

MIPS Reference Sheet

<code>.word i</code>	<code>iiii iiii iiii iiii iiii iiii iiii iiii</code>		
<code>add \$d, \$s, \$t</code>	<code>0000 00ss ssst tttt dddd d000 0010 0000</code>	R	$\$d = \$s + \$t$
<code>sub \$d, \$s, \$t</code>	<code>0000 00ss ssst tttt dddd d000 0010 0010</code>	R	$\$d = \$s - \$t$
<code>mult \$s, \$t</code>	<code>0000 00ss ssst tttt 0000 0000 0001 1000</code>	R	hi:lo = $\$s * \t
<code>multu \$s, \$t</code>	<code>0000 00ss ssst tttt 0000 0000 0001 1001</code>	R	hi:lo = $\$s * \t
<code>div \$s, \$t</code>	<code>0000 00ss ssst tttt 0000 0000 0001 1010</code>	R	lo = $\$s / \t ; hi = $\$s \% \t
<code>divu \$s, \$t</code>	<code>0000 00ss ssst tttt 0000 0000 0001 1011</code>	R	lo = $\$s / \t ; hi = $\$s \% \$$
<code>mfhi \$d</code>	<code>0000 0000 0000 0000 dddd d000 0001 0000</code>	R	$\$d = \text{hi}$
<code>mflo \$d</code>	<code>0000 0000 0000 0000 dddd d000 0001 0010</code>	R	$\$d = \text{lo}$
<code>lis \$d</code>	<code>0000 0000 0000 0000 dddd d000 0001 0100</code>	R	$\$d = \text{MEM}[\text{pc}]$; $\text{pc} = \text{pc} + 4$
<code>lw \$t, i(\$s)</code>	<code>1000 11ss ssst tttt iiii iiii iiii iiii</code>	I	$\$t = \text{MEM}[\$s + i]:4$
<code>sw \$t, i(\$s)</code>	<code>1010 11ss ssst tttt iiii iiii iiii iiii</code>	I	$\text{MEM}[\$s + i]:4 = \t
<code>slt \$d, \$s, \$t</code>	<code>0000 00ss ssst tttt dddd d000 0010 1010</code>	R	$\$d = 1$ if $\$s < \t ; 0 otherwise
<code>sltu \$d, \$s, \$t</code>	<code>0000 00ss ssst tttt dddd d000 0010 1011</code>	R	$\$d = 1$ if $\$s < \t ; 0 otherwise
<code>beq \$s, \$t, i</code>	<code>0001 00ss ssst tttt iiii iiii iiii iiii</code>	I	if $(\$s == \$t)$ $\text{pc} += i * 4$
<code>bne \$s, \$t, i</code>	<code>0001 01ss ssst tttt iiii iiii iiii iiii</code>	I	if $(\$s != \$t)$ $\text{pc} += i * 4$
<code>jr \$s</code>	<code>0000 00ss sss0 0000 0000 0000 0000 1000</code>	R	$\text{pc} = \$s$
<code>jalr \$s</code>	<code>0000 00ss sss0 0000 0000 0000 0000 1001</code>	R	$\$31 = \text{pc}$; $\text{pc} = \$s$

Relocation: What Must Change If Not Loaded at 0x0?

Assembly Lang	Address	Machine L.	Address	Machine L.
lis \$3	0x00000000	0x00001814	0x00010000	
.word 0xabc	0x00000004	0x00000abc	0x00010004	
lis \$1	0x00000008	0x00000814	0x00010008	
.word A	0x0000000c	0x00000018	0x0001000c	
jr \$1	0x00000010	0x00200008	0x00010010	
B:				
jr \$31	0x00000014	0x03e00008	0x00010014	
A:				
beq \$0, \$0, B	0x00000018	0x1000fffe	0x00010018	
.word B	0x0000001c	0x00000014	0x0001001c	

Symbol Table:

A = 0x0000 0018

B = 0x0000 0014

Relocation: What Must Change If Not Loaded at 0x0?

Assembly Lang	Address	Machine L.	Address	Machine L.
lis \$3	0x00000000	0x00001814	0x00010000	0x00001814
.word 0xabc	0x00000004	0x00000abc	0x00010004	0x00000abc
lis \$1	0x00000008	0x00000814	0x00010008	0x00000814
.word A	0x0000000c	0x00000018	0x0001000c	0x00010018
jr \$1	0x00000010	0x00200008	0x00010010	0x00200008
B:				
jr \$31	0x00000014	0x03e00008	0x00010014	0x03e00008
A:				
beq \$0, \$0, B	0x00000018	0x1000fffe	0x00010018	0x1000fffe
.word B	0x0000001c	0x00000014	0x0001001c	0x00010014

Symbol Table:

A = 0x0000 0018

B = 0x0000 0014

MERL Format: Mips Executable Relocatable Linkable

Assembly Lang	Location	Machine L.	Comments
	0x00000000	0x10000002	Cookie
	0x00000004	0x0000003c	Length of the .merl file
	0x00000008	0x0000002c	Code length=header+MIPS
lis \$3	0x0000000c	0x00001814	
.word 0xabc	0x00000010	0x00000abc	
lis \$1	0x00000014	0x00000814	
.word A	0x00000018	0x00000024	
jr \$1	0x0000001c	0x00200008	
B:			
jr \$31	0x00000020	0x03e00008	
A:			
beq \$0, \$0, B	0x00000024	0x1000fffe	
.word B	0x00000028	0x00000020	
	0x0000002c	0x00000001	Format code
	0x00000030	0x00000018	Address to relocate
	0x00000034	0x00000001	Format code
	0x00000038	0x00000028	Address to relocate

MERL Format: Mips Executable Relocatable Linkable

Assembly Lang	Location	Machine L.	Comments
beq \$0, \$0, 2	0x00000000	0x10000002	Cookie
.word endmodule	0x00000004	0x0000003c	Length of the .merl file
.word encode	0x00000008	0x0000002c	Code length=header+MIPS
lis \$3	0x0000000c	0x00001814	
.word 0xabc	0x00000010	0x00000abc	
lis \$1	0x00000014	0x00000814	
.word A	0x00000018	0x00000024	
jr \$1	0x0000001c	0x00200008	
B:			
jr \$31	0x00000020	0x03e00008	
A:			
beq \$0, \$0, B	0x00000024	0x1000fffe	
.word B	0x00000028	0x00000020	
endcode:			
.word 0x1	0x0000002c	0x00000001	Format code
.word reloc1	0x00000030	0x00000018	Address to relocate
.word 0x1	0x00000034	0x00000001	Format code
.word reloc2	0x00000038	0x00000028	Address to relocate
endmodule:			