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UFMG
UNIVERSIDADE FEDERAL DE MINAS GERAIS

MiniRISC Reference Data

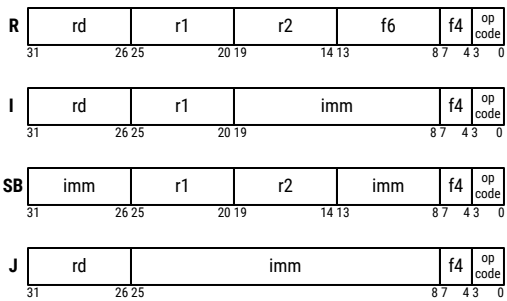
CORE INSTRUCTION SET

NAME	MNEMONIC	FORMAT	OPERATION
ADD	add	R	R[rd] = R[r1] + R[r2]
SUB	sub	R	R[rd] = R[r1] - R[r2]
XOR	xor	R	R[rd] = R[r1] ^ R[r2]
OR	or	R	R[rd] = R[r1] | R[r2]
AND	and	R	R[rd] = R[r1] & R[r2]
Shift Left Logical	sll	R	R[rd] = R[r1] << R[r2]
Shift Right Logical	srl	R	R[rd] = R[r1] >> R[r2]
Shift Left Arith*	sla	R	R[rd] = R[r1] << R[r2]
Shift Right Arith*	sra	R	R[rd] = R[r1] >> R[r2]
Set Less Than	slt	R	R[rd] = (R[r1] < R[r2])? 1:0
ADD Immediate	addi	I	R[rd] = R[r1] + imm
XOR Immediate	xori	I	R[rd] = R[r1] ^ imm
OR Immediate	ori	I	R[rd] = R[r1] | imm
AND Immediate	andi	I	R[rd] = R[r1] & imm
Shift Left Logical Imm	slli	I	R[rd] = R[r1] << imm
Shift Right Logical Imm	srli	I	R[rd] = R[r1] >> imm
Shift Left Arith Imm	slai	I	R[rd] = R[r1] << imm
Shift Right Arith Imm	srai	I	R[rd] = R[r1] >> imm
Set Less Than Imm	slti	I	R[rd] = (R[r1] < imm)?1:0
Ecall	ecall	I	imm = argumento
Load Word	lw	I	R[rd] = M[R[r1] + imm]
Store Word	sw	SB	M[R[r1] + imm] = R[r2]
Jump	j	J	R[rd] = PC + 4; PC = {imm,2'b00}
Jump register	jr	I	if {R[r1] != R[r2]} {PC += {imm,2'b00}}
Branch ==	beq	SB	if {R[r1] == R[r2]} {PC += {imm,2'b00}}
Branch !=	bne	SB	if {R[r1] != R[r2]} {PC += {imm,2'b00}}
Branch <	blt	SB	if {R[r1] < R[r2]} {PC += {imm,2'b00}}
Branch ≤	bge	SB	if {R[r1] >= R[r2]} {PC += {imm,2'b00}}

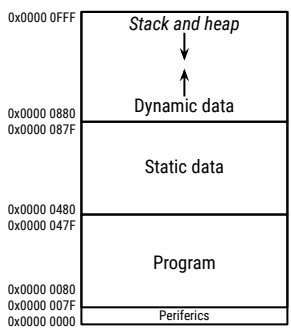
PSEUDOINSTRUCTION SET

NAME	MNEMONIC
No operation	nop

BASIC INSTRUCTION FORMATS



MEMORY ALLOCATION



OPCODES AND SIGNALS

Instruction Type	Op code	PC Src	Reg Write	ALU Src	Mem Write	Mem ToReg
R	0000	00	1	0	0	1
I	0001	00	1	1	0	1
L	0010	00	1	1	0	0
Jr	0011	10	0	1	0	0
S	0100	00	0	1	1	1
B	0101	01	0	0	0	0
J	0111	01	0	0	0	0

Instruction	F4	ALUOperation
Add/Addi	0000	0000
Xor/Xori	0001	0001
Or/Ori	0010	0010
And/Andi	0011	0011
Sll/Slli	0100	0100
Srl/Srli	0101	0101
Sla/Slai	0110	0110
Sra/Srai	0111	0111
Slt	1000	1000
Sub	1001	1001

PERIPHERALS AVAILABLE

Timers

- Timer 0 and Timer 1;
- Each one has a specific max count;
- The counting is triggered separately for each timer
- An interruption is triggered when counting reaches the end.

GPIO

- Set of 32 pins made available to the user for general purpose;
- Can be configured freely as input or output and used during program execution;
- Triggers an interruption when an input changes its logical value.