

Algorithm WD

Compute matrices W and D of a synchronous circuit G .

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

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

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

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- The quantity $W(u, v)$ is the minimum number of registers on any path from vertex u to vertex v .
 - We call a path $u \xrightarrow{p} v$ 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 .