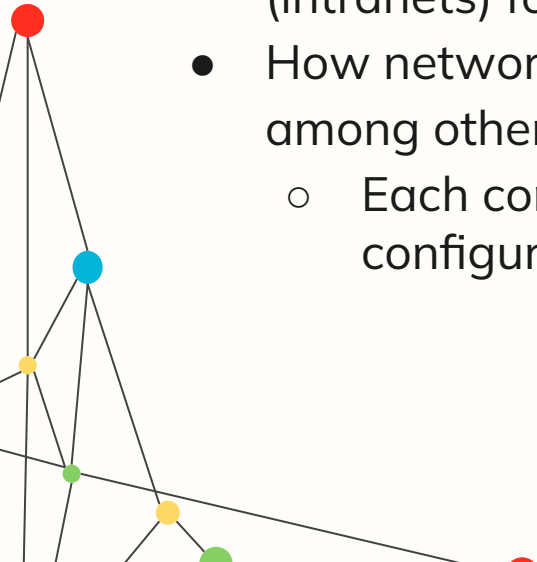# Network Dilemma:
an analysis of six network configurations
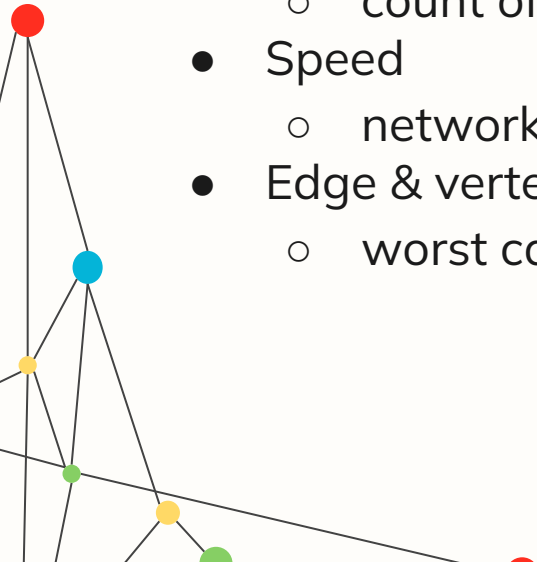
Jackson Eshbaugh, Amy Fabera, Tyler Salmon, Billy Zou

What's the deal with networks?

- Society relies on the internet and other internal networks (intranets) for work, school, entertainment, and more.
- How networks are configured can impact speed and reliability, among other things.
  - Each configuration has its pros and cons, and no two configurations are the same for any two use cases.
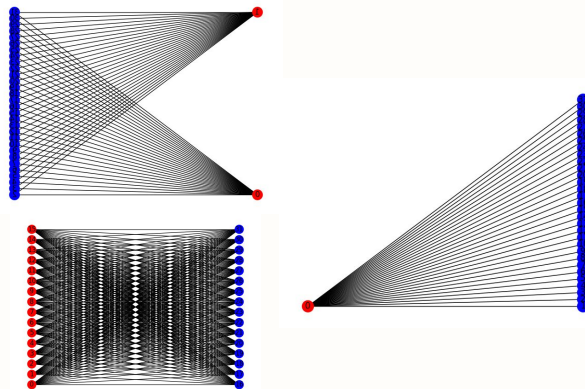
Criteria

- Cost
  - count of edges
- Speed
  - network diameter
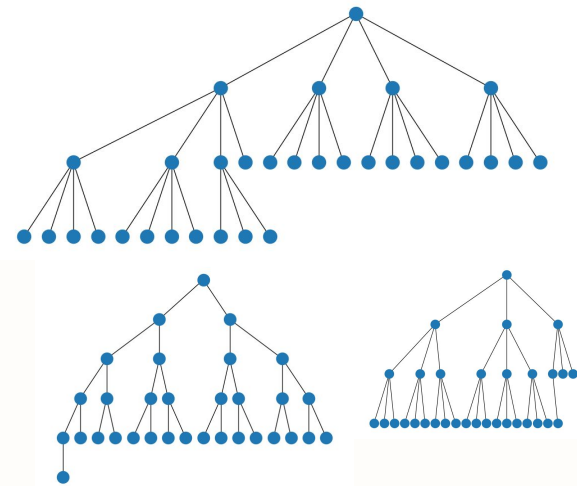- Edge & vertex reliability
  - worst case analysis

- Hamilton cycles & Euler tours
  - presence of both is preferred.
- Extensibility
  - to expand the network to a size of 64 nodes, how many additional edges are needed?
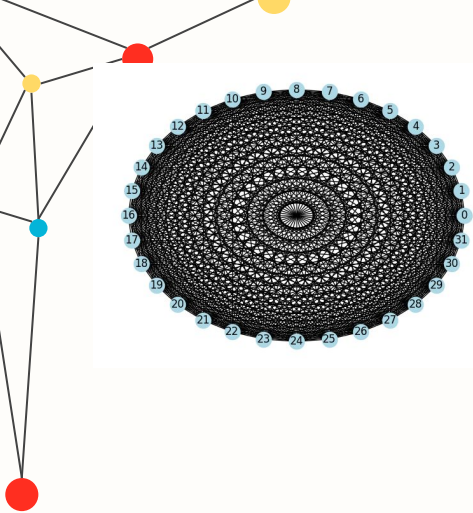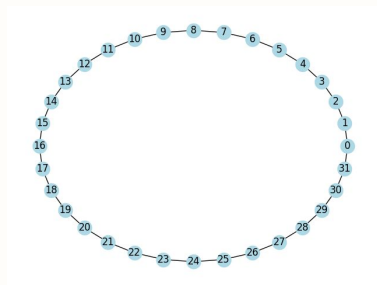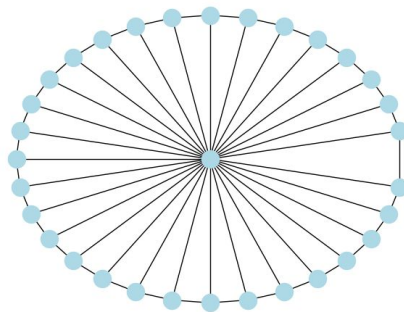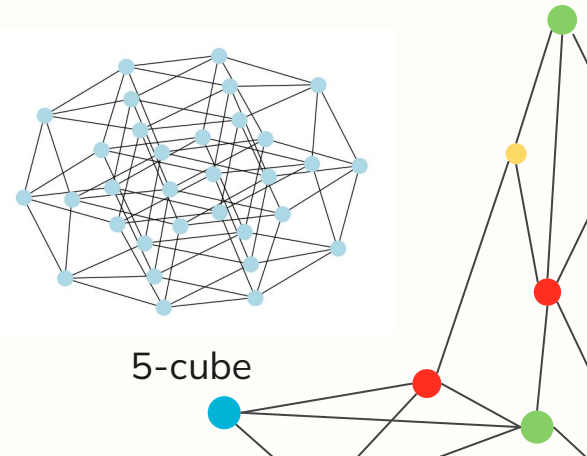
Complete

Complete Bipartite

Tree

Cyclic

Wheel

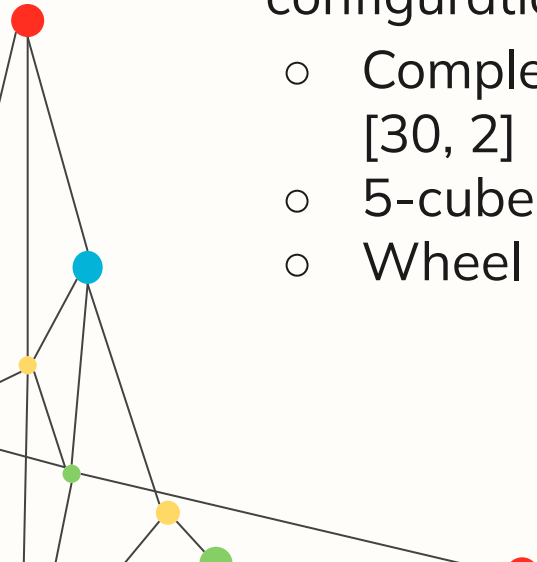5-cube

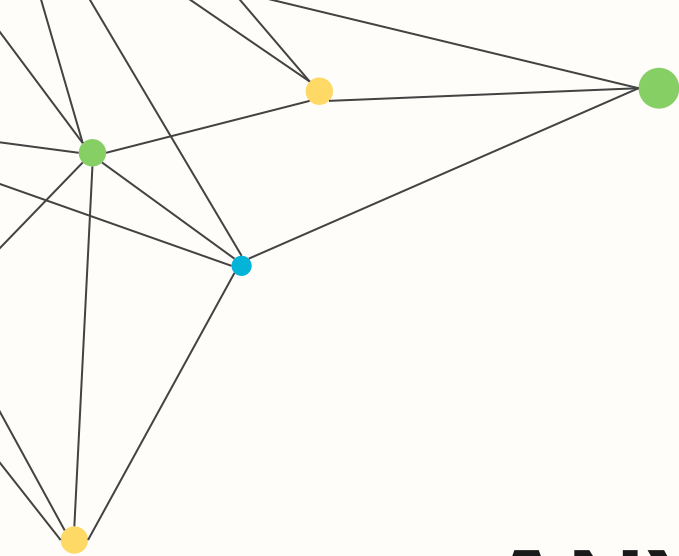| Config	Cost	Speed	Edge	Vertex	Hamilton	Euler	Expand
Complete	496	1	32	31	YES	NO	1,520
[31, 1]	31	2	31	1	NO	NO	32
[30, 2]	60	2	32	31	NO	YES	64
[16, 16]	256	2	32	31	YES	YES	768
5-cube	80	5	32	31	YES	NO	112
Binary Tree	31	5	16	15	NO	NO	32
Ternary Tree	31	3	19	5	NO	NO	32
4-degree Tree	31	3	16	5	NO	NO	32
Cyclic	31	16	32	31	YES	YES	32
Wheel	62	2	32	31	YES	NO	64

Conclusions

- Most suitable network configurations
    - Complete Bipartite [30, 2]
    - 5-cube
    - Wheel

- Reasonable cost
- Reasonable speed
- Reliable

Use Cases

- Complete Bipartite [30, 2]
  - Master-Slave Configuration
  - Great for parallel processing—can access every other machine via master node (which has a backup in case of failure)
- 5-cube & Wheel
  - Hivemind setup
  - Choice of which one to use depends on data size.
  - Can save money, so real value in making a decision between these two.

ANY QUESTIONS?

THANK YOU :)