

## **1 Cluster Node:**



A screenshot of a macOS Terminal window titled "Terminal". The window shows three separate ssh sessions running simultaneously. The sessions are labeled "roup-01-project-2", "roup-01-project-5", and "cc@group-01-project-9-1". Each session is executing a command related to "risk-admin" and "ring\_members". The status bar at the top right indicates the battery level is 94% and the time is Sun 4:58 PM.

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~ — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...roup-01-project-2: ~ — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...roup-01-project-5: ~ — ssh -i .ssh/group-01-project.pem cc@129.114.25.54 ...
... — cc@group-01-project-9-1: ~ — ssh -i .ssh/key1.pem cc@129.114.25.45 ...
[cc@group-01-project-2:~$ sudo risk-admin status | grep ring_members
ring_members : ['risk@192.168.6.30']
cc@group-01-project-2:~$ ]
```

---

### **Throughput:**

#### **1000(1K):**

Insert Operation Throughput 315.56243481663455 OPs/s

Lookup Operation Throughput 1163.0692933423588 OPs/s

Delete Operation Throughput 396.56778513322894 OPs/s

Overall Throughput: 625.0665044307408 OPs/s

```
Terminal Shell Edit View Window Help
...@...:~/riak-experiment$ python3 risk-throughput.py riak.conf
cc@group-01-project-2:~/riak-experiment$ ssh -i .ssh/group-01-project.pem cc@129.114.24.240 ...@group-01-project-5:~ ssh -i .ssh/group-01-project.pem cc@129.114.25.54 ...@cc@group-01-project-9-1:~ ssh -i .ssh/key1.pem cc@129.114.25.45 ...
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 315.56243481663455 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 1163.0492933423588 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 425.0665944387408 OPs/s
Overall Throughput: 425.0665944387408 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 10000(10K):

Insert Operation Throughput 601.3946944358662 OPs/s

Lookup Operation Throughput 1245.7474852406951 OPs/s

Delete Operation Throughput 442.14505435112295 OPs/s

Overall Throughput: 763.0957446758947 OPs/s

```
Terminal Shell Edit View Window Help
...:~/riak-experiment$ ssh -i .ssh/group-01-project.pem cc@129.114.24.240 ...:~/riak-experiment$ python3 risk-throughput.py riak.conf
cc@group-01-project-2:~/riak-experiment$ python3 risk-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 601.3946944358662 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 1245.7474852406951 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 461.42043870877103 OPs/s
Overall Throughput: 763.0957446758947 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Operation Throughput 603.2987591863924 OPs/s

Lookup Operation Throughput 1248.9279514696573 OPs/s

Delete Operation Throughput 461.42043870877103 OPs/s

Overall Throughput: 771.2157164549403 OPs/s

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2:~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
cc@group-01-project-2:~/riak-experiment$ python3 riak-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100%.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100%.
Insert Operation Throughput: 604.87591863924 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100%.
Lookup Operation Throughput 1248.9279514696573 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100%.
Delete operations >> 100% completed
Delete Operation Throughput 441.42043878877103 OPs/s
Overall Throughput: 773.2157164549403 OPs/s
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## Latency:

### **1000(1K):**

Insert Latency 0.0016943789999999998 secs

Lookup Latency 0.0008499370000000008 secs

Delete Latency 0.002559590000000002 secs

Overall Latency: 0.0017013020000000009 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — group-01-project-5: ~ — ssh -i .ssh/group-01-project.pem cc@129.114.25.54 — cc@group-01-project-9-1: ~ — ssh -i .ssh/key1.pem cc@129.114.25.45 ...
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 396.56778513322894 OPs/s
Overall Throughput 625.0665944387488 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$ python3 riak-latency.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.001694378999999998 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.000041207000000000008 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.002559590000000002 secs
Overall Latency: 0.0017013020000000009 secs
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 10000(10K):

Insert Latency 0.001669820700000014 secs

Lookup Latency 0.0008858752999999963 secs

Delete Latency 0.00227096129999994 secs

Overall Latency: 0.001608885766666664 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...-2:~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 ...-5: ~— ssh -i .ssh/group-01-project.pem cc@129.114.25.54 ...-9: ~— ssh -i .ssh/key1.pem cc@129.114.25.45 ...
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.001645604259999985 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.0008605804199999911 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.002178827110000004 secs
Overall Latency: 0.001645604259999985 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Latency 0.001645604259999985 secs  
Lookup Latency 0.0008605804199999911 secs  
Delete Latency 0.002178827110000004 secs  
Overall Latency: 0.0015616705966666588 secs

```
Terminal Shell Edit View Window Help
cc@group-01-project-2:~/riak-experiment$ python3 riak-latency.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100%.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Latency 0.0000000000000005 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Latency 0.0000000000000001 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Latency 0.0021788271100000004 secs
Overall Latency: 0.0015616705966666588 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 2 Cluster Node:

```
Terminal Shell Edit View Window Help
...Ssh -i .ssh/group-01-project.pem cc@129.114.24.240 ... ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...Ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ~ cc@group-01-project-4:/var/lib/riak/ring -- bash — /AOS550/project -- bash
cc@group-01-project-2:~/riak-experiment$ sudo riak ping
pong
cc@group-01-project-2:~/riak-experiment$ sudo riak-admin cluster plan
There are no staged changes
cc@group-01-project-2:~/riak-experiment$ sudo riak-admin status | grep ring_members
ring_members : ['riak@192.168.6.26','riak@192.168.6.30']
cc@group-01-project-2:~/riak-experiment$
```

## **Throughput:**

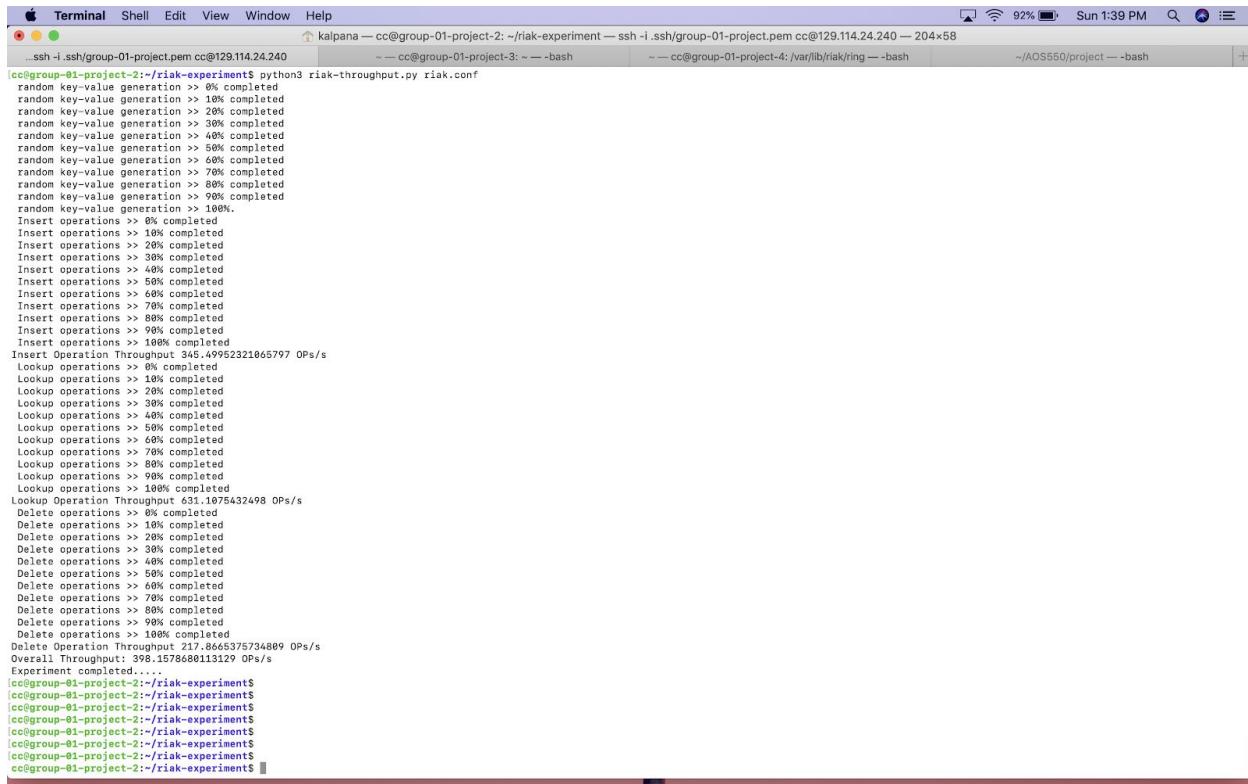
### **1000(1K):**

Insert Operation Throughput 345.49952321065797 OPs/s

Lookup Operation Throughput 631.1075432498 OPs/s

Delete Operation Throughput 217.8665375734809 OPs/s

Overall Throughput: 398.1578680113129 OPs/s



A screenshot of a macOS Terminal window titled "Terminal". The window has three tabs: "kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58", "— cc@group-01-project-3: ~ — bash", and "— cc@group-01-project-4: /var/lib/riak/ring — bash". The main pane displays the output of a command that runs a throughput test. The output shows progress percentages for random key-value generation, insert operations, and lookup operations, all reaching 100% completion. It also lists delete operations at various completion levels. The final output shows the overall throughput as 398.1578680113129 OPs/s.

```
...ssh -i .ssh/group-01-project.pem cc@129.114.24.240      ~— cc@group-01-project-3: ~ — bash      ~— cc@group-01-project-4: /var/lib/riak/ring — bash      ~/AOSS50/project — bash
cc@group-01-project-2:~/riak-experiment$ riax-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 345.49952321065797 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 631.1075432498 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 217.8665375734809 OPs/s
Overall Throughput: 398.1578680113129 OPs/s
Experiment finished
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
cc@group-01-project-2:~/riak-experiment$ 
```

### **10000(10K):**

Insert Operation Throughput 426.178854394588 OPs/s

Lookup Operation Throughput 611.5346566168693 OPs/s

Delete Operation Throughput 234.5141291714142 OPs/s

Overall Throughput: 424.07588006095716 OPs/s

```
Terminal Shell Edit View Window Help
SSH -i .ssh/group-01-project.pem cc@129.114.24.240 91% Sun 1:42 PM
... ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ~ cc@group-01-project-4:~/var/lib/riak/ring -- bash ~/AOS550/project -- bash
cc@group-01-project-2:~/riak-experiment$ vim riak-throughput.py
cc@group-01-project-2:~/riak-experiment$ python3 riak-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 426.178854394588 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 611.5346566168693 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 234.5141291714142 OPs/s
Overall Throughput: 424.07588066095716 OPs/s
Experiment completed...~/riak-experiment$
```

## 100000(100K):

Insert Operation Throughput 380.30753439464263 OPs/s

Lookup Operation Throughput 552.1181660083283 OPs/s

Delete Operation Throughput 214.84994569334606 OPs/s

Overall Throughput: 382.425215365439 OPs/s

```

Terminal Shell Edit View Window Help
SSH -i .ssh/group-01-project.pem cc@129.114.24.240 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ... cc@group-01-project-4:~/var/lib/riak/ring -- bash ~/AOSS550/project -- bash
cc@group-01-project-2:~/riak-experiment$ vim riak-latency.py
cc@group-01-project-2:~/riak-experiment$ clear

[cc@group-01-project-2:~/riak-experiment$ python3 riak-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100%.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 380.30753439464263 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 591.118166083283 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 214.84994569334606 OPs/s
Overall Throughput: 382.425215365439 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf

```

## Latency:

**1000(1K):**

Insert Latency 0.0023266720000000027 secs

Lookup Latency 0.0016811980000000016 secs

Delete Latency 0.004155553 secs

Overall Latency: 0.0027211410000000016 secs

```
Terminal Shell Edit View Window Help
SSH -i .ssh/group-01-project.pem cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100%.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.002326720000000027 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.0016811780000000016 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.00415553 secs
Overall Latency: 0.002721141000000016 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 10000(10K):

Insert Latency 0.002878200300000045 secs  
Lookup Latency 0.002136315900000005 secs  
Delete Latency 0.00478672179999994 secs  
Overall Latency: 0.003267079333333344 secs

```
Terminal Shell Edit View Window Help
SSH -i .ssh/group-01-project.pem cc@129.114.24.240 91% Sun 1:44 PM
SSH -i .ssh/group-01-project.pem cc@129.114.25.67 ~ cc@group-01-project-4:~/var/lib/riak/ring -- bash + /AOSS550/project -- bash

cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Latency 0.0028752803000000045 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Latency 0.0021363150000000005 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Latency 0.00478672179999994 secs
Overall Latency: 0.003267079333333344 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Latency 0.002309117720000037 secs  
Lookup Latency 0.0015859772699999936 secs  
Delete Latency 0.004266641939999949 secs  
Overall Latency: 0.00272057897666666 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.61 ...~/AOSS550/project — bash
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.002309117720000037 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.00158597723499999936 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.00426644193999949 secs
Overall Latency: 0.002728579766666666 secs
Experiment
cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$ cc@group-01-project-2:~/riak-experiment$
```

## 4 Cluster Node:

```

Terminal Shell Edit View Window Help
SSH -i .ssh/group-01-project.pem cc@129.114.24.240 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.61 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.54
cc@group-01-project-2:~/riak-experiment$ sudo riak-admin cluster plan
=====
Action      Details(s)
join       'riak@192.168.6.14'
join       'riak@192.168.6.33'

NOTE: Applying these changes will result in 1 cluster transition
#####
After cluster transition 1/1
#####
=====
Status   Ring   Pending   Node
valid    0.0%   25.0%   'riak@192.168.6.14'
valid    50.0%   25.0%   'riak@192.168.6.26'
valid    50.0%   25.0%   'riak@192.168.6.30'
valid    0.0%   25.0%   'riak@192.168.6.33'

Valid:4 / Leaving:0 / Exiting:0 / Joining:0 / Down:0
Transfers resulting from cluster changes: 32
  16 transfers from 'riak@192.168.6.30' to 'riak@192.168.6.33'
  16 transfers from 'riak@192.168.6.26' to 'riak@192.168.6.14'

cc@group-01-project-2:~/riak-experiment$ sudo riak-admin cluster commit
Cluster changes committed
[cc@group-01-project-2:~/riak-experiment$ sudo riak-admin status | grep ring_members
ring_members : ['riak@192.168.6.14', 'riak@192.168.6.26', 'riak@192.168.6.30',
cc@group-01-project-2:~/riak-experiment$ ]

```

## Throughput:

### **1000(1K):**

Insert Operation Throughput 259.03413940440277 OPs/s

Lookup Operation Throughput 508.1827587819063 OPs/s

Delete Operation Throughput 237.10206271681503 OPs/s

Overall Throughput: 334.772986967708 OPs/s

```
Terminal Shell Edit View Window Help
... ssh -i .ssh/group-01-project.pem cc@129.114.24.240 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.61 ... ssh -i .ssh/group-01-project.pem cc@129.114.25.54
cc@group-01-project-2:~/riak-experiment$ python3 risk-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 259.03413940440277 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 508.1827587819063 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 237.10206271681503 OPs/s
Overall Throughput: 334.7729806967708 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 10000(10K):

Insert Operation Throughput 316.2188822832521 OPs/s  
Lookup Operation Throughput 536.1840020495097 OPs/s  
Delete Operation Throughput 211.53775125978134 OPs/s  
Overall Throughput: 354.64687853084774 OPs/s

```
Terminal Shell Edit View Window Help
SSH — cc@group-01-project-2:~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.61 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.54
cc@group-01-project-2:~/riak-experiment$ python3 risk-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 316.2188822832521 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 536.1848028495097 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 211.53775125978134 OPs/s
Overall Throughput: 354.64687853084774 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Operation Throughput 328.51034807924964 OPs/s

Lookup Operation Throughput 537.7586106029726 OPs/s

Delete Operation Throughput 199.78293863413515 OPs/s

Overall Throughput: 355.3506324387858 OPs/s

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2:~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@cc@129.114.24.240 ...-project-3:~---bash ...-project-4:~---bash .../lib/riak/ring ---bash ...-project-6:~---bash ...-project-7:~---bash ...-project-9-1:~---bash ...---bash +]
cc@group-01-project-2:~/riak-experiment$ python3 risk-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 328.51034867924964 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 537.7586106029726 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 199.78293863413515 OPs/s
Overall Throughput: 355.3506324387858 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## Latency:

**1000(1K):**

Insert Latency 0.002900334000000001 secs

Lookup Latency 0.0017330680000000004 secs

Delete Latency 0.004243551000000004 secs

Overall Latency: 0.002958984333333358 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2:~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.61 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.54
[cc@group-01-project-2:~/riak-experiment$ clear & python3 risk-latency.py risk.conf
[1] 4909

random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100%.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.00290334000000001 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.0017330000000000004 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.004243551000000004 secs
Overall Latency: 0.002958984333333358 secs
Experiment completed.....
[1]+ Done clear
```

## 10000(10K):

Insert Latency 0.0027258516999999855 secs  
Lookup Latency 0.0015519668000000039 secs  
Delete Latency 0.004331723200000003 secs  
Overall Latency: 0.0028698472333333305 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...ssh -i .ssh/group-01-project.pem cc@129.114.25.67 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.61 ...ssh -i .ssh/group-01-project.pem cc@129.114.25.54
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.0027258516999999865 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.0015519468000000039 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.0043317232000000003 secs
Overall Latency: 0.0028698472333333395 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Latency 0.0030310010000000097 secs  
Lookup Latency 0.001690837769999996 secs  
Delete Latency 0.004577896789999989 secs  
Overall Latency: 0.003099911853333314 secs

```

Terminal Shell Edit View Window Help
...@...@129.114.24.240 ...-project-3:~---bash ...-project-4:~---bash .../lib/riak/ring---bash ...-project-6:~---bash ...-project-7:~---bash ...-project-9-1:~---bash ...em cc@129.114.25.68 +[kalpana --- cc@group-01-project-2:~/riak-experiment --- ssh -i .ssh/group-01-project.pem cc@129.114.24.240 --- 204x58]
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Latency 0.0030318010000000097 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Latency 0.001490277459999996 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Latency 0.004577897899999898 secs
Overall Latency: 0.003999118533333314 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$ 

```

## 8 Cluster Node:

```

cc@group-01-project-2:~$ sudo risk-admin cluster plan
=====
Action      Details(s)
join        'risk0192.168.6.13'
join        'risk0192.168.6.17'
join        'risk0192.168.6.18'
join        'risk0192.168.6.38'

NOTE: Applying these changes will result in 1 cluster transition
=====
# After cluster transition 1/1
=====
Status      Ring      Pending      Node
-----
valid      0.0%      12.5%      'risk0192.168.6.13'
valid      25.0%      12.5%      'risk0192.168.6.14'
valid      0.0%      12.5%      'risk0192.168.6.17'
valid      0.0%      12.5%      'risk0192.168.6.18'
valid      25.0%      12.5%      'risk0192.168.6.26'
valid      25.0%      12.5%      'risk0192.168.6.30'
valid      25.0%      12.5%      'risk0192.168.6.33'
valid      0.0%      12.5%      'risk0192.168.6.38'

Valid:8 / Leaving:0 / Exiting:0 / Joining:0 / Down:0

Transfers resulting from cluster changes: 32
8 transfers from 'risk0192.168.6.26' to 'risk0192.168.6.17'
8 transfers from 'risk0192.168.6.14' to 'risk0192.168.6.13'
8 transfers from 'risk0192.168.6.30' to 'risk0192.168.6.18'
8 transfers from 'risk0192.168.6.33' to 'risk0192.168.6.38'

cc@group-01-project-2:~$ sudo risk-admin cluster commit
Cluster changes committed

```

```

Terminal Shell Edit View Window Help
kalpana -- cc@group-01-project-2: ~ ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...m@c@129.114.24.240 ...-project-3: ~ -- bash ...-project-4: ~ -- bash ...rlib/riak/ring -- bash ...em cc@129.114.25.51 ...em cc@129.114.25.57 ...em cc@129.114.25.45 ...em cc@129.114.25.68 + 
object_set_merge_time_95 : 0
object_set_merge_time_99 : 0
object_set_merge_time_mean : 0
object_set_merge_time_median : 0
object_set_merge_total : 0
pbc_liveliness : 0
pbc_connects : 0
pbc_connects_total : 5
pipeline_active : 0
pipeline_create_count : 0
pipeline_create_error_count : 0
pipeline_create_error_one : 0
pipeline_create_time_mean : 0
postcommit_fail : 0
precommit_fail : 0
read_repairs : 0
read_repairs_counter : 0
read_repairs_counter_total : 0
read_repair_fallback_notfound_count : undefined
read_repair_fallback_notfound_one : undefined
read_repair_fallback_outofdate_count : undefined
read_repair_fallback_outofdate_one : undefined
read_repairs_hll : 0
read_repairs_hll_total : 0
read_repairs_map : 0
read_repairs_map_total : 0
read_repairs_primary_notfound_count : undefined
read_repairs_primary_notfound_one : undefined
read_repairs_primary_outofdate_count : undefined
read_repairs_primary_outofdate_one : undefined
read_repairs_set : 0
read_repairs_set_total : 0
read_repair_total : 0
rebalance_delay_last : 0
rebalance_delay_mean : 0
rebalance_delay_min : 0
rejected_handoffs : 0
riak_kv_vnode_max : 0
riak_kv_vnode_mean : 0.0
riak_kv_vnode_median : 0
riak_kv_vnode_min : 0
riak_kv_vnode_total : 0
riak_kv_vnodes_running : 16
riak_pipe_vnode_max : 0
riak_pipe_vnode_mean : 0.0
riak_pipe_vnode_median : 0
riak_pipe_vnode_min : 0
riak_pipe_vnode_total : 0
riak_pipe_vnodes_running : 16
ring_creation_size : 64
ring_members : ['riak@192.168.6.13','riak@192.168.6.14','riak@192.168.6.17',
               'riak@192.168.6.18','riak@192.168.6.26','riak@192.168.6.30',
               'riak@192.168.6.33','riak@192.168.6.38']
ring_num_partitions : <<('riak@192.168.6.30',16),\n ('riak@192.168.6.33',13),\n ('riak@192.168.6.13',5),\n ('riak@192.168.6.14',11),\n ('riak@192.168.6.26',11),\n ('riak@192.168.6.17',5),\n ('riak@192.168.6.38',3)>>
rings_reconciled : 99

```

## Throughput:

### **1000(1K):**

Insert Operation Throughput 227.75842210787232 OPs/s

Lookup Operation Throughput 470.584249168713 OPs/s

Delete Operation Throughput 177.55539950408777 OPs/s

Overall Throughput: 291.9660235935577 OPs/s

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@project.pem cc@129.114.24.240 ...@group-01-project-3: ~ -- bash ...@group-01-project-4: ~ -- bash ...@group-01-project-5: /var/lib/riak/ring -- bash ...@group-01-project-6: ~ -- bash ...@group-01-project-7: ~ -- bash + 
cc@group-01-project-2:~/riak-experiment$ python3 riak-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100%.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 227.75842218787232 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 476.584249168713 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 178.91815918405877 OPs/s
Overall Throughput: 291.9666235935677 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 10000(10K):

Insert Operation Throughput 254.30420677902285 OPs/s

Lookup Operation Throughput 496.61013918988976 OPs/s

Delete Operation Throughput 178.91815918405877 OPs/s

Overall Throughput: 309.9441683843238 OPs/s

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@group-01-project-3: ~ -- bash ...@group-01-project-4: ~ -- bash ...@group-01-project-5: /var/lib/riak/ring -- bash ...@group-01-project-6: ~ -- bash ...@group-01-project-7: ~ -- bash + 
cc@group-01-project-2:~/riak-experiment$ python3 riak-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 254.3042677902285 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 494.61913918988976 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 178.91815918485877 OPs/s
Overall Throughput: 309.9441683843238 OPs/s
Experiment completed...
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Operation Throughput 247.19613641733355 OPs/s

Lookup Operation Throughput 494.22622437393164 OPs/s

Delete Operation Throughput 170.96663189877845 OPs/s

Overall Throughput: 304.12966423001455 OPs/s

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@group-01-project-3: ~ -- bash ...@group-01-project-4: ~ -- bash ...@group-01-project-5: /var/lib/riak/ring -- bash ...@group-01-project-6: ~ -- bash ...@group-01-project-7: ~ -- bash + ...
cc@group-01-project-2:~/riak-experiment$ python3 riak-throughput.py riak.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed.
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert Operation Throughput 247.19613641733355 OPs/s
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup Operation Throughput 494.22622437393164 OPs/s
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete Operation Throughput 170.96663189877845 OPs/s
Overall Throughput...384.12966423801455 OPs/s
Experiment completed...~/riak-experiment$
```

## Latency:

**1000(1K):**

Insert Latency 0.004099263 secs

Lookup Latency 0.0016404609999999987 secs

Delete Latency 0.0055715579999999956 secs

Overall Latency: 0.003770427333333312 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@group-01-project-3: ~ -- bash ...@group-01-project-4: ~ -- bash ...@group-01-project-5: /var/lib/riak/ring -- bash ...@group-01-project-6: ~ -- bash ...@group-01-project-7: ~ -- bash + 
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.004099263 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.0016404409999999987 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.005571557999999996 secs
Overall Latency: 0.003770427333333312 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 10000(10K):

Insert Latency 0.00404143170000006 secs  
Lookup Latency 0.0019920333999999896 secs  
Delete Latency 0.00596052230000008 secs  
Overall Latency: 0.00399799580000001 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@project.pem cc@129.114.24.240 ...@group-01-project-3: ~ -- bash ...@group-01-project-4: ~ -- bash ...@group-01-project-5: /var/lib/riak/ring -- bash ...@group-01-project-6: ~ -- bash ...@group-01-project-7: ~ -- bash + 
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.004041431700000006 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.001920333999999896 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.005741418439999986 secs
Overall Latency: 0.003979958000000001 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```

## 100000(100K):

Insert Latency 0.004101224419999964 secs  
Lookup Latency 0.00198668018000002 secs  
Delete Latency 0.005741418439999986 secs  
Overall Latency: 0.00394310767999999 secs

```
Terminal Shell Edit View Window Help
kalpana — cc@group-01-project-2: ~/riak-experiment — ssh -i .ssh/group-01-project.pem cc@129.114.24.240 — 204x58
...@group-01-project-3: ~ -- bash ...@group-01-project-4: ~ -- bash ...@group-01-project-5: /var/lib/riak/ring -- bash ...@group-01-project-6: ~ -- bash ...@group-01-project-7: ~ -- bash + 
cc@group-01-project-2:~/riak-experiment$ python3 risk-latency.py risk.conf
random key-value generation >> 0% completed
random key-value generation >> 10% completed
random key-value generation >> 20% completed
random key-value generation >> 30% completed
random key-value generation >> 40% completed
random key-value generation >> 50% completed
random key-value generation >> 60% completed
random key-value generation >> 70% completed
random key-value generation >> 80% completed
random key-value generation >> 90% completed
random key-value generation >> 100% completed
Insert operations >> 0% completed
Insert operations >> 10% completed
Insert operations >> 20% completed
Insert operations >> 30% completed
Insert operations >> 40% completed
Insert operations >> 50% completed
Insert operations >> 60% completed
Insert operations >> 70% completed
Insert operations >> 80% completed
Insert operations >> 90% completed
Insert operations >> 100% completed
Insert latency 0.00418122441999964 secs
Lookup operations >> 0% completed
Lookup operations >> 10% completed
Lookup operations >> 20% completed
Lookup operations >> 30% completed
Lookup operations >> 40% completed
Lookup operations >> 50% completed
Lookup operations >> 60% completed
Lookup operations >> 70% completed
Lookup operations >> 80% completed
Lookup operations >> 90% completed
Lookup operations >> 100% completed
Lookup latency 0.001080480180000092 secs
Delete operations >> 0% completed
Delete operations >> 10% completed
Delete operations >> 20% completed
Delete operations >> 30% completed
Delete operations >> 40% completed
Delete operations >> 50% completed
Delete operations >> 60% completed
Delete operations >> 70% completed
Delete operations >> 80% completed
Delete operations >> 90% completed
Delete operations >> 100% completed
Delete latency 0.00574141843999986 secs
Overall Latency: 0.00394310767999999 secs
Experiment completed.....
cc@group-01-project-2:~/riak-experiment$
```