

# Pointers

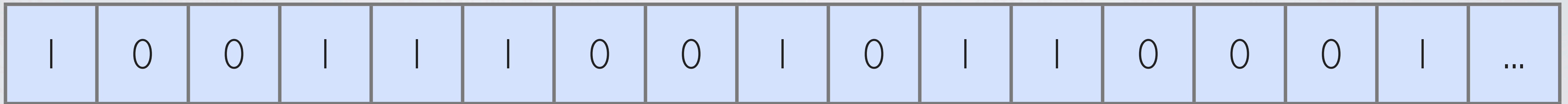
What's your address?

# Outline

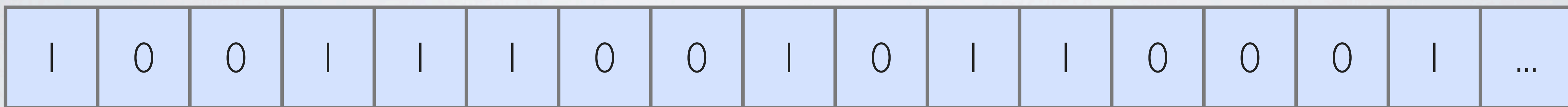
- Memory
- Pointers
- NULL



# Memory



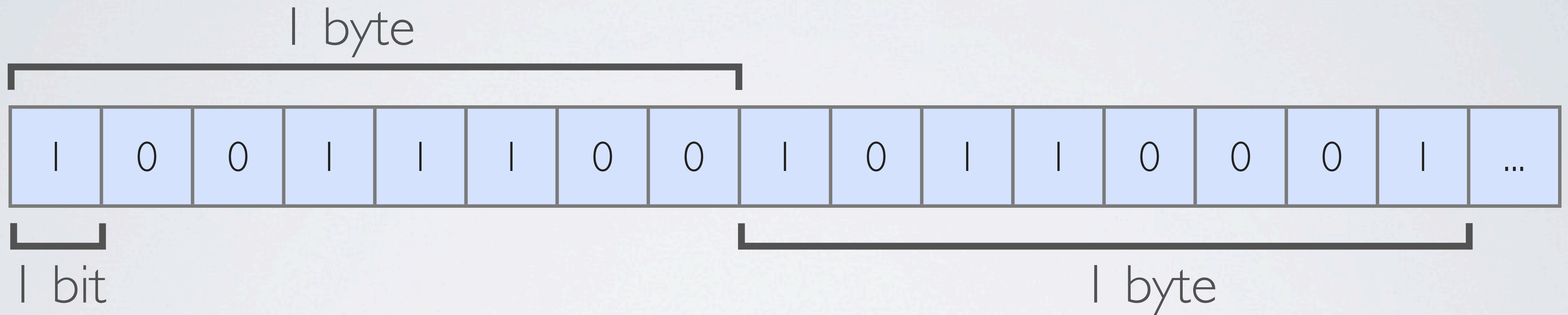
# Memory



1 bit



# Memory

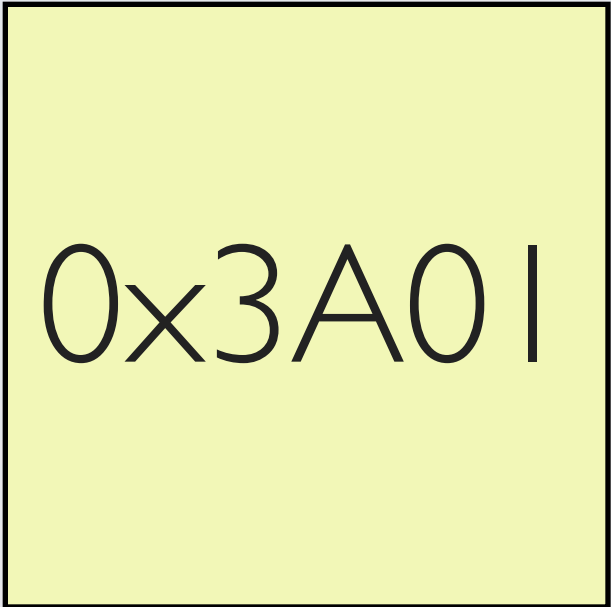


```
char *message = "hello";
```



Address	Value
0x3A01	'h'
0x3A02	'e'
0x3A03	'l'
0x3A04	'l'
0x3A05	'o'
...	...

char \*message



Address	Value
0x3A01	'h'
0x3A02	'e'
0x3A03	'l'
0x3A04	'l'
0x3A05	'o'
...	...



# Address Of: &

```
int height = 63;  
printf("height = %d\n", height);  
printf("address of height: %p\n", &height);
```

# Address Of: &

```
int height = 63;  
printf("height = %d\n", height);  
printf("address of height: %p\n", &height);
```

```
height = 63  
address of height: 0x7fff5fbff8cc
```



# Pointer

```
int weight = 155;  
int *pointer = &weight;  
printf("weight: %p\n", &weight);  
printf("pointer: %p\n", pointer);
```

# Pointer

```
int weight = 155;  
int *pointer = &weight;  
printf("weight: %p\n", &weight);  
printf("pointer: %p\n", pointer);
```

```
weight: 0x7fff5fbff8e8  
pointer: 0x7fff5fbff8e8
```



# Dereferencing: \*

```
int weight = 155;  
int *pointer = &weight;  
printf("weight: %d\n", weight);  
printf("*pointer: %d\n", *pointer);
```

# Dereferencing: \*

```
int weight = 155;  
int *pointer = &weight;  
printf("weight: %d\n", weight);  
printf("*pointer: %d\n", *pointer);
```

```
weight: 155  
*pointer: 155
```



# sizeof()

```
printf("sizeof(int): %zu\n", sizeof(int));  
printf("sizeof(double): %zu\n", sizeof(double));
```

# sizeof()

```
printf("sizeof(int): %zu\n", sizeof(int));  
printf("sizeof(double): %zu\n", sizeof(double));
```

```
sizeof(int): 4  
sizeof(double): 8
```



# NULL

- Address 0x0
- Nothing
- False

# NULL

```
int *pointer = NULL;  
int value = 27;  
printf("pointer: %p\n", pointer);  
pointer = &value;  
printf("pointer: %p\n", pointer);
```



# NULL

```
int *pointer = NULL;  
int value = 27;  
printf("pointer: %p\n", pointer);  
pointer = &value;  
printf("pointer: %p\n", pointer);
```

```
pointer: 0x0  
pointer: 0x7fff5fbff8b4
```

# Crash!

```
int *myPointer = NULL;  
*myPointer = 99;
```



# Crash!

```
int *myPointer = NULL;  
*myPointer = 99;
```

Dereferencing **NULL** will crash!

# Crash!

```
int *myPointer = NULL;  
*myPointer = 99;
```

Dereferencing **NULL** will crash!

Thread **1**: EXC\_BAD\_ACCESS (code=**1**, address=**0x0**)



# Crash Fix

```
int *myPointer = NULL;  
if(myPointer) { // if not NULL  
    *myPointer = 99;  
} else { // if NULL  
    printf("Error: Pointer not setup!\n");  
}
```

# Crash Fix

```
int *myPointer = NULL;  
if(myPointer) { // if not NULL  
    *myPointer = 99;  
} else { // if NULL  
    printf("Error: Pointer not setup!\n");  
}
```

Error: Pointer not setup!



# Review

- Memory
- Pointers
- NULL

