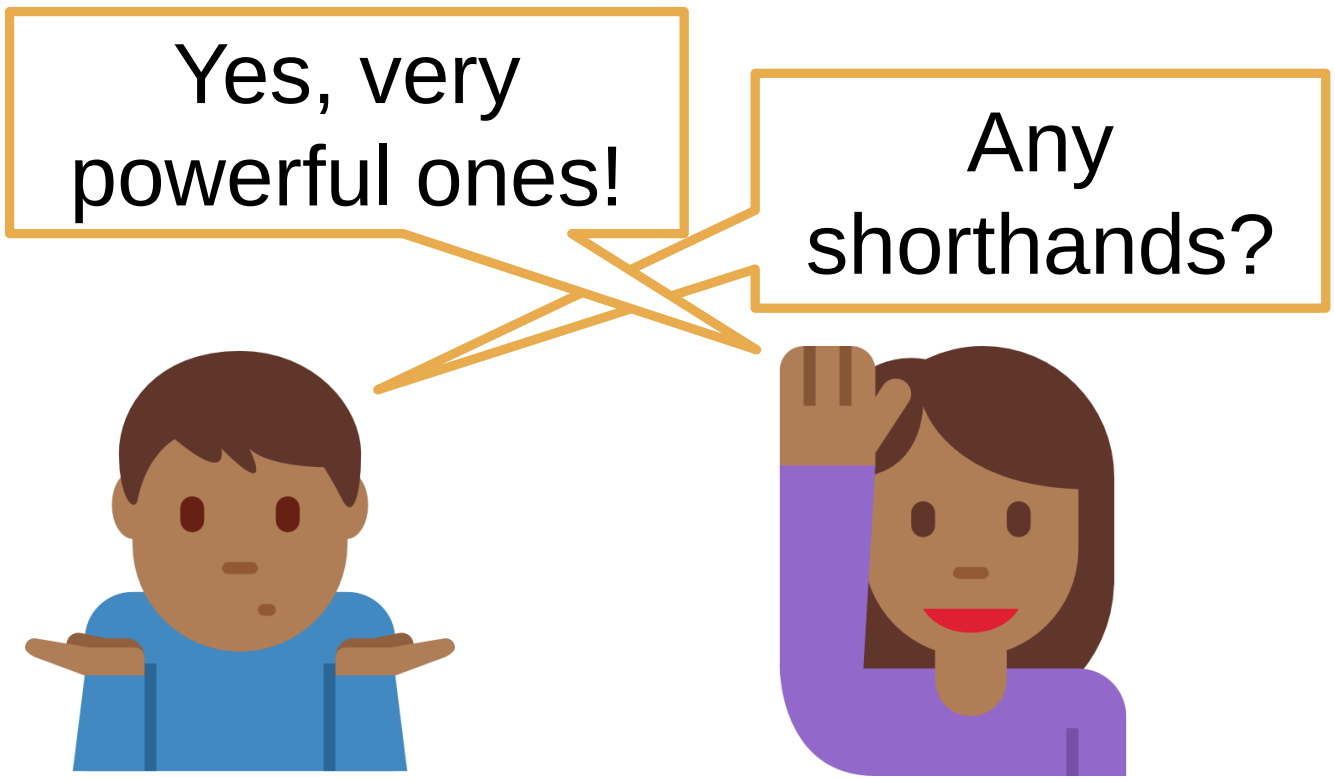


```
#include<stdio.h>
int main(){
int a = 5, b = 4;
```

The true power of printf

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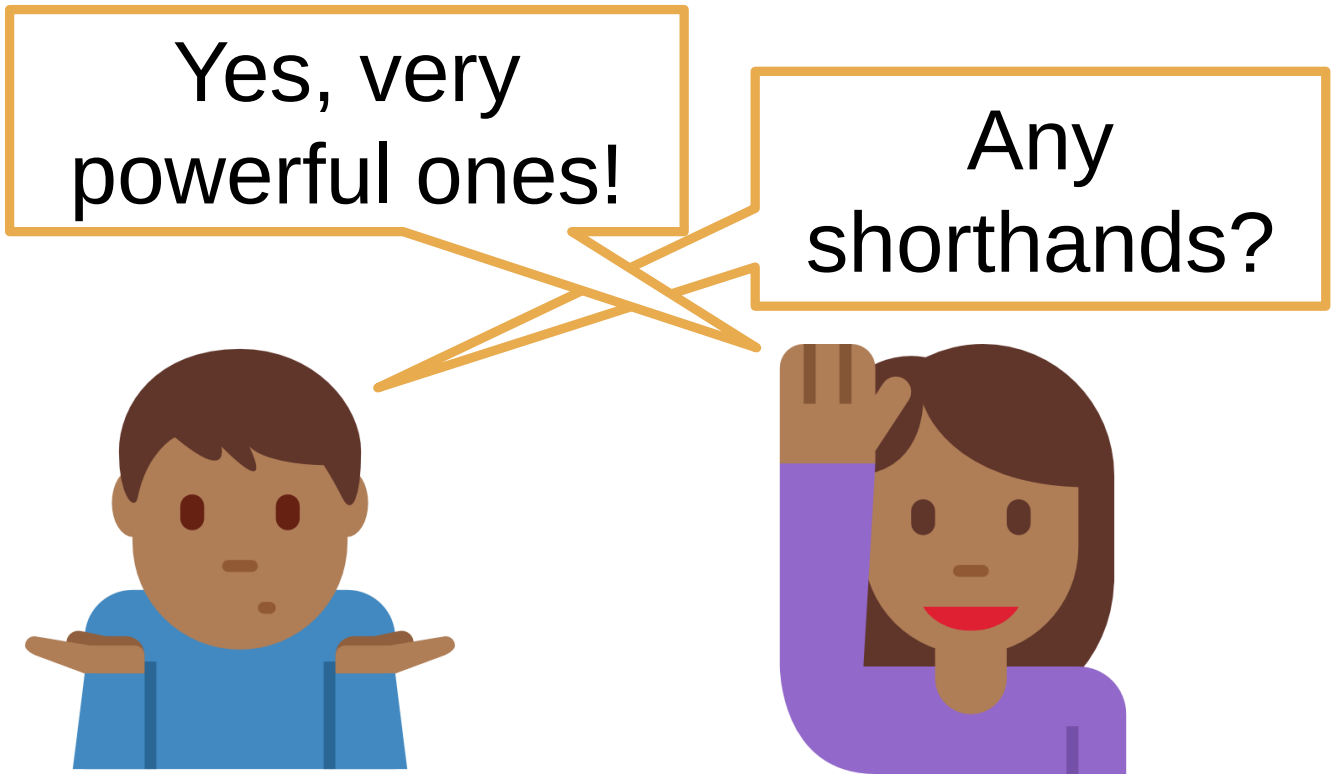


```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf(“Hello %d %d”,a,b);
```

The true power of printf

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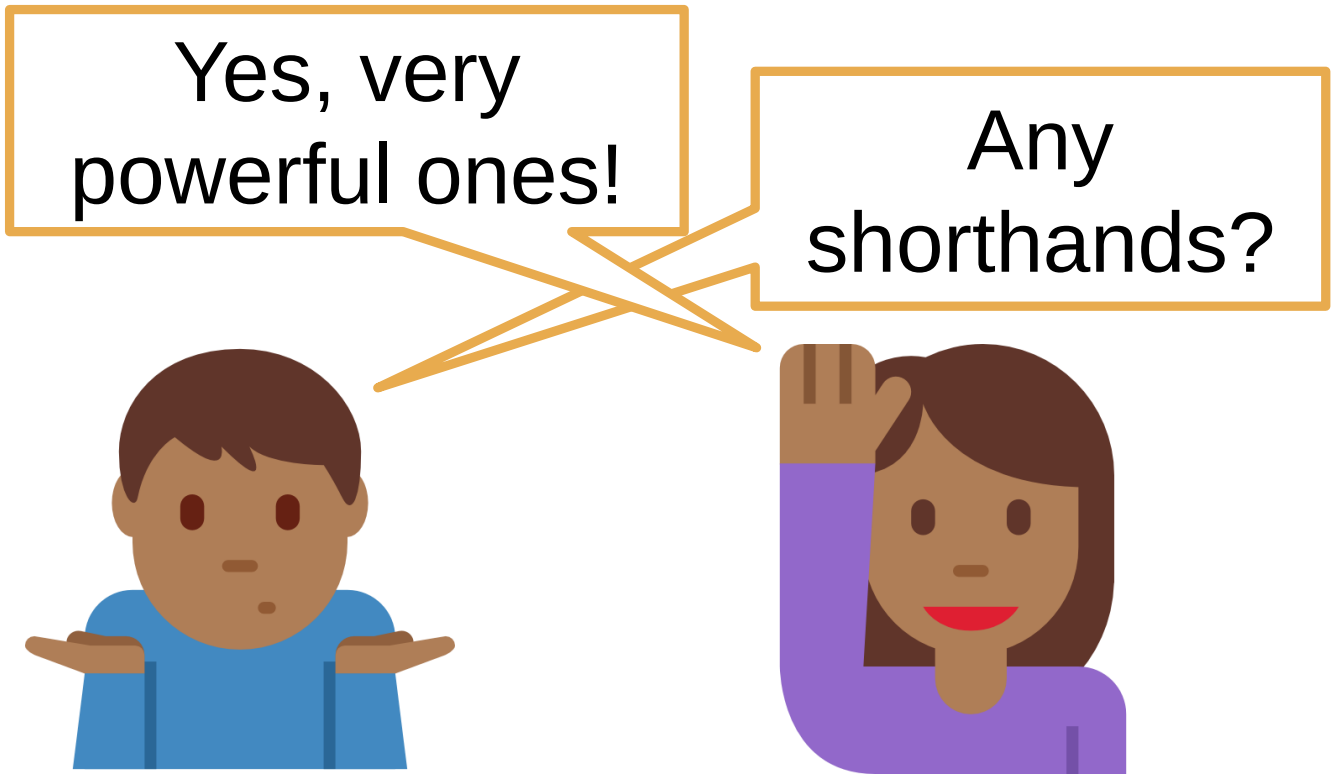
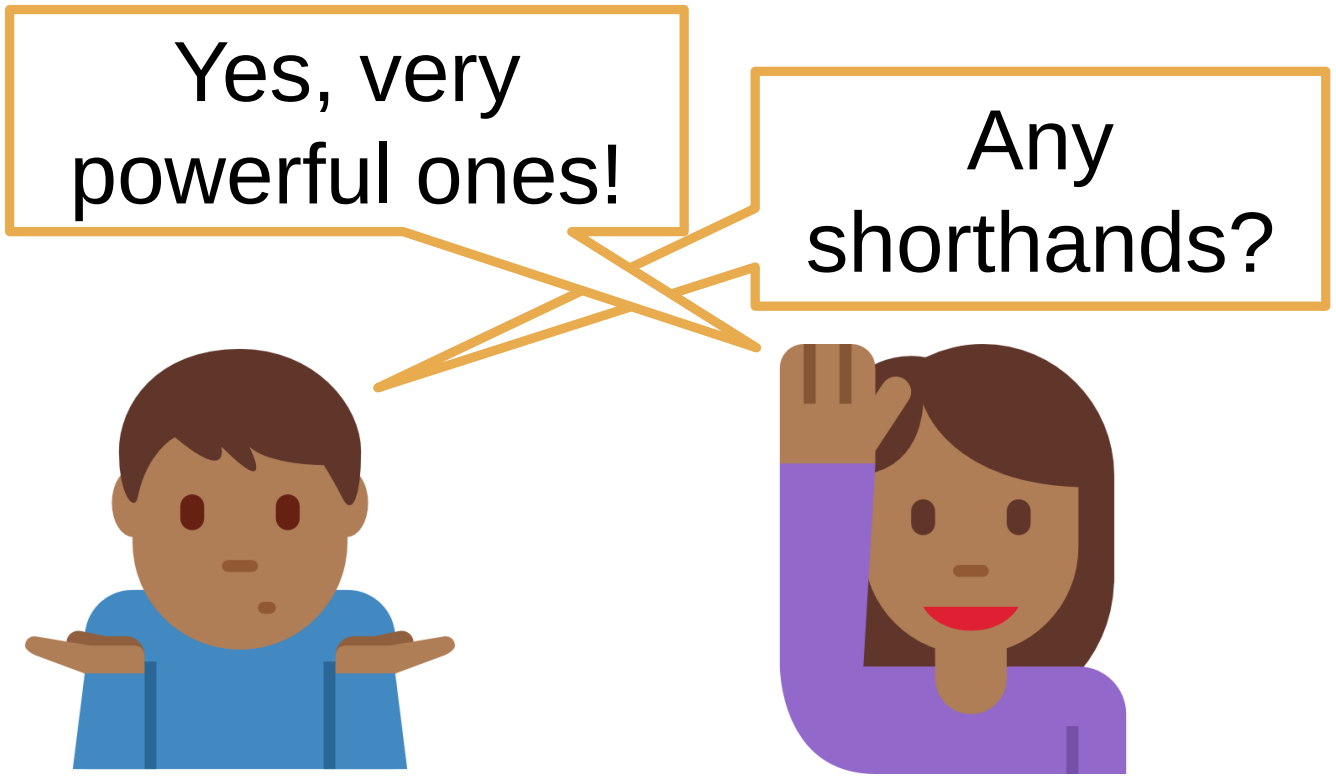



```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf(“Hello %d %d”,a,b);
return 0;
```

The true power of printf

We have seen how to make Mr. C

- Say things like “Hello”
- Tell us the value of an integer variable




```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf(“Hello %d %d”,a,b);
return 0;
}
```

The true power of printf

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- Say things like “Hello”
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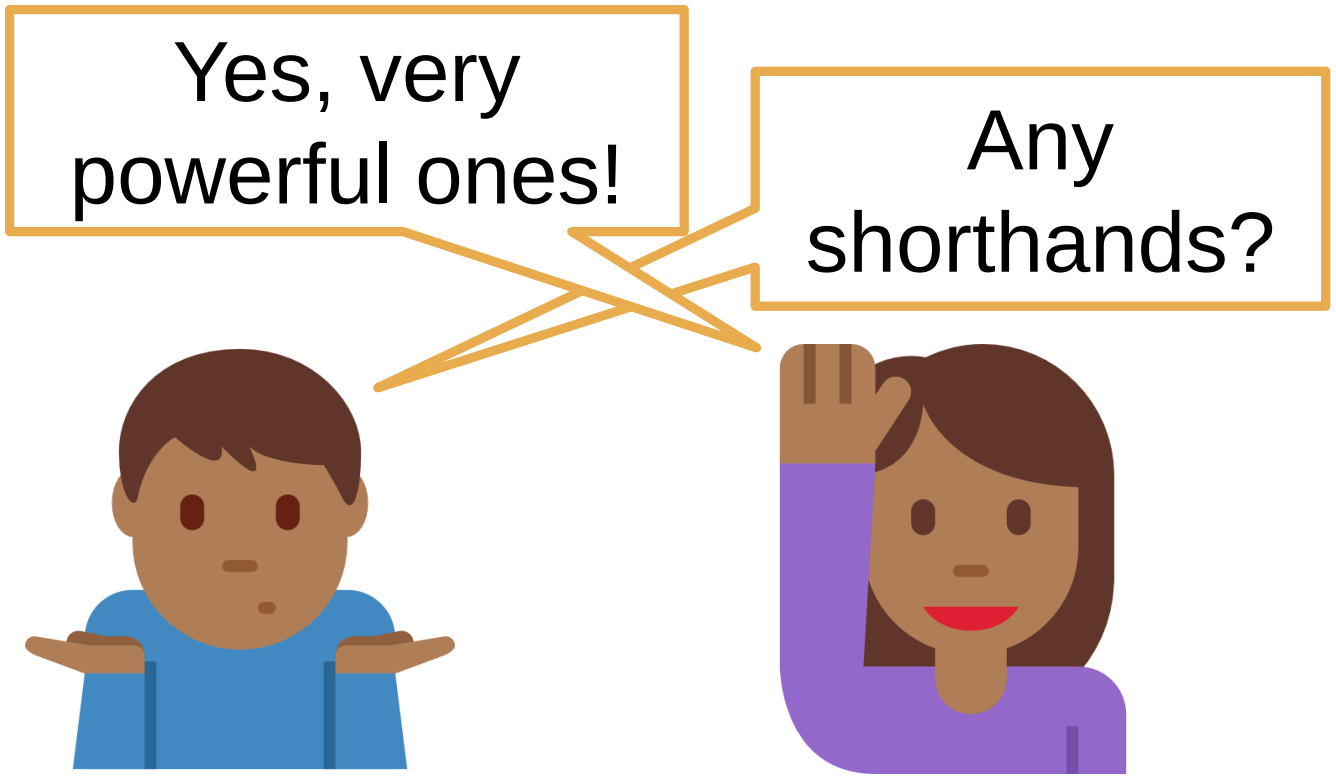


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int main(){
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return 0;
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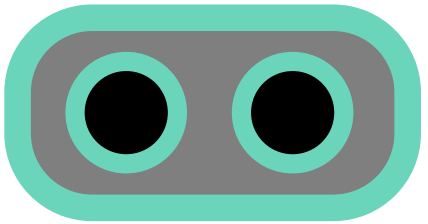

The true power of printf

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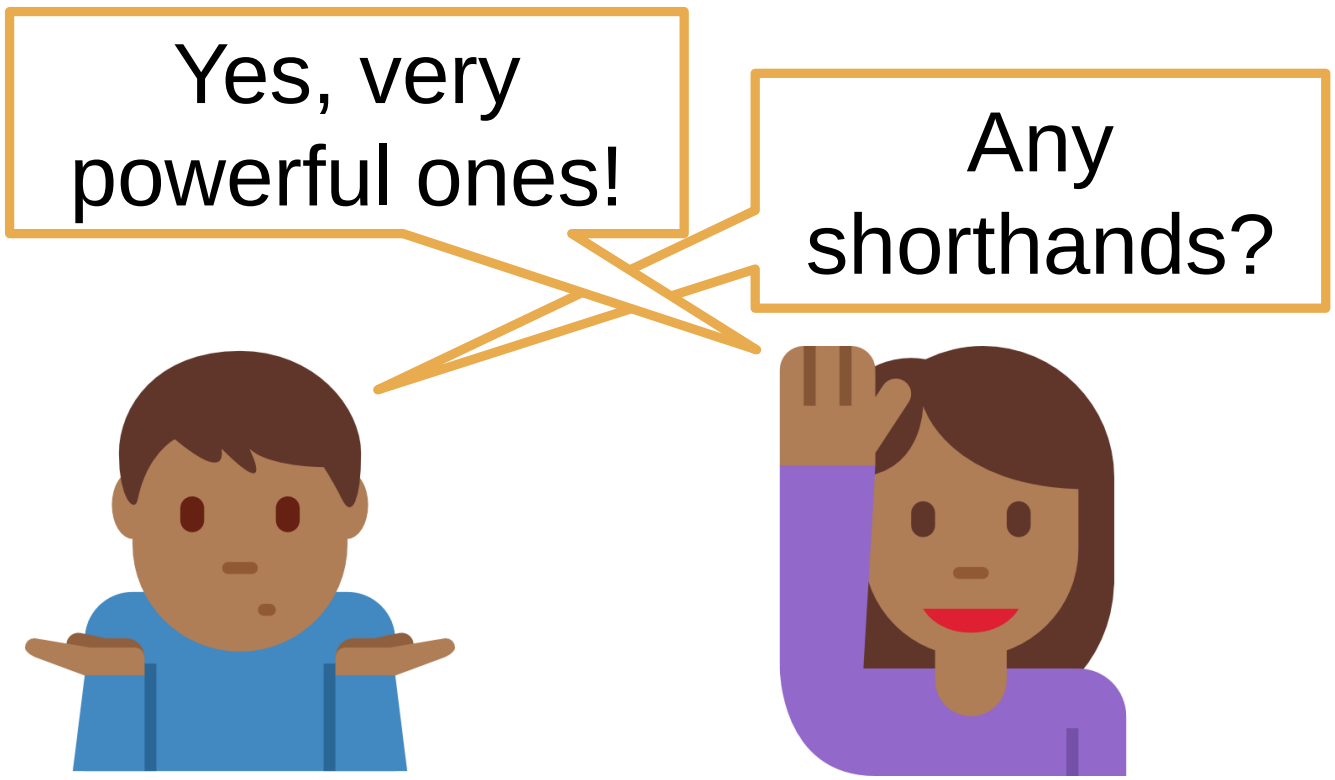


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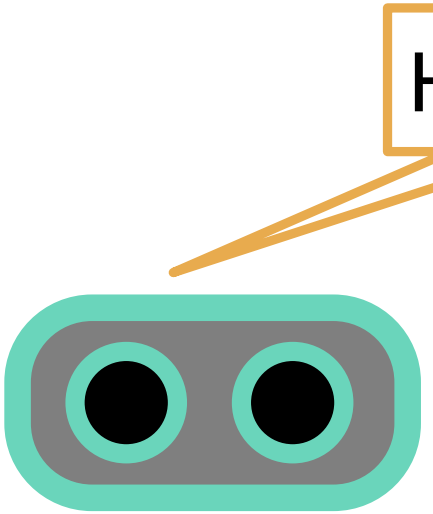


The true power of printf

We have seen how to make Mr. C

Say things like "Hell

Tell us the value of

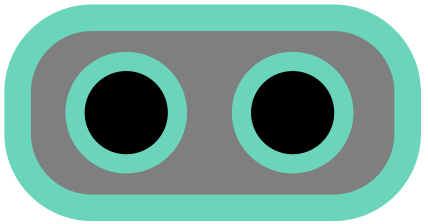
I am confused ☹

Any shorthands?

Yes, very powerful ones!

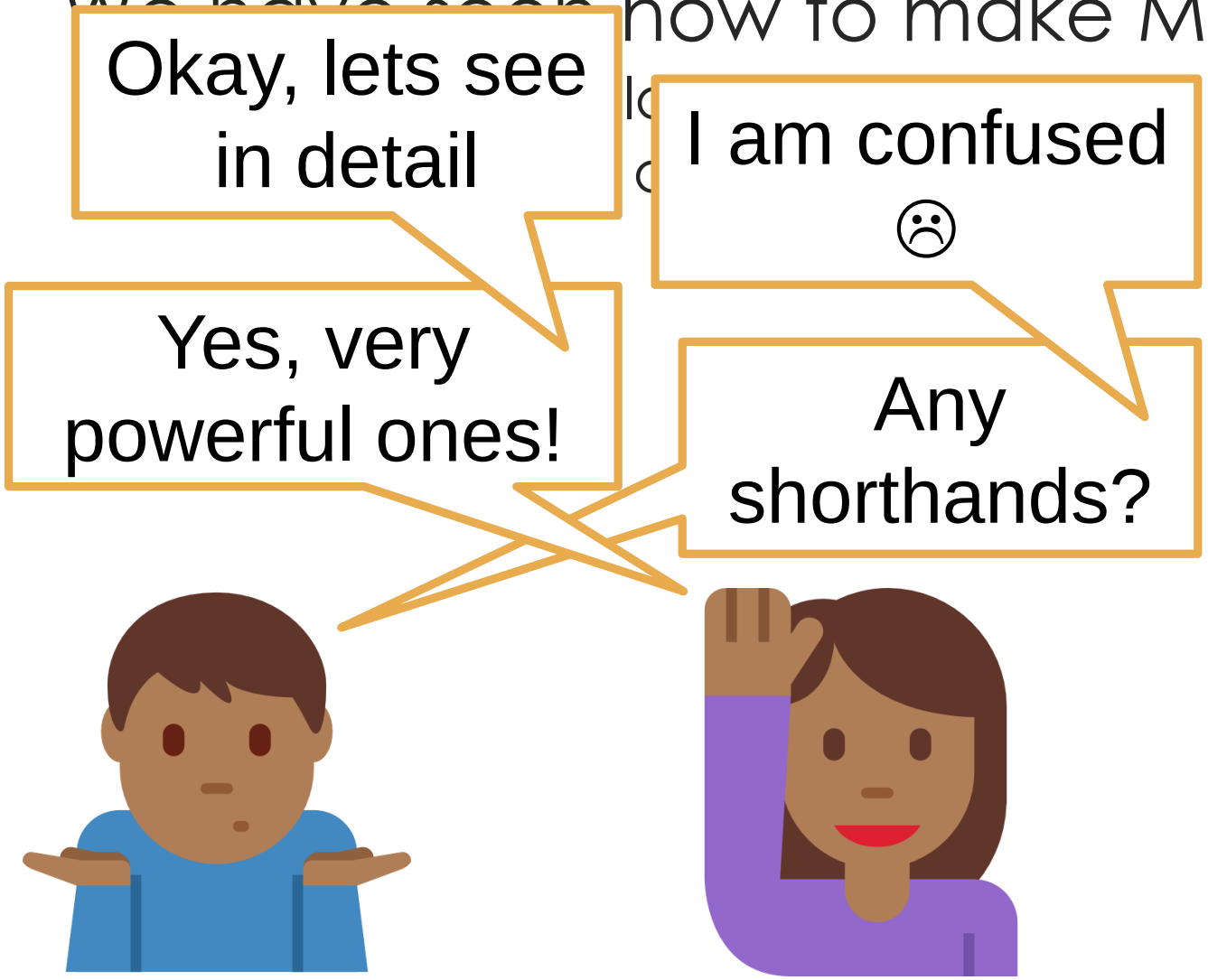
```
#include<stdio.h>
int main(){
int a = 5, b = 4;
printf("Hello %d %d",a,b);
return 0;
}
```

Hello 5 4



The true power of printf

We have seen how to make Mr. C




```
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}
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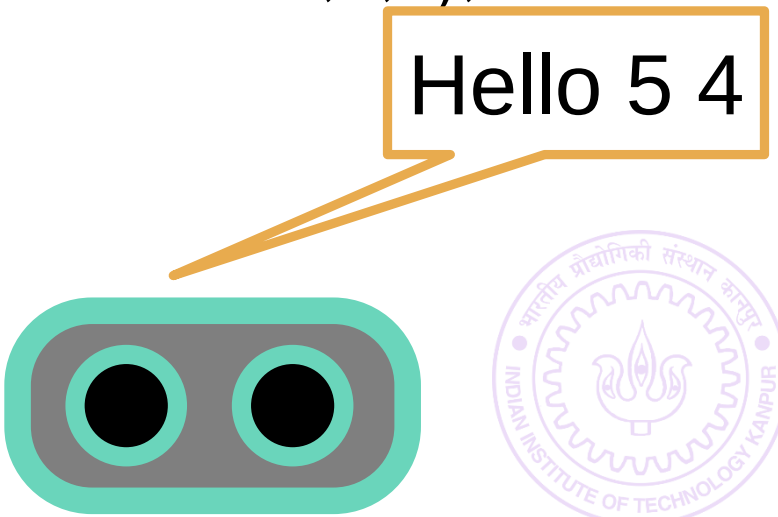

The true power of printf

The true power of printf

Remember Mr. C likes to be told beforehand what all we are going to ask him to do!

The true power of printf

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printf follows this exact same rule while telling Mr. C what to print

The true power of printf

HOW WE USUALLY SPEAK TO A HUMAN

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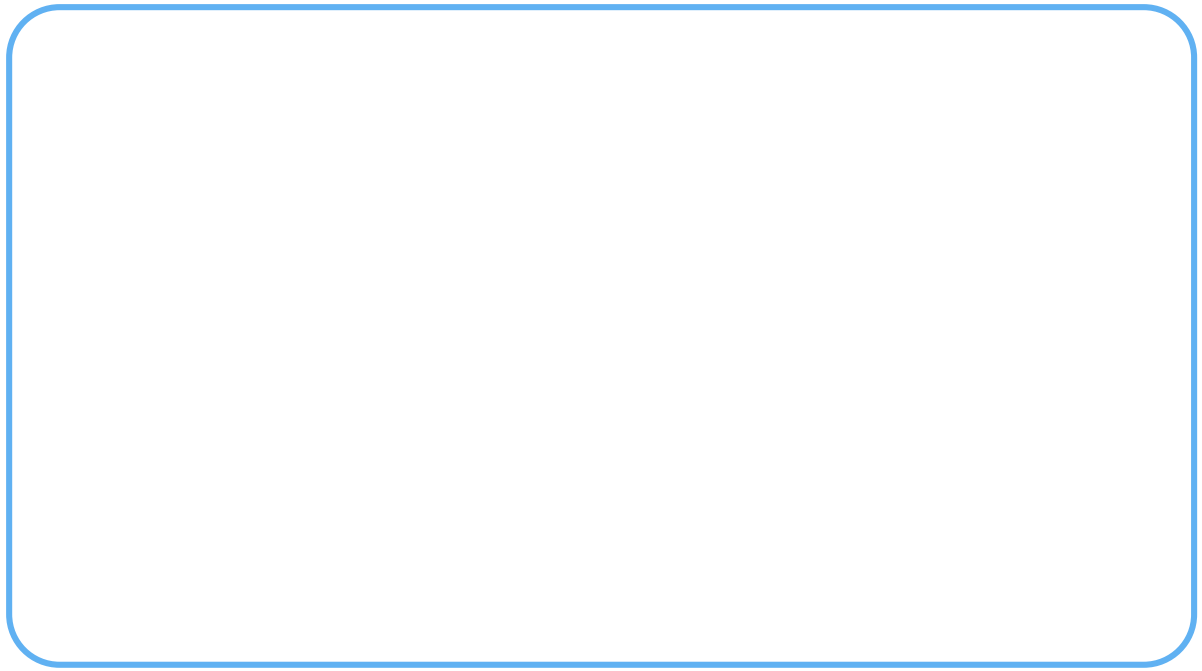

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HOW WE MUST SPEAK TO MR. COMPILER

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```
printf("Hello %d %d",a,b);
```

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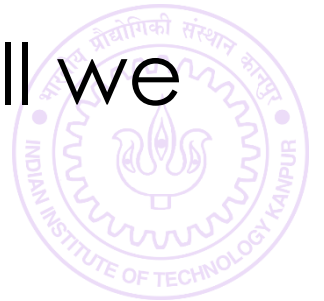

The true power of printf

HOW WE MUST SPEAK TO MR. COMPILER

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```

HOW WE USUALLY SPEAK TO A HUMAN

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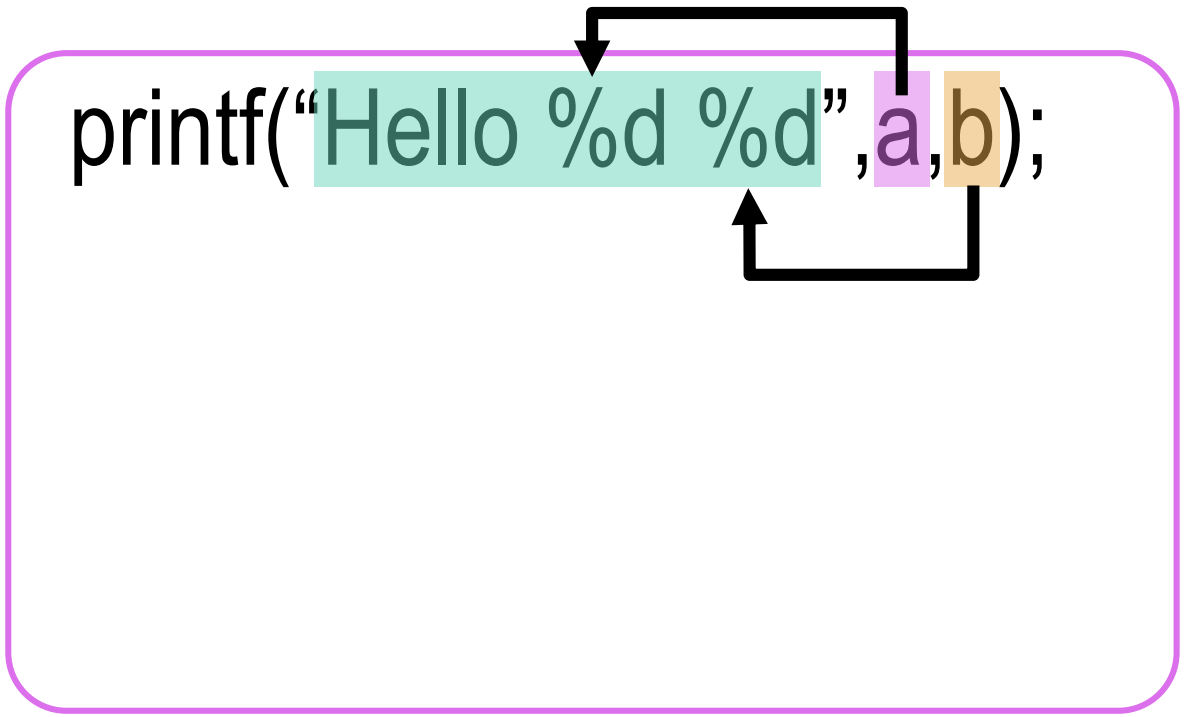
HOW WE MUST SPEAK TO MR. COMPILER



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The true power of printf

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```
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```

Format string

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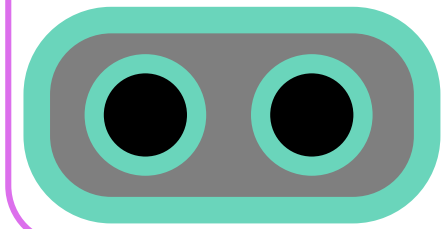
The true power of printf

HOW WE MUST SPEAK TO MR. COMPILER

```
printf("Hello %d %d",a,b);
```

Format string



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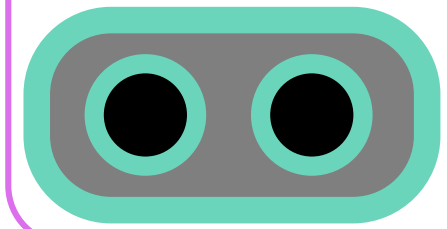
The true power of printf

HOW WE MUST SPEAK TO MR. COMPILER

printf("Hello %d %d",a,b);

Format string



Format string tells me **how** to print things, and then I am told **what** to print

HOW WE USUALLY SPEAK TO A HUMAN

Please write the English word Hello, followed by a space, followed by the value of an integer, followed by a space followed by the value of another integer.

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Fun with printf

Fun with printf

Can I print different things on separate lines?

Fun with printf

Can I print different things on separate lines?

```
printf("Hello\n%d\n%d",a,b);
```

Fun with printf

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```
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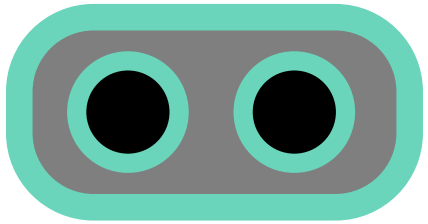

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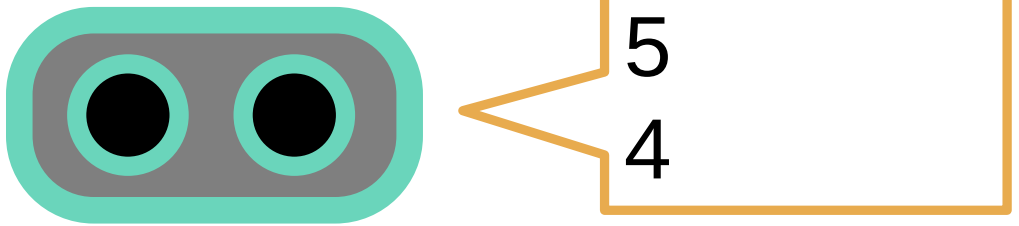
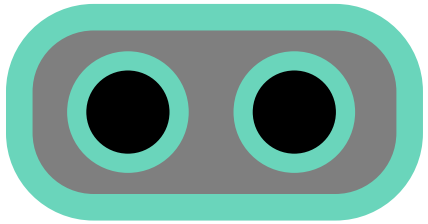


Fun with printf

Can I print different things on separate lines?

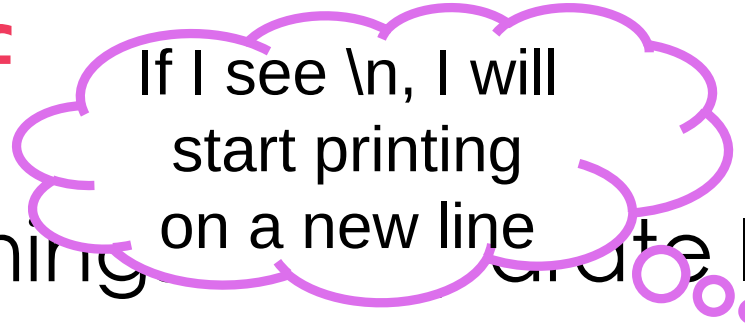
If I see \n, I will start printing on a new line

```
printf("Hello\n%d\n%d",a,b);
```



```
Hello
5
4
```

Fun with printf

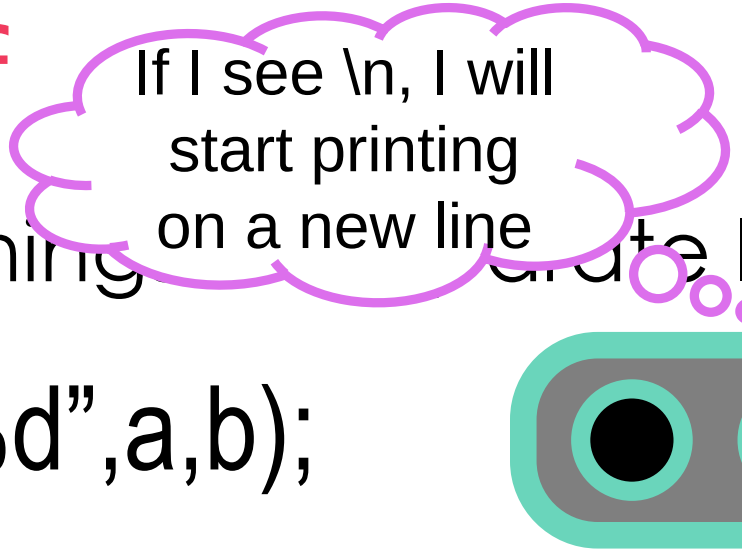


Can I print different things on separate lines?

```
printf("Hello\n%d\n%d",a,b);
```

What if I wish to print the character “ (inverted quotes)?

Fun with printf



Can I print different things on separate lines?

```
printf("Hello\n%d\n%d",a,b);
```



```
Hello
5
4
```

What if I wish to print the character " (inverted quotes)?

```
printf("\"Hello\"");
```

Fun with printf

If I see \n, I will start printing on a new line

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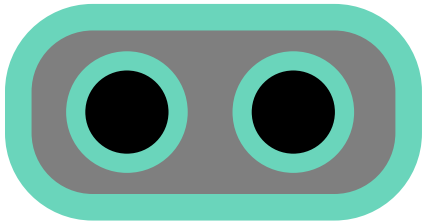

```
Hello
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```

What if I wish to print the character " (inverted quotes)?

```
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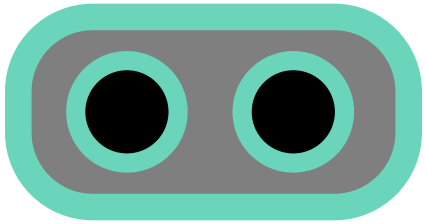
```



Fun with printf

If I see \n, I will start printing on a new line

Can I print different things on separate lines?

```
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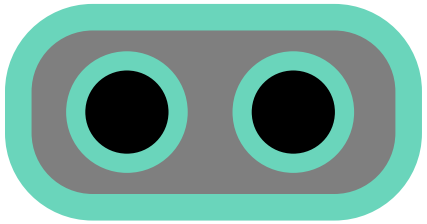

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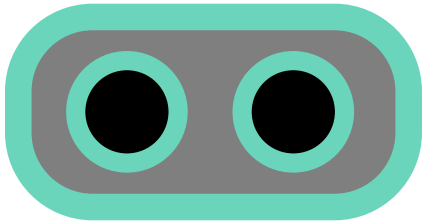
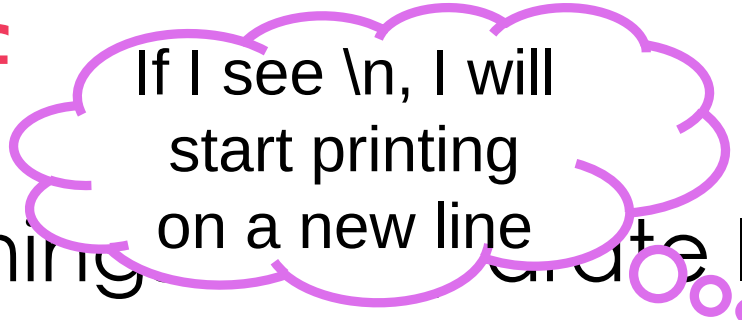


```
"Hello"
```

Fun with printf



Can I print different things on separate lines?

```
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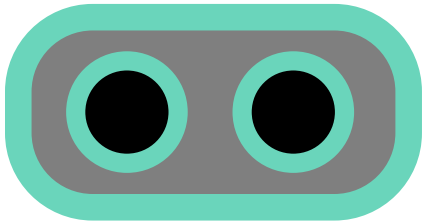

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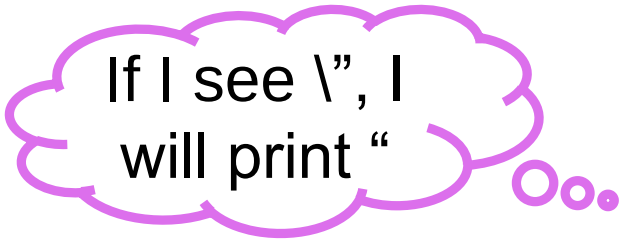

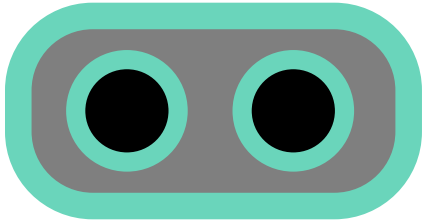

```
"Hello"
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Fun with printf

If I see \n, I will start printing on a new line

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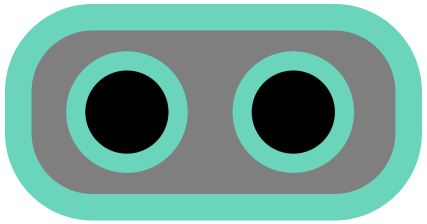

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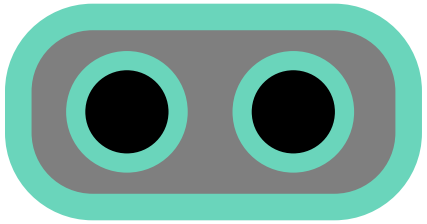


```
"Hello"
```

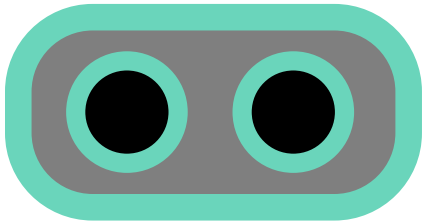
What if I wish to print the character % (percentage sign)?

Fun with printf

If I see \n, I will start printing on a new line

Can I print different things on separate lines?

```
printf("Hello\n%d\n%d",a,b);
```

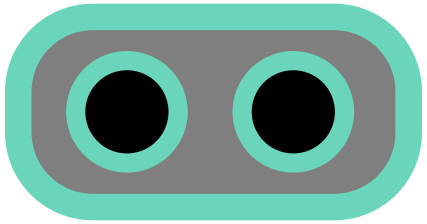


```
Hello
5
4
```

What if I wish to print the character " (inverted quotes)?

If I see \", I will print "

```
printf("\"Hello\"");
```



```
"Hello"
```

What if I wish to print the character % (percentage sign)?

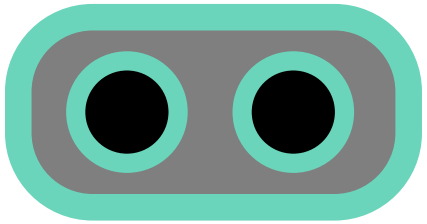
```
printf("90%% marks");
```

Fun with printf

If I see \n, I will start printing on a new line

Can I print different things on separate lines?

```
printf("Hello\n%d\n%d",a,b);
```

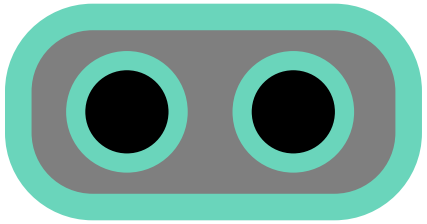


```
Hello
5
4
```

What if I wish to print the character " (inverted quotes)?

If I see \", I will print "

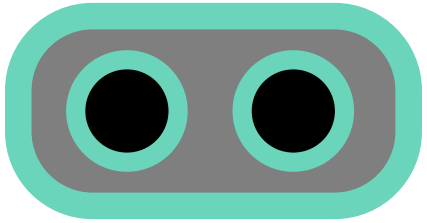
```
printf("\"Hello\"");
```



```
"Hello"
```

What if I wish to print the character % (percentage sign)?

```
printf("90%% marks");
```

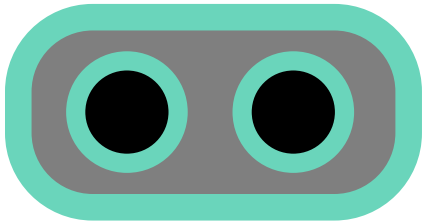


Fun with printf

Can I print different things on separate lines?

If I see \n, I will start printing on a new line

```
printf("Hello\n%d\n%d",a,b);
```

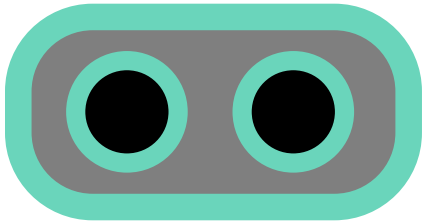


```
Hello
5
4
```

What if I wish to print the character " (inverted quotes)?

```
printf("\"Hello\"");
```

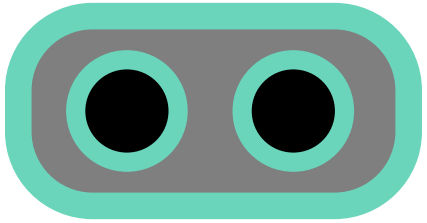
If I see \", I will print "



```
"Hello"
```

What if I wish to print the character % (percentage sign)?

```
printf("90%% marks");
```



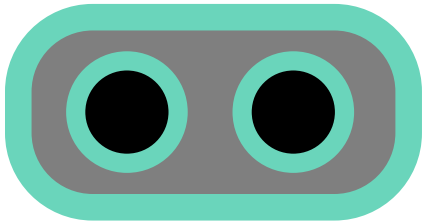
```
90% marks
```

Fun with printf

Can I print different things in separate lines?

If I see \n, I will start printing on a new line

```
printf("Hello\n%d\n%d",a,b);
```



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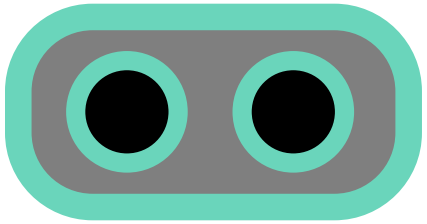
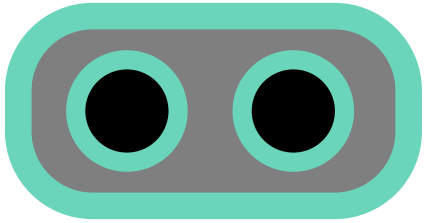


```
"Hello"
```

What if I wish to print the character % (percentage sign)?

```
printf("90%% ma
```

If I see %%, I will print %



```
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```

Fun with printf

Fun with printf

To print the character \ (backslash)

Fun with printf

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printf("To print on new line, use \\n");
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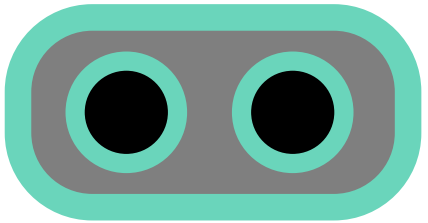

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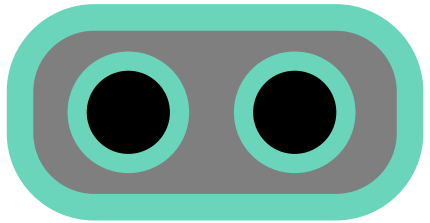

Fun with printf

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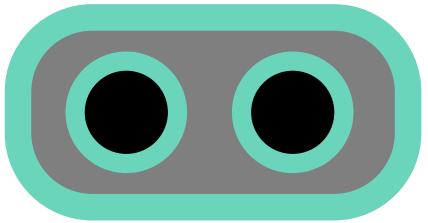

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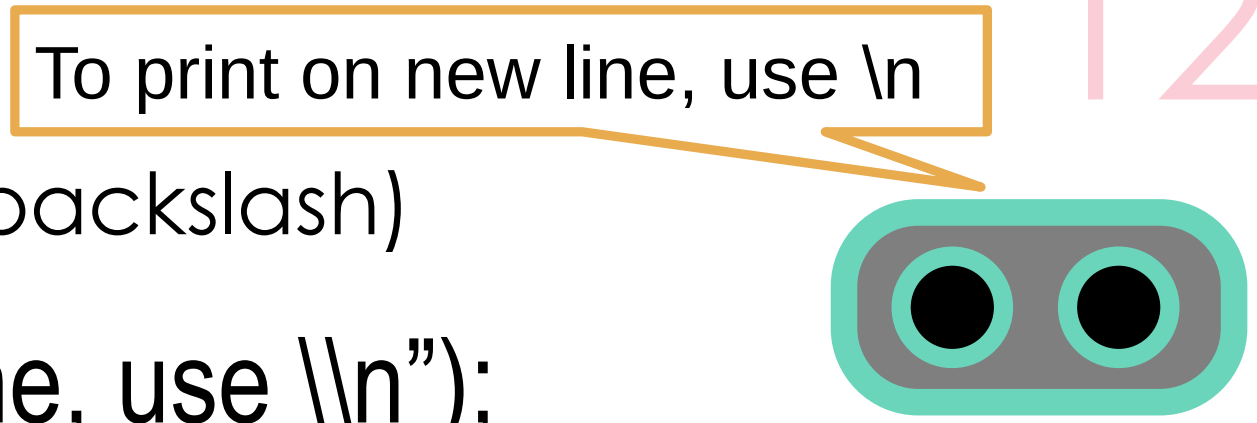
```

To print a *tab* character (a longer space)

Fun with printf



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```
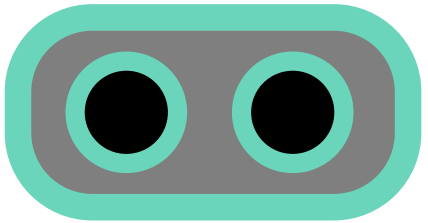

To print a *tab* character (a longer space)

```
printf("Very\tNice");
```

Fun with printf

To print on new line, use \n



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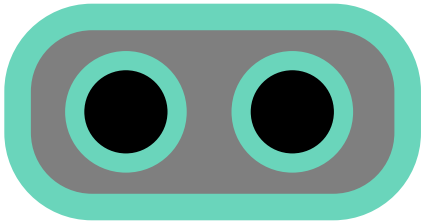

Fun with printf

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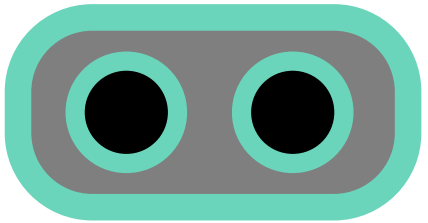

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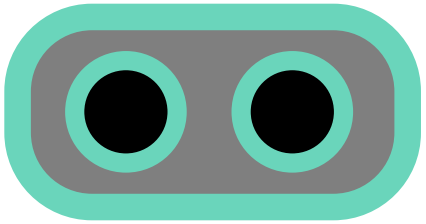

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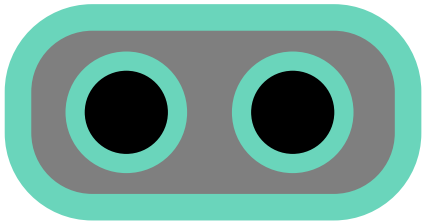

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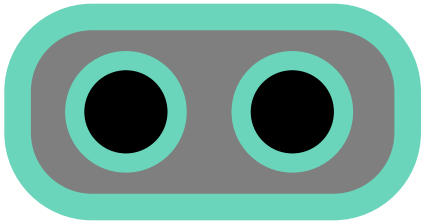

Very Nice

Allows us to print very nicely formatted output ☺

Fun with printf

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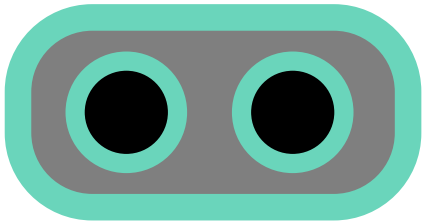

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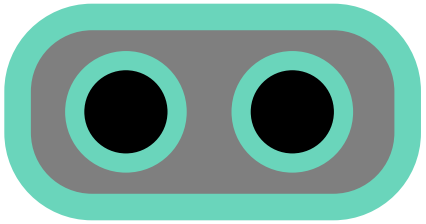

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More examples in labs – till then, have fun on your own

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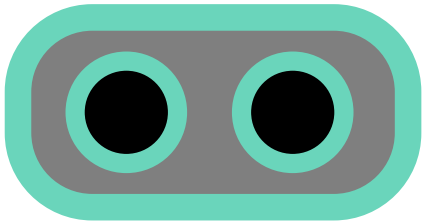

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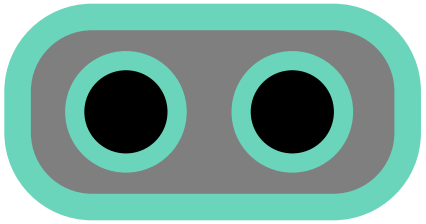

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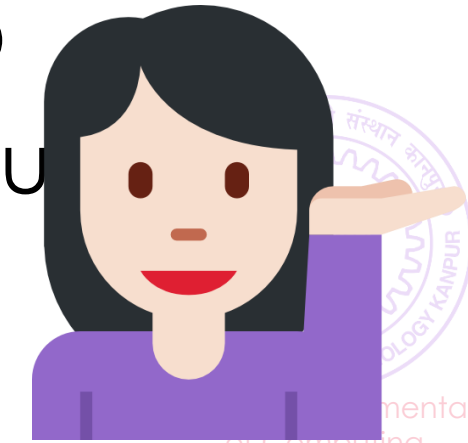

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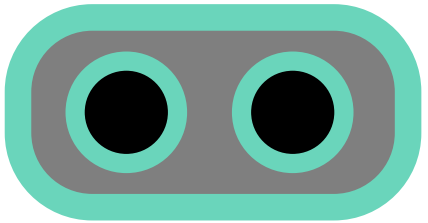

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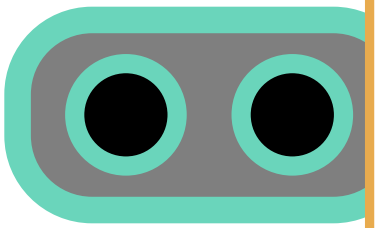

```
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```

\n, \" called *escape sequences* since they "escape" the normal rules

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Fun with printf

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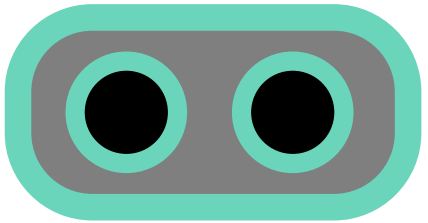

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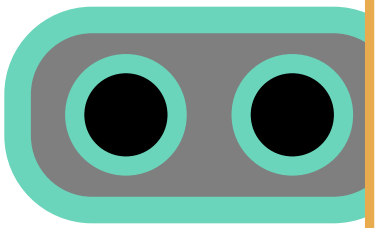

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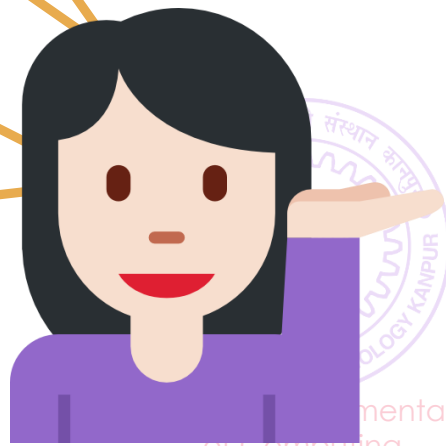

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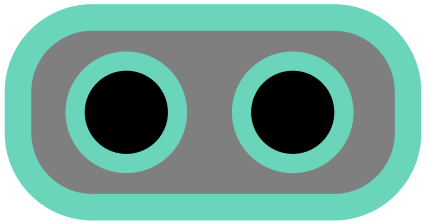

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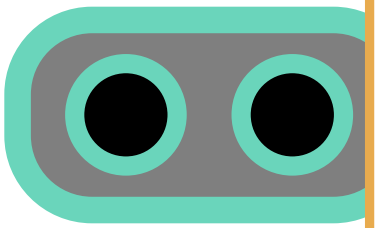

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More e

Need to be careful, especially with things like printf("\"Hello\"");

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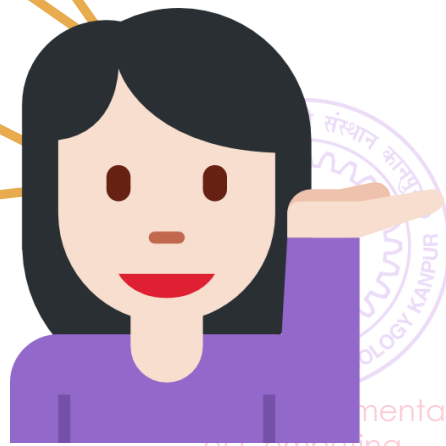

Fun with Integers

Fun with Integers

Operation	C Code	a	b	c
Addition	c = a + b;	5	4	9
Subtraction	c = a – b;	4	5	-1
Multiplication	c = a * b;	-2	-4	8
Division	c = a / b;	7	2	3
Remainder	c = a % b;	7	2	1

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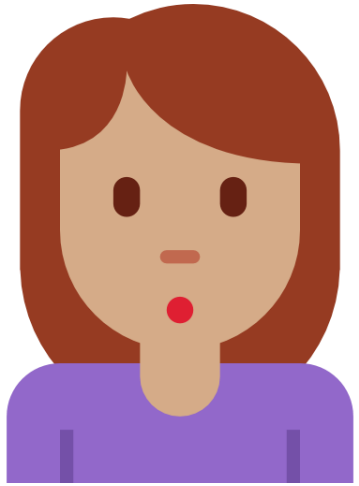

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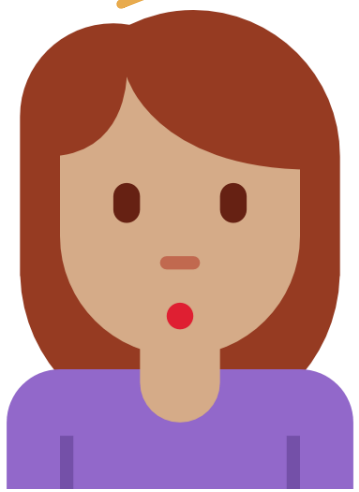

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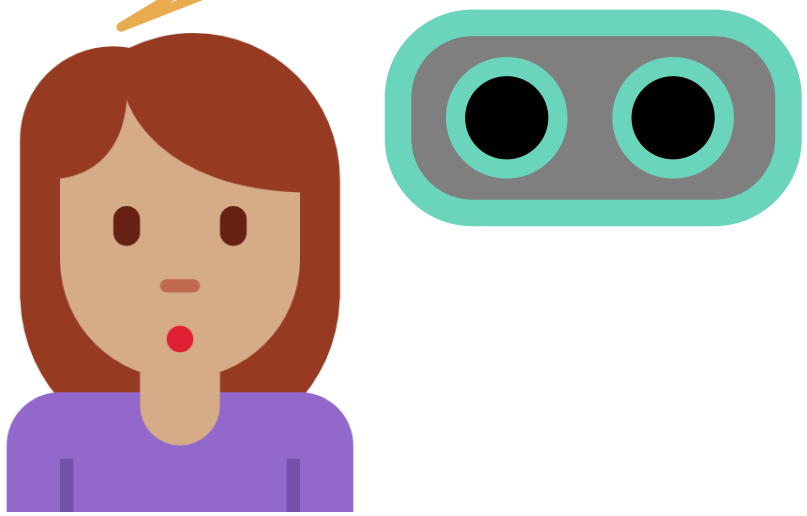

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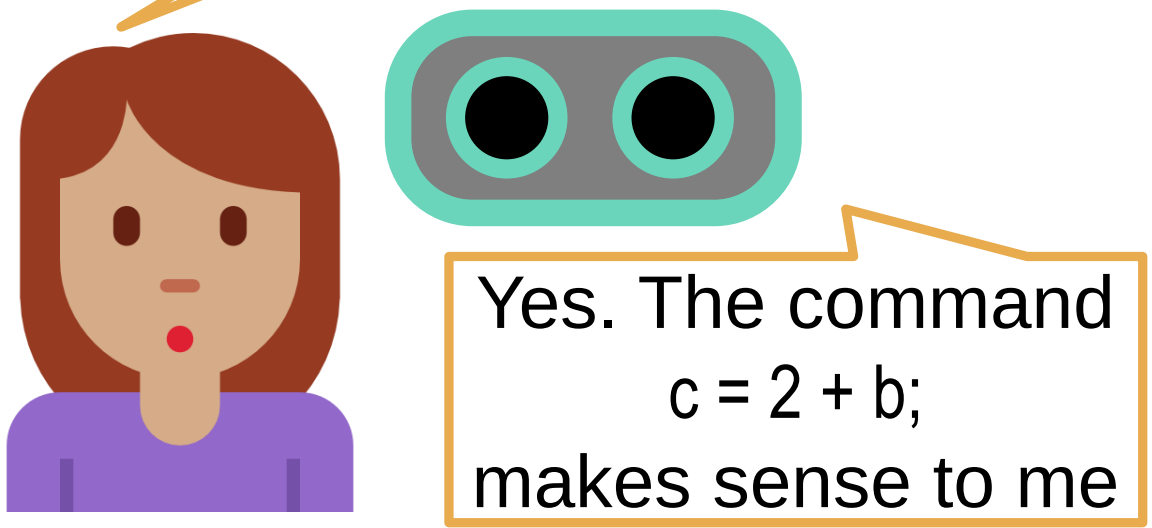

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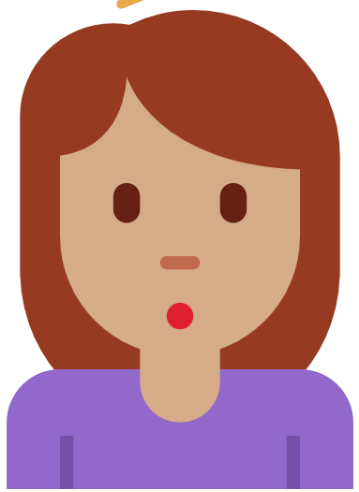

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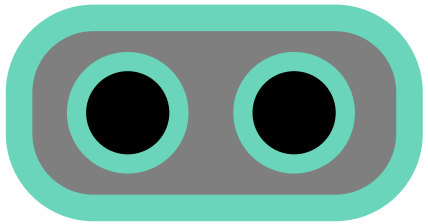

Not everything needs to be stored in a variable

Yes. The command
c = 2 + b;
makes sense to me

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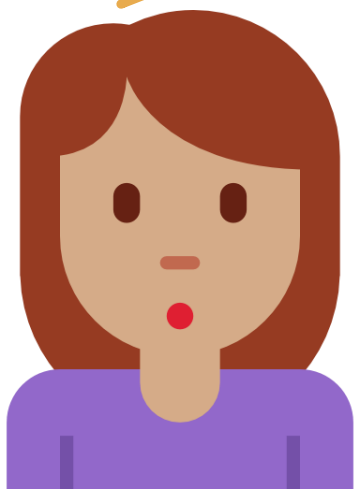

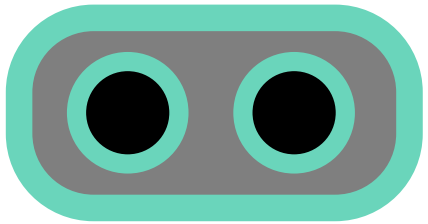

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printf("%d %d",a,10);

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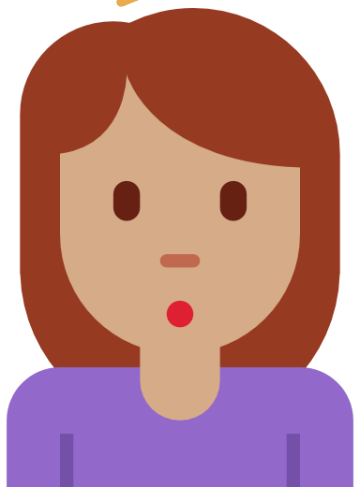

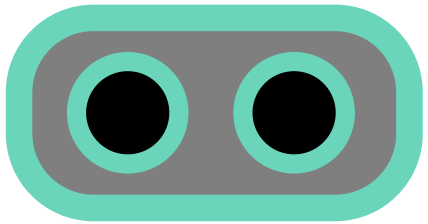

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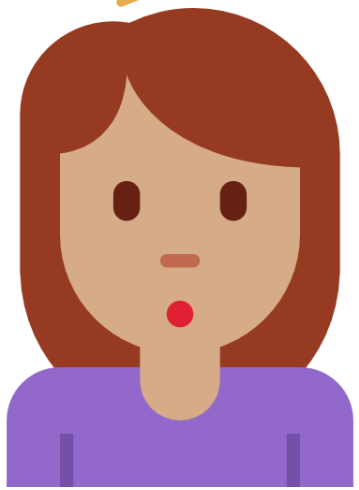

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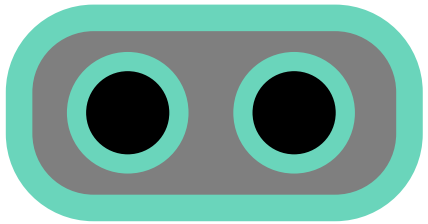

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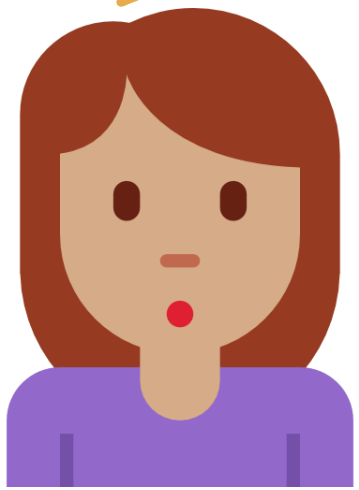

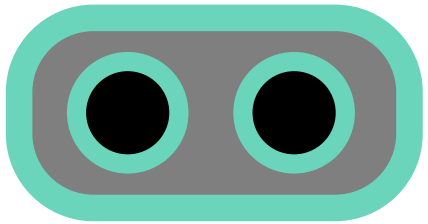

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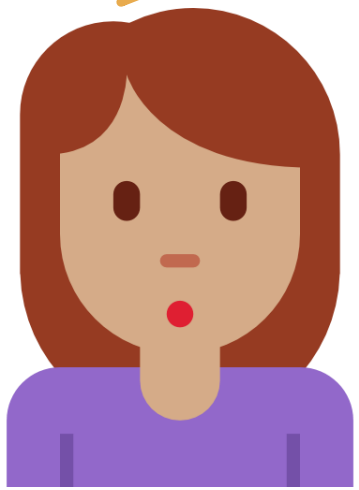

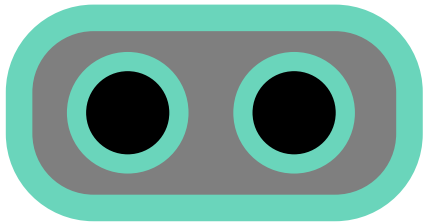

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Experiment on your own – will revisit these very soon

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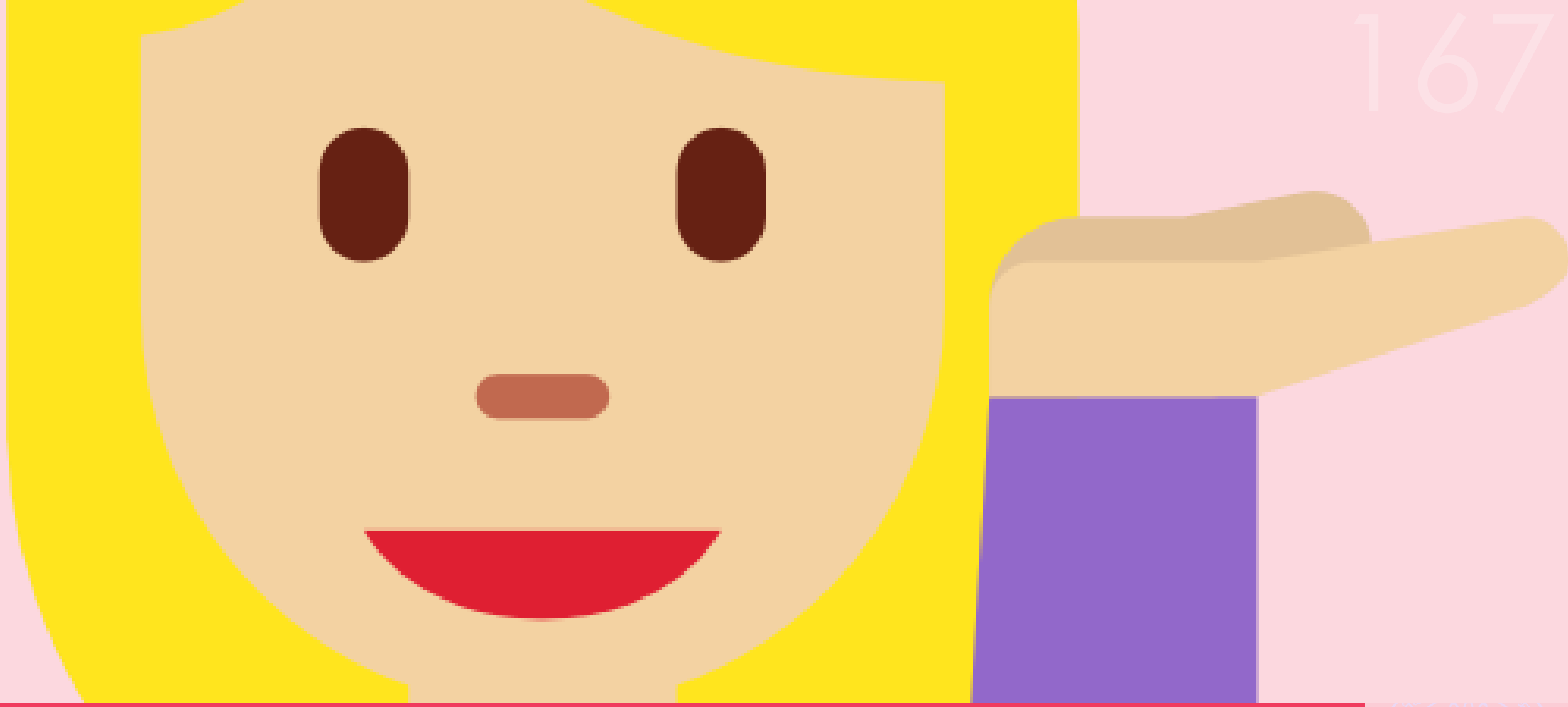

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