Carry-lookahead logic

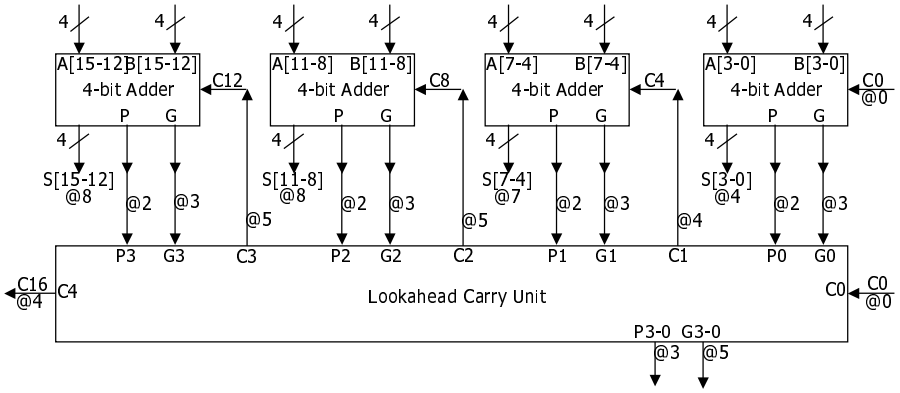
- Carry generate: Gi = Ai Bi
  - must generate carry when A = B = 1
- Carry propagate: Pi = Ai xor Bi
  - carry-in will equal carry-out here
- Sum and Cout can be re-expressed in terms of generate/propagate:
  - Si = Ai xor Bi xor Ci
    = Pi xor Ci
  - Ci+1 = Gi + Ci Pi

Carry-lookahead logic (cont'd)

- Re-express the carry logic as follows:
  - C1 = G0 + P0 C0
  - C2 = G1 + P1 C1 = G1 + P1 G0 + P1 P0 C0
  - C3 = G2 + P2 C2 = G2 + P2 G1 + P2 P1 G0 + P2 P1 P0 C0
  - C4 = G3 + P3 C3 = G3 + P3 G2 + P3 P2 G1 + P3 P2 P1 G0
    + P3 P2 P1 P0 C0

Carry-lookahead adder with cascaded carry-lookahead logic

- Carry-lookahead adder
  - 4 four-bit adders with internal carry lookahead
  - second level carry lookahead unit extends lookahead to 16 bits



Carry-select adder

- Redundant hardware to make carry calculation go faster
  - compute two high-order sums in parallel while waiting for carry-in
  - one assuming carry-in is 0 and another assuming carry-in is 1
  - select correct result once carry-in is finally computed