Distributed system design, 100K ft level

April 5, 2017
Distributed system design

• What do you need to think about when designing a distributed system?
Distributed system design

• What do you need to think about when designing a distributed system?
  • System API
  • Node roles
  • Network
  • System state
  • Failures
System API

• Who are the clients of the system?
• What do they assume about the system?
• How do they contact the system?
• Concurrent clients?
• Do clients know about one another?
• How can clients interfere with one another?
• Do we trust the clients? How much and with what?
System API: A2

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- What do they assume about the system?
- How do they contact the system?
- Concurrent clients?
- Do clients know about one another?
- How can clients interfere with one another?
- Do we trust the clients? How much and with what?
Node roles

• What are the different roles that nodes play in the system?
• What makes each role distinct and necessary?
• Which roles need to interact?
• What do different node roles assume about one another?
  • What is the API between node roles? (cross-cutting)
  • All API questions apply: e.g., what is the trust between roles?
Node roles: A5

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  - What is the API between node roles? (cross-cutting)
  - All API questions apply: e.g., what is the trust between roles?
Network

• What is the network model; what does the network provide?

• What is the network API? And, what are its semantics?

• How do we name entities in the network and how do we find/look them up?

• What is the network topology?

• Do we trust the network? With what?
Network: CODA

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- What is the network API? And, what are its semantics?
- How do we name entities in the network and how do we find/look them up?
- What is the network topology?
- Do we trust the network? With what?
System state

- What is the distributed system state?
- What is not distributed system state?
- What nodes have what state in the system?
- What distributed state can clients observe?
- What are the semantics of distributed state? Is this a function of node type, location, or other features of the system?
System state: BT

• What is the distributed system state?

• What is not distributed system state?

• What nodes have what state in the system?

• What distributed state can clients observe?

• What are the semantics of distributed state? Is this a function of node type, location, or other features of the system?
Failure (cross-cutting)

• What failures are outside the scope of what the system can deal with?
• Can the network fail, how? How does the system respond?
• Can nodes in the system fail, how? How does the system respond?
• Can clients fail? How does that impact the system?
• Can the system provide graceful degradation?
• Is there fate sharing in the system? Between what roles?
Failure: A7

• What failures are outside the scope of what the system can deal with?

• Can the network fail, how? How does the system respond?

• Can nodes in the system fail, how? How does the system respond?

• Can clients fail? How does that impact the system?

• Can the system provide graceful degradation?

• Is there fate sharing in the system? Between what roles?
Recap

• What do you need to think about when designing a distributed system?
  • System API
  • Node roles
  • Network
  • System state
  • Failures

Thanks for participating in 416 this term!