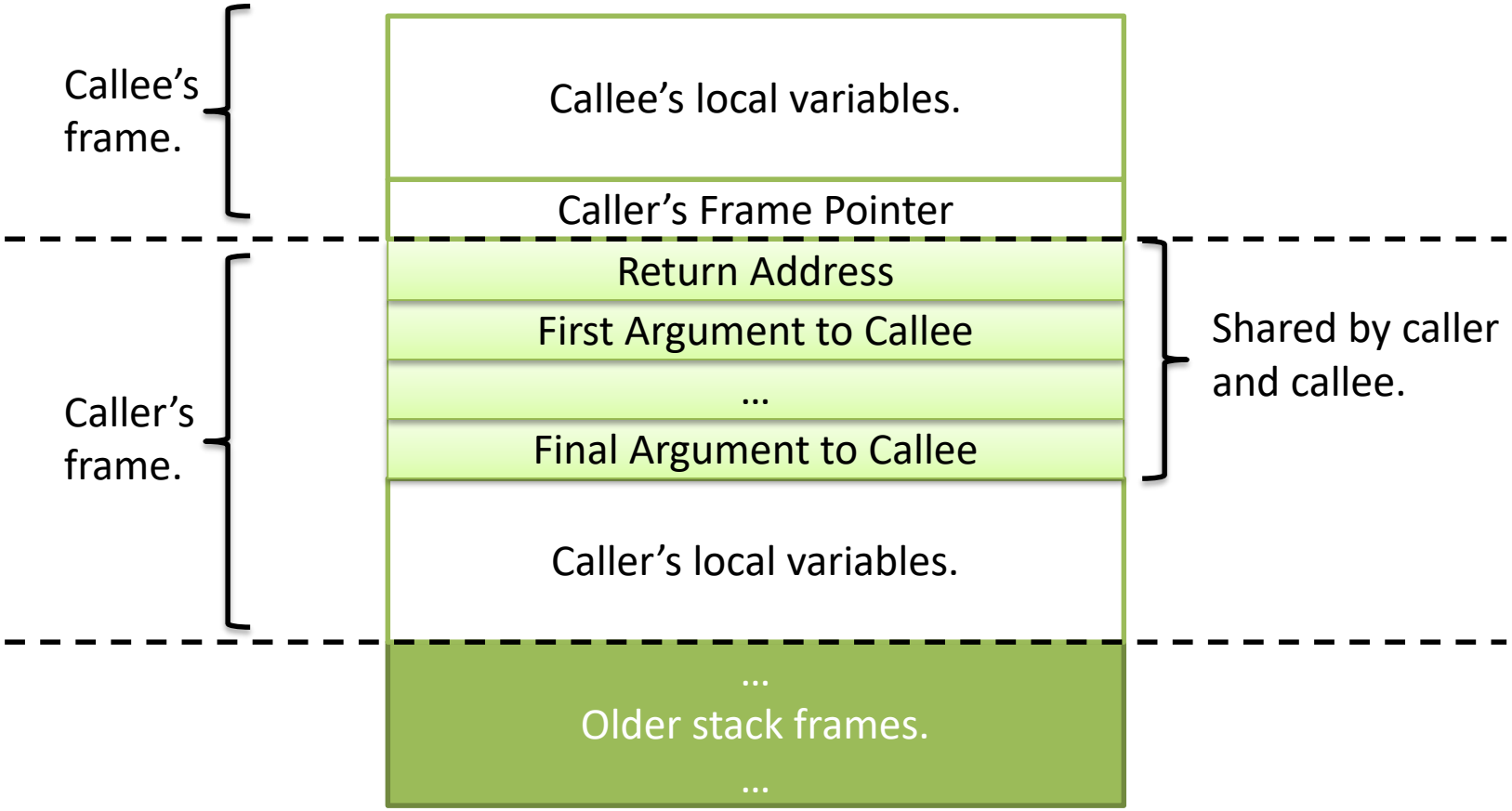
Buffer Overflows

Classic Security Vulnerability

- See “Smashing The Stack For Fun And Profit”



Classic Security Vulnerability

```
void func(char *user_input) {
     char name[100];
     …
}
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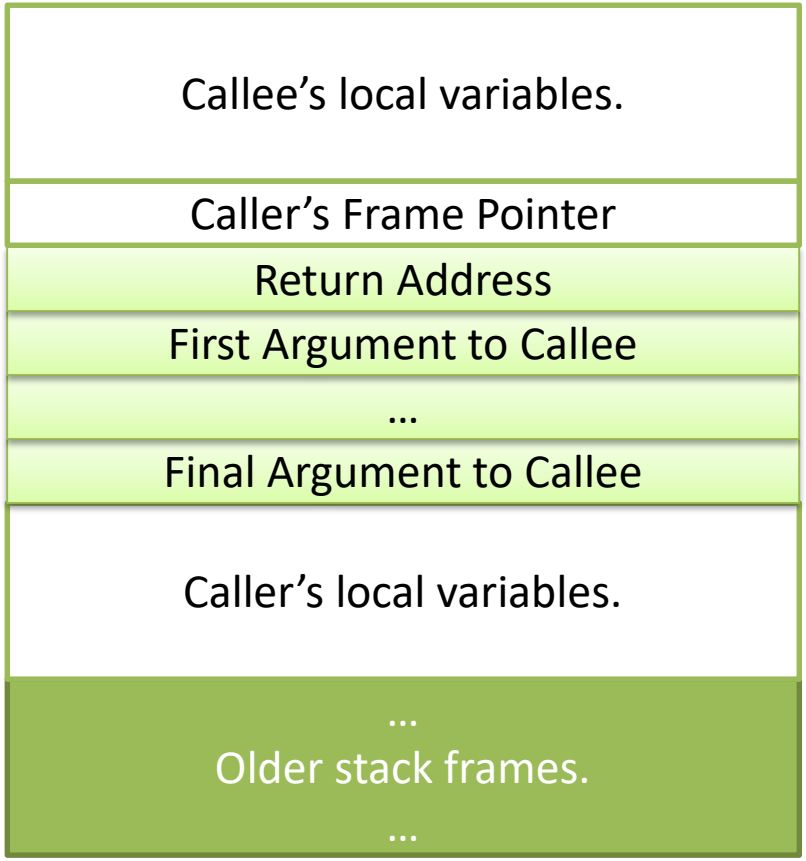

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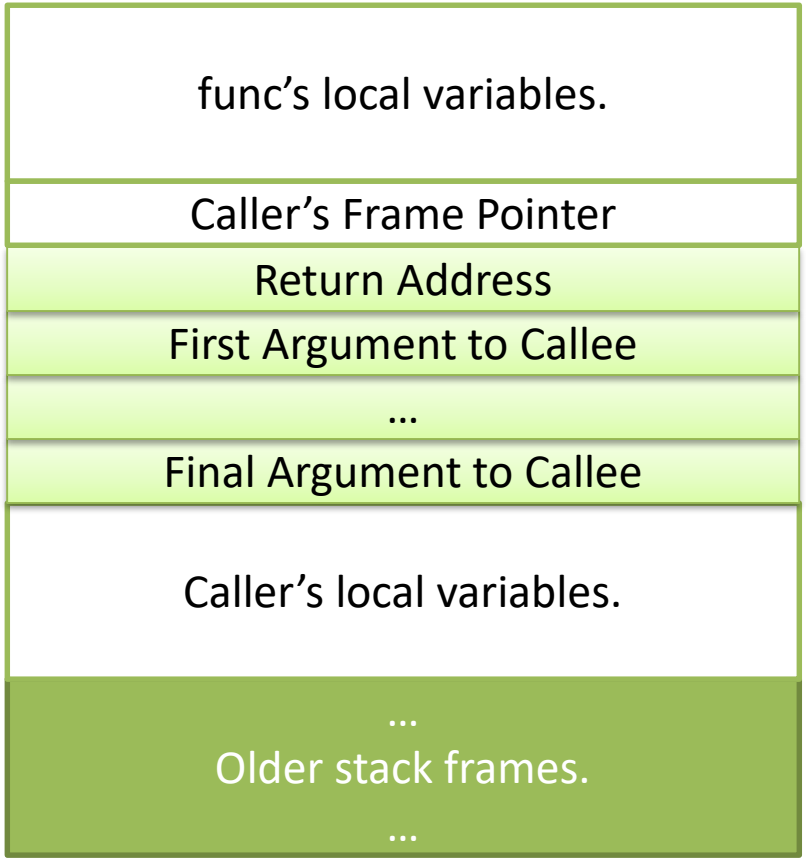

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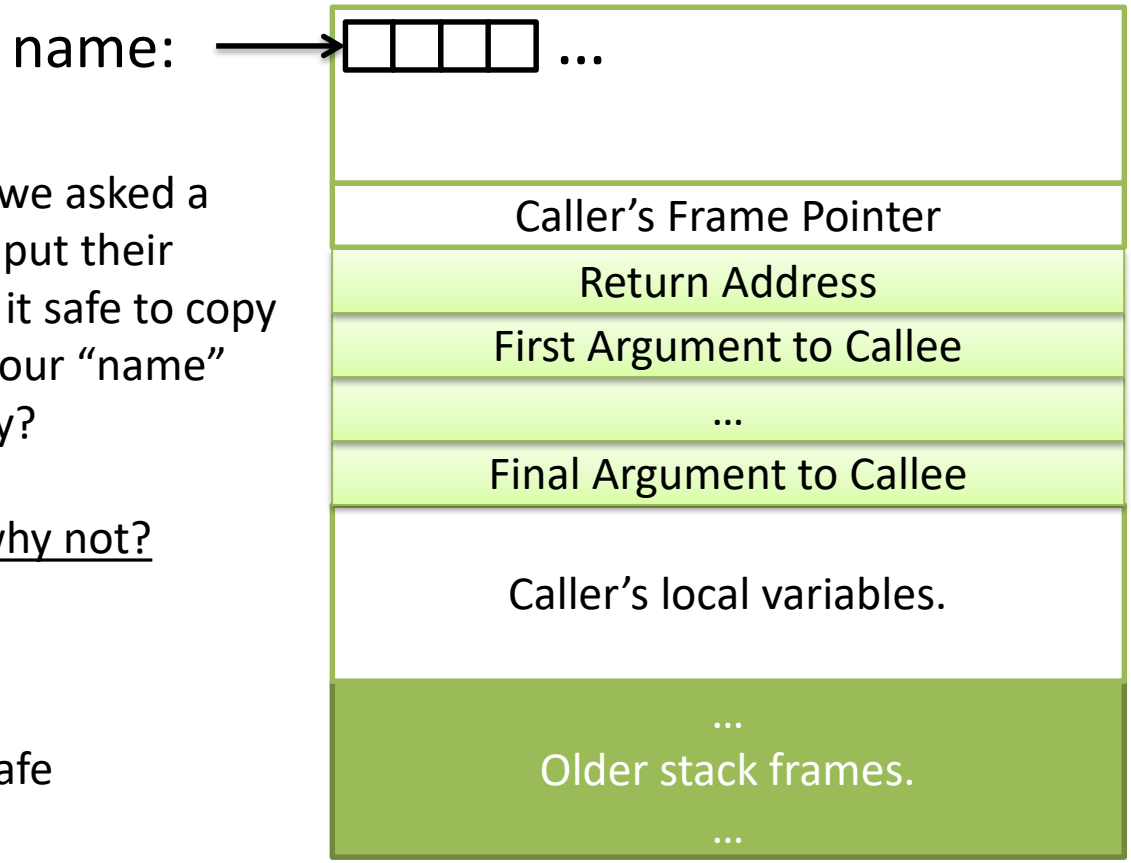


Suppose we asked a user to input their name. Is it safe to copy that into our "name" char array?

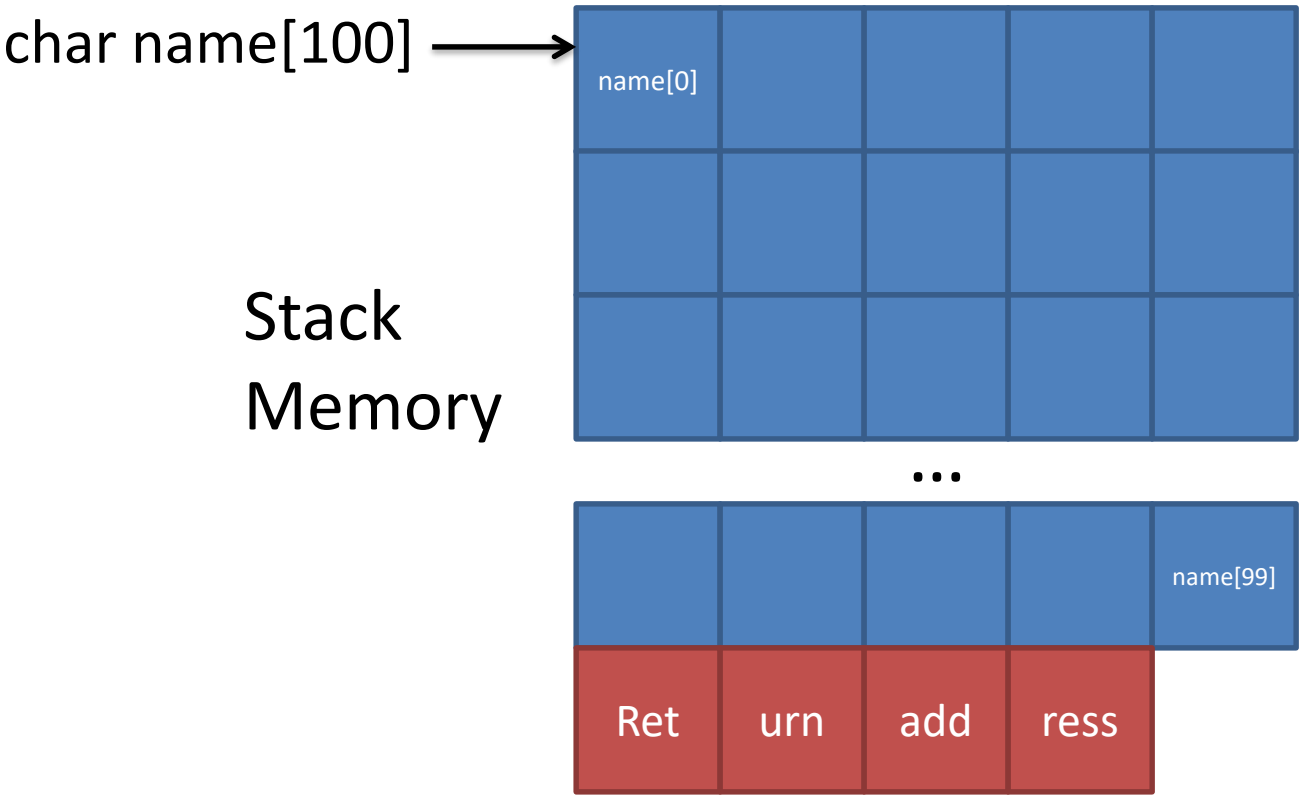
Why or why not?

A. Safe
B. Not safe

Is it safe? It depends…

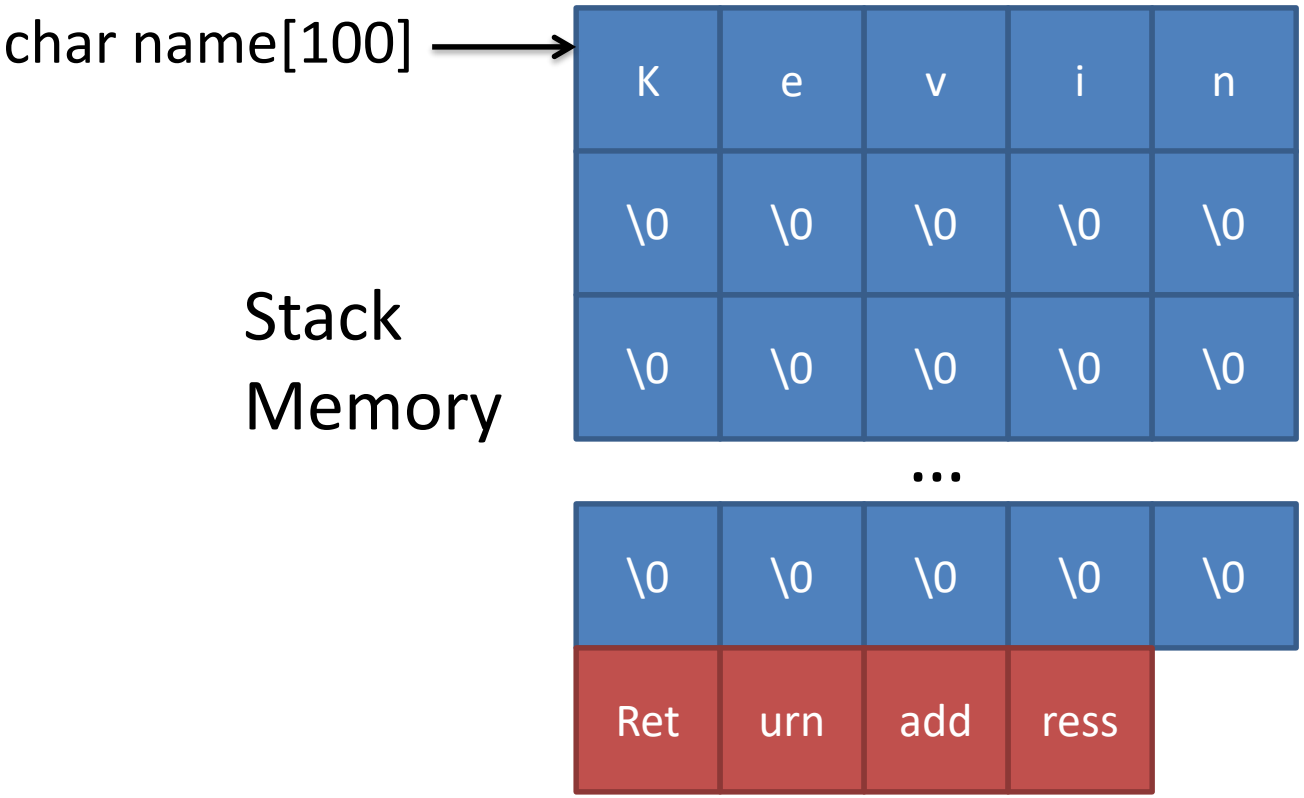
- What function are we using to do the copy?
  - strcpy? When does it stop copying?
- What happens if we copy too much?
  - Does C ensure that we don't go beyond the buffer?
  - Does strcpy?
  - What will we overwrite?
- Can we take advantage of that behavior?

A well intentioned program…



A well intentioned program…

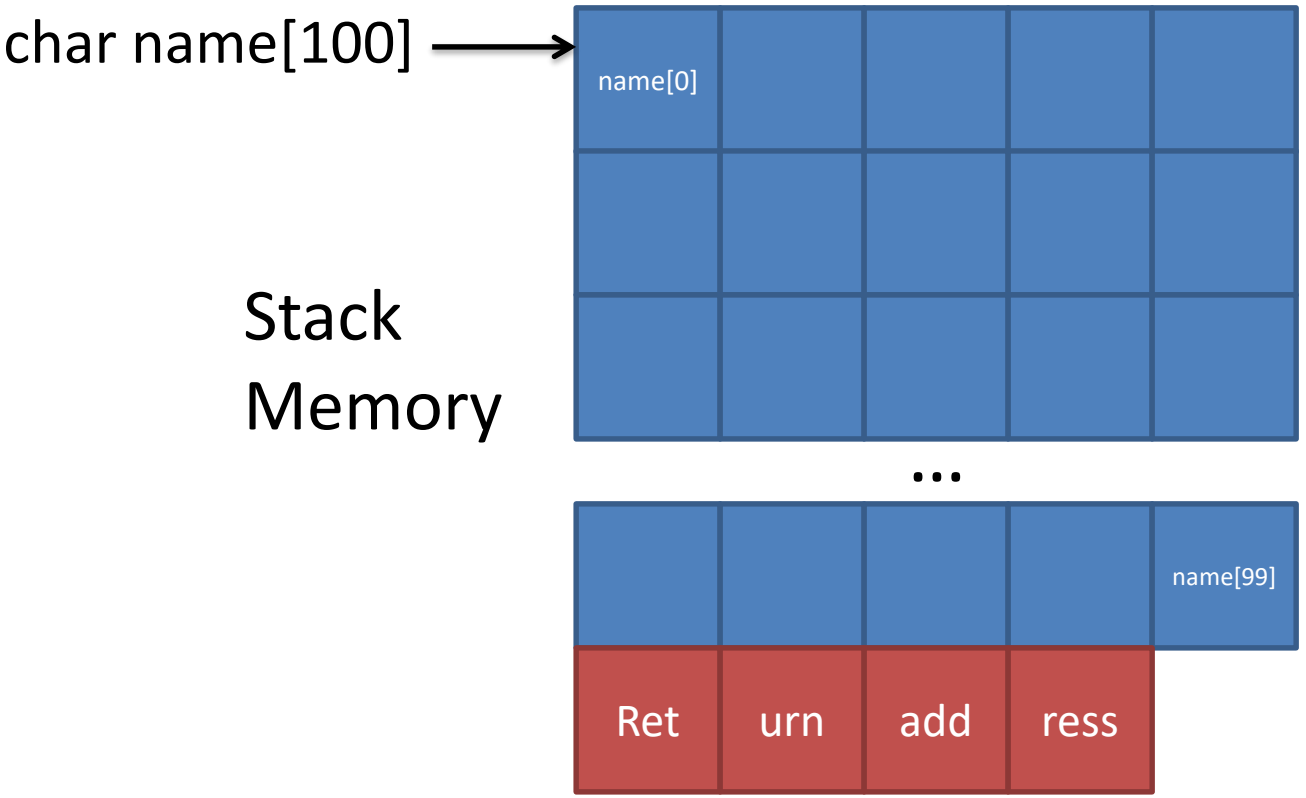
If used properly, with a reasonable name, no problem here.



A well intentioned program…

What if my cat steps on the keyboard and types in a name of:

asdfweffewaewerrr3f322frtfgfgdfgrgrdgrgdgvcdllliuiyytylj;jouiyiytuytrf
bbncbvcxvcxznv,mn.,n..,mloijuytytytgjkghgfgdfdtreyteretdgfhdjfsdfsds



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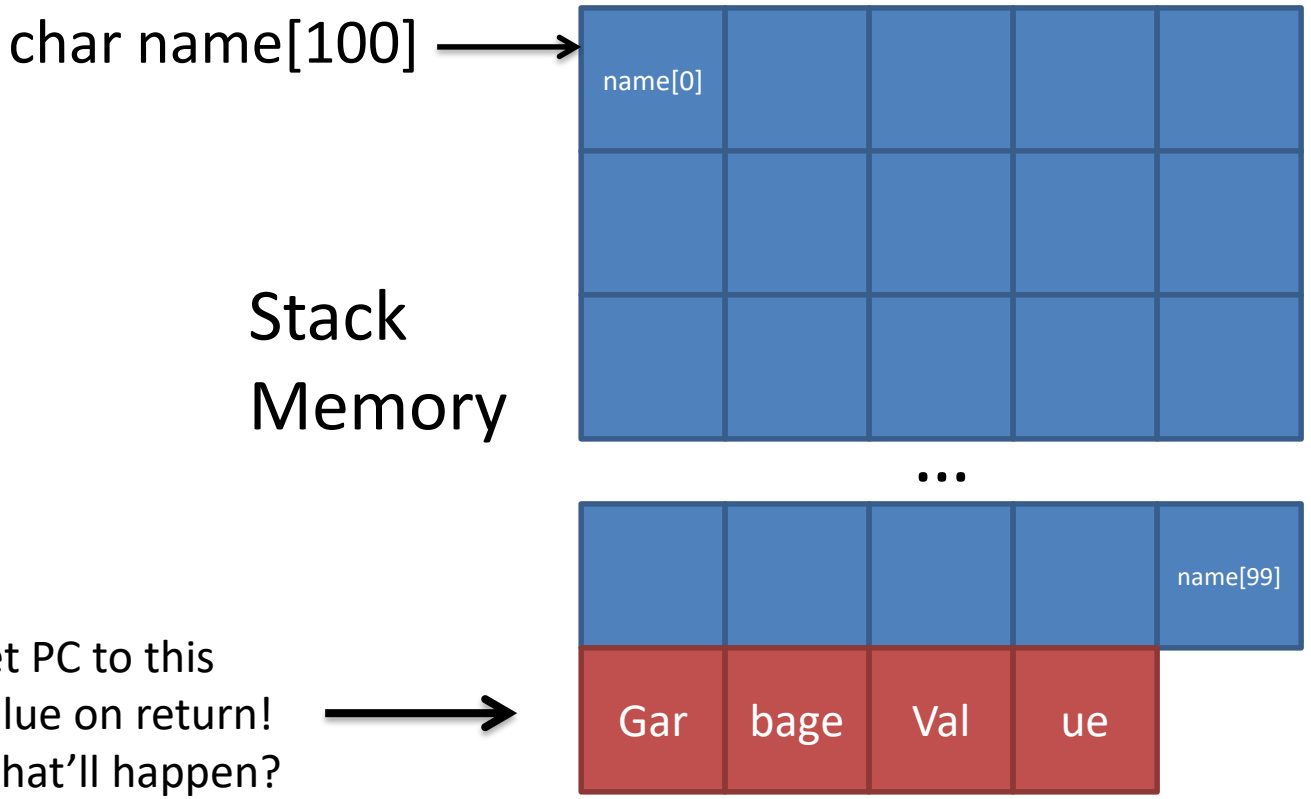
What if my cat steps on the keyboard and types in a name of:

asdfweffewaewerrr3f322frtfgfgdfgrgrdgrgdgvcdllliuiyytylj;jouiyiytuytrf
bbncbvcxvcxznv,mn.,n..,mloijuytytytgjkghgfgdfdtreyteretdgfhdjfsdfsds



Cat, performing the classic “Denial of Pizza” attack.

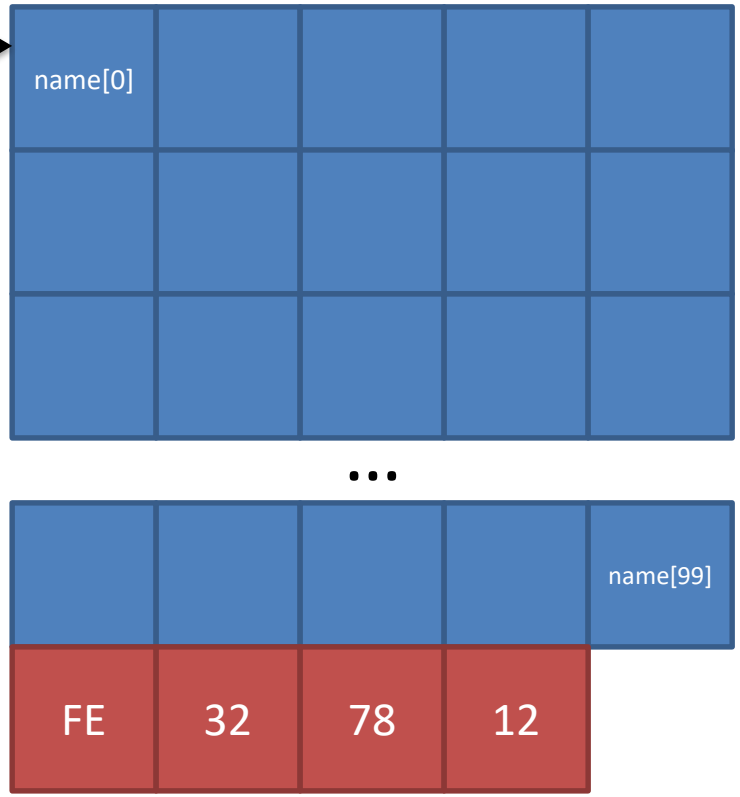
- Is crashing the program the worst we can do?

A well intentioned program…

Suppose I want to change the return address to do Evil™

Fake_name_that's_really_long_to_fill_100_characters____..____
_____0xFE327

char name[100] →



Stack Memory

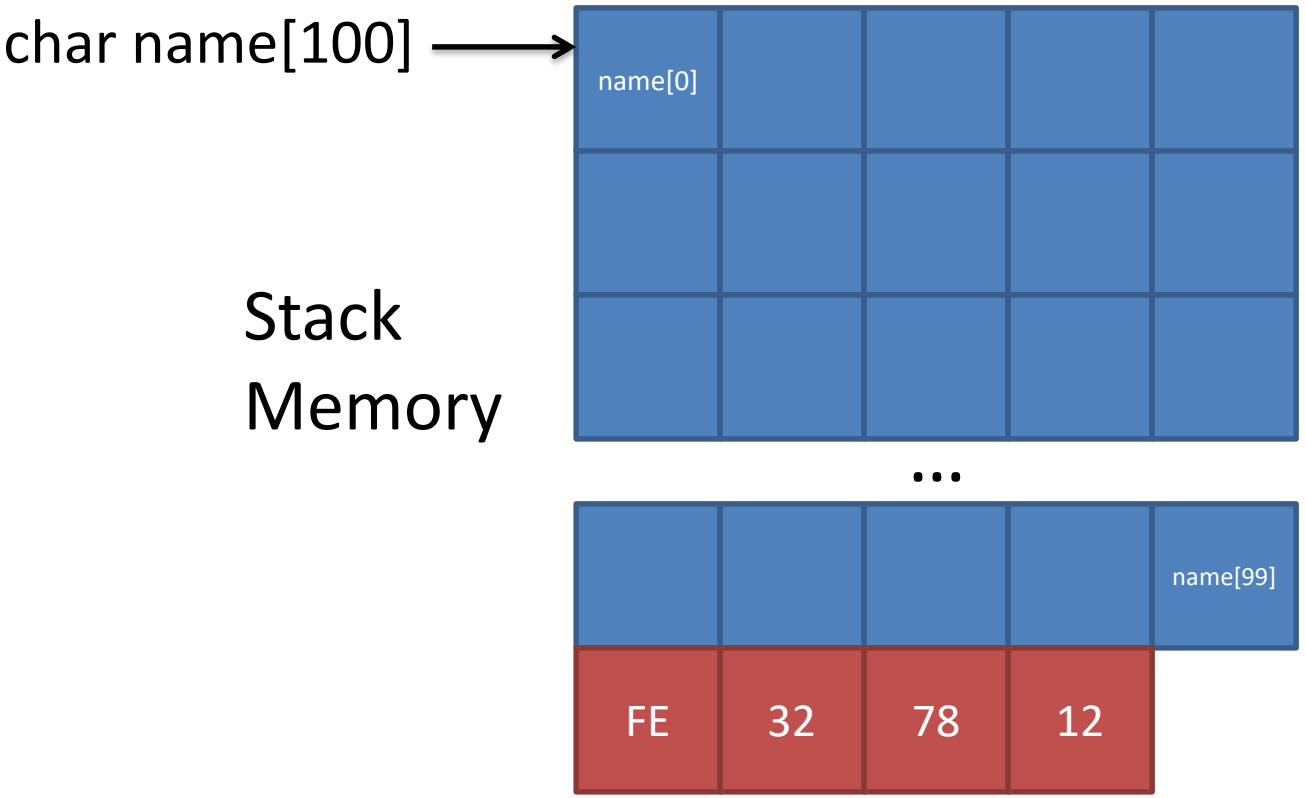
Set PC to this value on return! What'll happen?

Does this help me be evil?

A well intentioned program…

If I can set the return address to be an arbitrary pointer, I can control what gets executed next!

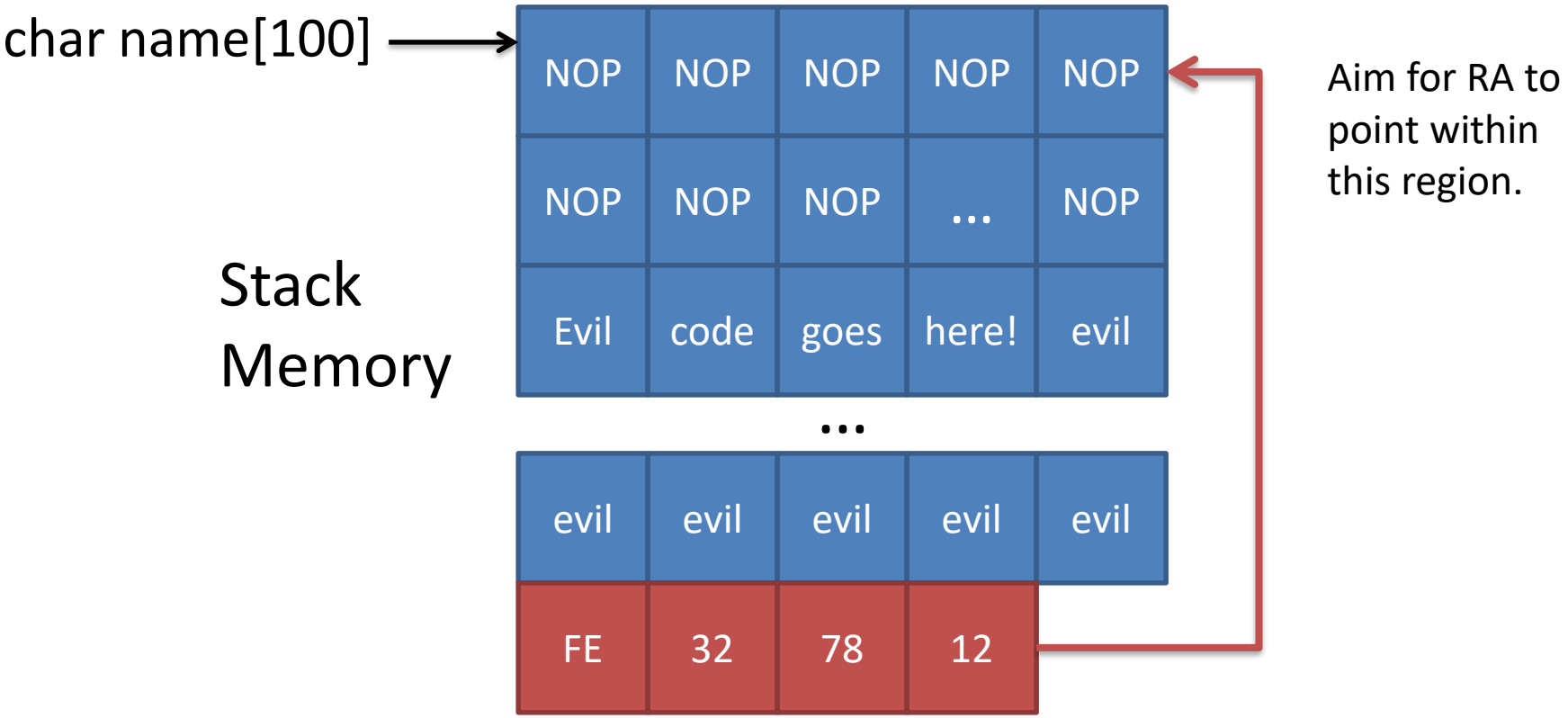
If only I could add my own instructions in memory somewhere…



A well intentioned program…

Suppose I want to change the return address to do Evil™

[Do nothing (NOP)]…[Do nothing (NOP)]
[Evil™ Code that sends all your secrets to me]0xFE327812



One careless strcat . . . Yours ?

Remember – Only you can

PREVENT BUFFER OVERFLOWS !

U. S. Department of Agriculture
Forest Service
State Forestry Department