

The MAL Instruction Set (cont)		
Format	Effect	Notes
mfc0 R, C	$R \leftarrow C$	R is a general register. F is a floating point register. C is a control register.
mtc0 R, C	$R \rightarrow C$	
mfc1 R, F	$R \leftarrow F$	
mtc1 R, F	$R \rightarrow F$	
b label	$PC \leftarrow \text{label}$	
beq $R_s, R_t, \text{label}$	if ( $R_s = R_t$ ), then $PC \leftarrow \text{label}$	
bne $R_s, R_t, \text{label}$	if ( $R_s \neq R_t$ ), then $PC \leftarrow \text{label}$	
blt $R_s, R_t, \text{label}$	if ( $R_s < R_t$ ), then $PC \leftarrow \text{label}$	
bgt $R_s, R_t, \text{label}$	if ( $R_s > R_t$ ), then $PC \leftarrow \text{label}$	
ble $R_s, R_t, \text{label}$	if ( $R_s \leq R_t$ ), then $PC \leftarrow \text{label}$	
bge $R_s, R_t, \text{label}$	if ( $R_s \geq R_t$ ), then $PC \leftarrow \text{label}$	
bltz R, label	if ( $R < 0$ ), then $PC \leftarrow \text{label}$	
bgtz R, label	if ( $R > 0$ ), then $PC \leftarrow \text{label}$	
blez R, label	if ( $R \leq 0$ ), then $PC \leftarrow \text{label}$	
bgez R, label	if ( $R \geq 0$ ), then $PC \leftarrow \text{label}$	
bnez R, label	if ( $R \neq 0$ ), then $PC \leftarrow \text{label}$	
beqz R, label	if ( $R = 0$ ), then $PC \leftarrow \text{label}$	
j address	$PC \leftarrow \text{address}$	Address may be a label or a register.
jr R	$PC \leftarrow R$	
jal address	$R_{31} \leftarrow PC + 4; PC \leftarrow \text{address}$	
jalr $R_d, R_s$	$R_d \leftarrow PC + 4; PC \leftarrow R_s$	
getc R	$R \leftarrow 0^{24} \parallel \text{input}_{7..0}$	S may be either a general register or a label. If S is a general register, effective address is contents of S; if S is a label, effective address is S.
putc R	$R_{7..0} \rightarrow \text{output}$	
puts S	Print string beginning at effective address	

## General Notes

- (1)  $R, R_b, R_d, R_s,$  and  $R_t$  are the contents of a general register.
- (2)  $\parallel$  indicates concatenation of bit fields.
- (3) Superscripts indicate repetitions of a binary value.
- (4) Subscripts indicate bit positions (Little-Endian) of sub-field.