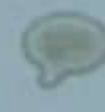
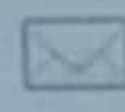
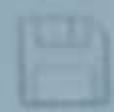


Open

Create



Customize



1

/ 1



78.6%



Tools

Fill & Sign

Comment

Suppose we are designing an instruction set architecture with 32-bit instructions and 26 different opcodes. The register file contains 128 registers. One of the instruction types we would like to support specifies an opcode, a destination register, and two immediate source values. What is the minimum number of bits that are needed to specify each field?

Opcode:	Destination Register:	Immediate Value:	Immediate Value:
---------	-----------------------	------------------	------------------

Problem 3

Suppose we are designing an instruction set architecture with 28-bit instructions and 44 different opcodes. Immediate operands can be in the range of ± 512 . How many registers can this datapath have? Assume we would like to support an I-type instruction format with the same operand number and types used in the MIPS format.

For I-type, the opcode and immediate fields must be 6 bits and 10 bits, respectively.

Opcode:	Destination Register:	Source 1 Register:	Immediate:
---------	-----------------------	--------------------	------------

28 bits

54 Registers

Problem 1^o, (A)

- ⇒ opcode = 6 bit ($2^6 = \# \text{ of instruction}$)
- ⇒ destination Reg = 5 bit ($2^5 = \# \text{ of Reg}$)
- ⇒ Source Reg = 5 bit ($2^5 = \# \text{ of Reg}$)
- ⇒ width of Reg = 32 bit

Problem 1^o, (B)

- ⇒ opcode = 6 bit ($2^6 = \# \text{ of instruction}$)
 - ⇒ dest + source = 5
 - ⇒ Immediate = 18 bit ($2^{n-1} = \pm 128 = 2^{17}$)
STUDENTS-HUB.com
- ⇒ $n-1 = 17$
⇒ $n = 18$
- Uploaded By: anonymous

Problem 2 >

32 bit instruction

26 opcodes

128 reg.

⇒ opcode = 5 ($2^5 = \text{opcode}$)

⇒ destination Reg = 7 ($2^7 = \text{reg}$)

⇒ Immediate value = 10 (32 bits)
 $\therefore 32 - (5 + 7) = 20$
 $\frac{20}{2} = 10$

unsigned $0 \rightarrow 2^{10}$ الفترة من

signed $-2^9 \rightarrow 2^9 - 1$ الفترة من

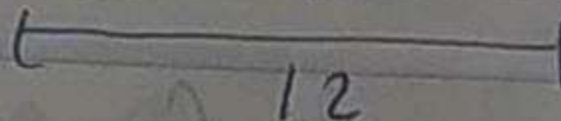
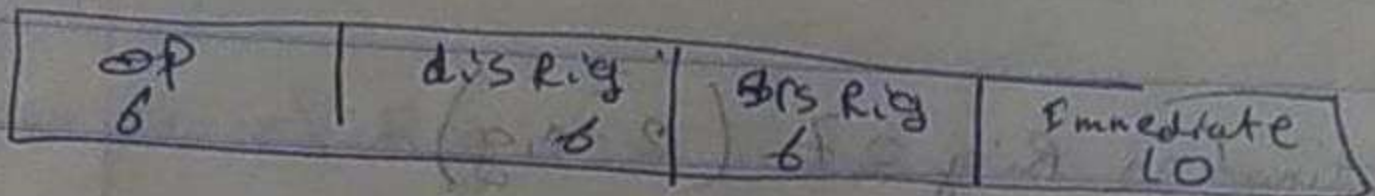
Problem 382

28 bit instruction →

44 bit opcode → 2^6

± 512 → 2^{10}

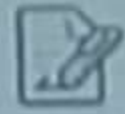
of Reg



of Reg = $2^6 = 64$

Open

Create



Customize



1 / 1



78.6%



Tools

Fill & Sign

Comments

Instruction Formats Problems & Answers

Problem 1

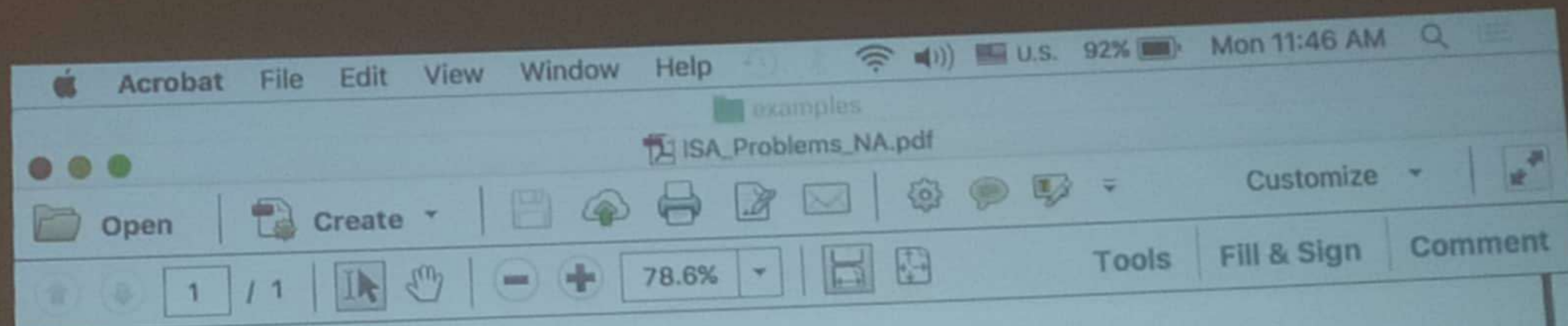
Suppose a datapath has three operand busses (two source, one destination), 45 instruction types, and 32 registers where each register is 16 bits wide. Immediate operands can be in the range of $\pm 128K$.

Design an instruction format for instructions that have one operation, one destination register and two source registers. Label the fields and minimum number of bits need for each field.

6 Opcode:	5 Destination Register: 00118	5 Source 1 Register: 00100	5 Source 2 Register: 00011
--------------	-------------------------------------	----------------------------------	----------------------------------

Design an instruction format for instructions that have one operation, one destination register, one source register, and an immediate value. Label the fields and minimum number of bits need for each field.

6 Opcode: s	5 Destination Register:	5 Source 1 Register:	18 Immediate:
----------------	----------------------------	-------------------------	------------------



each field.

Opcode:	Destination Register:	Source 1 Register:	Source 2 Register:
---------	-----------------------	--------------------	--------------------

Design an instruction format for instructions that have one operation, one destination register, one source register, and an immediate value. Label the fields and minimum number of bits need for each field.

Opcode: 5	Destination Register:	Source 1 Register:	Immediate:
-----------	-----------------------	--------------------	------------

Problem 2

Suppose we are designing an instruction set architecture with 32-bit instructions and 26 different opcodes. The register file contains 128 registers. One of the instruction types we would like to support specifies an opcode, a destination register, and two immediate source values. What is the minimum number of bits that are needed to specify each field?

Opcode: 5	Destination Register: 7	Immediate Value: 10	Immediate Value: 10
-----------	-------------------------	---------------------	---------------------

Problem 3

Suppose we are designing an instruction set architecture with 28-bit instructions and 44 different opcodes. Immediate operands can be in the range of ± 512 . How many registers can this datapath have? Assume we would like to support an I-type instruction format with the same operand

128 X
17
2

R_0, R_1, R_2
 $\leftarrow R_1 + R_2$