

# Computer Architecture

Peer Instruction

**ARM stands for Advanced RISC Machines. Which of the following device(s) is(are) using ARM processor?\***

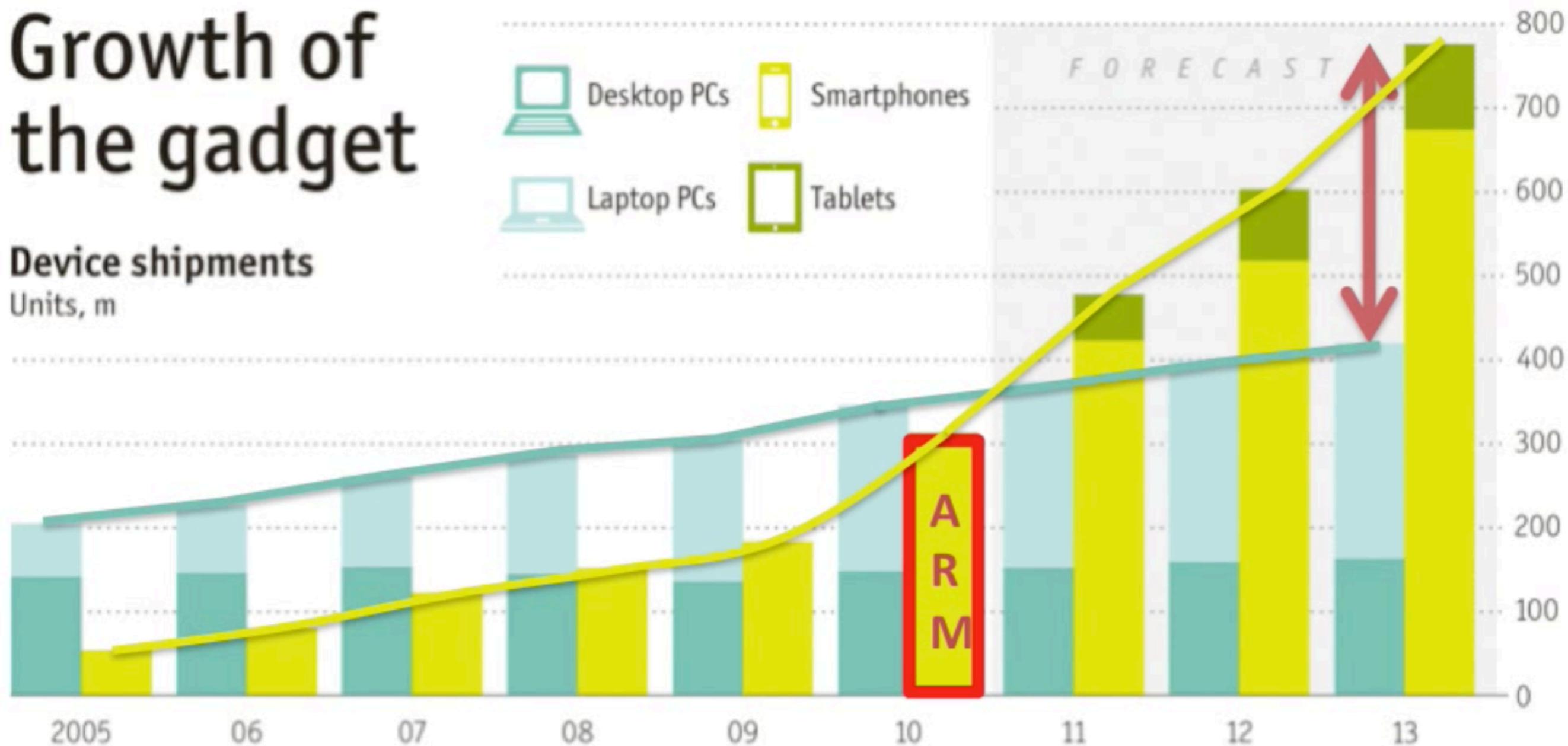
- A. Desktop PCs
- B. Laptop PCs
- C. Smartphones
- D. Tablets
- E. All of the above
- F. None of the above

*\*You can choose multiple answers.*

# Growth of the gadget

## Device shipments

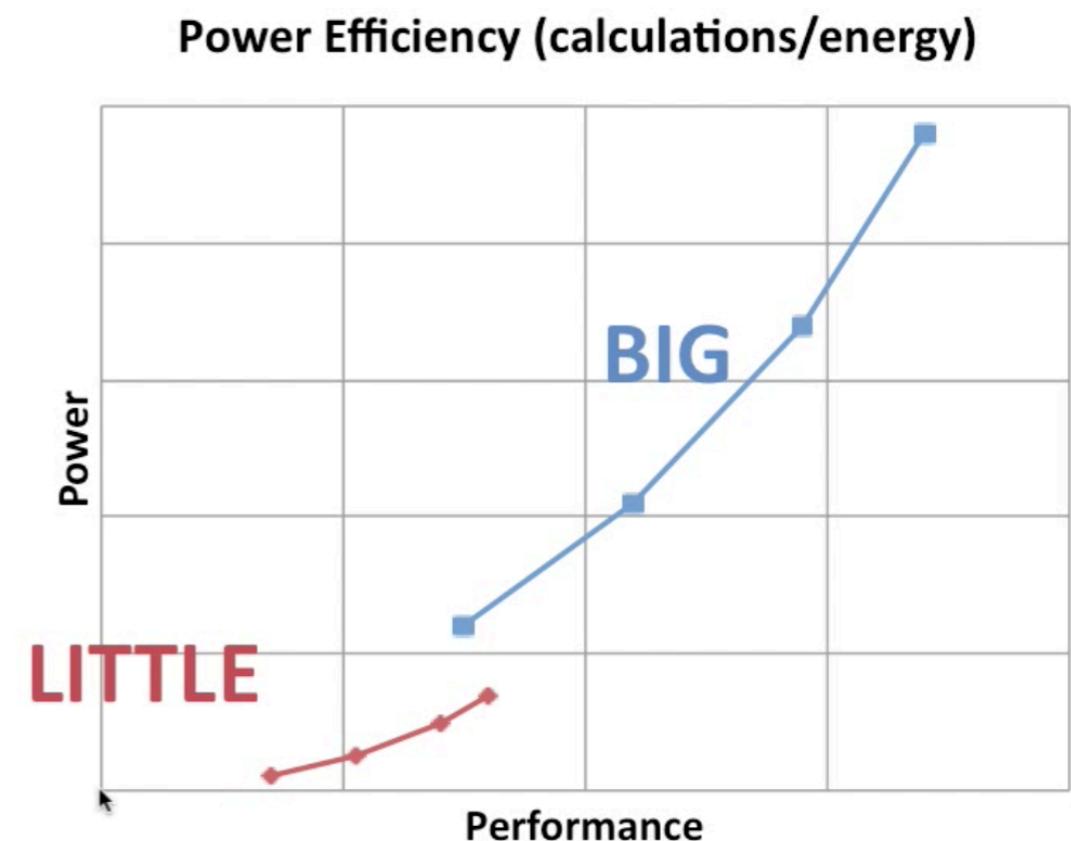
Units, m



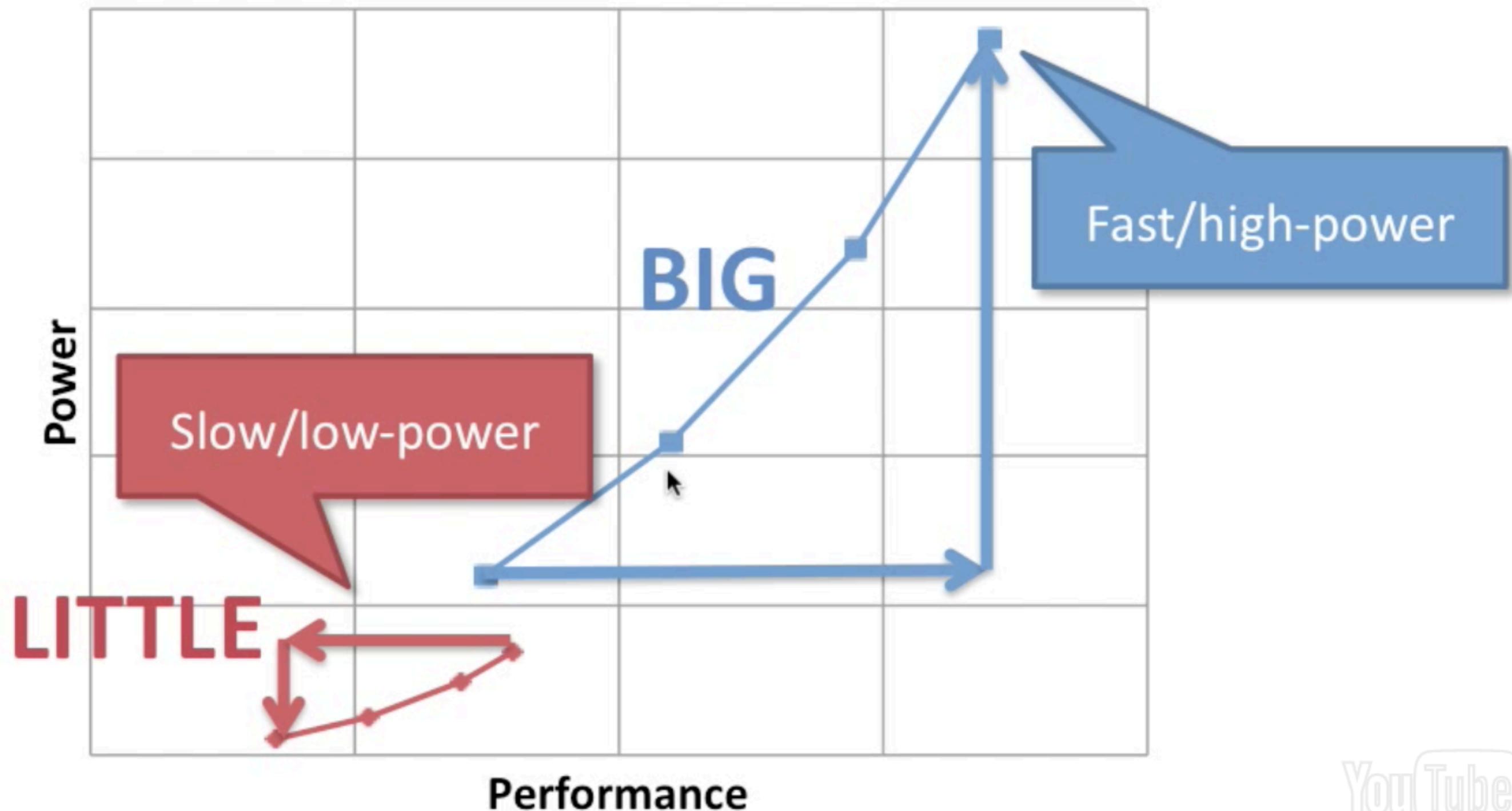
Embedded ARM computers are the most common in the world.

# What does the following chart below tell about big and little processors?

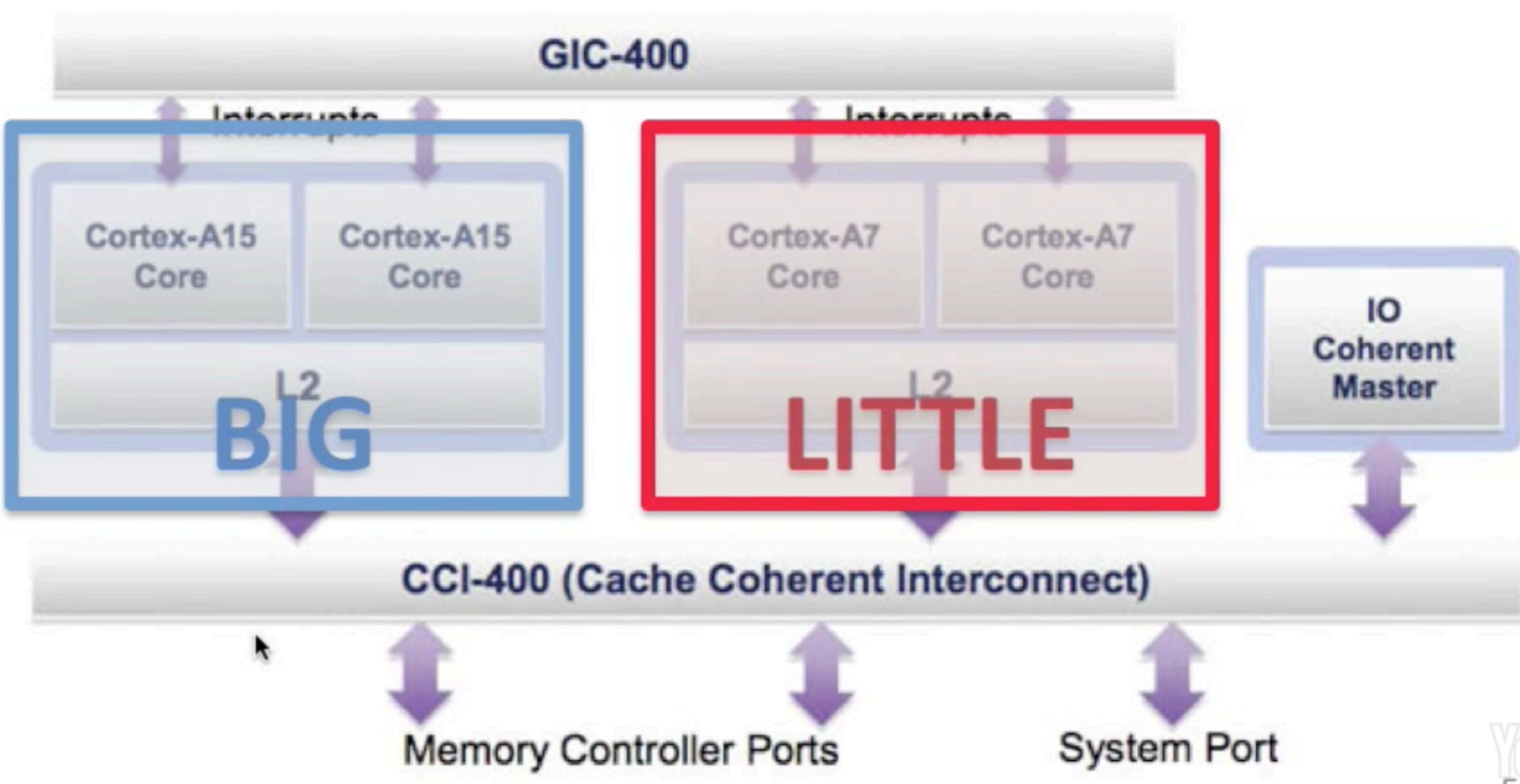
- A. Big processors are fast but high power
- B. Little processors are slow but low power
- C. All of the above
- D. None of the above



## Power Efficiency (calculations/energy)

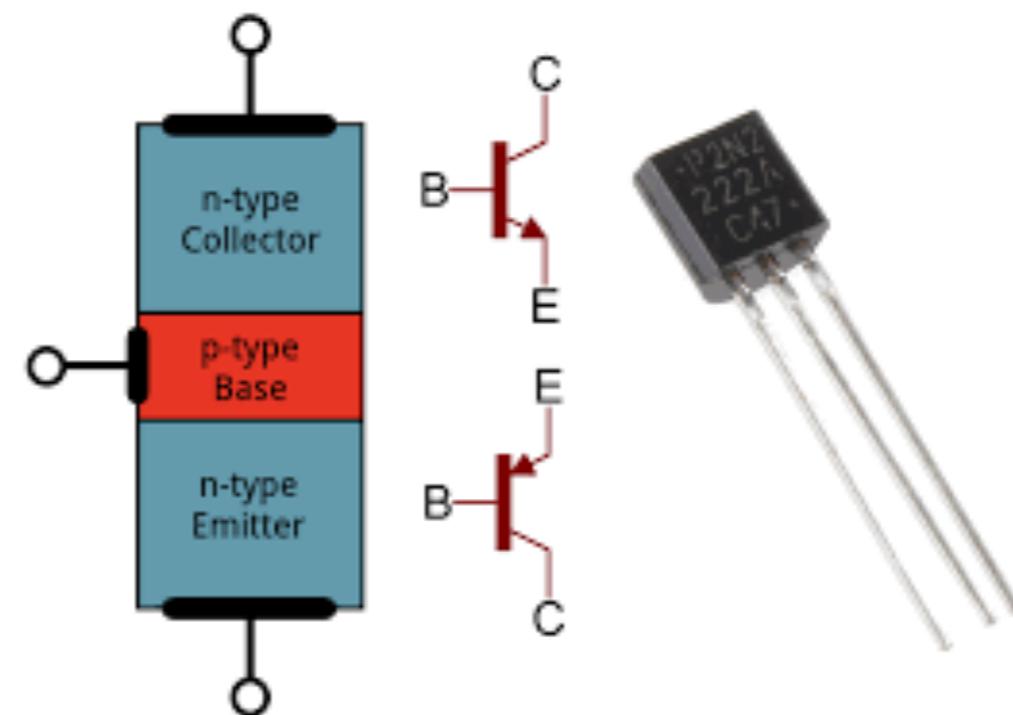


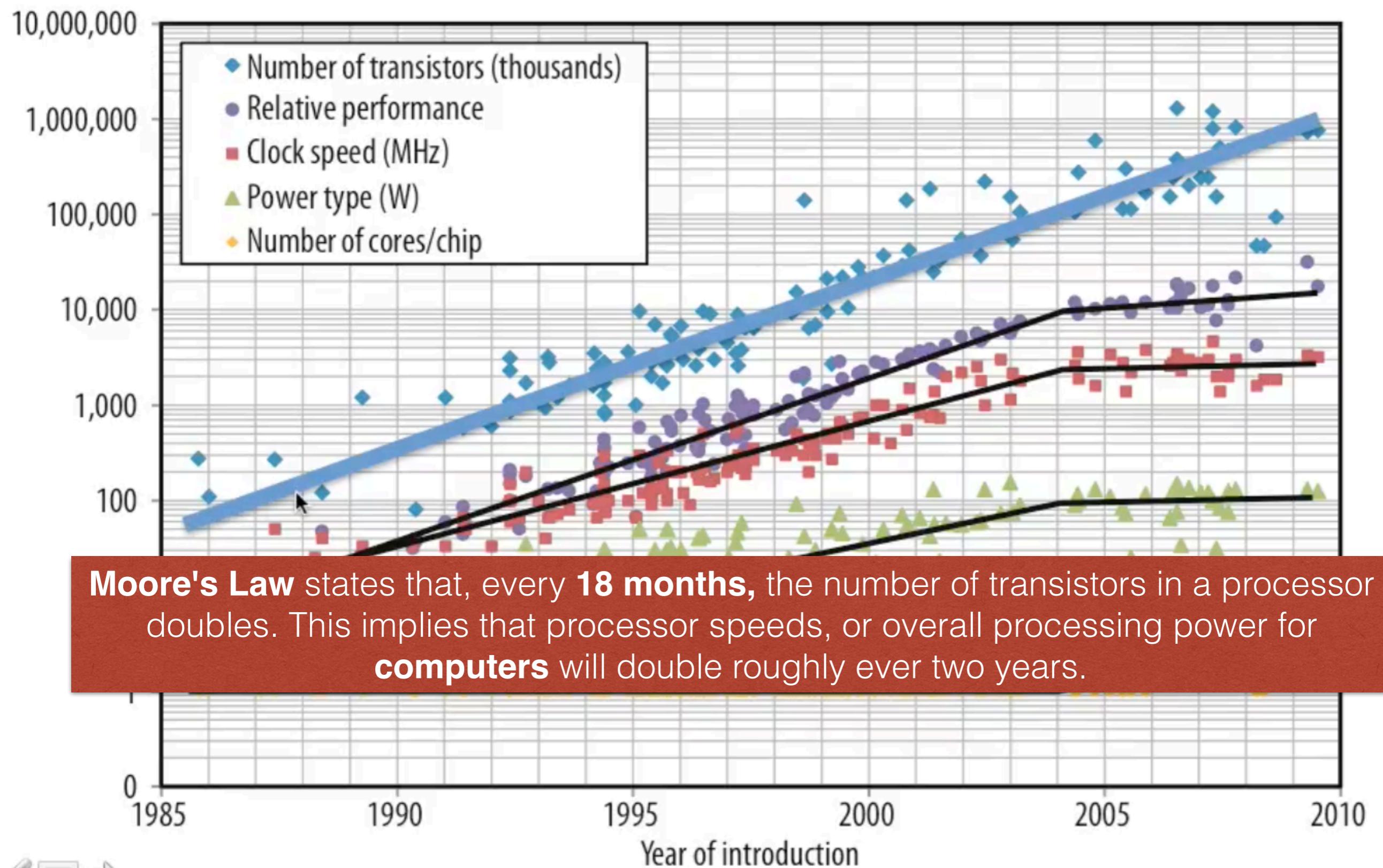
- Big processor cores for **high performance**
- Little processor cores for **low power**



- ARM is doing this for **battery life**.

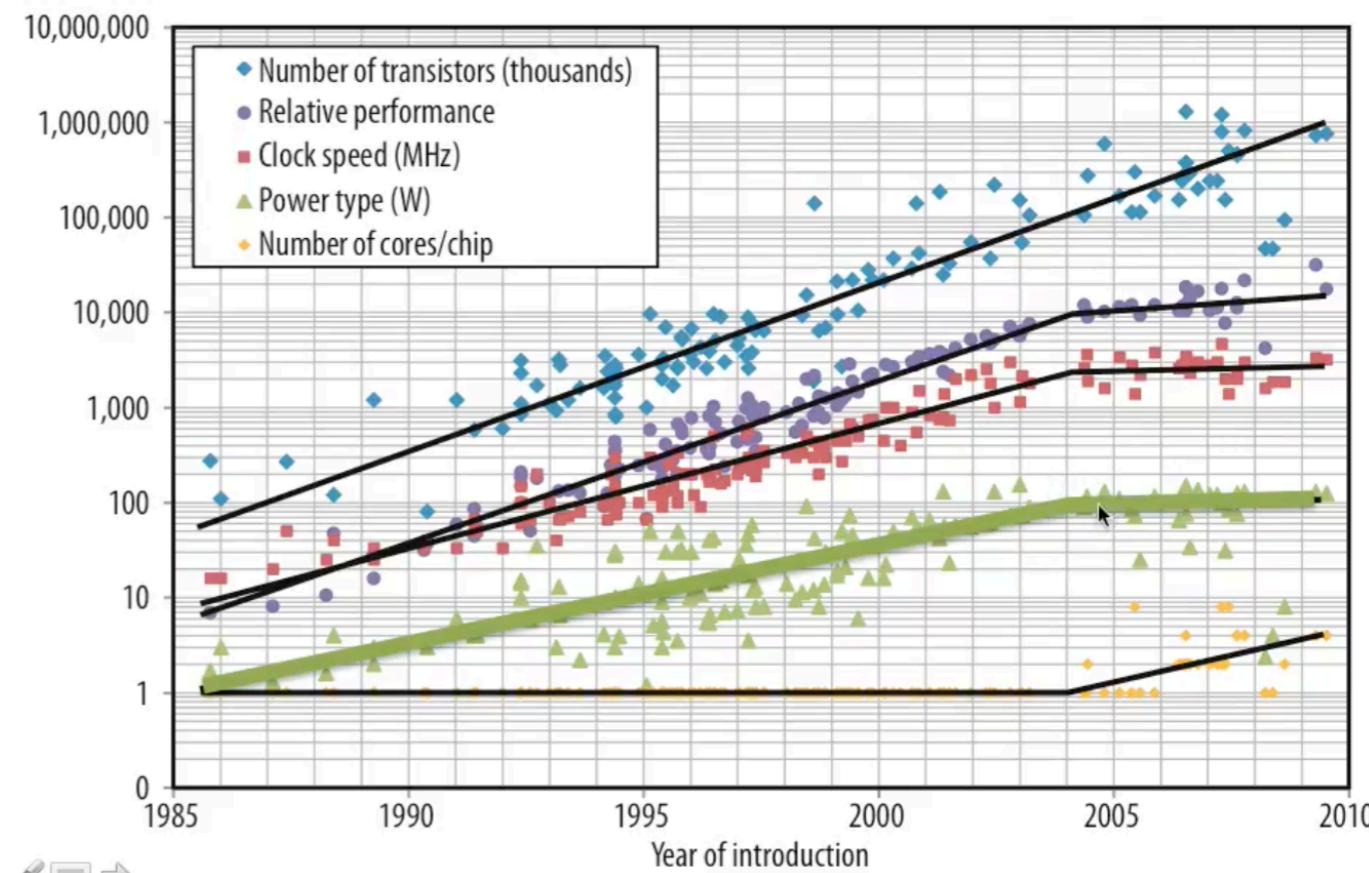
**On the right is a block diagram, schematic diagram and an actual transistor image. Transistors are the building blocks of processors. What does Moore's Law say about transistors?**



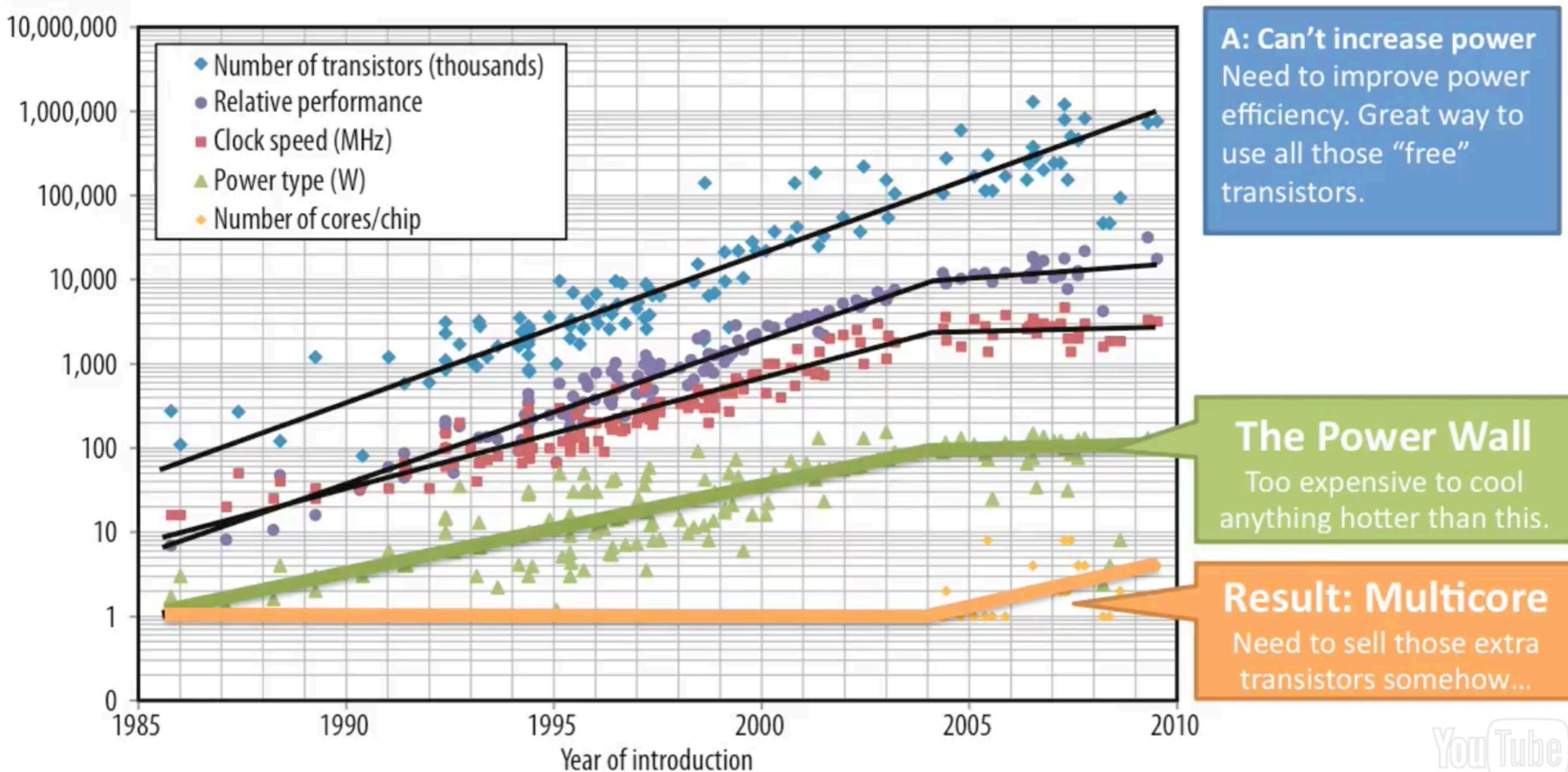


# In about 2003, designers started to put multiple cores on each processor chip. What made them do this?

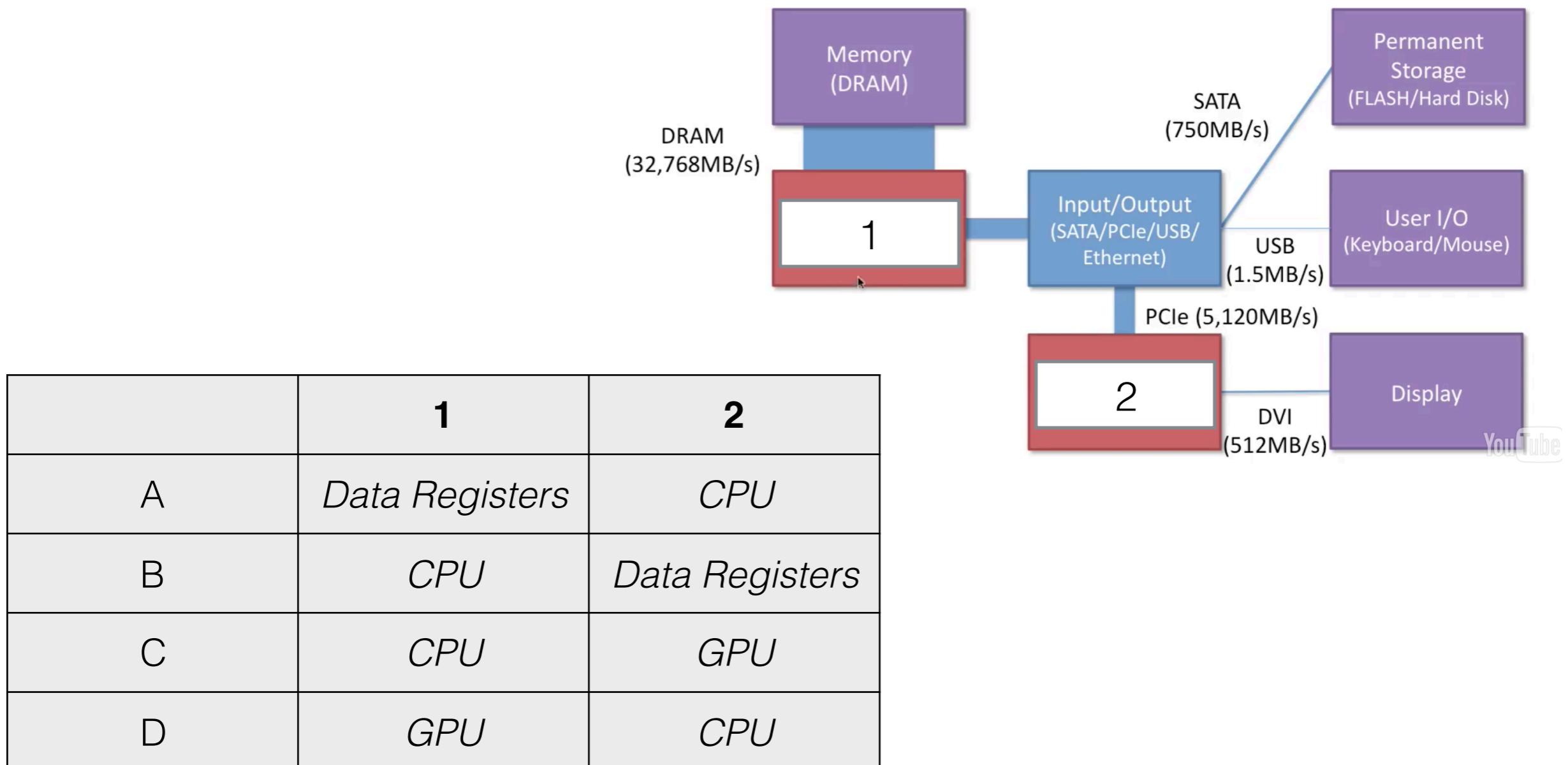
- A. Chips became too expensive to cool
- B. Manufacturers needed to sell those extra transistors somehow
- C. Can't increase clock speed (hence increase power)
- D. All of the above
- E. None of the above

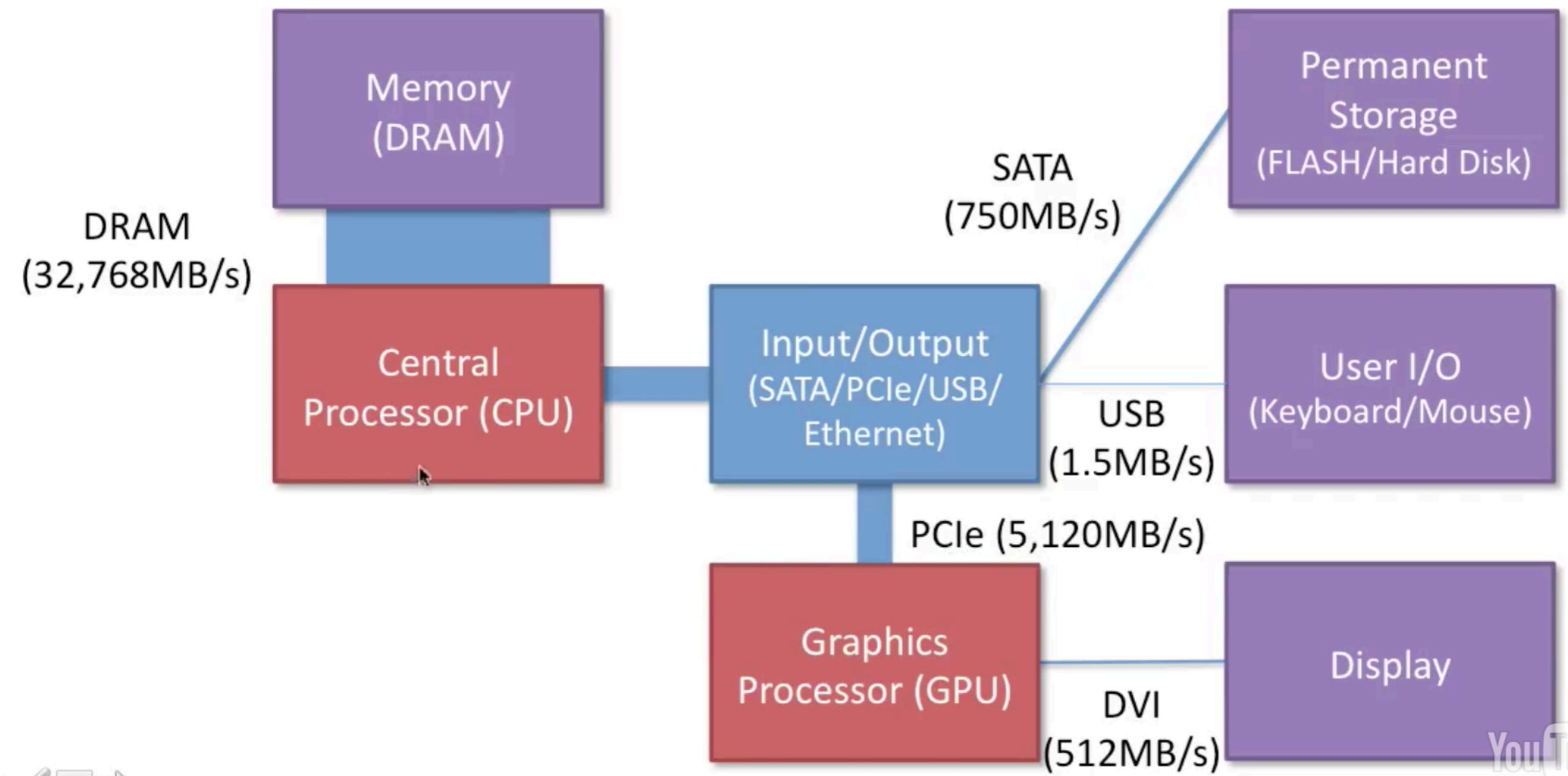


*\*You can choose multiple answers.*

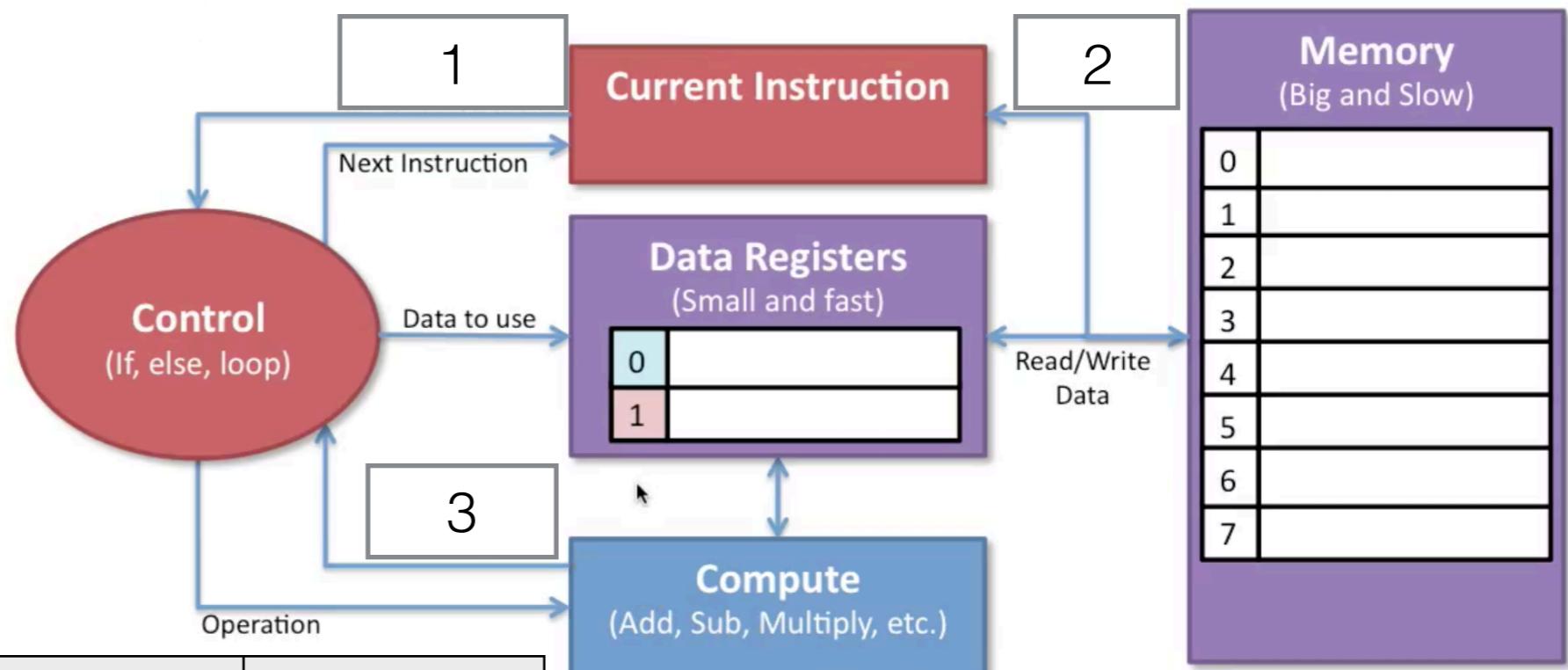


The figure on the right shows the components of a computer system and their interconnectivity. What should be in 1 and 2?

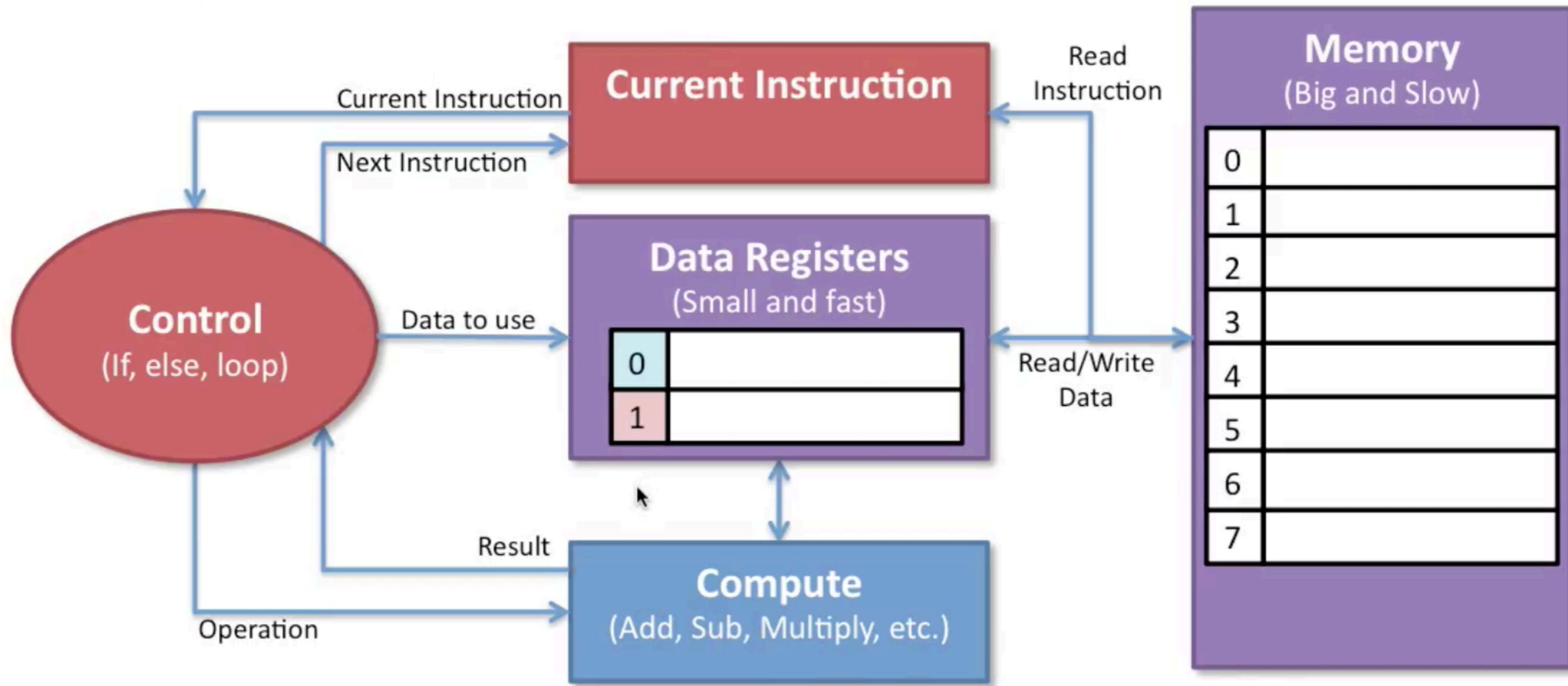




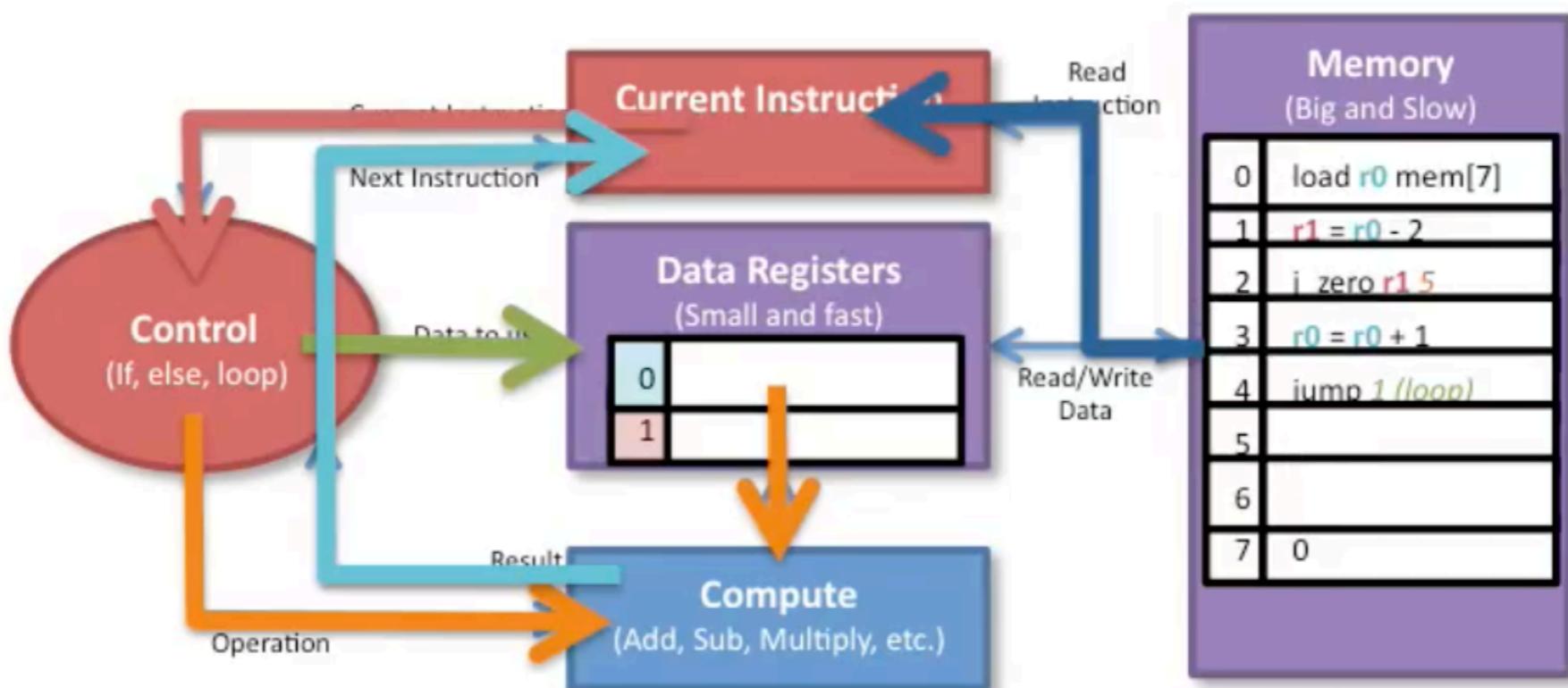
The figure on the right shows the components of a computer system and their interconnectivity. What should be in 1 and 2?



	1	2	3
A	<i>Current Instruction</i>	<i>Read Instruction</i>	<i>Result</i>
B	<i>Read Instruction</i>	<i>Current Instruction</i>	<i>Result</i>
C	<i>Current Instruction</i>	<i>Result</i>	<i>Read Instruction</i>
D	<i>Read Instruction</i>	<i>Result</i>	<i>Current Instruction</i>



# What will the processor do when processing an instruction? Order the following steps. Write the letters only.

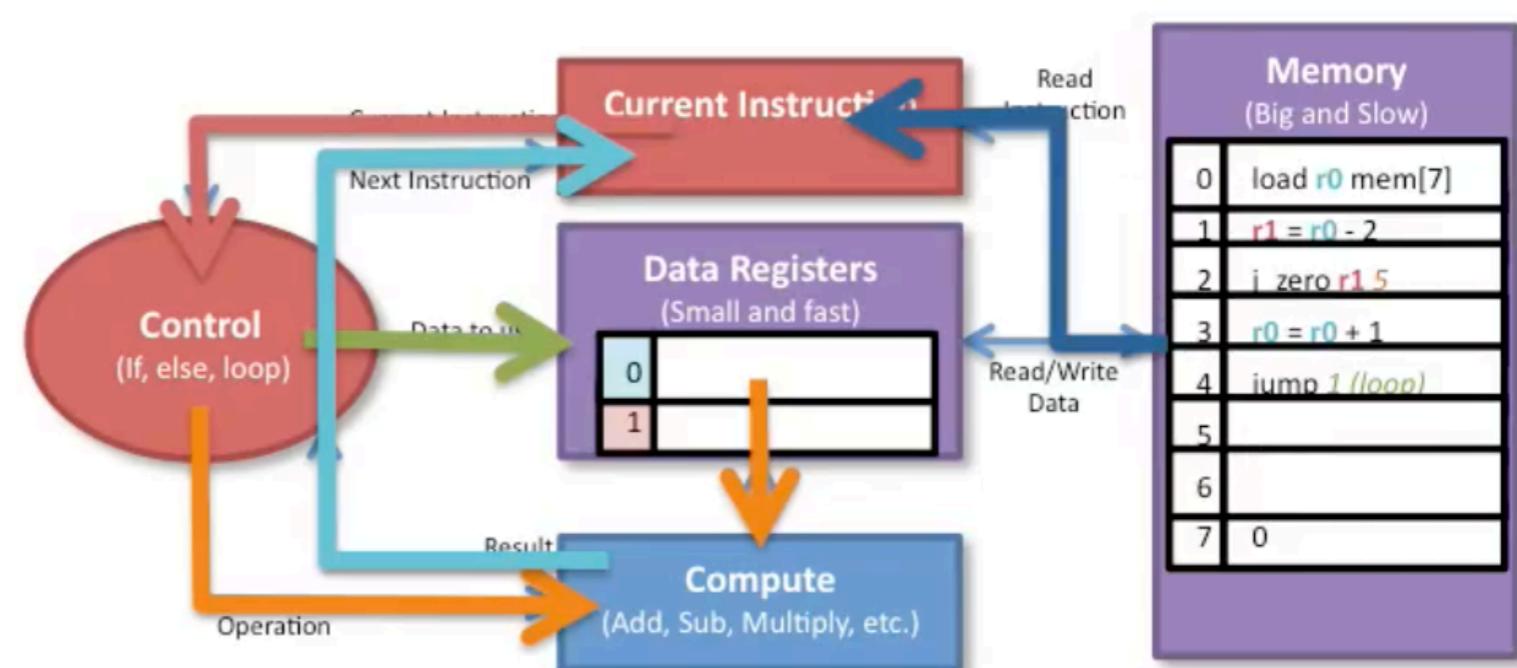


- |   |                                  |
|---|----------------------------------|
| A | Figure out what operation to do. |
| B | Do the computation.              |
| C | Figure out what data to use.     |
| D | Load the instruction.            |
| E | Figure out next instruction.     |

What will the processor do?

- 1. Load the instruction
- 2. Figure out what operation to do
- 3. Figure out what data to use
- 4. Do the computation
- 5. Figure out next instruction

Repeat this over and over and over...



D -> A -> C -> B -> E

**Which of the following decimal numbers cannot be represented with 7 binary bits (unsigned)?**

- A. 0
- B. 8
- C. 16
- D. 31
- E. 64
- F. 128
- G. 256

*\*You can choose multiple answers.*

Range for 7 bits:

0 to  $2^n - 1$

0 to  $2^7 - 1$

0 to 128 - 1

**0 to 127**

**Which of the following decimal numbers cannot be represented with 7 binary bits (unsigned)?**

- A. 0
- B. 8
- C. 16
- D. 31
- E. 64
- F. 128**
- G. 256**

**Which of these numbers can be represented by a 4-bit 2's complement number?**

- A. -9
- B. -8
- C. 7
- D. 8

*\*You can choose multiple answers.*

**A: -8 and 7**

$$-8 = 1000 = -8+0$$

$$7 = 0111 = 1+2+4$$

$$-9 \text{ needs 5 bits: } 1\ 0111 = -16 + 7$$

$$8 \text{ needs 5 bits: } 0\ 1000 = 8$$