microRISC

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Architecture

Registers

General Purpose Registers

The general purpose registers are used to store data and perform arithmetic operations. They are named R0-R31 and are 32 bits wide.

CMP Register

The CMP register is used to store the result of a comparison operation. It is set by the CMP instruction, which subtracts the second operand from the first operand and sets the CMP register based on the result.

Opcode Layout and Control Signals

Every opcode is 6 bits wide. Each bit will be a dedicated control signal:

Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5
Control Signal 0	Control Signal 1	Control Signal 2	Control Signal 3	Control Signal 4	Control Signal 5

Memory Layout

This is the content of Subsection 1.3.

Instruction Set

Arithmetic and Logical

The following arithmetic and logical operations are supported:

Syntax	Opcode	Rd	Rn	Rm
ADD Rd, Rn, Rm	Item2.1	5 bits	5 bits	5 bits
SUB Rd, Rn, Rm	Item2.2	5 bits	5 bits	5 bits
MUL Rd, Rn, Rm	Item2.3	5 bits	5 bits	5 bits
SDIV Rd, Rn, Rm	Item2.4	5 bits	5 bits	5 bits
UDIV Rd, Rn, Rm	Item2.5	5 bits	5 bits	5 bits
LDR Rd, [Rn, Rm]	Item2.5	5 bits	5 bits	5 bits
STR Rd, [Rn, Rm]	Item2.6	5 bits	5 bits	5 bits
AND Rd, Rn, Rm	Item2.7	5 bits	5 bits	5 bits
ORR Rd, Rn, Rm	Item2.8	5 bits	5 bits	5 bits
XOR Rd, Rn, Rm	Item2.9	5 bits	5 bits	5 bits
LSL Rd, Rn, Rm	Item2.10	5 bits	5 bits	5 bits
LSR Rd, Rn, Rm	Item2.11	5 bits	5 bits	5 bits
ASR Rd, Rn, Rm	Item2.12	5 bits	5 bits	5 bits

Branching

The following branching instructions are supported:

Syntax	Opcode	Label	Unused
B Label	Item2.27	20 bits	5 bits
BL Label	Item2.28	20 bits	5 bits
BEQ Label	Item2.29	20 bits	5 bits
BNE Label	Item2.30	20 bits	5 bits
BGT Label	Item2.31	20 bits	5 bits
BLT Label	Item2.32	20 bits	5 bits
BGE Label	Item2.33	20 bits	5 bits
BLE Label	Item2.34	20 bits	5 bits

Syntax	Opcode	Rd	Rn	Unused
CMP Rd, Rn	Item2.26	5 bits	5 bits	16 bits

Syntax	Opcode	Rd	Label	Unused
CBZ Rd, Label	Item2.35	5 bits	20 bits	1 bit
CBNZ Rd, Label	Item2.36	5 bits	20 bits	1 bit

Syntax	Opcode	Unused
RET	Item2.37	26 bits

Other

These are other instructions that don’t fit under the existing categories:

Syntax	Opcode	Rd	Rn	Unused
MOV Rd, Rn	Item2.26	5 bits	5 bits	16 bits

Syntax	Opcode	Rd	Imm	
MOV Rd, Imm	Item2.27	5 bits	21 bits	

Syntax	Opcode	Rd	Label	Unused
ADR Rd, Label	Item2.28	5 bits	20 bits	1 bit

Syntax	Opcode	Rd	Unused
NEG Rd	Item2.29	5 bits	21 bits

Syntax	Opcode	Unused
NOP	Item2.30	26 bits