

Computation Steps in Single-Cycle Implementation of Y86

Stage	Step	hlt	nop	rrmov	irmov	rmmov	mrmov
Fetch	<i>icode, ifun</i>	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$
	<i>rA, rB</i>			$rA:rB \leftarrow M_1[PC + 1]$	$rA:rB \leftarrow M_1[PC + 1]$	$rA:rB \leftarrow M_1[PC + 1]$	$rA:rB \leftarrow M_1[PC + 1]$
	<i>valC</i>				$valC \leftarrow M_8[PC + 2]$	$valC \leftarrow M_8[PC + 2]$	$valC \leftarrow M_8[PC + 2]$
	<i>valP</i>	$valP \leftarrow PC + 0$	$valP \leftarrow PC + 1$	$valP \leftarrow PC + 2$	$valP \leftarrow PC + 10$	$valP \leftarrow PC + 10$	$valP \leftarrow PC + 10$
Decode	<i>valA</i>			$valA \leftarrow R[rA]$		$valA \leftarrow R[rA]$	
	<i>valB</i>					$valB \leftarrow R[rB]$	$valB \leftarrow R[rB]$
Execute	<i>valE</i>			$valE \leftarrow 0 + valA$	$valE \leftarrow 0 + valC$	$valE \leftarrow valB + valC$	$valE \leftarrow valB + valC$
	<i>cond</i>						
Memory	<i>valM</i>					$M_8[valE] \leftarrow valA$	$valM \leftarrow M_8[valE]$
Write back	<i>dstE</i>			$R[rB] \leftarrow valE$	$R[rB] \leftarrow valE$		
	<i>dstM</i>						$R[rA] \leftarrow valM$
PC Update	<i>PC</i>	$PC \leftarrow valP$	$PC \leftarrow valP$	$PC \leftarrow valP$	$PC \leftarrow valP$	$PC \leftarrow valP$	$PC \leftarrow valP$

Stage	Step	OP	jXX	call	ret	push	pop
Fetch	<i>icode, ifun</i>	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$	$icode:ifun \leftarrow M_1[PC]$
	<i>rA, rB</i>	$rA:rB \leftarrow M_1[PC + 1]$				$rA:rB \leftarrow M_1[PC + 1]$	$rA:rB \leftarrow M_1[PC + 1]$
	<i>valC</i>		$valC \leftarrow M_8[PC + 1]$	$valC \leftarrow M_8[PC + 1]$			
	<i>valP</i>	$valP \leftarrow PC + 2$	$valP \leftarrow PC + 9$	$valP \leftarrow PC + 9$	$valP \leftarrow PC + 1$	$valP \leftarrow PC + 2$	$valP \leftarrow PC + 2$
Decode	<i>valA</i>	$valA \leftarrow R[rA]$			$valA \leftarrow R[4]$	$valA \leftarrow R[rA]$	$valA \leftarrow R[4]$
	<i>valB</i>	$valB \leftarrow R[rB]$		$valB \leftarrow R[4]$	$valB \leftarrow R[4]$	$valB \leftarrow R[4]$	$valB \leftarrow R[4]$
Execute	<i>valE</i>	$valE \leftarrow valB \text{ op } valA$		$valE \leftarrow valB + (-8)$	$valE \leftarrow valB + (+8)$	$valE \leftarrow valB + (-8)$	$valE \leftarrow valB + (+8)$
	<i>cond</i>	$cond \leftarrow Cond(valE)$	$b \leftarrow C(cond, ifun)$				
Memory	<i>valM</i>			$M_8[valE] \leftarrow valP$	$valM \leftarrow M_8[valA]$	$M_8[valE] \leftarrow valA$	$valM \leftarrow M_8[valA]$
Write back	<i>dstE</i>	$R[rB] \leftarrow valE$		$R[4] \leftarrow valE$	$R[4] \leftarrow valE$	$R[4] \leftarrow valE$	$R[4] \leftarrow valE$
	<i>dstM</i>						$R[rA] \leftarrow valM$
PC Update	<i>PC</i>	$PC \leftarrow valP$	$PC \leftarrow valC$ if b else $valP$	$PC \leftarrow valC$	$PC \leftarrow valM$	$PC \leftarrow valP$	$PC \leftarrow valP$

