Administrative Stuff

- Homework #10 due next week
- Project phase 4
  - In lab April 21-April 27
  - Due on Monday, May 1
  - Poster session in BWRC on May 2, 3:30-5:30
  - 2108 Allston way
- Hardware lab for Friday session
Class Material

- Last lecture
  - Guest lecture on integer execution datapath
- Today’s lecture
  - Finish adders
  - Flash memory
- Reading
  - Chapter 11 (pp. 578-586)
  - Chapter 12 (pp. 634-647)

Posters

- If you want it on the 42” plotter
  - Use the template and mail to ee141@cory
  - By Monday 10am
- You can print on 353 printer as an alternative
- You have to e-mail your slides to ee141-project@bwrc by Tuesday 10am
**Carry-Lookahead Adders**

Carry Lookahead Trees

\[ C_{0,0} = G_0 + P_0 C_{i,0} \]
\[ C_{0,1} = G_1 + P_1 G_{i,1} + P_1 P_{i} C_{i,0} \]
\[ C_{0,2} = G_2 + P_2 G_1 + P_2 P_1 G_0 + P_2 P_1 P_0 C_{i,0} \]
\[ = (G_2 + P_2 G_1) + (P_2 P_1)(G_0 + P_0 C_{i,0}) = G_{2;0} + P_{2;1} C_{i,0} \]

Can continue building the tree hierarchically.
Tree Adders

16-bit radix-2 Kogge-Stone tree

Tree Adders

16-bit radix-4 Kogge-Stone Tree
**Sparse Trees**

16-bit radix-2 sparse tree with sparseness of 2

**Tree Adders**

Brent-Kung Tree
Example: Domino Adder

Propagate

Generate
Example: Domino Sum