

Strongly Connected Components

Note Title

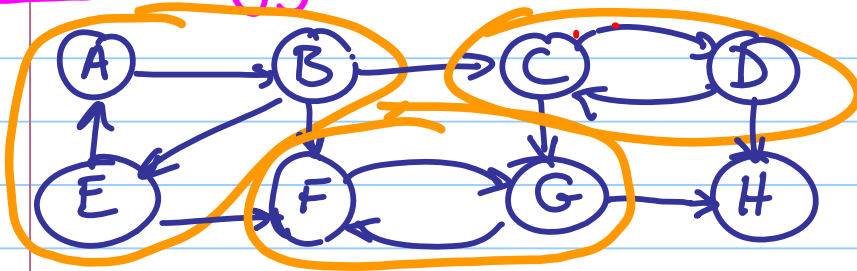
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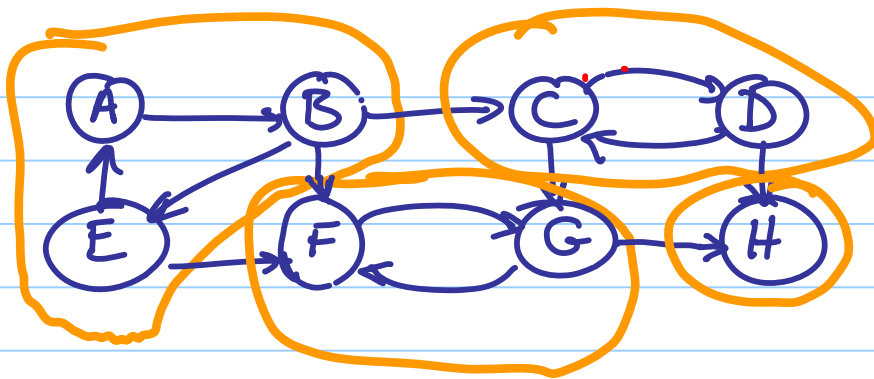
In a directed graph,
(digraph)

"strongly connected"

means that for every
pair of vertices (u, v)
in the component, there
is a PATH from u to v
and v to u .

Find Strongly Connected Components in graph G:

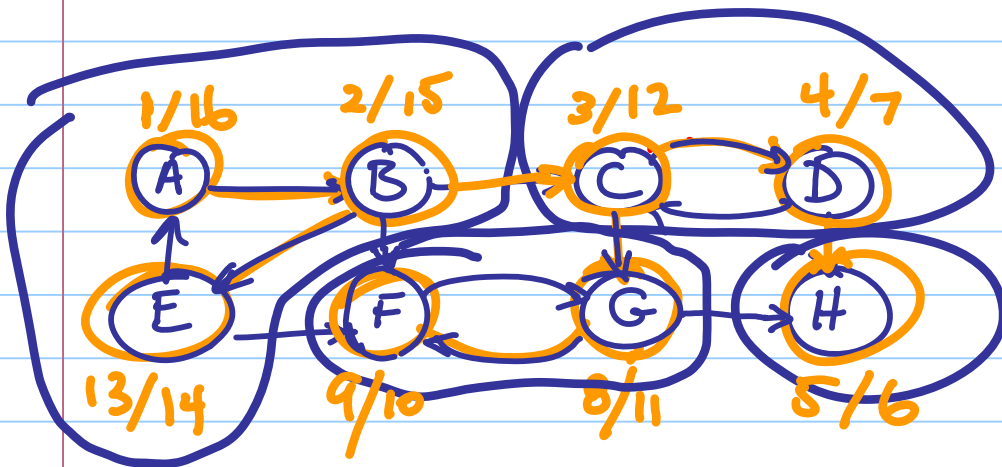




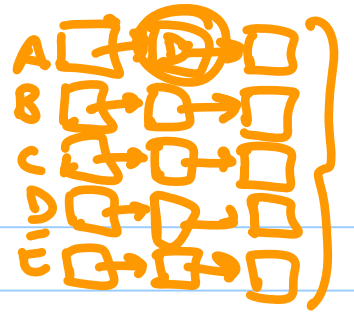
what is an algorithm
to find these
components?

Finding Strongly connected components in graph G :

- ① Perform DFS on G .
keep track of timing.



Let $G^T = (V, E)$



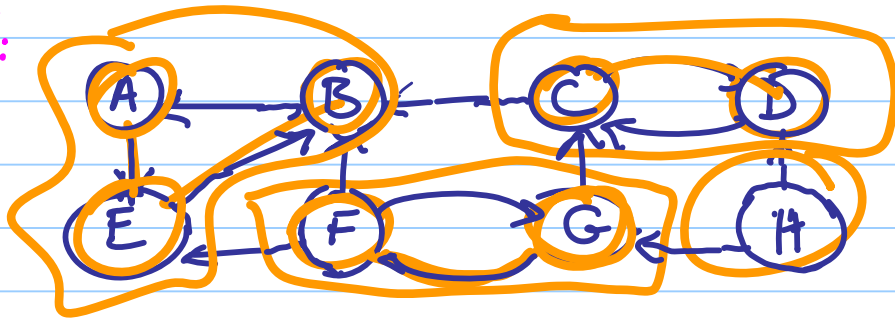
where $G^T \cdot v = G \cdot v$

and

$$\{u \rightarrow v \in G^T.E \text{ if } v \rightarrow u \in G.E\}$$

G^T has arrows going the opposite way.

Graph G^T :



② Perform DFS on G^T .

NOTE: G and G^T have the same strongly connected components

Whenever you have a choice, choose vertex with largest finish time (from DFS on G).

Every time you dead end, you finish one strongly connected component and start the next.

In G^T , if we do DFS in the right order, we can capture the strongly connected components!

