Think Like a Vertex!

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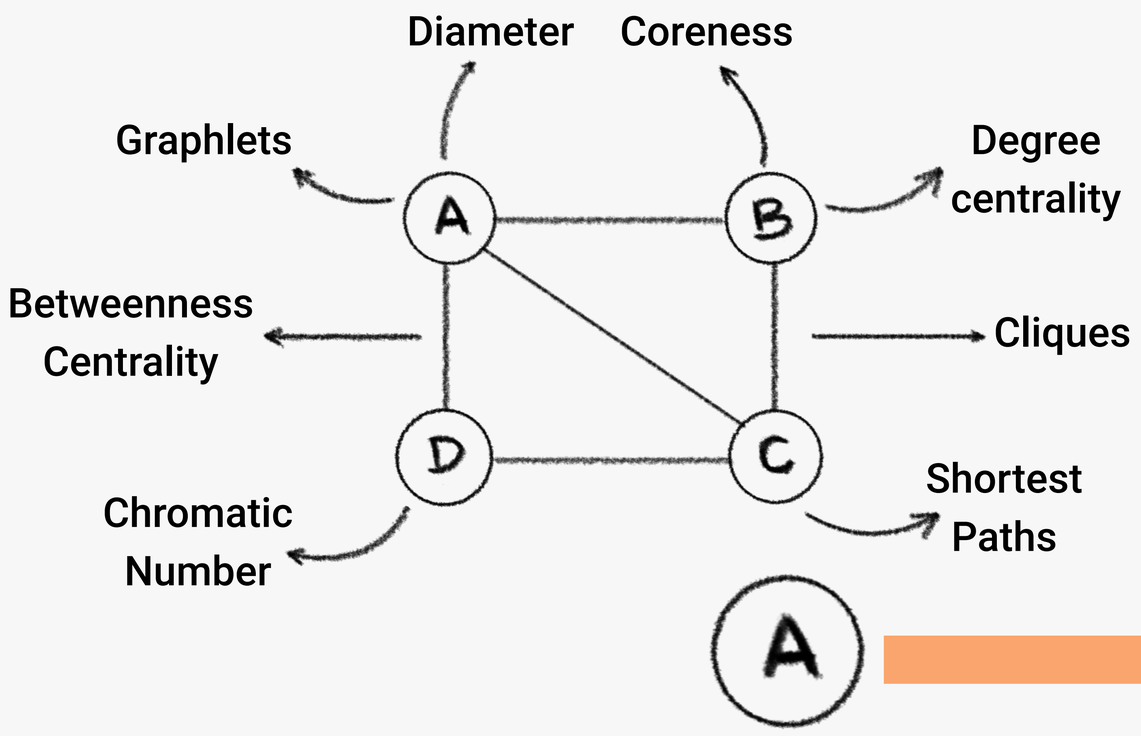
Graph Algorithms

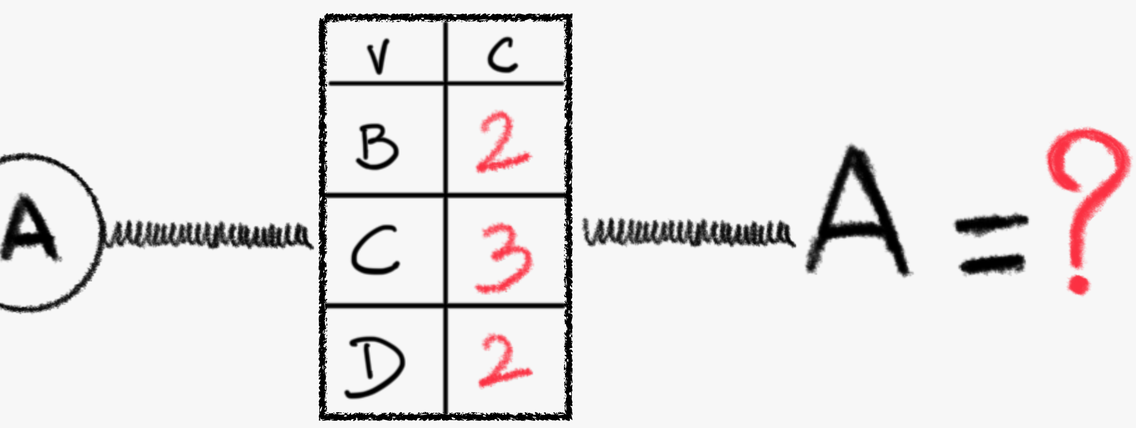
Graphs are able to model virtually any kind of relationship between entities.
There are many different *properties*, *measures* and *patterns* that can be computed or extracted from a graph G.



... and lots more. Maybe something completely new, by **you**!

Decentralize it!

Problem: as the size of graphs continues to grow, classical algorithms become impractical.
Solution: *decentralize* the computation, each vertex/subgraph computes the desired result **locally**.



Ⓐ One **host**, one **node** → a network of singular computing nodes
Ⓑ One host, **multiple** nodes → *distributed* computing
Ⓒ One **core**, one node → *parallel* computing

What, ***how*** and ***when*** we communicate with our neighbors: vertices or even subgraphs.
How do we reach consensus about a **global** solution?
→ **how would you act as a vertex?** ←

Applications

Edge Computing 📱

- 📱 Network self-organization
- 📱 Distributed fault detection and recovery
- 📱 Enhance Content Delivery Networks (CDNs)
- 📱 Mobile traffic management, load balancing

Peer To Peer Networks 👨‍💻

- 👨‍💻 Leader election
- 👨‍💻 Gossip protocols
- 👨‍💻 Maintain data consistency

Big Data 📈

- 📈 Social Network Analysis
- 📈 Community Detection
- 📈 Better handling of dynamic data
- 📈 Reduce total computation time

Internet of Things IoT

- ⚡ Fault prediction
- ⚡ Sensor data aggregation
- ⚡ Distributed power grid optimal flow

Distributed Databases 💾

- 💾 Efficient data replication
- 💾 Distributed queries/join
- 💾 Load balancing