

Y86 Instruction Set Reference

Instruction	Byte offset from PC									Instruction	Byte offset from PC									
	0	1	2	3	4	5	6	7	8		9	0	1	2	3	4	5	6	7	8
halt	0	0									jXX Dest	7	fn							Dest
nop	1	0									call Dest	8	0							Dest
cmovXX rA, rB	2	fn	rA	rB							ret	9	0							
irmovq V, rB	3	0	f	rB					V		pushq rA	a	0	rA	f					
rmmovq rA, D(rB)	4	0	rA	rB					D		popq rA	b	0	rA	f					
mrmovq D(rB), rA	5	0	rA	rB					D		iotrap id	c	id							
OPq rA, rB	6	fn	rA	rB																

cmovXX:	OPq:	jXX:	Trap IDs:	Registers:	Args:
rrmovq 20	addq 60	jmp 70	charout 0	%rax ⁺ 0	%rdi
cmovle 21	subq 61	jle 71	charin 1	%rcx ⁺ 1	%rsi
cmovl 22	andq 62	jl 72	decout 2	%rdx ⁺ 2	%rdx
cmove 23	xorq 63	je 73	decin 3	%rbx [*] 3	%rcx
cmovne 24		jne 74	strout 4	%rsp 4	%r8
cmovge 25		jge 75	flush 5	+caller-save	%r9
cmovg 26		jg 76		*callee-save	

In the following semantics, PC and STAT refer to the program counter and status code of the CPU.

Stage	HALT	NOP	cmovXX	IRMOVQ
Fch	icode:ifun $\leftarrow M_1[PC]$	icode:ifun $\leftarrow M_1[PC]$	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$
Dec	valP $\leftarrow PC + 1$	valP $\leftarrow PC + 1$	valP $\leftarrow PC + 2$	valC $\leftarrow M_8[PC+2]$ valP $\leftarrow PC + 10$
Exe	STAT $\leftarrow HLT$		valA $\leftarrow R[rA]$ valE $\leftarrow valA$ Cnd $\leftarrow Cond(CC,ifun)$	valE $\leftarrow valC$
Mem				
WB			Cnd ? R[rB] $\leftarrow valE$	R[rB] $\leftarrow valE$
PC	PC $\leftarrow valP$	PC $\leftarrow valP$	PC $\leftarrow valP$	PC $\leftarrow valP$
Stage	RMMOVQ	MRMOVQ	OPq	jXX
Fch	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$ valC $\leftarrow M_8[PC+2]$ valP $\leftarrow PC + 10$	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$ valC $\leftarrow M_8[PC+2]$ valP $\leftarrow PC + 10$	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$	icode:ifun $\leftarrow M_1[PC]$
Dec	valA $\leftarrow R[rA]$ valB $\leftarrow R[rB]$	valB $\leftarrow R[rB]$	valA $\leftarrow R[rA]$ valB $\leftarrow R[rB]$	valC $\leftarrow M_8[PC+1]$ valP $\leftarrow PC + 9$
Exe	valE $\leftarrow valB + valC$	valE $\leftarrow valB + valC$	valE $\leftarrow valB \text{ OP } valA$ Set CC	Cnd $\leftarrow Cond(CC,ifun)$
Mem	M ₈ [valE] $\leftarrow valA$	valM $\leftarrow M_8[valE]$		
WB		R[rA] $\leftarrow valM$	R[rB] $\leftarrow valE$	
PC	PC $\leftarrow valP$	PC $\leftarrow valP$	PC $\leftarrow valP$	PC $\leftarrow Cnd ? valC : valP$
Stage	CALL	RET	PUSHQ	POPQ
Fch	icode:ifun $\leftarrow M_1[PC]$	icode:ifun $\leftarrow M_1[PC]$	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$	icode:ifun $\leftarrow M_1[PC]$ rA:rB $\leftarrow M_1[PC+1]$
Dec	valC $\leftarrow M_8[PC+1]$ valP $\leftarrow PC + 9$	valP $\leftarrow PC + 1$ valA $\leftarrow R[RSP]$	valP $\leftarrow PC + 2$ valA $\leftarrow R[rA]$	valP $\leftarrow PC + 2$ valA $\leftarrow R[RSP]$
Exe	valB $\leftarrow R[RSP]$ valE $\leftarrow valB - 8$	valB $\leftarrow R[RSP]$ valE $\leftarrow valB + 8$	valB $\leftarrow R[RSP]$ valE $\leftarrow valB - 8$	valB $\leftarrow R[RSP]$ valE $\leftarrow valB + 8$
Mem	M ₈ [valE] $\leftarrow valP$	valM $\leftarrow M_8[valA]$	M ₈ [valE] $\leftarrow valA$	valM $\leftarrow M_8[valA]$
WB	R[RSP] $\leftarrow valE$	R[RSP] $\leftarrow valE$	R[RSP] $\leftarrow valE$	R[RSP] $\leftarrow valE$
PC	PC $\leftarrow valC$	PC $\leftarrow valM$	PC $\leftarrow valP$	R[rA] $\leftarrow valM$ PC $\leftarrow valP$