x86 Function Call Conventions



Register use in the stack frame

%ESP - Stack Pointer

This 32-bit register always points to the last element used on the stack.

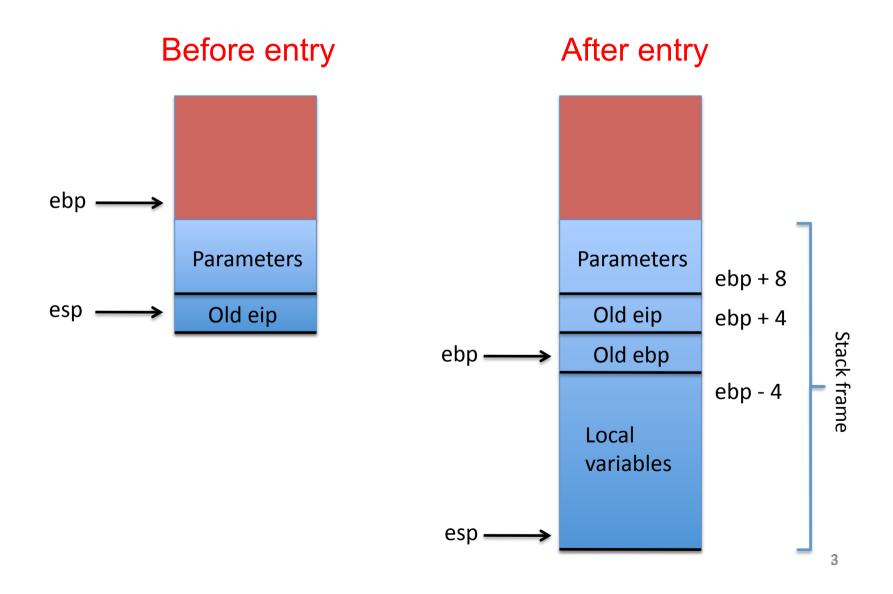
%EBP - Base Pointer

This 32-bit register is used to reference all the function parameters and local variables in the current stack frame.

%EIP - Instruction Pointer

This holds the address of the next CPU instruction to be executed. It is saved onto the stack as part of the CALL instruction.

Stack frame



Calling a function

- 1. Push parameters onto the stack, from right to left.
- 2. Call the function. The contents of the %EIP (instruction pointer) is pushed onto the stack. It points to the first byte *after* the CALL instruction.

Executing a function

3. Save and update the %ebp.

```
pushl %ebp
movl %esp, %ebp
```

- 4. Save CPU registers used for temporaries.
- 5. Allocate local variables.
- 6. Perform the function's purpose. Store return value, if any, in %eax.

- 7. Restore saved CPU registers.
- 8. Release local storage.
 movl %ebp, %esp
- 9. Restore the old base pointer. | leave popl %ebp
- 10. Return from the function.
- 11. Clean up pushed parameters.

 The *caller* must clean up the parameters pushed onto the stack.

An example

```
int main() {
    int i = 7;
    int j = 13;
    swap(&i, &j);
void swap(int *a, int *b) {
    int temp = *a;
    *a = *b;
   *b = temp;
```

Stack frame

