

Princeton University

COS 217: Introduction to Programming Systems

The System V AMD64 Function Call Conventions

When $f()$ calls $g()$:

Rule 1

Q: Where will $f()$ place its arguments and where will $g()$ find its parameters?

A: In registers RDI, RSI, RDX, RCX, R8, and R9, in that order.

Rule 2

Q: Where will $g()$ place its return **value** and where will $f()$ find that return **value**?

A: In register RAX.

Rule 3

Q: Where will $f()$ place the return **address** and where will $g()$ find that return **address**?

A: On the stack.

Rule 4

Q: Which registers may $g()$ affect?

A: **Callee-saved** registers (informally, the **g-saved** registers)

RBX, RBP, R12, R13, R14, R15

The callee/ g **may not** change the contents of those registers.

The callee/ g must either:

Not change the contents of those registers, or

Save the contents of those registers before it changes them, and restore the contents before it returns – thus giving the caller/ f the illusion that the contents of those registers were not changed.

Caller-saved registers (informally, the **f-saved** registers)

RDI, RSI, RDX, RCX, R8, R9, RAX, R10, R11

The callee/ g **may** change the contents of those registers.

If the caller/ f requires that the contents of those registers be preserved across its call of the callee/ g , then the caller/ f must do the preserving:

The caller/ f must save the contents of those registers before calling the callee/ g .

The caller/ f must restore the old contents of those registers after calling the callee/ g .