

Quick Review/Refresh: `sizeof` can take types, too!

$$\text{sizeof}(\text{uint8_t}) = \underline{\underline{1}}$$

$$\text{sizeof}(\text{char}*) = \underline{\underline{8}}$$

$$\text{sizeof}(\text{uint32_t}*) = \underline{\underline{8}}$$

$$\text{sizeof}(\text{uint32_t}) = \underline{\underline{4}}$$

$$\text{sizeof}(\text{char}) = \underline{\underline{1}}$$

```

1 #include <stdio.h>
2 #include <string.h>
3
4 char* concat(char a[], char b[]) {
5     int alen = strlen(a), blen = strlen(b);
6     char result[alen + blen + 1];
7     for(int i = 0; i < alen; i += 1) {
8         result[i] = a[i];
9     }
10    for(int i = 0; i < blen; i += 1) {
11        result[i + alen] = b[i];
12    }
13    result[alen + blen] = 0;
14    char* returnPtr = result;
15    return returnPtr;
16 }
17
18 int main() {
19     char like[] = "I like ";
20     char c1[] = "apples";
21     char c2[] = "CSE29";
22
23     printf("like: %p c1: %p c2: %p\n", like, c1, c2);
24
25     char* result1 = concat(like, c1);
26     char* result2 = concat(like, c2);
27     printf("%p %s\n", result1, result1);
28     printf("%p %s\n", result1, result2);
29     result2
30 }

```

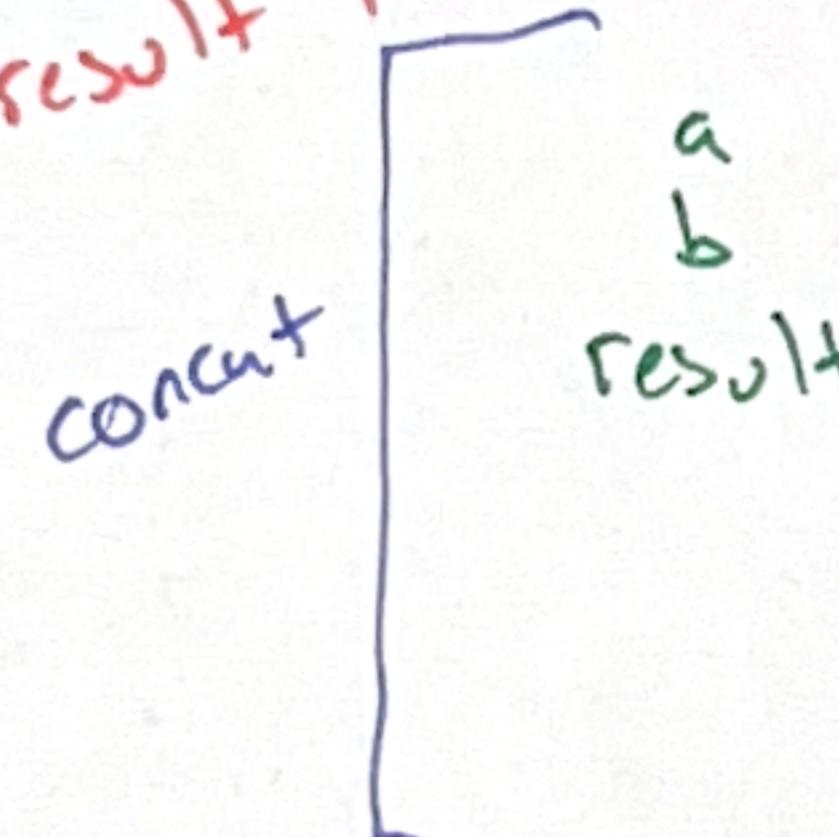
same printing

```

$ gcc -Wall concat-ptr.c -o concat-ptr
$ ./concat-ptr
like: 0x7ffc215ae970 c1: 0x7ffc215ae969 c2: 0x7ffc215ae963
0x7ffc215ae8e0 I like CSE29
0x7ffc215ae8e0 I like CSE29

```

Should not
return address
allocated on the stack
(instead, take a result param)



Variable/Role	Address	Data
	0x...88	
	0x...90	
	0x...98	
	0x...A0	
	0x...A8	
	0x...B0	
	0x...B8	
	0x...C0	
	0x...C8	
	0x...D0	0x...970
	0x...D8	0x...969
	0x...E0	I l i k e w a c
	0x...E8	S P E 2 9 \0
	0x...F0	
	0x...F8	
	0x...00	
	0x...08	
	0x...10	
	0x...18	
	0x...20	
	0x...28	
	0x...30	
	0x...38	
	0x...40	
result2	0x...48	0x...8e0 (stored @ line 26)
result1	0x...50	0x...8e0 (stored @ line 25)
	0x...58	
	0x...60	C S E 2 9
	0x...68	\0 a P P t e s \0
	0x...70	I L i k e \0
	0x...78	
	0x...80	

Why not `&result` on line 14?

Observation: 2 concurrent calls return
same address

Should print "I like apples" first

Could we return result directly?

If we do return result on line 14,
compiler gives a warning!

Warning: returning address of a stack-allocated
array.

Can I do

`char returnPtr[] = result;` X syntax error

This cannot be any
expression.

```
$ ls -l pa2  
$ cd  
$ git commit ...
```

bash
≡
shell

```
while(1) {  
    printf("$ ");  
    fgets(...)  
    // runs that command  
}
```