DISTRIBUTED LOCKING PROTOCOLS – OVERVIEW

	Single-Lock Manager	**Primary Copy**	**Majority**	**Biased**
Deadlock Handling	Centralized	Distributed	Distributed	Distributed
Availability (*)	global SPoF (central lock manager)	SPoF per data item Q (primary copy of Q)	No SPoF ($\lfloor \frac{n}{2} \rfloor + 1$ replicas must be up)	Read: No SPoF Write: all n replicas of Q must be up
Bottleneck	Yes	No	No	No
Supports Replicas	Yes	Yes	Yes	Yes
# of Messages	Read: 2 Write: 2 Unlock: 1	Read: 2 Write: 2 Unlock: 1	Read/Write: $2\left(\lfloor \frac{n}{2} \rfloor + 1\right)$ Unlock: $\left(\lfloor \frac{n}{2} \rfloor + 1\right)$	Read: 2 Write: $2n$ Unlock: Read: 1, Write: n
Read from Replicas	Any	Any	Any	Any
Write to Replicas	All	All	All	All

SPoF Single Point of Failure

Q data item to be locked / unlocked

n number of replicas for a data item Q

(*) The availability discussion is limited to lock requests only. Even if a lock is granted, depending on the replication policy it may not be possible to write. For example, the majority protocol grants a write lock if more than half of the replicas are available, but the replication policy may require writes to be executed on all replicas, which requires *all* replicas to be available.