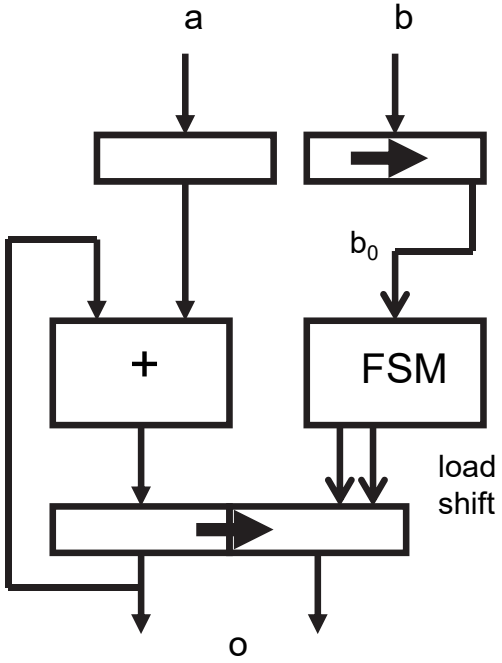
Korrutamisalgoritmid

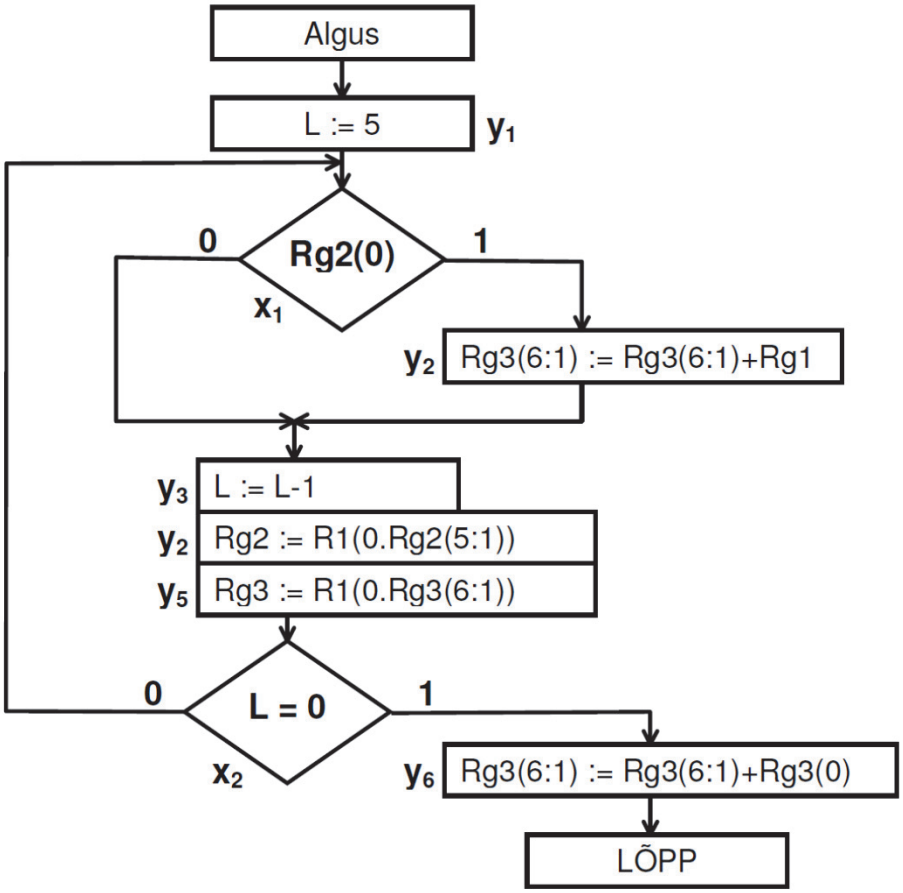
- 2-nd arvude korrutamine
  - analoogne 10-nd arvude korrutamisele

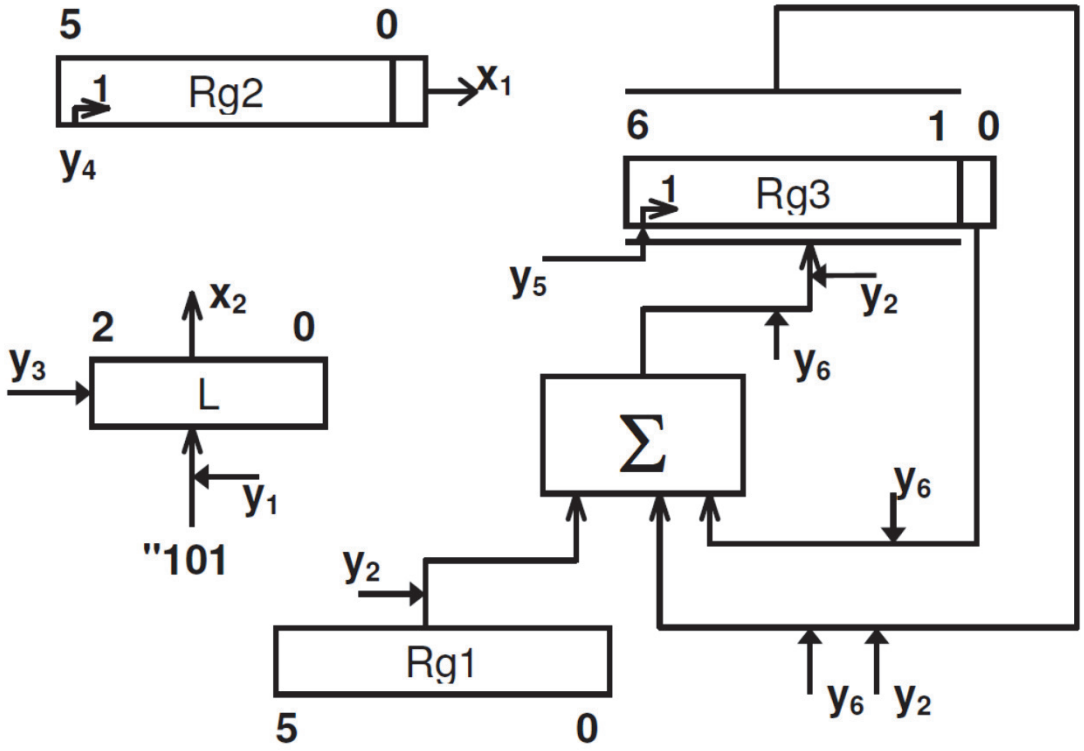
```
13 * 24        00001101 * 00011000
-------        -------------------
     52                 00001101...
    26                 00001101
-------        -------------------
    312               000100111000
```



- Liitmine ja nihutamine
- Enamus arhitektuure põhineb sellel algoritmil
  - Kiirendusvõtted kombineerivad eri variante

Korrutamisalgoritmid





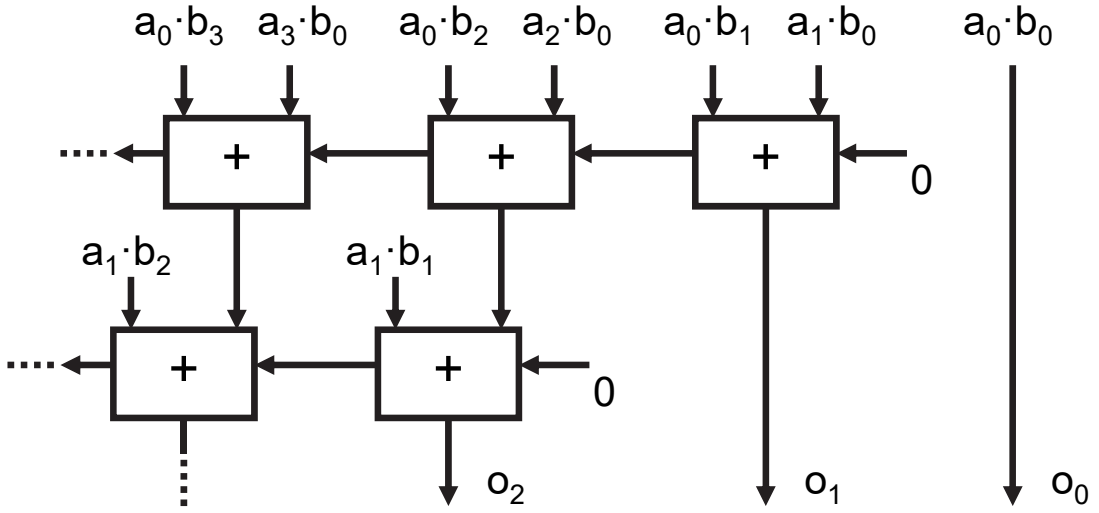
- Margus Kruus – Korrutusalgoritmid

Korrutite arhitektuurid

- Järjestikkorrutid
  - ühe või enama biti kaupa
  - juhtprogramm
  - kiirendamine täiendava analüüsi abil
    - aktiivsete bittide arv
  - kahe biti kaupa (radix-4)
    - … + [0,1,2,3]*a – 3*a = 4*a - a
  - 32-bitine korrutamine 16-bitiste korrutitega
    - $(a_H*2^{16}+a_L) * (b_H*2^{16}+b_L) =$
      $a_H*b_H*2^{32} + a_H*b_L*2^{16} + a_L*b_H*2^{16} + a_L*b_L$

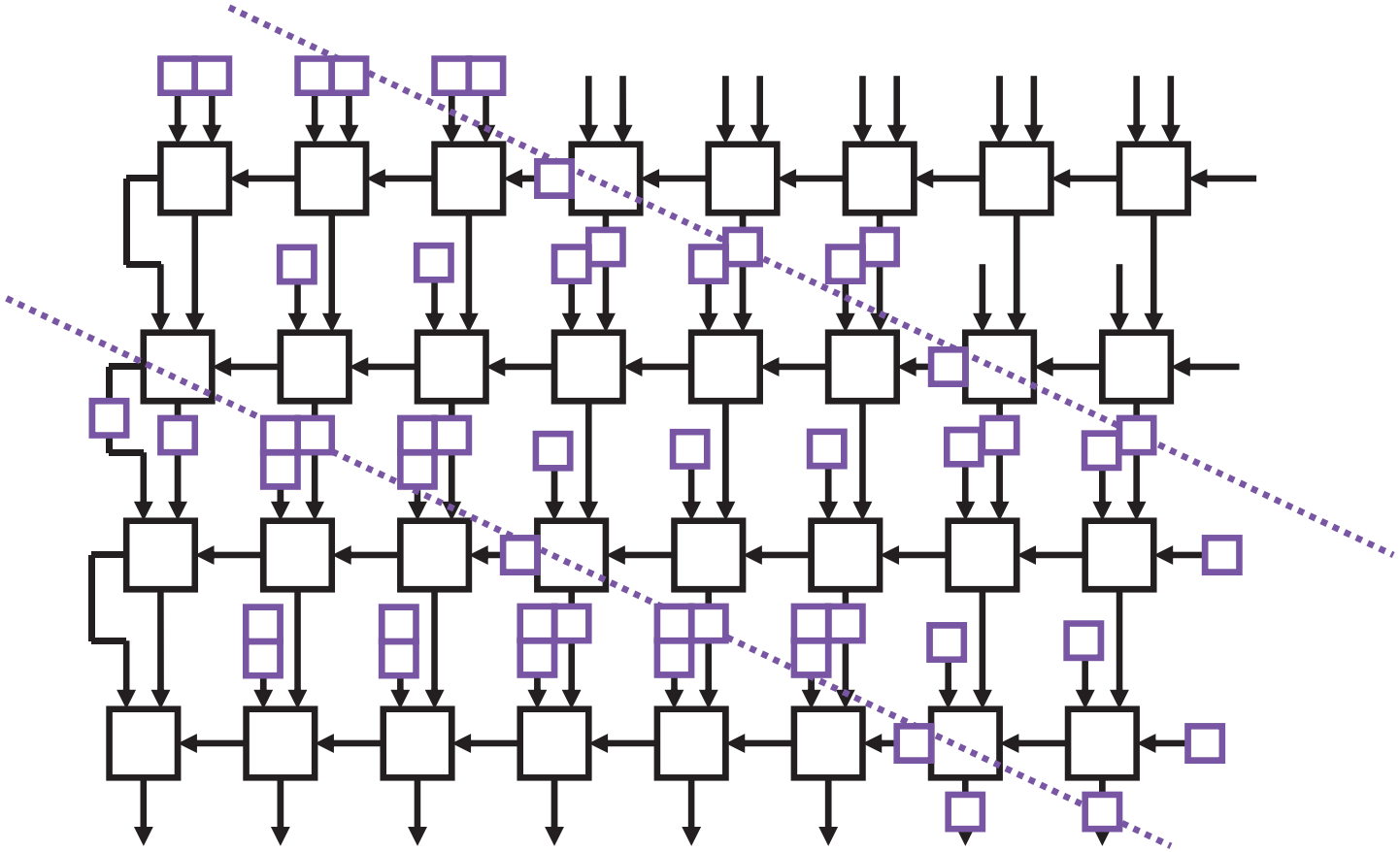
Korrutite arhitektuurid

- Paralleelkorrutid
  - maatrikskorruti
  - AND tehe ja täissummaator
  - konveierkorruti – registrid maatriksis



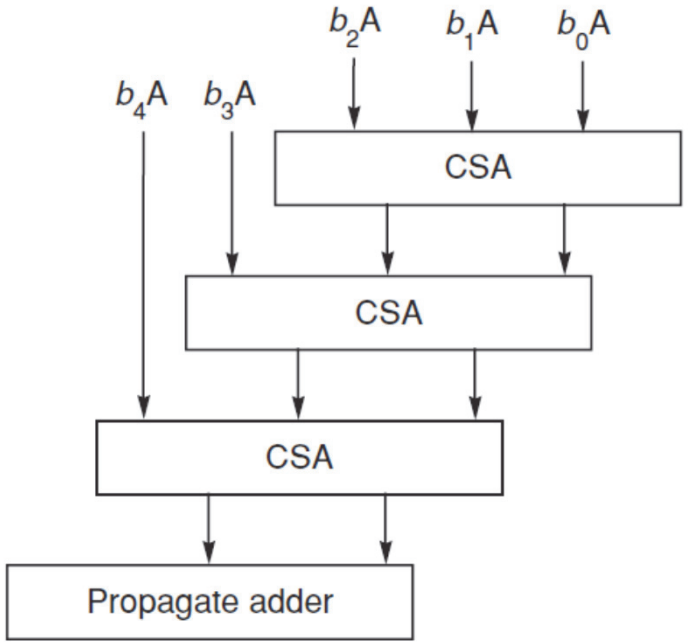
Korrutite arhitektuurid

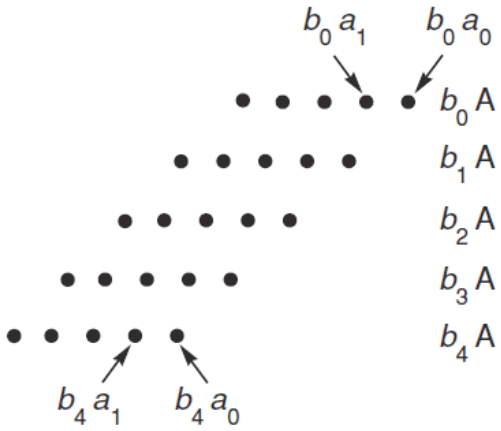
- Konveierkorruti – registrid maatriksis

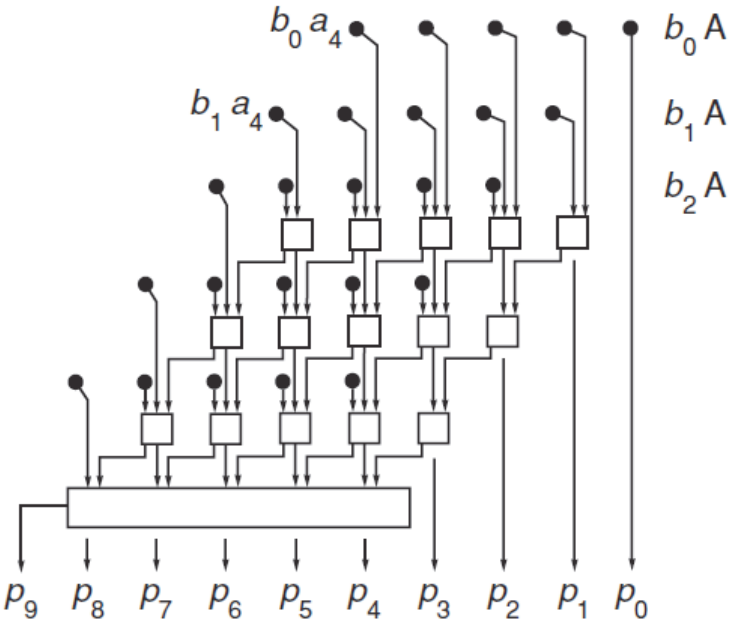


Korrutamise kiirendamine

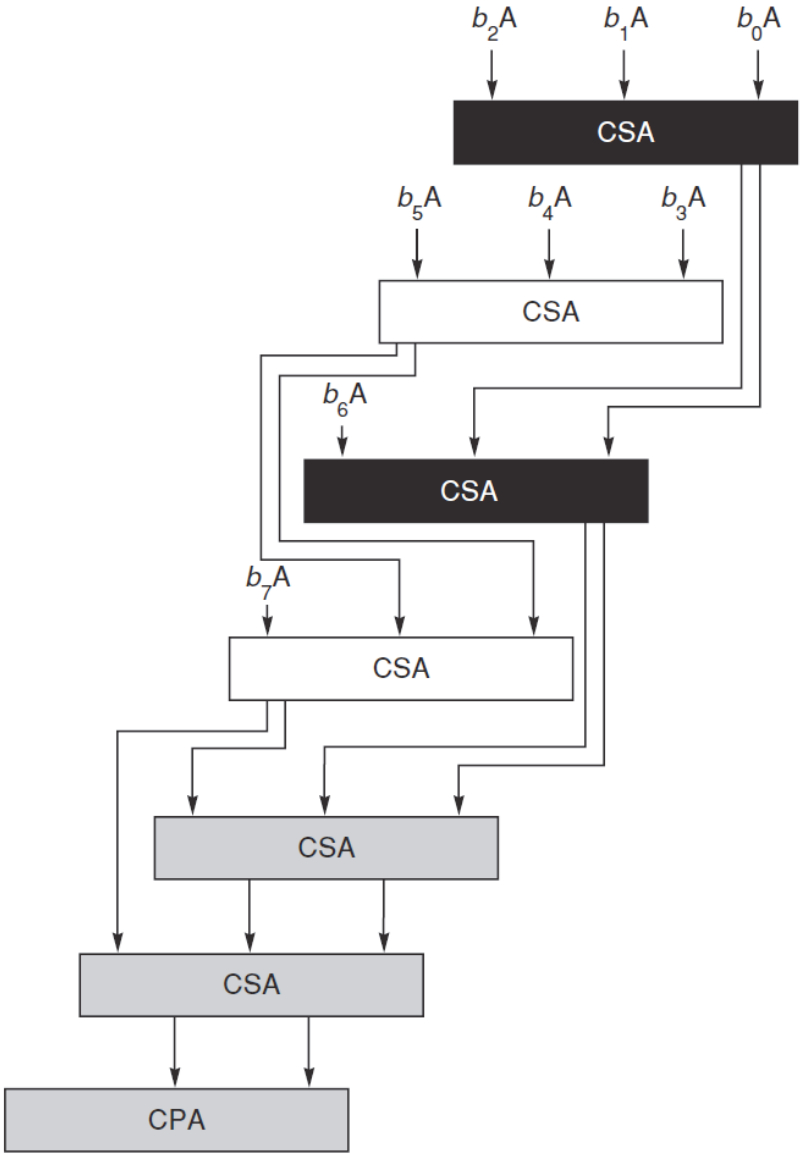
- Hennessy & Patterson, Computer Architecture
  - Appendix I – D. Goldberg, Computer Arithmetic







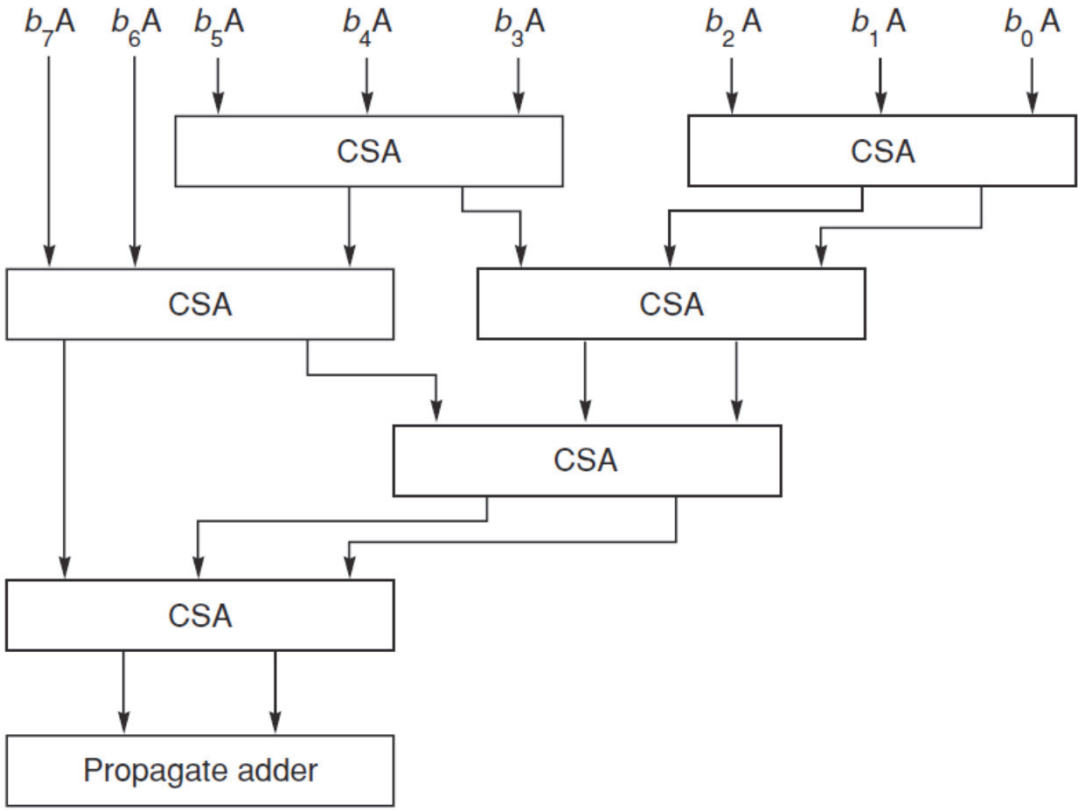
Korrutamise kiirendamine



even/odd array

CSA – carry-select adder

Wallace tree



Aritmeetikatehete simulaator

http://www.ecs.umass.edu/ece/koren/arith/simulator/