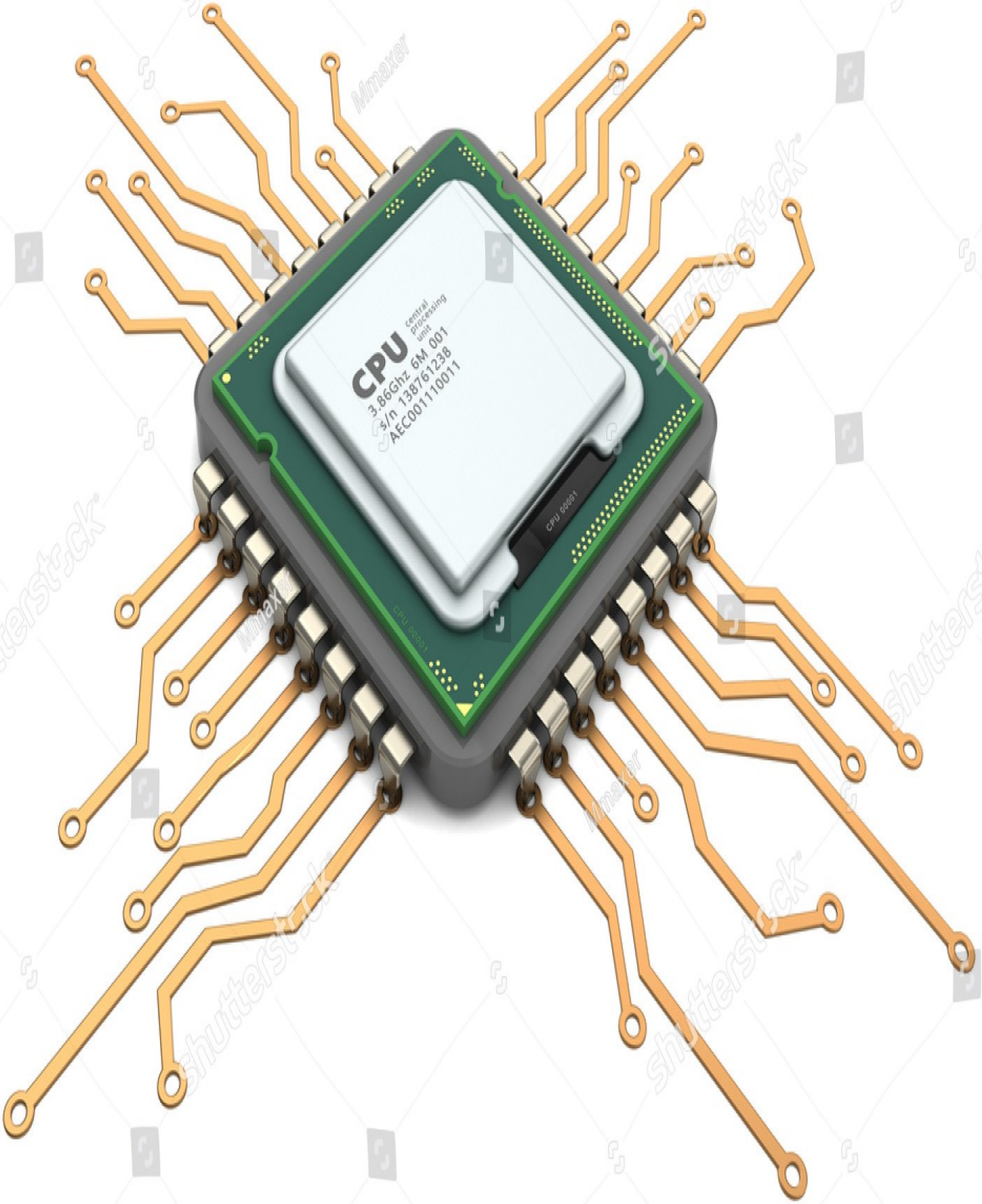
CPU
central processing unit
3.86Ghz 6M 001
s/n 138761238
AEC001110011

Lecture-4

MEMORY:

It is a storage device. It stores program instructions, data and the results. There are two kind of memories;

semiconductor memories & magnetic memories. (1): Semiconductor memories are faster, smaller, and lighter and consume less power. Semiconductor memories are used as the main memory of a computer. (2): Magnetic memories are slow but they are cheaper than semiconductor memories. Magnetic memories are used as the secondary memories of a computer for bulk storage of data and information's.

If a memory stores N- words of information each word being of m bits, we say it is a N x m memory. E.g. 8x4 memory means there are 8 words and each word containing 4- bit of information (called nibble). 8 words are stored at 8-memory locations and these memory locations are clearly identified by 8 unique addresses.

Table: Formulation of Memory Address

A2	A1	A0	Decimal Equivalent	Memory Location	Contents of the memory location
0	0	0	0	0	M(0)
0	0	1	1	1	M(1)
0	1	0	2	2	M(2)
0	1	1	3	3	M(3)
1	0	0	4	4	M(4)
1	0	1	5	5	M(5)
1	1	0	6	6	M(6)
1	1	1	7	7	M(7)

Addresses are formulated by bit combination available in wires known as address lines. To identify 8-memory locations, 3 address lines designated A2 A1 A0 are required. The memory locations identification and the corresponding contents stored are shown in table. M(0) is the content of memory location '0' and it has 4 bits here. M(1) is the content of memory location '1' and so on. It can also be represented as shown in fig.1

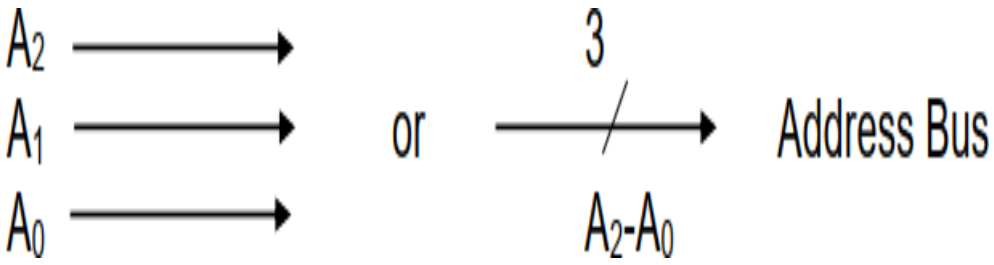

Fig.1 Representation of Address Bus

The capacity of a memory is specified terms of the maximum number of words the memory can store. In general, if the memory has k-bit address and each word is of length m, then the memory has a capacity of 2k x m bits, organized as 2k words each of m-bits. If k=10, then the memory can store 1024 words or 1k words. Intel 808A microprocessor has 16-address lines.

Therefore it can address directly 2^{16} memory locations.

2^{16} memory locations = 2^6 x 2^{10} memory locations

= 64k memory locations

= 65536 memory locations.

Thus, 8-bit microprocessor provides a maximum of 216 or 64k memory addresses ranging from 0000 to FFFF.