Algorithm WD

Compute matrices W and D of a synchronous circuit G.

1. Weight each edge $u \xrightarrow{e} ? \in E$ with $\big(w(e),\ -d(u)\big)$.

2. Compute the weight of the shortest path joining each connected pair of vertices by solving an all-pairs shortest-paths algorithm — e.g., Floyd-Warshall algorithm.

3. For each shortest-path weight (x, y) between two vertices u and v, set

$$W(u, v) \leftarrow x$$

$$D(u, v) \leftarrow d(v) - y$$

Algorithm WD

- The quantity $W(u, v)$ is the minimum number of registers on any path from vertex u to vertex v.
  - We call a path $u \overset{p}{\twoheadrightarrow} v$ such that $w(p) = W(u, v)$ a *critical path* from u to v.
- The quantity $D(u, v)$ is the maximum total propagation delay on any critical path from u to v.
- Both quantities are undefined if there is no path from u to v.