

Register Usage – Microsoft

<https://learn.microsoft.com/en-us/cpp/build/x64-software-conventions?view=msvc-170#x64-register-usage>

Register	Status	Use
rax	Volatile	Return value register
rcx	Volatile	First integer argument
rdx	Volatile	Second integer argument
r8	Volatile	Third integer argument
r9	Volatile	Fourth integer argument
r10:r11	Volatile	Must be preserved as needed by caller; used in syscall/sysret instructions
r12:r15	Nonvolatile	Must be preserved by callee
rdi	Nonvolatile	Must be preserved by callee
rsi	Nonvolatile	Must be preserved by callee
rbx	Nonvolatile	Must be preserved by callee
rbp	Nonvolatile	May be used as a frame pointer; must be preserved by callee
rsp	Nonvolatile	Stack pointer
xmm0, ymm0	Volatile	First FP argument; first vector-type argument when <code>__vectorcall</code> is used
xmm1, ymm1	Volatile	Second FP argument; second vector-type argument when <code>__vectorcall</code> is used
xmm2, ymm2	Volatile	Third FP argument; third vector-type argument when <code>__vectorcall</code> is used
xmm3, ymm3	Volatile	Fourth FP argument; fourth vector-type argument when <code>__vectorcall</code> is used
xmm4, ymm4	Volatile	Must be preserved as needed by caller; fifth vector-type argument when <code>__vectorcall</code> is used
xmm5, ymm5	Volatile	Must be preserved as needed by caller; sixth vector-type argument when <code>__vectorcall</code> is used
xmm6:xmm15, ymm6:ymm15	Nonvolatile (xmm), Volatile (upper half of ymm)	Must be preserved by callee. ymm registers must be preserved as needed by caller.

Register Usage – System V ABI / AMD64

<https://gitlab.com/x86-psABIs/x86-64-ABI>, p. 26

Register	Usage	Callee saved
%rax	temporary register; with variable arguments passes information about the number of vector registers used; 1st return register	No
%rbx	callee-saved register	Yes
%rcx	used to pass 4th integer argument to functions	No
%rdx	used to pass 3rd argument to functions; 2nd return register	No
%rsp	stack pointer	Yes
%rbp	callee-saved register; optionally used as frame pointer	Yes
%rsi	used to pass 2nd argument to functions	No
%rdi	used to pass 1st argument to functions	No
%r8	used to pass 5th argument to functions	No
%r9	used to pass 6th argument to functions	No
%r10	temporary register, used for passing a function's static chain pointer	No
%r11	temporary register	No
%r12–r14	callee-saved registers	Yes
%r15	callee-saved register; optionally used as GOT base pointer	Yes
%xmm0–%xmm1	used to pass and return floating point arguments	No
%xmm2–%xmm7	used to pass floating point arguments	No
%xmm8–%xmm15	temporary registers	No
%tmm0–%tmm7	temporary registers	No
%mm0–%mm7	temporary registers	No
%k0–%k7	temporary registers	No
%st0–%st1	temporary registers, used to return long double arguments	No
%st2–%st7	temporary registers	No
%fs	thread pointer	Yes
mxcsr	SSE2 control and status word	Partial
x87 SW	x87 status word	No
x87 CW	x87 control word	Yes
tilecfg	Tile control register	No