

1. State the size and purpose of each of the following RSC registers:

	size	purpose					
ACC	32	accumulates result from arith. operatn	AR	32	holds address of data from memory	PC	32 holds address of next instruction
S	1	RSC stops when S=1	DR	32	temporary data storage to/from mem.	Z	1 sets flag to 1 when ACC=0
			IR	32	holds opcode for current instruction		

2. Given a memory chip of size  $4G \times 16$ , answer the following: (1 pt each)

a. How many  $4G \times 4$  chips would be needed to construct the chip?

4 chips

b. How many total items can be stored in the chip (as a power of 2)?

$$4G = 2^2 \cdot 2^{30} = 2^{32} \text{ items}$$

c. How many address bits are needed to access all memory locations?

32

d. How many  $2G \times 2$  chips would be needed to construct the chip?

$$\begin{aligned} 4G &= 2^2 \cdot 2^{30} = 2^{32} \\ 2G &= 2^1 \cdot 2^{30} = 2^{31} \\ 2^{32} / 2^{31} &= 2^1 \\ 2^1 \cdot 2^3 &= 2^4 \end{aligned}$$

3. Define high-order interleaving. (1 pt)

most significant bit determines which module to read/write into while the rest of the number determines the position within the module.

4. Define low-order interleaving. (1 pt)

least significant bit determines which module to read and write into while the other bits decide the position within the module.

5. How many of the following components would be required to make a bus that has 8 interacting components? (All components can potentially read from or write to the bus.) (1 pt each)

a. Multiplexers 8

b. Tri-state Buffers 3