OpenRISC ISA cheatsheet

The main source of information on OpenRISC is the architecture manual, which can be found here: `https://raw.githubusercontent.com/openrisc/doc/master/openrisc-arch-1.4-rev0.pdf`. In particular, the following sections are of use:

- Chapter 5 describes the instructions in detail.
- Chapter 18 (page 362) presents a table of all instructions including their instruction format.

We will be implementing the *32-bit* OpenRISC instruction set. Below follow the register convention used with OpenRISC and some common instruction formats to give you a start with understanding OpenRISC instruction decoding.

Register convention

In the table below, the commonly used register convention for OpenRISC can be seen.

Register	**Omschrijving**	**Saver**
r0	Hard-wired zero	-
r1	Stack pointer	
r2	Frame pointer	
r3-r8	Function arguments[1] [2]	Caller
r9	Link/return address	Callee
r10	Callee-saved	Callee
r11	Return value	Caller
r12	Return value upper 32-bits	Caller
r13,r15,...,r31	Temporary	Caller
r14,r16,...,r30	Callee-saved	Callee

Instruction Formats

The OpenRISC architecture manual does not explicitly describe instruction formats as is done in the RISC-V manual. However, we can deduce several instruction formats from studying the instruction table in Chapter 18. We list some of these formats (not all) in the table below.

31 26	25 21	20 16	15 11	10	9 8	7 4	3 0	
opcode	D	A	B	res.	op2	res.	op3	R-type

31 26	25 21	20 16	15 0	
opcode	D	A	Immediate (I)	I-type

31 26	25 21	20 16	15 11	10 0	
opcode	Imm (I)	A	B	Immediate (I)	S-type

31 26	25 21	20 16	15 8	7 6	5 0	
opcode	D	A	reserved	op2	L	SH-type

31 26	25 0	
opcode	Immediate (N)	J-type

31 21	20 16	15 0	
opcode	A	Immediate (I)	F-type

[1] The 7th and further arguments are put on the stack.

[2] Variadic arguments (such as arguments following a `printf` format string) are *always* put on the stack.