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Homework Week 6

1. The forest network described by Suzanne Simard is like that of the internet network. In the forest network, trees share information below ground. These trees are connected to one another via pathways made my mycorrhiza, a type of fungus. This fungus connects not only trees of the same species, but those of different species. Mycorrhizal networks have nodes and links, the nodes representing trees and the links representing the interlinking fungal pathways. The busiest nodes in the network are the mother trees, which send out more nutrients to seedling trees. Additionally, mother trees connect bigger mycorrhizal networks to their kin, sending them more nutrients and reducing their root competition to make room for their children, as well as send them messages when dying or injured. The forest network is a biological parallel to structure of the internet.
2. Water and electrical networks differ from the internet in two ways. Water and electrical networks are built to distribute physical resources. Water flows through pipes, while electricity flows through power lines. Meanwhile, the internet distributes digital information. The content of the digital information on the internet can be any kind of information, rather than a predictable resource like in water and electrical networks. Secondly, water and electrical networks are centralized, getting their resources from a centralized location, such as a reservoir for water networks and power plants for electrical networks. The internet however is decentralized, relying on multiple different networks that are connected through common protocols. Information on the internet is not required to pass through a centralized location to get delivered to a specific device.
3. Dropbox handles scaling by using sharding and caching strategies. Sharding means that user data is split across multiple databases, which prevents a database from getting too large when the number of users increases. Additionally, caching is used on common database requests to reduce database operations and make information retrieval faster.
4. An application programming interface is a tool that allows different software systems to interact with each other. It acts as a messenger, taking requests from one system, sends them to another system, and then returning the responses.
5. A company might switch to cloud computing for multiple reasons. One reason is cost effectiveness since it eliminates the need for onsite hardware and servers. Additionally, cloud computing offers a more flexible architecture since its scale can be adjusted more easily. Lastly, cloud computing allows for reliable security, data backup, and recovery.
6. When it is stated that HTTP is stateless and connectionless, is means that after a client sends a request to the server, the connection is closed. The client disconnects from the server and only reconnects when it needs another response. Additionally, HTTP does not retain information between different requests. Each new request is handled independently, with no memory of previous interactions.
7. A Content Delivery Network is a group of globally distributed servers that speed up the delivery of web content. This is done by caching copies of files in data centers around the world, allowing users to access content over the internet from a server near them geographically, reducing load times and improving performance.
8. A modem connects a homer or business to the internet by converting analog signals from the Internet Service Provider into digital signals, it also modulates outgoing digital signals from home or business devices into analog signals for internet transmission. Meanwhile, a router distributes the internet connection from the modem to the home or business devices.

9. The physical layer handles the transmission of data using cables, like traffic networks, where roadways are the physical paths that vehicles travel on. Traffic networks optimize traffic flow using certain intersection and interchange designs, like how data packets in networks more through routers and switches to reach their destination. In traffic networks, intersections present opportunities for crashes, or collisions. Specific intersection designs are made to reduce the probability of crashes, much like in data networks.
10. Circuits are closed paths where electric current can flow. A circuit needs to be closed for current to flow. When all components are connected electricity moves through the circuit. If there's a break in the circuit, it becomes open, and current cannot flow. Switches allow one to manually open or close a circuit, controlling whether current flows or not, and whether the device is powered on or off.