Blitz-Feedback zu Lehrveranstaltungen: schnell, ehrlich, anonym

Das ist dein direkter Draht zur Fachschaft. Trag ein, was dir gefällt oder was dich stört. Kleinigkeiten oder Riesenprobleme: Wir kümmern uns drum.

Herzlich Willkommen bei Inf-Einf-B Woche 4.

Heute geht es um Speicher.

Diese Konzepte fallen vielen anfangs schwer – Sie können auch die Tutorien nutzen, um Fragen zu klären.

Ausführliche Erklärungen folgen in den Shorts und in der Section. Diese Videos werden in 1–2 Tagen online sein.

Kurs-Website mit Wochenplan, Videos, Notizen, Aufgaben, FAQ, uvm.: **inf.zone**

Die Vorlesungen werden aufgezeichnet und im Internet veröffentlicht. Die Videos werden allerdings meist erst 6 Wochen später online sein; Folien und Notizen am Tag nach der Vorlesung. Machen Sie sich Notizen!

Ihre Fragen sind in der Aufzeichnung in der Regel nicht zu hören (ich wiederhole sie).

This is CS50

Dies ist Inf-Einf-B.

EMBRACE
THE FLOW
INF.ZONE

THE FLOW
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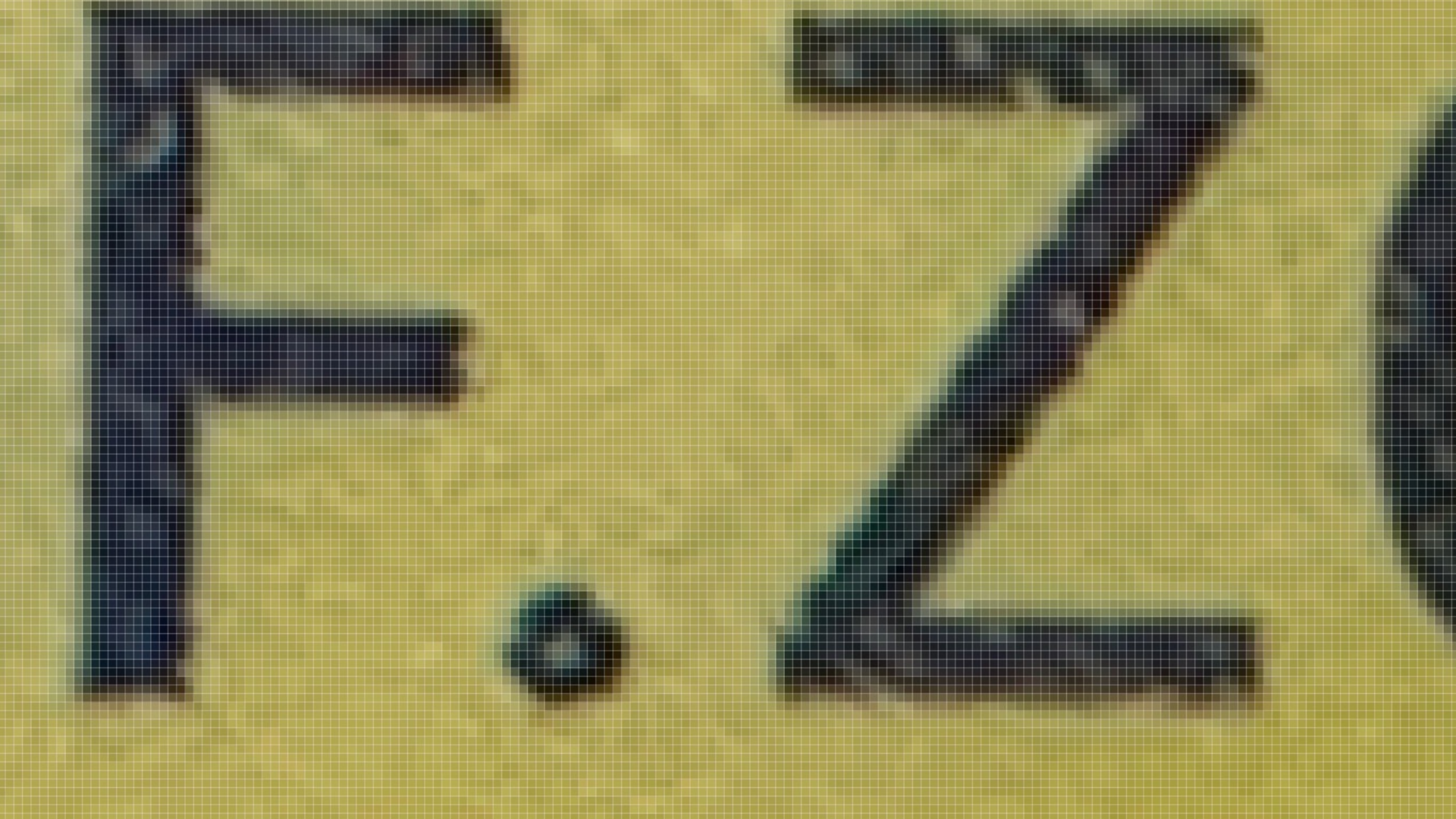

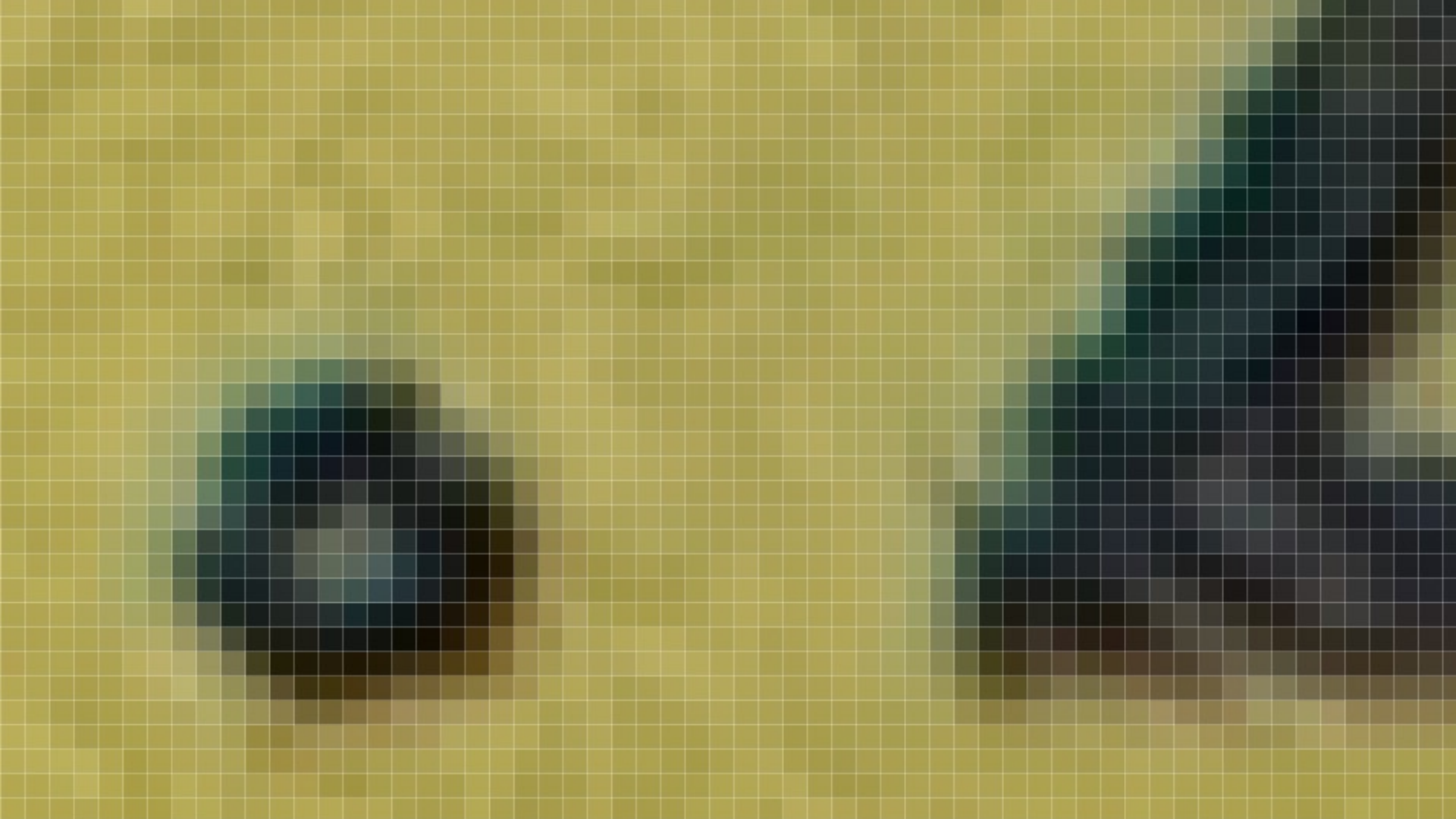

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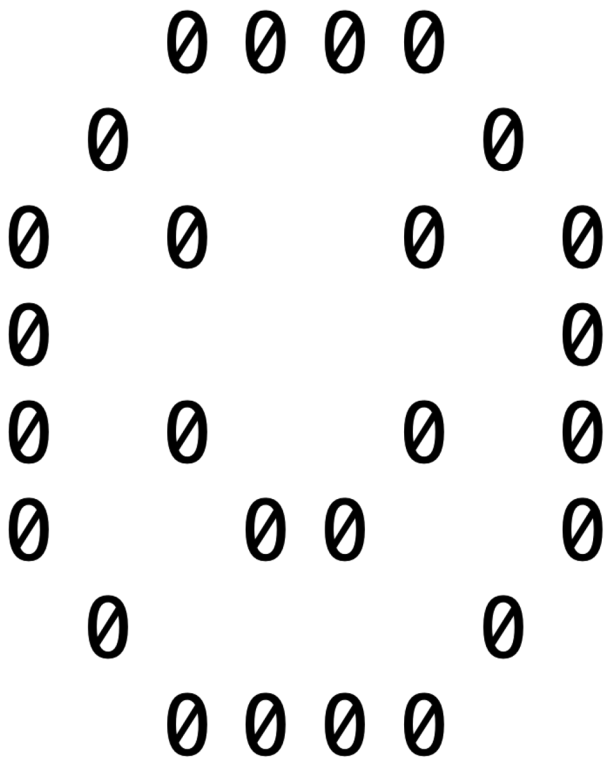

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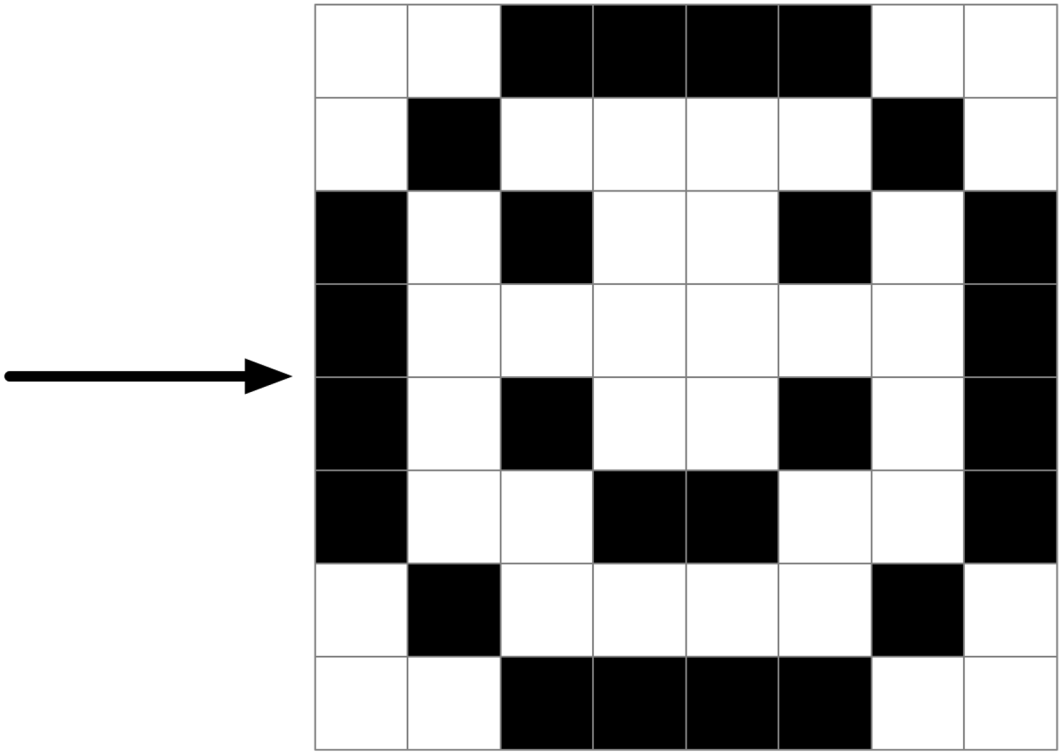
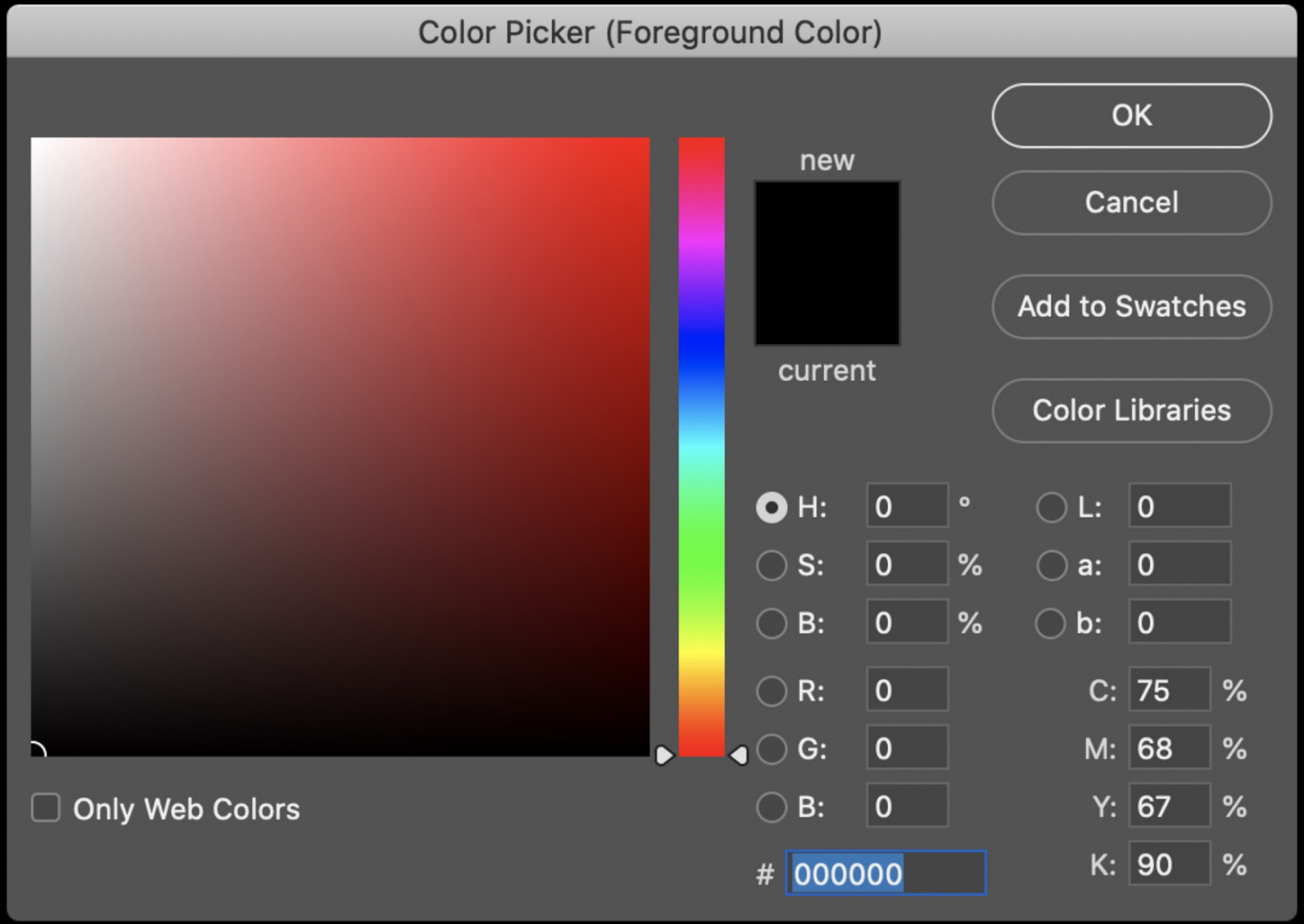


RGB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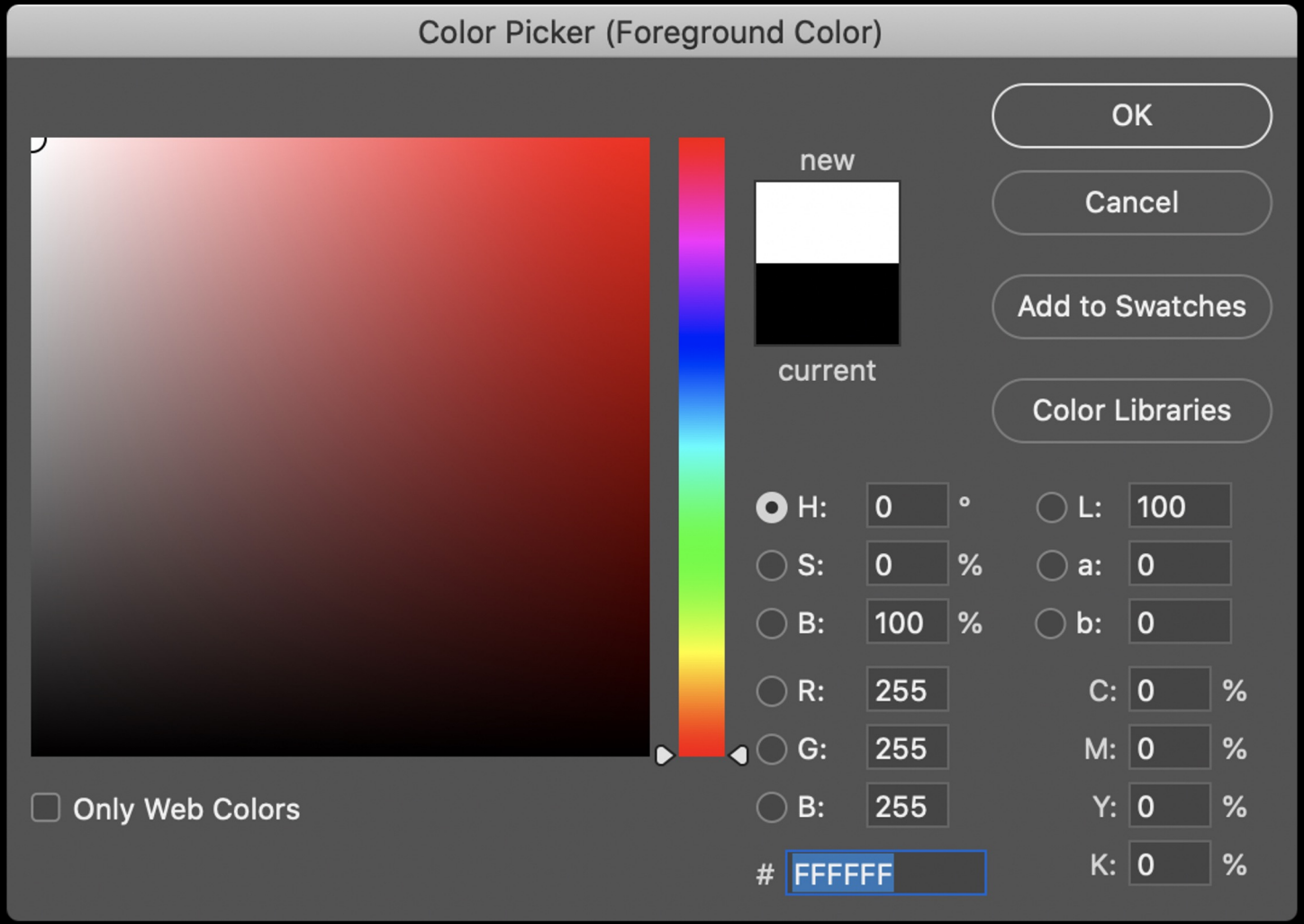
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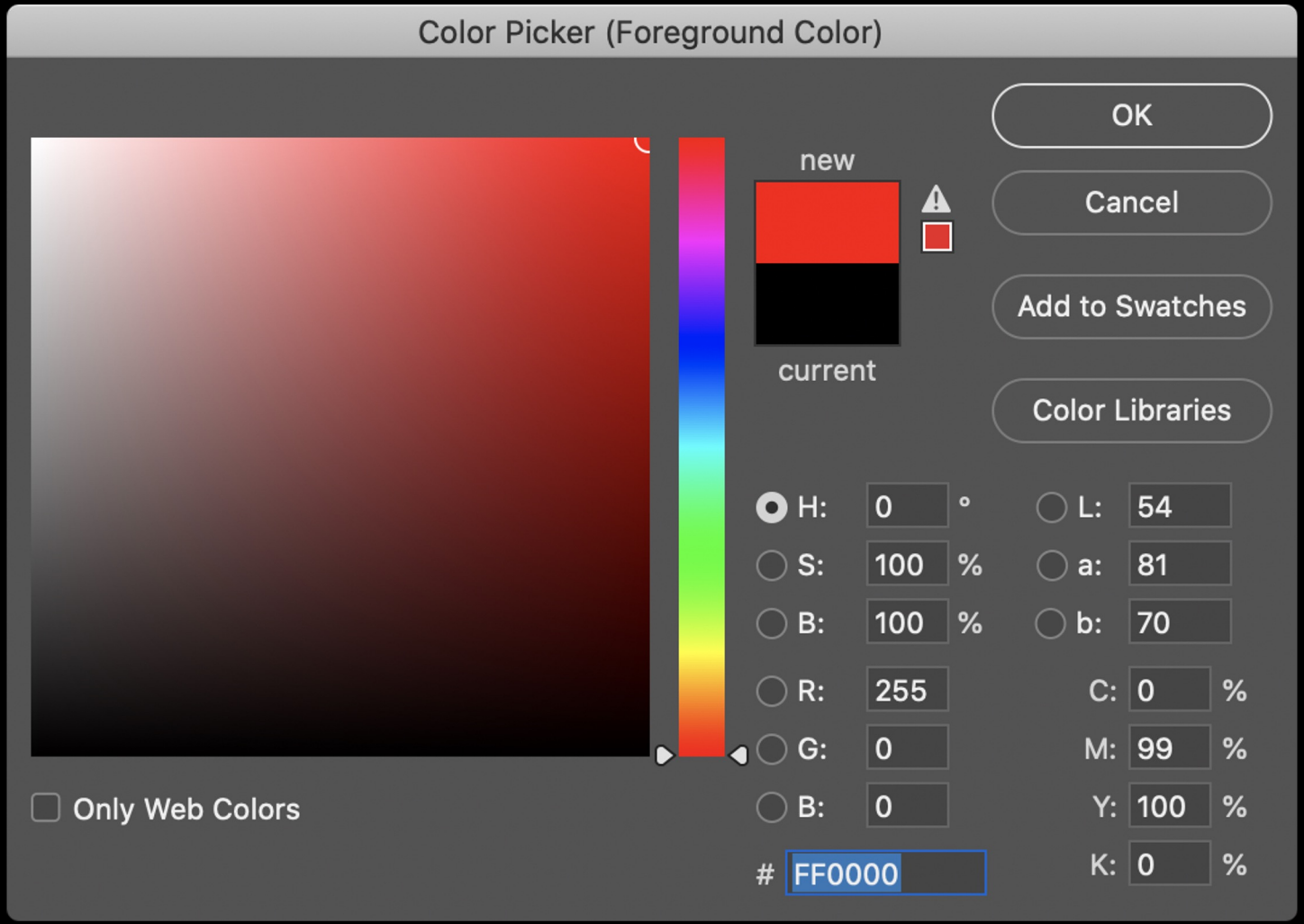
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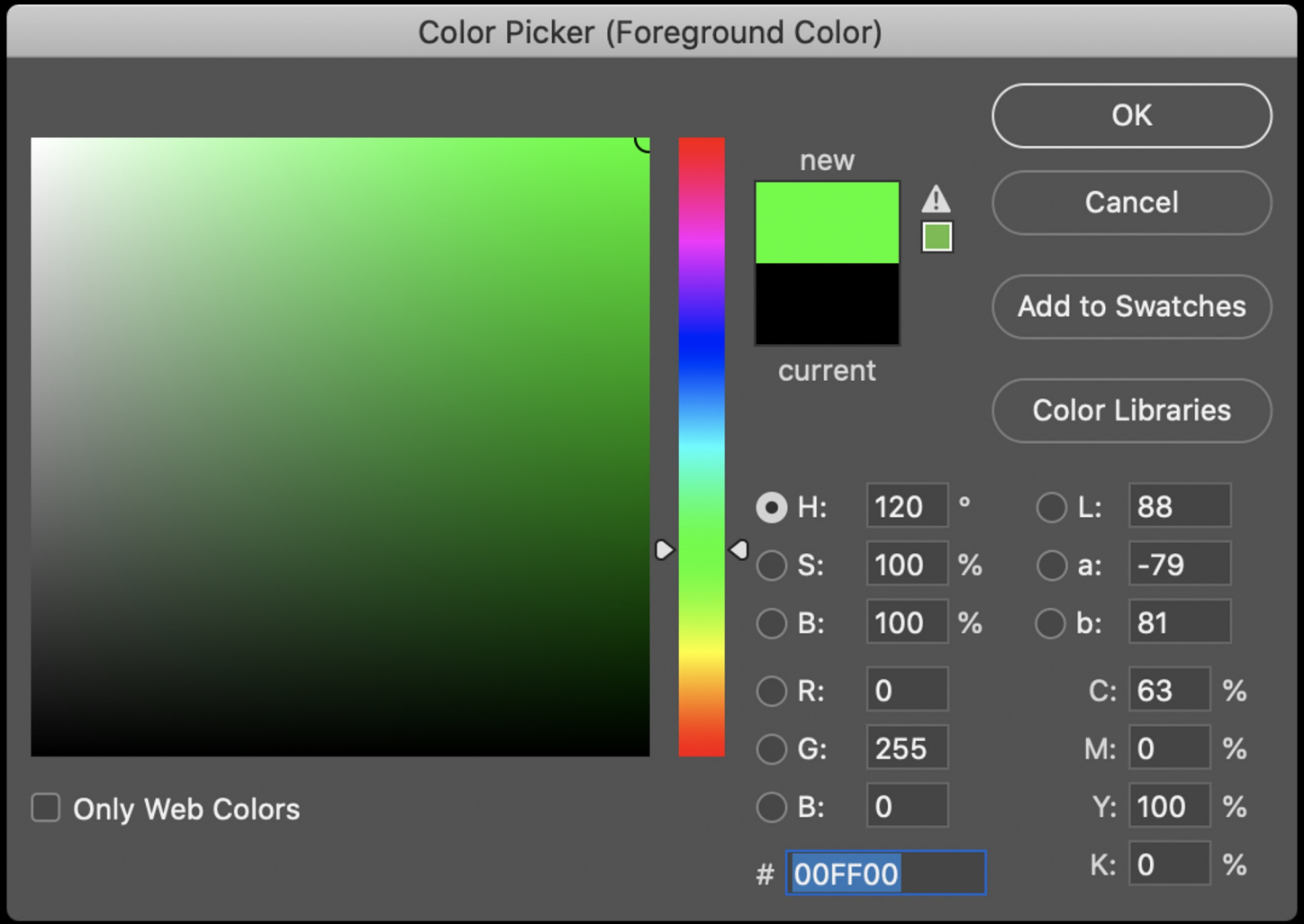
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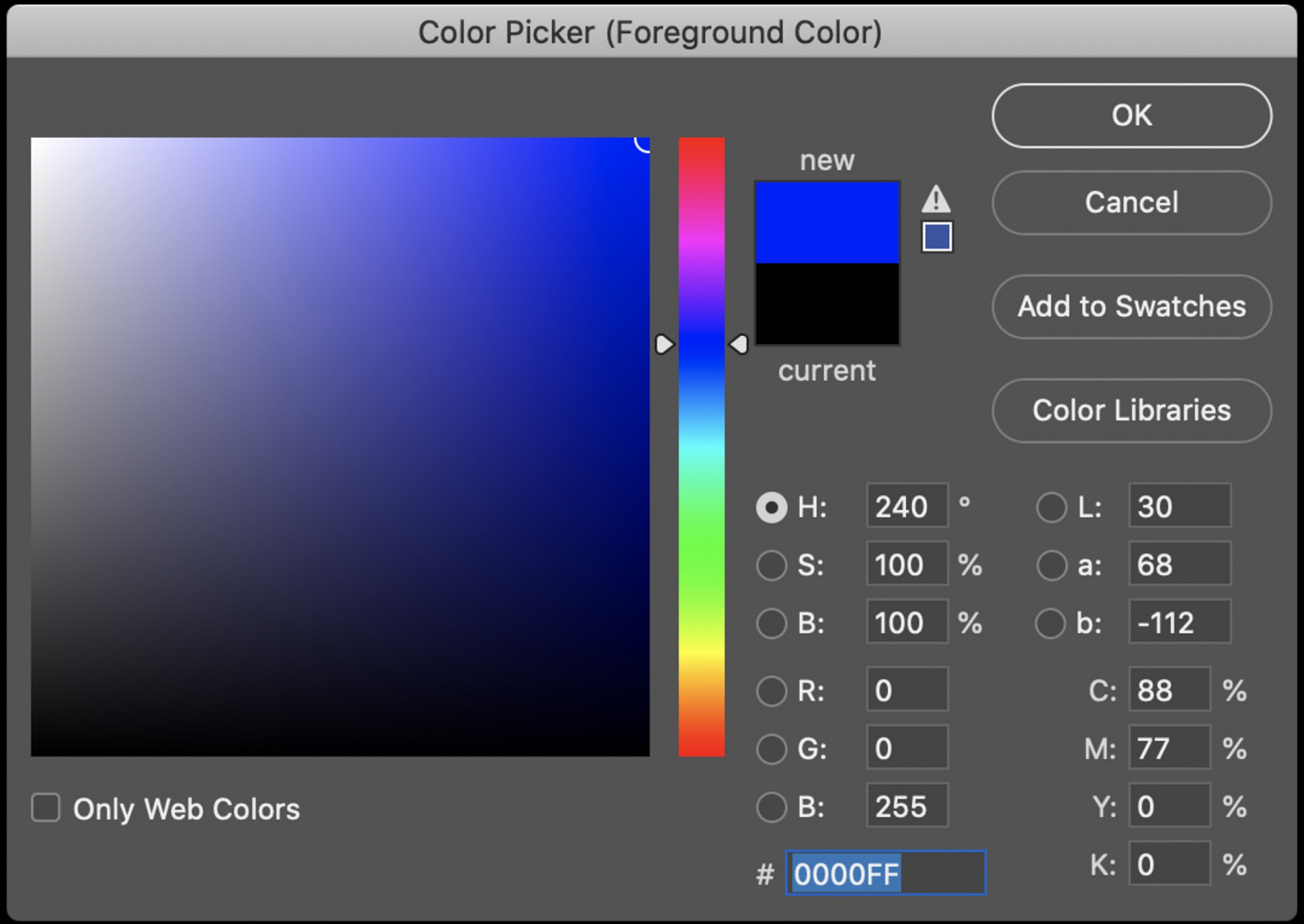
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b: -112
C: 88 %
M: 77 %
Y: 0 %
K: 0 %
Only Web Colors

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0 1 2 3 4 5 6 7 8 9 A B C D E F

0 1 2 3 4 5 6 7 8 9 a b c d e f

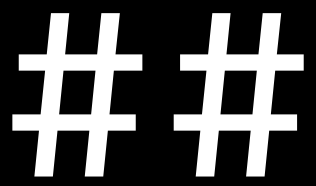
hexadezimal

“base-16”

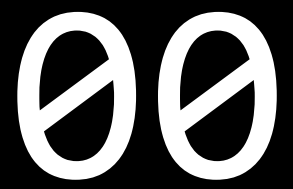
16^1 16^0

##

16 1



16 1



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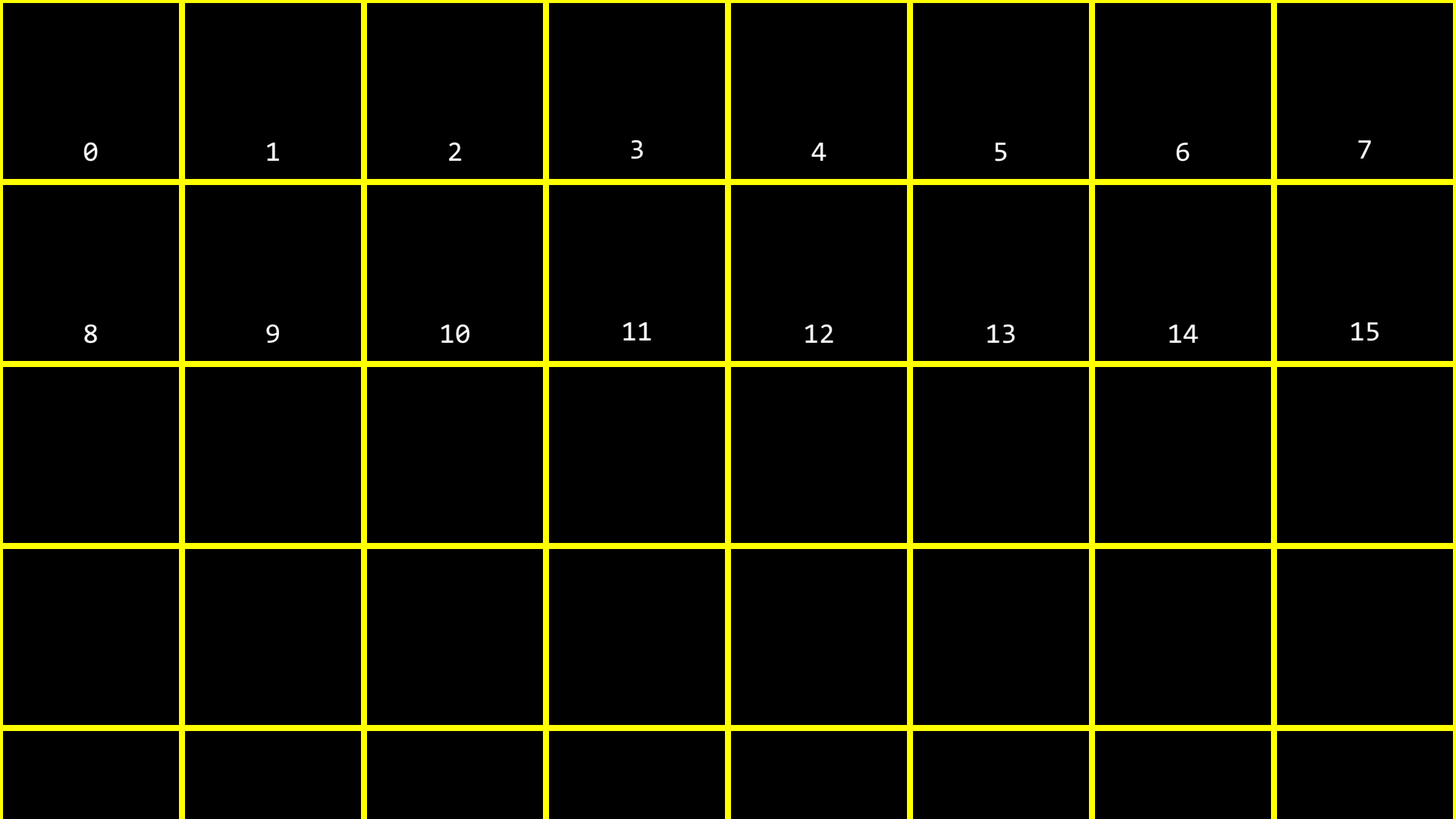
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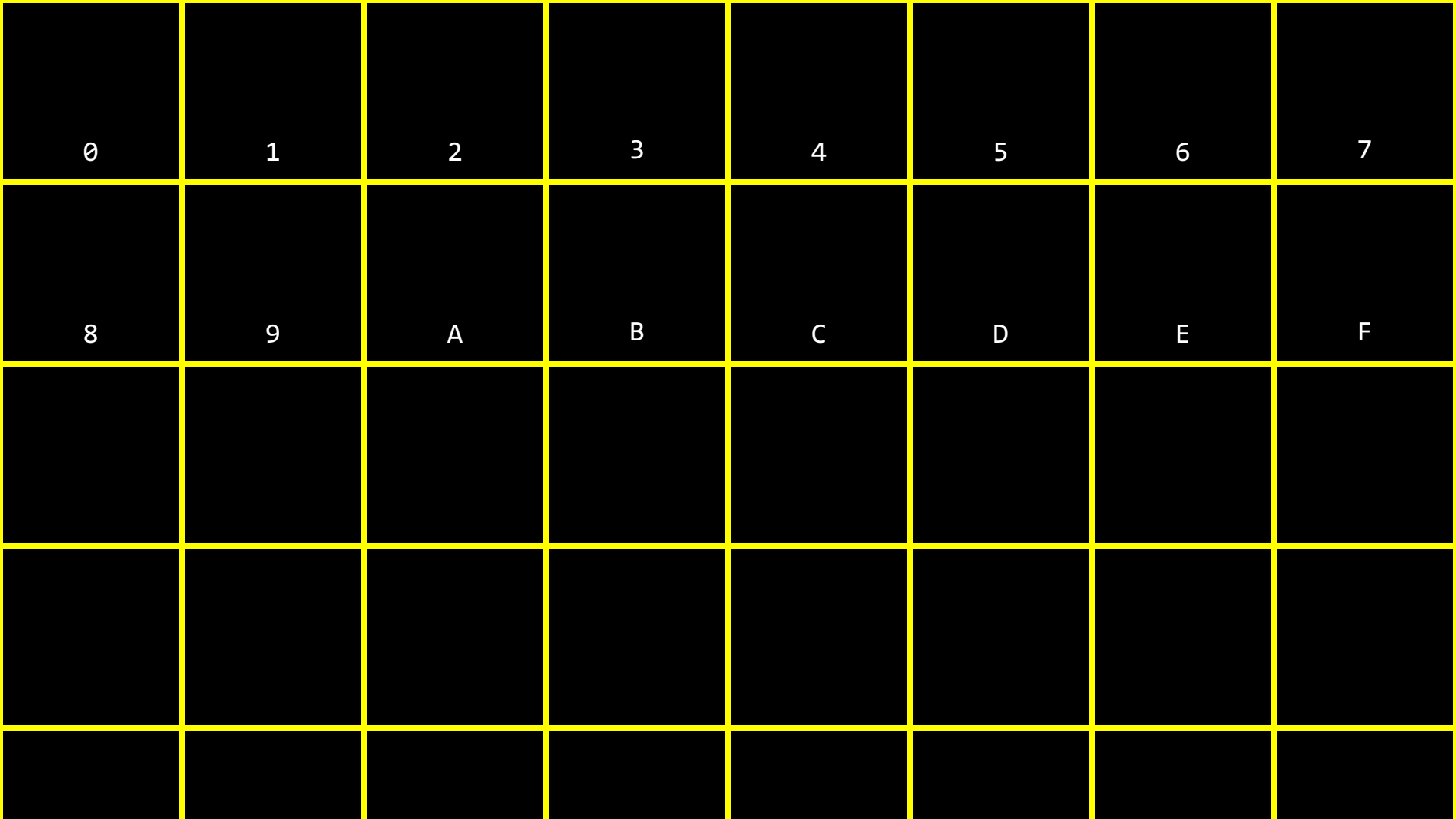
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C
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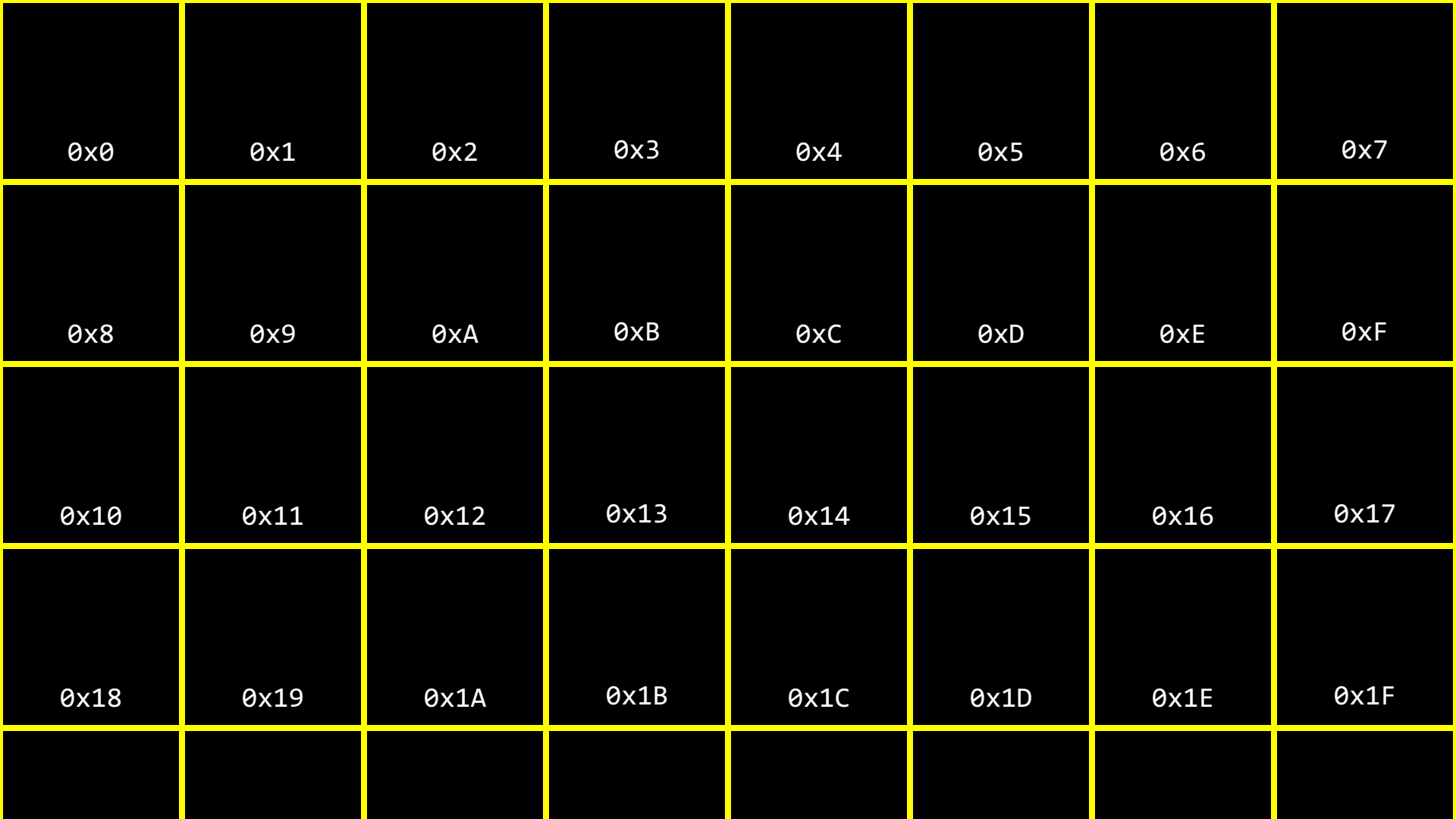
E
F

0	1	2	3	4	5	6	7
8	9	A	B	C	D	E	F
10	11	12	13	14	15	16	17
18	19	1A	1B	1C	1D	1E	1F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0x15
0x16
0x17
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0x1A
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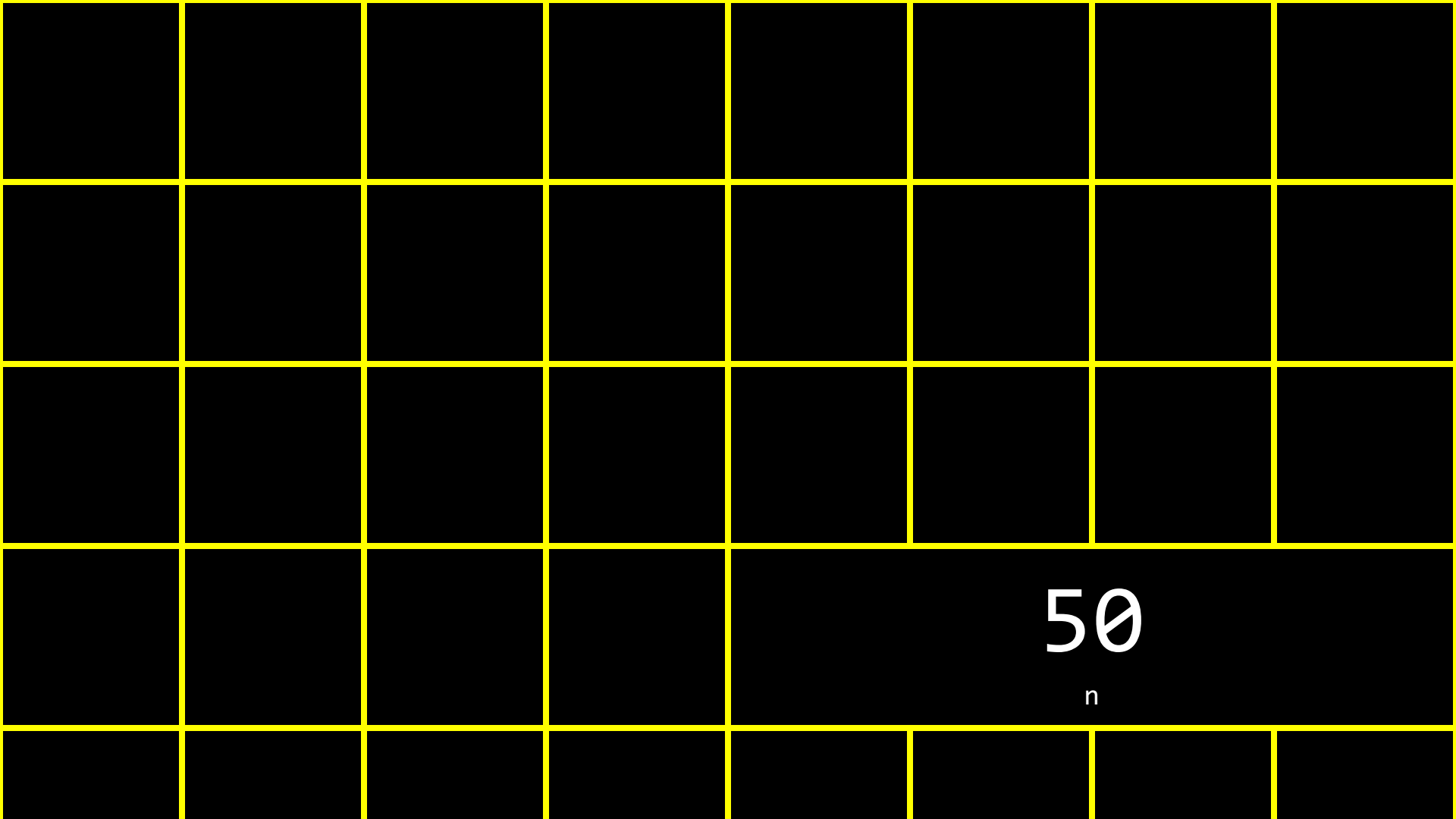
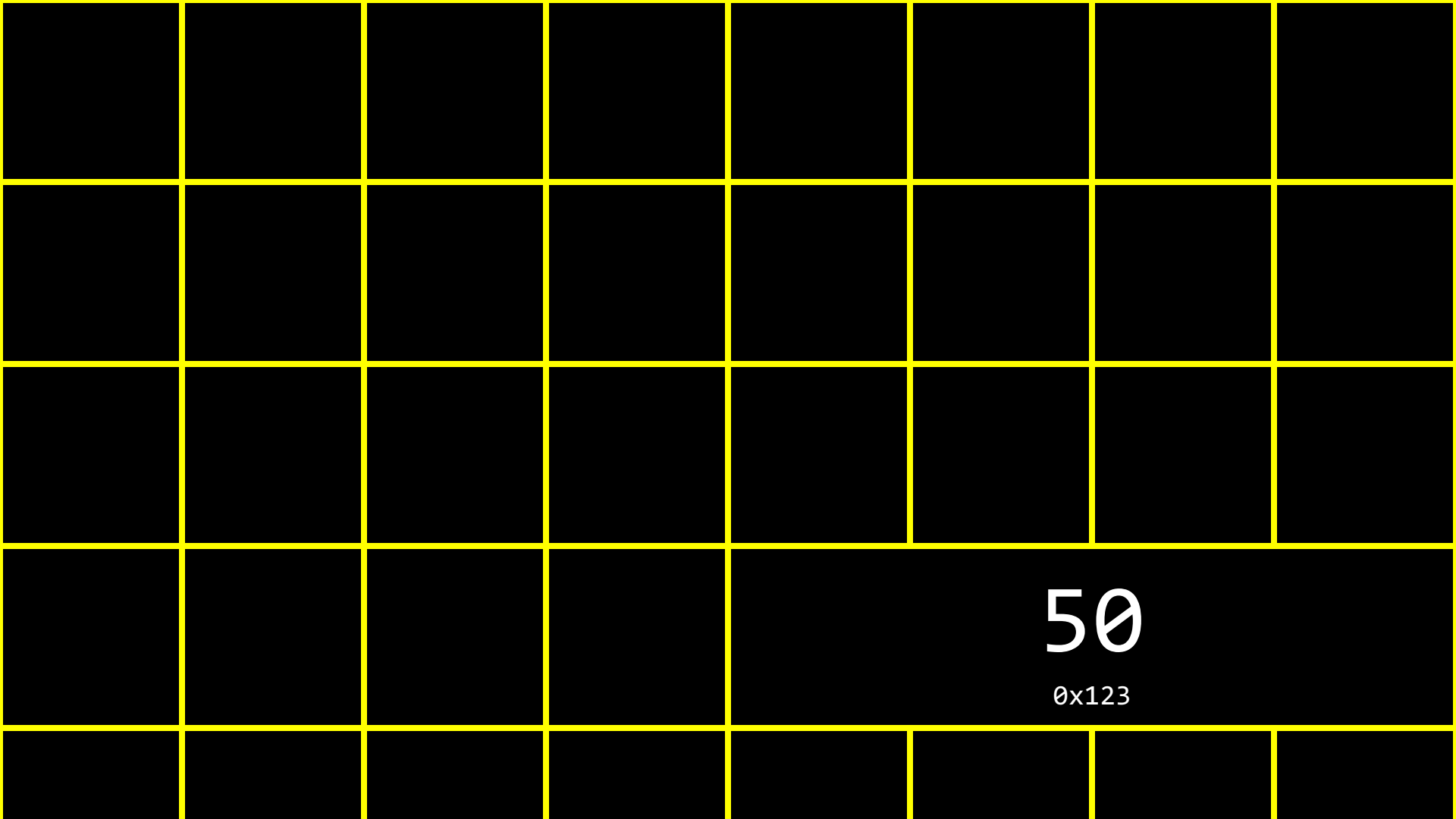
0x1D
0x1E
0x1F

```
int n = 50;
```


50
n


50
0x123

&

*

Pointer

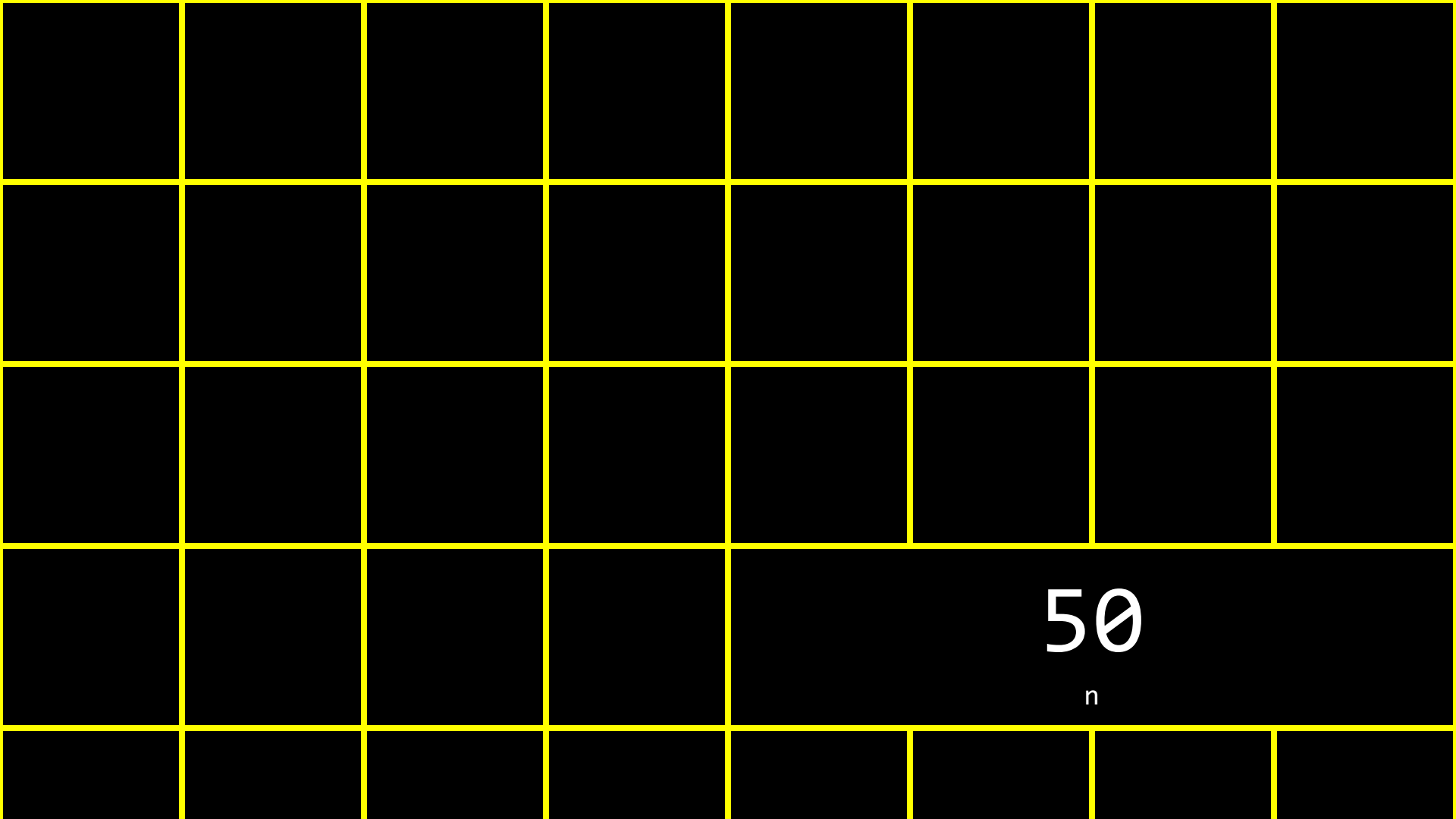
```
int n = 50;

int *p = &n;
```

```
int n = 50;

int *p = &n;
```

```
int n = 50;

int* p = &n;
```

```
int n = 50;

int * p = &n;
```

```
int n = 50;

int *p = &n;
```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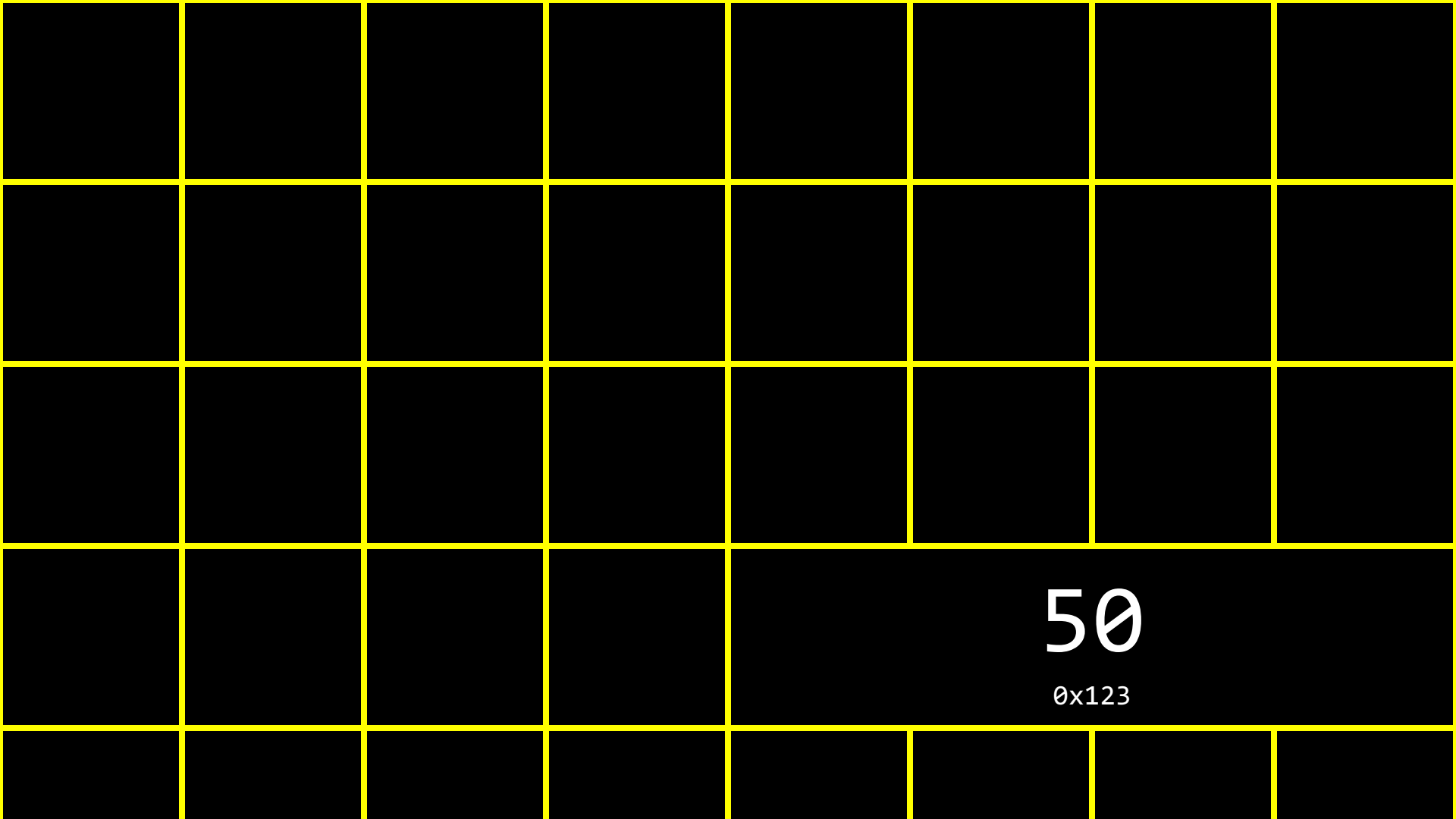
n


50
0x123

0x123

p

50

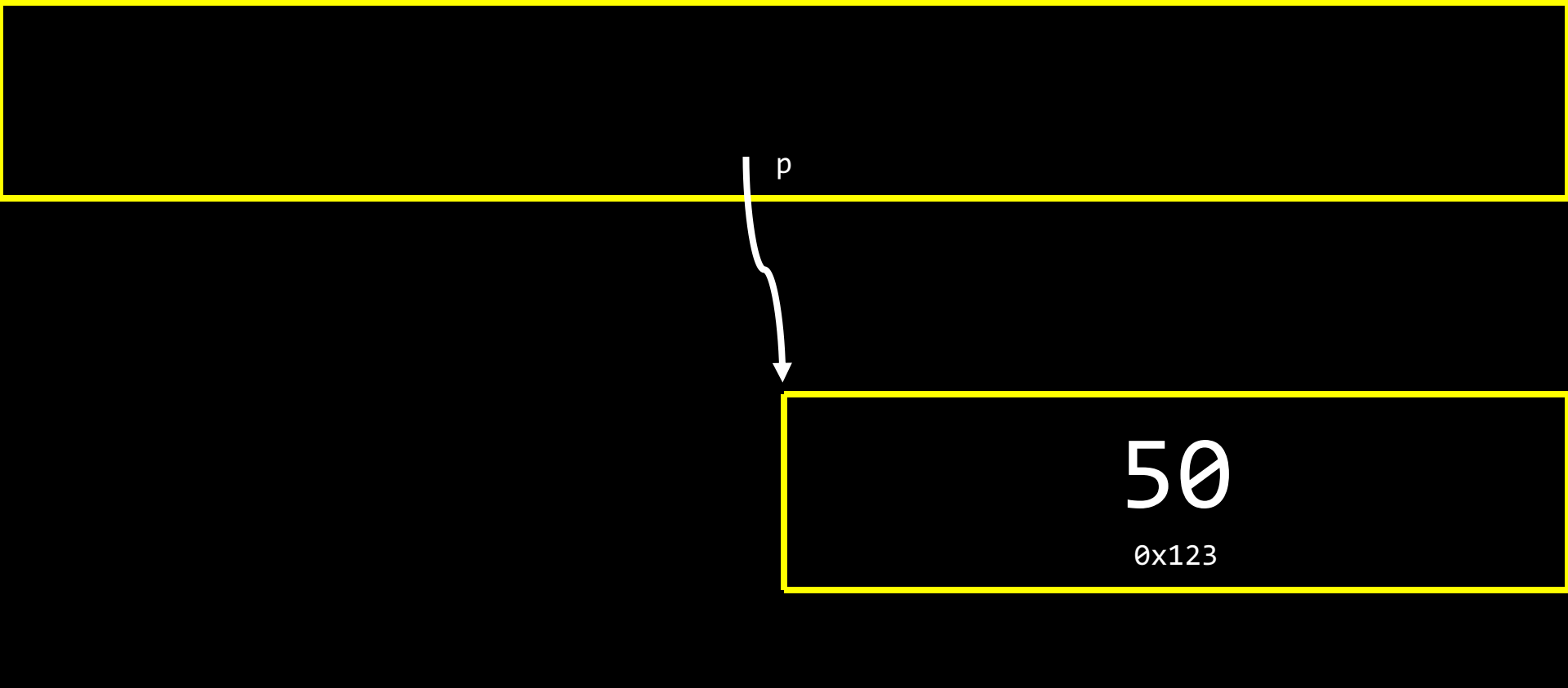
0x123

0x123

p

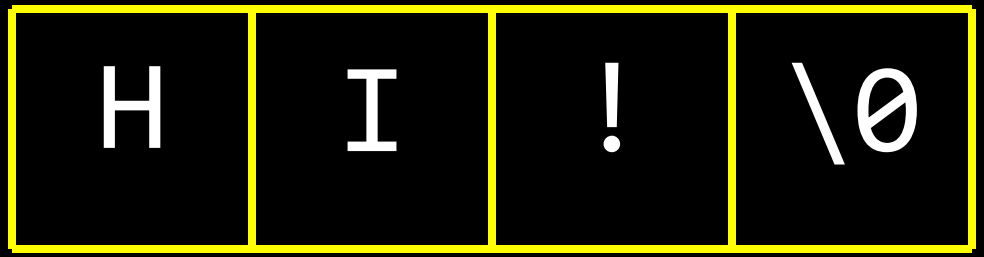
50

0x123


p
50
0x123

string

```
string s = "HI!";
```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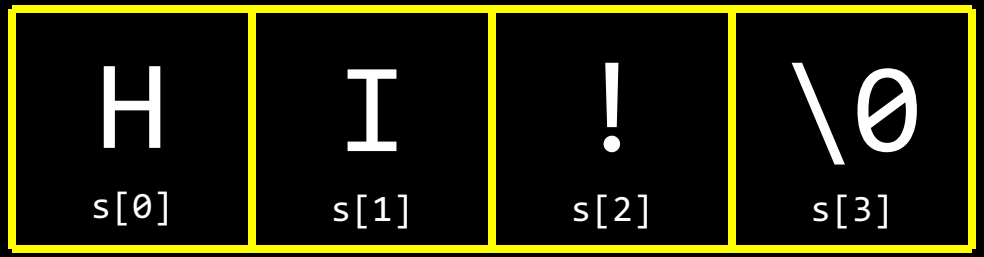
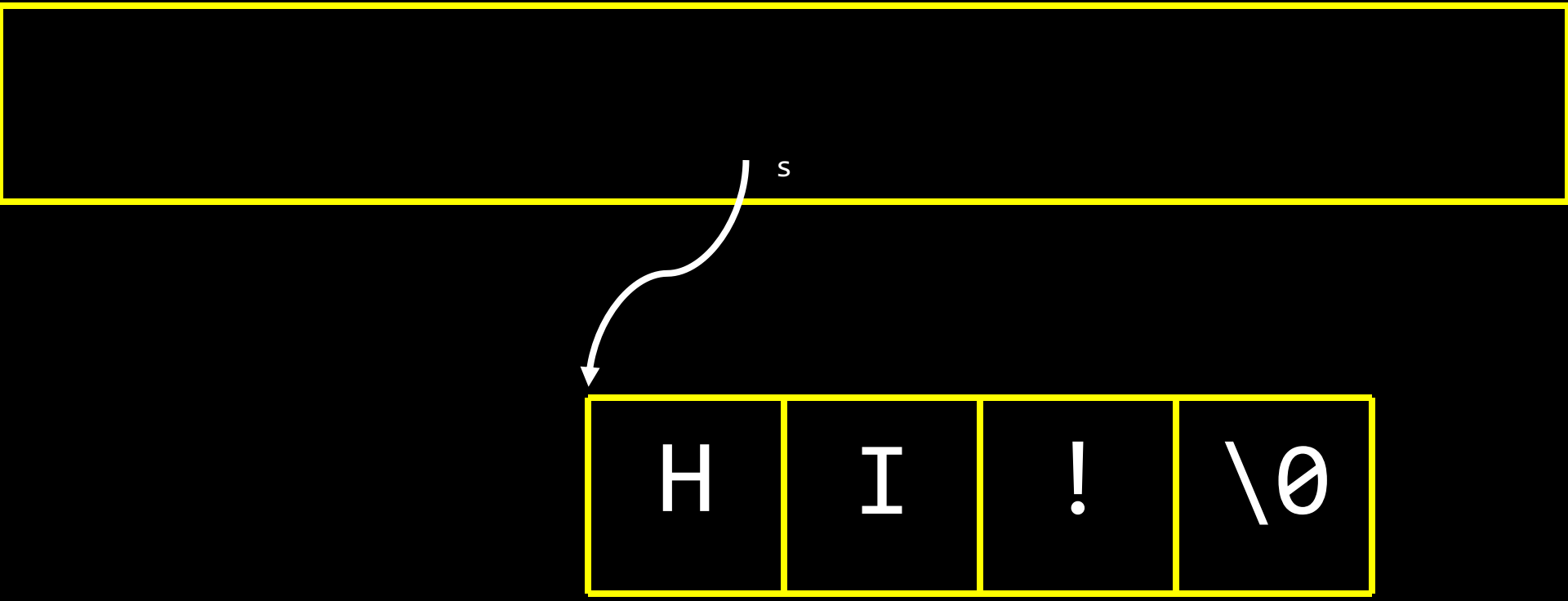

H
I
!
\0
s[0]
s[1]
s[2]
s[3]

H
0x123
I
0x124
!
0x125
\0
0x126

s

0x123

s


s
H
I
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```
string s = "HI!";
```

```
string s = "HI!";
```

```
char *s = "HI!";
```

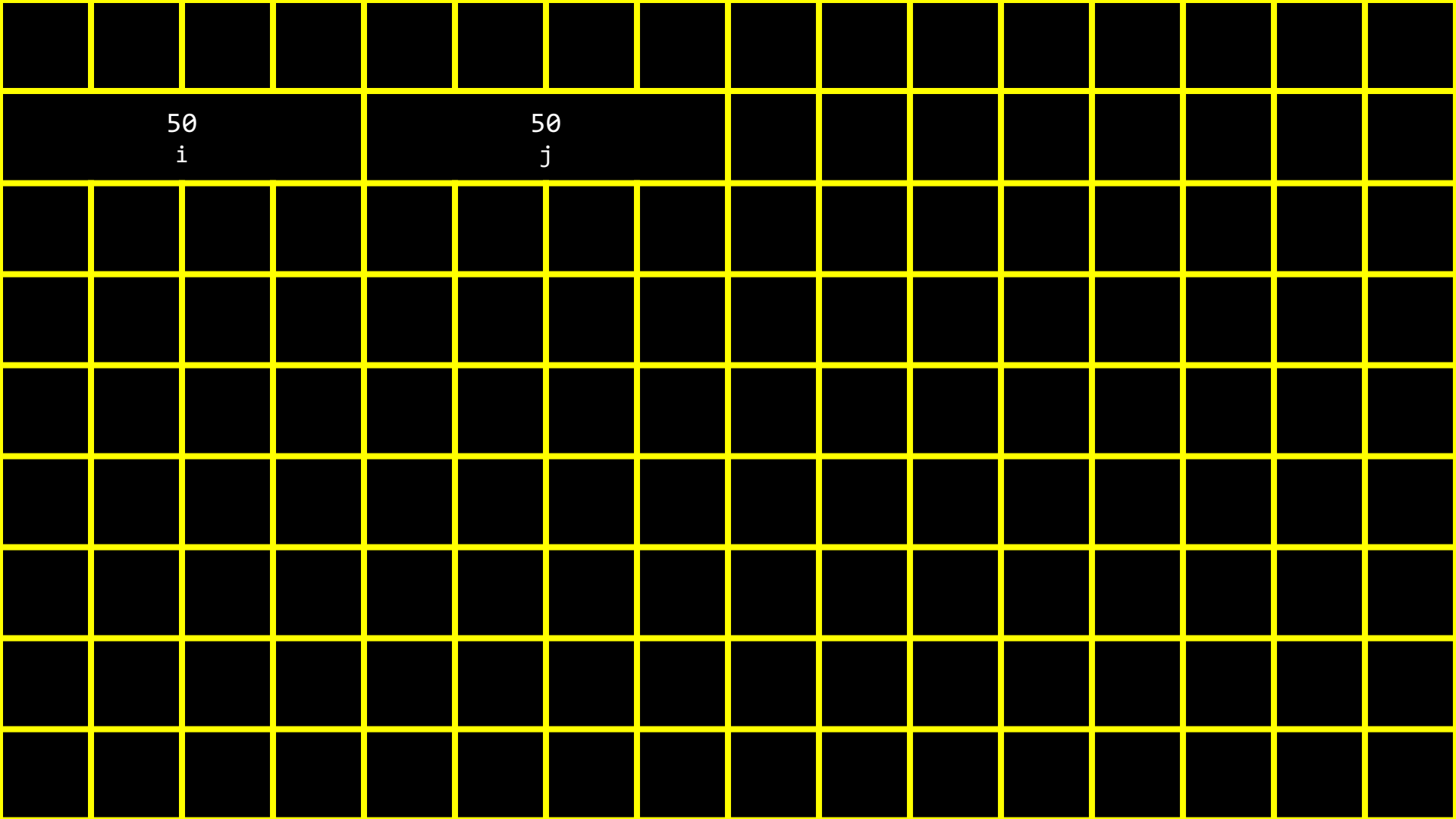
```
typedef struct
{
    string name;
    string number;
} person;
```

```
typedef int integer;
```

```
typedef uint8_t BYTE;
```

```
typedef char *string;
```

Pointer-Arithmetik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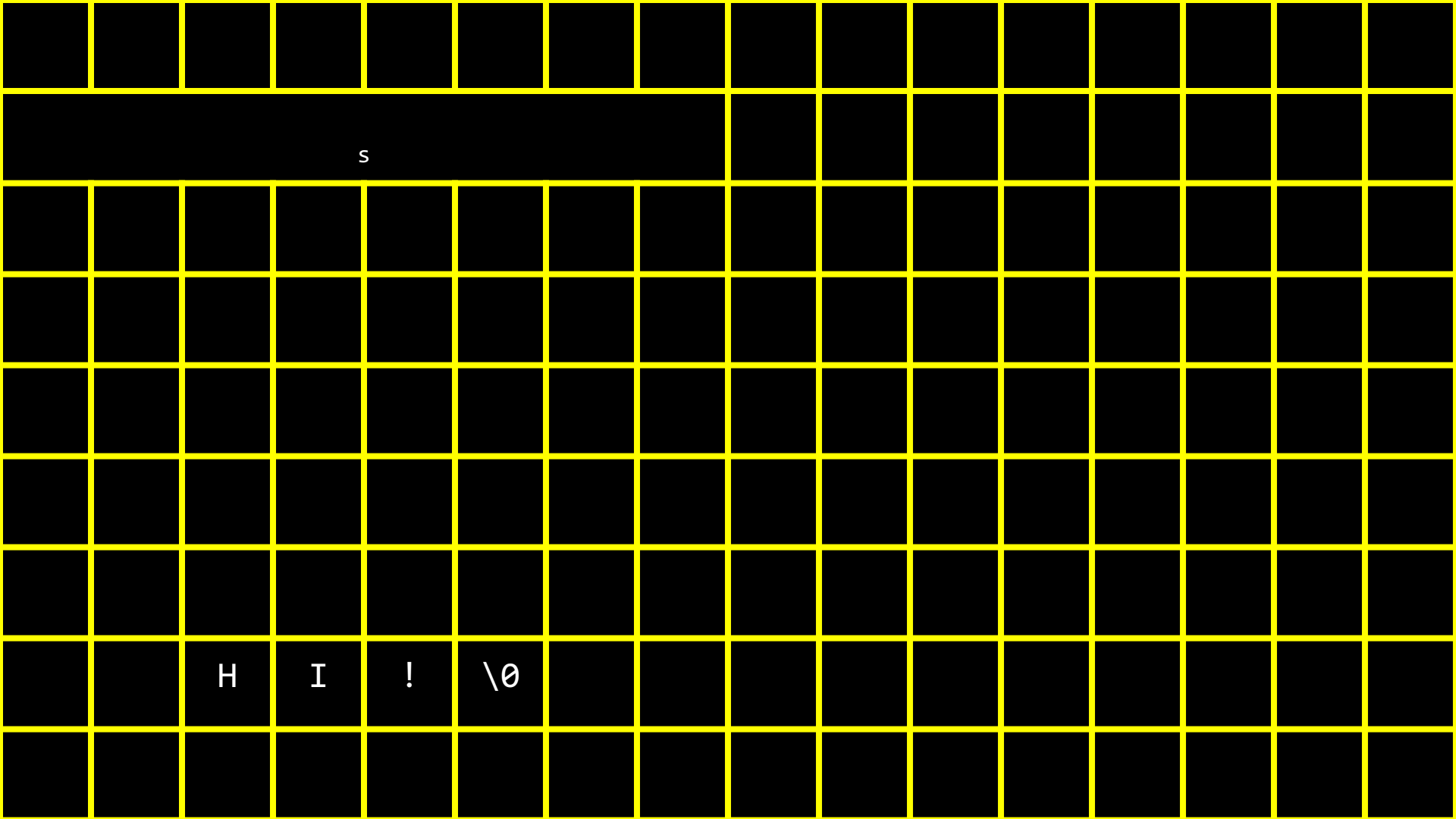
50
j

s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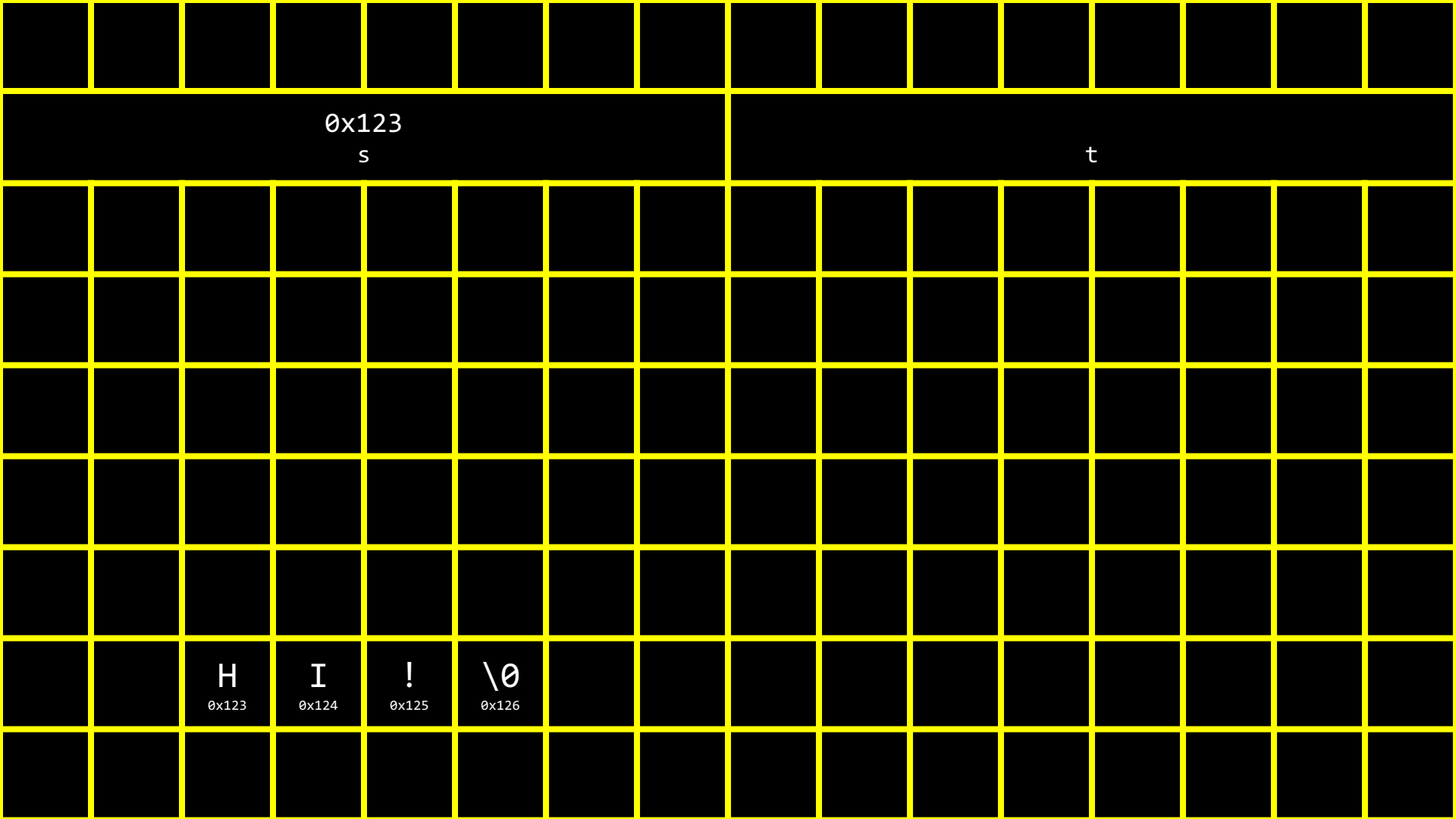
s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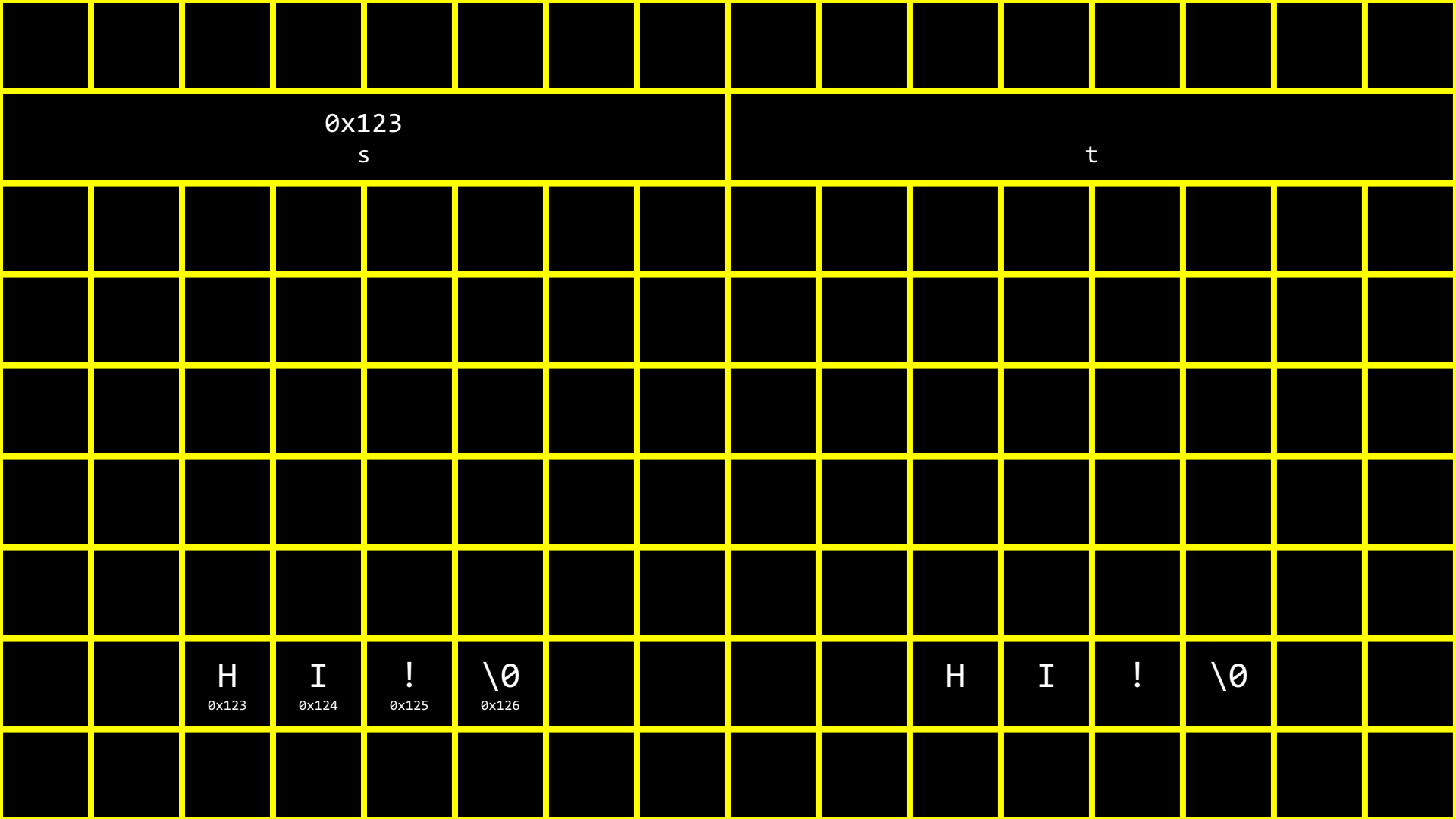
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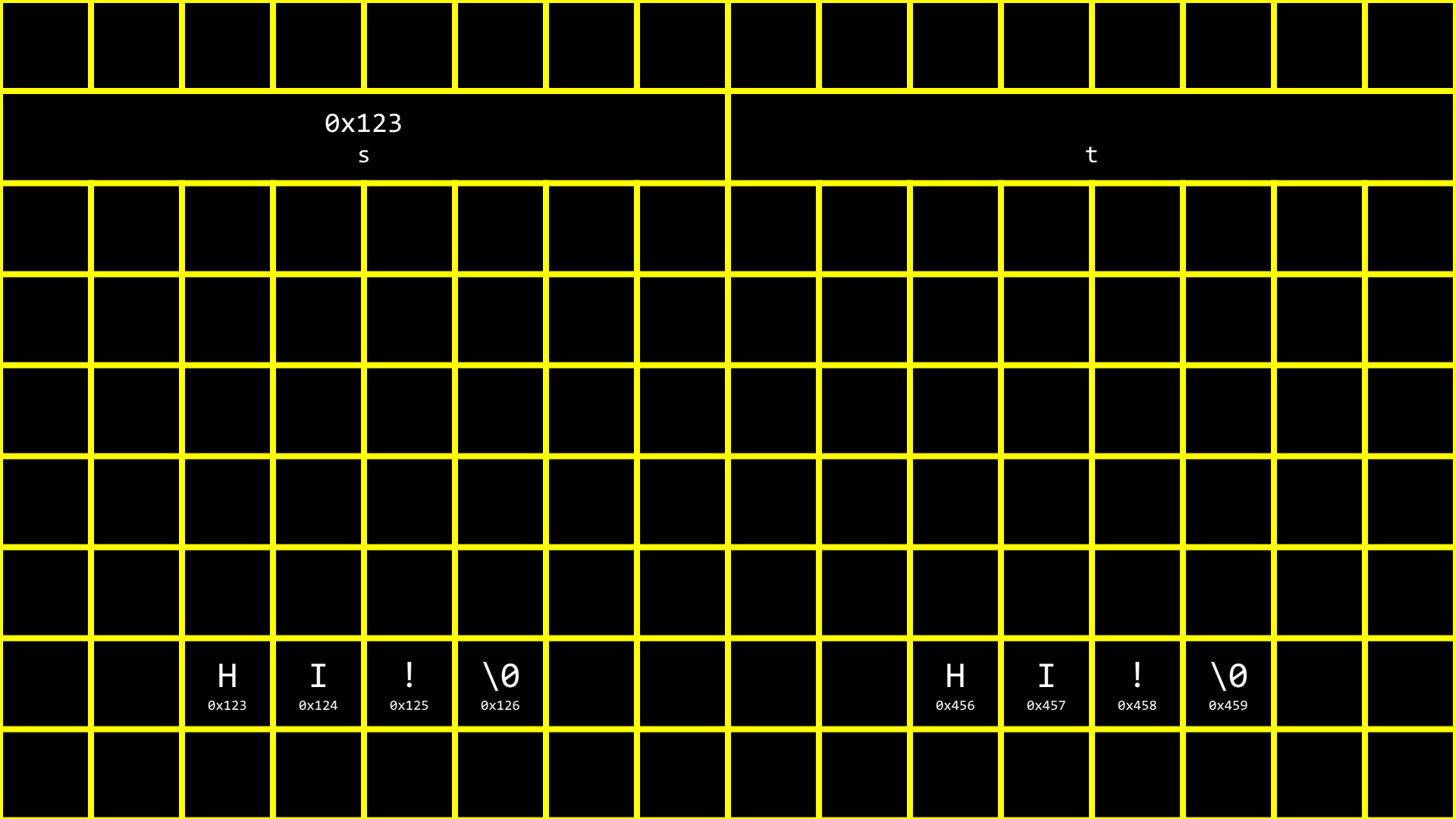
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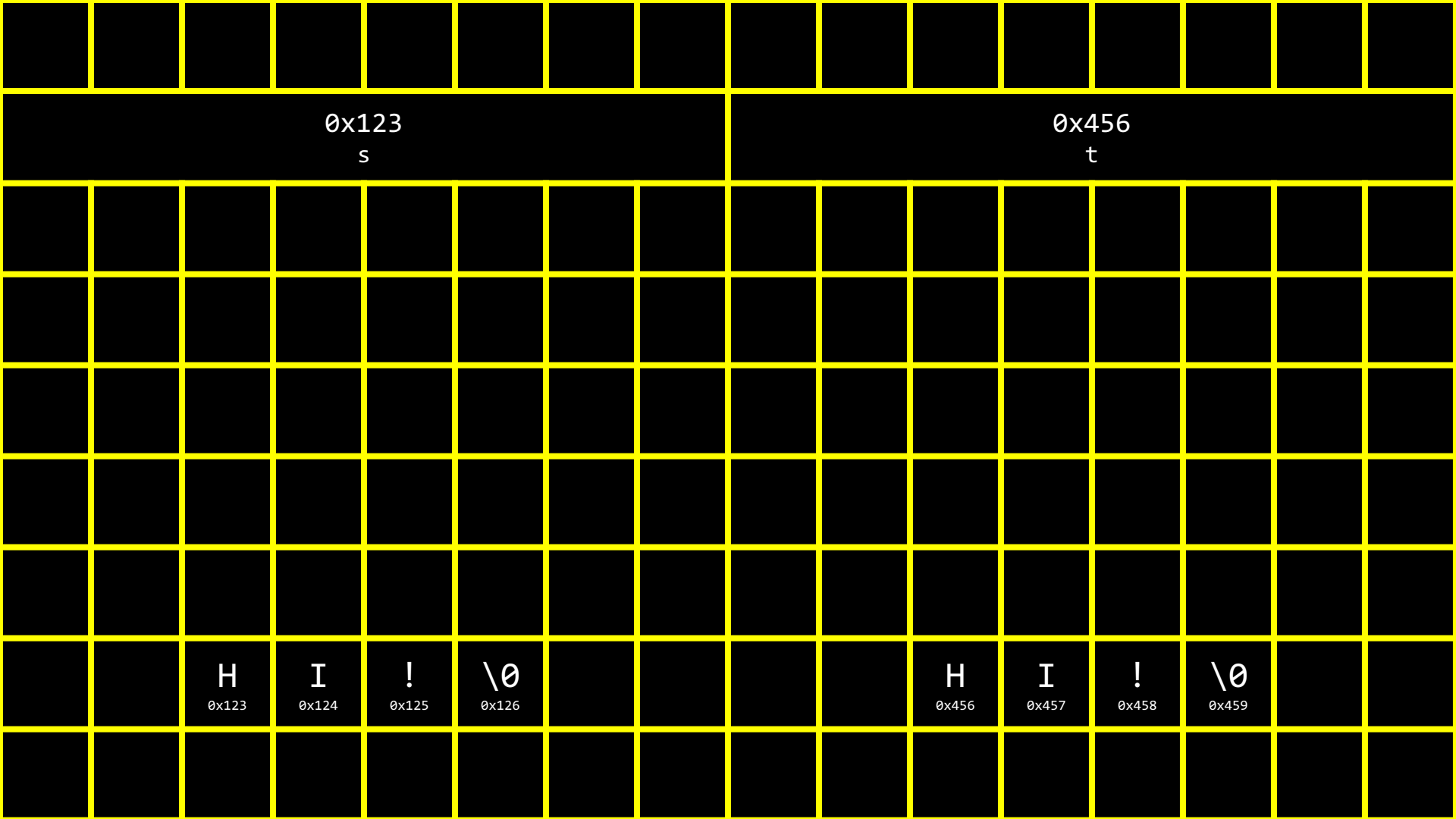
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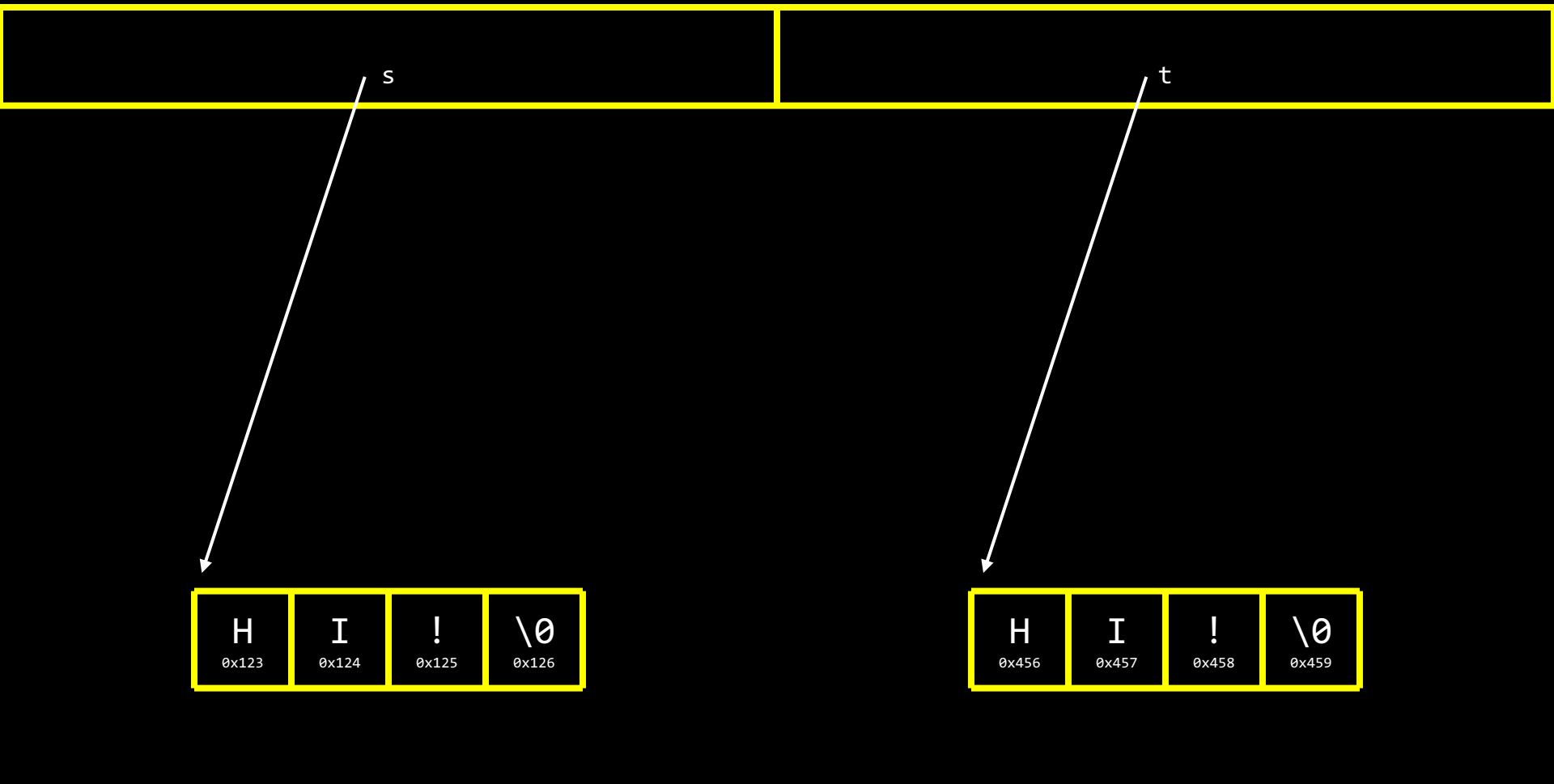
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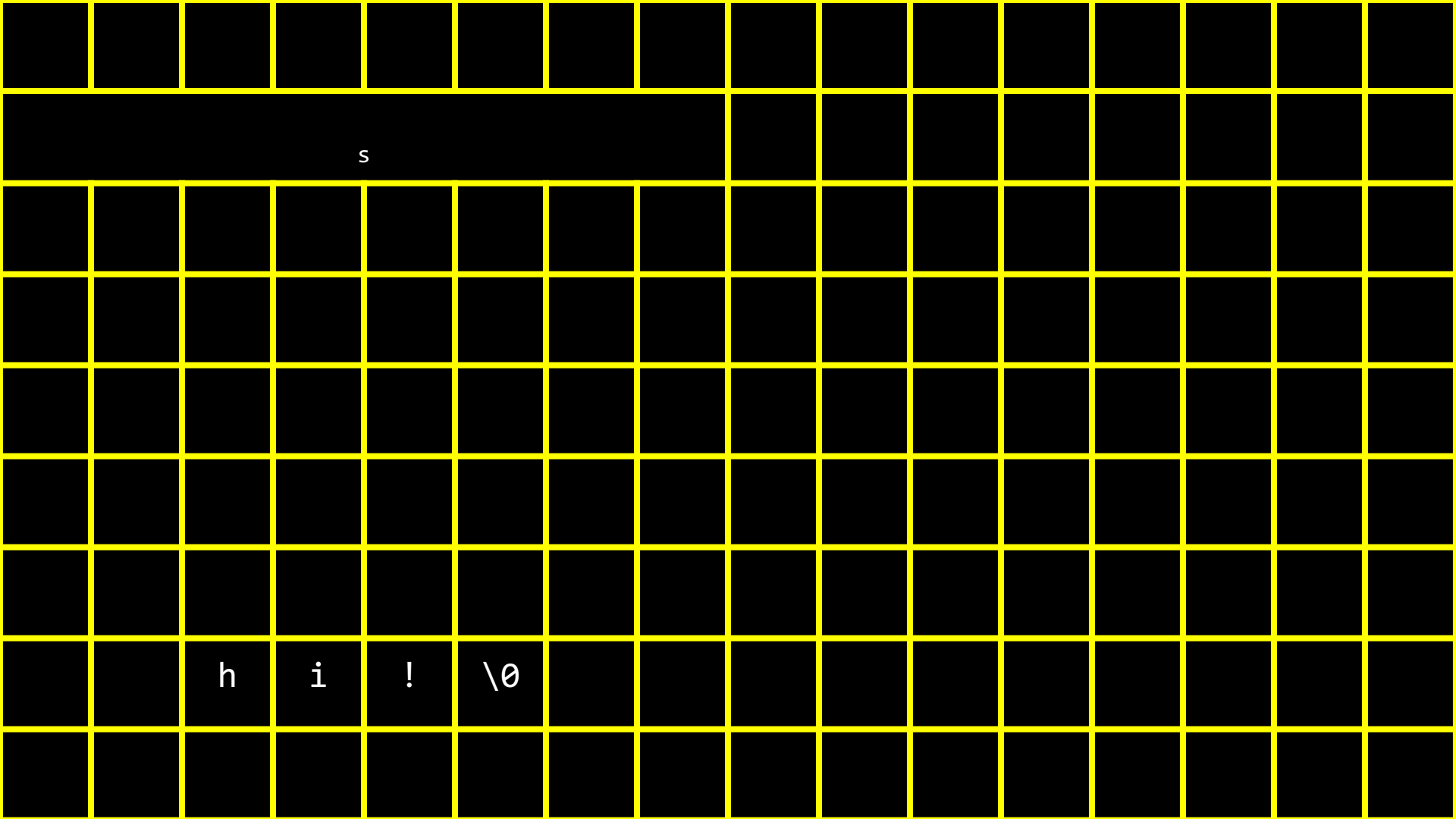
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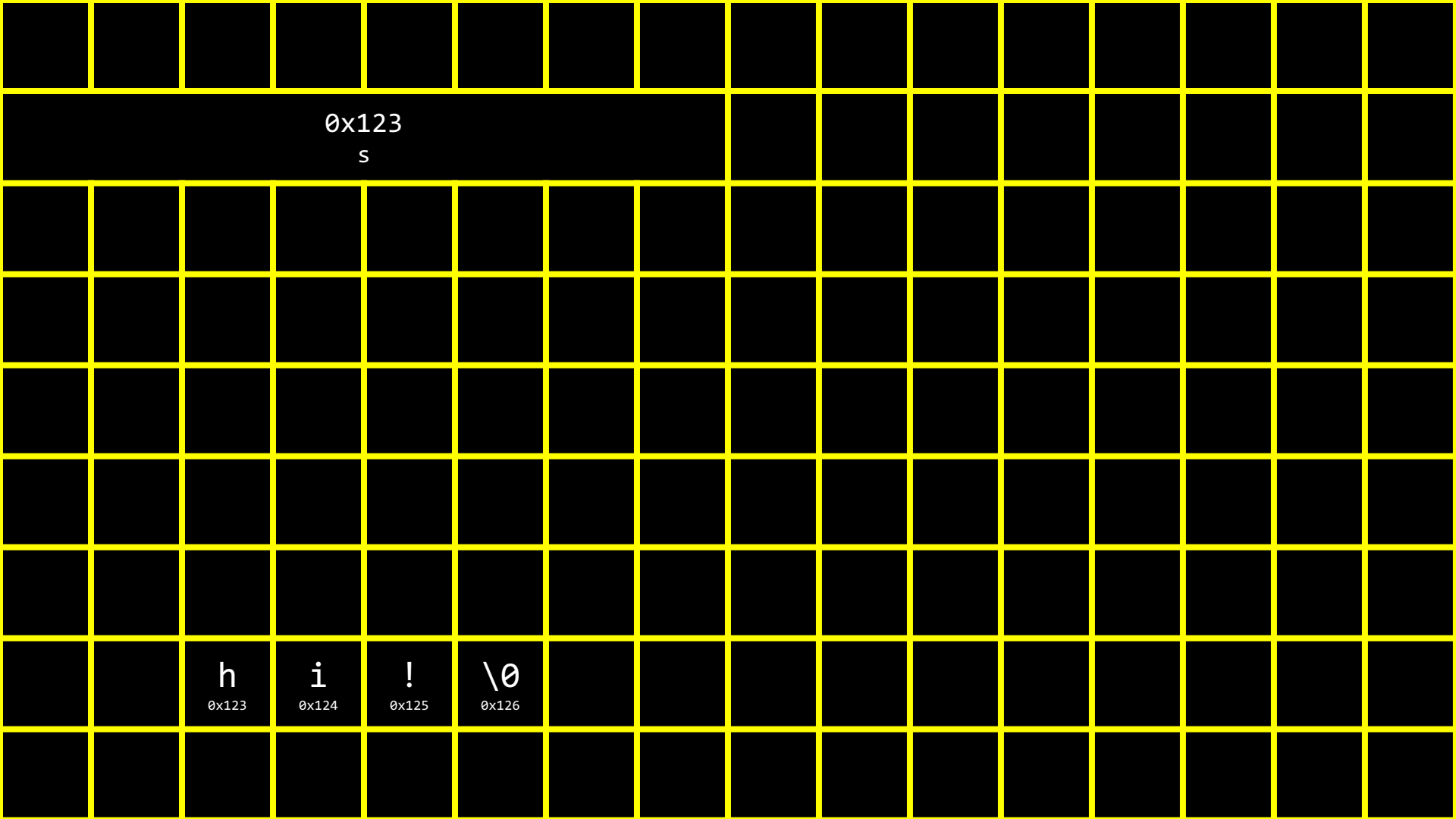
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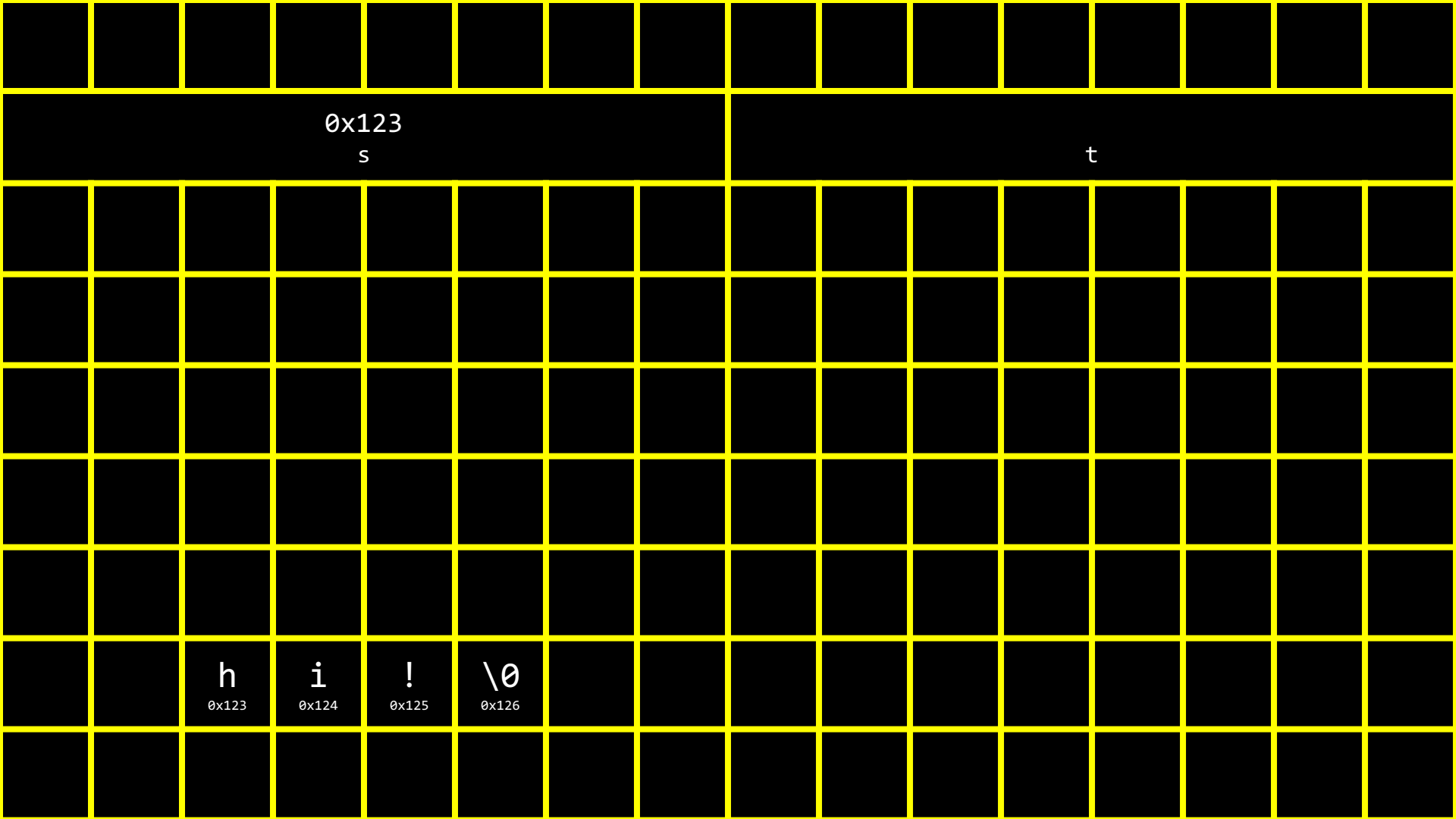
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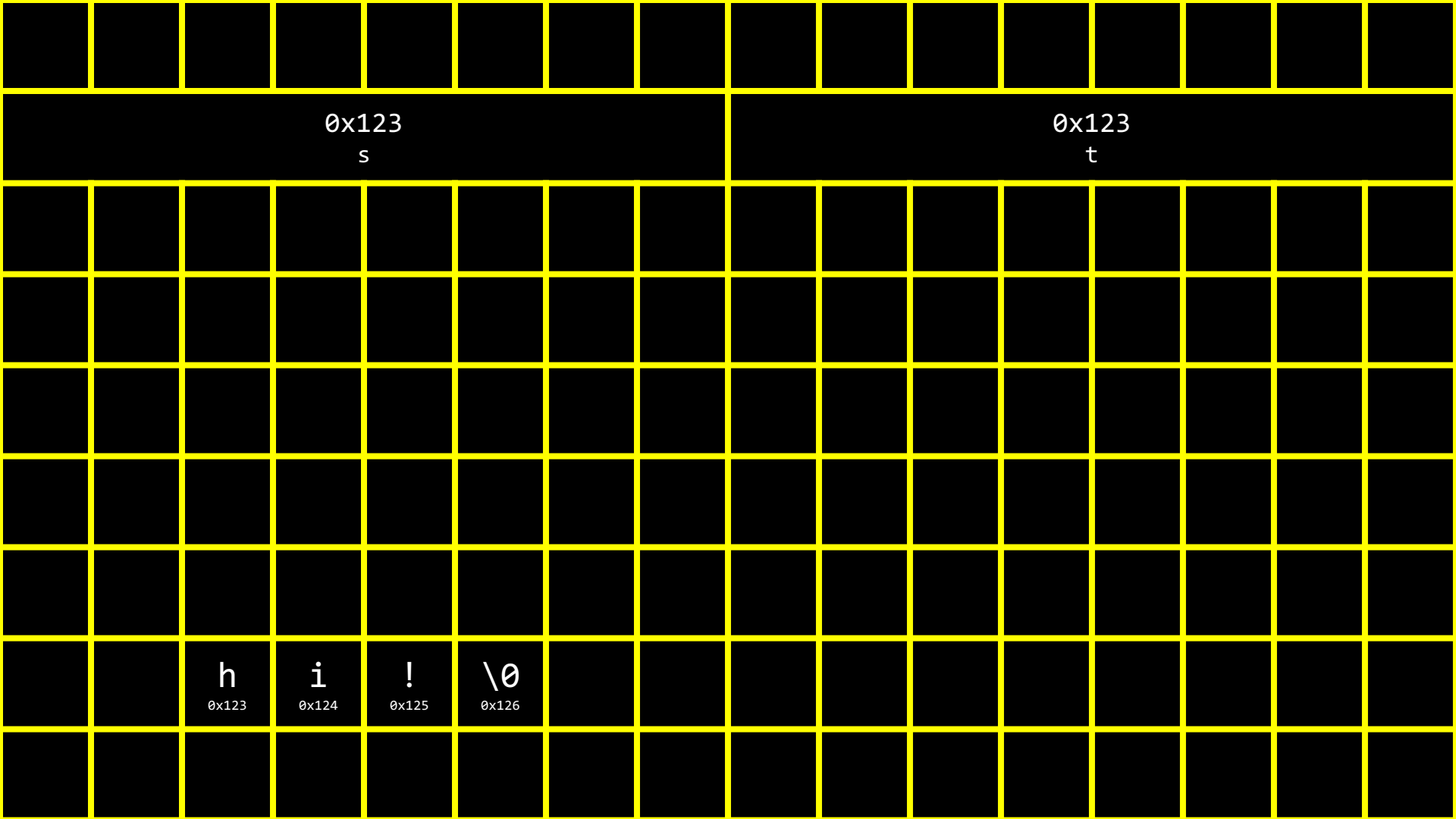
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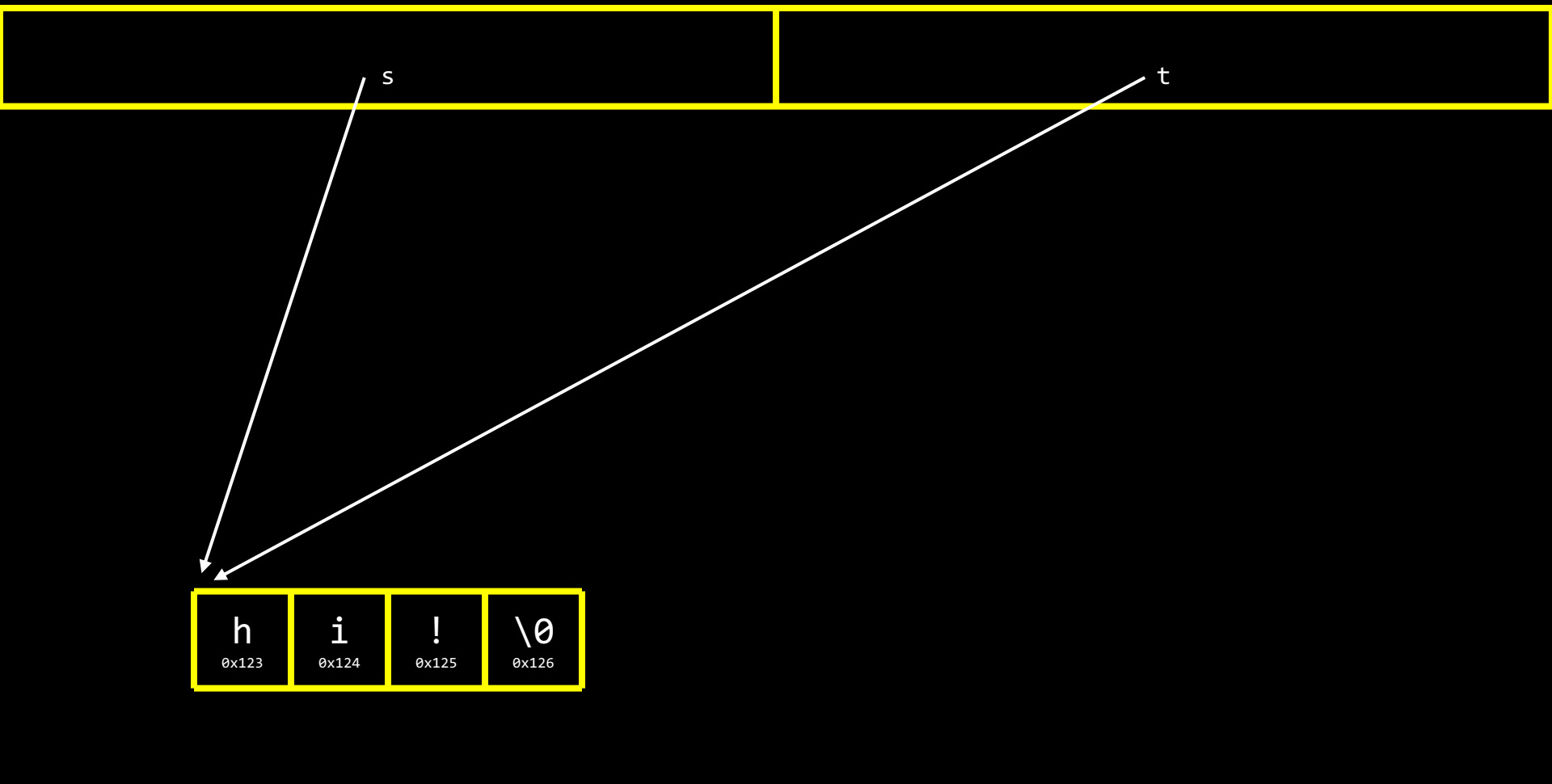
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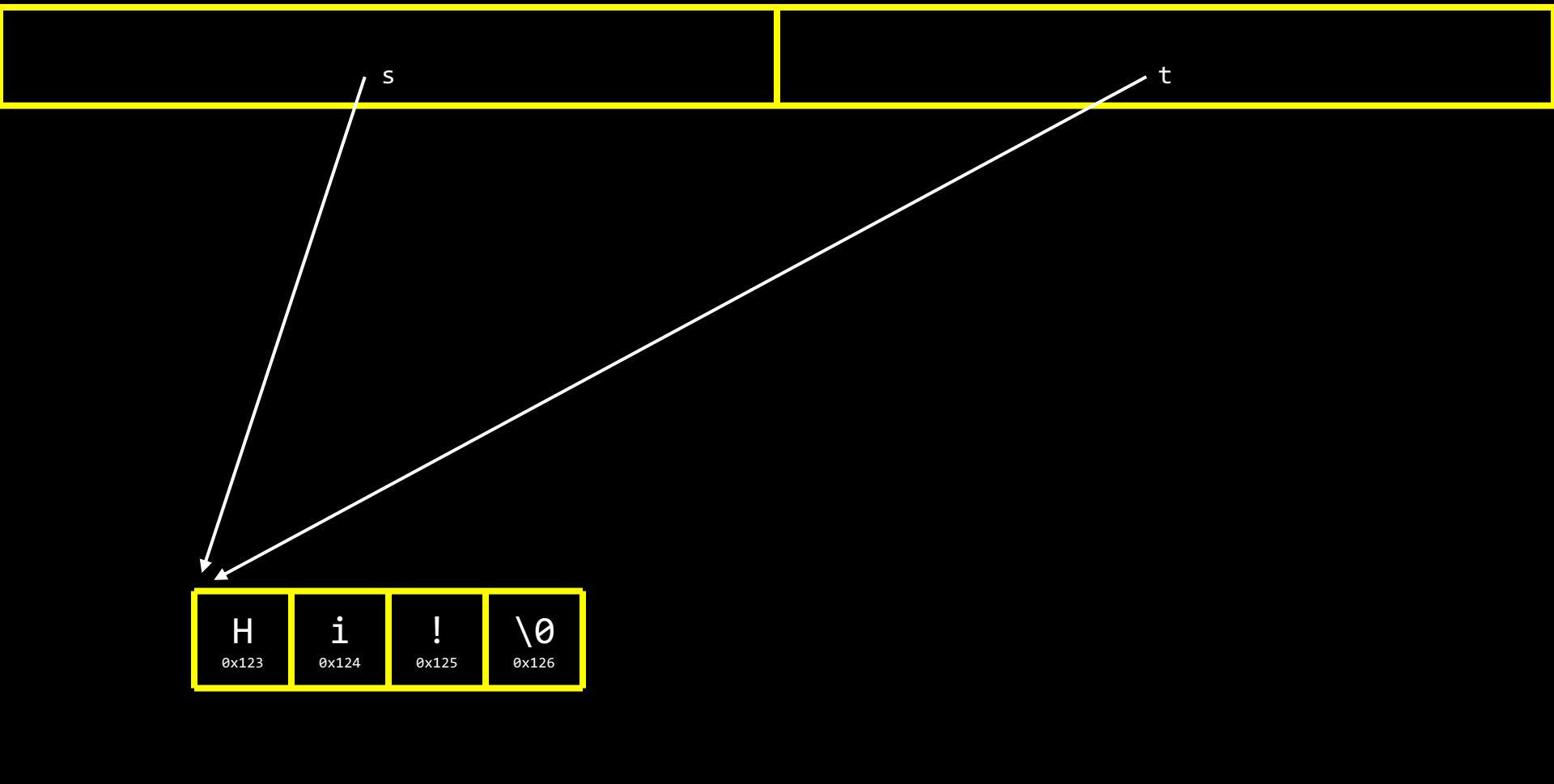
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malloc

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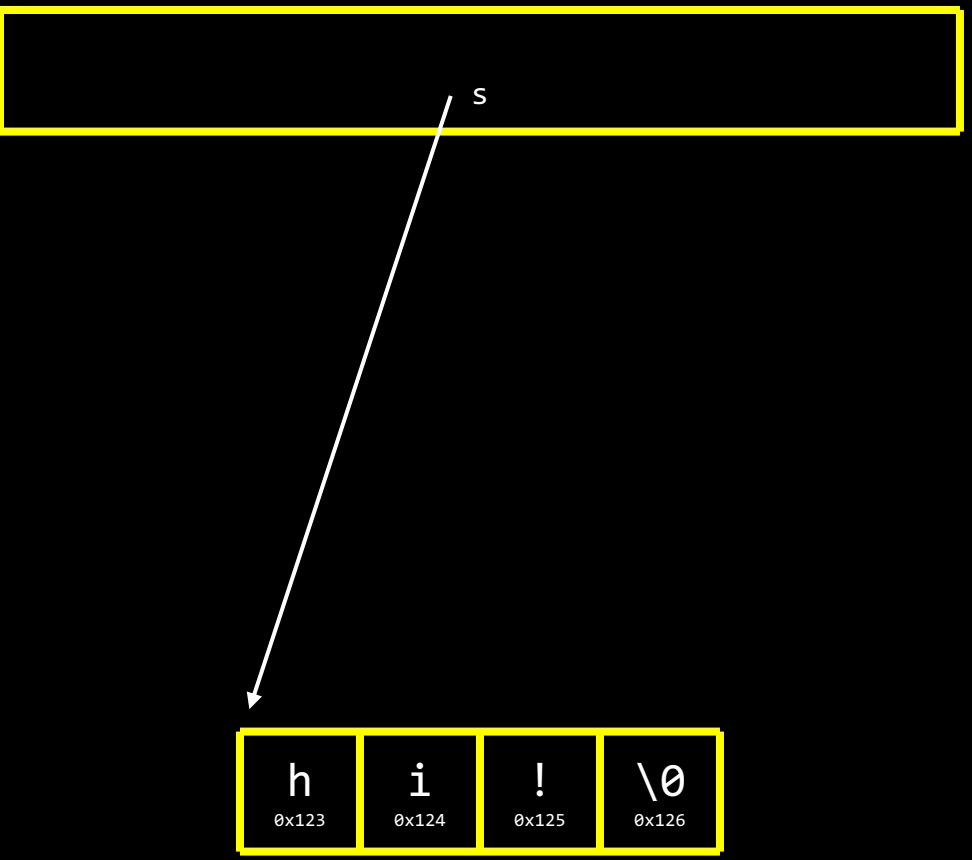
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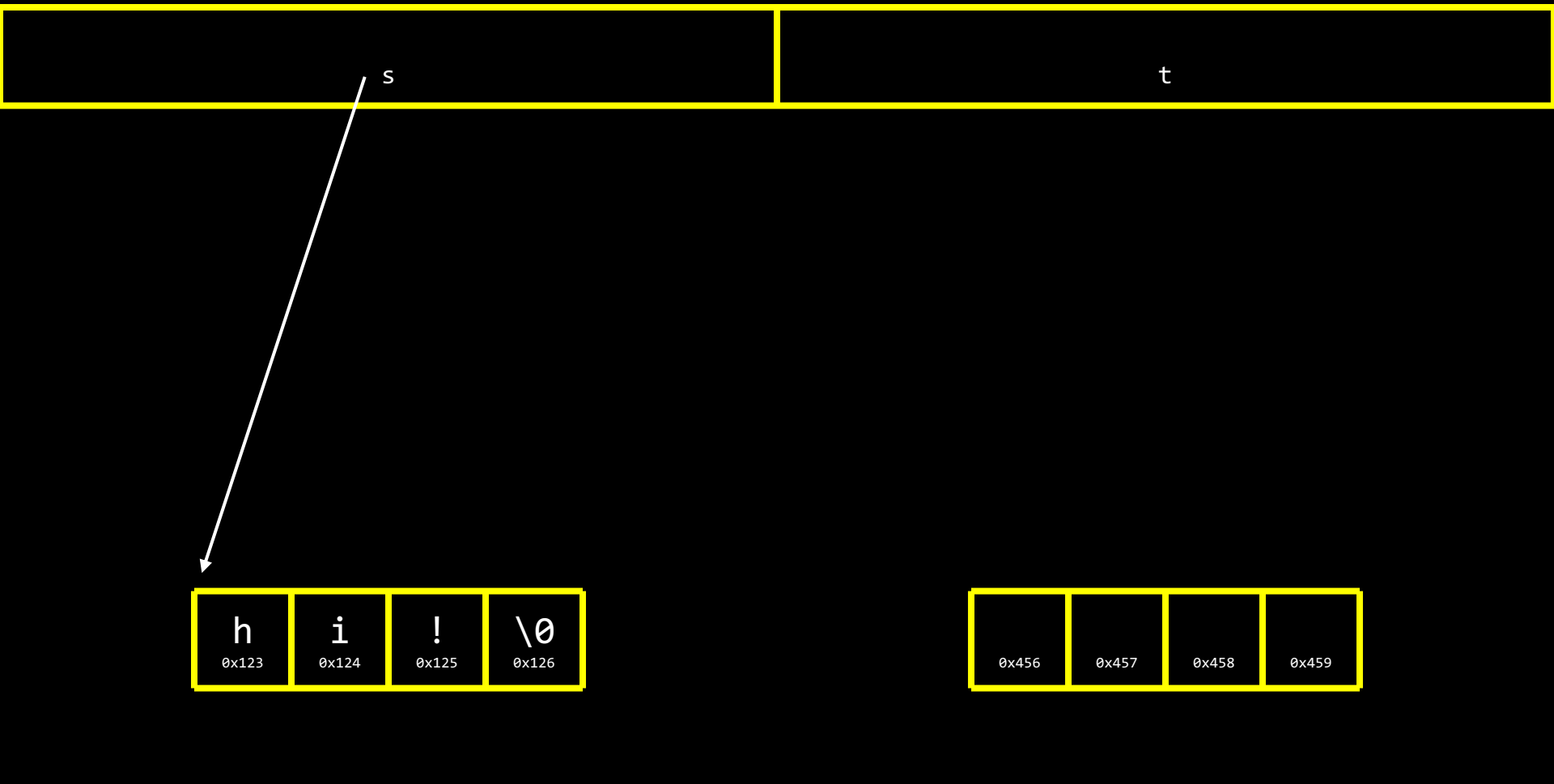
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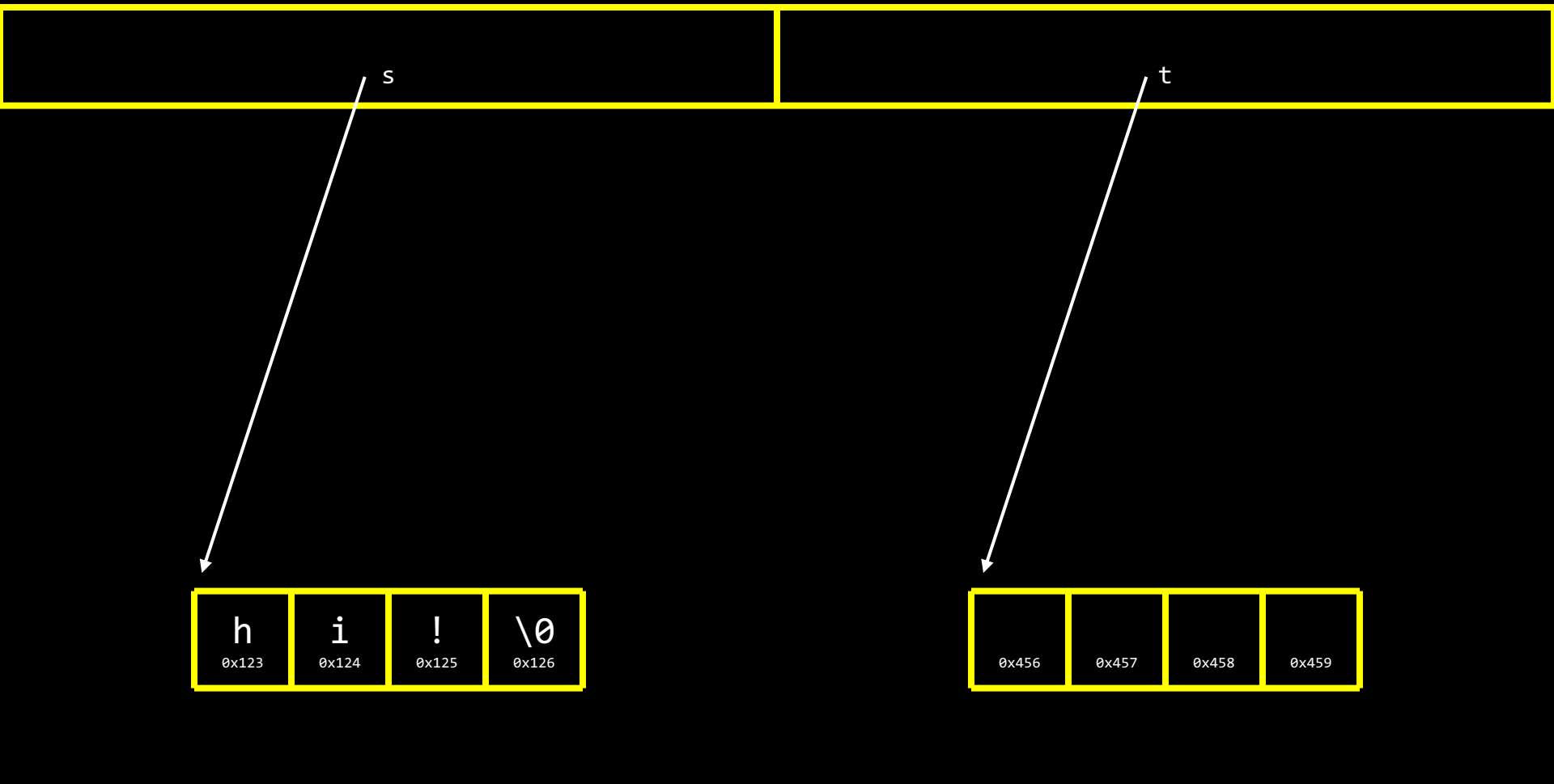
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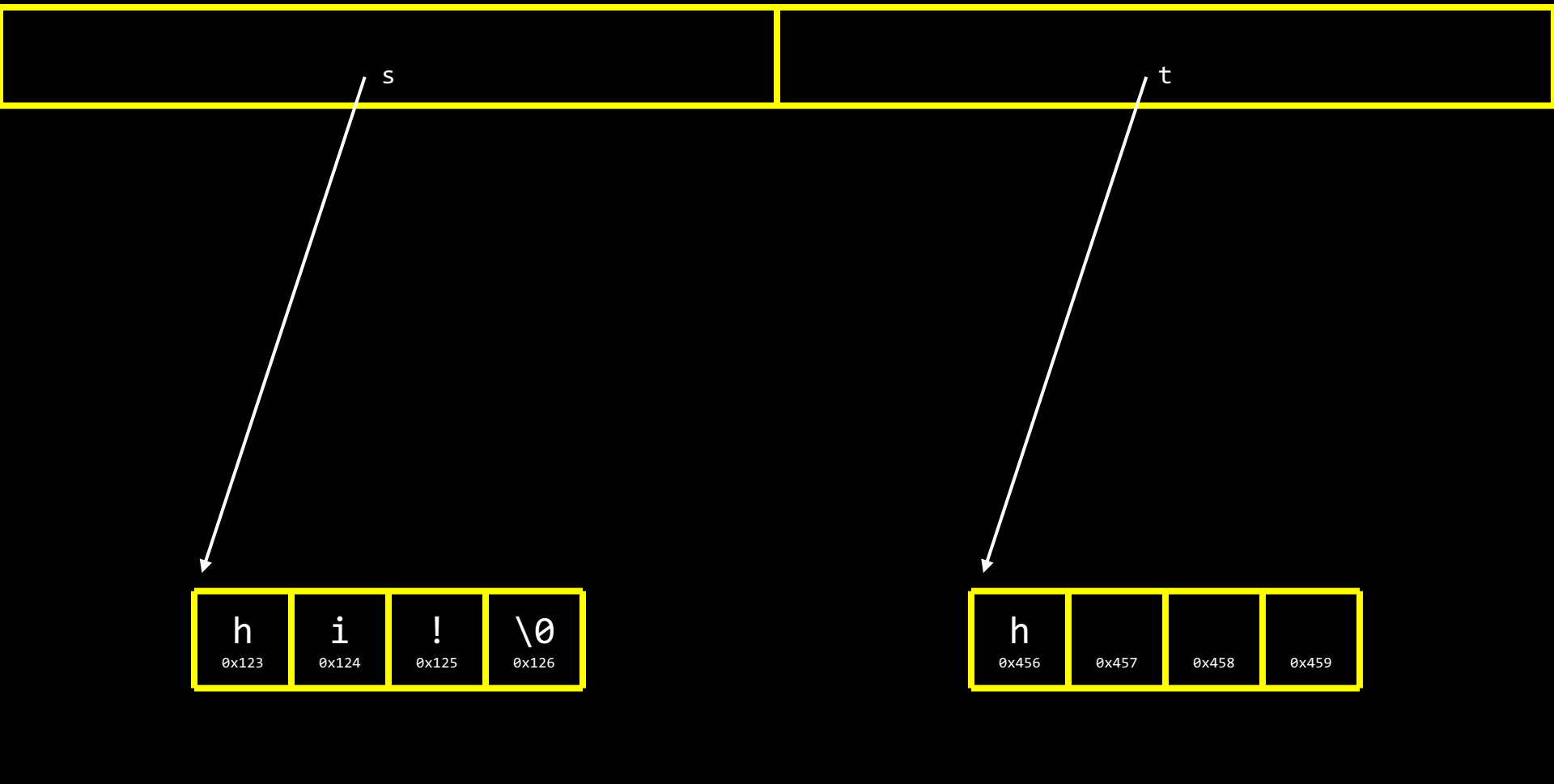
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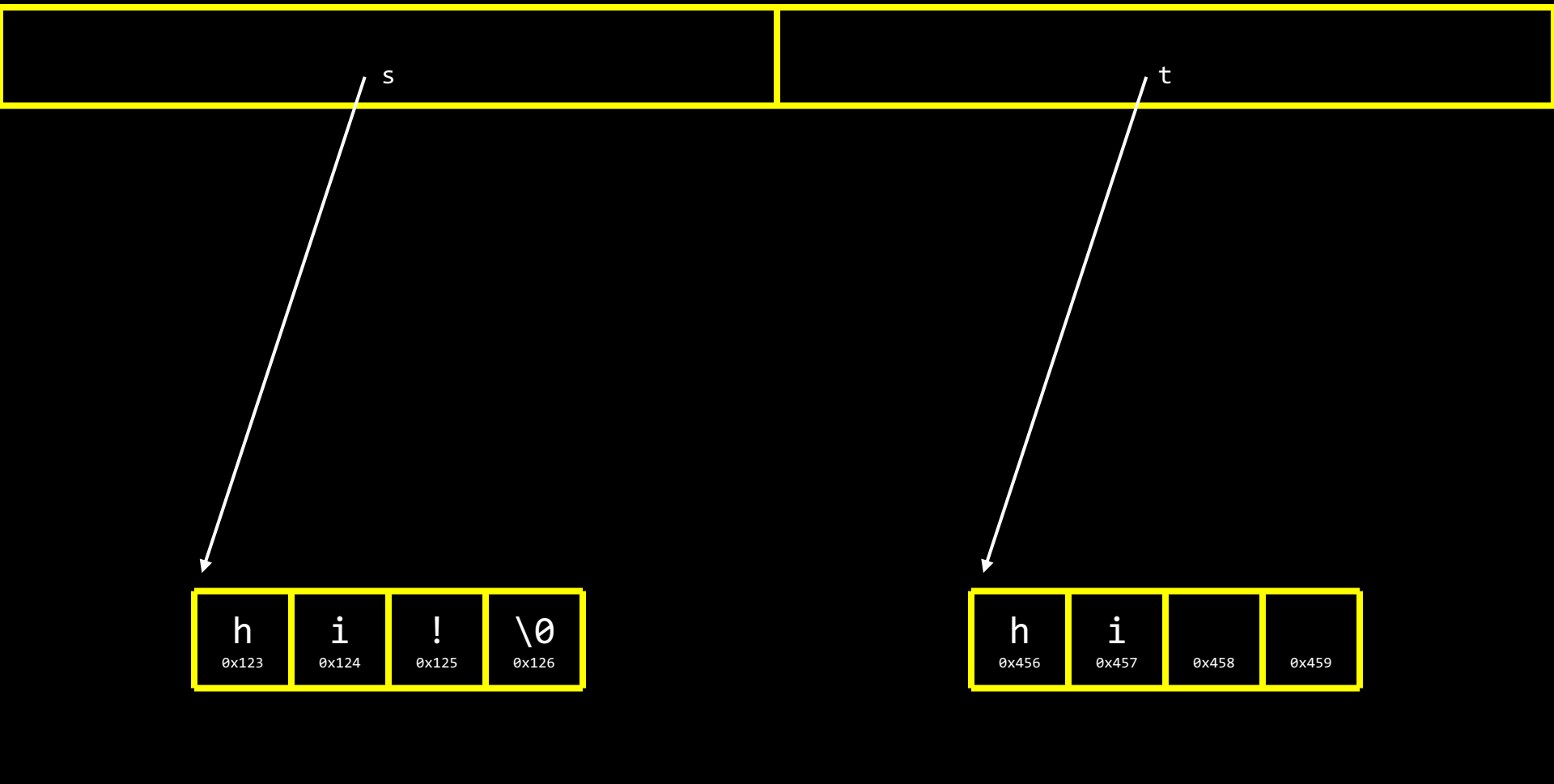
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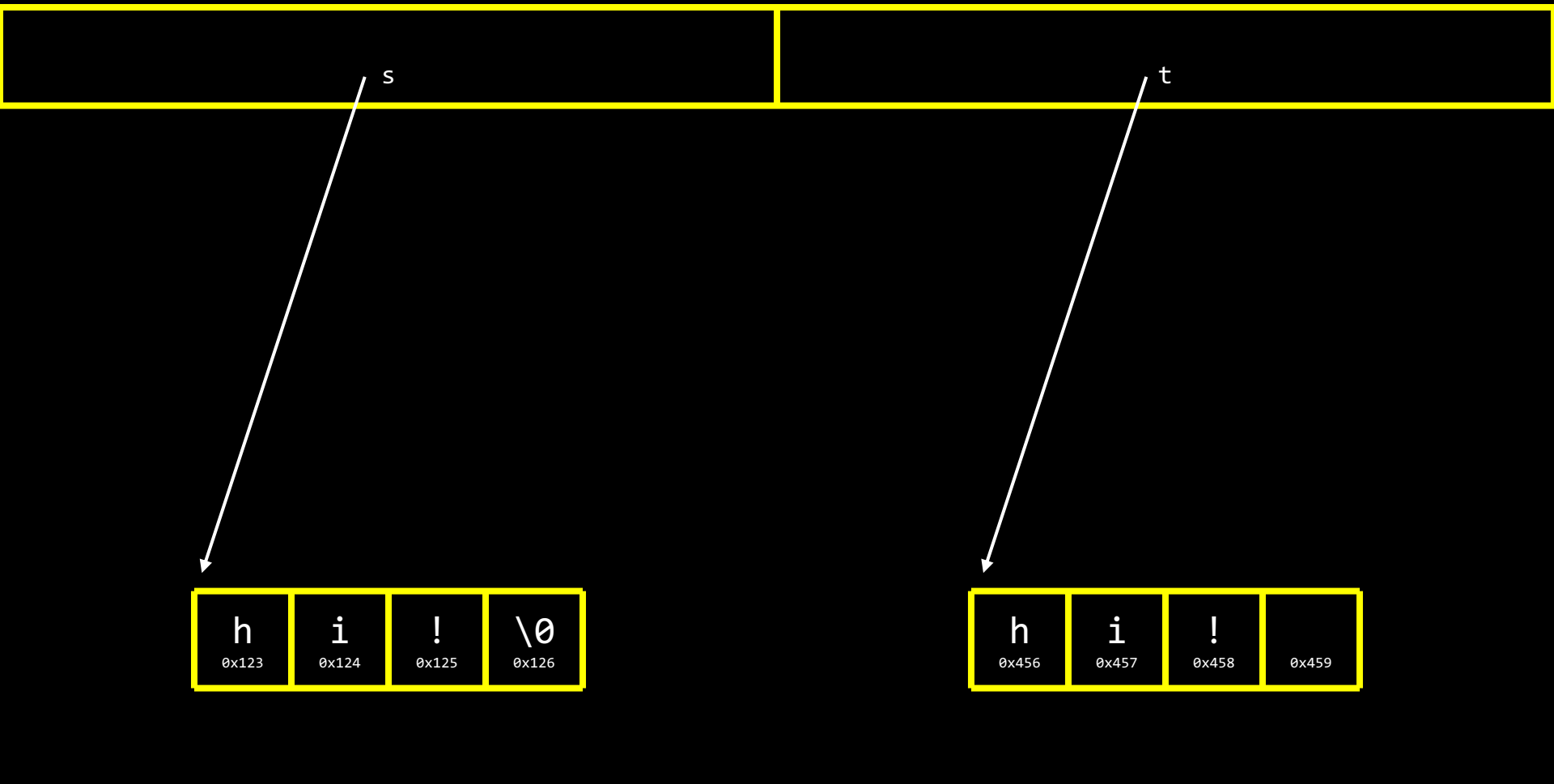
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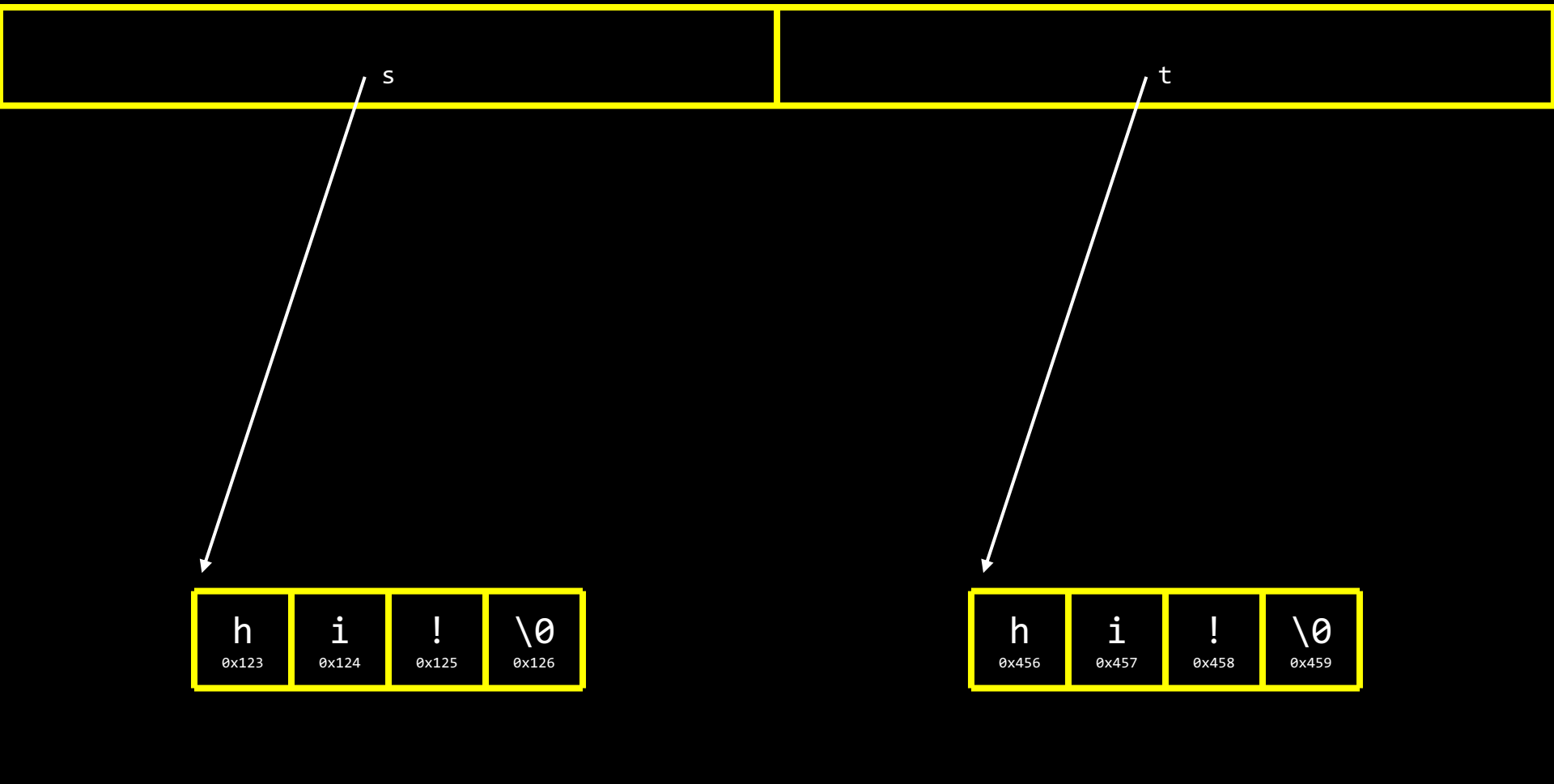
s
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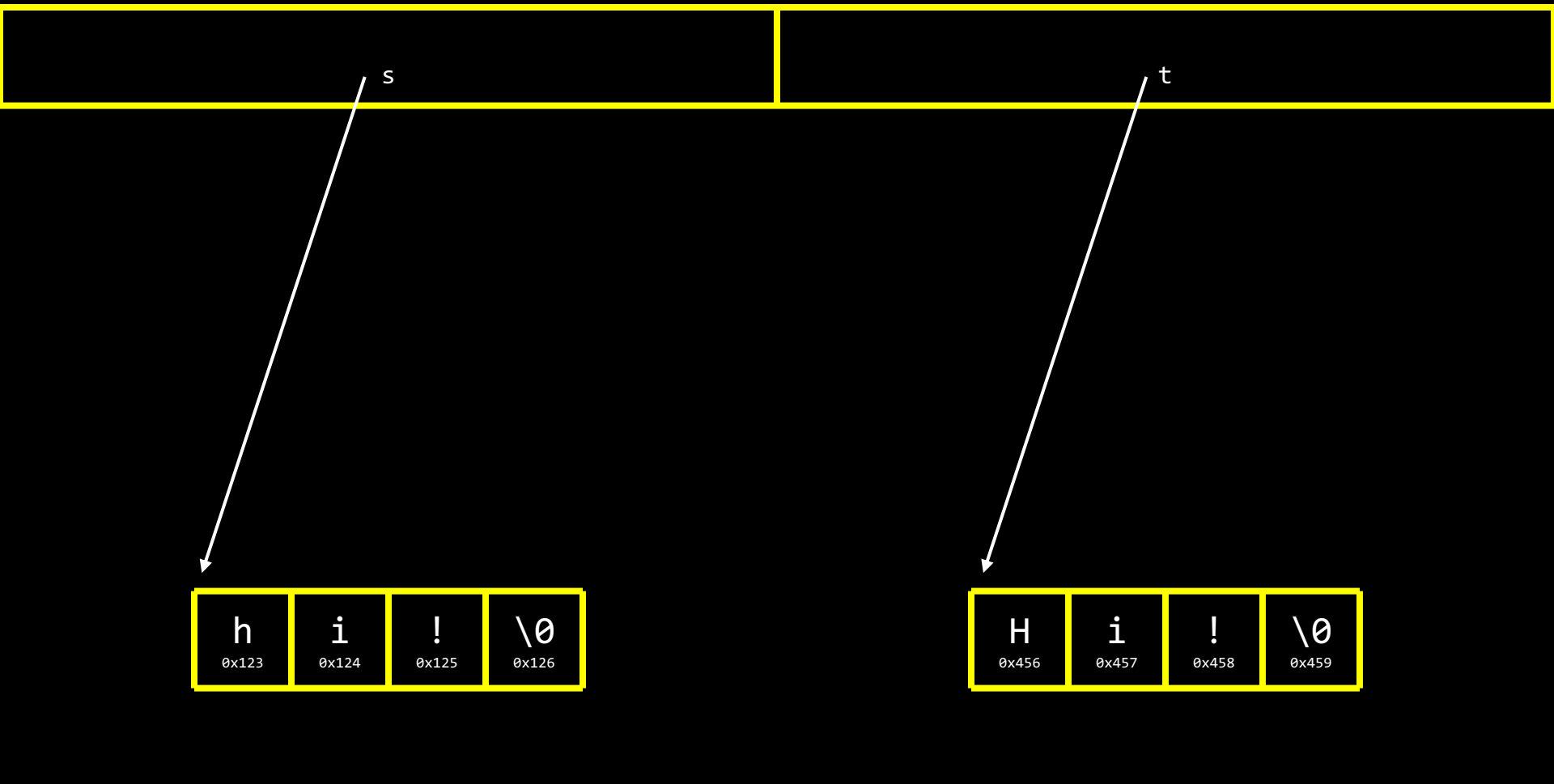

s
t
h
0x123
i
0x124
!
0x125
\0
0x126
H
0x456
i
0x457
!
0x458
\0
0x459

NULL

valgrind

Garbage Values

```
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;
    *y = 13;

    y = x;

    *y = 13;
}
```

```c
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;
    *y = 13;

    y = x;

    *y = 13;
}
```

```c
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;
    *y = 13;

    y = x;

    *y = 13;
}
```

```c
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;
    *y = 13;

    y = x;

    *y = 13;
}
```

```c
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;
    *y = 13;

    y = x;

    *y = 13;
}
```

```
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;


    y = x;

    *y = 13;
}
```

```c
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;


    y = x;

    *y = 13;
}
```

```c
int main(void)
{
    int *x;
    int *y;

    x = malloc(sizeof(int));

    *x = 42;


    y = x;

    *y = 13;
}
```

```
void swap(int a, int b)
{



}
```

```
void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

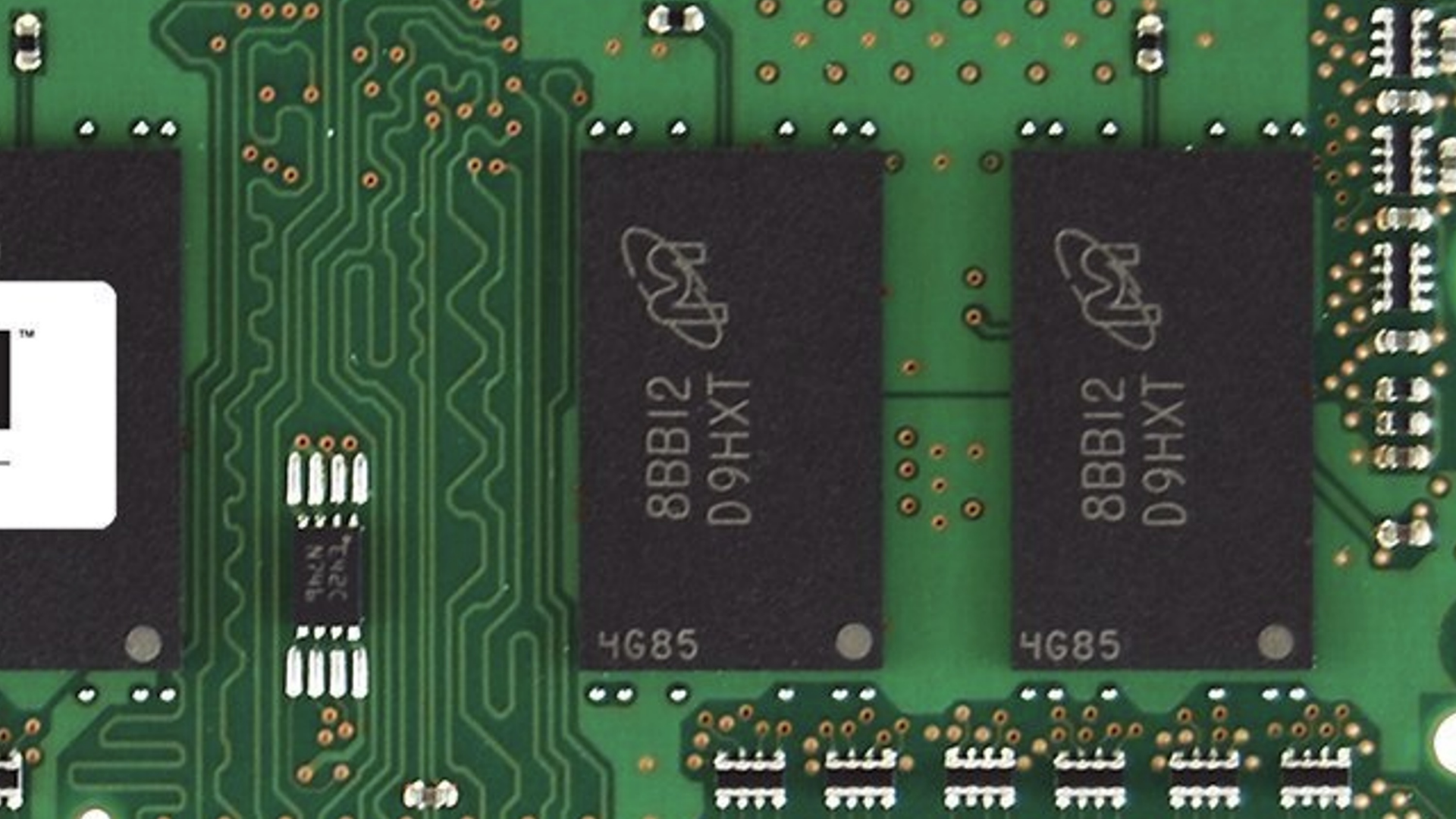
```
void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

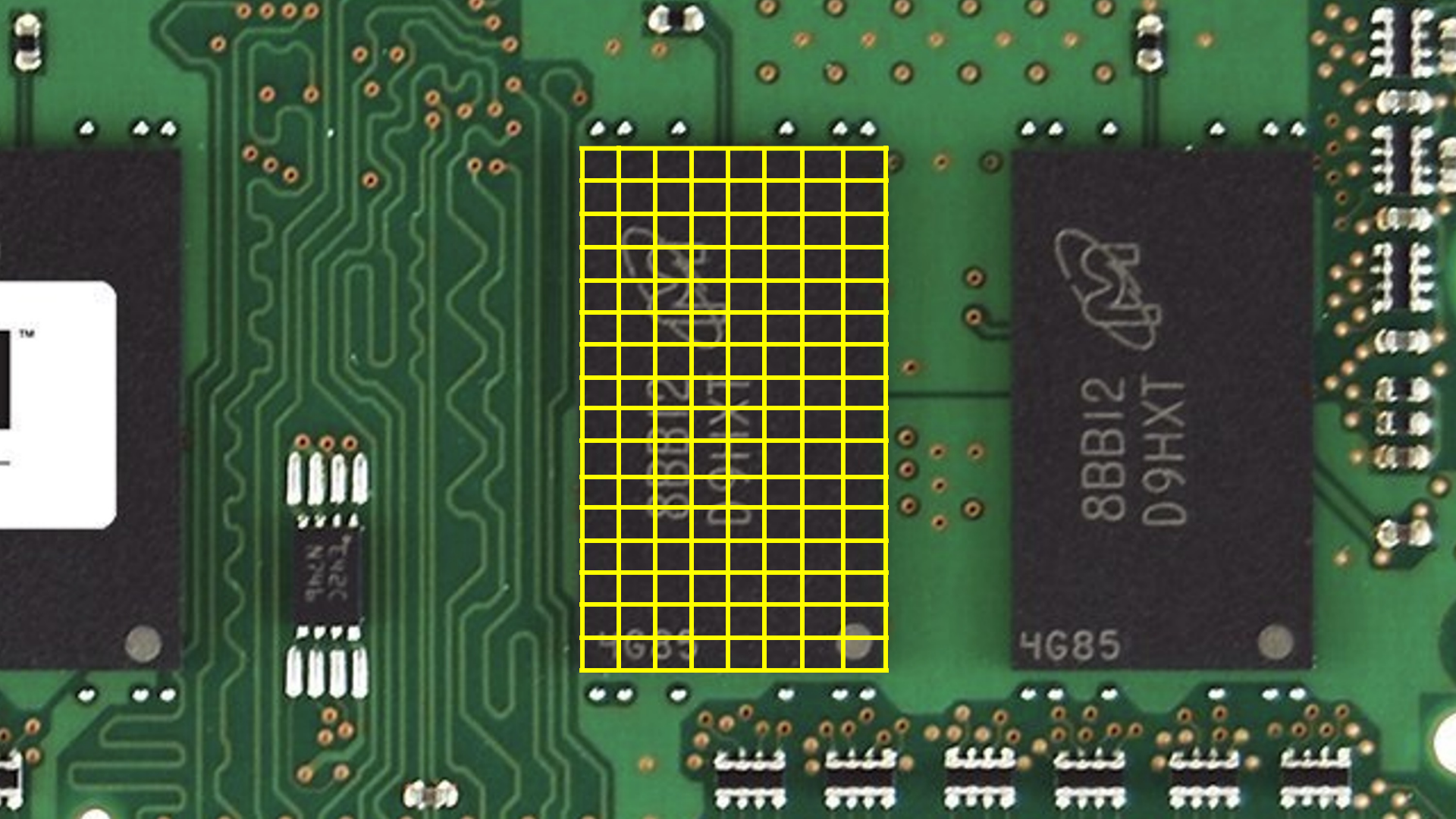
scope

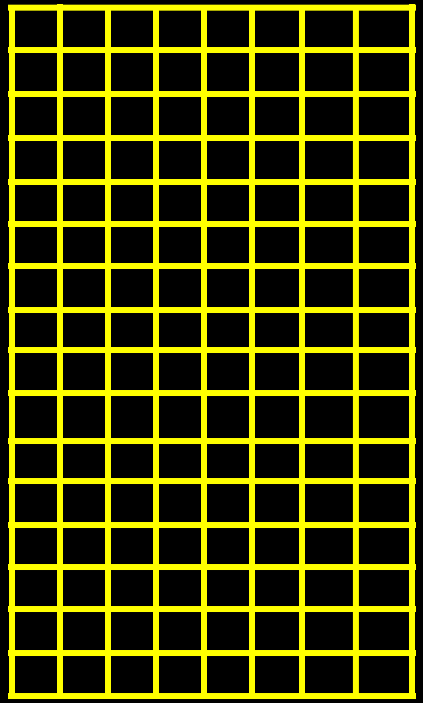
passing by value

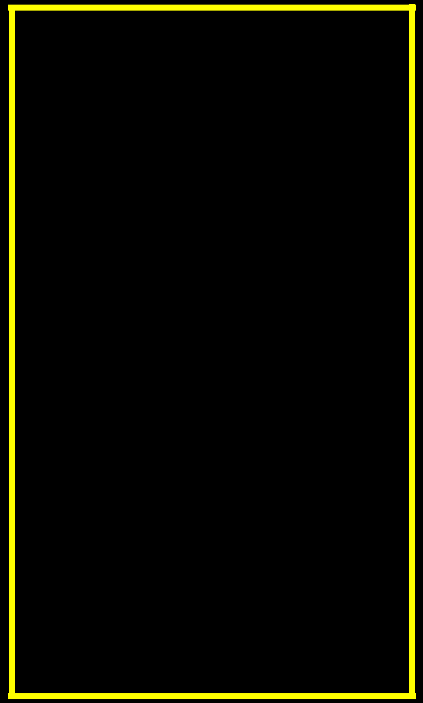
crucial
by Micron
8BBI2
D9HXT
8BBI2
D9HXT
4G85
4G85
4G85
47J6

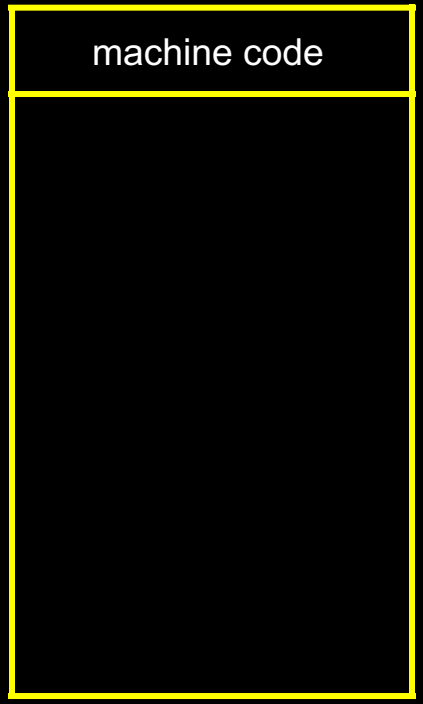
amazon.com

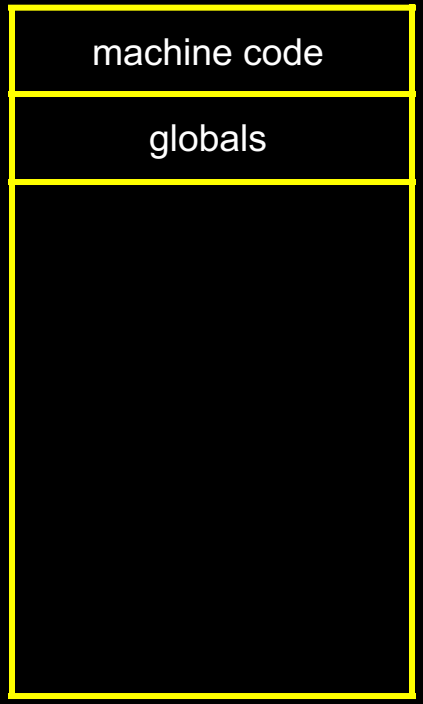

8BBI2
D9HXT
4G85
8BBI2
D9HXT
4G85

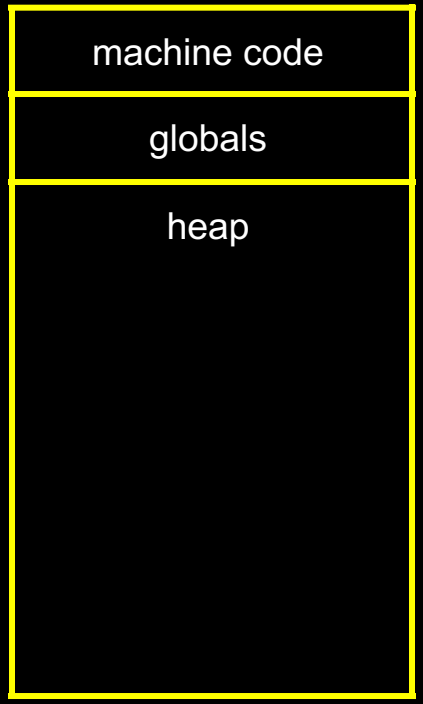

8BBI2
D9HXT
4G85

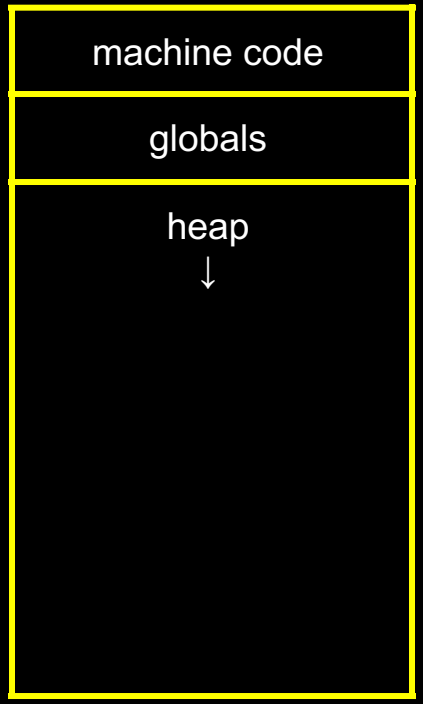


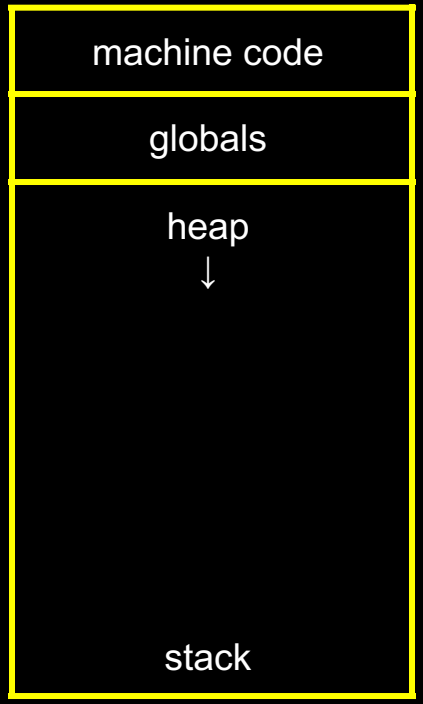


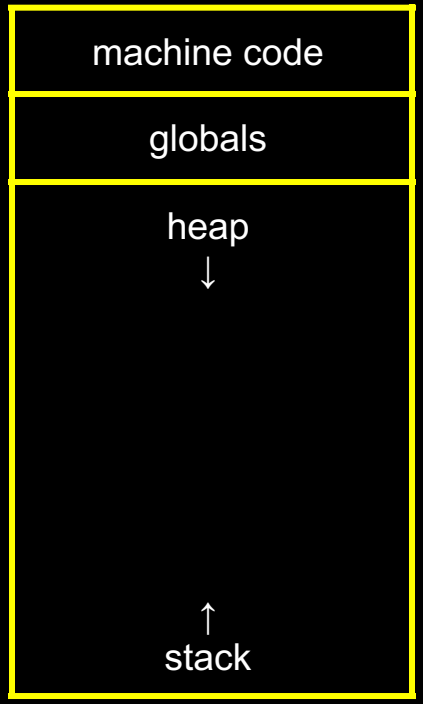

machine code

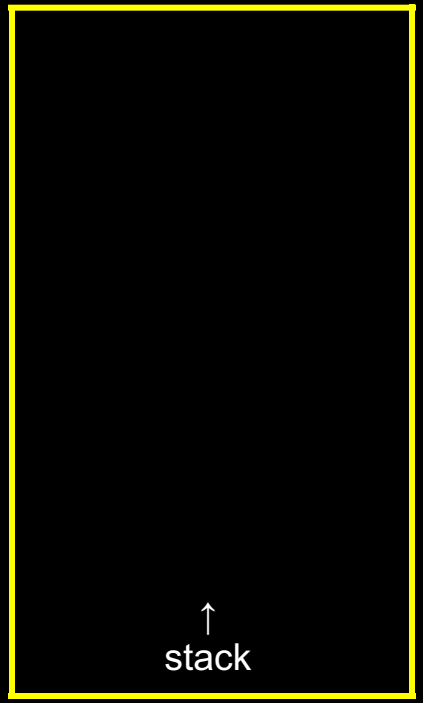

machine code
globals


machine code
globals
heap

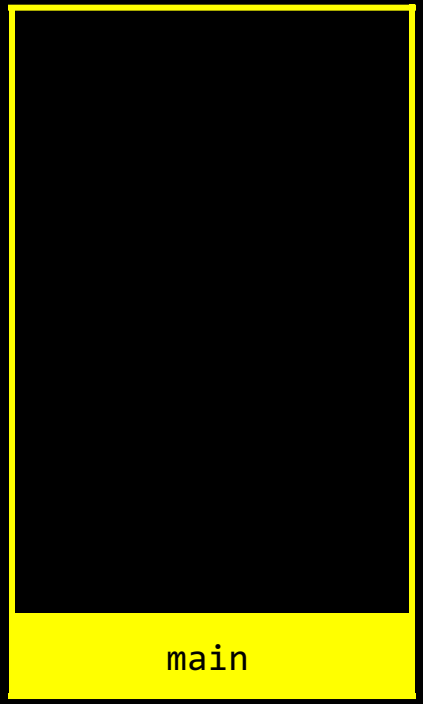

machine code
globals
heap
↓

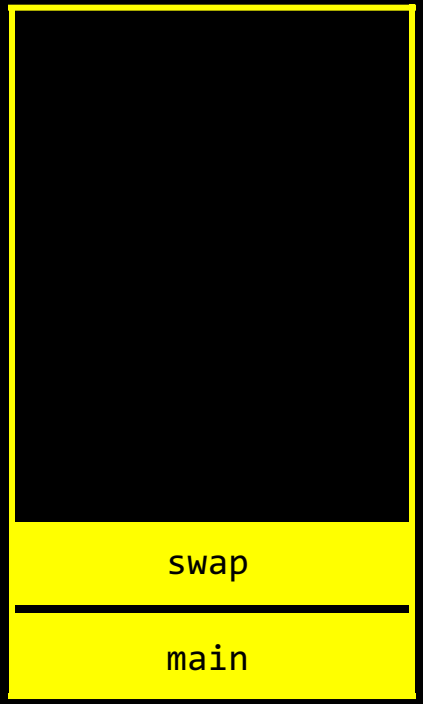

machine code
globals
heap
↓
stack

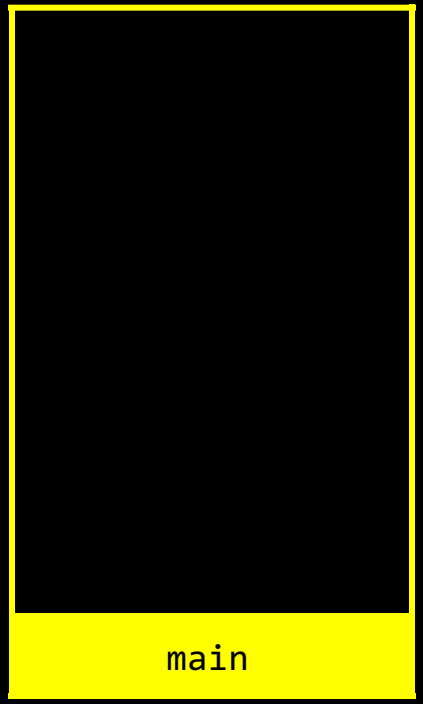

machine code
globals
heap
↓
↑
stack

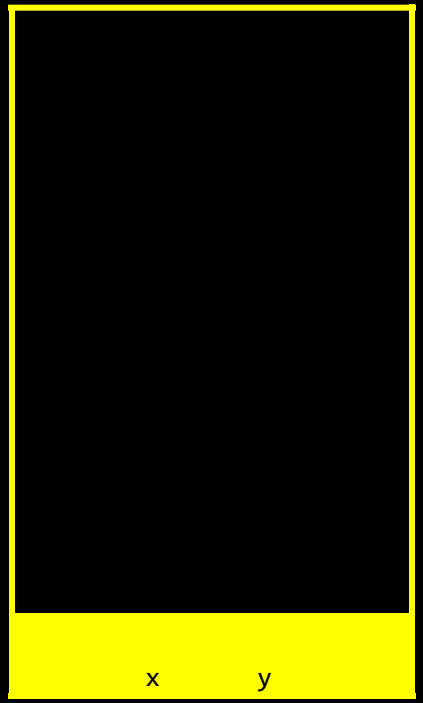

↑
stack

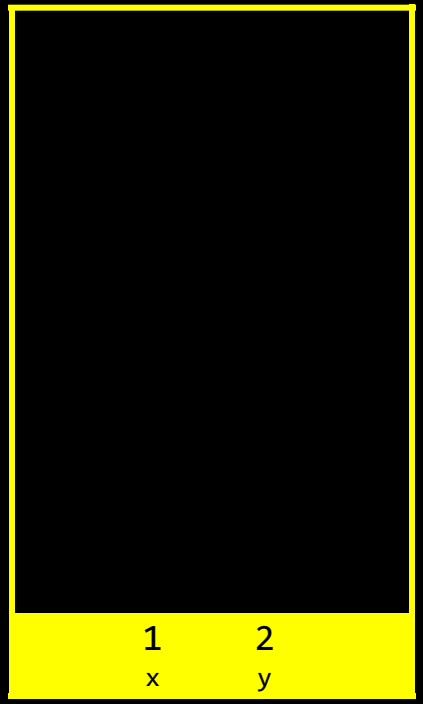
```
void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

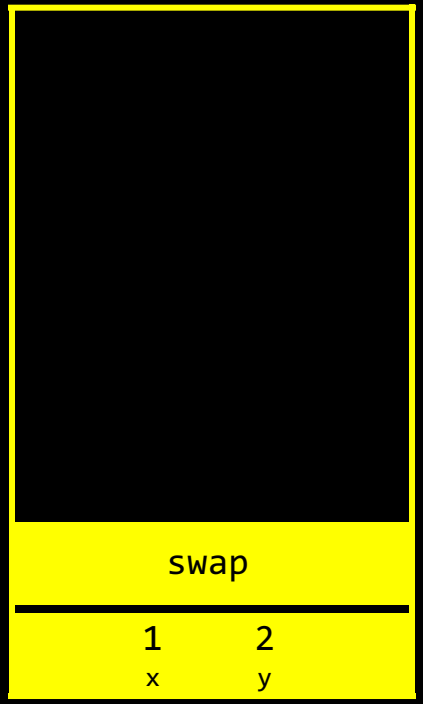

main

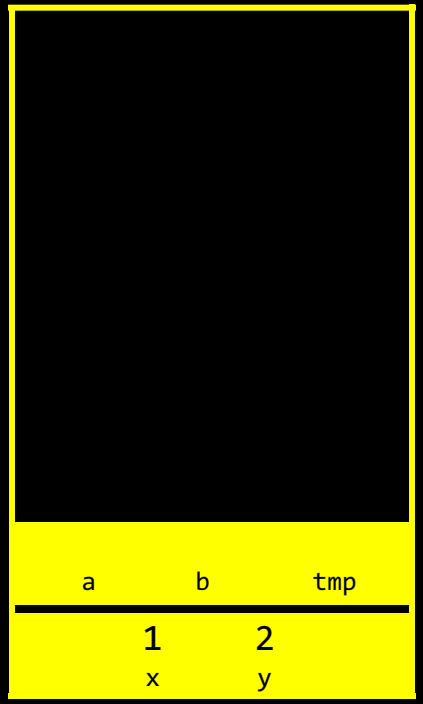

swap
main

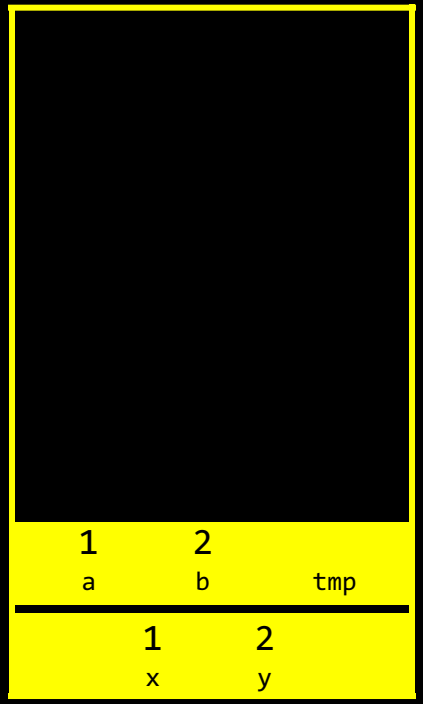

main


x
y

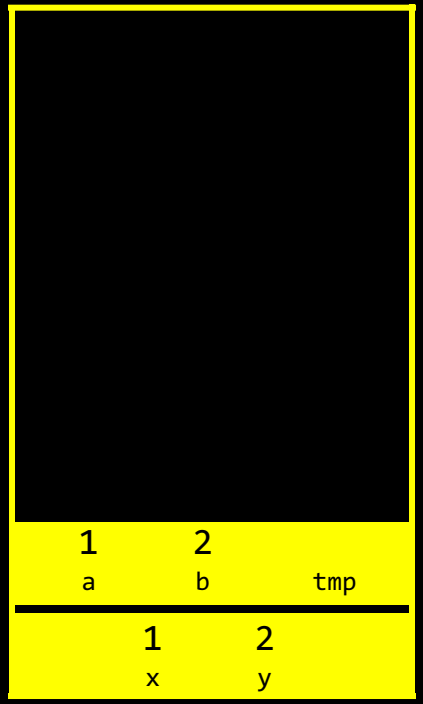

1
x
2
y


swap
1
x
2
y

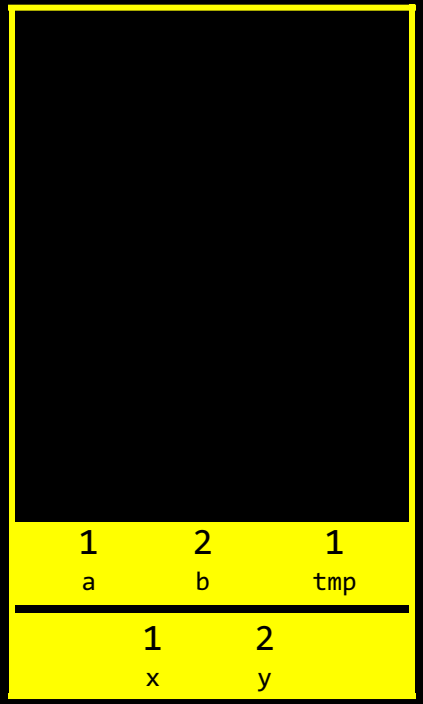

a
b
tmp
1
2
x
y


1
a
2
b
tmp
1
x
2
y

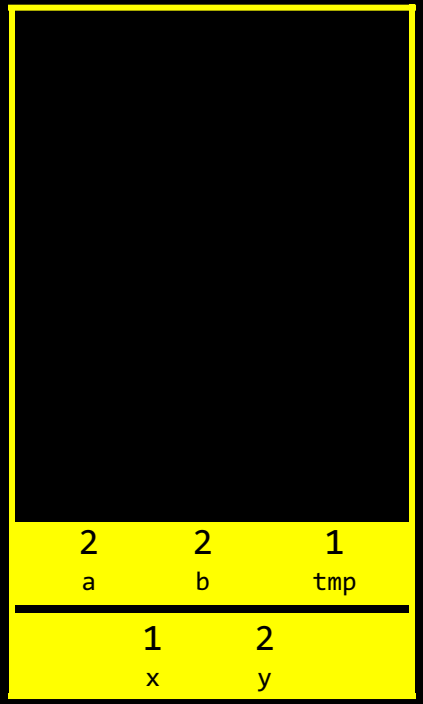
```
int tmp = a;
a = b;
b = tmp;
```



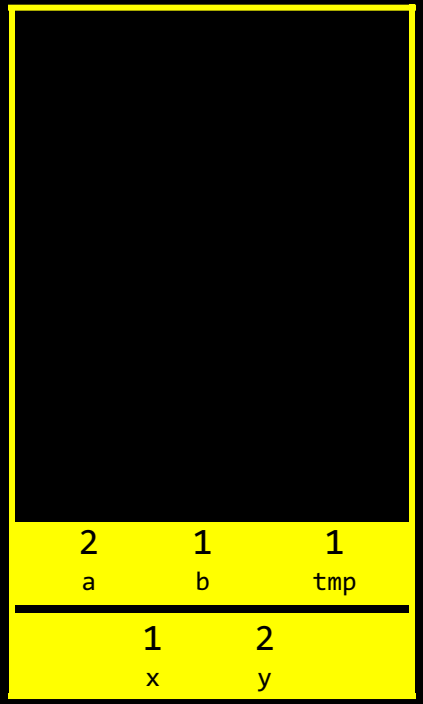
```
int tmp = a;
a = b;
b = tmp;
```

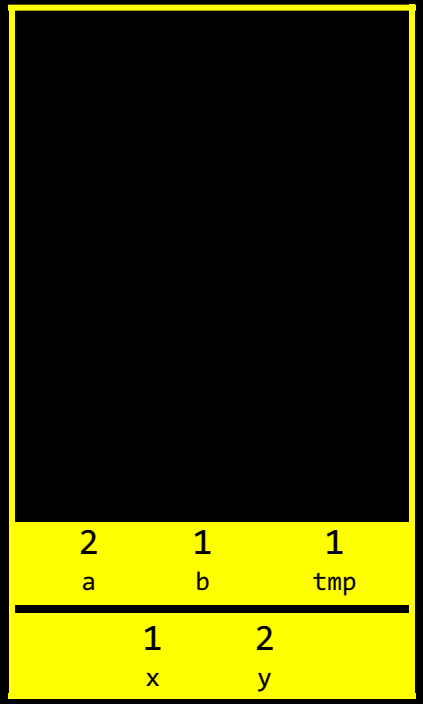


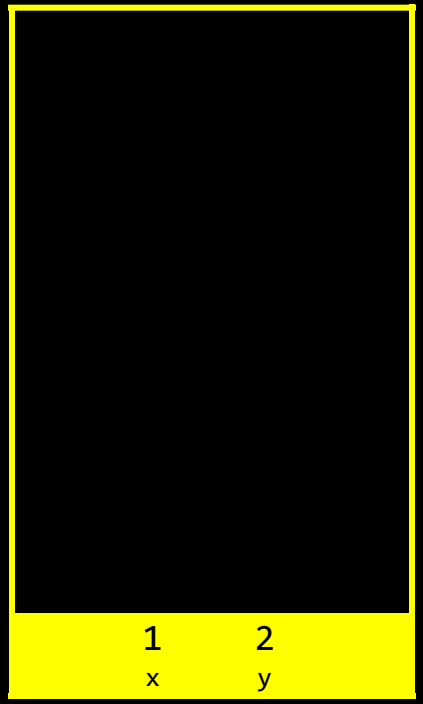
```
int tmp = a;
a = b;
b = tmp;
```



```
int tmp = a;
a = b;
b = tmp;
```



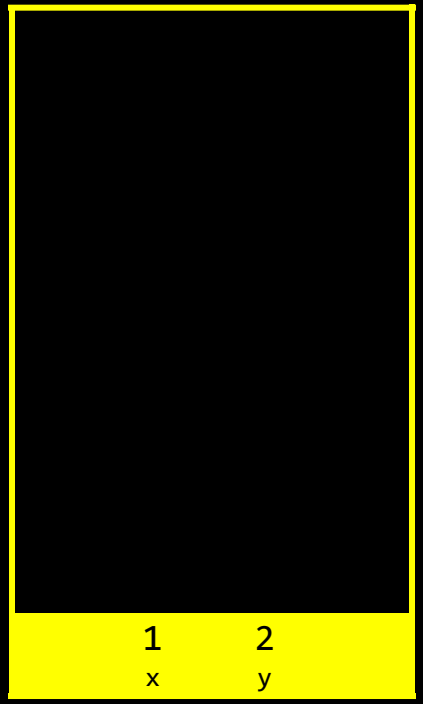

2
a
1
b
1
tmp
1
x
2
y

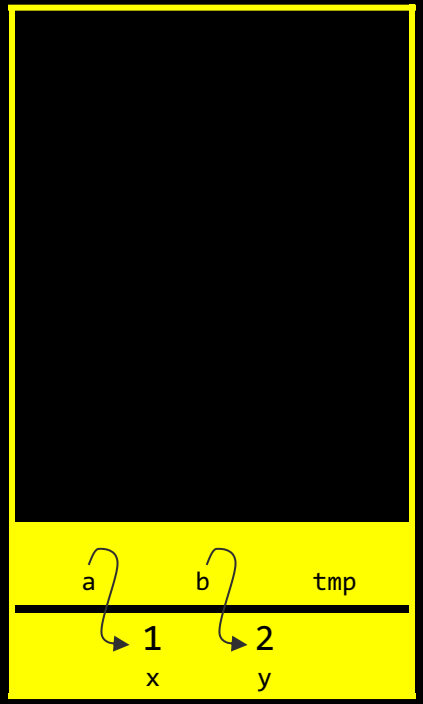

1
x
2
y

Übergabe als Referenz

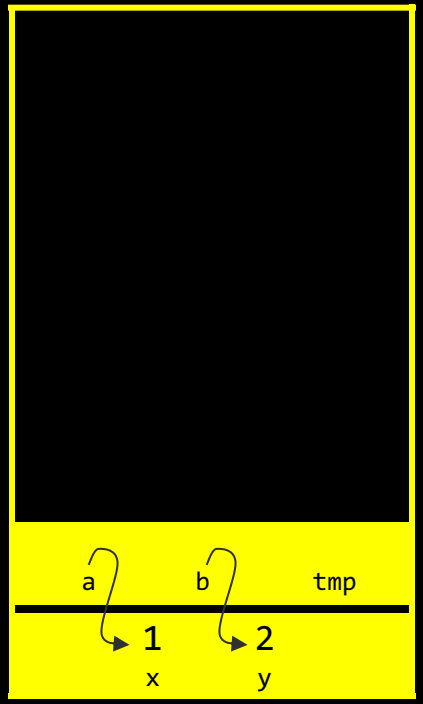
```
void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

```
void swap(int *a, int *b)
{
    int tmp = *a;
    *a = *b;
    *b = tmp;
}
```

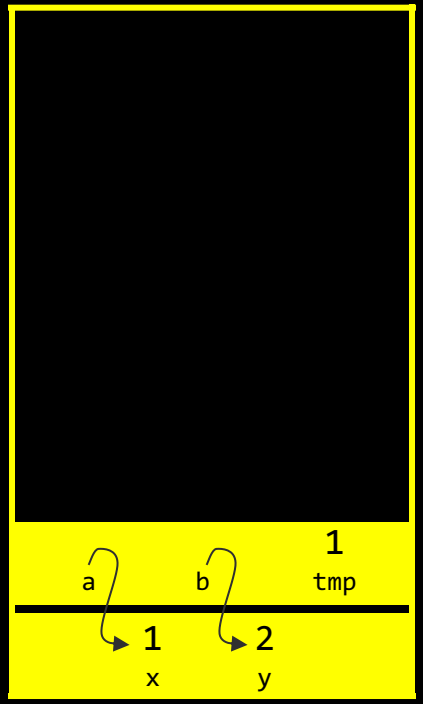

1
x
2
y


a
b
tmp
1
2
x
y

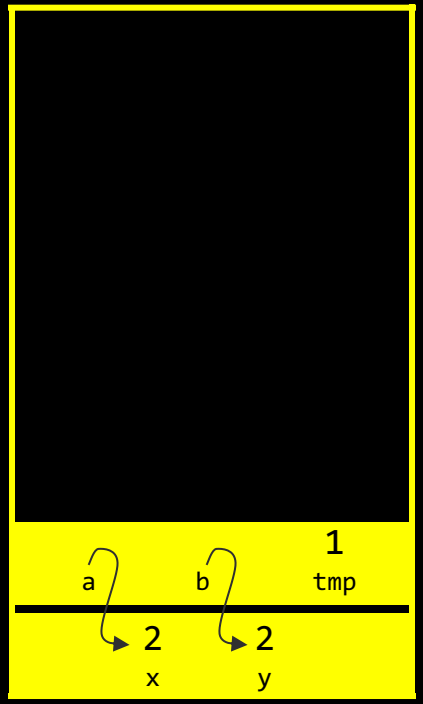
```
int tmp = *a;
*a = *b;
*b = tmp;
```



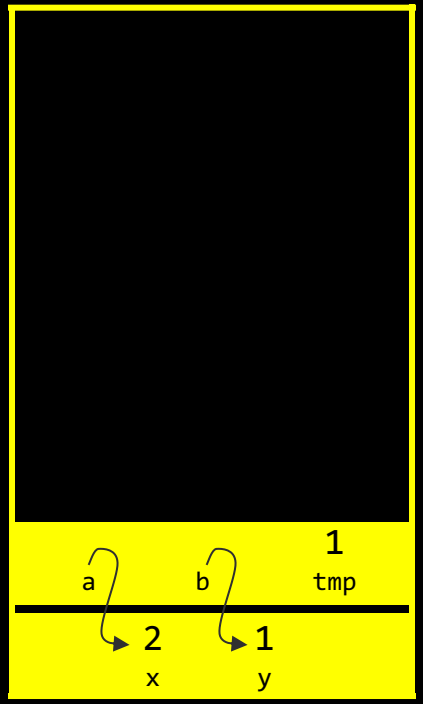
```
int tmp = *a;
*a = *b;
*b = tmp;
```

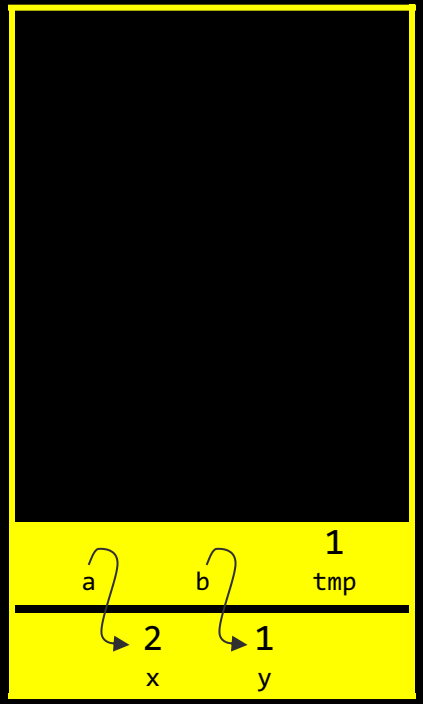


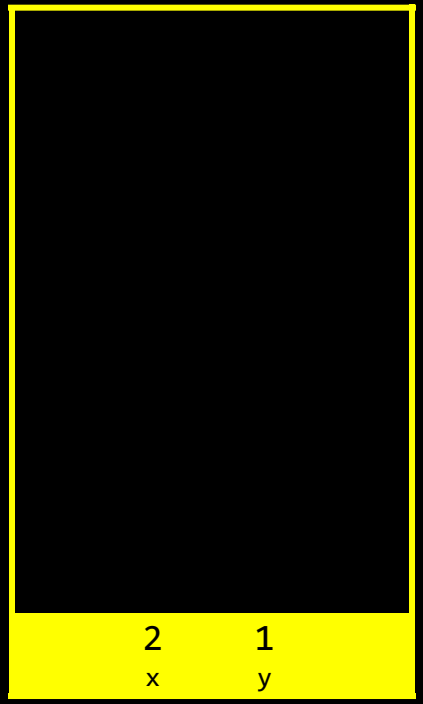
```
int tmp = *a;
*a = *b;
*b = tmp;
```



```
int tmp = *a;
*a = *b;
*b = tmp;
```

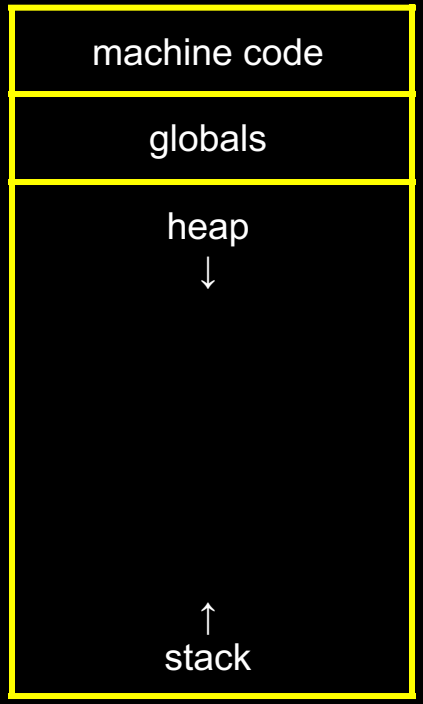


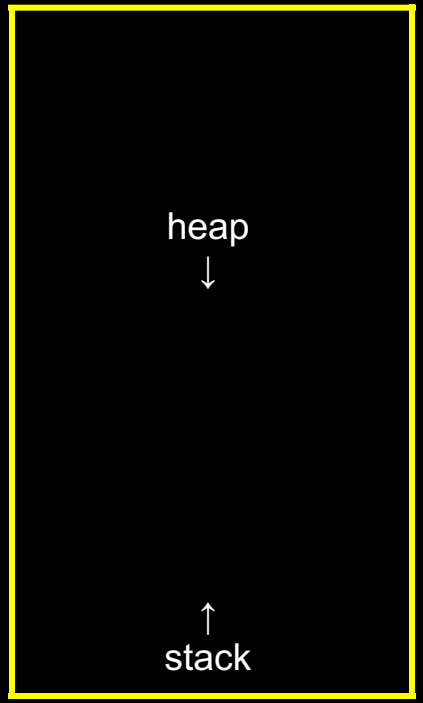

1
tmp
a
b
2
x
1
y


2
x
1
y

```
void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

```
void swap(int *a, int *b)
{
    int tmp = *a;
    *a = *b;
    *b = tmp;
}
```


machine code
globals
heap
↓
↑
stack


heap
↓
↑
stack

heap overflow

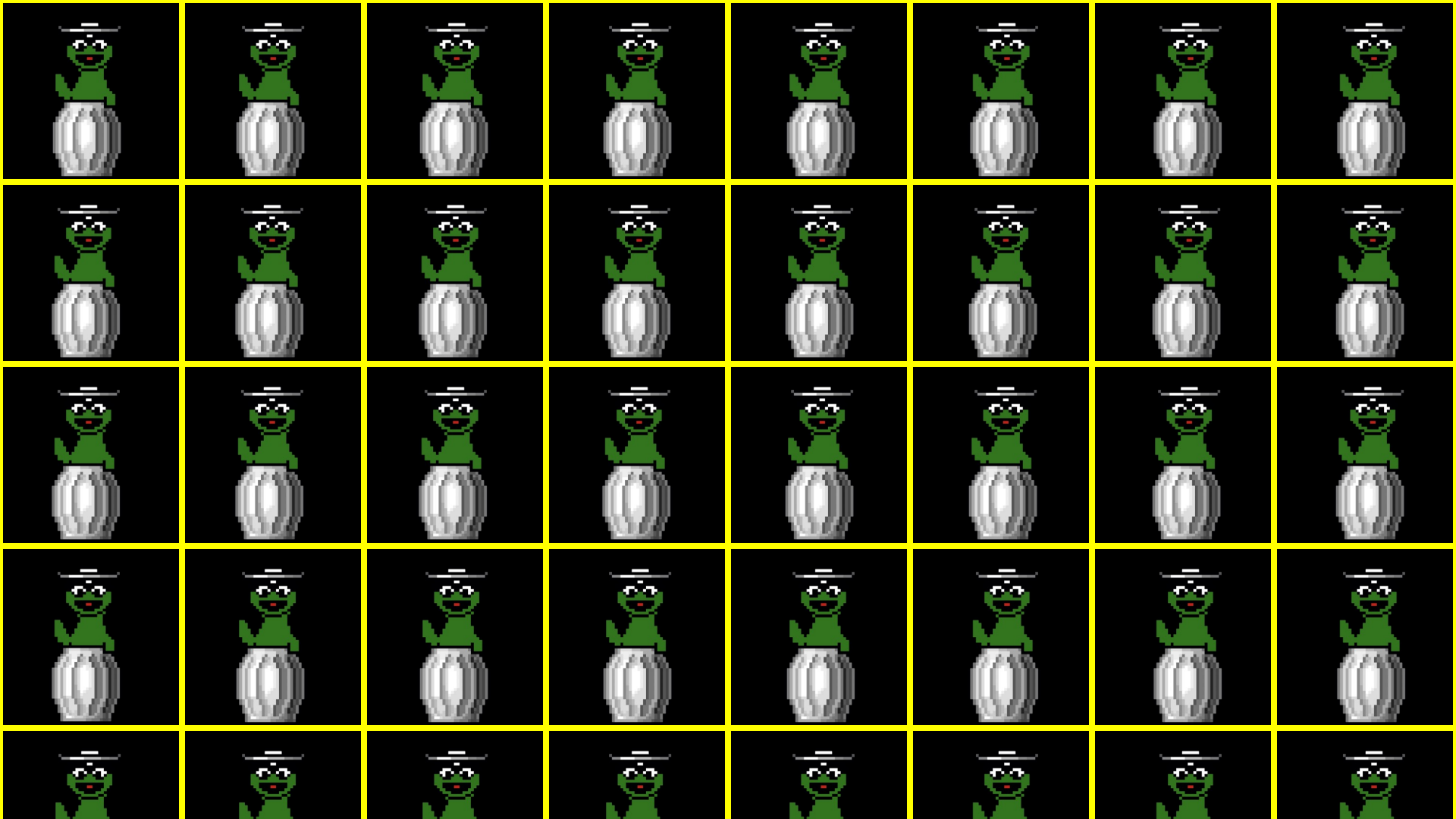
stack overflow

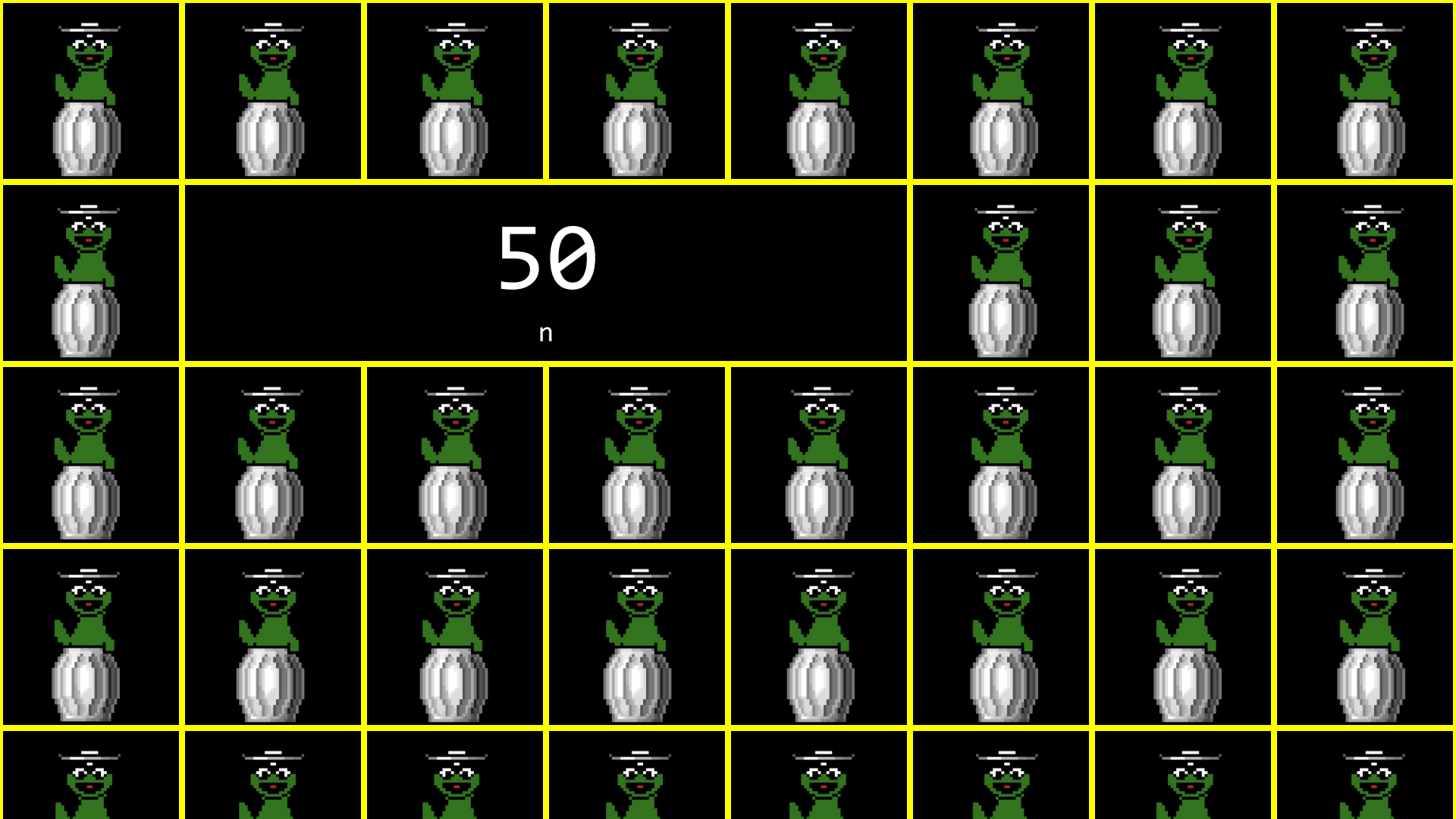
buffer overflow

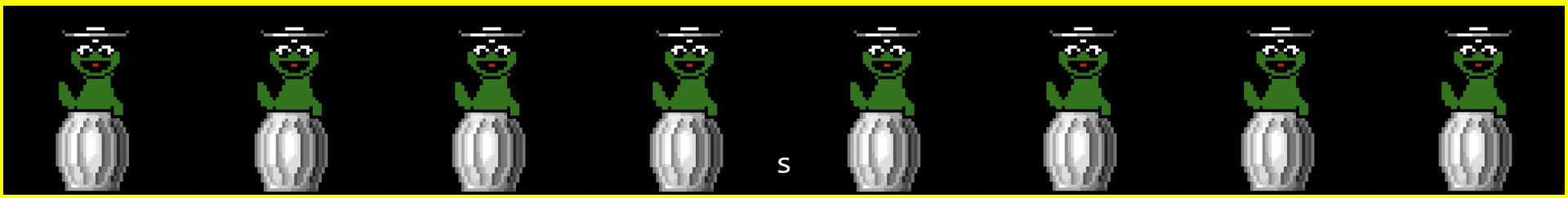
```
get_char

get_double

get_float

get_int

get_long

get_string

...
```

scanf

...




50
n



s

File-I/O

Input und Output

fopen

fclose

fprintf

fscanf

fread

fwrite

fseek

…

BMP

MAN, I SUCK AT THIS GAME. CAN YOU GIVE ME A FEW POINTERS?
0x3A28213A
0x6339392C,
0x7363682E.
I HATE YOU.

This is CS50

Dies war Inf-Einf-B.