COMPUTER ARCHITECTURE
CS2010

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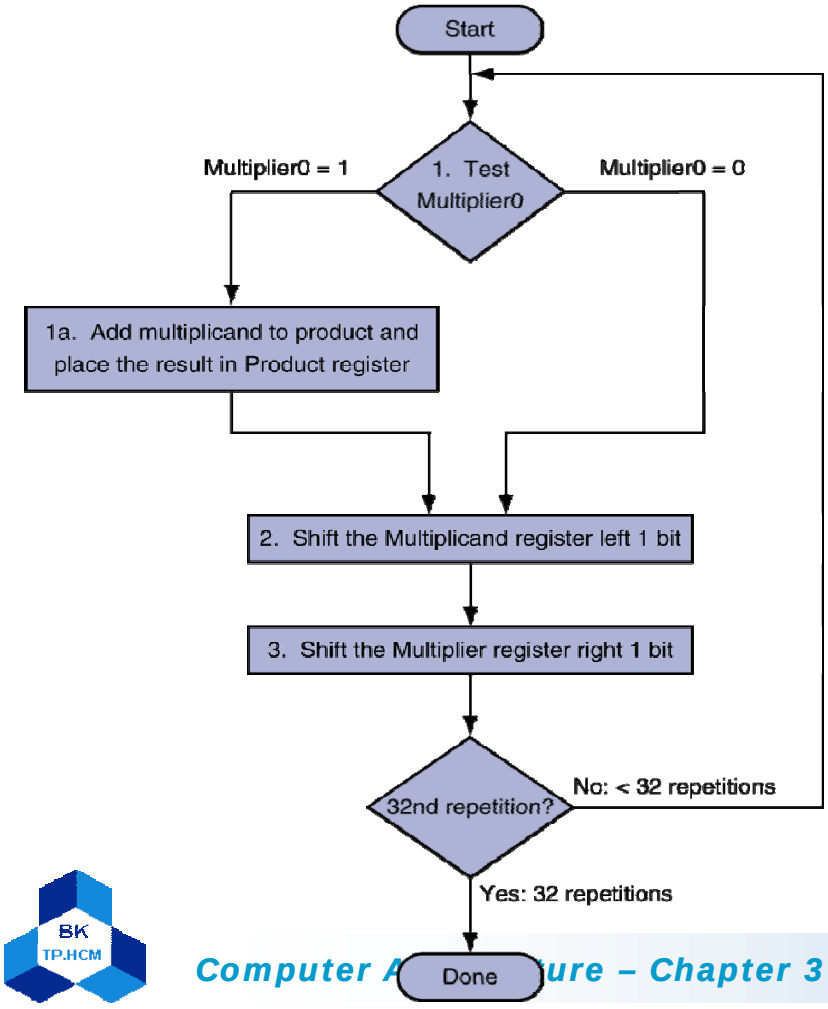
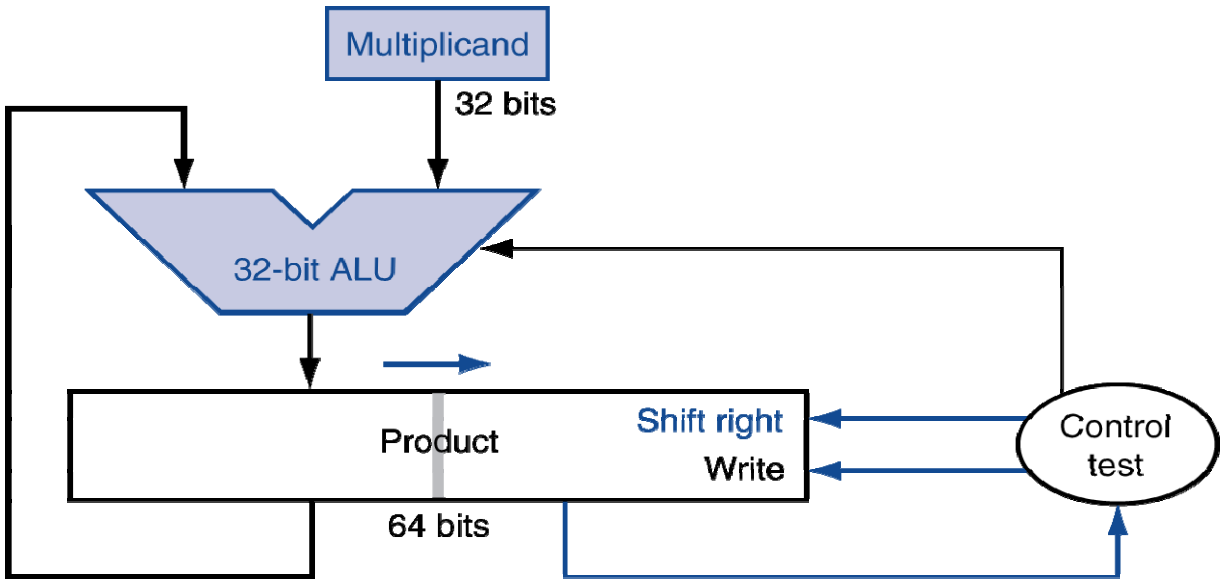
Chapter 3

ARITHMETIC FOR COMPUTERS

Exercise 1

- Show the contents of each register on each step for the result of multiplication of 6-bit integer 4 and 7
- Calculate the time necessary (number of cycles) to perform the multiplication above





Exercise 2

- Prepresent 927.45_{10} into IEEE FP 754 for single precision

  – + 1110011111.01 1100 1100 1100
  – + 1.11001111101 1100 1100 1100 x 2^9
  – S = 1
  – F = 110 0111 1101 1100 1100 1100
  – E = -9 + Bias = 9 + 127 = 136 = 10001000

  1 10001000 110 0111 1101 1100 1100 1100

Exercise 3

- NVIDIA has 16-bits wide for FP which is similar to IEEE 754. The left most bit is the sign bit, the exponent is 5 bits.
- Calculate $1.5234375 \times 10^{-1} \times (2.0703125 \times 10^{-1} + 9.96875 \times 10^{1})$. Assume one guard, one round bit and one sticky bit and round to nearest even. Show all steps in binary number

Exercise 3

- $1.5234375 \times 10^{-1} = 1.0011100000 \times 2^{-3}$
- $2.0703125 \times 10^{-1} = 1.1010100000 \times 2^{-3}$
- $9.96875 \times 10^{1} = 1.1000111011 \times 2^{6}$
  - $2.0703125 \times 10^{-1} + 9.96875 \times 10^{1} =$
  - (.0000000011 01 0100000 (G =0, R=1, S=1) +
  - 1.1000111011) x 2^{6} =
  - $1.1000111110 \times 2^{6}$ (Not round) x
  - $1.0011100000 \times 2^{-3}$
  - 1.1110011011 1001000000 (G=1, R=0, S=1) Round up
  - $1.1110011100 \times 2^{3}$