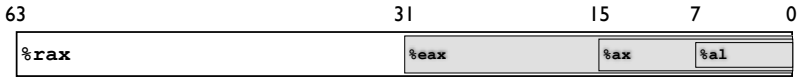
x86-64 registers

%rax	%eax	return value	%r8	%r8d	5th argument
%rbx	%ebx	callee saved	%r9	%r9d	6th argument
%rcx	%ecx	4th argument	%r10	%r10d	caller saved
%rdx	%edx	3rd argument	%r11	%r11d	caller saved
%rsi	%esi	2nd argument	%r12	%r12d	callee saved
%rdi	%edi	1st argument	%r13	%r13d	callee saved
%rsp	%esp	stack pointer	%r14	%r14d	callee saved
%rbp	%ebp	frame pointer	%r15	%r15d	callee saved



Moving data

movq *source*, *destination*

	Source	Destination	Example	C Analog
movq	Immediate	Register	movq $0x1A, %rax	t = 0x1A;
		Memory	movq $42, (%rax)	*p = 42;
	Register	Register	movq %rax, %rdx	x = y;
		Memory	movq %rax, (%rdx)	*p = y;
	Memory	Register	movq (%rax), %rdx	x = *p;

Data types

C	Name	Suffix	Size (bytes)
char	Byte	b	1
short	Word	w	2
int	Double word	l	4
long	Quad word	q	8
char *	Quad word	q	8
float	Single precision	s	4
double	Double precision	l	8

Operand forms

type	form	value	name
immediate	$imm	imm	immediate
register	r_a	$R[r_a]$	register
memory	imm	M[imm]	absolute
memory	(r_a)	$M[r_a]$	indirect
memory	imm(r_a)	$M[imm + r_a]$	base + displacement
memory	(r_b, r_i)	$M[R[r_b] + R[r_i]]$	indexed
memory	imm(r_b, r_i)	$M[imm + R[r_b] + R[r_i]]$	indexed
memory	(, r_i, s)	$M[R[r_i] * s]$	scaled indexed
memory	imm(, r_i, s)	$M[imm + R[r_i] * s]$	scaled indexed
memory	(r_b, r_i, s)	$M[R[r_b] + R[r_i] * s]$	scaled indexed
memory	imm(r_b, r_i, s)	$M[imm + R[r_b] + R[r_i] * s]$	scaled indexed

Integer arithmetic operators

Instruction		Effect	Description
lea	S, D	D ← &S	Load effective address
inc	D	D ← D+1	increment
dec	D	D ← D-1	decrement
neg	D	D ← -D	negate
not	D	D ← ~D	compliment
add	S, D	D ← D + S	add
sub	S, D	D ← D - S	subtract
imul	S, D	D ← D * S	integer multiply
xor	S, D	D ← D ^ S	exclusive or
or	S, D	D ← D | S	or
and	S, D	D ← D & S	and
sal	k, D	D ← D << k	left shift
shr	k, D	D ← D << k	left shift (same as sal)
sar	k, D	D ← D $>>_A$ k	arithmetic right shift
shr	k, D	D ← D $>>_L$ k	logical right shift

Condition codes

Flag	Meaning	Description
CF	Carry flag	There was a carry out from the last bit
ZF	Zero flag	The last result was zero
SF	Sign flag	The last result was negative
OF	Overflow flag	The last result had two's compliment overflow

Codes set by

- integer arithmetic operations except lea
- cmp *A*, *B*: subtracts B - A and doesn't store result
- test *A*, *B*: ANDs A & B and doesn't store result

Jump instructions

Instruction	Synonym	Condition	Description
jump *label*			Direct jump
jump *Operand*			Indirect jump
je *Label*	jz	ZF	Equal / zero
jne *Label*	jnz	~ZF	No equal/ not zero
js *Label*		SF	Negative
jns *Label*		~SF	Nonnegative
jg *Label*	*jnle*	~(SF ^ OF)& ~ZF	Greater than
jge *Label*	jnl	~(SF ^ OF)	Greater than or equal
jl *Label*	jnge	(SF ^ OF)	Less than
jle *Label*	*jng*	(SF ^ OF) | ZF	Less than or equal
ja *Label*	jnbe	~CF & ~ZF	Above (unsigned >)
jae *Label*	jnb	~CF	Above or equal
jb *Label*	jnae	CF	Below (unsigned <)
jbe *Label*	jna	CF | ZF	Below or equal