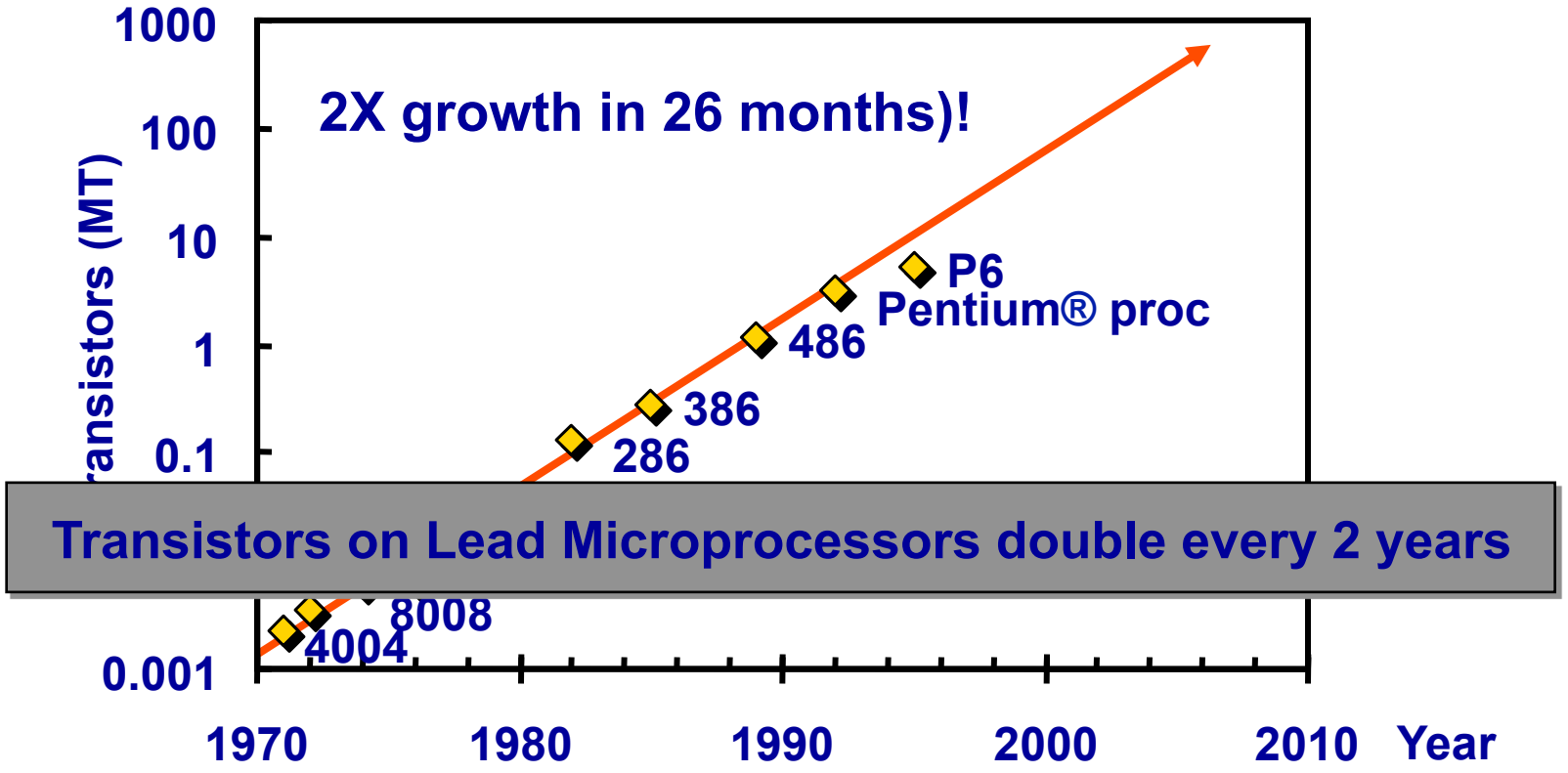
1.Introduction-Homework

- 1-1Extrapolating the data from figure, predict the transistor count of a microprocessor in 2010



Homework

- 1-2 sketch a transistor-level schematic for a CMOS 4-input NOR gate
- 1-3 sketch a transistor-level schematic for a single-stage CMOS logic gate for each of the following functions:

$$a)\ Y = \overline{A + BC + D}$$

$$b)\ Y = \overline{A + BCD}$$

Homework

- 1-4 sketch a transistor-level schematic of a CMOS 2-input XOR gate. You may assume you have both true and complementary versions of the inputs available
- 1-5 Sketch a stick diagram for a CMOS 3-input NOR gate
- 1-6 estimate the area of 1-5

Homework

- 1-7 sketch transistor-level schematic of the following logic functions. You may assume you have both true and complementary versions of the inputs available
  - a) 2:4 decoder defined by

$$Y0 = \overline{A0} \bullet \overline{A1}, Y1 = A0 \bullet \overline{A1}$$

$$Y2 = \overline{A0} \bullet A1, Y3 = A0 \bullet A1$$

  - b) 3:2 priority encoder defined by

$$Y0 = \overline{A0} \bullet (A1 + \overline{A2})$$

$$Y1 = \overline{A0} \bullet \overline{A1}$$

Homework

- 1-8 Use a combination of CMOS gates(represented by their symbols) to generate the following functions from A, B, and C

$$a)\ Y = A(\text{buffer})$$

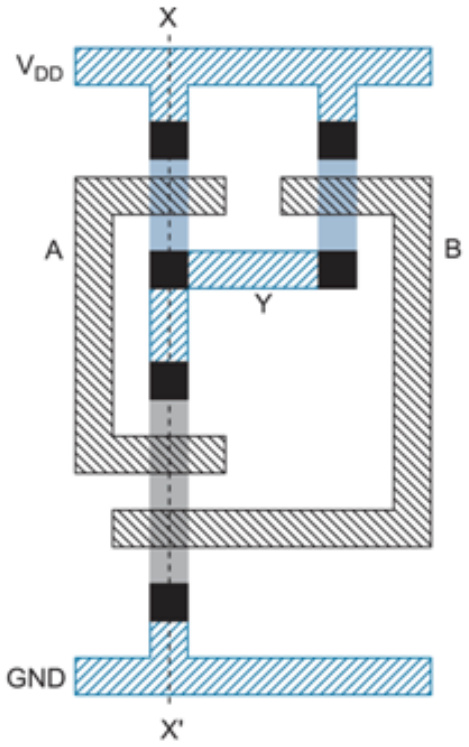
$$b)\ Y = A\overline{B} + \overline{A}B(\text{XOR})$$

$$c)\ Y = AB + \overline{A}\,\overline{B}(\text{XNOR})$$

$$d)\ Y = AB + BC + AC(\text{SUM})$$

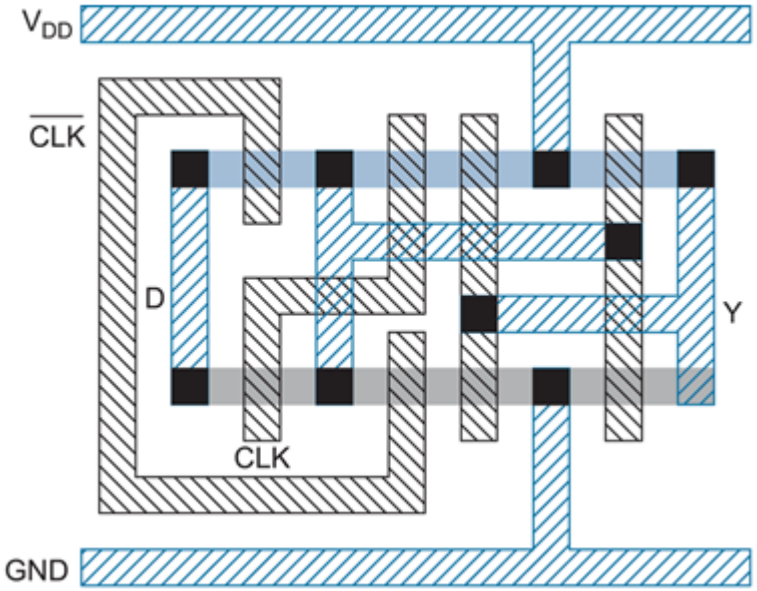
Homework

- 1-9 sketch a side view(cross section) of the gate from X to X’



Home work

- 1-10 translate the layout to circuit structure;estimate the area of the latch



homework

- 1-10 consider the design of a CMOS compound OR-AND-INVERT(OA21)gate computing $F = \overline{(A+B)C}$
  - Sketch a transistor-level schematic
  - Sketch a stick diagram
  - Estimate the area from the stick diagram
- 1-11 consider the design of a CMOS compound OR-AND-INVERT(OA22)gate computing $F = \overline{(A+B)(C+D)}$
  - Sketch a transistor-level schematic
  - Sketch a stick diagram
  - Estimate the area from the stick diagram