Programming Assignment 3 Demo Procedure

To conduct this demo, you will start four replicas: S1, S2, S3, and S4. You will then select three keys, K1, K2, and K3. These keys should be selected such that K1's replicas are S2, S3, and S4 (in clockwise direction); K2's replicas are S3, S4, and S1 (also in clockwise direction); and K3's replicas include S1.

Note that values such as "aaaa" and "bbbb" in the demo procedure are just examples. You may be asked to write other values during the demo.

Key-value store put/get

You will first start four replicas: S1, S2, S3, and S4. At least one of them has to be on a different physical machine than others. Initially, all four replicas are empty, containing no key-value pairs.

A client, C1, selects S1 as the coordinator and issues the following request: (select your own K1 such that K1's replicas are S2, S3, and S4.)

client	coordinator	consistency	operation	key	value
C1	S1	ONE	put	K1	aaaa

Another client, C2, selects S2 as the coordinator and issues the following requests:

client	coordinator	consistency	operation	key	value
C2	S2	ONE	get	K1	(Expected result: aaaa)
C2	S2	ONE	put	K1	bbbb

Write-ahead log

Stop all replicas via command line, then restart S2. Instruct a client, C3, to issue the following request:

client	coordinator	consistency	operation	key	value
C3	S2	ONE	get	K1	(Expected result: bbbb)

Replication factor 3

Select a new key K2 such that its replicas are S3, S4, and S1. Make sure only replica S2 is available. Instruct C3 to issue the following request:

client	coordinator	consistency	operation	key	value
C3	S2	ONE	put	K2	eeee (Expected result: exception)

Configurable consistency level

With S2 being the only replica available, instruct C3 to issue the following request:

client	coordinator	consistency	operation	key	value
C3	S2	QUORUM	get	K1	(Expected result: exception)

Restart S3, instruct C3 to issue the following request:

client	coordinator	consistency	operation	key	value
C3	S2	QUORUM	get	K1	(Expected result: bbbb)

Hinted handoff

Restart S1 and S4 so that all four replicas are up and running.

Stop S2. Instruct a client, C4, to issue the following request:

client	coordinator	consistency	operation	key	value
C4	S1	QUORUM	put	K1	cccc

At this point, S1 should have stored a hint for S2.

Restart S2. Instruct another client, C5, to issue the following request: (You need to select a different key K3 whose replicas include S1. This request allows S1 to know that S2 has recovered.)

client	coordinator	consistency	operation	key	value
C5	S2	ONE	put	K3	dddd

Stop S3, S4.

Instruct C6 to issue the following request:

client	coordinator	consistency	operation	key	value
C6	S1	ONE	get	K1	(Expected result: cccc)