a-b

	PCSel	ImmSel	RegWEn	BrUn	BrEq	BrLT	BSel	ASel	ALUSel	MemRW	WBSel
ADD	PC+4	X	1	X	X	X	rs2	rs1	add	Read	alu
SUB	+4	X	1	X	X	X	r	r	sub	Read	alu
SLT	+4	X	1	X	X	X	r	r	slt	Read	alu
SLTU	+4	X	1	X	X	X	r	r	sltu	Read	alu
XOR	+4	X	1	X	X	X	r	r	xor	Read	alu
SRL	+4	X	1	X	X	X	r	r	SRL	Read	alu
SRA	+4	X	1	X	X	X	r	r	SRA	Read	alu
OR	+4	X	1	X	X	X	r	r	OR	Read	alu
AND	+4	X	1	X	X	X	r	r	AND	Read	alu
ADDI	PC+4	I	1	X	X	X	imm	rs1	add	Read	alu
SLTI	+4	I	1	X	X	X	imm	r	slt	Read	alu
SLTIU	+4	I	1	X	X	X	imm	r	sltu	R	alu
XORI	+4	I	1	X	X	X	imm	r	XOR	R	alu
ORI	+4	I	1	X	X	X	imm	r	OR	R	alu
ANDI	+4	I	1	X	X	X	imm	r	AND	R	alu
SB	PC+4	S	0	X	X	X	imm	rs1	add	Write	X
SH	+4	S	0	X	X	X	imm	r	add	W	X
SW	+4	S	0	X	X	X	imm	r	add	W	X
LB	PC+4	I	1	X	X	X	imm	rs1	add	Read	mem
LH	+4	I	1	X	X	X	imm	r	add	R	mem
LW	+4	I	1	X	X	X	imm	r	add	R	mem
LBU	+4	I	1	X	X	X	imm	r	add	R	mem
LHU	+4	I	1	X	X	X	imm	r	add	R	mem
=BEQ	alu / PC+4	B	0	?/0	?/1	X	imm	PC	add	Read	X
≠BNE	PC+4 / alu	B	0	?/1	?/0	X	imm	PC	add	R	X
<BLT	alu / PC+4	B	0	X	?/1	?/0	imm	PC	add	R	X
≥BGE	PC+4 / alu	B	0	X	?/0	?/1	imm	PC	add	R	X
<BLTU	alu / PC+4	B	0	X	?/1	?/0	imm	PC	add	R	X
≥BGEU	PC+4 / alu	B	0	X	?/0	?/1	imm	PC	add	R	X
JUMP	PC+4	J	1	X	X	X	imm	rs1	add	Read	alu
AUIPC	PC+4	U	1	X	X	X	imm	PC	add	R	alu
JAL	alu	J	1	X	X	X	imm	PC	add	R	pc+4
JALR	alu	I	1	X	X	X	imm	rs1	add	R	pc+4

Inst PCSel ImmSel RegWEn BrUN BrEq BrLT Bs As Ale

ADD

Control Unit

```
Wb_sel = (opcode == LOAD) ? mem :
         ((opcode == JAL)|(opcode == JALR)) ? pc+4 :
         alu

mem_RW = (opcode == STORE)

alu_sel = ((opcode == OP)|(opcode == OP_IMM)) ? {Funct7, Funct3[2:0]} :
          add

asel = (opcode == Branch)|(opcode == AUIPC)|(opcode == JAL)

bsel = (opcode == OP)

brun = (opcode == Branch) & Funct3[1]

regwe = ~((opcode == STORE)|(opcode == Branch))

imm = (opcode == STORE) ? S :
      (opcode == BRANCH) ? B :
      ((opcode == LUI)|(opcode == AUIPC)) ? U :
      (opcode == JAL) ? J :
      I

pcsel = ((opcode == JAL)|(opcode == JALR)|(branch_taken)) ? alu : pc+4;

branch_taken = ((opcode == BRANCH) &
               (BEQ & BrEq)|(BNE & ~BrEq)|((BLT|BLTU) & BrLT)|
               ((BGE|BGEU) & ~BrLT))
```

		BrEq	BrLT	
BEQ & BrEq → alu	000	1		alu
BNE & ~BrEq → alu	001	0		alu
BLT/BLTU & BrLT → alu	100/110	1		alu
BGE/BGEU & ~BrLT → alu	101/111	0		alu

0	0	0/1
0	1	0
1	0	0/1
1	1	0/1
1	0	1
1	1	1