Note Title 23-08-2011

Aug 23rd.

SPEC

SPEC CPU 2006

- Int
- Float

Time : A.M

Perf : H.M

Spec Ratio = G.M(Individual Ratios)

www.spec.org

0x FE 00 00 00

MOV r1, #0xFE 00 00 00

If you want to load a number (32 bit)
write the entire number.

Valid:

Consider the part of the number
between the leftmost and rightmost 1
(payload)

(a) This should be 8 bits.

(b) It is right rotated from its base
value by an even number
of steps.

base value → payload is in the first (LSB) 8 bits.

00 00 00 78

ROR 4

80 00 00 07

Pls. take a look at the relevant section in the book

3

```
  1 1 0
  0 1 1
-------
1 0 0 1
```

```
  1 1 1 1 1
      + 1
-----------
1 0 0 0 0 0
```

Ripple Carry Adder

$O(n)$ → Complexity (Time)

$\theta(n)$ → space

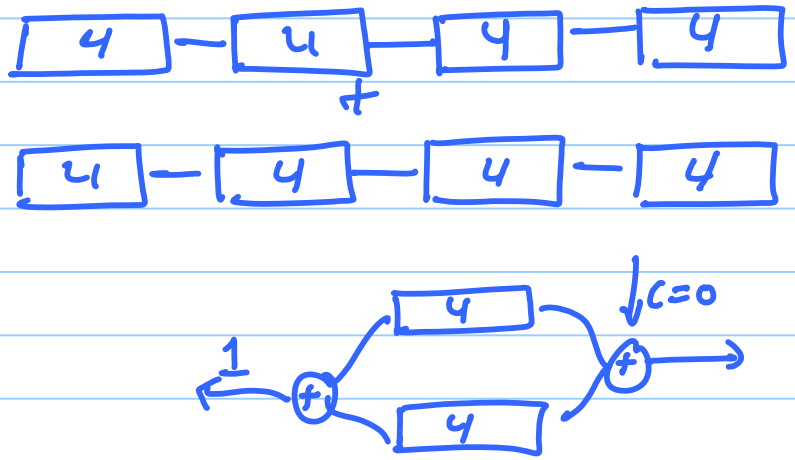
Full Adder : a, b, c (carry)

$$\text{carry out} = ab + bc + ca$$

$$\text{sum} = a \oplus b \oplus c$$

Carry - Select Adder

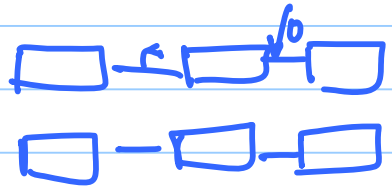
(16 bit addition)



First Stage: Add blocks of 4 → Carry = 0
                              → Carry = 1

Second stage: Propagate the carry.

A Block can → generate its own carry
            → propagate a carry
            → absorb a carry



Stage 1 : 4

Stage 2 : $n/4$

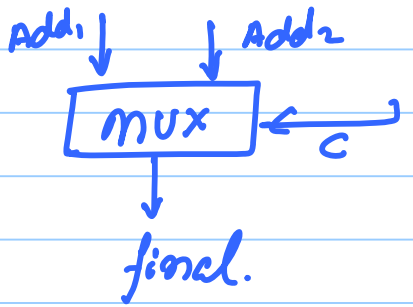
Time: $O(n/4)$

Space: $\Theta(2n)$

Asymptotic complexity — did not improve.

But, it is faster.

For one result bit



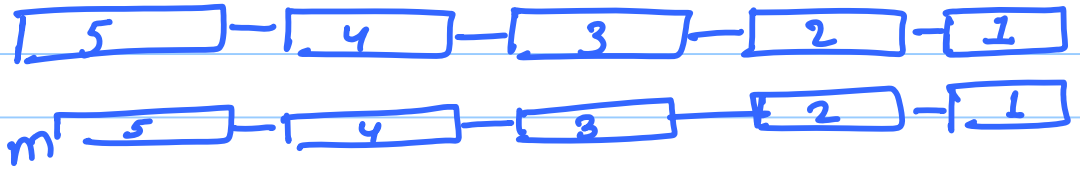
Stage 1: $\sqrt{n}$

Stage 2: $\sqrt{n}$

$O(\sqrt{n})$

Slightly better version

(1 bit num addition)



$\sum_{i=1}^{m} i = \frac{m(m+1)}{2} = O(m^2)$

blocks $= m$

Time: $O(m) = O(\sqrt{n})$

Carry Lookahead Adder

$a \quad b$

$G = ab$

$P = a\bar{b} + \bar{a}b$

carry out $= G + PC_{in}$