



DSP Algorithms

 DSP algorithms are described by nonterminating programs, which execute the same code repetitively.

 $Y(n) = a^*x(n) + b^*x(n-1) + c^*x(n-2)$, for n=1 to ∞

- An iteration execution of all the computations in the algorithm once.
- Critical path the longest path between inputs and outputs in combinational logic circuit.
- Latency the difference between the time an output is generated and the time at which its corresponding input was received by the system.















Synchronous DFG (SDFG)

- SDFG is a special case of data-flow graph.
- In SDFG, the number of data samples produced or consumed are specified a priori.
- For example, node B needs 1 data unit to fire and produces one data unit after completion.
- In multi-rate systems, that number could be greater than 1.
- By using node replication, a multi-rate system could be changed to a single-rate system.



























Longest Path Matrix Algorithm

• First determine $\ell_{i,j}^{(1)} \rightarrow L^{(1)}$

Then high order matrices are computed by

$$\ell_{i,j}^{(m+1)} = \max_{k \in K} \left(-1, \ell_{i,k}^{(1)} + \ell_{k,j}^{(m)} \right)$$

where *K* is the set of integers *k* in the interval [1,d] such that neither $\ell_{i,k}^{(1)} = -1$ nor $\ell_{k,j}^{(1)} = -1$ holds

$$T_{\infty} = \max_{i,m \in \{1,2,..d\}} \left\{ \frac{\ell_{i,i}^{(m)}}{m} \right\}$$



