ASProcessor Two-Pass Assembler Guidelines

By Michael J. Sepcot

Available Commands:

ASProcessor Command List

Command	Example	Function
and	*and rd, rs, rt*	Logical-and of rs and rt performed and stored in rd
or	*or rd, rs, rt*	Logical-or of rs and rt performed and stored in rd
add	*add rd, rs, rt*	Values of rs and rt added and stored in rd
jr	*jr rd*	Returns to instruction location stored in rd
sll	*sll rd, rs, shamt*	Left shift of shamt bits of rs performed and stored in rd
srl	*srl rd, rs, shamt*	Right shift of shamt bits of rs performed and stored in rd
sub	*sub rd, rs, rt*	Values of rt subtracted from rs and stored in rd
slt	*slt rd, rs, rt*	rs and rt compared: if rs < rt, rd set to 1, else rd set to 0
beq	*beq rs, rt, label*	Jump to label performed if rs = = rt
bne	*bne rs, rt, label*	Jump to label performed if rs != rt
lw	*lw rt, immediate(rs)*	Memory location (rs + immediate) loaded into rt
sw	*sw rt, immediate(rs)*	rt written to memory location (rs + immediate)
andi	*andi rt, rs, immediate*	Logical-and of rs and immediate performed, stored in rt
ori	*ori rt, rs, immediate*	Logical-or of rs and immediate performed and stored in rt
addi	*addi rt, rs, immediate*	Values of rs and immediate added and stored in rt
subi	*subi rt, rs, immediate*	Value of immediate subtracted from rs and stored in rt
slti	*slti rt, rs, immediate*	If the value of rs < immediate, rt set to 1, else rt set to 0
j	*j label*	Jump to label performed
jal	*jal label*	Jumps to label and stores return address in register 0
#	*# comment*	Comments in .s file appear as comments in .mif file
.text	*.text*	Identifies the start of program code

Available Registers:

$0 $1 $2 $3

Notes:

* Registers *
    A "," must be used to separate all registers in the source code and a space must be included after each ","
    Register 0 ($0) is the default register for the return address to be saved
* Labels *
    All identification labels must be followed immediately by a ":" to identify them as such (do not use the ":" in branch and jump label fields)
    All labels must be on separate lines from all other code (except #s)
* I-Type Instructions *
    I-Type Instructions Include: lw sw andi ori addi subi slti
    The immediate field must be an integer value in the [-127, 127] range
* Jump Instructions *
    Jump Instructions Include: j jal
    Input following the jump instruction command should be a label name only – Direct Address jumps are not allowed
* R-Type Instructions *
    R-Type Instructions Include: and or add sub slt sll srl jr
    Fields following r-type instruction commands must only be valid register names
    Shamt (shift amount) must only be positive integers in the [0, 7] range (when required)
* Branch Instructions *
    Branch Instructions Include: beq bne
    No Direct Address branches are allowed – Branching to label names only
* Miscellaneous Instructions *
    Miscellaneous Instructions Include: .text #
    The .text command is required for each program – Program code is not converted until the .text command is read in
    Any text written after the # is taken as a comment – Comments are transferred to the .mif file in appropriate fashion

The ASProcessor Two-Pass Assembler does not recognize any other commands, registers, or immediate/shamt values and those entered in the source code will be ignored by said assembler.