Properties of a (Point-to-Point) Message Channel

Consider these questions

- Must a message that is received have been sent?
- Can we take a system snapshot wherein a message is received but not sent?
- Must a message that is sent be received?
- Can we take a system snapshot wherein a message is sent but not received?
- Must the messages that are received be received in order?
- In which direction does the information flow?
Challenges to Correctness

- Challenges
  - (Asynchrony) message order may be inconsistently observed
  - (Distribution) each party lacks remote knowledge

- Intuition about correctness
  - If each party interacts correctly, is the overall behavior correct?
  - If not, our sequence diagram is not realizable or enactable
Counting Possible Sequence Diagrams

Given messages from $a$ to $b$ and from $c$ to $d$
State Diagrams

Statecharts

- Generalize over finite state machines
- Condition or guard on a transition
- Nested states where being in a substate entails being in the superstate
  - Natural for summarizing states that bear similar meanings and support similar transitions
- Parallel states indicating being in the each of the states at the same time
  - Cartesian product of the individual states
  - Natural for expressing mutually independent components of the state
State Diagram Example
State Diagram Example