Computer Organization Quiz 3 – chap 3.

3/30 14:20 ~ 14:45

True or False (10 pts / problem)

1. (x) Consider the subtraction of two signed numbers. It has no overflow if two operands are one positive and one negative numbers, respectively.
2. (o) Consider the addition of two unsigned numbers *a* and *b*. An overflow occurs if *b* is larger than the complement of *a*.

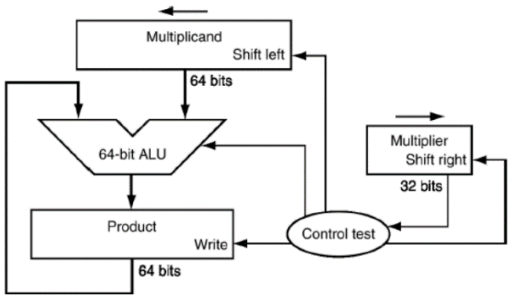

Fig. 1

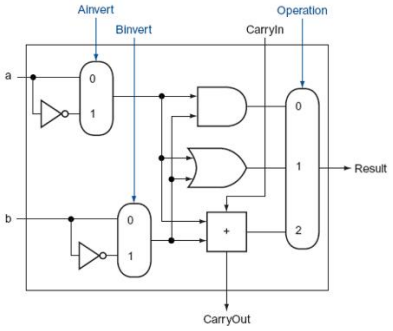

Fig. 2

3. (x) Fig. 1 shows one hardware to realize computer multiplication. The multiplicand is stored in the left 32-bit of multiplicand register.
4. (o) If we want to refine the hardware in Fig. 1, we can simplify the 64-bit ALU and multiplicand register to 32-bit ALU and 32-bit register. The multiplier is stored in the right 32-bit of product register.
5. (o) Follow previous problem. In each iteration, after addition result is stored in the product register, the product register needs to be shifted right by one bit.
6. (o) Fig. 2 shows a one-bit ALU design. If we want to conduct an operation of *a*-*b*, the control values should be (AInvert, BInvert, CarryIn, Operation) = (0, 1, 1, 10).
7. (x) Consider the design of carry look-ahead adder, *generate* and *propagate* are two important fundamental functions. Function *generate* means that we can determine the result of no carry out at current bit only by *generate* function.
8. (x) If we adopt the carry look-ahead adder scheme in the adder design, the more bit an adder has, the larger delay it also has. It is mainly because an adder with more bits need to compute more gates of AND-OR structure.
9. (o) Consider the Booth algorithm to refine multiplication, the increasing number of successive 1s can promote the performance gain of Booth algorithm.
10. (x) A floating-point number whose integer part is non-zero is regarded as a normalized floating-point number.