Algoritmo de componentes fuertemente conectados de Tarjan

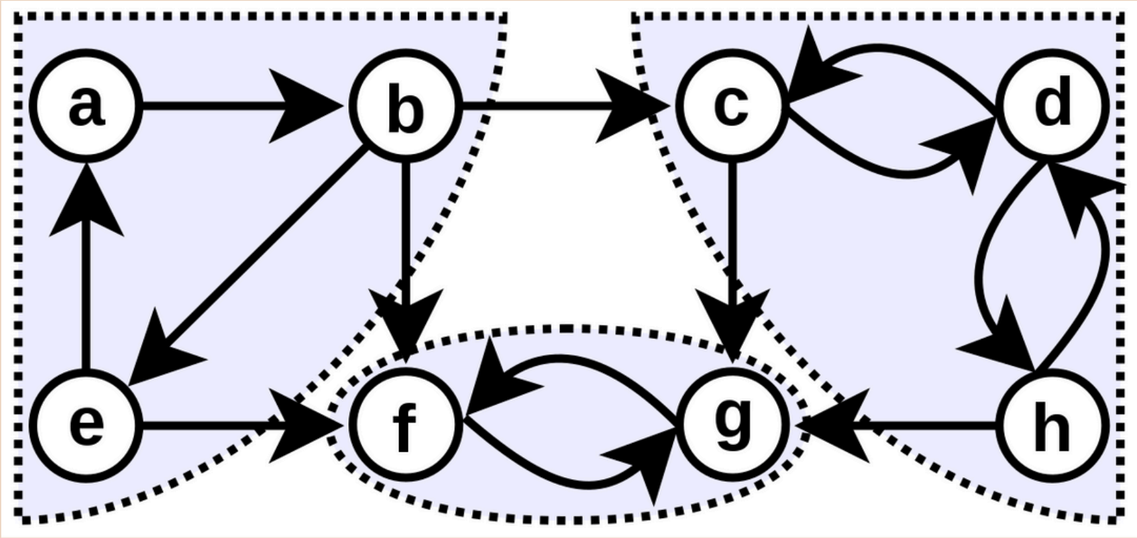
Robert Tarjan

Informático y matemático estadounidense conocido por sus trabajos en algoritmos de teoría de grafos y estructuras de datos, incluyendo el algoritmo de componentes fuertemente conectados en un grafo y el algoritmo de los árboles Splay (co-inventor).

Un breve resumen

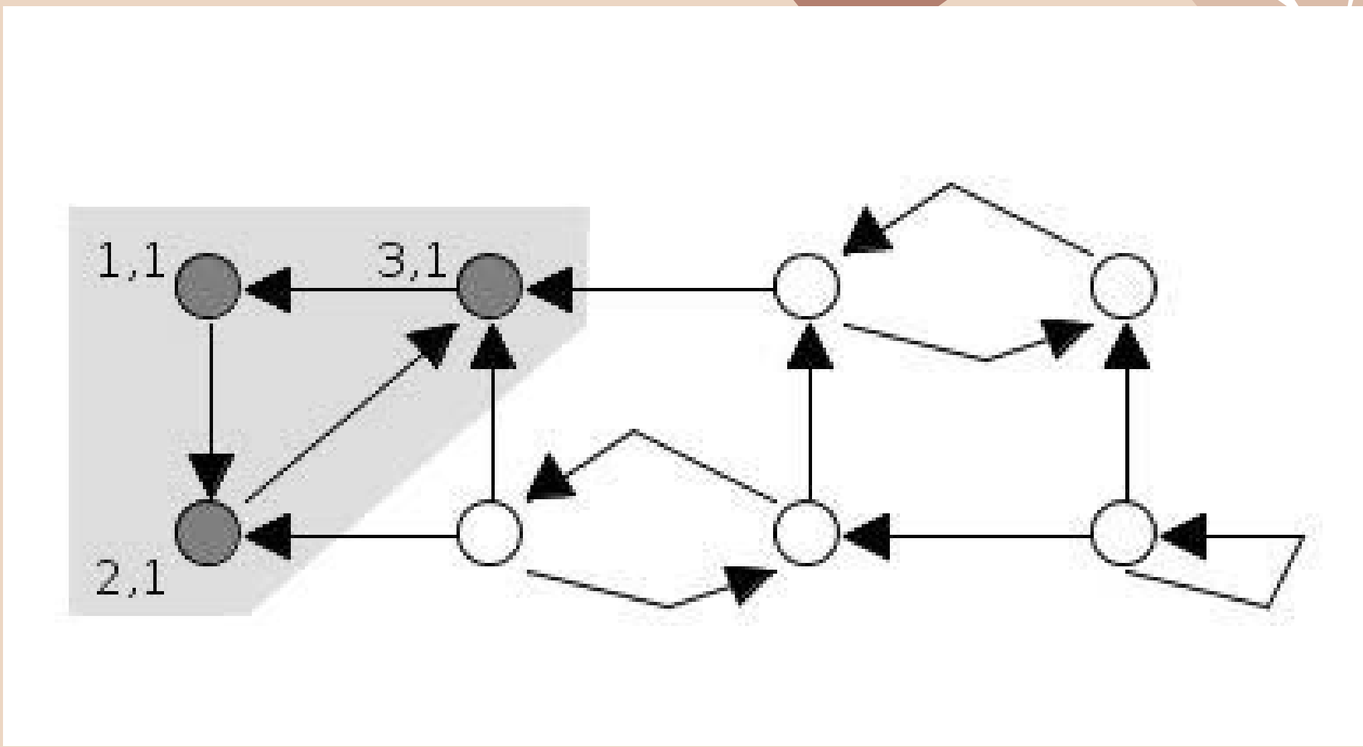
- Un grafo dirigido es **fuertemente conexo** si para cada par de vértices U y V existe un camino desde U a V y desde V a U

- **Un componente fuertemente conexo** de un grafo dirigido, es un subconjunto de vértices tal que para cada par de vértices C y D existe un camino desde C a D y desde D a C



Funcionamiento

- Realiza un recorrido en profundidad (DFS)desde un vértice arbitrario.
- A medida que se recorren vértices se agregan a una pila
- Los vértices que se recorren se van marcando con un valor de “visitado” y un valor de “enlace”.



- Solo se remueven elementos de la pila si hallamos un nodo raíz (V.V = V.E)

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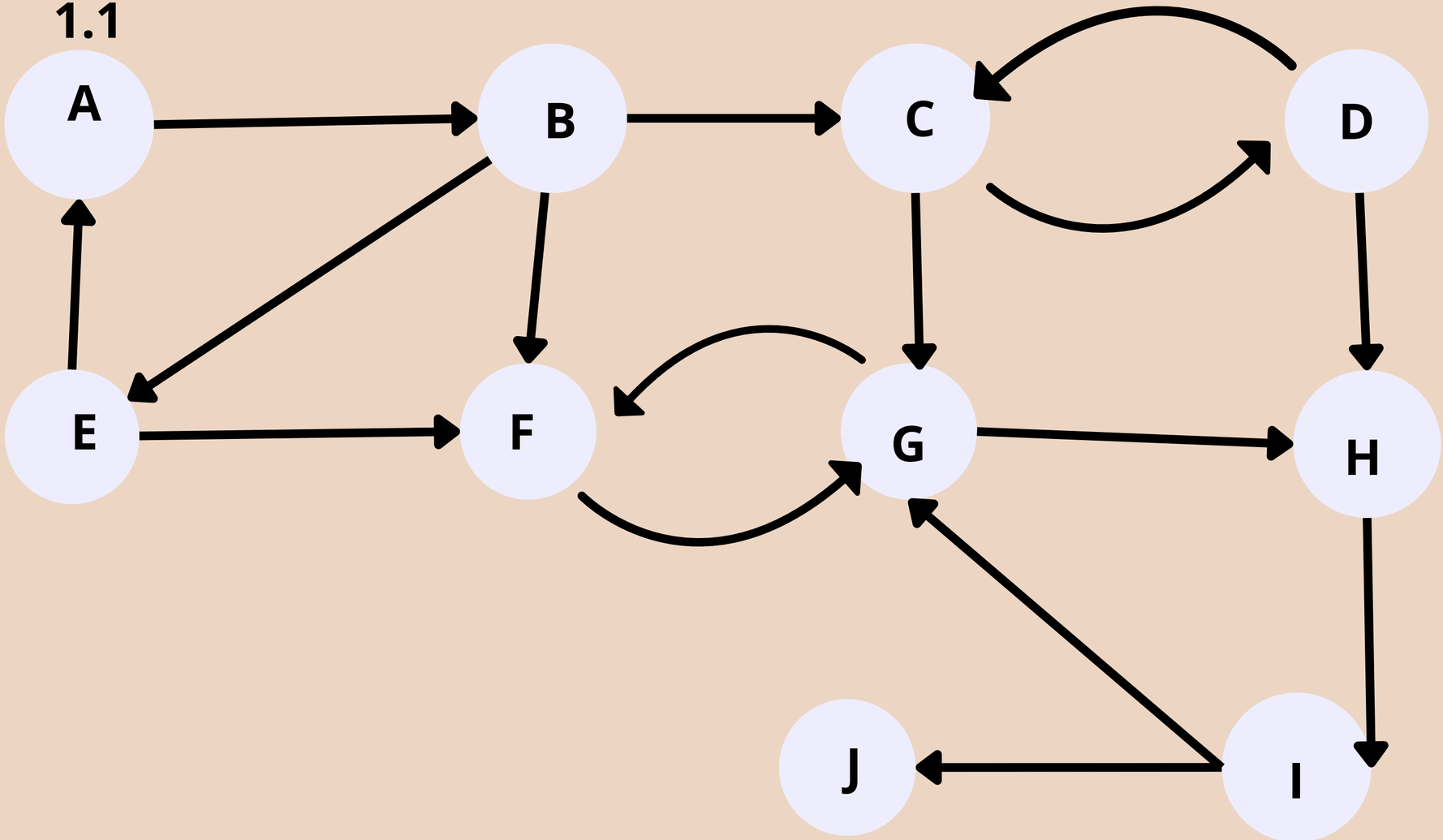

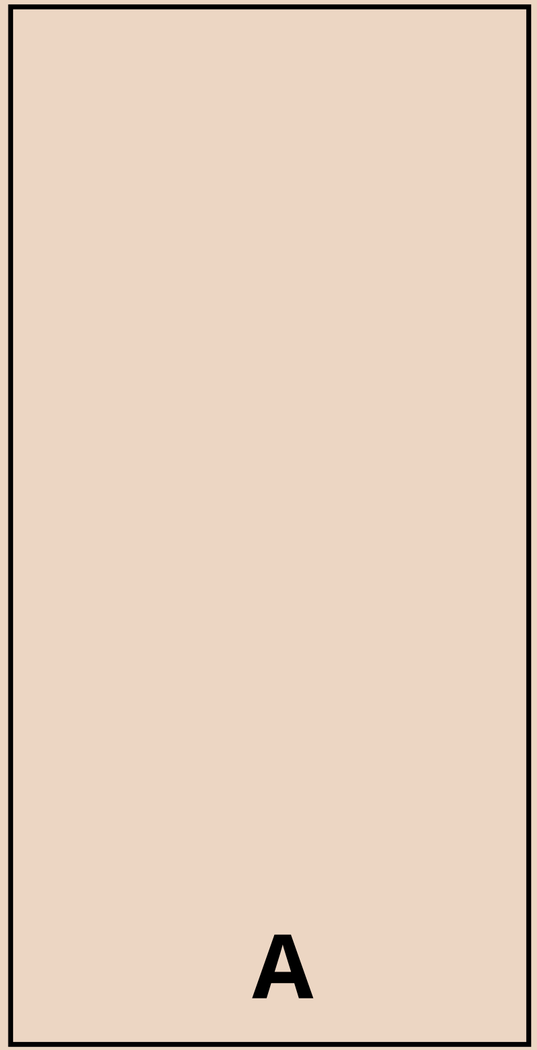

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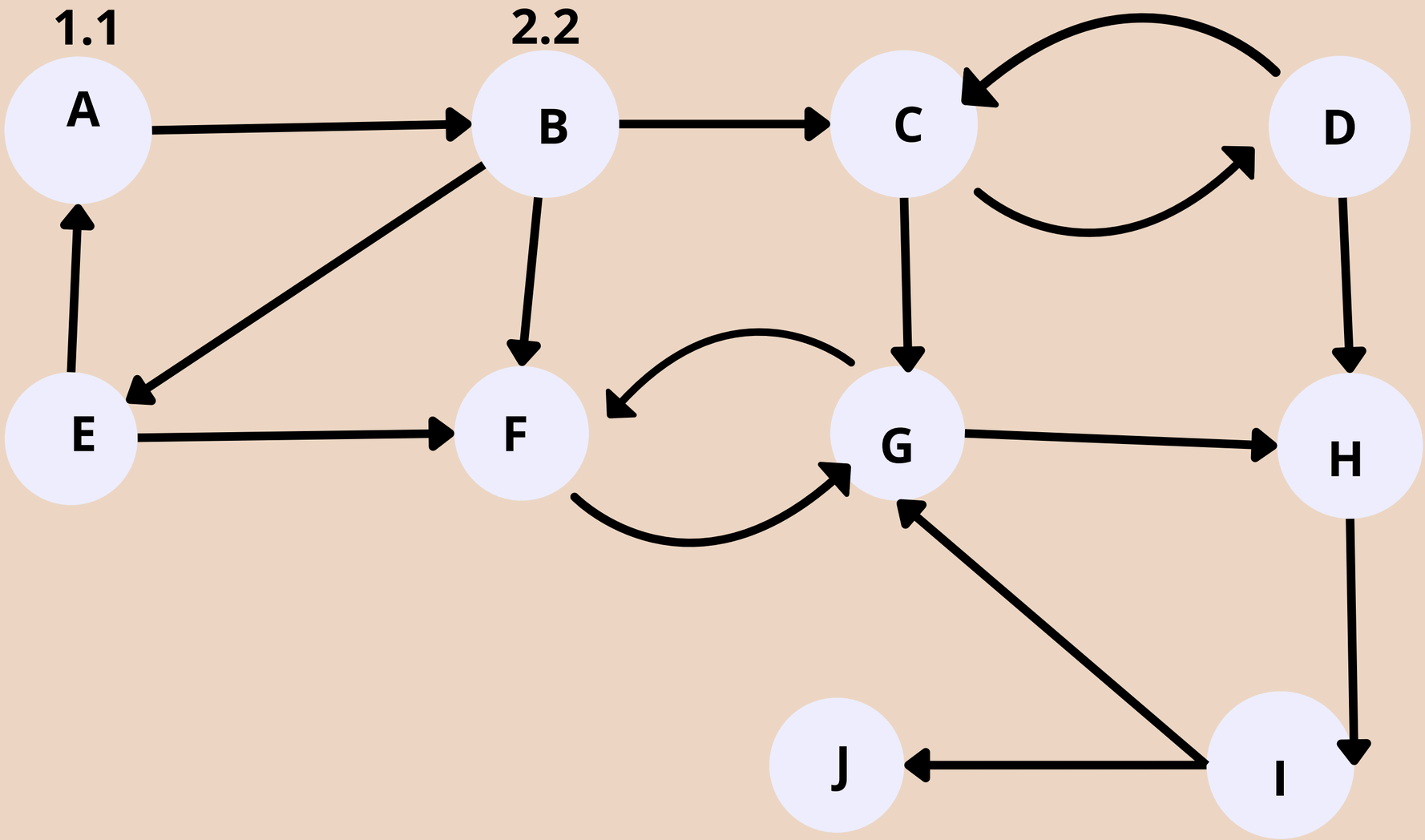

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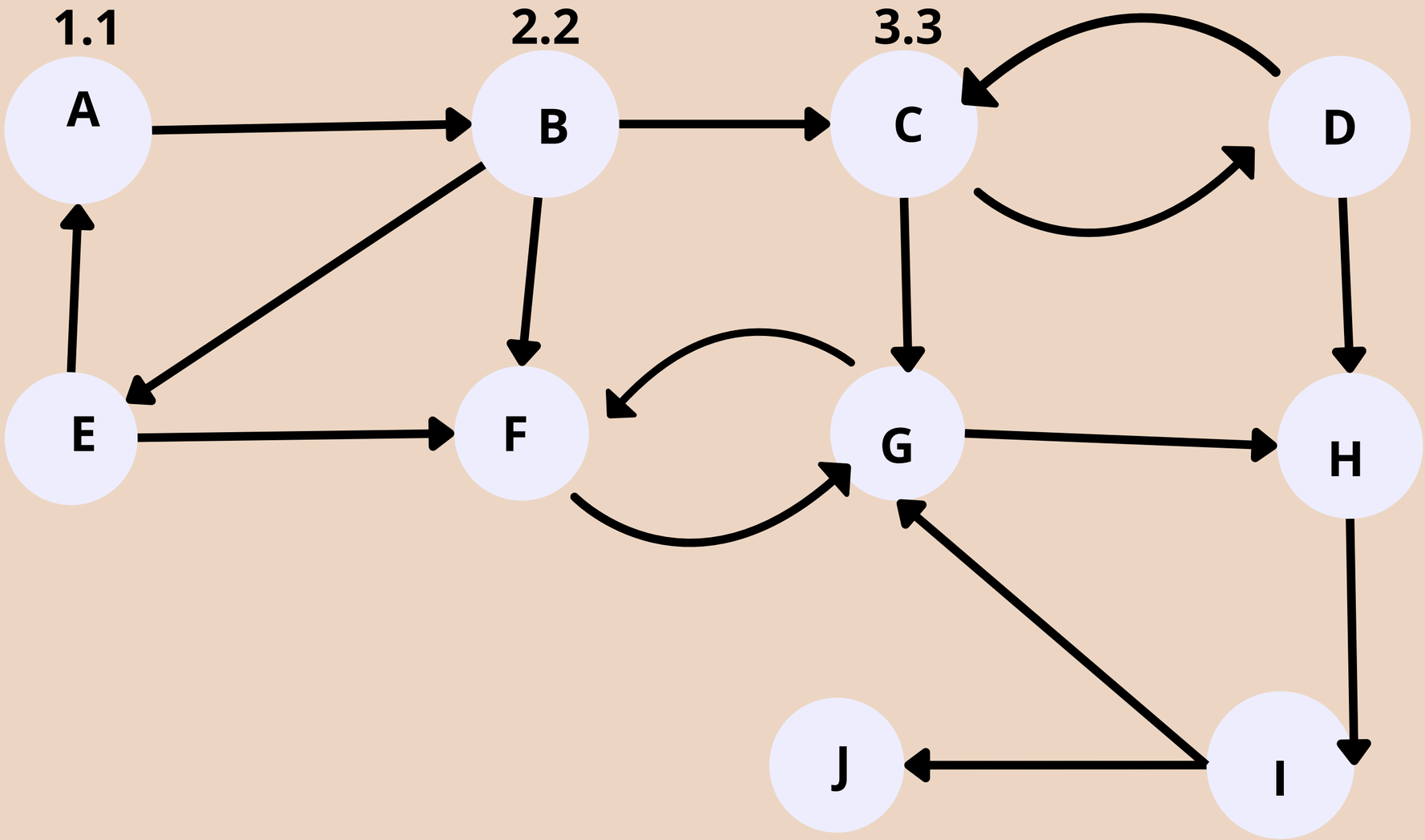

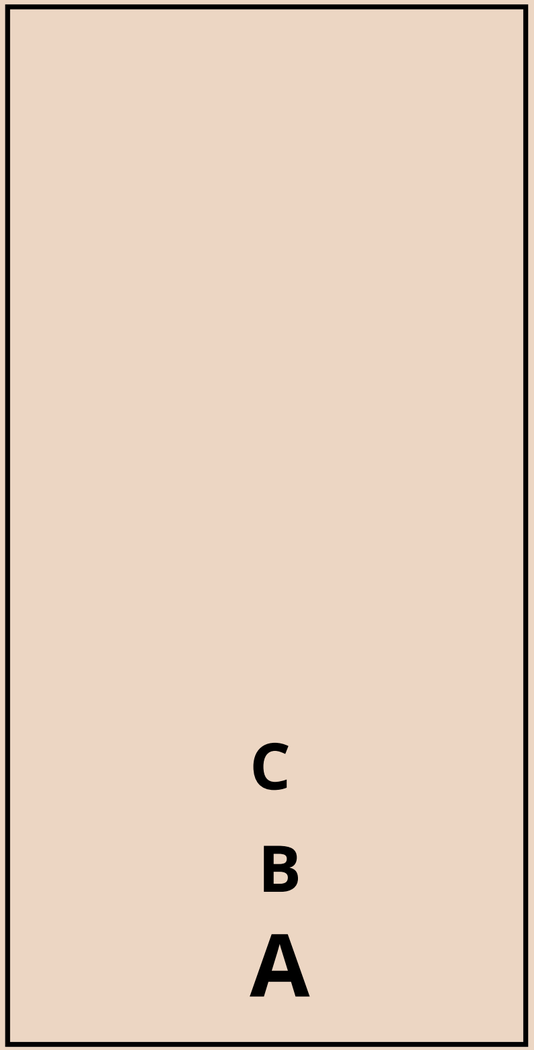

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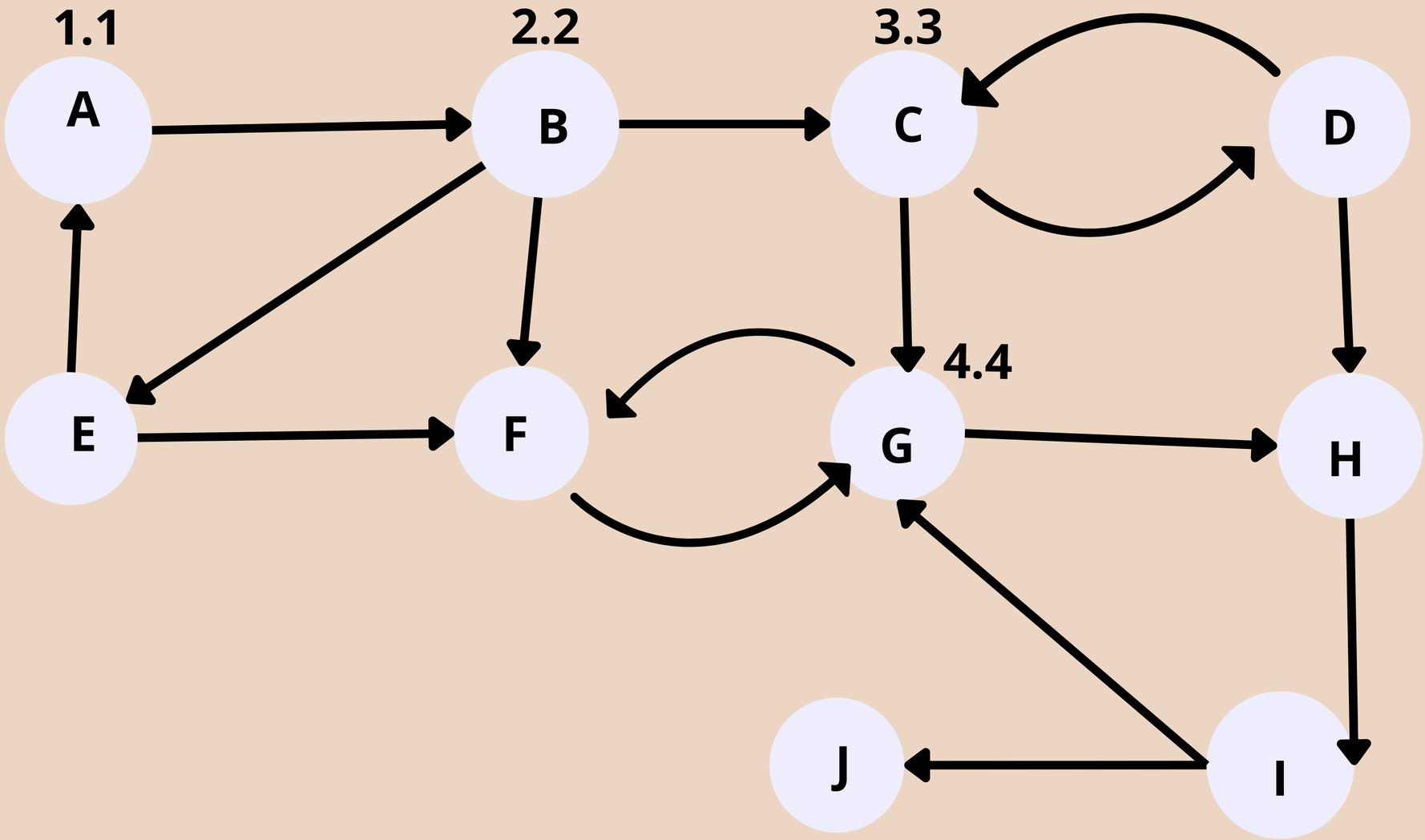

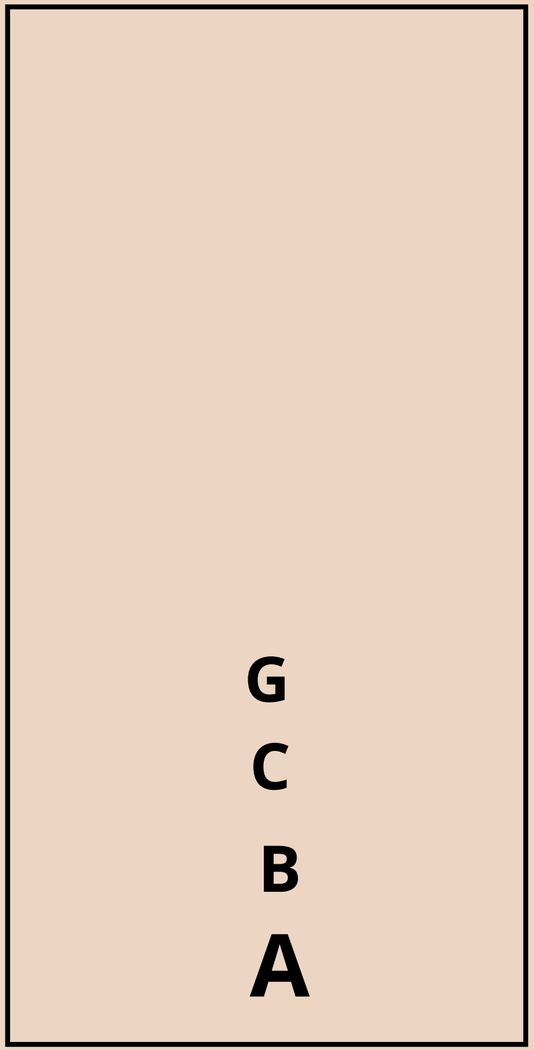

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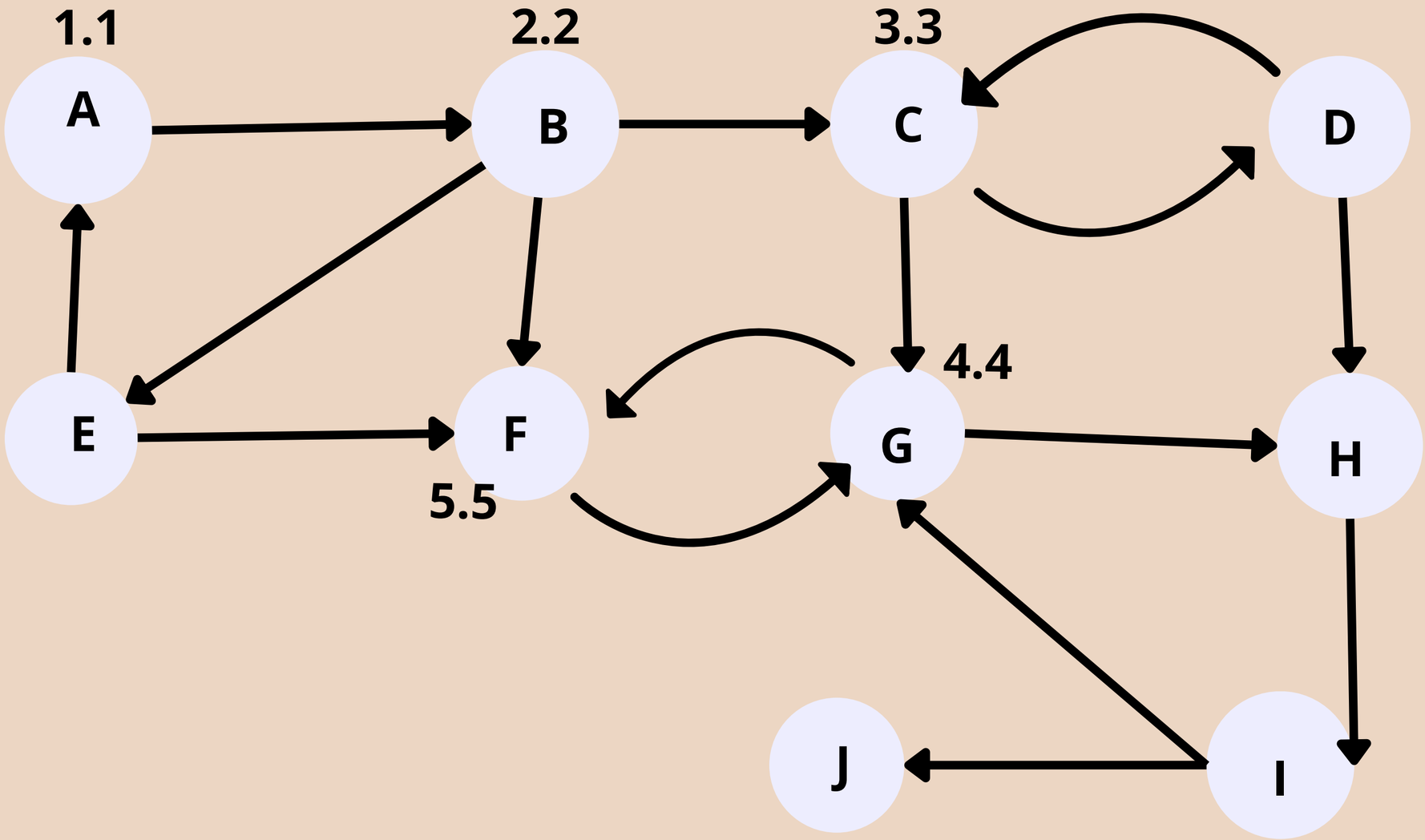

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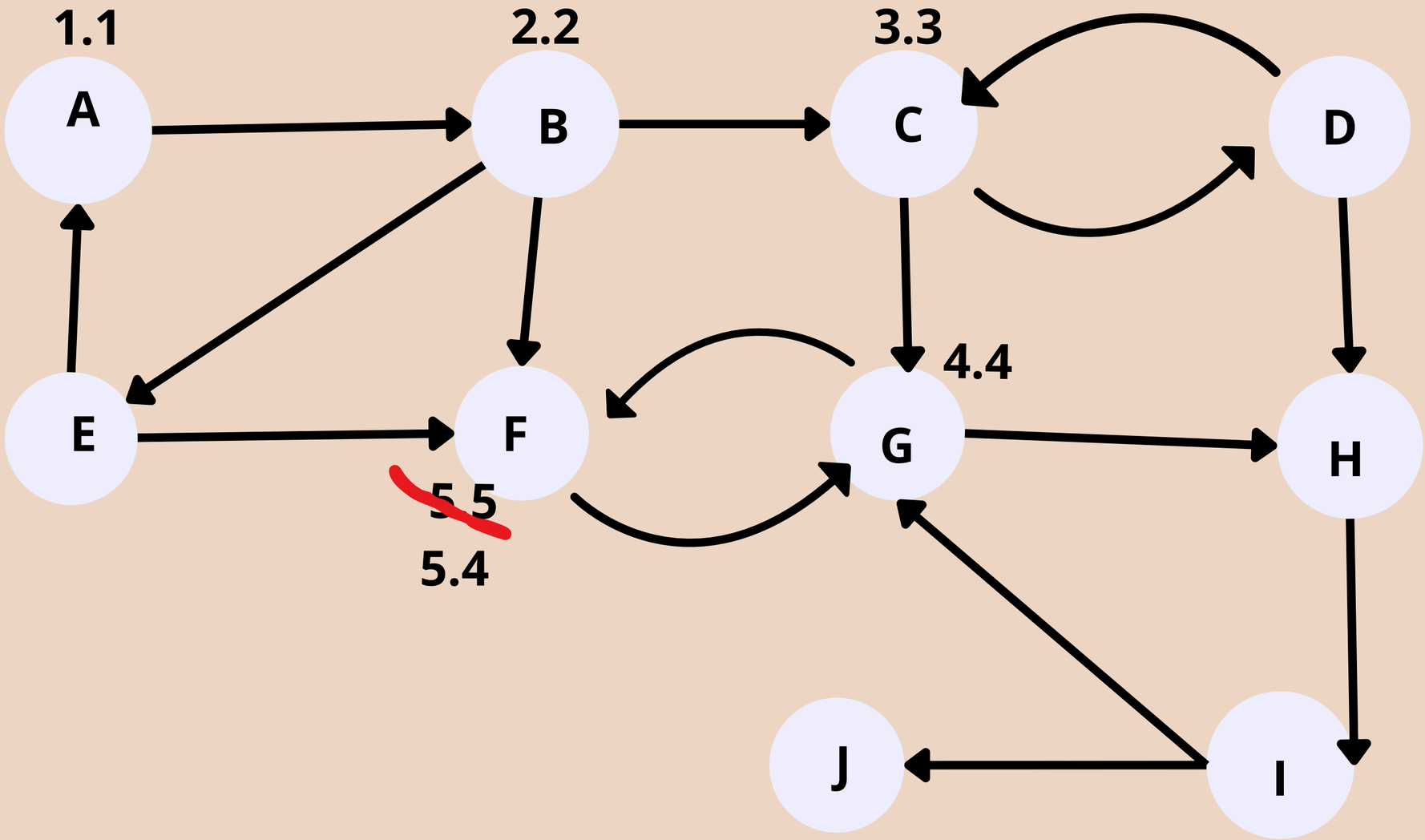

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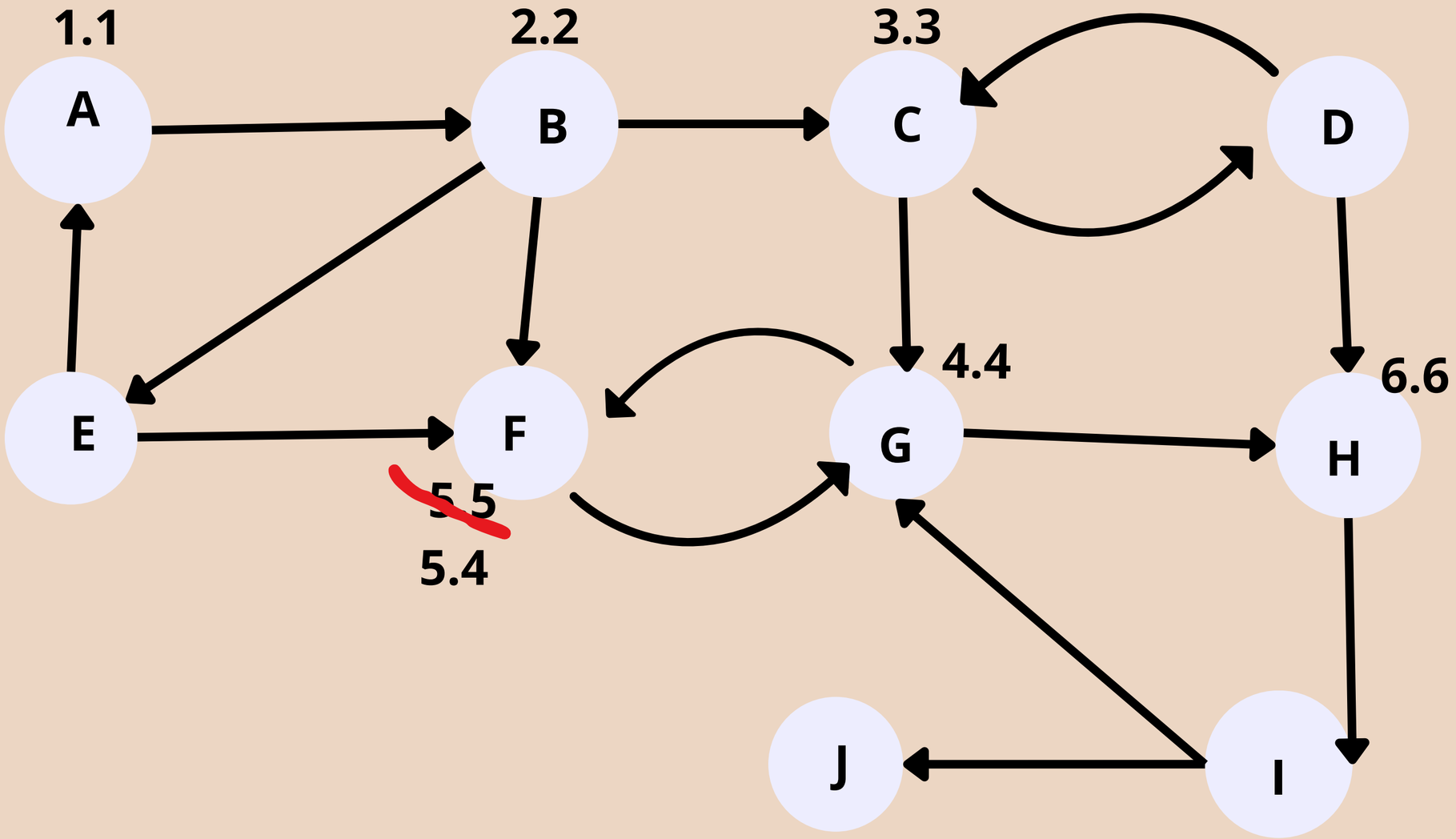

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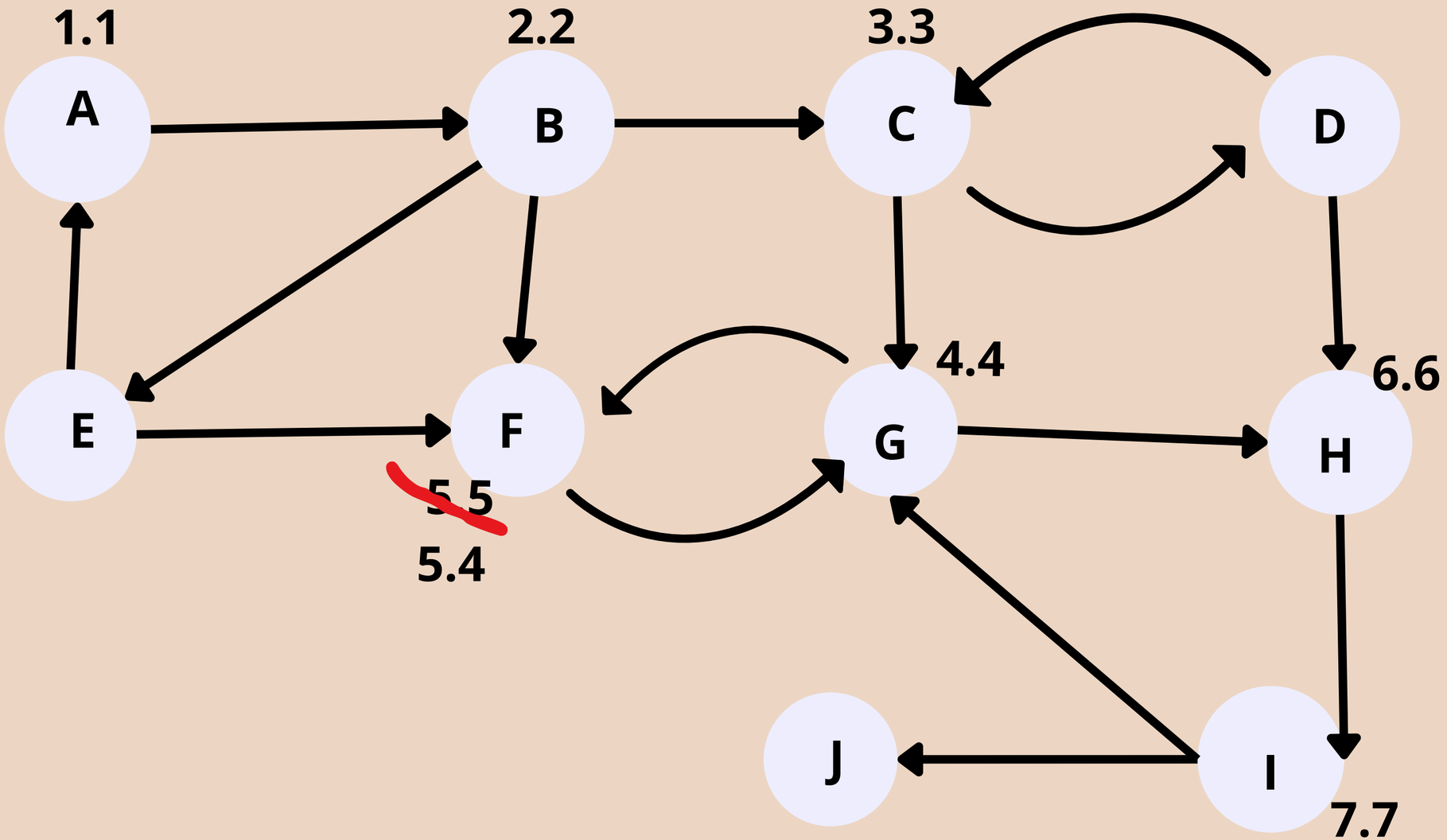

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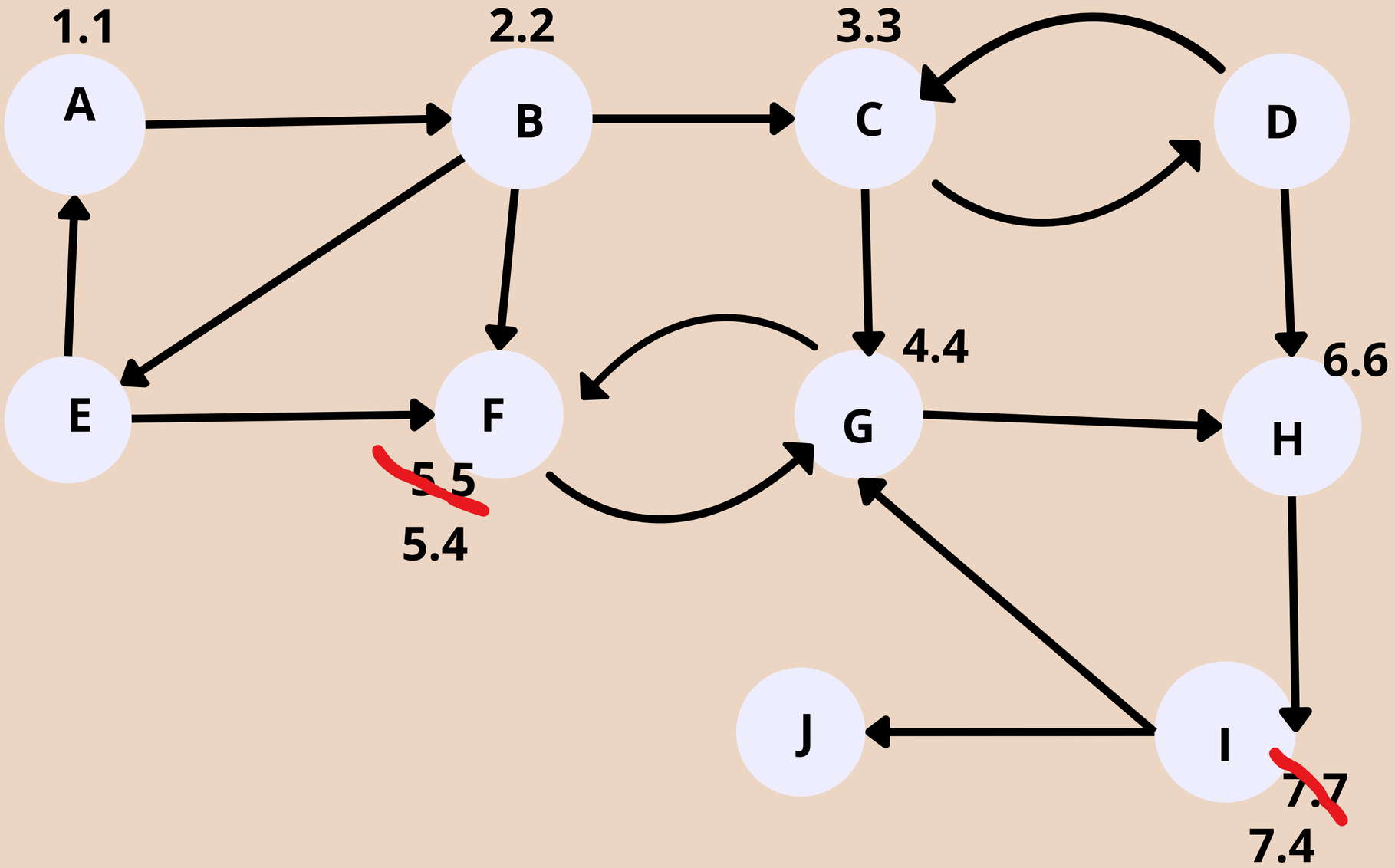

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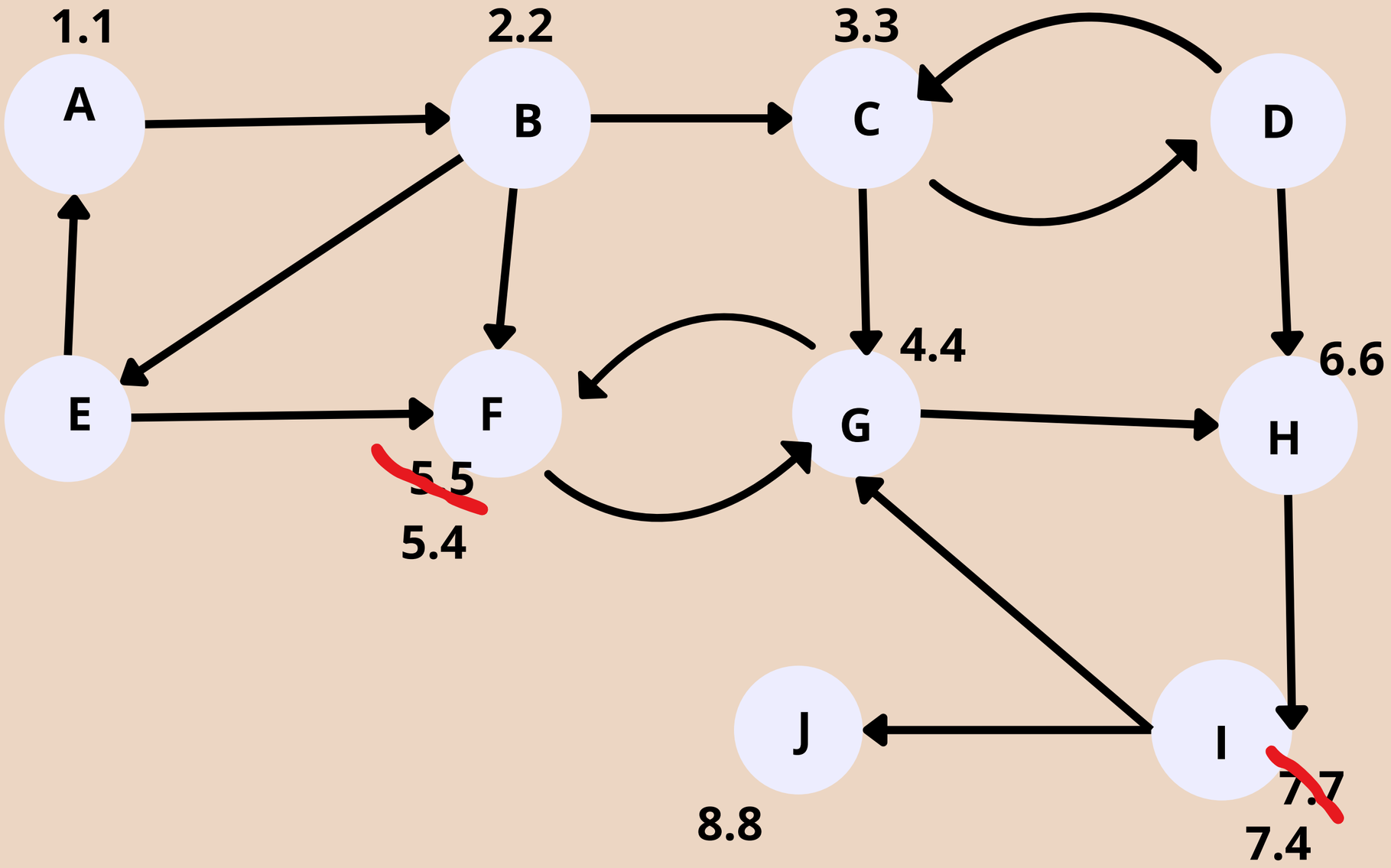

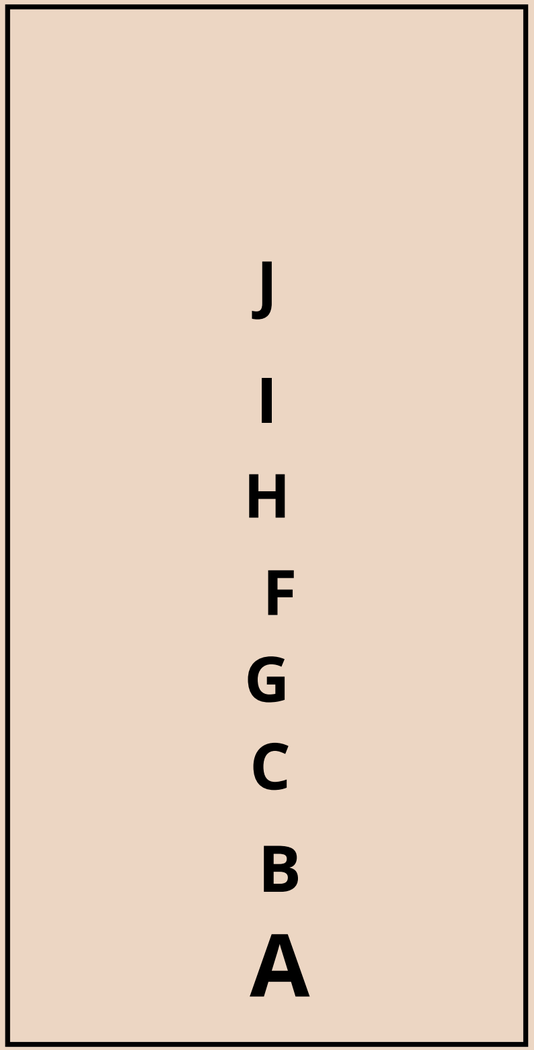

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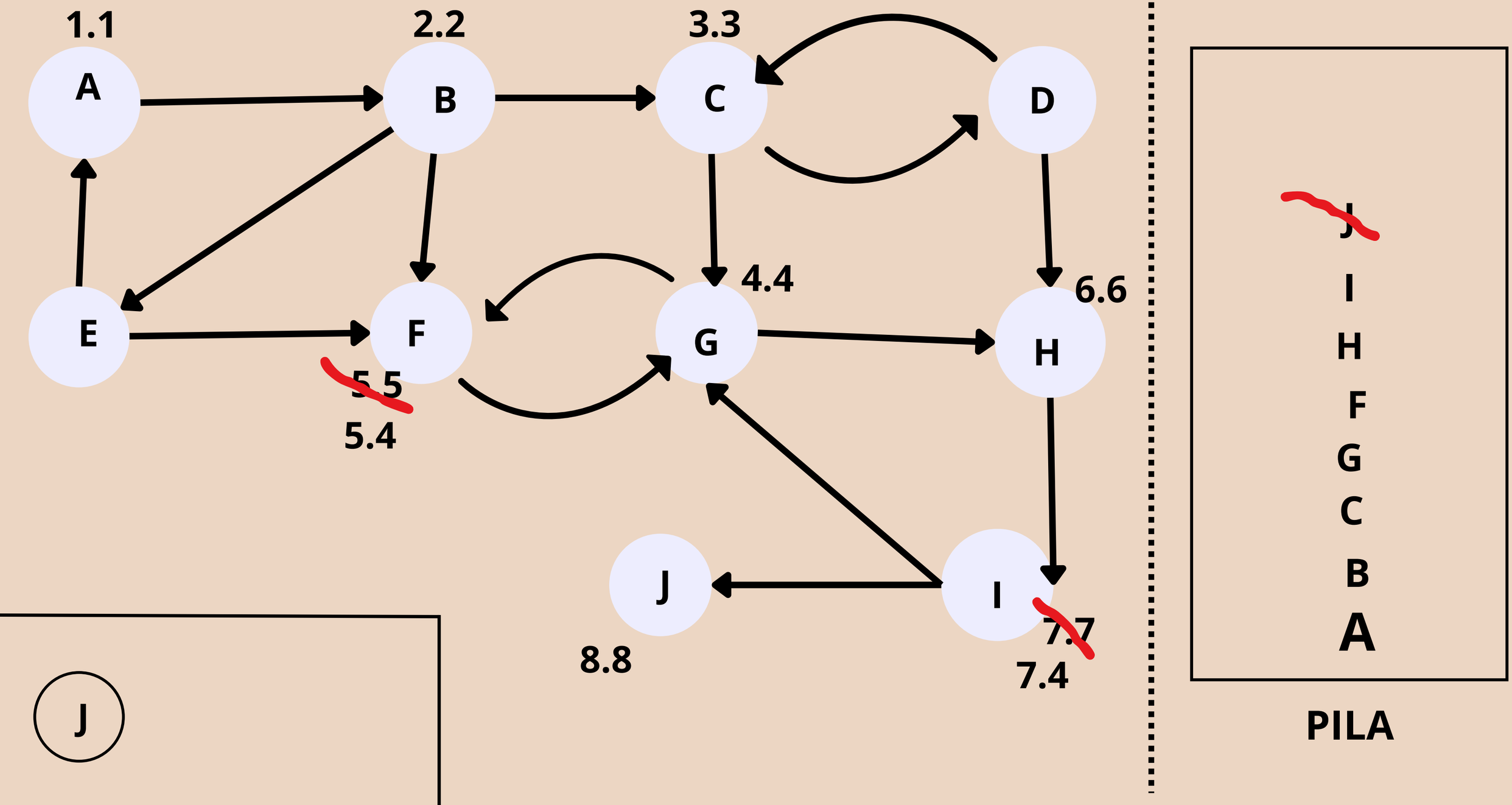
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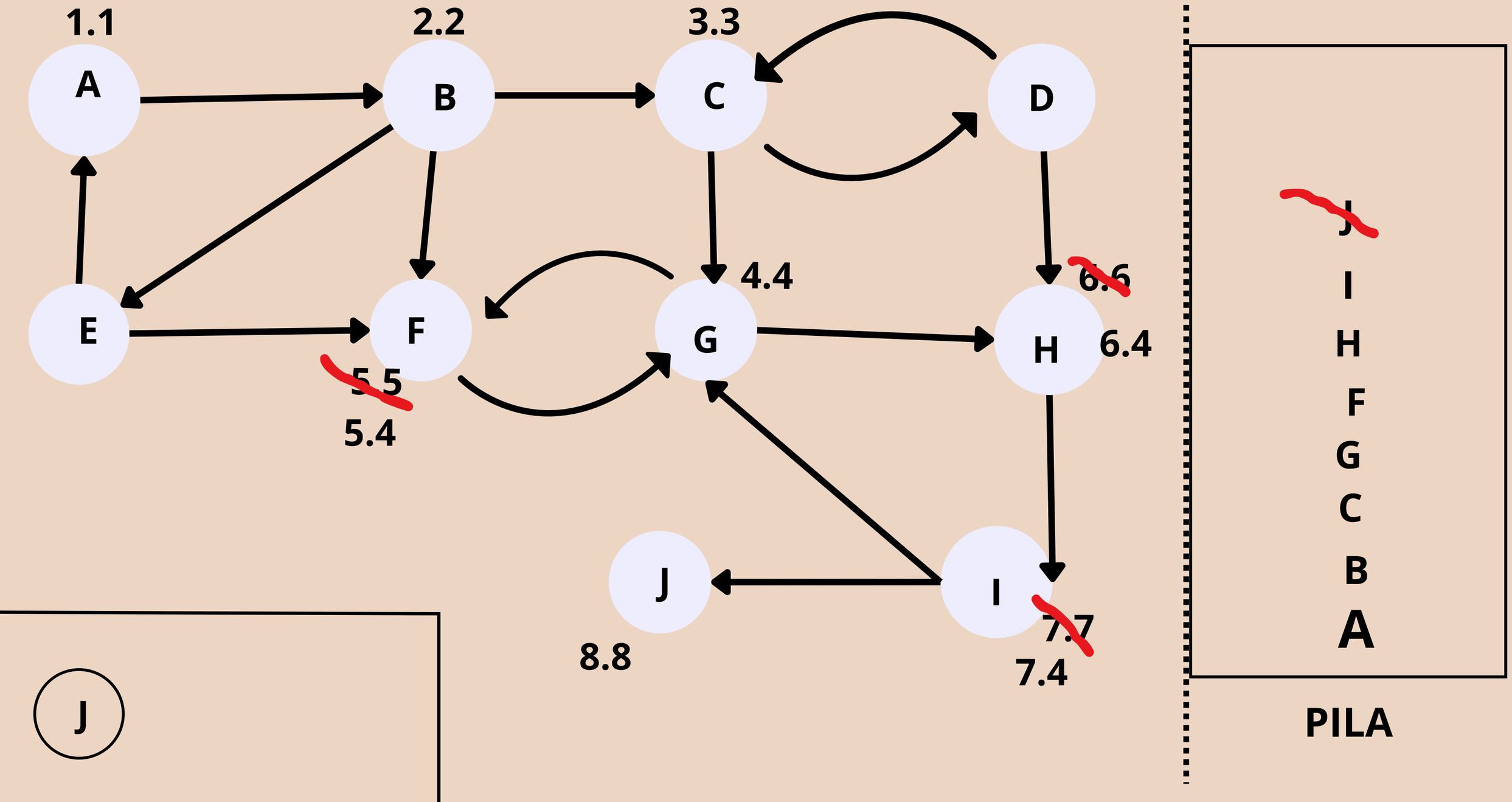
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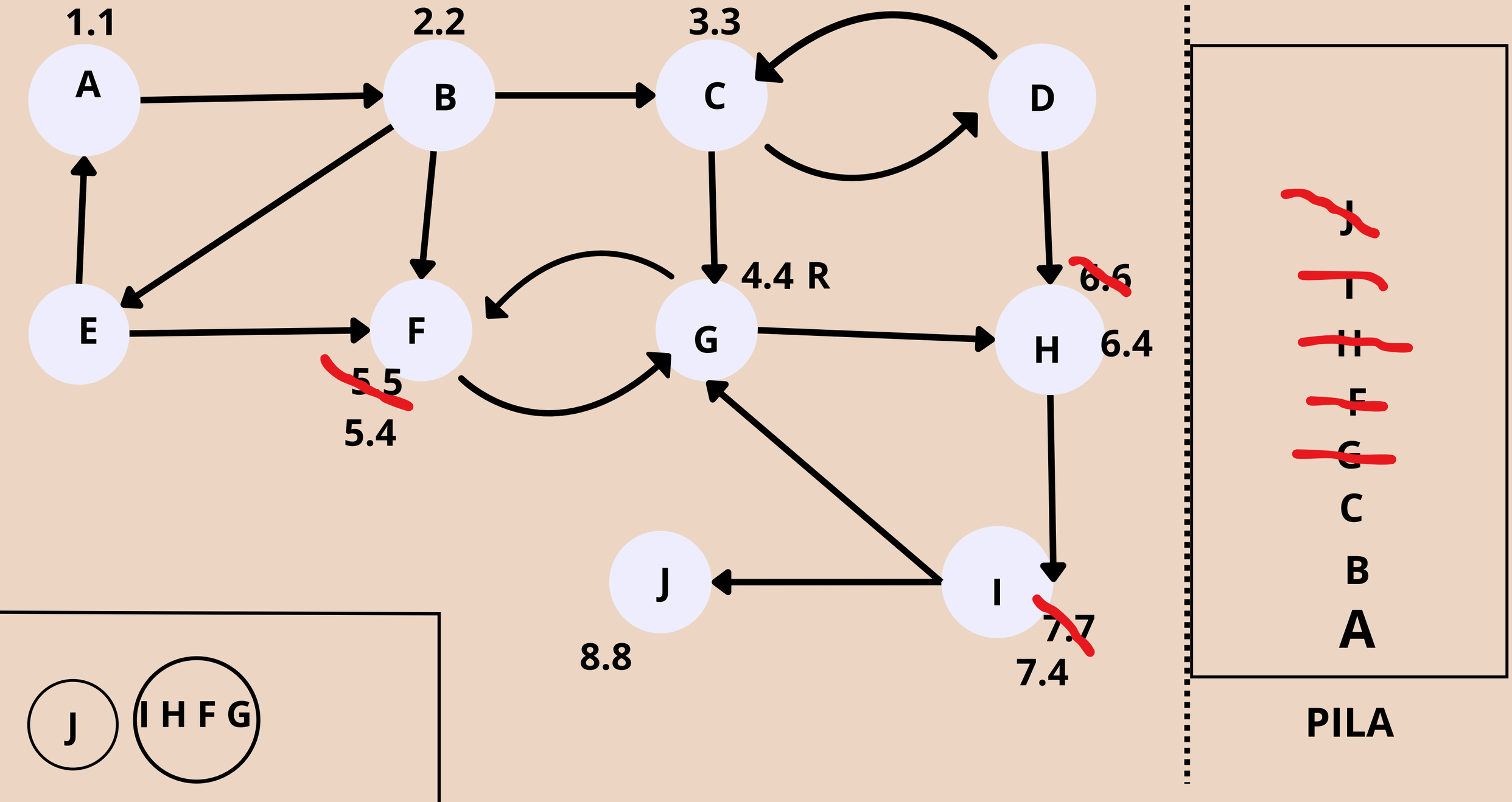
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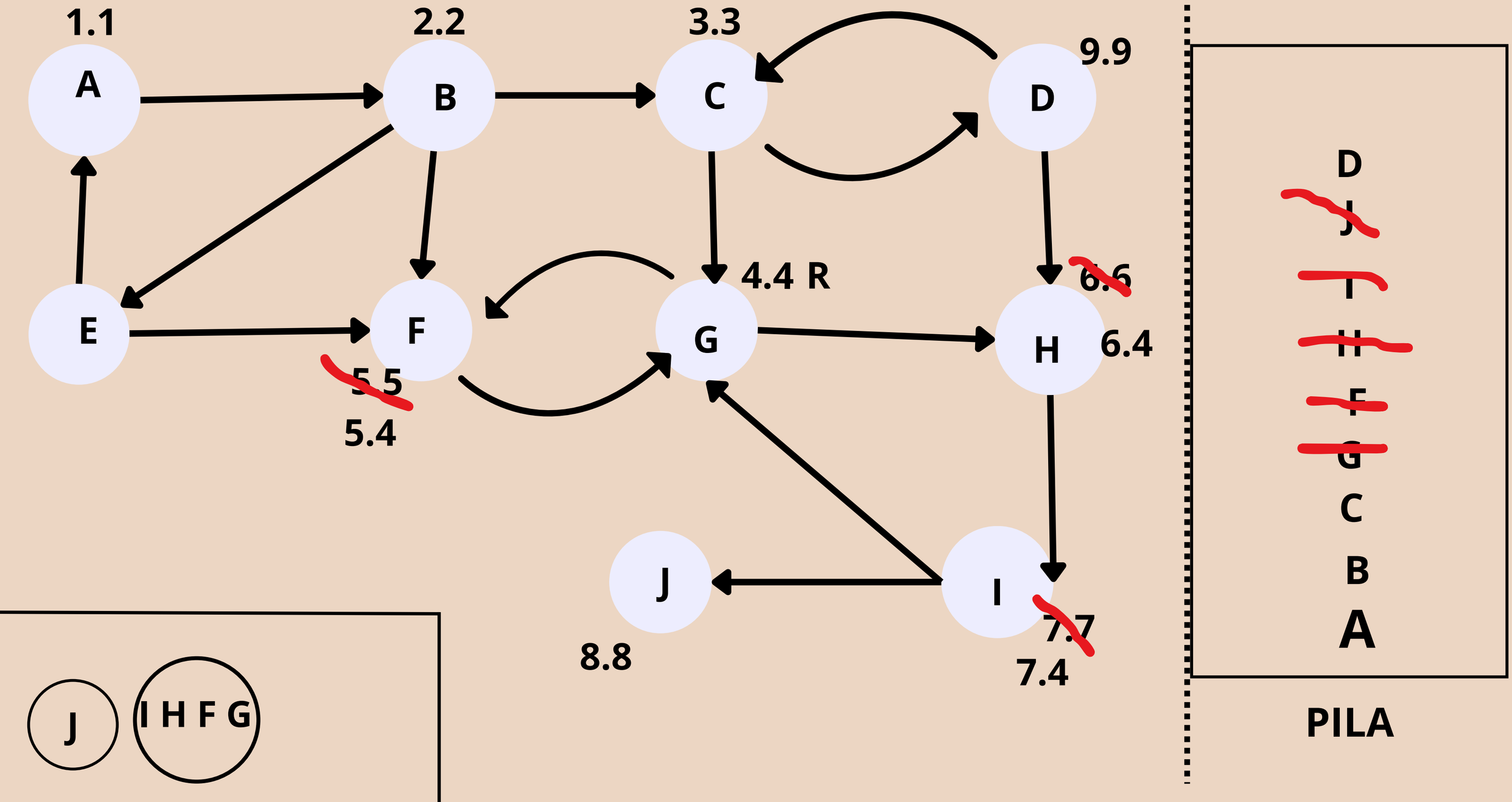
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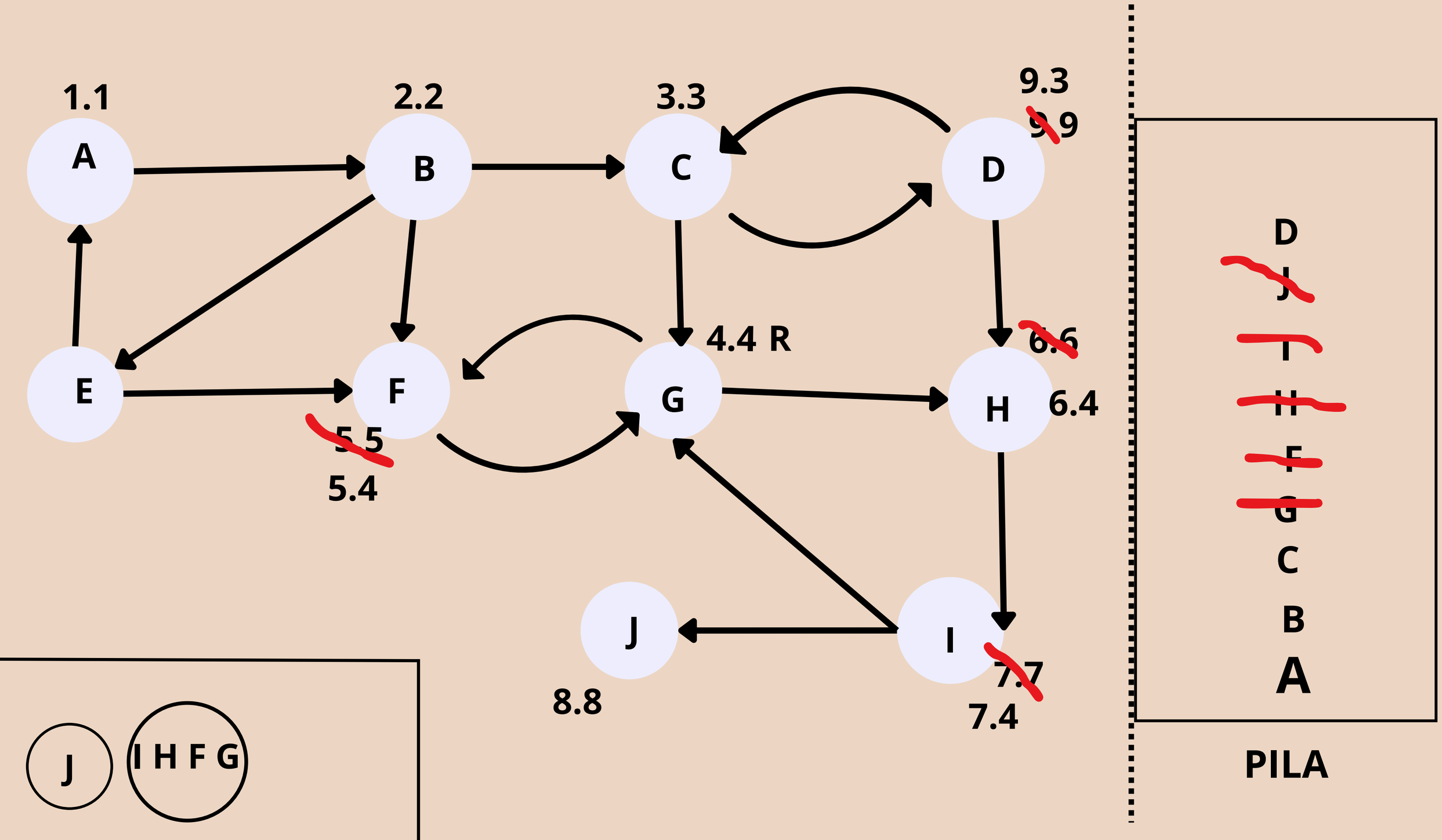
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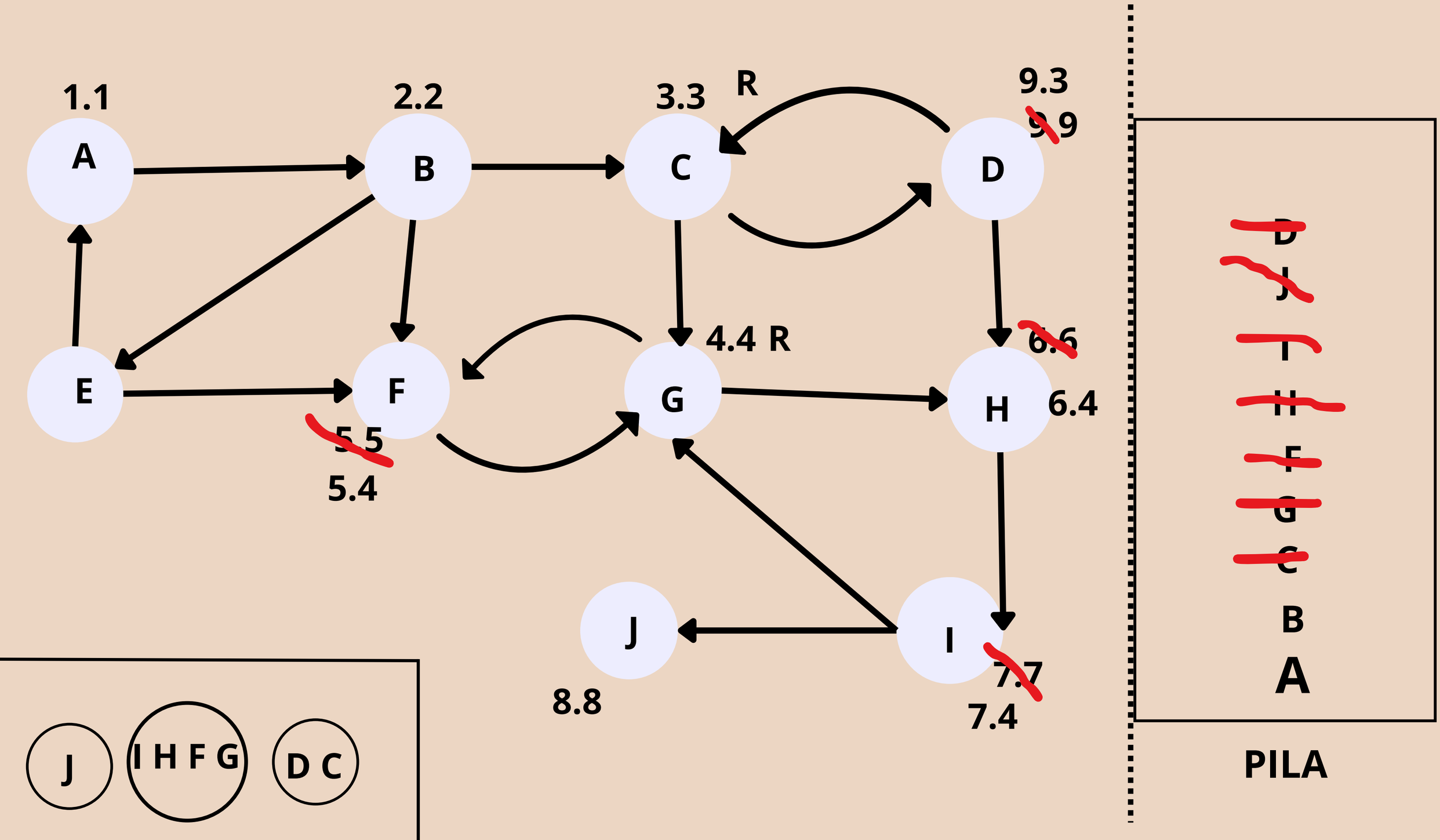
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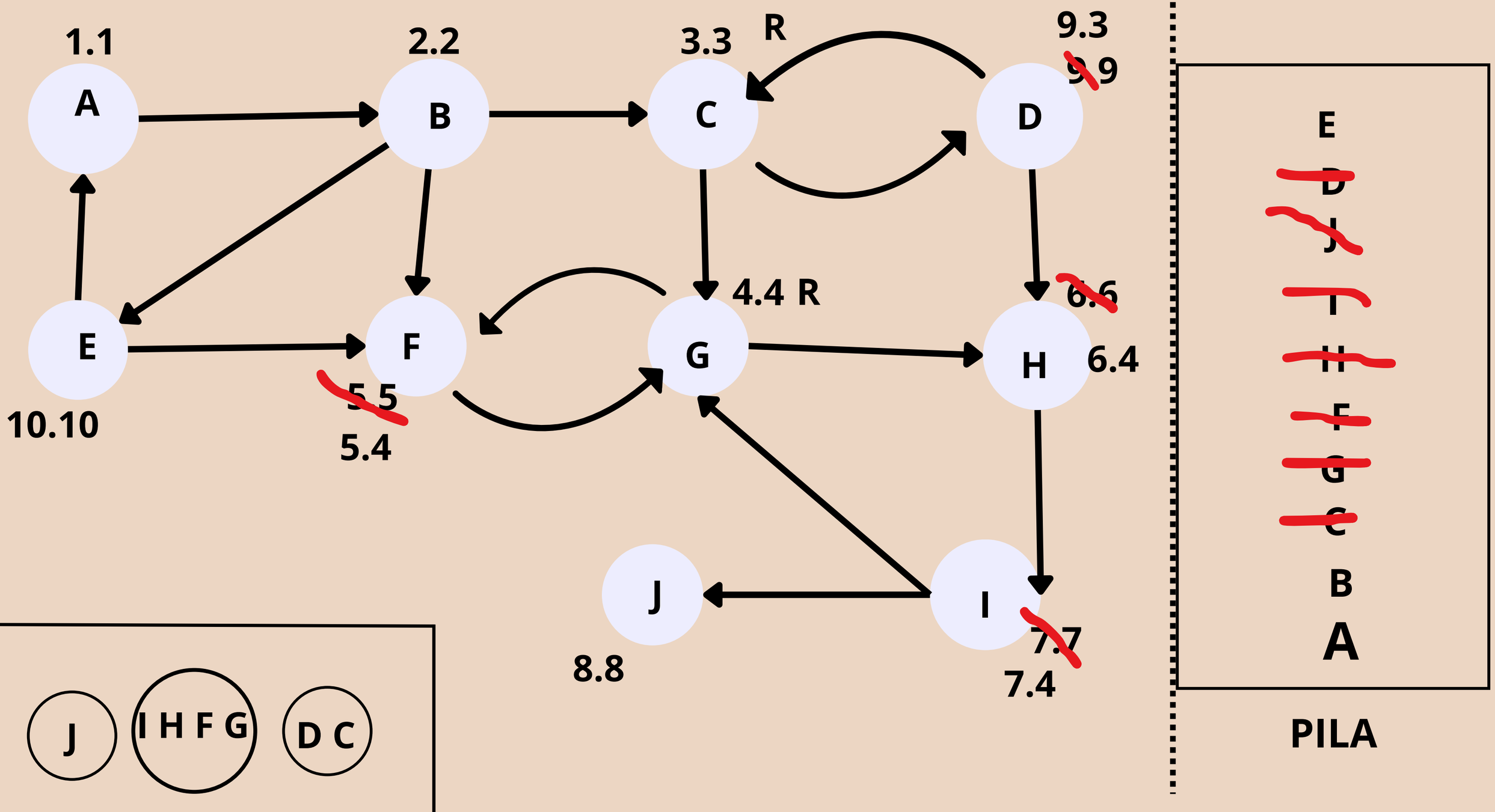
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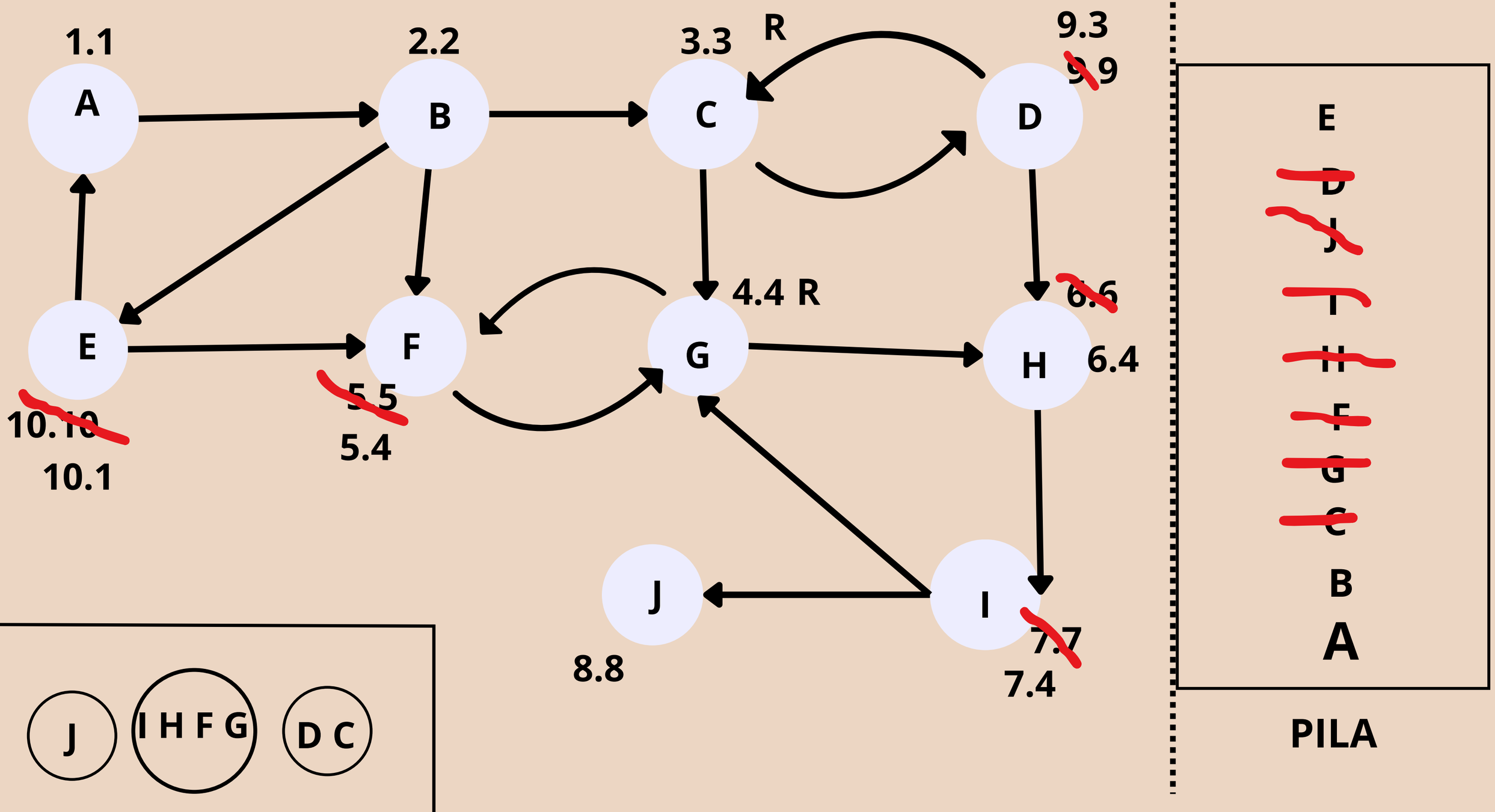
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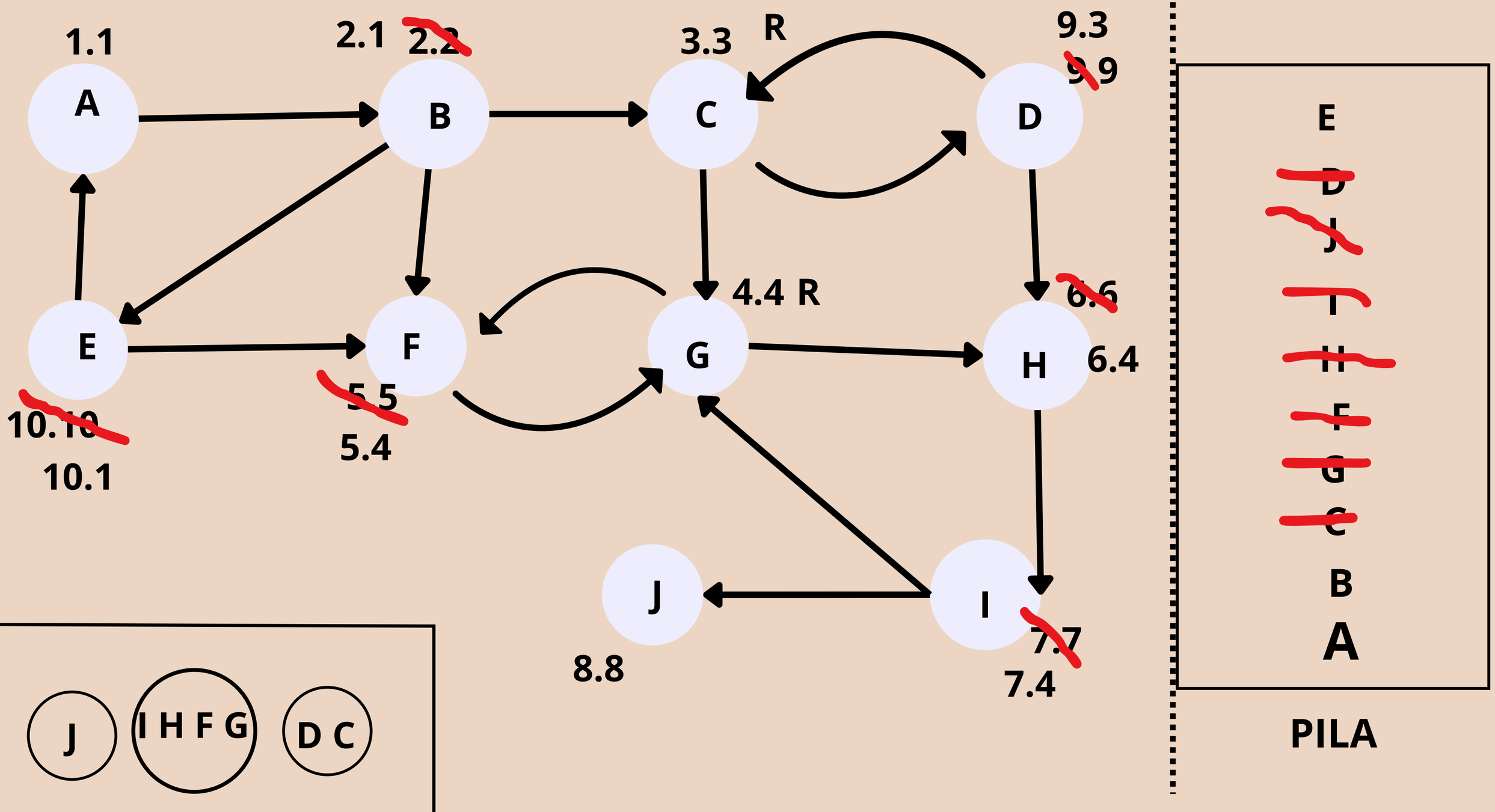
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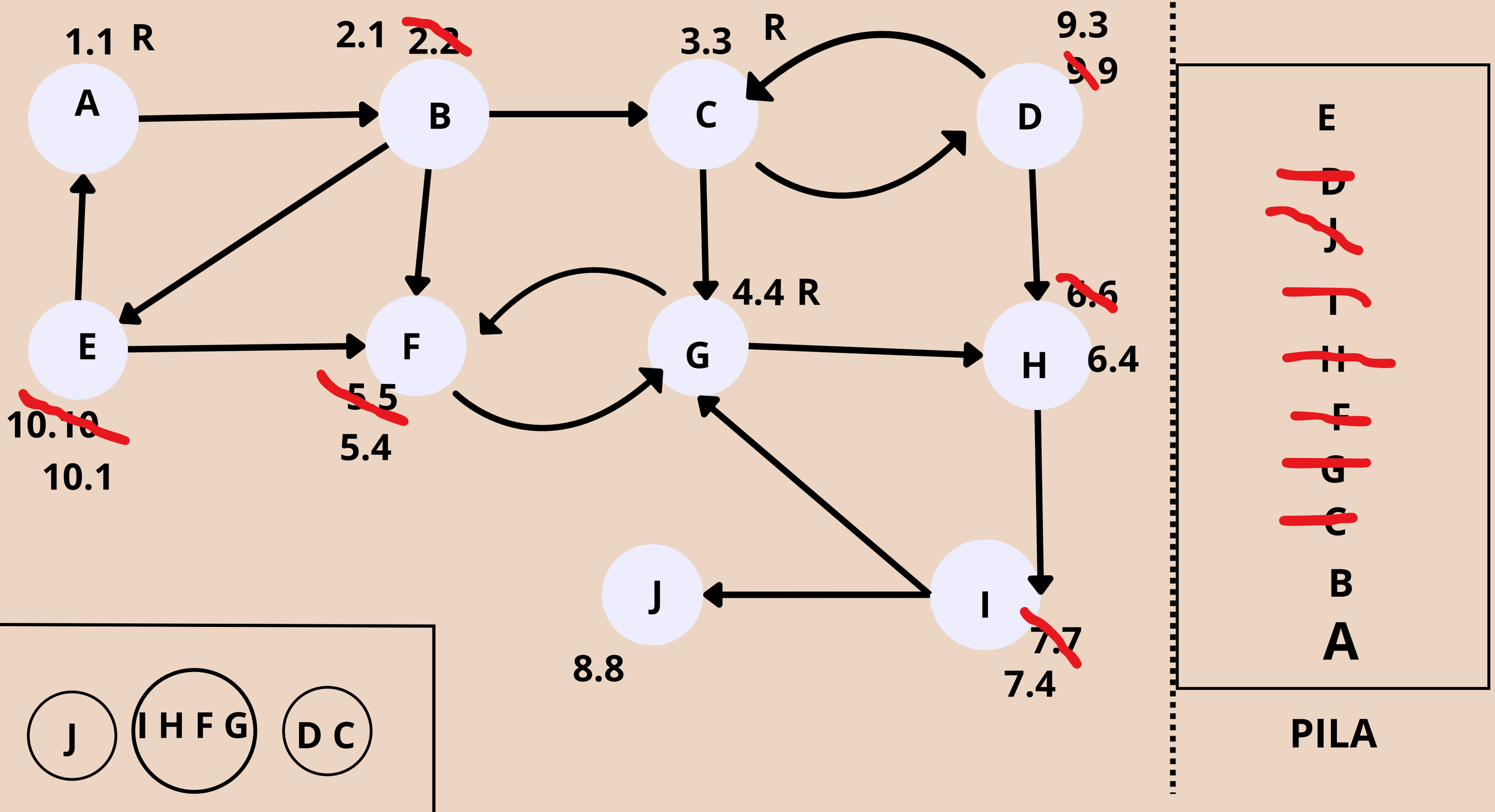
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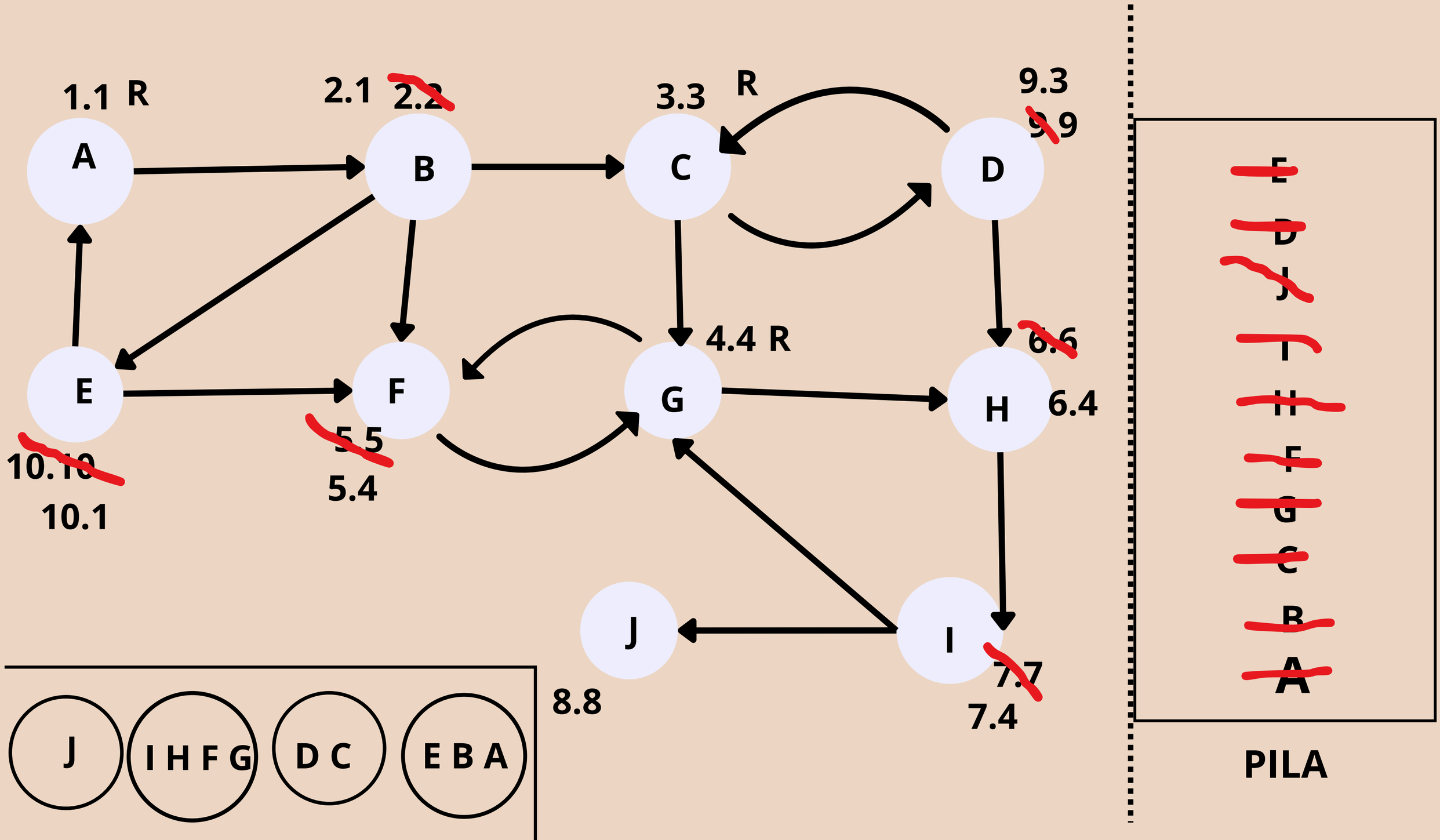
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Complejidad

- *Realiza un recorrido DFS con listas de adyacencias (O(V+A))*
- *Realiza operaciones adicionales(actualiza índices y pila) en tiempo constante*
- *Tiempo total = O(V+A) “lineal”*

¡Gracias por su atención!