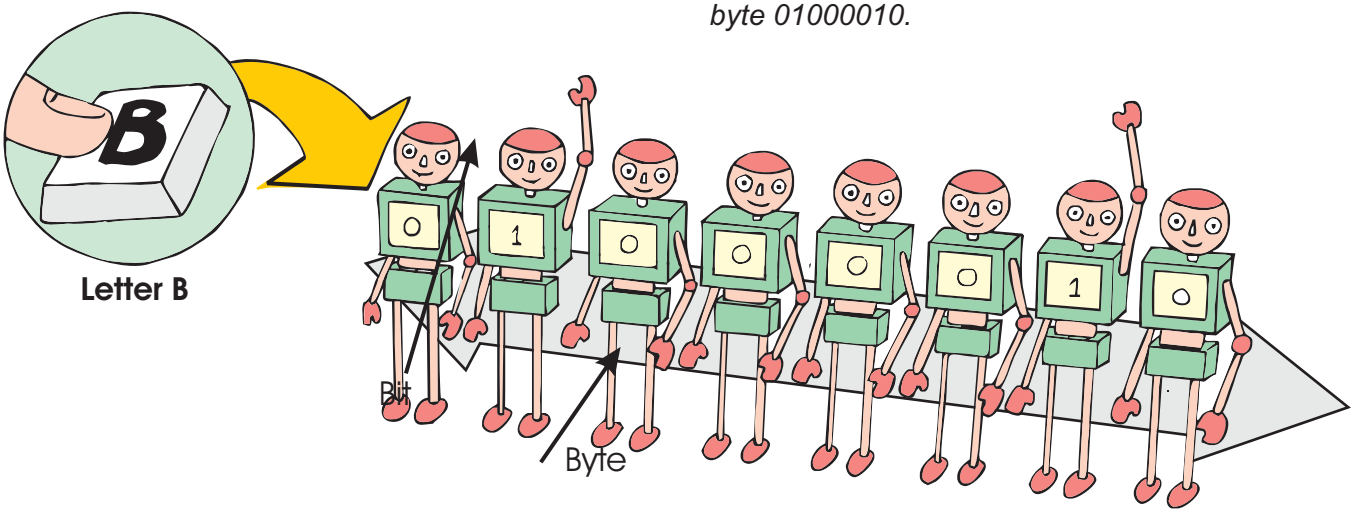
Bits and Bytes

All the data and instructions inside a computer are stored and processed as numbers. Most computers use only two digits: 0 and 1. This is called binary code. The numbers 0 and 1 are called binary digits, or bits. Although it is hard to believe, all sorts of information, from pictures and photographs to words and music, can be stored as patterns of just these two numbers. Inside the computer, the digits 0 and 1 are recorded as pulses of electricity on tiny electronic circuits. If a circuit is carrying an electrical pulse, it is 1, if it isn't, it is 0. All the input fed into the computer has to be coded as a different combination of pulses and non-pulses.

Pieces of computer data are stored in series of eight bits called **bytes**.

The letter B is converted to the byte 01000010.

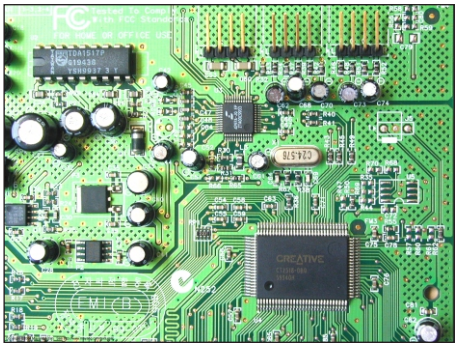


Data flow

To process data, computer sends electrical pulses through electronic circuits. Take note that a circuit is made up of a system of electronic pathways, and electronic devices called logic gates. As each pulse passes through a gate, it may be changed to a non-pulse. This is the way data is processed. Gates are arranged in thousand of different patterns, which can add, subtract, compare, memorize and do all the other works inside the computer.

Silicon chips

Electronic circuits are stored on chips. When you say chips, they are tiny slices of a substance called silicon. Each chip is covered with millions of circuits. The way circuits are arranged decides what jobs each chip can do. For example, there is a special chip for the memory of a computer and another one for its CPU. All the chips in a computer are mounted on boards called printed circuit boards (PCBs).



Chips with everything

Look closely at the printed circuit board below from a personal computer.

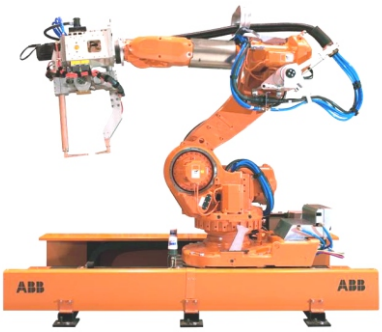
Some chips are very small that they can pass through the eye of a needle.

Many modern machines contain chips. Here are some examples.

Flat TV

PSP

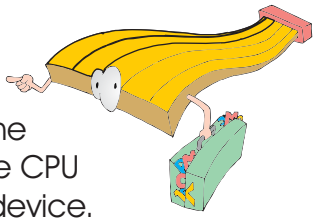
Industrial Robot



Buses

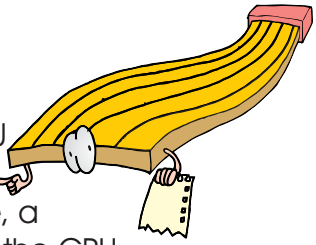
Information flows around the computer in bytes. Bytes are carried along metal paths called **buses**. Every bus consists of several tracks, and each track carries one bit. There are three types of buses: the data bus, the control bus and the address bus.

Data bus

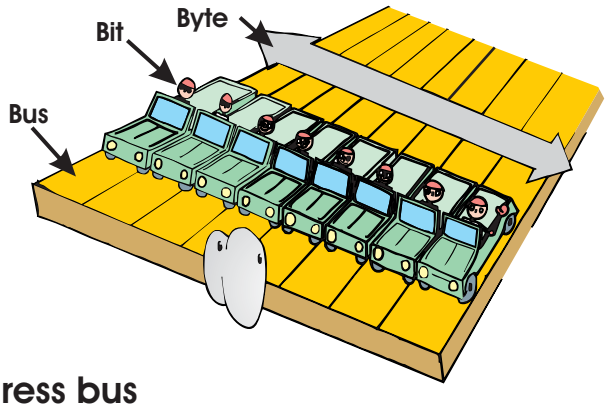


A **data bus** carries data between the CPU and the memory, or between the CPU and an input or output device.

Control bus



A **control bus** carries instructions from the CPU to the other parts of the computer. For example, a signal can be sent from the CPU telling the memory, whether a piece of data is to be stored or taken out from there.



Address bus

An **address bus** carries the numbers (addresses) which identify each place in the computer's memory.

All Are Binary

Lesson 2

Score

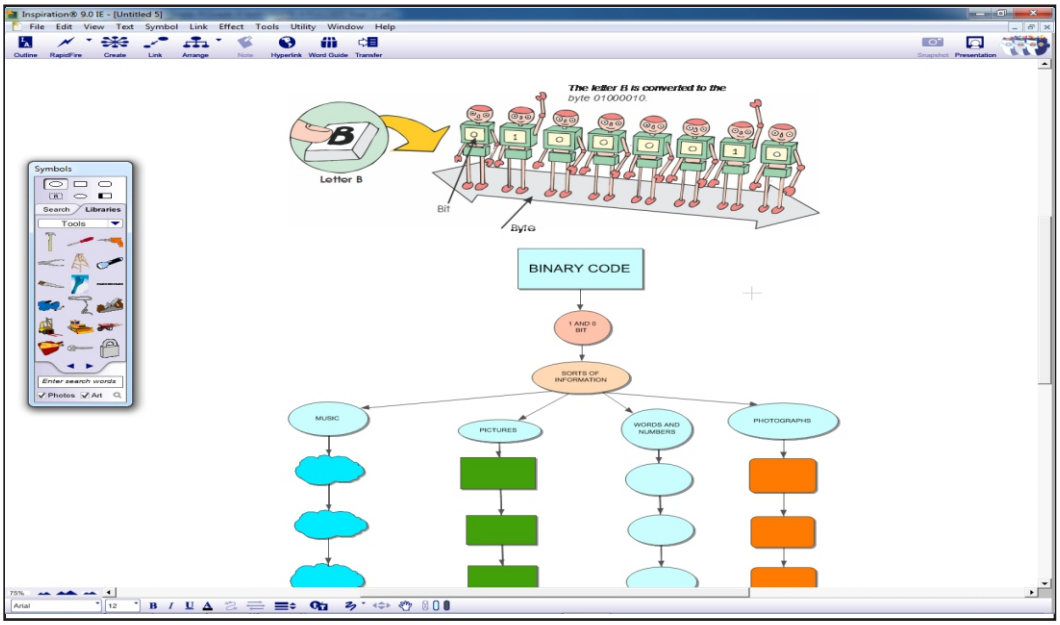
Activity 4

Directions:

1. Launch Inspiration.
2. Open and perform Lesson 2 Activity 4 **All Are Binary**.
3. Check the following and give what is asked:
   a. Music - Give at least 5 songs that you know and type them in the Music column.
   b. Pictures - Search at least 5 picture symbols from the library and place them in the picture column.
   c. Words and Numbers - Type your favorite singer and rank them using numbers 1 to 5 in each box under words and numbers' column.
   d. Photographs - Search at least 3 photographs' in the library and place them in the photographs column.

Note: Click the arrow in the right side of the symbol to show the whole data.

Preview:



4. Save the activity as **The Binary Rules**.

Chips with Everything

Lesson 2

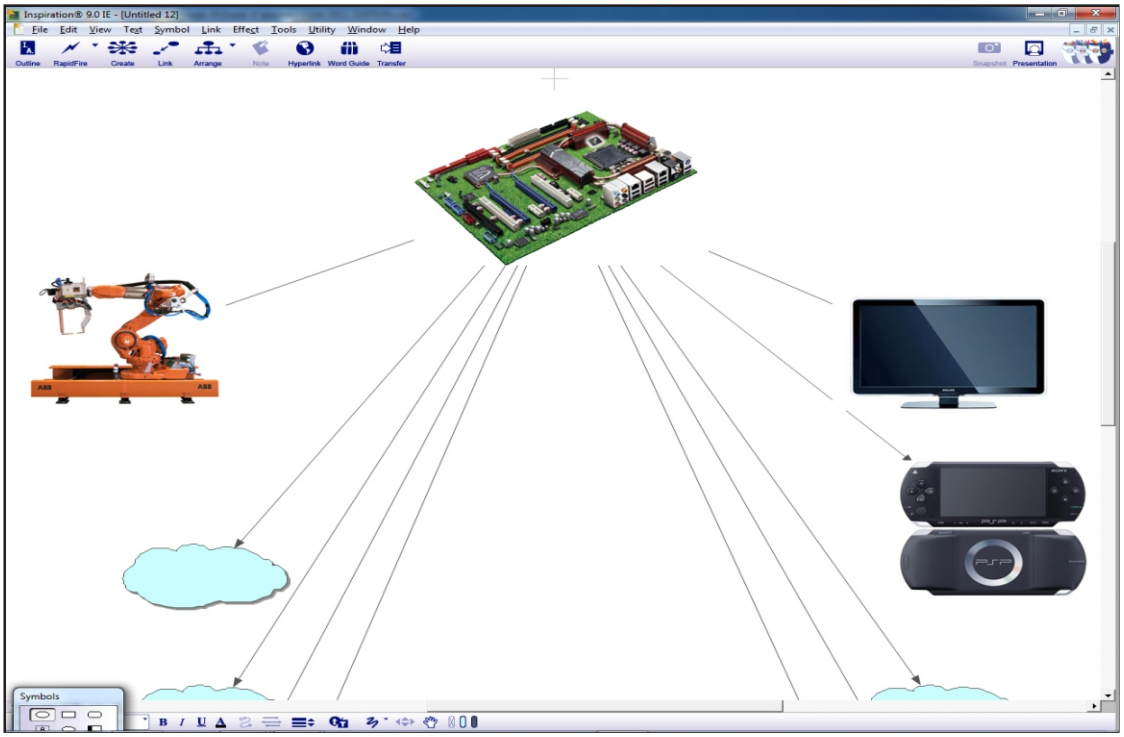
Score

Activity 5

Directions:

1. Launch Inspiration.
2. Open and answer Lesson 2 Activity 5 **Chips With Everything**.
3. Research ten (10) examples of modern machines that contain chips. Use Encarta Kids or Microsoft Student for your research and replace the symbols with your own researched machines. See the examples.
4. Connect the machines that you have researched to the circuit board.

Preview:



5. Save the activity as **Chips With Everything**.

What Buses Do

Lesson 2

Score

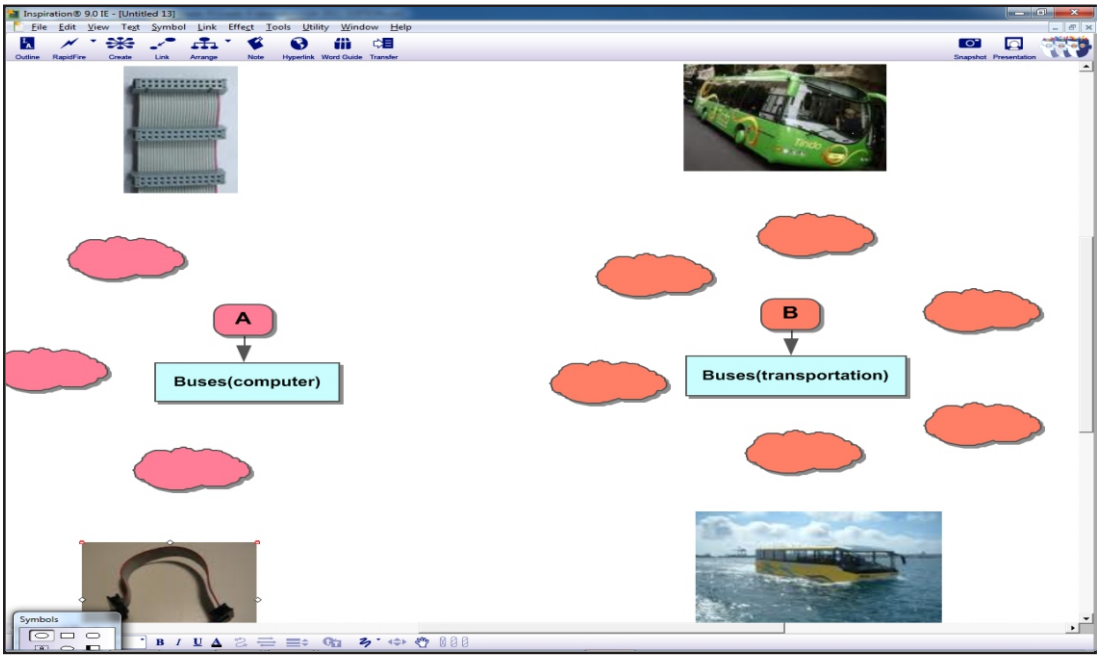
Activity 6

Directions:

1. Launch Inspiration.
2. Open and answer Lesson 2 Activity 6 **What Buses Do**.
3. Provide answers to the following:
    a. Three (3) things that computer buses carry.
    b. Six (6) things that transportation buses carry (see in the Inspiration picture library).
4. Link your answers to the buses using the Link tool. Arrange them further using the tree type of arrangement with the direction toward the right.

Note: To arrange, click the arrange button in the Main toolbar, click move, right tree direction and click **OK**.

Preview:



4. Save the activity as **What Buses Do**.