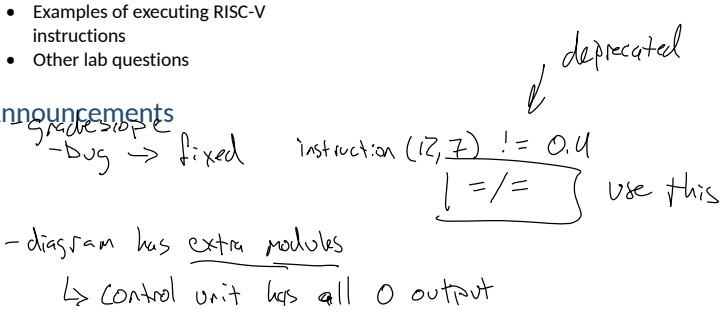
Discussion 2: Execution examples

Thursday, January 17, 2019 10:10 AM

Outline

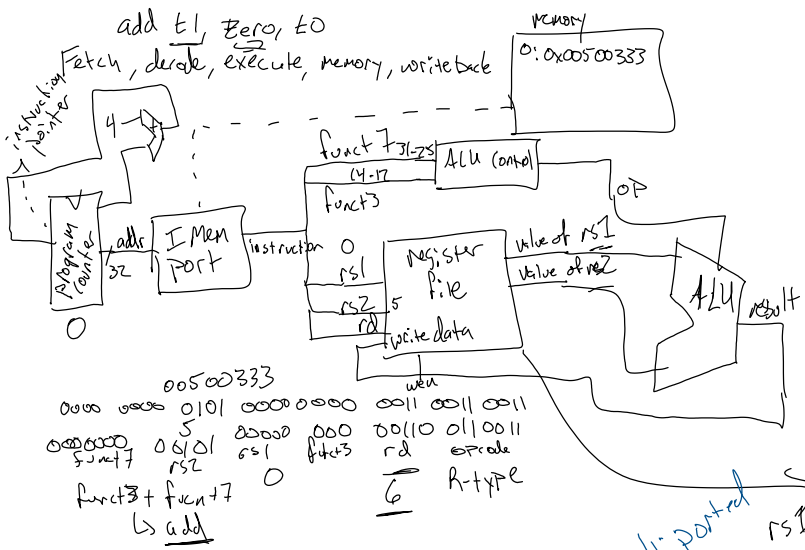
- Lab announcements
- Examples of executing RISC-V instructions
- Other lab questions

Announcements

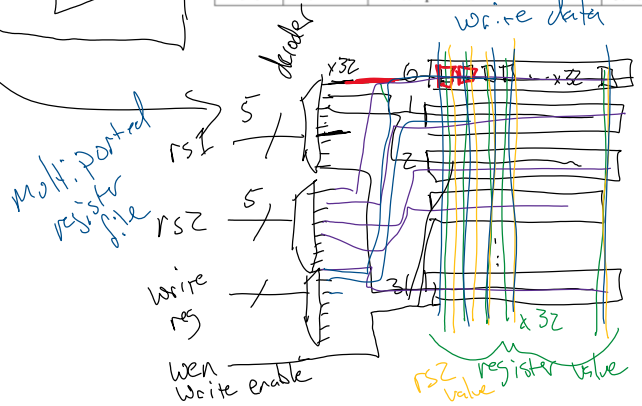


Example 1:

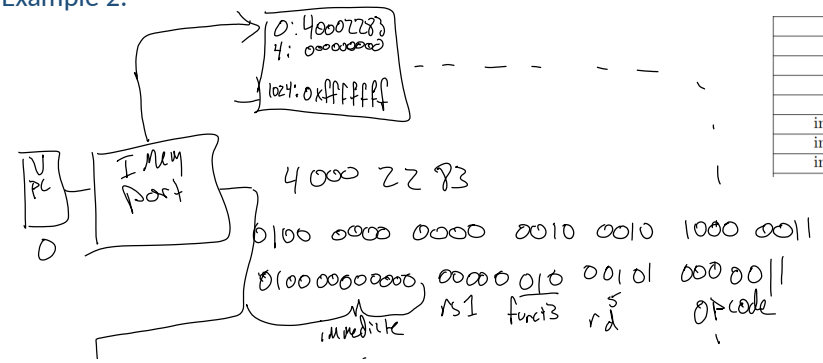
31 27	26 25	24 20	19 15	14 12	11 7	6 0	
funct7		rs2	rs1	funct3	rd	opcode	R-type
imm[11:0]			rs1	funct3	rd	opcode	I-type
imm[11:5]		rs2	rs1	funct3	imm[4:0]	opcode	S-type
imm[12|10:5]		rs2	rs1	funct3	imm[4:1|11]	opcode	B-type
imm[31:12]					rd	opcode	U-type
imm[20|10:1|11|19:12]					rd	opcode	J-type



Register	ABI Name	Description	Saver
x0	zero	Hard-wired zero	—
x1	ra	Return address	Caller
x2	sp	Stack pointer	Callee
x3	gp	Global pointer	—
x4	tp	Thread pointer	—
x5	t0	Temporary/alternate link register	Caller
x6–7	t1–2	Temporaries	Caller
x8	s0/fp	Saved register/frame pointer	Callee
x9	s1	Saved register	Callee
x10–11	a0–1	Function arguments/return values	Caller
x12–17	a2–7	Function arguments	Caller
x18–27	s2–11	Saved registers	Callee
x28–31	t3–6	Temporaries	Caller
f0–7	ft0–7	FP temporaries	Caller
f8–9	fs0–1	FP saved registers	Callee
f10–11	fa0–1	FP arguments/return values	Caller
f12–17	fa2–7	FP arguments	Caller
f18–27	fs2–11	FP saved registers	Callee
f28–31	ft8–11	FP temporaries	Caller



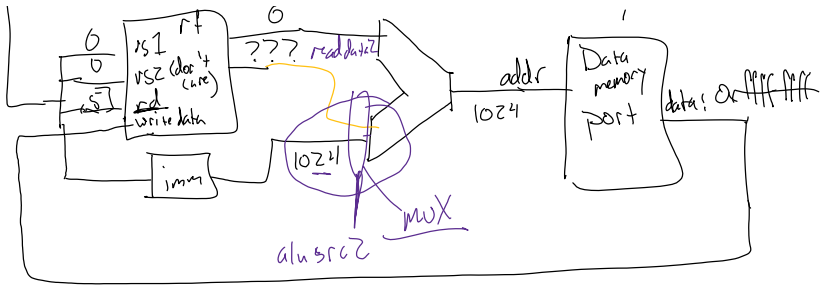
Example 2:



imm[11:0]		rs1	000	rd	0000011
imm[11:0]		rs1	001	rd	0000011
imm[11:0]		rs1	010	rd	0000011
imm[11:0]		rs1	100	rd	0000011
imm[11:0]		rs1	101	rd	0000011
imm[11:5]	rs2	rs1	000	imm[4:0]	0100011
imm[11:5]	rs2	rs1	001	imm[4:0]	0100011
imm[11:5]	rs2	rs1	010	imm[4:0]	0100011

lw → Mem[R[rs1] + imm] → R[rd]

execute calculate effective


0
0
1
rs1
rs2
rd
write data
???
readdata2
addr
1024
Data memory port
data: 0xffff ffff
imm
1024
MUX
alusrc2