

Operand Forms			Arithmetic Operations			JUMP instructions				
Name (type)	Form	Operand Value	Instruction	Description	Operation	Instruction (syn.)	Description	Condition		
Immediate (I)	$\$Imm$	Imm	leal S,D	load effective address	$\&S \rightarrow D$	jmp L	Direct jump	1 (always)		
Register (R)	E_a	$R[E_a]$	INC D	Increment	$D + 1 \rightarrow D$	jmp $*Operand$	Indirect jump	1 (always)		
Absolute (M)	Imm	$M[Imm]$	DEC D	Decrement	$D - 1 \rightarrow D$	je L (jz)	Equal/zero	ZF		
Indirect (M)	(E_a)	$M[R[E_a]]$	NEG D	Negate	$-D \rightarrow D$	jne L (jnz)	Not Equal/zero	$\sim ZF$		
Base+displacement (M)	$Imm(E_b)$	$M[Imm+R[E_b]]$	NOT D	Complement	$\sim D \rightarrow D$	je L (jz)	Equal/zero	ZF		
Indexed (M)	(E_b, E_i)	$M[R[E_b]+R[E_i]]$	ADD S,D	Add	$S + D \rightarrow D$	js L	Negative	SF		
Indexed(M)	$Imm(E_b, E_i)$	$M[Imm+R[E_b]+R[E_i]]$	SUB S,D	Subtract	$D - S \rightarrow D$	jns L	Not Negative	$\sim SF$		
Scaled Indexed (M)	$(, E_i, s)$	$M[R[E_i]*s]$	IMUL S,D	Multiply	$S * D \rightarrow D$	kg L (jnl)	Greater (signed)	$\sim ZF \ \& \ \sim (SF \wedge OF)$		
Scaled Index (M)	$Imm(, E_i, s)$	$M[Imm+R[E_i]*s]$	XOR S,D	Exclusive OR	$S \wedge D \rightarrow D$	jge L (jnl)	Greater-Eq (signed)	$\sim (SF \wedge OF)$		
Scaled Index (M)	(E_b, E_i, s)	$M[R[E_b]+R[E_i]*s]$	OR S,D	OR	$S D \rightarrow D$	jl L (jnge)	Less (signed)	$SF \wedge OF$		
Scaled Index (M)	$Imm(E_b, E_i, s)$	$M[Imm+R[E_b]+R[E_i]*s]$	AND S,D	AND	$S \& D \rightarrow D$	jle L (jng)	Less-Eq (signed)	$(SF \wedge OF) ZF$		
Transfer Operations			SAL (SHL) k,D	Shift left	$D \ll k \rightarrow D$	ja L (jnbe)	Greater (signed)	$\sim CF \ \& \ \sim ZF$		
Instruction	Description	Operation	SAR k,D	Shift right (arith.)	$D \gg k \rightarrow D$ (arith)	jae L (jnb)	Greater-Eq (signed)	$\sim CF$		
MOV S,D	Move (copy)	$S \rightarrow D$	SHR k,D	Shift right (logic.)	$D \gg k \rightarrow D$ (logic)	jb L (jnae)	Less (signed)	CF		
MOVS S,D	Move (sign ext)	$S \rightarrow D$ (sign ext)	imull S mull S	Signed multiply Unsigned multiply	$S * R[\%eax] \rightarrow R[\%edx]:R[\%eax]$	jbe L (jna)	Less-Eq (signed)	CF ZF		
MOVZ S,D	Move (zero ext)	$S \rightarrow D$ (zero ext)	idivl S divl S	Signed divide Unsigned divide	$R[\%edx]:R[\%eax]\%s \rightarrow R[\%edx]$ $R[\%edx]:R[\%eax]/s \rightarrow R[\%eax]$	Comparison and Test				
PUSH S	Push on stack	$R[\%esp]-4 \rightarrow R[\%esp]$ $S \rightarrow M[R[\%esp]]$	cld	Convert to quad word	$SignExtend(R[\%eax]) \rightarrow R[\%edx]:R[\%eax]$	Instruction	Description	Based on		
POP D	Pop off stack	$M[R[\%esp]] \rightarrow D$ $R[\%esp]+4 \rightarrow R[\%esp]$				CMP S_2, S_1	Compare	$S_1 - S_2$		
						TEST S_2, S_1	Test	$S_1 \ \& \ S_2$		
SET Instructions										
Instruction (syn.)	Condition	Effect	Instruction (syn.)	Condition	Effect	Instruction (syn.)	Condition	Effect		
sete D (setz)	Equal/zero	$ZF \rightarrow D$	setg D (setnle)	greater (sign)	$\sim ZF \ \& \ \sim (SF \wedge OF) \rightarrow D$	seta D (setnbe)	greater (unsign)	$\sim CF \ \& \ \sim ZF \rightarrow D$		
setne D (setnz)	Not equal/zero	$\sim ZF \rightarrow D$	setge D (setnl)	greater-eq(sign)	$\sim (SF \wedge OF) \rightarrow D$	setae D (setnb)	greater-eq (unsign)	$\sim CF \rightarrow D$		
sets D	Negative	$SF \rightarrow D$	setl D (setnge)	less (sign)	$SF \wedge OF \rightarrow D$	setb D (setnae)	less (unsign)	$CF \rightarrow D$		
setns D	Non-negative	$\sim SF \rightarrow D$	setle D (setng)	less-eq (sign)	$(SF \wedge OF) ZF \rightarrow D$	setbe D (setna)	less-eq (unsign)	$CF ZF \rightarrow D$		
						Registers and stack pointers				
						31	15	8	7	0
						%eax	%ax	%ah	%al	
						%ecx	%cx	%ch	%cl	
						%edx	%dx	%dh	%dl	
						%ebx	%bx	%bh	%bl	
						%esi	%si			
						%edi	%di			
						%ebp	%bp			
						%esp	%sp			