Assignment

1. Draw a memory chip with a data width of 4 bits that uses 3x8 row and column decoders.

2. Using the memory chip from problem 1, draw a memory module that has a data width of 16 bits and a data capacity of 512 bytes.

3. How many of each of the following memory chips is needed to build a memory with the given capacity?
   (a) 8x8 memory chip, memory capacity 256 bytes
   (b) 1Mx1 memory chip, memory capacity 32 MB (megabytes)
   (c) 16Mx4 memory chip, memory capacity 1 GB (gigabyte)

4. Draw the internal structure of a 4x16 SRAM memory that uses flip-flops to store one bit of information.

5. Draw the internal structure of a 16x4 DRAM memory that uses capacitors to store one bit of information. Row and column address bits are multiplexed on the same address lines. Be sure to show the refresh and control signals. (You do not have to show the internal structure of an individual memory cell.)

6. Pick any current computer system with an Intel P4 processor that runs faster than 2.5 GHz. What kind of main memory does this system use? What is the access latency of the memory?