

# Flat Hierarchies Testing

Tests to determine whether Fedora 4 ingest performance is impacted when there is a lack of hierarchy in the repository structure. There are two sets of tests here.

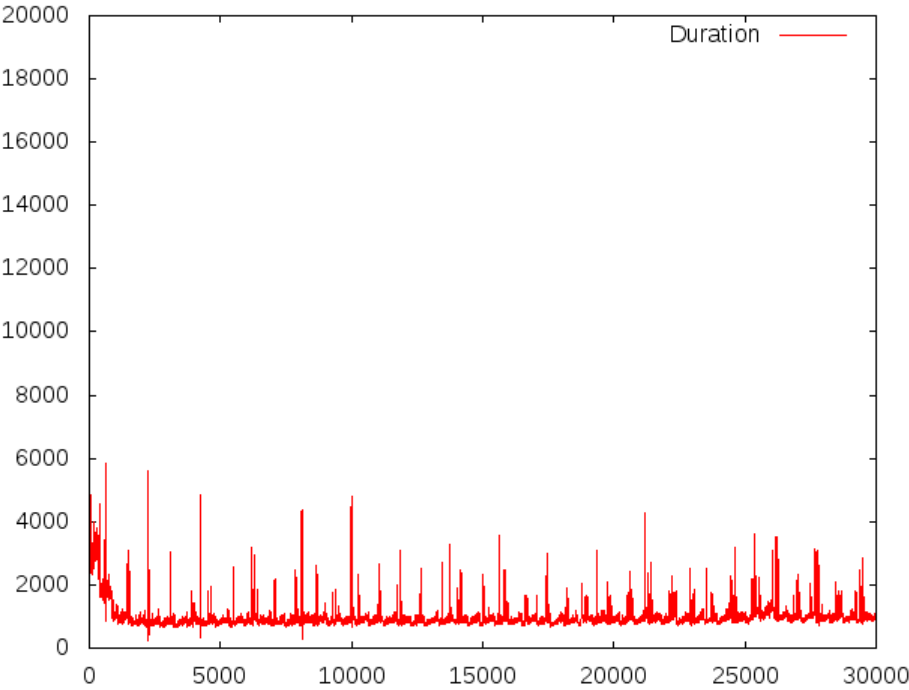
The first hypothesis was that we'd see a slow down in ingest time at the ten thousand [Glossary](#) mark. To test this, we ran tests of 30k records using [benchtool](#) and a [Bash script](#) written to alternate between the Inifinispans configurations available in the [fcrepo4/fcrepo-configs](#) repository (e.g., [file](#), [leveldb-default](#), [leveldb](#), and [ram](#)). The tests were run on an [EC2 m3.medium instance](#). The initial tests, documented below, did not reveal a problem with a lack of hierarchy. However, there was an uptick at the end of the 30k 2 MB container tests that indicated more testing was warranted. When 60k container tests were run with benchtool, there were exceptions thrown and the tests ended prematurely.

The second round of tests were designed to load a larger number of containers. The initial Bash script [was modified](#) to use curl, instead of benchtool, to submit containers to Fedora 4. These tests were single threaded and attempted to load 100k, and then 500k, containers with 1 MB [Glossary](#) into a flat fcrepo4 structure. These tests ran without exception, but showed a definite slow down in the containers' ingest times as the number of containers ingested continued to grow. The second test (of 500k containers) was discontinued at 175k containers when the increase in ingest times was determined to be growing to the point of being prohibitively slow. The graphs for these tests are near the bottom of the page (the last two red graphs).

At the very bottom of this page are graphs from a test run by Ben Pennell, which shows a similar pattern in the timing of ingests of over 100k containers. He experienced the repository becoming non-responsive near the 200k container mark.

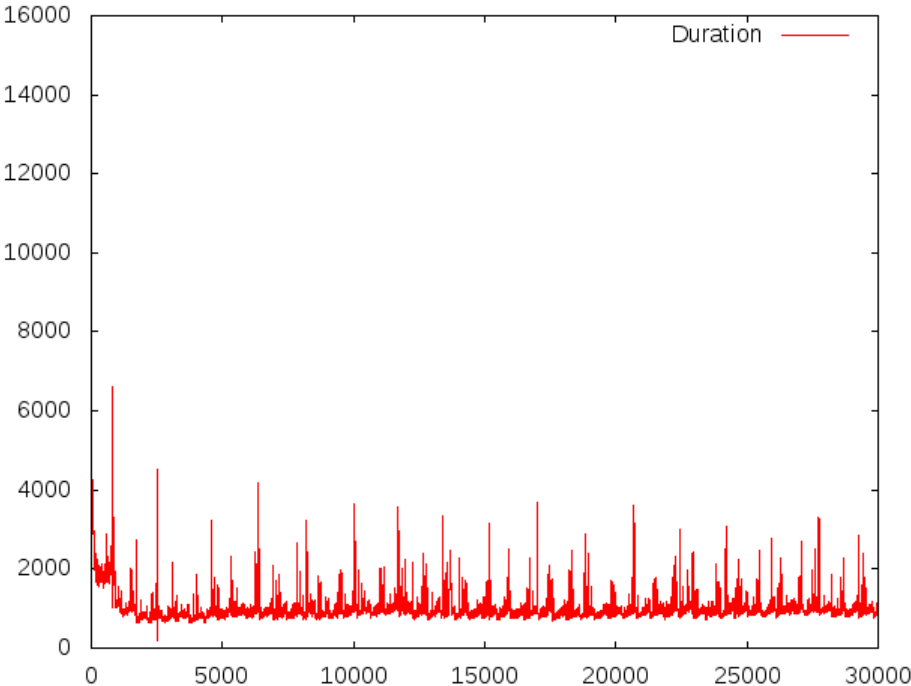
*Updated (at the bottom of the page) with results from a hierarchical test (same architecture, but using a 64/64/64 structure).*

## Results from the First Round of Testing

Configuration	Results Graph	Logging Output
leveldb-default (30k 1 KB containers / 15 threads) - tested using benchtool		Running new test [config: config /inifinispans /leveldb-default /inifinispans.xml] [Jetty pid: 30298] 18:30:11 INFO Found Fedora 4 at http://localhost:8080 18:30:11 INFO Running 30000 INGEST action(s) against FCREPO4 with a binary size of 1.0 KB using 15 thread(s) 18:30:15 INFO The Fedora cluster has 0 node(s) before the benchmark 18:30:15 INFO preparing 30000 objects 18:32:30 INFO creating 30000 objects took 125639 ms 18:33:27 INFO scheduling 30000

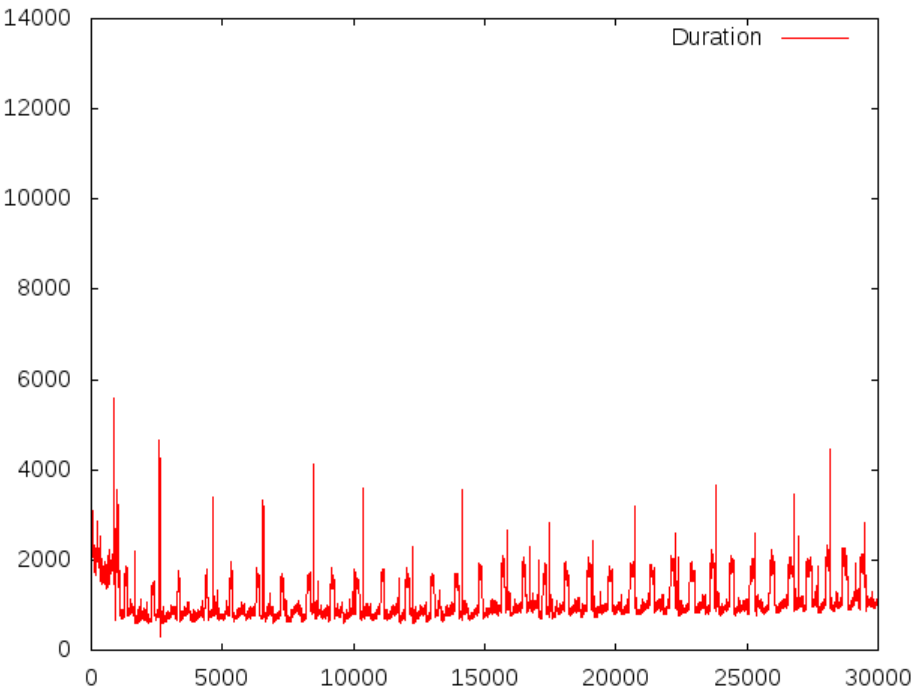
actions  
19:08:14  
INFO  
purging  
30000  
objects and  
datastreams  
19:10:38  
INFO  
Completed  
30000  
INGEST  
action(s)  
executed in  
31292451  
ms  
19:10:38  
INFO The  
Fedora  
cluster has  
0 node(s)  
after the  
benchmark  
19:10:38  
INFO  
Throughput  
was 0.01  
MB/sec  
19:10:38  
INFO  
Throughput  
per thread  
was 0 MB  
/sec  
19:10:38  
INFO  
Condensed  
results:  
19:10:38  
INFO  
30000  
1024 15  
INGEST  
31292451  
9.3622814  
E-4 no-tx  
19:10:38  
INFO All  
operations  
completed  
in 2426697  
ms

leveldb (30k 1 KB containers /  
15 threads) - tested using  
benchtool



Running  
new test  
[config:  
config  
/infinispan  
/leveldb  
/infinispan.  
xml] [Jetty  
pid: 3870]  
19:12:40  
INFO  
Found  
Fedora 4 at  
<http://localhost:8080>  
19:12:40  
INFO  
Running  
30000  
INGEST  
action(s)  
against  
FCREPO4  
with a  
binary size  
of 1.0 KB  
using 15  
thread(s)  
19:12:44  
INFO The  
Fedora  
cluster has  
0 node(s)  
before the  
benchmark

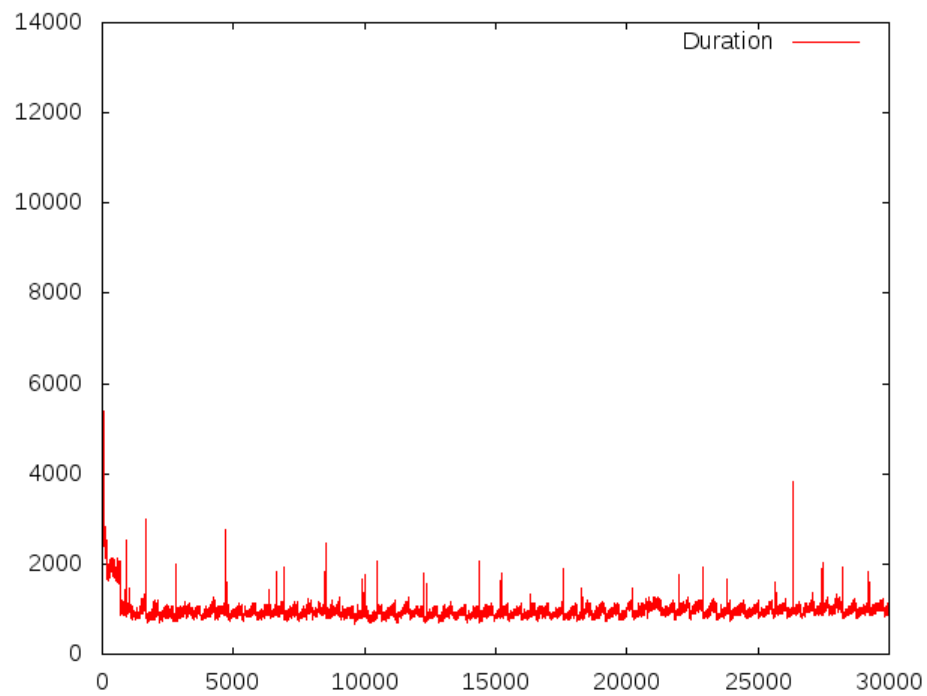
		19:12:44 INFO preparing 30000 objects 19:15:01 INFO creating 30000 objects took 126888 ms 19:16:04 INFO scheduling 30000 actions 19:51:06 INFO purging 30000 objects and datastreams 19:53:28 INFO Completed 30000 INGEST action(s) executed in 31517411 ms 19:53:29 INFO The Fedora cluster has 0 node(s) after the benchmark 19:53:29 INFO Throughput was 0.01 MB/sec 19:53:29 INFO Throughput per thread was 0 MB /sec 19:53:29 INFO Condensed results: 19:53:29 INFO 30000 1024 15 INGEST 31517411 9.295457E- 4 no-tx 19:53:29 INFO All operations completed in 2448012 ms
file (30k 1 KB containers / 15 threads) - tested using benchtool		Running new test [config: config /infinispan /file /infinispan. xml] [Jetty pid: 7558] 20:02:31 INFO Found Fedora 4 at <a href="http://localhost:8080">http://localhost:8080</a> 20:02:31 INFO Running 30000



INGEST action(s) against FCREPO4 with a binary size of 1.0 KB using 15 thread(s)  
20:02:34 INFO The Fedora cluster has 0 node(s) before the benchmark  
20:02:34 INFO preparing 30000 objects  
20:04:47 INFO creating 30000 objects took 124113 ms  
20:08:28 INFO scheduling 30000 actions  
20:45:14 INFO purging 30000 objects and datastreams  
20:50:51 INFO Completed 30000 INGEST action(s) executed in 33069648 ms  
20:50:52 INFO The Fedora cluster has 0 node(s) after the benchmark  
20:50:52 INFO Throughput was 0.01 MB/sec  
20:50:52 INFO Throughput per thread was 0 MB/sec  
20:50:52 INFO Condensed results:  
20:50:52 INFO 30000 1024 15 INGEST 33069648 8.859143E-4 no-tx  
20:50:52 INFO All operations completed in 2900327 ms

ram (30k 1 KB containers / 15 threads) - tested using benchtool

Running new test [config:

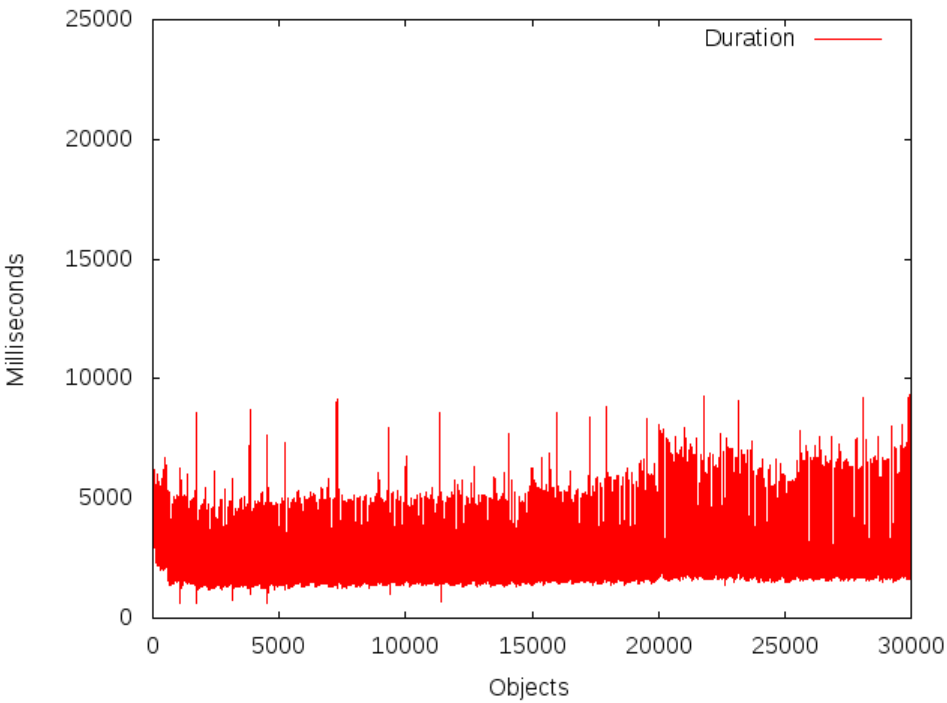


```

config
/finis/finis.xml] [Jetty
/ram
/finis/finis.xml] [Jetty
pid: 11324]
20:52:45
INFO
Found
Fedora 4 at
http://localhost:8080
20:52:45
INFO
Running
30000
INGEST
action(s)
against
FCREPO4
with a
binary size of 1.0 KB
using 15
thread(s)
20:52:48
INFO The
Fedora
cluster has
0 node(s)
before the benchmark
20:52:48
INFO
preparing
30000
objects
20:55:00
INFO
creating
30000
objects
took
123502 ms
20:55:45
INFO
scheduling
30000
actions
21:28:38
INFO
purging
30000
objects and
datastreams
21:30:23
INFO
Completed
30000
INGEST
action(s)
executed in
29588918
ms
21:30:23
INFO The
Fedora
cluster has
0 node(s)
after the benchmark
21:30:23
INFO
Throughput
was 0.01
MB/sec
21:30:23
INFO
Throughput
per thread
was 0 MB
/sec
21:30:23
INFO
Condensed
results:
21:30:23
INFO

```

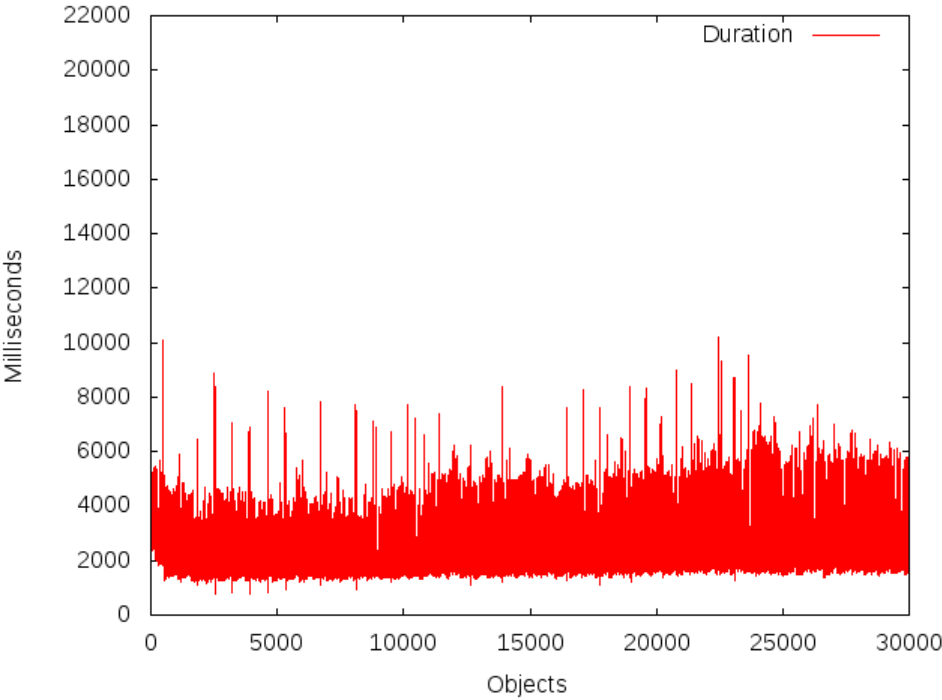
		30000 1024 15 INGEST 29588918 9.9013E-4 no-tx 21:30:23 INFO All operations completed in 2257950 ms
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Configuration	Results Graph	Logging Output
leveldb-default (30k 2 MB containers / 15 threads) - tested using benchtool		Running new test [config: config /infinispan /leveldb- default /infinispan. xml] [Jetty pid: 1370] 14:10:27 INFO Found Fedora 4 at <a href="http://localhost:8080">http://localhost:8080</a> 14:10:27 INFO Running 30000 INGEST action(s) against FCREPO4 with a binary size of 2.0 MB using 15 thread(s) 14:10:29 INFO The Fedora cluster has 0 node(s) before the benchmark 14:10:29 INFO preparing 30000 objects 14:12:40 INFO creating 30000 objects took 121853 ms 14:13:34 INFO scheduling 30000 actions 15:48:36 INFO purging 30000 objects and datastreams 15:51:10 INFO Completed 30000 INGEST action(s) executed in 85507949 ms 15:51:10 INFO The Fedora

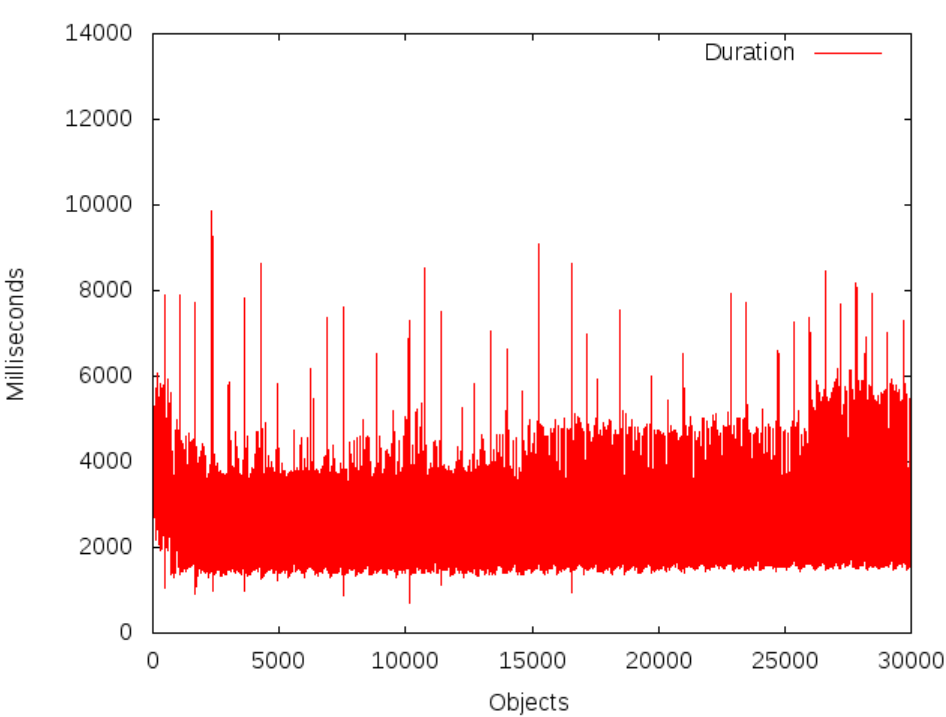
cluster has 0 node(s) after the benchmark 15:51:10 INFO Throughput was 10.53 MB/sec 15:51:10 INFO Throughput per thread was 0.7 MB/sec 15:51:10 INFO Condensed results: 15:51:10 INFO 30000 2097152 15 INGEST 85507949 0.7016891 no-tx 15:51:10 INFO All operations completed in 6042901 ms

Running new test [config: config /infinispan /leveldb /infinispan.xml] [Jetty pid: 7694] 18:06:30 INFO Found Fedora 4 at <http://localhost:8080> 18:06:30 INFO Running 30000 INGEST action(s) against FCREPO4 with a binary size of 2.0 MB using 15 thread(s) 18:06:32 INFO The Fedora cluster has 0 node(s) before the benchmark 18:06:32 INFO preparing 30000 objects 18:08:41 INFO creating 30000 objects took 120016 ms 18:09:34 INFO scheduling 30000 actions 19:45:21 INFO

leveldb (30k 2 MB containers / 15 threads) - tested using benchtool



file (30k 2 MB containers / 15 threads) - tested using benchtool

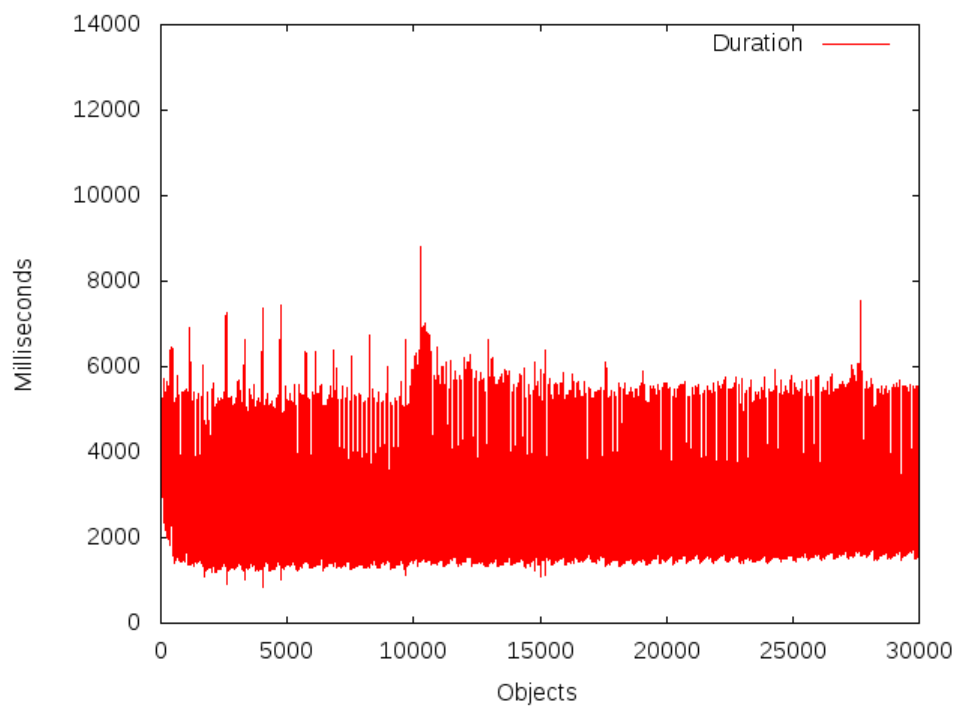


purging  
30000  
objects and  
datastreams  
19:47:52  
INFO  
Completed  
30000  
INGEST  
action(s)  
executed in  
86194079  
ms  
19:47:52  
INFO The  
Fedora  
cluster has  
0 node(s)  
after the  
benchmark  
19:47:52  
INFO  
Throughput  
was 10.44  
MB/sec  
19:47:52  
INFO  
Throughput  
per thread  
was 0.7 MB  
/sec  
19:47:52  
INFO  
Condensed  
results:  
19:47:52  
INFO  
30000  
2097152  
15 INGEST  
86194079  
0.6961035  
no-tx  
19:47:52  
INFO All  
operations  
completed  
in 6081741  
ms

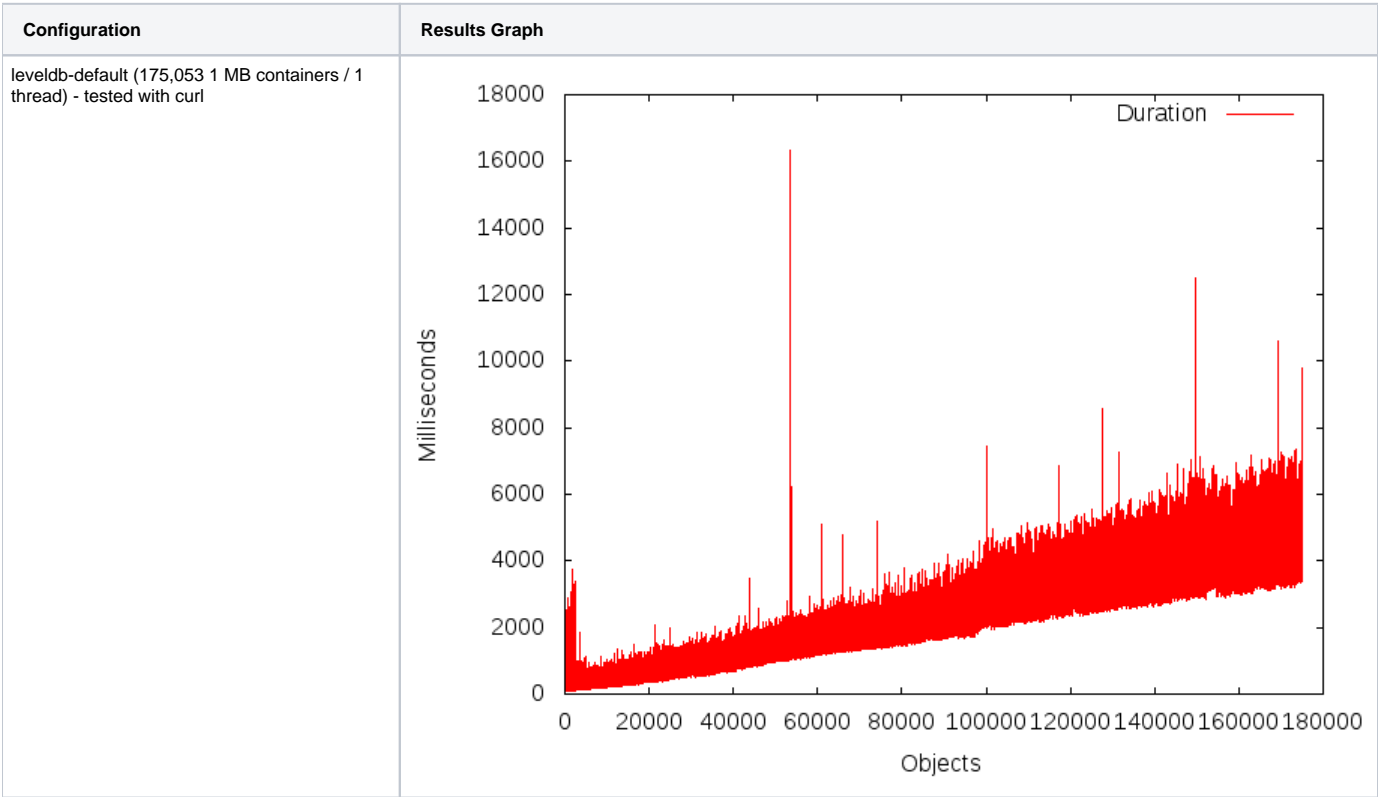
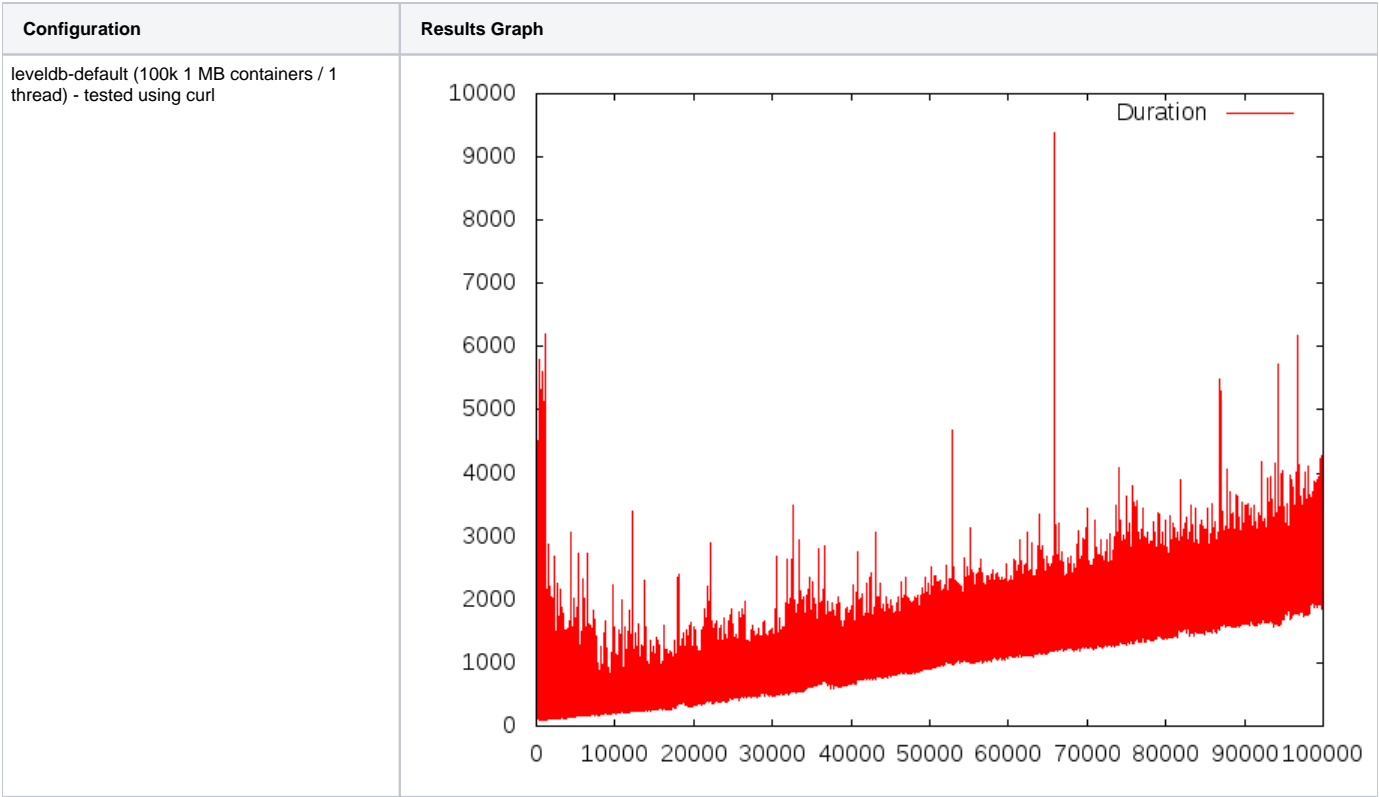
Running  
new test  
[config:  
config  
/infinispan  
/file  
/infinispan.  
xml] [Jetty  
pid: 14070]  
21:45:20  
INFO  
Found  
Fedora 4 at  
<http://localhost:8080>  
21:45:20  
INFO  
Running  
30000  
INGEST  
action(s)  
against  
FCREPO4  
with a  
binary size  
of 2.0 MB  
using 15  
thread(s)  
21:45:22  
INFO The  
Fedora  
cluster has  
0 node(s)  
before the  
benchmark  
21:45:22  
INFO  
preparing



		30000 objects 21:47:36 INFO creating 30000 objects took 124645 ms 21:51:06 INFO scheduling 30000 actions 23:26:46 INFO purging 30000 objects and datastreams 23:31:50 INFO Completed 30000 INGEST action(s) executed in 86083830 ms 23:31:51 INFO The Fedora cluster has 0 node(s) after the benchmark 23:31:51 INFO Throughput was 10.45 MB/sec 23:31:51 INFO Throughput per thread was 0.7 MB /sec 23:31:51 INFO Condensed results: 23:31:51 INFO 30000 2097152 15 INGEST 86083830 0.696995 no-tx 23:31:51 INFO All operations completed in 6390673 ms
ram (30k 2 MB containers / 15 threads) - tested using benchtool		Running new test [config: config /infinispan /ram /infinispan. xml] [Jetty pid: 1573] 17:46:22 INFO Found Fedora 4 at <a href="http://localhost:8080">http://localhost:8080</a> 17:46:22 INFO Running 30000 INGEST action(s) against



FCREPO4  
with a  
binary size  
of 2.0 MB  
using 15  
thread(s)  
17:46:24  
INFO The  
Fedora  
cluster has  
0 node(s)  
before the  
benchmark  
17:46:24  
INFO  
preparing  
30000  
objects  
17:48:35  
INFO  
creating  
30000  
objects  
took  
122076 ms  
17:49:25  
INFO  
scheduling  
30000  
actions  
19:18:49  
INFO  
purging  
30000  
objects and  
datastreams  
19:21:02  
INFO  
Completed  
30000  
INGEST  
action(s)  
executed in  
80453741  
ms  
19:21:02  
INFO The  
Fedora  
cluster has  
0 node(s)  
after the  
benchmark  
19:21:02  
INFO  
Throughput  
was 11.19  
MB/sec  
19:21:02  
INFO  
Throughput  
per thread  
was 0.75  
MB/sec  
19:21:02  
INFO  
Condensed  
results:  
19:21:02  
INFO  
30000  
2097152  
15 INGEST  
80453741  
0.74577016  
no-tx  
19:21:02  
INFO All  
operations  
completed  
in 5680046  
ms



Results from Ben Pennell's Testing

Configuration	Results Graph	Throughput
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200 KB  
containers (get  
more info from  
Ben -  
transactions with  
500 containers?)

