

## **Compared with a single centralized system, what are the advantages and disadvantages of the distributed systems?**

### **Advantages:**

- More reliable: Distributed system should be more reliable than single system because of multiple machines. Thus a failure of a machine doesn't necessarily imply the shutdown of the system.
- Easy to recover: With more machines, data can be replicated in multiple copies. We can quickly restore data back.
- Easy access for users: users may be able to access data and/or service quicker because they are closer to some machines geographically.
- Reduced bottleneck: A single system can be a bottleneck for users' requests (e.g., hardware limit, network bandwidth). With distributed systems, users' requests can be dispersed to multiple machines.
- More resources can be added easily: With a single system, resources are usually tightly coupled. With distributed systems, however, we can add more machines on demand easily.

### **Disadvantages:**

- More components to fail: With more machines, it is more likely to have a fault in the whole system.
- Larger development cost: It is more difficult to implement a distributed database system; thus it is more costly.
- Harder to coordinate: It is harder to coordinate among multiple machines than a single system due to many factors (e.g., network latency, lack of global clock)
- Increased processing overhead: The exchange of information and additional computation required among multiple machines are a form of overhead that does not arise in centralized system.
- difficult to administrate: With a heterogenous system, it is difficult to manage different types of machine in both hardware and software perspectives.