Data transfer

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo

mov S, D
reg, reg
reg, mem
mem, reg
imd, reg
imd, mem
	D = S	---------	
			mov %rcx, %rax
			mov %rdx, i
			movw table(%rdi), %cx
			mov $stack_top, %rsp
			movq $1 << 3, mask

movasb I, R			movabsq $0xFEDCBA9876543210, %r10

movsx S, R
reg8, reg16
reg8, reg32
reg8, reg64
reg16, reg32
reg16, reg64
mem8, reg16
mem8, reg32
mem8, reg64
mem16, reg32
mem16, reg64
	low(R) = low(S)
	if (high_bit(S) == 0)
	high(R) = 0
	else
	high(R) = ~0
		--------- 	
			movsbw %dl, %cx
			movsbl %al, %eax
			movsbq %dl, %rax
			movswl %ax, %eax
			movswq %dx, %rax
			movsbw char, %r10w
			movsbl char, %r10d
			movsbq (%rbx),%r10
			movswl mask, %eax
			movswq i, %r12

movslq S32, R64 **movsxd S32, R64** reg32, reg64 mem32, reg64		---------	 movslq %eax, %r15 movsxd %eax, %r15 movsxd var, %r10
movzx S, R reg8, reg16 reg8, reg32 reg8, reg64 reg16, reg32 reg16, reg64 mem8, reg16 mem8, reg32 mem8, reg64 mem16, reg32 mem16, reg64	low(S) = low(S) high(D) = 0	---------	 movzbw %dl, %cx movzbl %al, %eax movzbq %dl, %rax movzwl %ax, %eax movzwq %dx, %rax movzbw char, %r10w movzbl char, %r10d movzbq (%rbx),%r10 movzwl mask, %eax movzwq i, %r12
push S reg64 mem64 imd	rsp = rsp - 8 [rsp] = S	---------	 push %rax push (%rbx) push $0
pop D reg64 mem64	D = [rsp] rsp = rsp + 8	---------	 pop %rdx pop i
xchg D, R mem, reg reg, reg	temp = D D = S S = temp	---------	 xchg var, %rsi xchg %al, %bl
lea M, D mem, reg	Load effective address D = address(M)	---------	 lea i, %rax lea base(%rbp, %rsi, 8), %rbx
cmovXX S, R reg, reg mem, reg	Conditional move R = (XX is true) ? S : R	---------	 cmovXX %rax, %rdx cmovXX var, % ax
in port, acc imd8, acc dx, acc	input byte, word or dword AL = [port]	---------	 in $0xfa, %al in %dx, %ax
out acc, port acc, imd8 acc, dx	output byte, word or dword [port] = acc	---------	 out %ax, $0x44 out %eax, %dx

Flag Manipulation

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
lahf	AH = EFLAGS & 0x1f 7 6 4 2 0 = S Z A P C	---------	lahf
sahf	EFLAGS |= AH & 0xd5 S Z A P C = 7 6 4 2 0	----MMMMM	sahf
pushf	rsp = rsp - 8 ; [rsp] = RFLAGS	---------	pushf
popf	RFLAGS = [rsp]; rsp = rsp + 8	MMMMMMMMM	popf
clc	CF = 0	--------0	clc
cmc	CF = ~CF	--------M	cmc
stc	CF = 1	--------1	stc
cld	DF = 0	-0-------	cld
std	DF = 1	-1-------	std
cli	IF = 0	--0------	cli
sti	IF = 1 depois de executar a próxima instrução	--1------	sti
setXX dst reg8 mem8	Conditional byte set dst = XX is true	---------	 setXX %al setXX res

Arithmetic

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo

add S, D
reg, reg
mem, reg
reg, mem
imd8/16/32, reg
imd8/16/32, mem
	D = D + S	M---MMMMM	
			add %rcx, %rax
			add name(%rbx), %r8
			add %bl, temp
			add $1, %cl
			addq $2, alpha

adc S, D reg, reg mem, reg reg, mem imd8/16/32, reg imd8/16/32, mem	Adição com carry D = D + S + CF	M---MMMMM	 adc %rsi, %rax adc beta(%rsi), %rdx adc %rdi, key(%rsi) adc $256, %rbx adcq $0x30, gamma
inc D reg mem	D = D + 1	M---MMMMM	 inc %rbx incq alpha(%rdi)

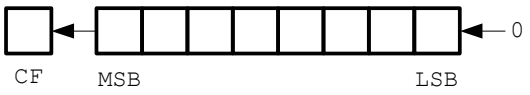
sub S, D
reg, reg
mem, reg
reg, mem
imd8/16/32, reg
imd8/16/32, mem
	D = D - S	M---MMMMM	
			sub %rcx, %rdx
			sub math(%rsi,%rbx,2), %r10
			sub %cl, 2(%rbx)
			sub $5280, %r14
			subq $1000, amount

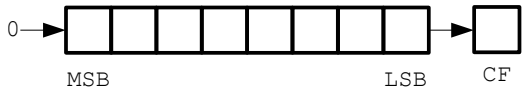
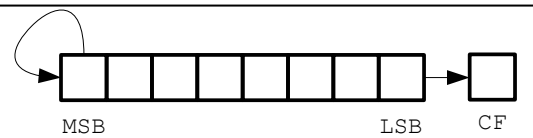
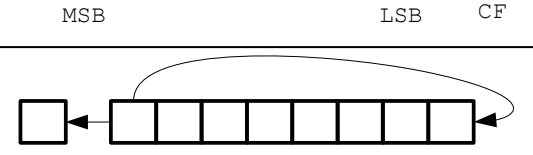
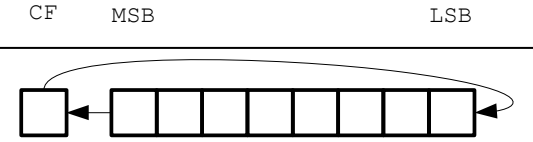
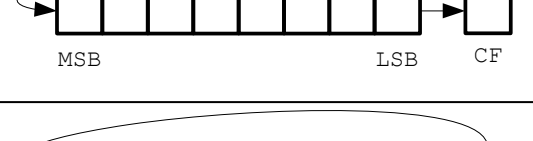
sbb S, D reg, reg mem, reg reg, mem imd8/16/32, reg imd8/16/32, mem	Subtracção com borrow D = D - S - CF	M---MMMMM	 sbb %r12, %r11 sbb pay(,%rsi, 4), %rdi sbb %rax, balance sbb $1, %cl sbbb $10, count(%rsi)
dec D Reg mem	D = D - 1	M---MMMMM	 dec %al decw array(%rdi)
neg D reg mem	D = -D	M---MMMMM	 neg %al negl multiplier

cmp S, D
reg, reg
mem, reg
reg, mem
imd8/16/32, reg
imd8/16/32, mem
	Flags modificadas de acordo com o resultado da operação D - S	M---MMMMM	
			cmp %cx, %bx
			cmp alpha, %dl
			cmp %si, 2(%rbp)
			cmp $2, %bl
			cmpq $0x3420, x(%rbx)

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
div op **idiv op** reg8 mem8 reg16 mem16 reg32 mem32 reg64 mem64	Divisão de números sem sinal Divisão de números com sinal AL = AX / byte AH = AX % byte AX = DX:AX / word DX = DX:AX % word EAX = EDX:EAX / dword EDX = EDX:EAX % dword RAX = RDX:RAX / qword RDX = RDX:RAX % qword	U---UUUUU	 div %cl divb alpha div %bx divw table(%rsi) div %ebx divl (%rsi) div %rbx divq (%rsi)
mul op reg8 mem8 reg16 mem16 reg32 mem32 reg64 mem64	Multiplicação de números sem sinal AX = AL * op (byte) DX:AX = AX * op (word) EDX:EAX = EAX * op (dword) RDX:RAX = RAX * op (qword)	M---UUUUM	 mul %bl mulb month(%rsi) mul %cx mulw baund_rate mul %ebx mull (%rsi) mul %rbx mulq (%rsi)
imul **[[op3],op2],op1** reg8 mem8 reg16 mem16 reg32 mem32 reg64 mem64 reg, reg mem, reg imd, reg imd, reg, reg imd, mem, reg	Multiplicação de números com sinal AL = AL * op1 (byte) DX:AX = AX * op1 (word) EDX:EAX = EAX * op1 (dword) RDX:RAX = RAX * op1 (qword) op1 = op1 * op2 op1 = op2 * op3	M---UUUUM	 imul %cl imulb rate imul %bx imulw red(%rbp, %rdi) imul %ebx imulw (%rsi) imul %r10 imulq (%r10) imul %rax, %rbx imul m, %r14 imul $5, %r12 imul $54, %ax, %bx imul $3, n, %r13
cbw	Estende o sinal de AL para AX	---------	cbw
cwde	Estende o sinal de AX para EAX	---------	cwde
cdqe/cltq	Estende o sinal de EAX para RAX	---------	cdqe
cwd	Estende o sinal de AX para DX:AX	---------	cwd
cdq/cltd	Estende o sinal de EAX para EDX:EAX	---------	cdq
cqo/cqto	Estende o sinal de RAX para RDX:RAX	---------	cqo

Shift

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
shld count, R, D imd, reg, reg imd, reg, mem CL, reg, reg CL, reg, mem	temp = count & 1fh (3fh) value = concatenate(D, R) value = value << temp D = value >> 32 (64)	---------	 mov (%rsi), %rax shld $7, %rax, 8(%rsi)
shrd count, R, D imd, reg, reg imd, reg, mem CL, reg, reg CL, reg, mem	temp = count & 1fh (3fh) value = concatenate(R, D) value = value >> temp D = value	---------	 shrd $33, %r10, %r11 shrd %cl, %r10, var
sal/shl count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	 sal %cl, %rdi shl $5, %ax sal %cl, stor_cnt shlq $3, status(%rbx)

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
shr count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	shr %cl, %rsi shr $1, %si shrb %cl, input shrq $1, by(%rsi, %rbx)
sar count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	sar %cl, %di sar $1, %dx sarw %cl, n_blocks sarb $2, n_blocks
rol count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	rol %cl, %di rol $1, %bx rolq %cl, alpha rolb $2, byte(%rdi)
rcl count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	rcl %cl, %al rcl $1, %cl rclq %cl, parm(%r13) rclq $4, alpha
ror count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	ror %cl, %bx ror $2, %al rorb %cl, cmd_word rorl $2, port_stat
rcr count,D CL, reg imd8, reg CL, mem imd8, mem		M-------M	rcr %cl, %bl rcr $10, %bx rcr %cl, array(%r14) rcrq $24, (%r12)

Logic

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
and S, D reg, reg mem, reg reg, mem imd8/16/32, reg imd8/16/32, mem	D = D & S (and bit a bit)	0---MMUM0	and %al, %bl and flag_word, %rcx and %al, ascii(%rdi) and $0xf0, %cl andq $3, beta
test S, D reg, reg mem, reg reg, mem imd8/16/32, reg imd8/16/32, mem	Flags modificadas de acordo com a operação D & S (and bit a bit)	0---MMUM0	test %si, %di test end_cnt, %rax testw $0xCC4, (%r15) testq $1, retcode
or S, D reg, reg mem, reg reg, mem imd8/16/32, reg imd8/16/32, mem	D = D | S (or bit a bit)	0---MMUM0	or %dl, %al or prtid(%rdi), %r14 or %cl, flag_byte or $1, %cx orq $0xcf, car(%rbx)
xor S,D reg, reg mem, reg reg, mem imd8/16/32, reg imd8/16/32, mem	D = D ^ S (xor bit a bit)	0---MMUM0	xor %rbx, %r10 xor mask_byte, %dl xor %rdx, alpha(%rsi) xor $0xc2, %rsi xorq $0xff, retcode
not D reg mem	D = ~D (inverte bit a bit)	---------	not %rax notw charater

String manipulation

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
rep	CX = CX - 1 Repete operação de string enquanto CX <> 0	---------	rep movsq
repe/repz	CX = CX - 1 Repete operação CMPS ou SCAS se CX <> 0 && ZF == 1	---------	repe cmpsq
repne/repnz	CX = CX - 1 Repete operação CMPS ou SCAS se CX <> 0 && ZF == 0	---------	repne cmpsb
movs movsb movsw movsd movsq	Move string b? n=1 : w? n=2 : d? n=4 : q? n=8 [RDI] = [RSI] if (DF == 0) {ESI += n; EDI += n} else {ESI -= n; EDI -= n}	---------	rep movsb
cmps cmpsb cmpsw cmpsd cmpsq	Compara strings b? n=1 : w? n=2 : d? n=4 : q? n=8 [RDI] - [RSI] if (DF == 0) {RSI += n; RDI += n} else {RSI -= n; RDI -= n}	M---MMMMM	rep cmpsb
scas scasb scasw scasd scasq	Scan string scasb n = 1; scasw n = 2; scasd n = 4; scasq n = 8 al, ax, eax or rax - [RDI] if (DF == 0) RDI += n; else RDI -= n	M---MMMMM	repne scasq
lods lodsb lodsw lodsd lodsq	Load string b? n=1 : w? n=2 : d? n=4 : q? n=8 al, ax, eax or rax = [RSI] if (DF == 0) RSI += n; else RSI -= n	---------	rep lods
stos stosb stosw stosd stosq	Store string stosb n = 1; stosw n = 2; stosd n = 4; stosq n = 8 ES:[EDI] = al, ax, eax or rax if (DF == 0) EDI += n; else EDI -= n	---------	rep stos
ins insb insw insd insq	Input string from I/O port b? n=1 : w? n=2 : d? n=4 : q? n=8 [RDI] = port(DX) if (DF == 0) RDI += n; else RDI -= n	---------	rep insb
outs outsb outsw outsd outsq	Output string to I/O port b? n=1 : w? n=2 : d? n=4 : q? n=8 port(DX) = [RSI] if (DF == 0) RSI += n; else RSI -= n	---------	rep outsb
xlat xlatb	AL = [EBX + AL]	---------	xlatb

Bit manipulation

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo

bsf target, index
reg, reg
mem, reg
	Scan bit forward
	for(i = 0; target[i] == 0 &&
	i <= 15(31)(63); i++);
	index = i;
		U---UMUUU	bsf %rcx, %rax
			bsf var, %ax

bsr target, index
reg, reg
mem, reg
	Scan bit reverse
	for(i = 15(31)(63);
	target[i] == 0 && i >= 0; i--);
	index = i;
		U---UMUUU	bsr %rcx, %rax
			bsr var, %ax

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
bt index, target imd8, reg imd8, mem reg, reg reg, mem	Test bit CF = target[index]	U---UUUUM	
btc index, target imd8, reg imd8, mem reg, reg reg, mem	Test bit and complement CF = target[index] target[index] = ~ target[index]	U---UUUUM	
btr index, target imd8, reg imd8, mem reg, reg reg, mem	Test bit and reset CF = target[index] target[index] = 0	U---UUUUM	
bts index, target imd8, reg imd8, mem reg, reg reg, mem	Test bit and set CF = target[index] target[index] = 1	U---UUUUM	

Control transfer

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
jmp target label reg mem	RIP += offset8(16)(32) RIP = reg RIP = [mem]	---------	jmp .L1 jmp *%rbx jmp *switch(%rsi)
call target label reg mem	push RIP; RIP += offset16(32) push RIP; RIP = reg push RIP; RIP = [mem]	---------	call strcpy call *%rbx call *table(%rsi)
ret [count]	pop RIP pop RIP; RSP = RSP + count	---------	ret ret $4
jXX disp disp8 disp64	if (XX is true) RIP += disp	---------	jXX label
jcxz disp disp8	Jump if CX is zero if (CX == 0) RIP += disp	---------	jcxz count_done
jecxz disp disp8	Jump if ECX is zero if (ECX == 0) RIP += disp	---------	jecxz count_done
jrcxz disp disp8	Jump if RCX is zero if (RCX == 0) RIP += disp	---------	jrcxz count_done
loop disp disp8	RCX = RCX - 1; if (RCX != 0) RIP += disp	---------	loop again
loope/loopz disp disp8	RCX = RCX - 1; if (RCX != 0 && ZF == 1) RIP += disp	---------	loope again
loopne/loopnz disp disp8	rCX = RCX - 1; If (RCX != 0 && ZF == 0) RIP += disp	---------	loopne again

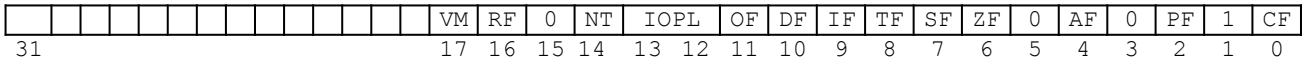
enter level, size
imd8, imd16
	level = level & 0x1f
	push rbp
	temp = rsp
	if (level > 0) {
	for (i = 1; i < level; i++) {
	rbp = rbp – 8
	push [rbp]
	}
	push temp
	}
	rbp = temp
	esp = esp – size
		--------- 		

Sintaxe	Descrição	Flags ODITSZAPC	Exemplo
leave	mov RSP, RBP pop RBP	---------	

Condições

Mnemónica	Descrição	Condição
g / nle	greater / not less or equal (operandos com sinal)	SF == OF && ZF == 0
ge / nl	greater or equal / not less (operandos com sinal)	SF == OF
l / nge	less / not greater nor equal (operandos com sinal)	SF != OF
le / ng	less or equal / not greater (operandos com sinal)	SF != OF || ZF == 1
a / nbe	above / not below nor equal (operandos sem sinal)	CF == 0 && ZF == 0
ae / nb	above or equal / not below (operandos sem sinal)	CF == 0
b / nae	below / not above nor equal (operandos sem sinal)	CF == 1
be / na	below or equal / not above (operandos sem sinal)	CF == 1 || ZF == 1
p / pe	parity / parity even	PF == 1
np / po	not parity / parity odd	PF == 0
o	overflow	OF == 1
no	not overflow	OF == 0
s	sign	SF == 1
ns	not sign	SF == 0
e / z	equal / zero	ZF == 1
ne / nz	not equal / not zero	ZF == 0
c	carry	CF == 1
nc	not carry	CF == 0

Formato do registo EFlags



	estende a zero com operandos a 32 bit				8-bit	16-bit	32-bit	64-bit
valor de retorno			AH	AL	AL	AX	EAX	RAX
[1]salvar antes de usar			BH	BL	BL	BX	EBX	RBX
4º. argumento			CH	CL	CL	CX	ECX	RCX
3º. argumento			DH	DL	DL	DX	EDX	RDX
2º. argumento				SIL	SIL	SI	ESI	RSI
1º. argumento				DIL	DIL	DI	EDI	RDI
[1]salvar antes de usar				BPL	BPL	BP	EBP	RBP
stack pointer				SPL	SPL	SP	ESP	RSP
5º. argumento				R8B	R8B	R8W	R8D	R8
6º. argumento				R9B	R9B	R9W	R9D	R9
[2]salvar antes de chamar				R10B	R10B	R10W	R10D	R10
[2]salvar antes de chamar				R11B	R11B	R11W	R11D	R11
[1]salvar antes de usar				R12B	R12B	R12W	R12D	R12
[1]salvar antes de usar				R13B	R13B	R13W	R13D	R13
[1]salvar antes de usar				R14B	R14B	R14W	R14D	R14
[1]salvar antes de usar				R15B	R15B	R15W	R15D	R15
	63 32	31 16	15 8	7 0				
	0	EFLAGS				RFLAGS		
						RIP		

(1) – *calee saved*

(2) – *caller saved*