

Names: Phuc Nguyen (32593321) and Hai Nguyen (32610558)

3a. When only the 2nd instance crashes

```
PhucNguyen-OptiPlex-5090:~/Desktop/kafka-local$ ./bin/zookeeper zkServer --config zoo2 stop
ZooKeeper JMX enabled by default
Using config: zoo2/zoo.cfg
Stopping zookeeper ... STOPPED
```

```
WatchedEvent state:SyncConnected type:None path:null zxid: -1
create /zk_test
Created /zk_test
[zk: localhost:2888(CONNECTED) 1] set /zk_test data
[zk: localhost:2888(CONNECTED) 2] get /zk_test
data
[zk: localhost:2888(CONNECTED) 3] delete /zk_test
[zk: localhost:2888(CONNECTED) 4] get /zk_test
Node does not exist: /zk_test
```

When 3 servers crash:

```
PhucNguyen-OptiPlex-5090:~/Desktop/kafka-local$ ./bin/zookeeper zkServer --config zoo2 stop
ZooKeeper JMX enabled by default
Using config: zoo2/zoo.cfg
Stopping zookeeper ... STOPPED
```

```
> ./bin/zookeeper zkServer --config zoo3 stop
ZooKeeper JMX enabled by default
Using config: zoo3/zoo.cfg
Stopping zookeeper ... STOPPED
```

```
> ./bin/zookeeper zkServer --config zoo4 stop
ZooKeeper JMX enabled by default
Using config: zoo4/zoo.cfg
Stopping zookeeper ... STOPPED
```

```
WatchedEvent state:Disconnected type:None path:null zxid: -1
create /zk_test
KeeperErrorCode = ConnectionLoss for /zk_test
```

8:

zkCli window:

```
create /zk_test
Created /zk_test
[zk: localhost:2888(CONNECTED) 3] ls /
[zk_test, zookeeper]
[zk: localhost:2888(CONNECTED) 4] get /zk_test
null
[zk: localhost:2888(CONNECTED) 5] set /zk_test data
[zk: localhost:2888(CONNECTED) 6] set /zk_test new_data
[zk: localhost:2888(CONNECTED) 7] create /watch_test1 test_value1
Created /watch_test1
[zk: localhost:2888(CONNECTED) 8] delete /watch_test1
[zk: localhost:2888(CONNECTED) 9]
```

zk\_test window:

```
phucnguyen02@Phucs-MacBook-Air.local ..../Documents/Fall_2023/CS578/PA3 (main)
> cd /Users/phucnguyen02/Documents/Fall_2023/CS578/PA3 ; /usr/bin/env /Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java @var/folders/bh/s6x15bbj267_zw7_g3ywp5mh0000gn/T/cp_c815wbglpwusd44w1c8mogv.argfile Executor localhost:2888 /zk_test myfile cat myfile
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:zookeeper.version=3.4.8--1, built on 02/06/2016 03:18 GMT
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:host.name=localhost
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.version=21.0.1
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.vendor=Oracle Corporation
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.home=/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.class.path=/Users/phucnguyen02/Library/Application Support/Code/User/workspaceStorage/a60d310668eb6444ef1504fecf8099c/redhat.java/jdt_ws/PA3_eb5b634b/bin:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/metrics-jvm-3.1.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/nio-1.2.1.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/guava-18.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/slf4j-api-1.7.7.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/cassandra-driver-core-3.0.1-shaded.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/json-20231013.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/zookeeper-3.4.8.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/gigapaxos-nio-src.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/metrics-logback-3.1.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/netty-all-4.0.44.Final.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/apache-cassandra-3.11.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/grader.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/junit-4.12.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/hamcrest-all-1.3.jar
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.library.path=/Users/phucnguyen02/Library/Java/Extensions:/Library/Java/Extensions:/Network/Library/Java/Extensions:/System/Library/Java/Extensions:/usr/lib/java.
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.io.tmpdir=/var/folders/bh/s6x15bbj267_zw7_g3ywp5mh0000gn/T/
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.compiler=<NA>
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:os.name=Mac OS X
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:os.arch=aarch64
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:os.version=13.4.1
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:user.name=phucnguyen02
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:user.home=/Users/phucnguyen02
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:user.dir=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3
[main] INFO org.apache.zookeeper.ZooKeeper - Initiating client connection, connectString=localhost:2888 sessionTimeout=3000 watcher=Executor@2d98a335
[main-SendThread(localhost:2888)] INFO org.apache.zookeeper.ClientCnxn - Opening socket connection to server localhost/127.0.0.1:2888. Will not attempt to authenticate using SASL (unknown error)
[main-SendThread(localhost:2888)] INFO org.apache.zookeeper.ClientCnxn - Socket connection established to localhost/127.0.0.1:2888, initiating session
[main-SendThread(localhost:2888)] INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server localhost/127.0.0.1:2888, sessionid = 0x10060b4c5aa0003, negotiated timeout = 4000
Starting child
new_data
```

Test value window:

```
> cd /Users/phucnguyen02/Documents/Fall_2023/CS578/PA3 ; ./usr/bin/env /Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home/bin/java @var/folders/bh/s6x15bbj267_zw7_g3ywp5mh0000gn/T/cp_c815wbgp1powusd4
4w1c8mogv.orgfile Executor localhost:2888 /watch_test1 test_file1 cat test_file1
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:zookeeper_version=3.4.8--1, built on 02/06/2016 03:18 GMT
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:host.name=localhost
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.version=21.0.1
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.vendor=Oracle Corporation
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.home=/Library/Java/JavaVirtualMachines/jdk-21.jdk/Contents/Home
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.class.path=/Users/phucnguyen02/Library/Application Support/Code/User/workspaceStorage/e60d310668eb6444ef1504feccf8099c/redhat.jdt_ws/P
A3_e6b5634b/bin:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/metrics-jvm-3.1.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/nio-1.2.1.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/quava-18.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/slf4j-api-1.7.7.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/cassandra-driver-core-3.0.1-shaded.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/metrics-core-3.1.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/netty-all-4.0.44.Final.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/gigaquux-nio-src.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/metri
cs-logback-3.1.0.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/json-20231013.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/apache-cassandra-3.11.0.jar:/Users/phucnguyen02/Docu
ments/Fall_2023/CS578/PA3/lib/grover.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/junit-4.12.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/lib/hmcrest-all-1.3.jar
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.library.path=/Users/phucnguyen02/Library/Java/Extensions:/Library/Java/Extensions:/Network/Library/Java/Extensions:/System/Library/Java/Ext
ensions:/usr/lib/java.
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.io.tmpdir=/var/folders/bh/s6x15bbj267_zw7_g3ywp5mh0000gn/T/
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:java.compiler=<NA>
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:os.name=Mac OS X
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:os.arch=armch64
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:os.version=13.4.1
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:user.name=phucnguyen02
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:user.home=/Users/phucnguyen02
[main] INFO org.apache.zookeeper.ZooKeeper - Client environment:user.dir=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3
[main] INFO org.apache.zookeeper.ZooKeeper - Initiating client connection... connectionString=localhost:2888 sessionTimeout=3000 watcher=Executor@2d98a335
[main-SendThread[localhost:2888]] INFO org.apache.zookeeper.ClientCnxn - Opening socket connection to server localhost/[0:0:0:0:0:0:0:1]:2888. Will not attempt to authenticate using SASL (unknown error)
[main-SendThread[localhost:2888]] INFO org.apache.zookeeper.ClientCnxn - Socket connection established to localhost/[0:0:0:0:0:0:0:1]:2888, initiating session
[main-SendThread[localhost:2888]] INFO org.apache.zookeeper.ClientCnxn - Session establishment complete on server localhost/[0:0:0:0:0:0:0:1]:2888, sessionid = 0x0060b4c5aa0004, negotiated timeout = 4000
Starting child
test_value1Killing process
```

## Activity 2: Gigapaxos

### 1. Modified code:

```
/*
 * @param request
 * @param callback
 * @return Request ID.
 * @throws IOException
 * @throws JSONException
 */
public Long sendRequest(RequestPacket request, RequestCallback callback)
    throws IOException, JSONException {
    return this.sendRequest(request,
        servers[0], callback);
}
```

If 2 out of 5 servers are down:

```
phucnguyen02@Phucs-MacBook-Air.local .../CS578/PA3/gigapaxos/bin (master *)
> ./gpServer.sh stop AR2
killing AR2(66300)
phucnguyen02@Phucs-MacBook-Air.local .../CS578/PA3/gigapaxos/bin (master *)
> ./gpServer.sh stop AR3
killing AR3(66313)
```

```

Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":784075244,"NAME":"some_name1740592504"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1002559283,"NAME":"some_name1049461845"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":11638575,"NAME":"some_name12595676"} [4ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1564677712,"NAME":"some_name142641566"} [5ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":963183093,"NAME":"some_name1723071364"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":2040549179,"NAME":"some_name803884016"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":336619493,"NAME":"some_name1740529504"} [4ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":135192259,"NAME":"some_name1049461845"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1721786319,"NAME":"some_name142641566"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1837402147,"NAME":"some_name12599676"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":7082221402,"NAME":"some_name1489122646"} [5ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":19116300,"NAME":"some_name1928774832"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1299585764,"NAME":"some_name1723071364"} [4ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1037477833,"NAME":"some_name803884016"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":3216907828,"NAME":"some_name1049461845"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":110655933,"NAME":"some_name12599676"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1779413196,"NAME":"some_name142641566"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":2023866776,"NAME":"some_name1928774832"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":862559919,"NAME":"some_name1723071364"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":307446603,"NAME":"some_name803884016"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":135622648,"NAME":"some_name17409239504"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":64067270,"NAME":"some_name1489122646"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":818798168,"NAME":"some_name12599676"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":26513546,"NAME":"some_name142641566"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":744450382,"NAME":"some_name1723071364"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1671614546,"NAME":"some_name17409239504"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1220659630,"NAME":"some_name803884016"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":38210908,"NAME":"some_name1049461845"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1564046924,"NAME":"some_name1928774832"} [4ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":180170538,"NAME":"some_name1489122646"} [4ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":61913195,"NAME":"some_name142641566"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1469861747,"NAME":"some_name1723071364"} [2ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":900532099,"NAME":"some_name1928774832"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":479013023,"NAME":"some_name1489122646"} [4ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":502140603,"NAME":"some_name142641566"} [3ms]
Received response: {"COORD":true,"STOP":false,"QVAL":"ACK 20","EPOCH":0,"type":401,"OID":1483681008,"NAME":"some_name142641566"} [3ms]
2023-11-13 22:28:50 [WARNING] MessageNIOTransport:NoopAppClient58314/0:0:0:0:0:0:0:0:58314 incurred IOException on java.nio.channels.SocketChannel[connected local=/127.0.0.1:58517 remote=/127.0.0.1:3103] likely because remote end closed connection
java.io.IOException: null: Parsed bad preamble 1213486160 before: [/.1] on channel java.nio.channels.SocketChannel[connected local=/127.0.0.1:58517 remote=/127.0.0.1:3103]
at edu.umass.cs.nio.NIOTransport.read(NIOTransport.java:884)
at edu.umass.cs.nio.NIOTransport.processSelectedKeys(NIOTransport.java:672)
at edu.umass.cs.nio.NIOTransport.runNIOTransport.java:549)
at java.base/java.lang.Thread.run(Thread.java:1583)

NoopAppClient58314 successfully created 10 names, sent 200 requests, and received 130 responses.

```

If 3 out of 5 servers are down:

```

phucnguyen02@Phucs-MacBook-Air.local ..../CS578/PA3/gigapaxos/bin (master *)
> ./gpServer.sh stop AR2
killing AR2(66300)
phucnguyen02@Phucs-MacBook-Air.local ..../CS578/PA3/gigapaxos/bin (master *)
> ./gpServer.sh stop AR3
killing AR3(66313)
phucnguyen02@Phucs-MacBook-Air.local ..../CS578/PA3/gigapaxos/bin (master *)
> ./gpServer.sh stop AR4
killing AR4(66326)

```

```

023/CS578/PA3/gigapaxos/build/test/classes:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-android-oid-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-src.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/nio-1.2.1.jar -Djava.util.logging.config.file=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/logging.properties -Dlog4j.configuration=log4j.properties -DgigapaxosConfig=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/gigapaxos.properties edu.umass.cs.reconfiguration.examples.NoopAppClient
2023-11-13 22:30:12 [WARNING] MessageNIOTransport:NoopAppClient58913/0:0:0:0:0:0:0:0:58913 incurred IOException on java.nio.channels.SocketChannel[connected local=/127.0.0.1:58914 remote=/127.0.0.1:3103] likely because remote end closed connection
java.io.IOException: null: Parsed bad preamble 1213486160 before: [/.1] on channel java.nio.channels.SocketChannel[connected local=/127.0.0.1:58914 remote=/127.0.0.1:3103]
at edu.umass.cs.nio.NIOTransport.read(NIOTransport.java:884)
at edu.umass.cs.nio.NIOTransport.processSelectedKeys(NIOTransport.java:672)
at edu.umass.cs.nio.NIOTransport.runNIOTransport.java:549)
at java.base/java.lang.Thread.run(Thread.java:1583)
Retrying connectivity check to /127.0.0.1:58913...1 2023-11-13 22:30:20 [WARNING] MessageNIOTransport:NoopAppClient58913/0:0:0:0:0:0:0:0:58913 incurred IOException on java.nio.channels.SocketChannel[connected local=/127.0.0.1:58913 remote=/127.0.0.1:3103] likely because remote end closed connection
java.io.IOException: null: Parsed bad preamble 1213486160 before: [/.1] on channel java.nio.channels.SocketChannel[connected local=/127.0.0.1:58913 remote=/127.0.0.1:3103]
at edu.umass.cs.nio.NIOTransport.read(NIOTransport.java:884)
at edu.umass.cs.nio.NIOTransport.processSelectedKeys(NIOTransport.java:672)
at edu.umass.cs.nio.NIOTransport.runNIOTransport.java:549)
at java.base/java.lang.Thread.run(Thread.java:1583)
2 2023-11-13 22:30:26 [WARNING] MessageNIOTransport:NoopAppClient58913/0:0:0:0:0:0:0:0:58913 incurred IOException on java.nio.channels.SocketChannel[connected local=/127.0.0.1:58988 remote=/127.0.0.1:3103] likely because remote end closed connection
java.io.IOException: null: Parsed bad preamble 1213486160 before: [/.1] on channel java.nio.channels.SocketChannel[connected local=/127.0.0.1:58988 remote=/127.0.0.1:3103]
at edu.umass.cs.nio.NIOTransport.read(NIOTransport.java:884)
at edu.umass.cs.nio.NIOTransport.processSelectedKeys(NIOTransport.java:672)
at edu.umass.cs.nio.NIOTransport.runNIOTransport.java:549)
at java.base/java.lang.Thread.run(Thread.java:1583)
Creating name some_name111639062
Creating name some_name1516232350
Creating name some_name2094840961
Creating name some_name2092432177
Creating name some_name1352280862
Creating name some_name5646361
Creating name some_name1793358670
Creating name some_name2086552907
Creating name some_name1741381010
Creating name some_name801204399
2023-11-13 22:30:32 [WARNING] MessageNIOTransport:NoopAppClient58913/0:0:0:0:0:0:0:0:58913 incurred IOException on java.nio.channels.SocketChannel[connected local=/127.0.0.1:59034 remote=/127.0.0.1:3103] likely because remote end closed connection
java.io.IOException: null: Parsed bad preamble 1213486160 before: [/.1] on channel java.nio.channels.SocketChannel[connected local=/127.0.0.1:59034 remote=/127.0.0.1:3103]
at edu.umass.cs.nio.NIOTransport.read(NIOTransport.java:884)
at edu.umass.cs.nio.NIOTransport.processSelectedKeys(NIOTransport.java:672)
at edu.umass.cs.nio.NIOTransport.runNIOTransport.java:549)
at java.base/java.lang.Thread.run(Thread.java:1583)
NoopAppClient58913 successfully created 10 names, sent 200 requests, and received 0 responses.

```

## 2. 1 server stopped:

```
total time: 1 second
phucnguyen02@vl965-172-31-190-17.wireless.umass.edu .../Fall_2023/CS578/PA3/gigapaxos (master *)
> ./bin/gpServer.sh -DgigapaxosConfig=conf/examples/adder.properties stop AdderAR1
killing AdderAR1(72993)

phucnguyen02@Phucs-MacBook-Air.local .../Fall_2023/CS578/PA3/gigapaxos (master *)
> ./bin/gpClient.sh -DgigapaxosConfig=conf/examples/adder.properties.edu.umass.cs.gigapaxos.examples.adder.StatefulAdderAppClient

java -Djavax.net.ssl.keyStorePassword=qwerty -Djavax.net.ssl.keyStore=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/trustStore.jks -ea -cp :/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/build/classes:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-src.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-android-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-1.2.1.jar -Djava.util.logging.config.file=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/logging.properties -Dlog4j.configuration=log4j.properties -DgigapaxosConfig=conf/examples/adder.properties -DgigapaxosConfig=conf/examples/adder.properties.edu.umass.cs.gigapaxos.examples.adder.StatefulAdderAppClient
0: Response for request [1800619067] = total=467047682 received in 6ms
1: Response for request [1832233742] = total=-1995685872 received in 4ms
2: Response for request [1622495336] = total=-366190536 received in 5ms
3: Response for request [1391761633] = total=1025571097 received in 9ms
4: Response for request [1351147587] = total=-1918248612 received in 8ms
5: Response for request [933802696] = total=-984445916 received in 6ms
6: Response for request [792172584] = total=192273412 received in 7ms
7: Response for request [1016809022] = total=824535610 received in 6ms
8: Response for request [760971259] = total=1585506869 received in 10ms
9: Response for request [882037633] = total=-1827422794 received in 9ms
10: Response for request [1399234361] = total=-1687499358 received in 8ms
11: Response for request [1798948196] = total=114488838 received in 9ms
12: Response for request [1873750117] = total=1985198955 received in 6ms
13: Response for request [1960897687] = total=-348870654 received in 11ms
14: Response for request [1512103711] = total=-163233857 received in 8ms
15: Response for request [714383491] = total=187761106 received in 9ms
16: Response for request [516806773] = total=-190054417 received in 12ms
17: Response for request [1495594590] = total=-404949827 received in 7ms
18: Response for request [1691073357] = total=-1286123526 received in 8ms
19: Response for request [1580814126] = total=1428029644 received in 4ms
20: Response for request [756937049] = total=-671092604 received in 4ms
21: Response for request [728517989] = total=57455305 received in 8ms
22: Response for request [1614642654] = total=1699098159 received in 6ms
23: Response for request [1634607768] = total=-961861429 received in 6ms
24: Response for request [1082740273] = total=120878844 received in 7ms
25: Response for request [1047945888] = total=116824732 received in 8ms
26: Response for request [1669218607] = total=1456923957 received in 9ms
27: Response for request [1180191064] = total=-27632893 received in 8ms
28: Response for request [1764245594] = total=1487512701 received in 9ms
29: Response for request [1095518091] = total=-1712136504 received in 9ms
30: Response for request [1998706063] = total=-713430441 received in 9ms
31: Response for request [628058765] = total=-85371676 received in 5ms
```

When restarting that server and sending a 0 request value to it:

```
phucnguyen02@Phucs-MacBook-Air.local .../Fall_2023/CS578/PA3/gigapaxos (master *)
> ./bin/gpServer.sh -DgigapaxosConfig=conf/examples/adder.properties start AdderAR1
[edu.umass.cs.gigapaxos.examples.adder.StatefulAdderApp]
java -cp :/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/build/classes:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-src.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-android-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-1.2.1.jar -Djava.util.logging.config.file=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/trustStore.jks -Djava.util.logging.config.file=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/logging.properties -Dlog4j.configuration=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/log4j.properties -DgigapaxosConfig=conf/examples/adder.properties -DgigapaxosConfig=conf/reconfigurableNode AdderAR1&
phucnguyen02@Phucs-MacBook-Air.local .../Fall_2023/CS578/PA3/gigapaxos (master *)
> Initializing gigapaxos server [ AdderAR1:127.0.0.1:6001 ]; server[AdderAR1] ready

99: Response for request [1626633829] = total=-1573827382 received in 6ms
phucnguyen02@Phucs-MacBook-Air.local .../Fall_2023/CS578/PA3/gigapaxos (master *)
> ./bin/gpClient.sh -DgigapaxosConfig=conf/examples/adder.properties.edu.umass.cs.gigapaxos.examples.adder.StatefulAdderAppClient
java -Djavax.net.ssl.keyStorePassword=qwerty -Djavax.net.ssl.keyStore=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/keyStore.jks -Djavax.net.ssl.trustStore=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/trustStore.jks -ea -cp :/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/build/classes:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-src.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-android-1.0.09.jar:/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-1.2.1.jar -Djava.util.logging.config.file=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/logging.properties -Dlog4j.configuration=log4j.properties -DgigapaxosConfig=conf/examples/adder.properties -DgigapaxosConfig=conf/examples/adder.properties.edu.umass.cs.reconfiguration.ReconfigurableNode AdderAR1&
0: Response for request [0] = total=-1573827382 received in 5ms
1: Response for request [0] = total=-1573827382 received in 4ms
2: Response for request [0] = total=-1573827382 received in 6ms
3: Response for request [0] = total=-1573827382 received in 5ms
4: Response for request [0] = total=-1573827382 received in 7ms
5: Response for request [0] = total=-1573827382 received in 7ms
6: Response for request [0] = total=-1573827382 received in 3ms
7: Response for request [0] = total=-1573827382 received in 5ms
8: Response for request [0] = total=-1573827382 received in 3ms
9: Response for request [0] = total=-1573827382 received in 5ms
10: Response for request [0] = total=-1573827382 received in 7ms
11: Response for request [0] = total=-1573827382 received in 6ms
12: Response for request [0] = total=-1573827382 received in 7ms
13: Response for request [0] = total=-1573827382 received in 6ms
14: Response for request [0] = total=-1573827382 received in 2ms
15: Response for request [0] = total=-1573827382 received in 7ms
16: Response for request [0] = total=-1573827382 received in 6ms
17: Response for request [0] = total=-1573827382 received in 7ms
18: Response for request [0] = total=-1573827382 received in 6ms
19: Response for request [0] = total=-1573827382 received in 6ms
20: Response for request [0] = total=-1573827382 received in 3ms
21: Response for request [0] = total=-1573827382 received in 5ms
22: Response for request [0] = total=-1573827382 received in 6ms
23: Response for request [0] = total=-1573827382 received in 7ms
24: Response for request [0] = total=-1573827382 received in 7ms
25: Response for request [0] = total=-1573827382 received in 6ms
26: Response for request [0] = total=-1573827382 received in 6ms
27: Response for request [0] = total=-1573827382 received in 5ms
28: Response for request [0] = total=-1573827382 received in 6ms
```

## 3. Code modification:

```

@Override
public boolean needsCoordination() {
    return true;
    // return this.getRequestType().equals
    // (PacketType.LOCAL_READ) ? true : true;
}

```

```

56: Response for request [LOCAL_READ:LinWritesLocReadsApp0:6896128909506091008] = total=741533198 received in 20ms
57: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:2261031010841067520] = total=1765103578 received in 8ms
58: Response for request [LOCAL_READ:LinWritesLocReadsApp0:1653714938270856192] = total=1765103578 received in 3ms
59: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:7785809602583406592] = total=-1927152356 received in 3ms
60: Response for request [LOCAL_READ:LinWritesLocReadsApp0:4130560599254100992] = total=-1927152356 received in 4ms
61: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:3608582649743245312] = total=-309873288 received in 8ms
62: Response for request [LOCAL_READ:LinWritesLocReadsApp0:1444913756861619200] = total=-309873288 received in 8ms
63: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:3210484042069032960] = total=656560930 received in 9ms
64: Response for request [LOCAL_READ:LinWritesLocReadsApp0:768809146157505536] = total=656560930 received in 10ms
65: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:533409201479788446] = total=1281503328 received in 10ms
66: Response for request [LOCAL_READ:LinWritesLocReadsApp0:2585040937233691648] = total=1281503328 received in 8ms
67: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:3366518502846243840] = total=-2068304521 received in 8ms
68: Response for request [LOCAL_READ:LinWritesLocReadsApp0:8171901004029686784] = total=-2068304521 received in 8ms
69: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:1245927397039900672] = total=-1891005376 received in 10ms
70: Response for request [LOCAL_READ:LinWritesLocReadsApp0:3271654073165786112] = total=-1891005376 received in 8ms
71: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:807518620215049216] = total=-663959334 received in 9ms
72: Response for request [LOCAL_READ:LinWritesLocReadsApp0:7287423001390045184] = total=-663959334 received in 7ms
73: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:2152721608476170240] = total=857124936 received in 8ms
74: Response for request [LOCAL_READ:LinWritesLocReadsApp0:5072372176367400960] = total=857124936 received in 8ms
75: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:7611029750083359744] = total=1738505084 received in 8ms
76: Response for request [LOCAL_READ:LinWritesLocReadsApp0:3996338486891310080] = total=1738505084 received in 9ms
77: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:74619696757524429824] = total=-1819299248 received in 8ms
78: Response for request [LOCAL_READ:LinWritesLocReadsApp0:7812199133476232192] = total=-1819299248 received in 11ms
79: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:2325772821480029184] = total=-1113354417 received in 8ms
80: Response for request [LOCAL_READ:LinWritesLocReadsApp0:15892867349246712] = total=-1113354417 received in 10ms
81: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:4324003383463263232] = total=-429086794 received in 10ms
82: Response for request [LOCAL_READ:LinWritesLocReadsApp0:5365813171529357312] = total=-429086794 received in 8ms
83: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:610480680410112000] = total=426694059 received in 9ms
84: Response for request [LOCAL_READ:LinWritesLocReadsApp0:6735737320475116544] = total=426694059 received in 11ms
85: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:837209596643525632] = total=1807544205 received in 9ms
86: Response for request [LOCAL_READ:LinWritesLocReadsApp0:6601463926262219776] = total=1807544205 received in 6ms
87: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:2390732937993928704] = total=1936549985 received in 4ms
88: Response for request [LOCAL_READ:LinWritesLocReadsApp0:6296610033465412608] = total=1936549985 received in 22ms
89: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:1116979213393425408] = total=-1045120087 received in 7ms
90: Response for request [LOCAL_READ:LinWritesLocReadsApp0:8571927527492835328] = total=-1045120087 received in 8ms
91: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:546972689833867264] = total=53592134 received in 10ms
92: Response for request [LOCAL_READ:LinWritesLocReadsApp0:4420363444589548544] = total=53592134 received in 6ms
93: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:6546539144448219136] = total=2039608035 received in 8ms
94: Response for request [LOCAL_READ:LinWritesLocReadsApp0:4887049665868631040] = total=2039608035 received in 19ms
95: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:4711188518957989888] = total=-1027523166 received in 3ms
96: Response for request [LOCAL_READ:LinWritesLocReadsApp0:7298515597916097536] = total=-1027523166 received in 9ms
97: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:6892045453521572864] = total=-281601437 received in 8ms
98: Response for request [LOCAL_READ:LinWritesLocReadsApp0:6153221593944881152] = total=-281601437 received in 8ms
99: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:9177098450745724928] = total=813724198 received in 12ms

```

After stopping LWAR0, running the client, restarting LWAR0, and running the client again sending only 1 request to LWAR0, we get this result:

```

97: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:98105251251212] = total=320327601 received in 7ms
98: Response for request [LOCAL_READ:LinWritesLocReadsApp0:8084282761572346880] = total=-320327601 received in 6ms
99: Response for request [COORDINATED_WRITE:LinWritesLocReadsApp0:569070585262671736832] = total=427689264 received in 5ms
phucnguyen02:Phuc-MacBook-Pro:~/local ..$ Fall_2023/CS578/PA3/gigapaxos (host)
> bin/gpClient.sh -dgigapaxosConfig=conf/examples/linwrites.properties.edu.umass.cs.reconfiguration.examples.linwrites.LinWritesLocReadsAppClient
java -Djavac.net.ssl.KeyStorePassword=qwerty -Djavac.net.ssl.KeyStore=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/keystore.jks -Djavac.net.ssl.trustStore=/Users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/truststore.jks -ed -cp ./users/phucnguyen02/documents/Fall_2023/CS578/PA3/gigapaxos/build/classes:/users/phucnguyen02/documents/Fall_2023/CS578/PA3/gigapaxos/build/test/classes:/users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-1.0.09.jar:/users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/gigapaxos-nio-src.jar:/users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/jars/no-1.2.1.jar -Djava.util.logging.config.file=/users/phucnguyen02/Documents/Fall_2023/CS578/PA3/gigapaxos/conf/logging.properties -Dlog4j.configuration=log4j.properties -DgigapaxosConfig=conf/examples/linwrites.properties -DgigapaxosConfig=conf/examples/linwrites.properties.edu.umass.cs.reconfiguration.examples.linwrites.LinWritesLocReadsAppClient
0: Response for request [LOCAL_READ:LinWritesLocReadsApp0:774270839867474176] = total=427689264 received in 34ms

```

The total is 427689264, which is the same as a coordinated write from when LWAR0 was still down. The reason is that we made the local reads coordinated reads, so the

replica is still able to read an updated value despite that value existing while it was down.

The latency is 7.6ms