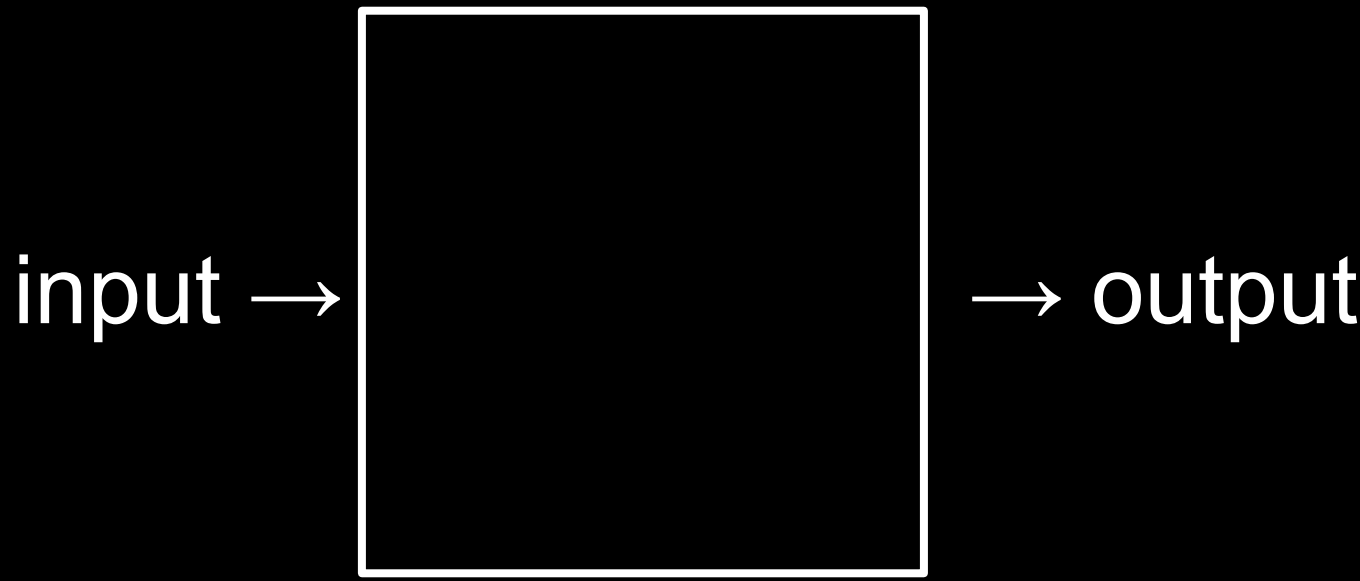
This is CS50

```
01111111 01000101 01001100 01000110 00000010 00000001 00000001 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000010 00000000 00111110 00000000 00000001 00000000 00000000 00000000
10110000 00000101 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
11010000 00010011 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 01000000 00000000 00111000 00000000
00001001 00000000 01000000 00000000 00100100 00000000 00100001 00000000
00000110 00000000 00000000 00000000 00000101 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
00001000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000011 00000000 00000000 00000000 00000100 00000000 00000000 00000000
00111000 00000010 00000000 00000000 00000000 00000000 00000000 00000000
...
```

hello, world


input →
→ output

representation

1001000 1001001 100001

72	73	33
1001000	1001001	100001

H	I	!
72	73	33
1001000	1001001	100001


72
73
33

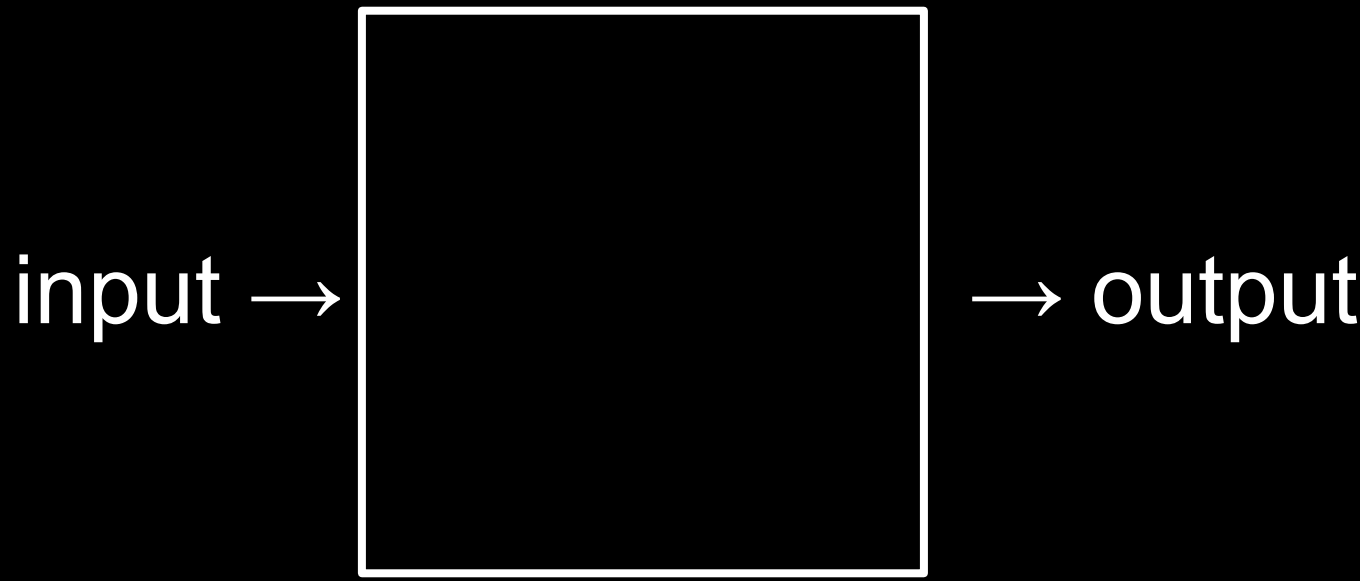
face-with-tears-of-joy_1f602.png

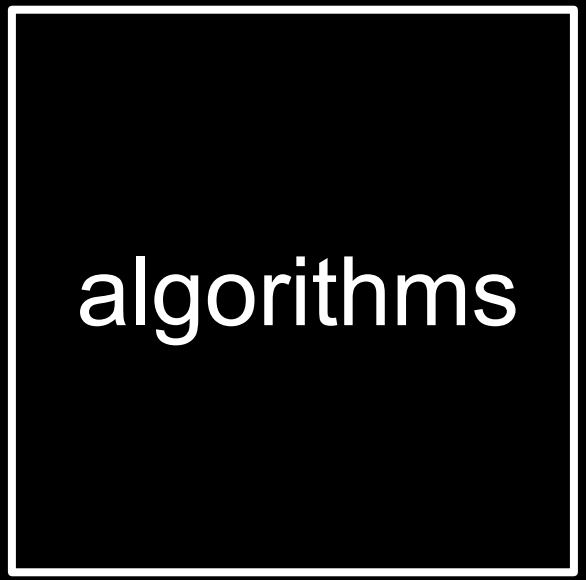


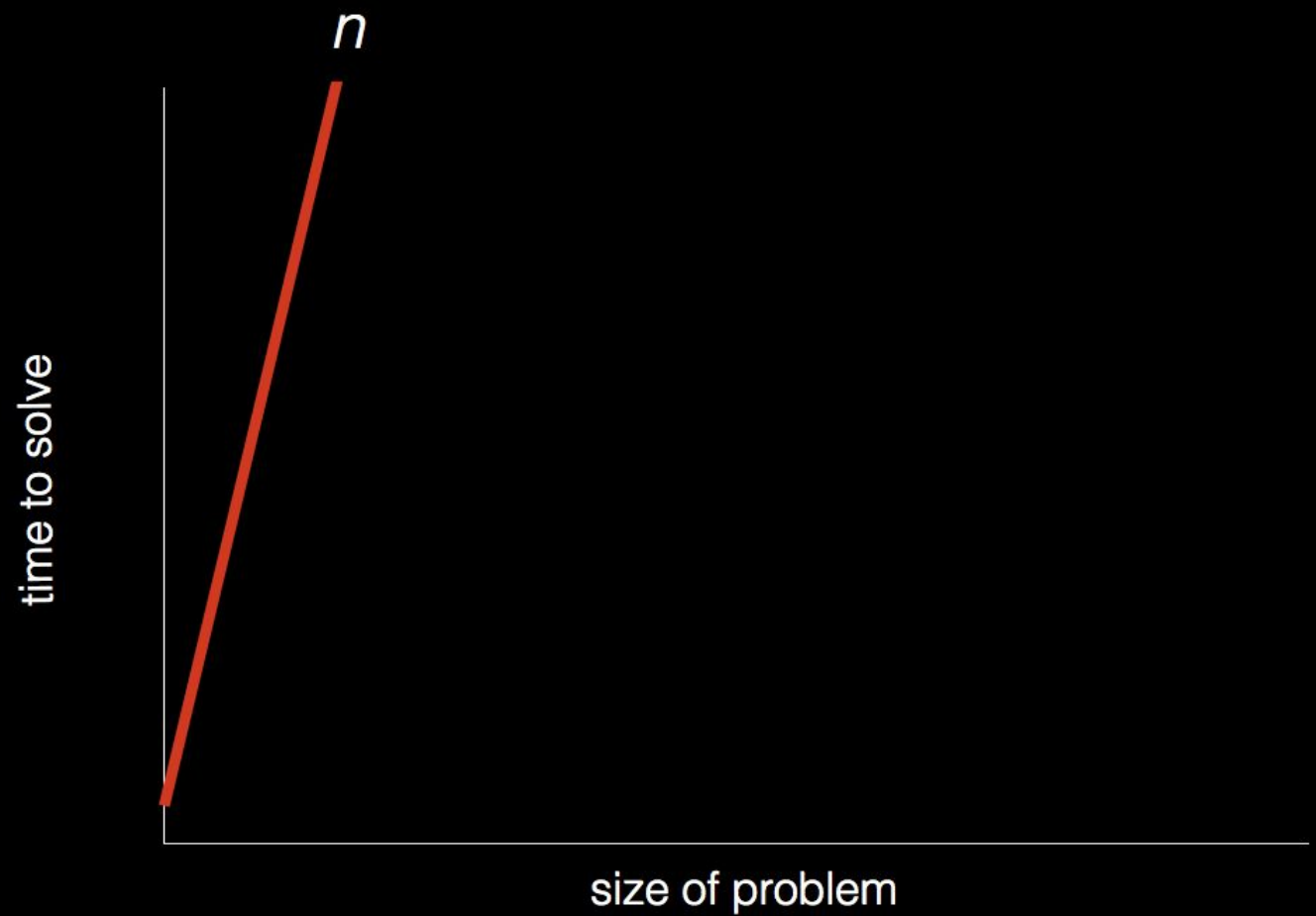


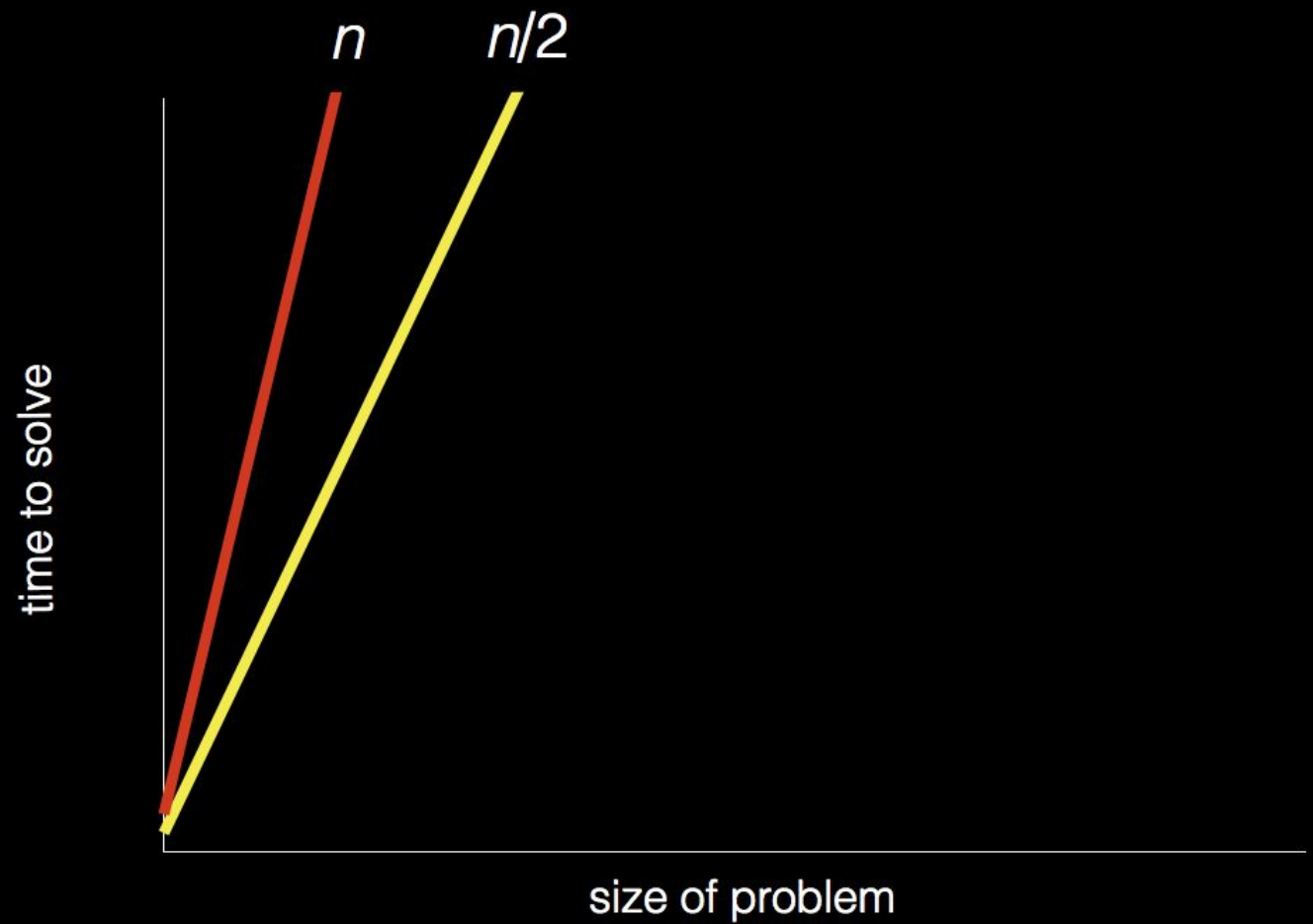


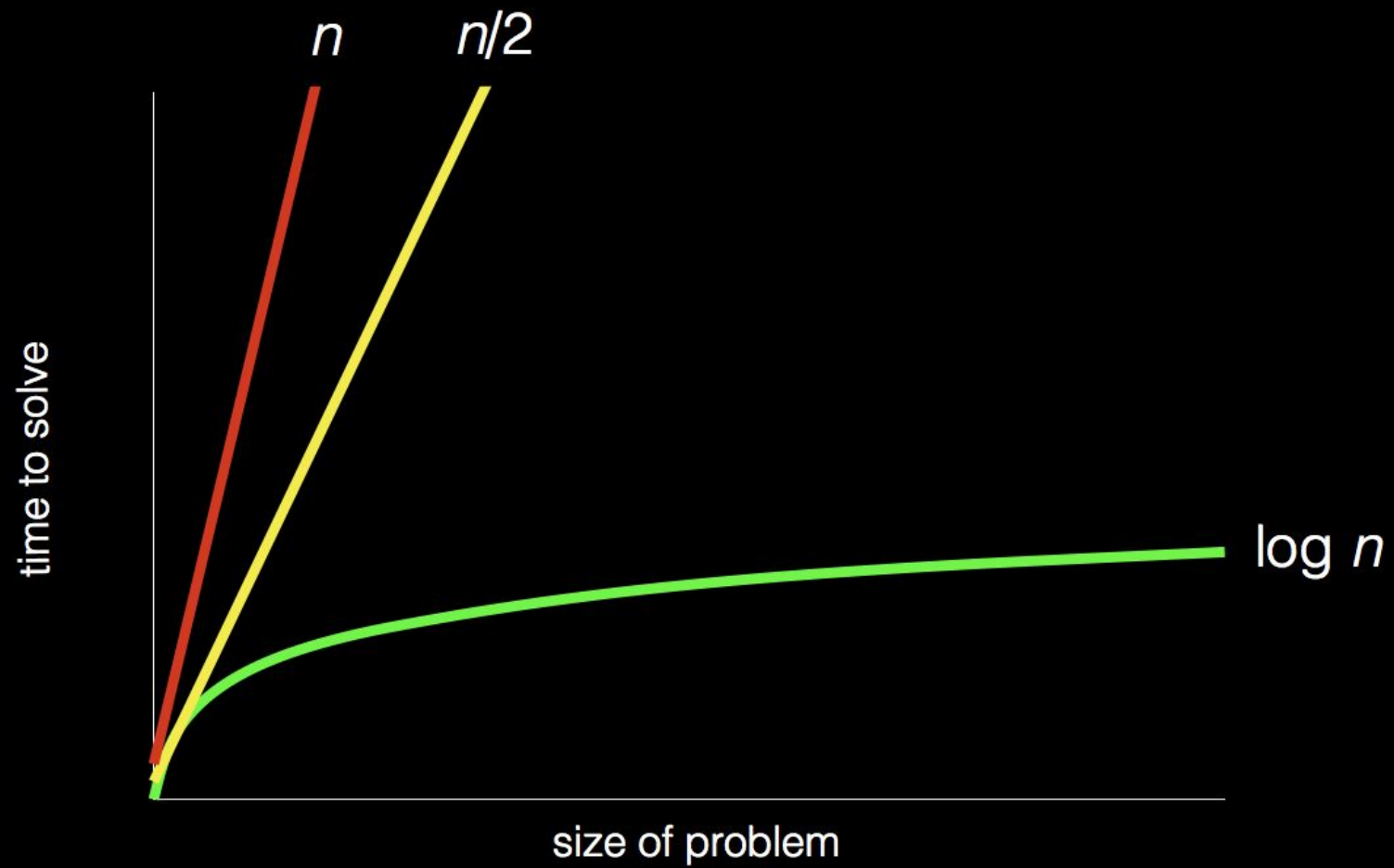



input →
→ output

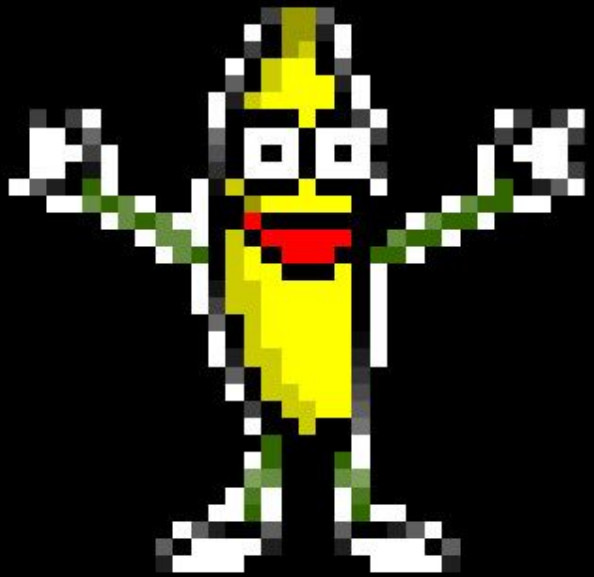

algorithms


n
time to solve
size of problem


n
n/2
time to solve
size of problem


n
n/2
log n
time to solve
size of problem

```
 0  pick up phone book
 1  open to middle of phone book
 2  look at names
 3  if Smith is among names
 4      call Mike
 5  else if Smith is earlier in book
 6      open to middle of left half of book
 7      go back to step 2
 8  else if Smith is later in book
 9      open to middle of right half of book
10      go back to step 2
11  else
12      quit
```

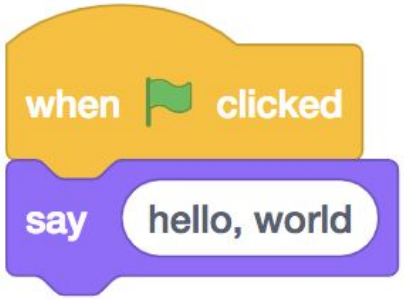


C

```c
#include <stdio.h>

int main(void)
{
    printf("hello, world\n");
}
```

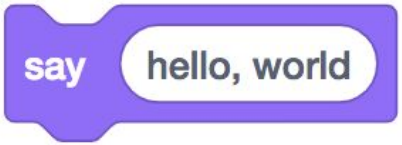
hello, world

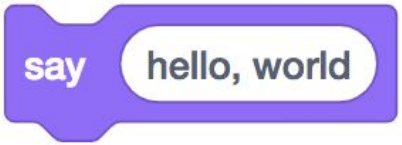
```c
#include <stdio.h>

int main(void)
{
    printf("hello, world\n");
}
```



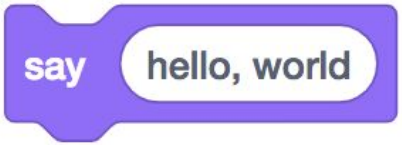

```c
#include <stdio.h>

int main(void)
{
    printf("hello, world\n");
}
```

C

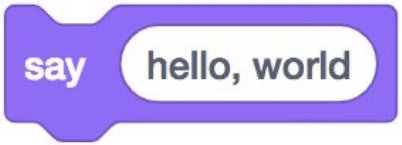

say
hello, world



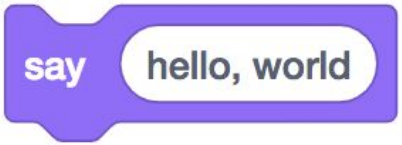

```
print (                )
```



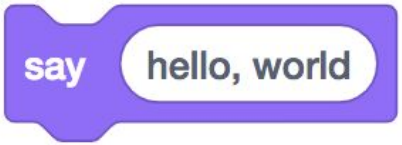

```
printf(                    )
```



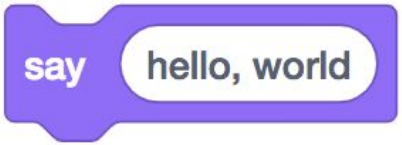

```
printf( hello, world   )
```




```
printf("hello, world  ")
```




```
printf("hello, world\n")
```



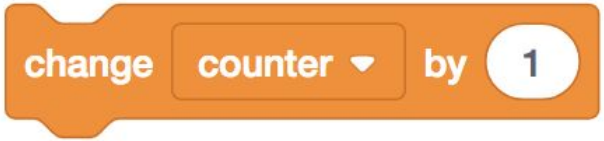

```
printf("hello, world\n");
```

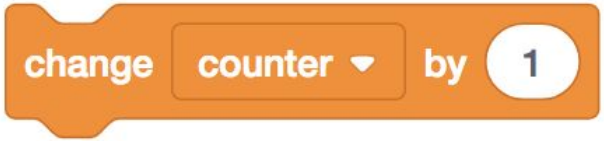

set
counter
to
0


```
counter = 0
```

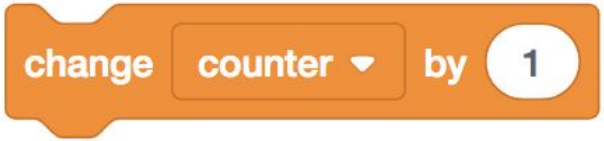

```
int counter = 0
```


```
int counter = 0;
```

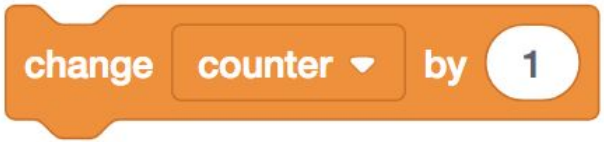

change
counter
by
1



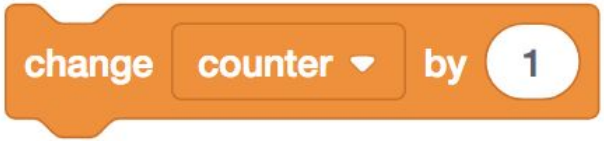

```
counter = counter + 1
```




```
counter = counter + 1;
```



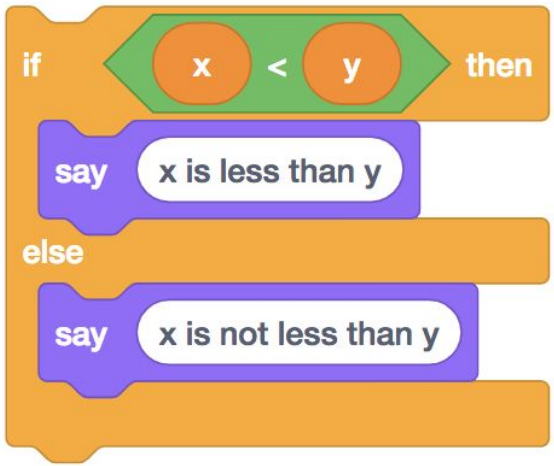

```
counter += 1;
```

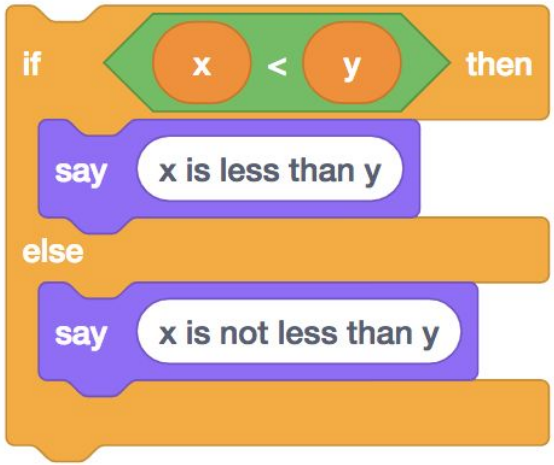



```
counter++;
```

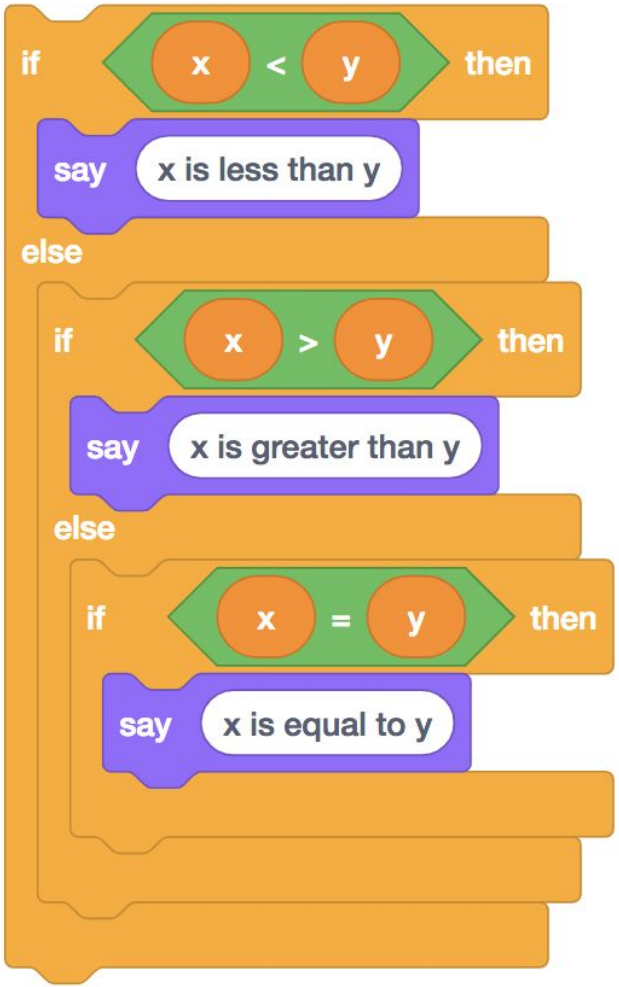

if
x
<
y
then
say
x is less than y

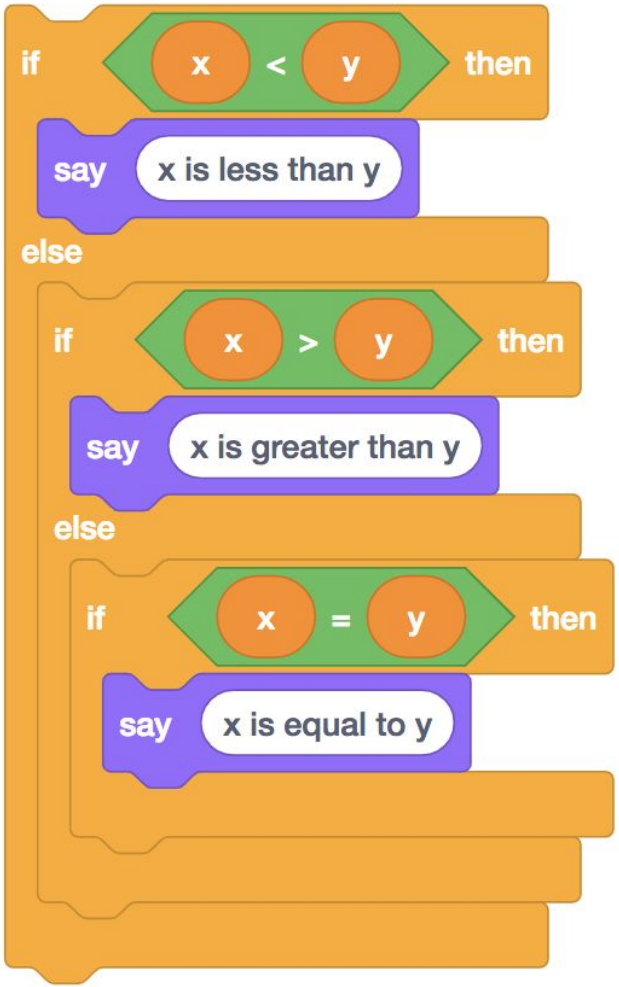

```
if (x < y)
{
    printf("x is less than y\n");
}
```


if
x
<
y
then
say
x is less than y
else
say
x is not less than y

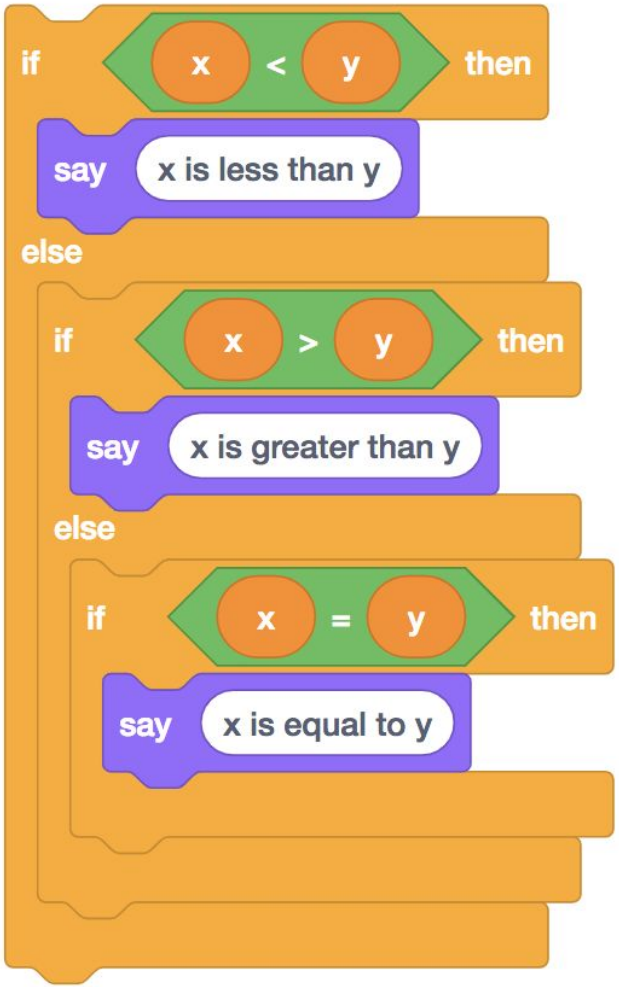


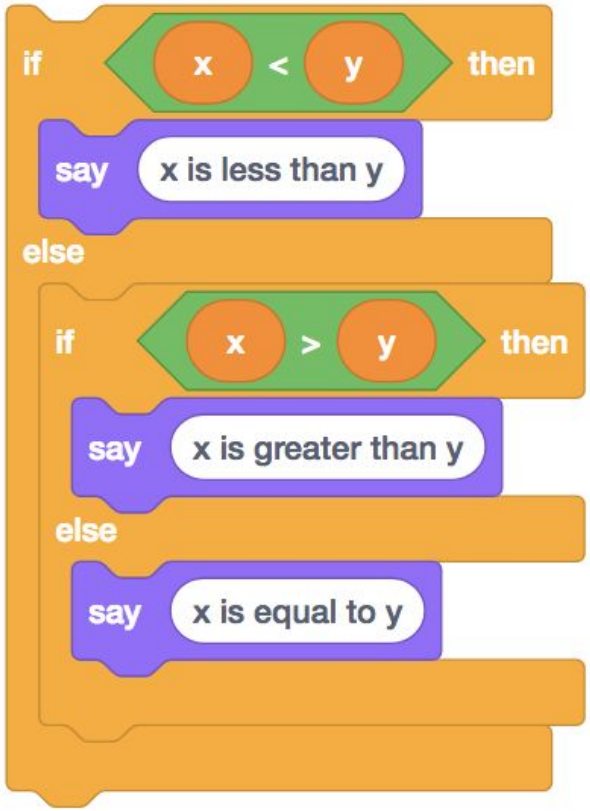

```
if (x < y)
{
    printf("x is less than y\n");
}
else
{
    printf("x is not less than y\n");
}
```

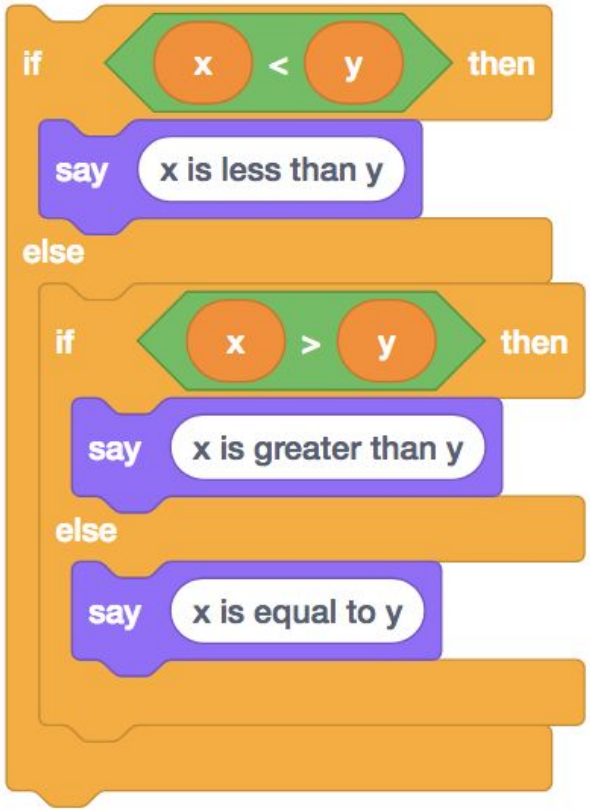

if x < y then
say x is less than y
else
if x > y then
say x is greater than y
else
if x = y then
say x is equal to y



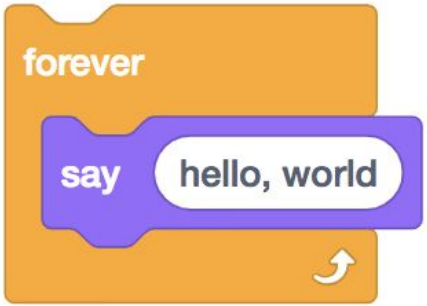

```
if (x < y)
{
    printf("x is less than y\n");
}
else if (x > y)
{
    printf("x is greater than y\n");
}
else if (x == y)
{
    printf("x is equal to y\n");
}
```

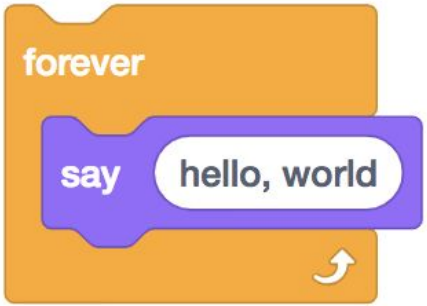

if x < y then
say x is less than y
else
if x > y then
say x is greater than y
else
if x = y then
say x is equal to y


if
x
<
y
then
say
x is less than y
else
if
x
>
y
then
say
x is greater than y
else
say
x is equal to y

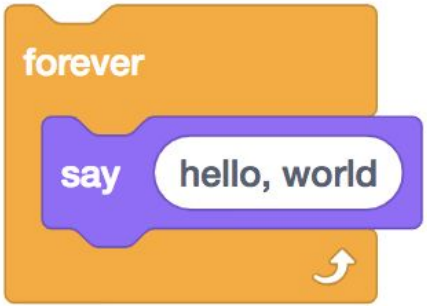



```
if (x < y)
{
    printf("x is less than y\n");
}
else if (x > y)
{
    printf("x is greater than y\n");
}
else
{
    printf("x is equal to y\n");
}
```

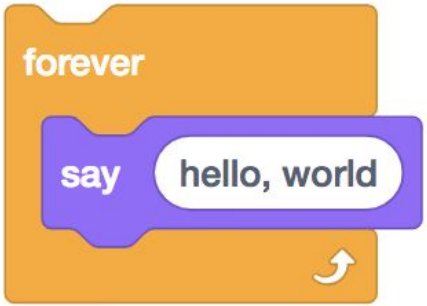

forever
say
hello, world



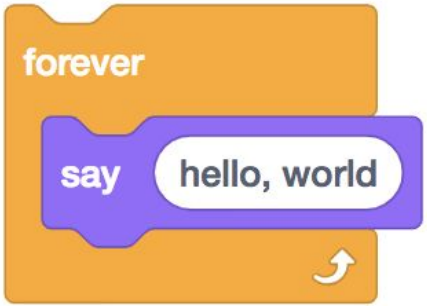

```
while
```



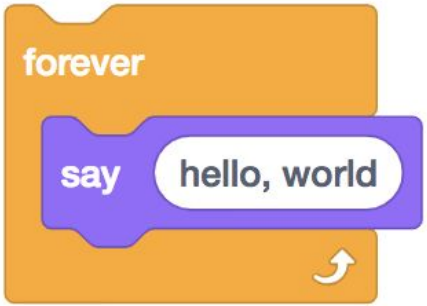

```
while
{

}
```



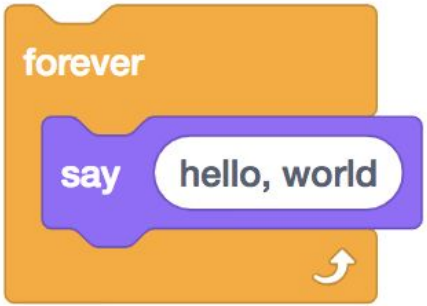

```
while
{
    printf("hello, world\n");
}
```



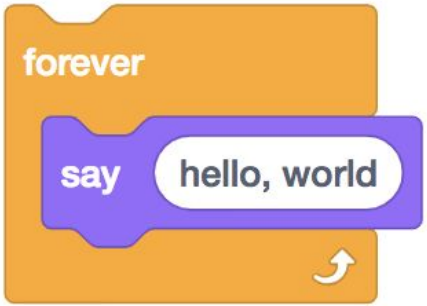

```
while (    )
{
    printf("hello, world\n");
}
```



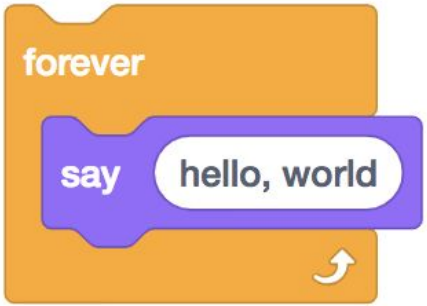

```
while (true)
{
    printf("hello, world\n");
}
```



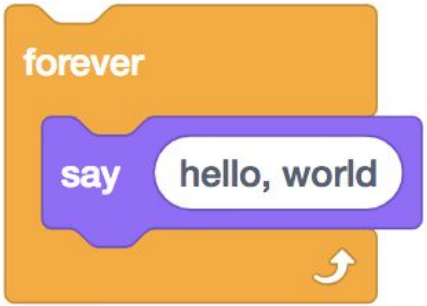

```
while (true)
{
    printf("hello, world\n");
}
```



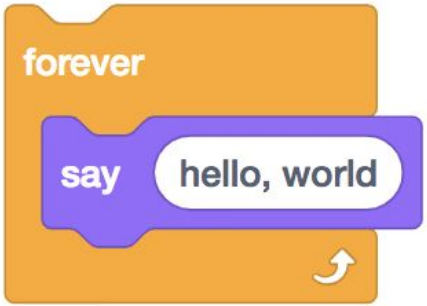

```
while (true)
{
    printf("hello, world\n");
}
```



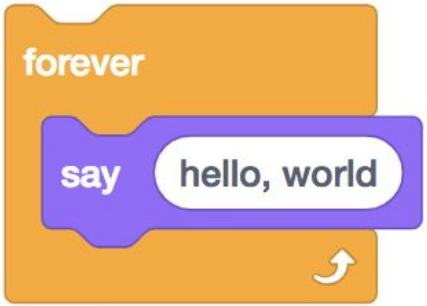

```
while (true)
{
    printf("hello, world\n");
}
```




```
while (true)
{
    printf("hello, world\n");
}
```




```
while (true)
{
    printf("hello, world\n");
}
```




```
while (true)
{
    printf("hello, world\n");
}
```


repeat
50
say
hello, world


```
for
```


```
for
{

}
```


```
for
{
    printf("hello, world\n");
}
```


```
for (                        )
{
    printf("hello, world\n");
}
```


```
for (int i = 0;             )
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50;    )
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```c
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```

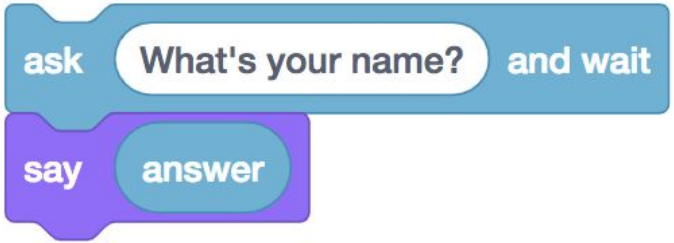

```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```

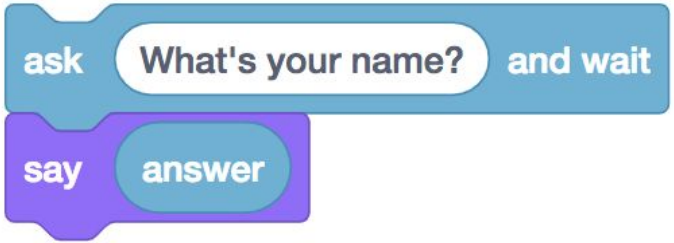

```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```

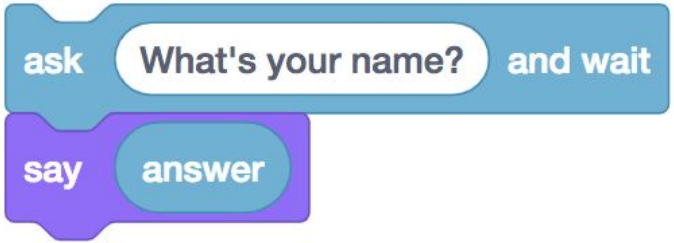

```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```


```
for (int i = 0; i < 50; i++)
{
    printf("hello, world\n");
}
```

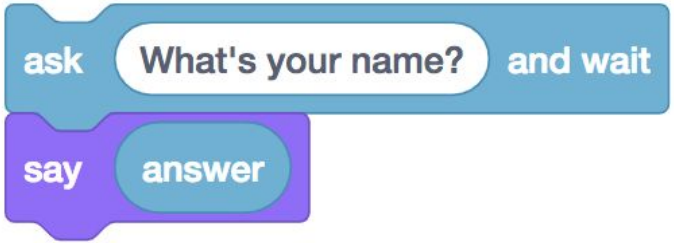

ask
What's your name?
and wait
say
answer



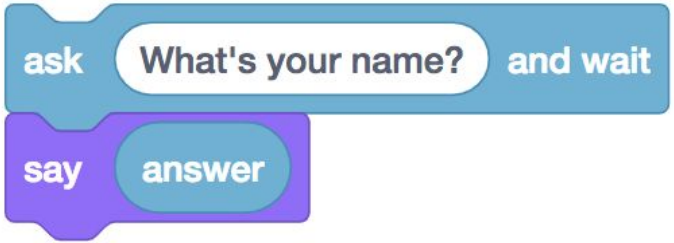

```
get_string("What's your name?\n");
```



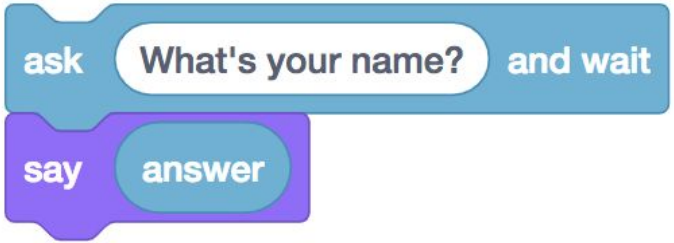

```
answer = get_string("What's your name?\n");
```



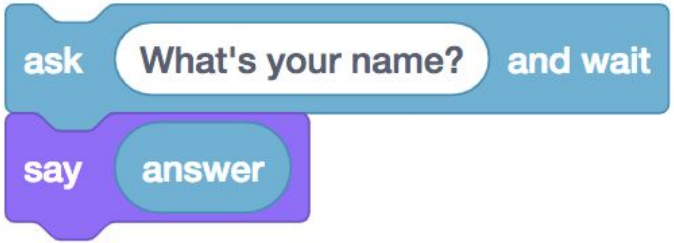

```
string answer = get_string("What's your name?\n");
```




```
string answer = get_string("What's your name?\n");
printf("%s\n", answer);
```




```
string answer = get_string("What's your name?\n");
printf("%s\n", answer);
```




```
string answer = get_string("What's your name?\n");
printf("%s\n", answer);
```


ask
What's your name?
and wait
say
join
hello,
answer


```
string answer = get_string("What's your name?\n");
```

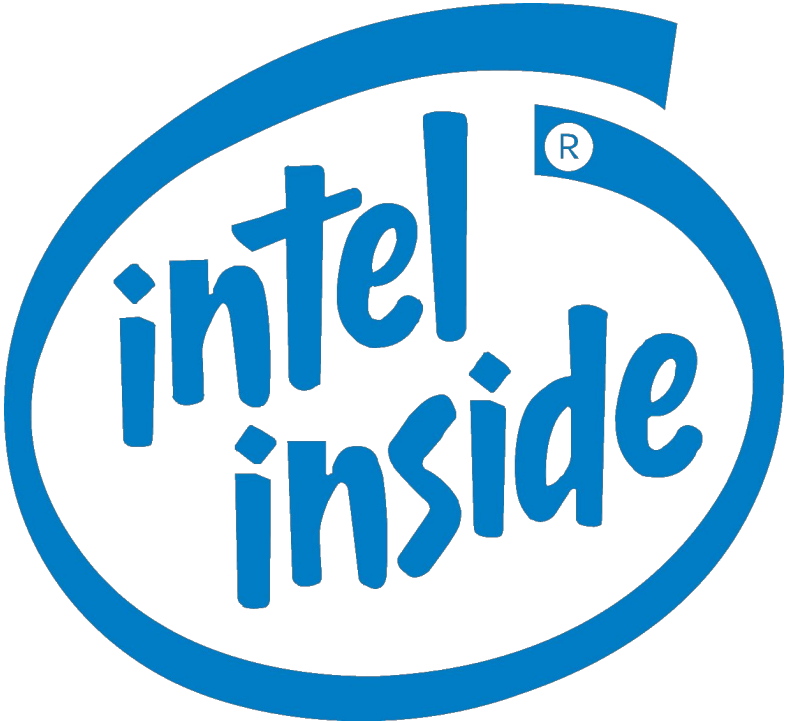

```
string answer = get_string("What's your name?\n");
printf("hello, %s\n", answer);
```


```
string answer = get_string("What's your name?\n");
printf("hello, %s\n", answer);
```


```
string answer = get_string("What's your name?\n");
printf("hello, %s\n", answer);
```

CS50 Sandbox

sandbox.cs50.io


intel
inside
R

```c
#include <stdio.h>

int main(void)
{
    printf("hello, world\n");
}
```

```
01111111 01000101 01001100 01000110 00000010 00000001 00000001 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000010 00000000 00111110 00000000 00000001 00000000 00000000 00000000
10110000 00000101 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
11010000 00010011 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 01000000 00000000 00111000 00000000
00001001 00000000 01000000 00000000 00100100 00000000 00100001 00000000
00000110 00000000 00000000 00000000 00000101 00000000 00000000 00000000
01000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
01000000 00000000 01000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
11111000 00000001 00000000 00000000 00000000 00000000 00000000 00000000
00001000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000011 00000000 00000000 00000000 00000100 00000000 00000000 00000000
00111000 00000010 00000000 00000000 00000000 00000000 00000000 00000000
...
```

```
clang hello.c

./a.out
```

```
clang -o hello hello.c

./hello
```

```
make hello

./hello
```

```
get_char

get_double

get_float

get_int

get_long

get_string

...
```

```
bool

char

double

float

int

long

string

...
```

%c

%f

%i

%li

%s


crucial
by Micron
8BBI2
D9HXT
8BBI2
D9HXT
4G85
4G85
4G85
47J6

floating-point imprecision

integer overflow

1 2 3

1 2 4

1 2 5

1 2 6

1 2 7

1 2 8

1 2 9

1 2 10

1 2 9

1

1 2 0

1 3 0

9 9 9

1

9 9 0

1

9 0 0

1

0 0 0

1 0 0 0

0 0 0

1 1 1

1

1 1 0

1

1 0 0

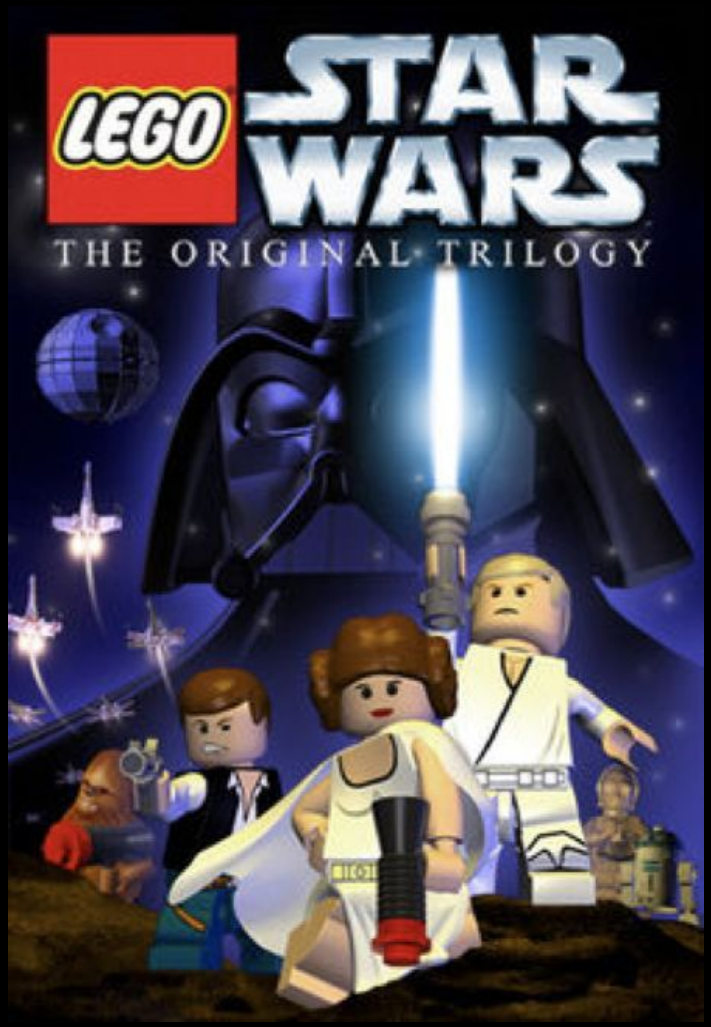
1

0 0 0

1 0 0 0

0 0 0

integer overflow

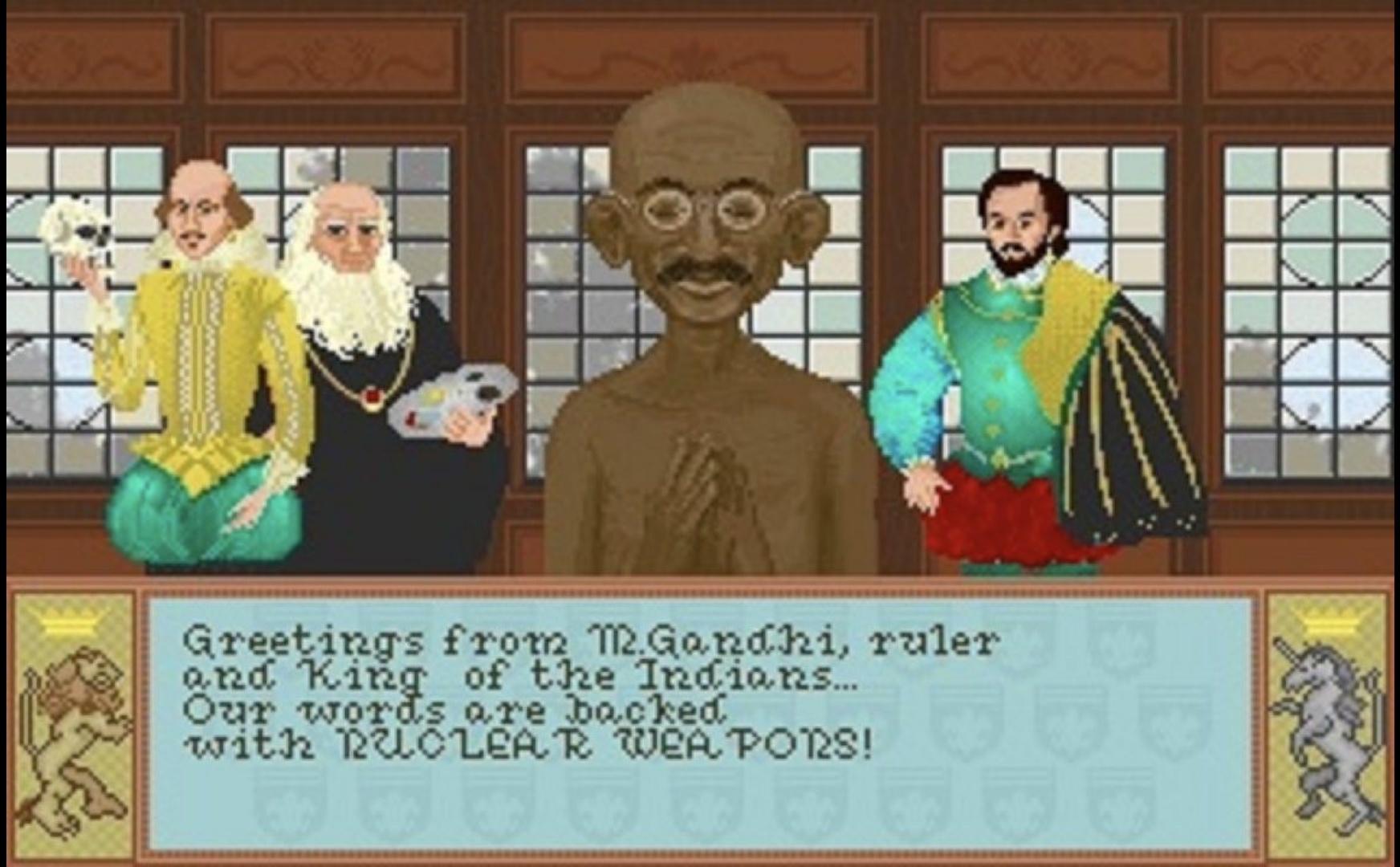

LEGO
STAR WARS
THE ORIGINAL TRILOGY


B Back
A Buy
4,000,000,000

1999

99

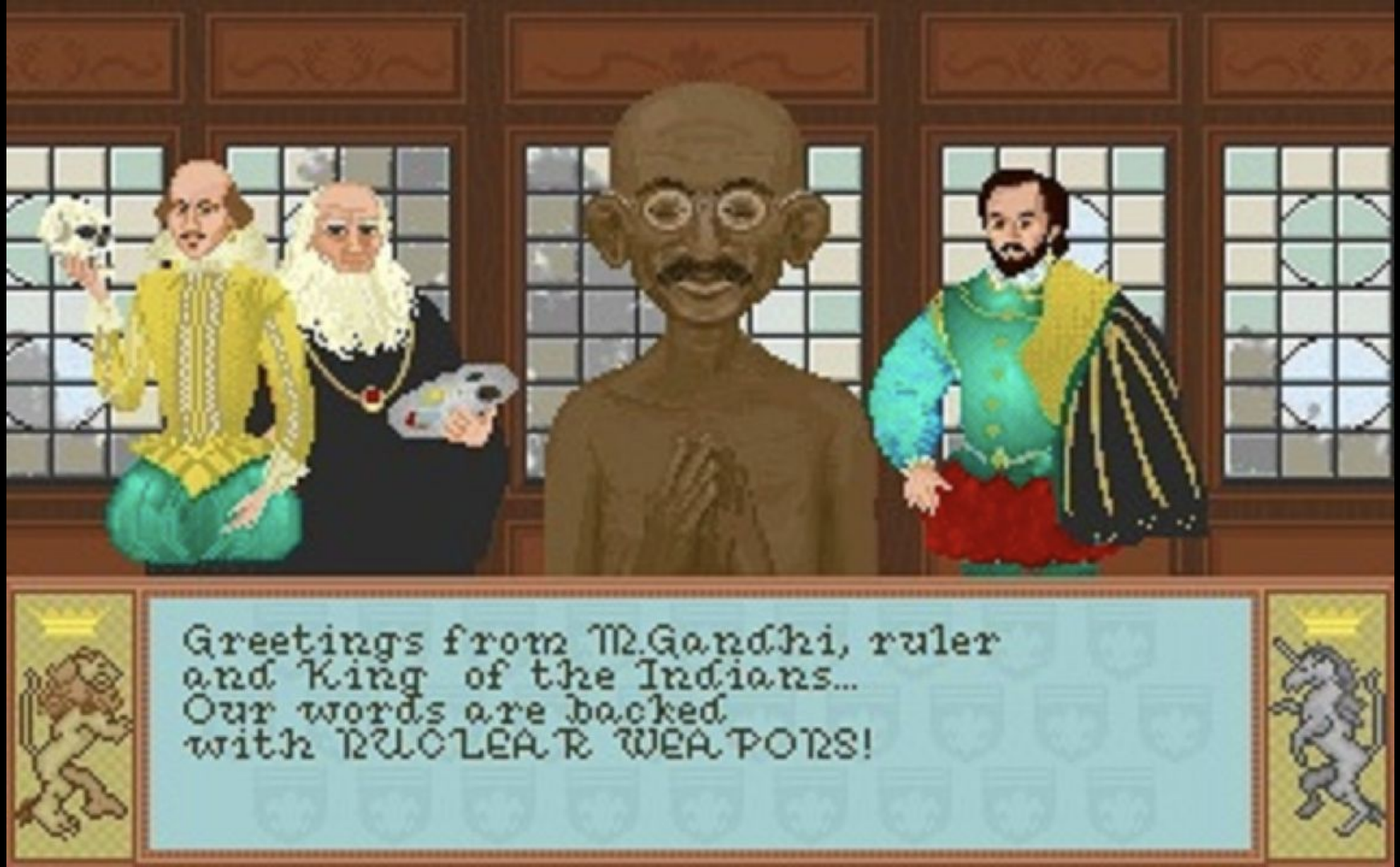
00


Greetings from M.Gandhi, ruler
and King of the Indians...
Our words are backed
with NUCLEAR WEAPONS!

0 0 0 0 0 0 0 1

0 0 0 0 0 0 0 0

1 1 1 1 1 1 1 1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CS50 Lab

lab.cs50.io

This is CS50