L05a. Definitions

What is a Distributed System?

- A Distributed System is a collection of nodes connected by a LAN/WAN.
- No physical memory is shared between nodes on a Distributed System. Nodes communicate by sending messages on the network.
- The Messaging Time (the time consumed for message communication) is much larger than the Event Computation Time (the time a node takes to complete a process).
- Formal definition: A system is distributable if the message transmission time T_m is not negligible to the time between events in a single process T_e.

Distributed System Events Ordering:

- Beliefs:
  - Processes are sequential.
  - Send happens before Receive.
- Relationships between events:
  - Happened Before: If a happened before b ($a \rightarrow b$), then it's either:
    1. a is located textually before b in the same process.
    2. a and b are in different processes, and there's a communication event that connects a and b.

    Transitivity: if $a \rightarrow b$ and $b \rightarrow c$ then $a \rightarrow c$
  - Concurrent events: If a and b are in two different processes and no communication event connects them, then we say that they're concurrent $a \| b$.

    This is why the "Happened Before" relationship cannot give a complete picture of the system events.