Programming Assignment 4 Demo Procedure

To conduct this demo, you will first start four replicas: S1, S2, S3, and S4, in hinted handoff mode. 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; K2's replicas are S3, S4, and S1; and K3's replias include S1.

You will then start another round of demo, showing the read repair capability of your implementation. In this round, you will start four new replicas, S5, S6, S7, and S8. You will also select a key K4 such that K4's replicas are S6, S7, and S8.

Key-value store put/get

You will first start four replicas: S1, S2, S3, and S4, in hinted handoff mode. 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

Kill 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. Instruct C3 to issue the following request:

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

Configurable consistency level

With S1, S3, S4 remain killed, 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, S3, and S4 so that all four replicas are up and running.

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

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

Restart S2. Instruct another client, C5, to issue the following request: (you need to select a different key K3 whose replicas include S1.)

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

Kill S3, S4. Instruct C6 to issue the following request:

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

Read repair

Start four new empty replicas, S5, S6, S7, and S8 in read repair mode.

Instruct a client, C7, to do the following: (select your own K4 such that its replicas are S6, S7, and S8.)

client	coordinator	consistency	operation	key	value
C7	S5	QUORUM	put	K4	eeee

Kill S8.

client	coordinator	consistency	operation	key	value
C7	S5	QUORUM	put	K4	ffff

Restart S8. Instruct C7 to issue the following request:

client	coordinator	consistency	operation	key	value
C7	S5	QUORUM	get	K4	(Expected result: ffff)

Kill S5, S6, and S7. Instruct C8 to issue the following request:

client	coordinator	consistency	operation	key	value
C8	S8	ONE	get	K4	(Expected result: ffff)