Failure Detection

- The ping-ack failure detector in a **synchronous** system satisfies
  - A: completeness
  - B: accuracy
  - C: neither
  - **D: both**

Failure Detection

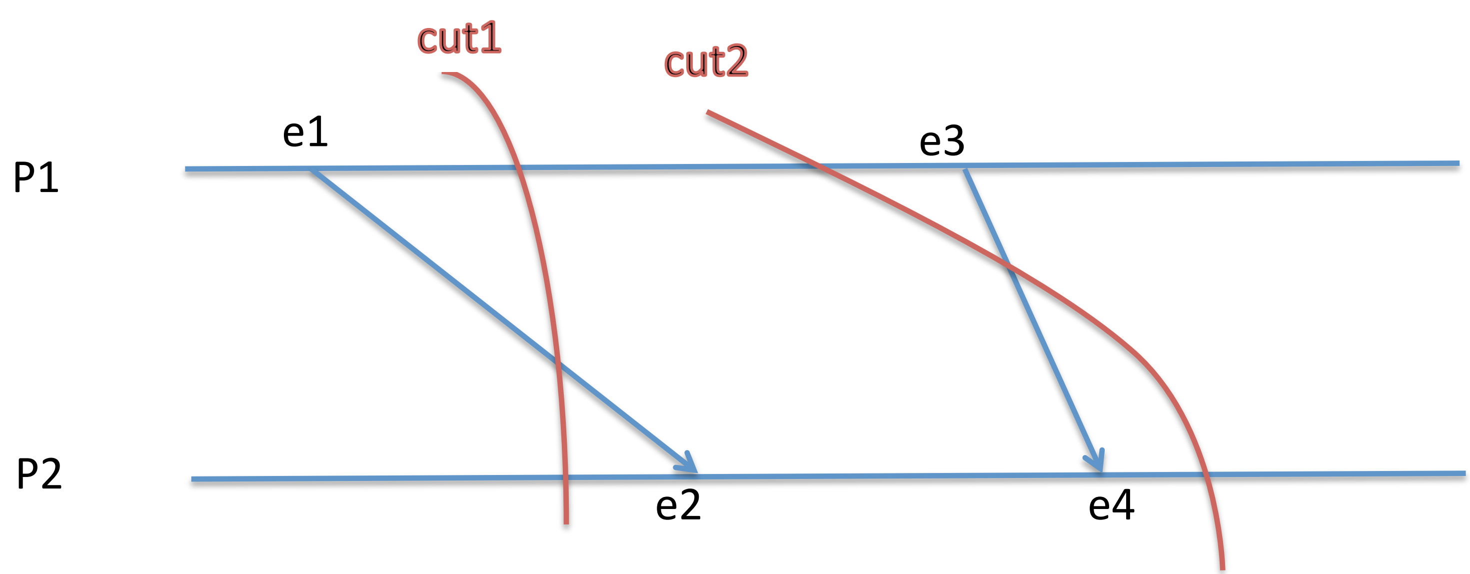
- The ping-ack failure detector in an **asynchronous** system satisfies
  - **A: completeness**
  - B: accuracy
  - C: neither
  - D: both

Vector timestamps

- Which of these timestamps is **concurrent** with (1,2,3)
  - A: (1,3,3)
  - B: (1,2,1)
  - C: (4,5,6)
  - **D: (2,3,2)**

Consistent Cut

- Which of these cuts is consistent?
  - **A: cut1**
  - B: cut2



Reliable Multicast

- In reliable multicast, what is the definition of "Integrity"?
  - **A: A correct process *p* delivers a message *m* at most once.**
  - B: If a correct process delivers message *m*, then all the other correct processes in group(*m*) will eventually deliver *m*.
  - C: If a correct process multicasts (sends) message *m*, then it will eventually deliver *m* itself.

Multicast

- State true or false: Any multicast that is both FIFO-ordered and totally ordered is thereby causally ordered.
  - A: True
  - **B: False**

Consensus

- For which of the following situations, consensus is possible:
  – A: synchronous system, failures possible
  – B: asynchronous system, failures impossible
  – **C: both**
  – D: neither

Mutual Exclusion

- What properties does Token Ring mutual exclusion algorithm satisfy
  - A: Safety only
  - **B: Safety & liveness**
  - C: Safety & ordering
  - D: Safety, liveness, and ordering
  - E: none of the above

Mutual Exclusion

- What properties does Ricart & Agrawala mutual exclusion algorithm satisfy
  - A: Safety only
  - B: Safety & liveness
  - C: Safety & ordering
  - **D: Safety, liveness, and ordering**
  - E: none of the above

Leader Election

- Leader election in asynchronous systems is
  - A: possible
  - **B: impossible**

Leader Election

- Bully algorithm guarantees:
  - A: Safety
  - B: Liveness
  - **C: Both**
  - D: Neither

Byzantine Generals Algorithm

- What is the minimum number of nodes required to achieve agreement in Byzantine generals algorithm with *f* Byzantine faulty nodes?
  - A: f+1
  - B: 2f+1
  - **C: 3f+1**

Routing Algorithms

- In which routing algorithm each node talks only to its directly connected neighbors, but it tells them everything it has learned?
  - **A: Link State routing algorithm**
  - B: Distance Vector routing algorithm

Chord

- How much state does a Chord peer maintain?
  - A: O(1)
  - B: O(log N / log log N)
  - **C: O(log N)**
  - D: O(√N)
  - E: O(N)

Idempotence

- Idempotent algorithms are needed when using
  - A: at most once invocation semantics
  - **B: at least once invocation semantics**

RMI

- To facilitate RMI, a stub object is maintained
  - **A: on the client**
  - B: on the server

2PL

- Two-phase locking ensures that:
  - **A: Transactions maintain serial equivalence**
  - B: Deadlocks do not occur
  - C: Distributed transactions can commit atomically

Quorum

- In a system of 6 nodes, which of these is an *invalid* quorum configuration?
  - A: w=4, r=3
  - B: w=6, r=3
  - **C: w=5, r=1**
  - D: w=6, r=1
  - E: w=4, r=5

Available Copies Replication

- Available copies replication captures which two properties from the CAP theorem?
  - **A: Consistency and Availability**
  - B: Consistency and Partition-tolerance
  - C: Availability and Partition-tolerance

Gossip protocols

- What is the **worst-case** latency for distributing a message among N nodes through a gossip protocol
  - A: O(log N)
  - B: $O(N^{0.5})$
  - C: O(N)
  - **D: unbounded**

Gossip protocols

- What is the **expected** latency for distributing a message among N nodes through a gossip protocol
  - **A: O(log N)**
  - B: $O(N^{0.5})$
  - C: O(N)
  - D: unbounded

Two-phase commit

- If a participant has responded *yes* to a *canCommit* call and has not heard from the coordinator for a long time, it should:
  - A: abort
  - B: commit
  - **C: call *getDecision* on the coordinator**
  - D: keep waiting

Routing Algorithms

- Count-to-infinity is a problem of
  - A: Link State routing algorithm
  - **B: Distance Vector routing algorithm**

Distributed Shared Memory

- False sharing leads to:
  - **A: Excessive page transfers**
  - B: Violations of sequential consistency
  - C: Deadlock

CODA

- Which of the CAP "vertices" does CODA sacrifice?
  - **A: Consistency**
  - B: Availability
  - C: Partition-tolerance

Paxos

- In Paxos, a distinguished **proposer** is used to:
  - A: ensure safety
  - **B: ensure liveness**
  - C: optimize performance

Paxos

- In Paxos, a distinguished **listener** is used to:
  - A: ensure safety
  - B: ensure liveness
  - **C: optimize performance**