Actividad integradora 4: Grafos
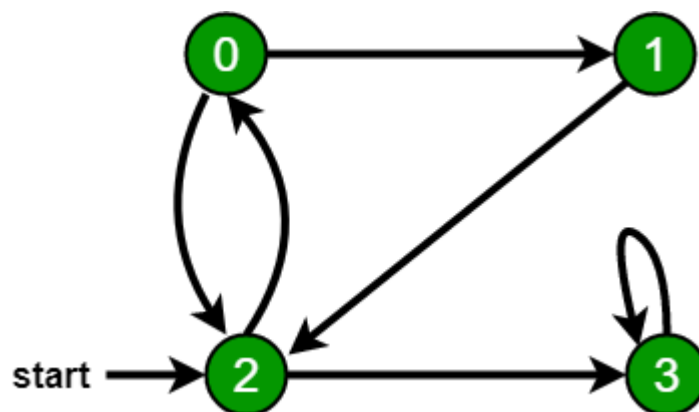
Integrantes:

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Un grafo es una estructura de datos no lineal, la cual consiste de vertices y esquinas. Los vertices usualmente refieren a nodos y esquinas de los mismos, que son líneas o arcos que conectan uno o más nodos de un grafo.
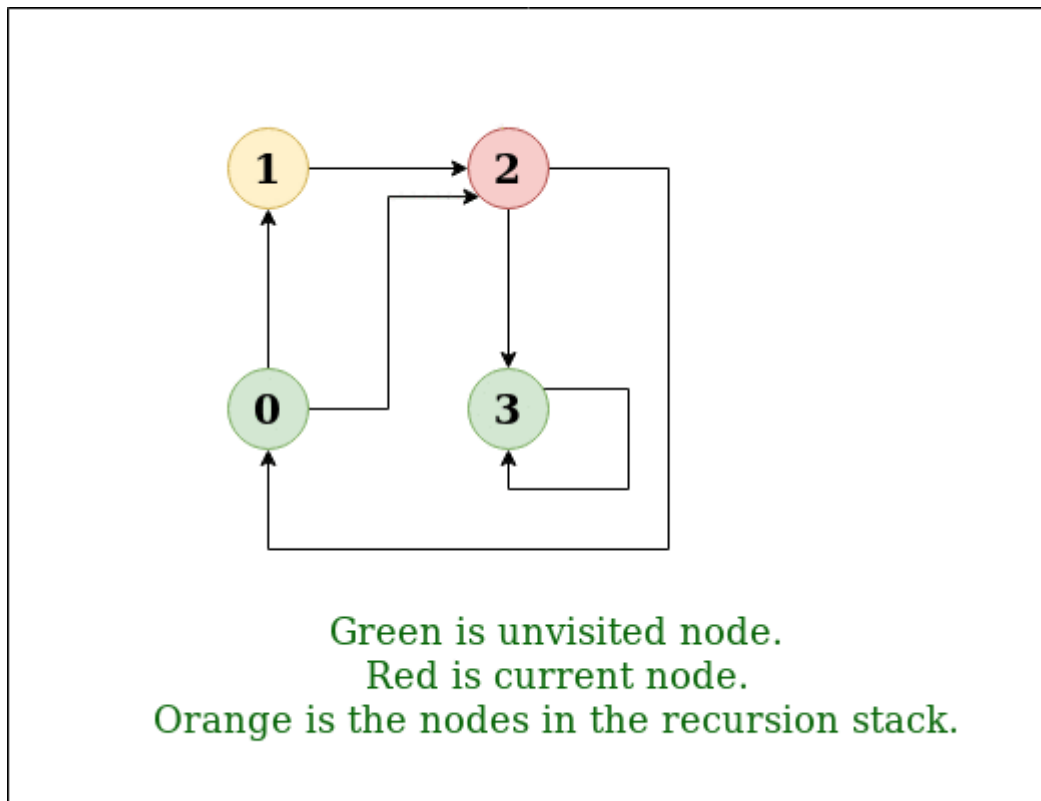

BFS

Este método es similar al utilizado en un árbol binario, sin embargo, en cambio a los árboles binarios, los grafos pueden contener cíclos, así que tenemos la posibilidad de regresar al mismo nodo, para evitar procesar el mismo nodo más de una vez dividimos los vertices en dos categorías:

- Visitados
- No visitados

DFS

Este método es similar al DFT de los árboles binarios, sin embargo, en cambio a los árboles binarios se utilizan métodos booleanos para confirmar que no se haya visitado más de una vez.

Green is unvisited node.
Red is current node.
Orange is the nodes in the recursion stack.

Casos de prueba:

```
=================================================================================
Insert the magnitude of the fan-in:2
 Fan-in graph:
Port: 6520 | Fan in: 2
Day: 29 | Month: 6 | Hour: 0 | Minute: 49 | Second: 16 | IP: 944.46.553.90 | Port: 6520 | Action: Failed password for ro
ot
Day: 7 | Month: 9 | Hour: 20 | Minute: 46 | Second: 2 | IP: 485.91.670.93 | Port: 6520 | Action: Illegal user
=================================================================================
Port: 4156 | Fan in: 2
Day: 1 | Month: 10 | Hour: 1 | Minute: 38 | Second: 51 | IP: 344.56.234.47 | Port: 4156 | Action: Failed password for il
legal user guest
Day: 8 | Month: 9 | Hour: 6 | Minute: 40 | Second: 12 | IP: 960.68.935.71 | Port: 4156 | Action: Failed password for ill
egal user test
=================================================================================
Port: 4024 | Fan in: 2
Day: 29 | Month: 10 | Hour: 14 | Minute: 41 | Second: 43 | IP: 278.67.977.27 | Port: 4024 | Action: Failed password for
illegal user test
Day: 8 | Month: 9 | Hour: 11 | Minute: 49 | Second: 26 | IP: 512.25.509.98 | Port: 4024 | Action: Failed password for il
legal user test
=================================================================================
Port: 4681 | Fan in: 2
Day: 18 | Month: 8 | Hour: 5 | Minute: 33 | Second: 56 | IP: 893.60.774.73 | Port: 4681 | Action: Failed password for il
legal user guest
Day: 3 | Month: 9 | Hour: 18 | Minute: 1 | Second: 55 | IP: 456.80.431.43 | Port: 4681 | Action: Failed password for ill
egal user test
=================================================================================
Port: 6444 | Fan in: 2
Day: 21 | Month: 10 | Hour: 15 | Minute: 26 | Second: 48 | IP: 345.43.733.23 | Port: 6444 | Action: Illegal user
Day: 16 | Month: 7 | Hour: 5 | Minute: 44 | Second: 16 | IP: 884.22.865.61 | Port: 6444 | Action: Failed password for il
legal user test
=================================================================================
Port: 4470 | Fan in: 2
Day: 14 | Month: 10 | Hour: 20 | Minute: 40 | Second: 43 | IP: 595.18.367.10 | Port: 4470 | Action: Failed password for
illegal user guest
Day: 6 | Month: 9 | Hour: 2 | Minute: 59 | Second: 16 | IP: 91.24.740.3 | Port: 4470 | Action: Failed password for admin
```

```
=================================================================================
Port: 6071 | Fan in: 2
Day: 11 | Month: 10 | Hour: 1 | Minute: 1 | Second: 35 | IP: 357.6.291.86 | Port: 6071 | Action: Failed password for roo
t
Day: 14 | Month: 10 | Hour: 1 | Minute: 24 | Second: 2 | IP: 315.5.28.28 | Port: 6071 | Action: Failed password for ille
gal user test
=================================================================================
Port: 4202 | Fan in: 2
Day: 4 | Month: 9 | Hour: 21 | Minute: 52 | Second: 36 | IP: 262.89.42.45 | Port: 4202 | Action: Failed password for adm
in
Day: 12 | Month: 9 | Hour: 23 | Minute: 6 | Second: 24 | IP: 663.37.126.61 | Port: 4202 | Action: Failed password for il
legal user guest
=================================================================================
Port: 4429 | Fan in: 2
Day: 27 | Month: 8 | Hour: 16 | Minute: 29 | Second: 22 | IP: 755.29.675.53 | Port: 4429 | Action: Failed password for i
llegal user guest
Day: 10 | Month: 8 | Hour: 8 | Minute: 24 | Second: 5 | IP: 92.63.754.35 | Port: 4429 | Action: Failed password for admi
n
=================================================================================
Port: 6791 | Fan in: 2
Day: 30 | Month: 8 | Hour: 9 | Minute: 16 | Second: 26 | IP: 540.68.698.56 | Port: 6791 | Action: Illegal user
Day: 4 | Month: 7 | Hour: 22 | Minute: 50 | Second: 52 | IP: 105.69.592.19 | Port: 6791 | Action: Failed password for ad
min
=================================================================================
Port: 6658 | Fan in: 2
Day: 26 | Month: 10 | Hour: 18 | Minute: 45 | Second: 34 | IP: 525.75.32.67 | Port: 6658 | Action: Failed password for i
llegal user test
Day: 28 | Month: 8 | Hour: 12 | Minute: 3 | Second: 56 | IP: 321.96.232.53 | Port: 6658 | Action: Illegal user
=================================================================================
Average fan-in: 5.62517
Median fan-in: 5
Standard deviation fan-in: 2.36754
```

Conclusiones:

La existencia de los grafos, nos benefician para relaciones entre sí, así mismo es necesario para explicación e problemas directos en los cuales podamos meter incluso los costos de la transferencia.