

MarkLogic Cluster Monitoring Application

15/05/2014

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1 Introduction

The purpose of this document is to detail the the MarkLogic Monitoring application available at <https://github.com/mustard57/marklogic-monitoring>.

The framework consists of the following aspects

- A visual web based application, built on the MarkLogic platform allowing visual and tabular monitoring of key metrics
- A configurable, rule based alerting mechanism, which can either be monitored directly, or can be integrated with monitoring systems such as Geneos

The purpose of this document is

- To describe the above framework and it's configurable elements
- To detail the specific configuration made
- To detail, on a metric by metric basis, recommended actions¹ to be taken in the event of alerts being raised.
- To detail setup.

2 MarkLogic Monitoring Framework

This is a web based application built on the MarkLogic platform. It can be accessed via <http://HOSTNAME:8030> on any MarkLogic host upon which it is installed. The access credentials are MarkLogic-Monitoring-user/ MarkLogic-Monitoring-user.

The core of the application is a scheduled job which captures key metrics on a minute by minute basis. A sample is shown in

¹ The actions outlined are indicative, but not exhaustive. Any support hierarchy should include personnel able to go beyond scripted tasks as it is not possible to outline a full diagnostic tree for all conceivable circumstances.

Appendix 1 - Monitoring Data.

2.1 Web Application - Front Page

The user will see the following upon login



2.2 Current Server Metrics

The option 'Current Server Metrics' looks like the screenshot below. It shows, in tabular form, the last five snapshots of key selected metrics. It is intended to provide a holistic view of system activity.

Monitoring Statistics

Queries / Updates	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
Query Count	0	0	0	0	0	0
Update Count	0	0	0	0	0	0
Thread Count	5	5	5	5	5	5
Request Rate	0	0	0	0	0	0
Oldest Request	0	0	0	0	0	0
IO Rates	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
Document Count Per Second	83	85	84	85	85	86
Query Read Bytes Per Second	0 b	0 b	0 b	0 b	0 b	0 b
Journal Write Bytes Per Second	2.178 mb	2.189 mb	2.18 mb	2.195 mb	2.181 mb	2.185 mb
Save Write Bytes Per Second	1.066 mb	1.049 mb	1.057 mb	1.024 mb	1.057 mb	1.032 mb
Merge Read Bytes Per Second	0 b	0 b	0 b	0 b	0 b	0 b
Merge Write Bytes Per Second	0 b	0 b	0 b	0 b	0 b	0 b
Backup Read Bytes Per Second	0 b	0 b	0 b	0 b	0 b	0 b
Backup Write Bytes Per Second	0 b	0 b	0 b	0 b	0 b	0 b
Raw Counts	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
Document Count	159.32 k	154.323 k	149.197 k	144.116 k	138.954 k	133.808 k
Max Forest Size Bytes	30 mb	30 mb	30 mb	30 mb	30 mb	30 mb
Max Forest Fragments	4.849 k	4.661 k	4.499 k	4.327 k	4.152 k	3.987 k
Memory	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
In Memory Size	26.049 gb	26.049 gb	26.049 gb	26.049 gb	26.049 gb	26.049 gb
In Memory Size Minus In Memory Stands	0 b	0 b	0 b	0 b	0 b	0 b
Cache	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
List Cache Hit Miss Ratio	98%	98%	98%	98%	98%	98%
Compressed Tree Cache Hit Miss Ratio	100%	100%	100%	100%	100%	100%
Expanded Tree Cache Hit Miss Ratio	100%	100%	100%	100%	100%	100%
Merge	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
Merge Count	0	0	0	0	0	0
Merge Size	0	0	0	0	0	0
Reindex Count	0	0	0	0	0	0
Network	13:30:00	13:29:00	13:28:00	13:27:00	13:26:00	13:25:00
Network Send Bytes Per Second	8.372 mb	8.383 mb	8.383 mb	8.373 mb	8.365 mb	8.353 mb
Dr Cluster Send Bytes Per Second	1.213 mb	1.219 mb	1.215 mb	1.222 mb	1.216 mb	1.217 mb

The metrics are explained in the section below

2.3 Server Metrics

2.3.1.1 Queries / Updates

Query Count : Number of queries (including updates) running vs application server at snapshot time

Update Count : Number of updates running vs application server

Thread Count : Number of active threads

Request Rate : Rate at which requests are being received for application

Oldest Request : Age of oldest request in seconds to application server

2.3.1.2 IO Rates

Document Count Per Second : Ingest rate per second based on the difference between the two most recent snapshots

Query Read Bytes Per Second : Data read rate from disk for query purposes based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned.

Journal Write Bytes Per Second : Data write rate to Journal based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned.

Save Write Bytes per Second : Stand Data write rate to disk based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned.

Merge Read Bytes per Second : Data read rate from disk for merge purposes based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned.

Merge Write Bytes per Second : Data write rate to disk for merge purposes based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned.

Backup Read Bytes per Second : Data read rate from disk for restore purposes based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned. This mainly to highlight if a restore is taking place.

Backup Write Bytes per Second : Data write rate to disk for backup purposes based on the difference between the two most recent snapshots. Gb / Mb/ Kb / bytes selected automatically as applicable to the number returned. This mainly to highlight if a backup is taking place.

2.3.1.3 Raw Counts

Document Count : Application document count

2.3.1.4 Memory

In Memory Size : Memory consumed by database

In Memory Size Minus In Memory Stands : The permanent memory usage by the application database, after subtracting the amount consumed by in memory stands. The latter can contribute to a 'sawtooth' effect which may be confusing

2.3.1.5 Cache

List Cache Hit Miss Ratio : Percentage of universal index lookups served out of cached resources. This should ideally usually be above 70%.

Compressed Tree Cache Hit Miss Ratio : Percentage of compressed tree lookups served out of cached resources. This should ideally be usually above be above 70%.

Expanded Tree Cache Hit Miss Ratio : Percentage of expanded document lookups served out of cached resources. This should usually ideally be above 70%.

2.3.1.6 Merge

This section primarily to highlight whether merging / re-indexing is taking place

Merge Count : Number of active merges

Merge Size : Total amount of data being merged

Reindex Count : Number of forests currently being re-indexed

2.3.1.7 Network

This section shows total network traffic

Network Send Bytes Per Second : Total internal cluster network send traffic

Dr Cluster Send Bytes Per Second : Traffic sent across network to DR cluster

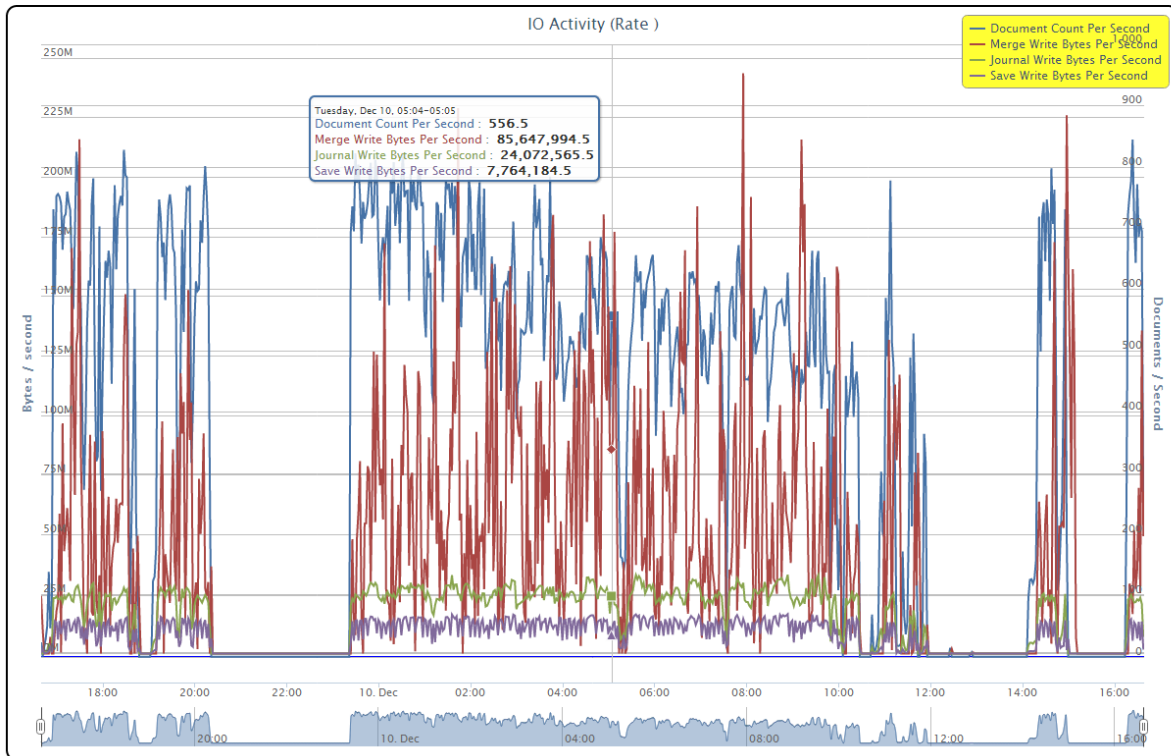
2.4 Charts

A number of the metrics above are made available in graphical form. This allows introspection of historic activity, which may aid performance diagnosis and testing amongst other activities.

All charts are available over 1 hour, 8 hour, 1 day, 5 day and 10 day periods, as per the screenshot in 2.1.

At the base of each chart is a 'slider' which allows key periods to zoomed in on. A sample is shown below.

MarkLogic System Analysis



The chart types are as follows

Requests : Data as per 2.3.1.1

Ingestion : Data as per 2.3.1.2

Memory : Data as per 2.3.1.4

Cache Ratio : Data as per 2.3.1.5

Absolute : Document count, and also absolute values for merge / save and journal write, for performance monitoring and testing purposes.

Network : Data as per 2.3.1.7

2.5 Alerting Status

This page shows the monitored quantities, the monitoring parameters (e.g. limits) and the status of the monitored quantity. This is logically equivalent to the information that is written to Geneos - see section 4.14. The meaning, and configuration mechanism behind this data is detailed in section 3.

Alerting Dashboard for ML-Monitoring-xcc

Boolean Limits

Check	Check Type	Status
Database Available	BOOLEAN	OK
Is Bootstrapped	BOOLEAN	FAIL

Trend Limits

Check	Check Type	Check Period	Tolerance	Current Value	Baseline Value	Status
Database Count Change	TREND	3600	0	51	51	OK
Foreign Cluster Count	TREND	3600	0	0	0	OK
Host Count Change	TREND	3600	0	1	1	OK
Server Count Change	TREND	3600	0	38	38	OK

Limit Limits

Check	Check Type	Limit	Value	Status
ASync Replicating	LIMIT	0	0	OK
Failed Masters	LIMIT	0	0	OK
Long Running Request	LIMIT	60	0	OK
Max Forest Fragment Count	LIMIT	64 m	175,011 k	OK
Max Forest Size	LIMIT	200 gb	562 mb	OK
Stands Per Forest	LIMIT	50	3	OK

Freshness Limits

Check	Check Type	Limit	Value	Status
Freshness	FRESHNESS	120 seconds	2014-05-15 09:47:00	OK
Last Backup	FRESHNESS	3 days		FAIL

Capacity Limits

Host	Data Directory	Forest Count	Used Space	Free Space	Required Free Space	Status
van-prod3.demo.marklogic.com	/space/	1	562 mb	322.366 gb	702.5 mb	OK

3 Alerting

The monitoring application allows alerts to be raised based on the snapshot data shown in

Appendix 1 - Monitoring Data.

For each check in the alerting configuration, the system returns a status value of OK, WARN or FAIL. The value returned is dependent on the alerting configuration and the snapshot data.

Other quantities may be returned depending on the return type.

In this section we detail the configuration mechanism, the data returned and the specific configuration made.

3.1 Alerting Configuration

The quantities being monitored are specified by the alerting configuration file². The current configuration is shown in Appendix 2 - Alerting Configuration.

As alerting is specified by a configuration file it can be amended easily.

Each configuration element is specified using the tag 'check' e.g.

```
<check>
  <name>Server Count Change</name>
  <check-type>TREND</check-type>
  <check-over-period-seconds>3600</check-over-period-seconds>
  <path>/status/server-count</path>
  <tolerance>0</tolerance>
</check>
```

Each check has a name, a type and a path. It may have other fields.

The name of the check is used in the alerting dashboard, to give the check a readable name. It is also used in Geneos to give the quantity a readable title.

The type of the check is one of boolean, limit, trend or capacity. These are detailed below.

The path is the xpath to the monitored quantity in the snapshot xml. So /status/server-count refers to the server-count field as shown in

² Found at /data/config/monitoring-config.xml in the code base

Appendix 1 - Monitoring Data.

3.1.1 Boolean Alert Type

If the field in the most recent snapshot referenced by the path field has value true then OK is returned, otherwise FAIL. An example configuration element is

```
<check>
  <name>Database Available</name>
  <check-type>BOOLEAN</check-type>
  <path>/status/database-available</path>
</check>
```

3.1.2 Limit Alert Type

In its simplest form (without using the warn-limit field), if the field in the most recent snapshot referenced by the path field is less than the value specified by the limit field then OK is returned, otherwise FAIL.

If using the warn-limit field then OK is returned if the field in the most recent snapshot referenced by the path field is less than warn-limit. If the value is above warn-limit but less than limit, WARN is returned, and if above limit, FAIL is returned. An example configuration element is

```
<check>
  <name>Stands Per Forest</name>
  <check-type>LIMIT</check-type>
  <limit>50</limit>
  <warn-limit>5</warn-limit>
  <path>/status/max-stands-per-forest</path>
</check>
```

3.1.3 Trend Alert Type

This alert type allows monitoring based on the variability of the field. It checks the current value of the field against historic values. The historic value selected is determined by the check-over-period-seconds field in the configuration below. So, given the configuration below, if database-count has changed in the last hour a fail status will be returned.

The tolerance field allows some slack to be built in. If tolerance is non-zero, then a fail status is returned if the current value differs from the historic value by more than tolerance (taking the absolute value).

```
<check>
  <name>Database Count Change</name>
  <check-type>TREND</check-type>
  <check-over-period-seconds>3600</check-over-period-seconds>
  <path>/status/database-count</path>
  <tolerance>0</tolerance>
</check>
```

3.1.4 Capacity Alert Type

At each snapshot time, the usage and free space on each file system used by MarkLogic is calculated. The snapshot process determines whether the free space is sufficient. This can be seen in the sample snapshot data shown in

Appendix 1 - Monitoring Data.

```
<capacity>
  <host>my-domain-p1.uk.loc.com</host>
  <data-dir>/data/forests/</data-dir>
  <forest-count>1</forest-count>
  <used-space>355</used-space>
  <free-space>363</free-space>
  <merge-space-ratio>1.25</merge-space-ratio>
  <required-free-space-using-ratio>443.75</required-free-space-using-ratio>
  <merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
  <required-free-space-using-max-merge>49152</required-free-space-using-max-merge>
  <status>FAIL</status>
</capacity>
```

Two rules are used to determine whether free space is sufficient. Firstly, is the free space greater than 125% of the used space, and secondly whether the free space is greater than the $1.5 * 32\text{Gb}$ per forest required.³ If both tests fail, a status of FAIL is returned.

Failure will occur if free space is less than 100% of used space and less than 32GB - so the FAIL message will be seen before actual failure takes place.

Warning limits are also built in, so if free space is less than 150% of the used space, or less than $2 * 32\text{Gb}$ (= 48Gb) per forest, then a status of WARN is returned (unless FAIL would otherwise have been returned.

An overall status of FAIL is returned if any one file system has insufficient space. If this condition is not met, a status of WARN is returned if any one file system meets the warning criteria. Otherwise an overall status of OK is returned.

3.1.5 Freshness Alert type

This alert type checks whether the field in the most recent snapshot referenced by the path field is sufficiently recent.

A failure will be registered if the difference between the current date/time and the field is more than the limit. The limit can be specified in days, hours, minutes or seconds.

An example configuration element is

```
<check>
  <name>Last Backup</name>
  <check-type>FRESHNESS</check-type>
  <limit>3</limit>
  <path>/status/last-backup</path>
  <unit>day</unit>
</check>
```

The warn-limit field can also be used here, with the usual meaning.

³ The relevant constants are in `/src/app/lib/constants.xqy` in the code base

3.2 Active Alerts

In this section we detail the actual alerts configured. Note that this section will require amending if the alerting configuration in Appendix 2 - Alerting Configuration is amended.

3.2.1 Is Bootstrapped

This alert returns OK if the primary cluster is connected to a remote cluster, otherwise FAIL.

3.2.2 Database Available

This alert returns OK if the application database is available, otherwise FAIL.

3.2.3 Long Running Request

This alert returns OK if the longest running request on the application server has been running for less than 60 seconds, otherwise FAIL.

3.2.4 Failed Masters

This alert returns FAIL if failover has occurred for any forest.

3.2.5 ASync Replicating

This alert returns FAIL if any of the primary forests is replicating asynchronously to its replica. This means the replica forest is in the 'catch up' state.

3.2.6 Stands Per Forest

MarkLogic has a hard limit of 64 stands per forest. If any forest reaches this number it will become unavailable. In general this will only happen if merging cannot take place. To guard against this, a FAIL status will be returned if any forest has more than 50 stands, and a WARN status if any forest has more than 35 stands.

3.2.7 Max Forest Fragment Count

The recommended upper limit for fragments per forest is 64m. This alert will return WARN if 90% of that figure is reached and FAIL if the limit is reached.

3.2.8 Max Forest Size

The recommended data limit limit for forests is 200Gb. This alert will return WARN if 90% of that figure is reached and FAIL if the limit is reached.

3.2.9 Host Count Change

This alert returns FAIL if the number of hosts in the cluster changes. This will happen if a host becomes available, or a host is deliberately added or removed. The alert will persist for one hour.

3.2.10 Database Count Change

This alert returns FAIL if the number of databases in the cluster changes. This highlights configuration changes. The alert will persist for one hour.

3.2.11 Server Count Change

This alert refers to the number of application servers running on a cluster. This alert returns FAIL if the number of application servers changes. This highlights configuration changes. The alert will persist for one hour.

3.2.12 Foreign Cluster Count

This alert refers to the number of foreign clusters available. This alert returns FAIL if the number changes. Typically this alert will be trigger if the foreign cluster becomes unavailable. The alert will persist for one hour.

3.2.13 Capacity

A status of FAIL will be returned if any one forest has insufficient space for merging. A WARN status will be returned if the free space is no more than 50% greater than what is required.⁴

3.2.14 Freshness

A status of FAIL is returned if the last monitoring snapshot is more than 120 seconds, using current configuration.

3.2.15 Last Backup

A status of FAIL is returned if the most recent backup is more than 3 days old.

4 Actions Following Alerts

This section details, for each configured alert, indicative steps to be followed. The steps indicated cannot be fully proscriptive - it is therefore important to have personnel in the support hierarchy who are able to use initiative in diagnosing and resolving.

If the cause of an alert is not fully understood, key diagnostic materials such as sar logs⁵ and MarkLogic Error Logs⁶ should be maintained for analysis.

If an error is not immediately understood, ErrorLog.txt should be consulted for relevant detail.

4.1 Is Bootstrapped

As above, this alert is raised if the primary cluster is no longer attached to the secondary cluster. This may occur because of a network outage, a configuration error, or a failure of the secondary

⁴ See variable \$additional-merge-space-factor-warning-level in constants.xqy

⁵ Typically online for one month - /var/log/sa/sa<n> where n is day of month

⁶ Typically online for one week - see /var/opt/MarkLogic/Logs

cluster. All three possibilities should be investigated as needed. The outcome should be that the secondary cluster is connected to the primary. This can be confirmed from the Admin console - see <http://docs.marklogic.com/guide/database-replication/configuring#chapter>, or alternatively by the alert status being restored to OK.

4.2 Database Available

This alert is raised if the application database becomes unavailable. Without high availability, this alert may occur if a host in the cluster managing forests in the application database becomes unavailable. With high availability this alert may occur if the forest is unable to merge due to insufficient disk space, or if the maximum stands per forest has been reached. Both these events will result in additional alerts being generated⁷ (see below). It can also happen if more than one host becomes unavailable, and for a particular forest, no replicas are available - though this is unlikely.

Consulting the Named Database -> Status page may yield additional information. The goal should be that the 'mount state' of this database returns to 'available', and that the alert status returns to 'OK'.

4.3 Long Running Request

This alert is raised if a single request runs for more than 60s (as currently specified). This is not a critical error, though may indicate that the system is not performing as expected.

The following should be investigated

- CPU levels - are these high, and is this expected (use top or sar -u)
- Memory - is this 90%+. Is swapping occurring (use top or sar -r / sar -S)
- Overall IO - if it is possible to look at the Monitoring -> ingestion graph use this to obtain an aggregate picture of cluster io. Alternatively look at the iowait column in sar -u
- Is the system retrieving an excessive amount of content from disk - use the query read bytes per second graph to see if this is unusual
- Select Application Server -> Status -> Show more in the MarkLogic Admin console to see something similar to

⁷ Also pre-emptive alerts

HTTP Server: App-Services

sl

appserver status -- A detailed view of this appserver's activity.

App ServerApp-Services [HTTP]

DatabaseApp-Services

Host	Threads	Requests	Updates	Average Time	Request Rate	Oldest Request	Expanded Tree Cache		Ratio
hp8460-1647.marklogic.com	2	1	0	53.9 s	NaN	53.9 s	57,492	3,590	94%
	2	1	0	53.9 s	n/a		57,492	3,590	94%

Query	#	Average Time	Oldest Time	Expanded Tree Cache		Ratio
/qconsole/endpoints/eval.xqy	1	53.9 s	53.9 s	2	0	100%
Total	1	53.9 s	53.9 s	2	0	100%

Host	Query	User	Client IP	Time	Expanded Tree Cache		Time Limit	Retry Count			
hp8460-1647.marklogic.com	/qconsole/endpoints/eval.xqy	admin	127.0.0.1	53.9 s	2	0	100%	86400	0	[stack]	[cancel]
	Total				2	0	100%				

This will identify the long running query (use the 'Time' field). The 'stack' link can be used to introspect the query, and 'cancel' can be used to terminate if required.

4.4 Failed Masters

This alert is raised if failover has occurred for any forest. In a HA environment this is not a critical error, but it is likely that the condition warrants attention.

The following should be investigated

- Hosts -> Status (in the MarkLogic Admin Console). Are all hosts connected. If not, review the Error Logs for the disconnected host (and a connected host) for further information. The next action will be determined by the reason why the host(s) has / have been disconnected. A network failure (network card / DNS error) may have occurred. There may have been an overall failure at the host level.

There may have been a transient outage, in which case the status can be reset by 'restarting' any active replica forests. If failover repeats then further investigation is needed.

Check that the forest has not been disabled via the Admin Console.

4.5 ASync Replicating

This alert is raised if a replica forest is not synchronous with its master. Although this is not a critical condition, it should not be allowed to persist. Likely causes are heavy load on the host managing the replica in question, reduced network capacity or network infrastructure failure between the host managing the primary and the host managing the replica. For load considerations, the steps in 4.3 should be followed. If 'ping' testing is not revealing, a network expert should be consulted if network problems are suspected.

The Named Database -> Status page in the MarkLogic admin console can be used to determine which forests are in this state.

4.6 Stands Per Forest

As above, there is a maximum stand limit per forest (64) that must be observed. If a forest reaches this limit it will become unavailable, and the situation will be very difficult to recover from.

The most likely cause is that merging has been disabled. Named Database -> Merge Policy should be investigated.

If you are not able to resolve this problem quickly you should consult MarkLogic Support as a matter of urgency. The WARN alert will be triggered at 35 stands. Stands will continue to be created at a uniform rate, so it will be possible to reach the critical limit if this alert is not addressed.

4.7 Max Forest Fragment Count

You should add additional forests, and rebalance, if there is sufficient disk space to do so. If not, you need to add additional nodes and rebalance.

4.8 Max Forest Size

You should add additional forests, and rebalance, if there is sufficient disk space to do so. If not, you need to add additional nodes and rebalance.

4.9 Host Count Change

As above, this alert will be triggered if the host count changes. If this is unexpected then you should look to discover which host is missing. The files hosts*.xml in /var/opt/MarkLogic may be helpful in this regard. The Error Logs of other hosts may also be instructive. Most likely this will be due to an operational error.

4.10 Database Count Change

This is not a critical error (though may be), but may also indicate unauthorized or unintentional configuration changes. You should ascertain the nature of the change (use the historied databases*.xml files in /var/opt/MarkLogic), or by inspection of Databases -> Summary in the MarkLogic Admin Console.

4.11 Server Count Change

Server in this instance means MarkLogic Application server. As per 4.10 it is not necessarily critical, but may indicate unauthorized or erroneous activity. groups*.xml in /var/opt/MarkLogic may be used to determine the change, also inspection of App Servers -> Summary in the MarkLogic Admin Console.

Note that should a server have been added accidentally, its removal, using the admin console, will trigger a cluster restart.

4.12 Foreign Cluster Count

This should be regarded as a critical change in an environment where replication is being used. It means the configuration has changed so that there is no longer a foreign cluster (or an additional cluster has been added).

Use Configure -> Clusters -> Summary in the Admin Console to confirm this message.

Should the foreign cluster have been removed, it should be restored as a matter of urgency. Use http://docs.marklogic.com/guide/database-replication/dbrep_intro#chapter if needed.

4.13 Capacity

The alerting dashboard can be used to determine which file system has triggered the capacity alert.

If you are satisfied the alert is correct you should extend the file system capacity if possible.

Alternatively, you might make use of the replication mechanism to replicate to a larger file system and then take the original forest offline. You may need to work with support to accomplish this.

4.14 Freshness

This alert will be triggered if the snapshot mechanism is failing for some reason. If this is the case you will be seeing stale information, i.e. not actively monitoring your system. This will mean you are not correctly alerted if problems occur.

The first step is to identify the server the snapshot is running on - you can use the admin console for this purpose - Configure -> Groups -> Default -> Scheduled Tasks.

scheduled tasks -- The scheduled tasks' specifications.	
scheduled task -- A scheduled task specification.	
task path	/app/procs/save-monitoring-stats.xqy
task root	/
task type	minutely
task period	1
task database	ML-Monitoring-content
task modules	ML-Monitoring-modules
task user	admin
task host	van-prod3.demo.marklogic.com
task priority	normal

Investigate the error log on the task host. Check the MarkLogic-Monitoring database is available.

Likely causes are a host failure, or a database failure due to insufficient space. Restoring the host in the event of host failure is one option. Alternatively, remove the host from the cluster and re-run the create_scheduled_task job as per the Monitoring installation instructions.

If the problems relate to capacity, proceed as per section 4.13.

4.15 Last Backup

This alert will be triggered if the most recent backup is more than three days old. This could be because the scheduled backup mechanism has been disabled, or the backup has outgrown the volume allocated to it.

5 Setup

‘MarkLogic-Monitoring’ is roxy based - details available at <https://github.com/marklogic/roxy>. To start using the MarkLogic IO Test application, do

```
git clone https://github.com/mustard57/marklogic-monitoring.git
```

In build.properties set your administrator credentials - if you wish to use a user other than admin set

```
user=<required-user-name>
```

You can store your password in this file using

```
password=<admin-user-password>
```

If you do not do this, you will be prompted for the password at the command line.

You also need to specify the application server you wish to monitor. You can do this by setting the server-name field in data/config/monitoring-config.xml to your server name.⁸ Note you can monitor multiple servers by repeating the monitoring-config-item block. In operation, you can toggle between them via the ‘Select Server’ option on the home page.

From the project directory

```
ml local bootstrap
```

```
ml local deploy modules
```

```
ml local deploy content ( required )
```

```
ml local create_scheduled_task ( this creates the monitoring job )
```

will deploy to your local machine on port 8030.

To install on another machine, choose an alias e.g. myalias

In deploy/default.properties, alter the line starting with environments to

```
environments=local,dev,prod,myalias
```

Add your machine name to build.properties - put something like

```
myalias-server=mymachinename.mydomain.com
```

⁸ See Appendix 2.

at the foot of the file.

If you want to run on a different port, add a file named myalias.properties to the deploy directory, and add

app-port=<my-port-number>⁹

xcc-port=<my-port-number-2>¹⁰

Also, if you have different access credentials, add

user=<required-user-name>

password=<admin-user-password>

as appropriate to this file.

If you go to <http://localhost:8030>¹¹ you should then see



⁹ HTTP application port

¹⁰ XDBC port - used by deploy modules

¹¹ Or <http://mymachinename.mydomain.com:my-port-number> as appropriate

Appendix 1 - Monitoring Data

```
<?xml version="1.0" encoding="UTF-8"?>
<status>
  <date-time>2014-01-09T13:44:00.693685Z</date-time>
  <server-name>your-application-xcc</server-name>
  <database-count>18</database-count>
  <server-count>14</server-count>
  <host-count>3</host-count>
  <foreign-cluster-count>0</foreign-cluster-count>
  <is-bootstrapped>false</is-bootstrapped>
  <last-backup>2014-01-14T13:49:59.236357Z</last-backup>
  <oldest-request>0</oldest-request>
  <request-rate>0</request-rate>
  <expanded-tree-cache-hits>7445</expanded-tree-cache-hits>
  <expanded-tree-cache-misses>122805</expanded-tree-cache-misses>
  <expanded-tree-cache-hit-miss-ratio>6</expanded-tree-cache-hit-miss-ratio>
  <query-count>0</query-count>
  <update-count>0</update-count>
  <thread-count>3</thread-count>
  <database-available>true</database-available>
  <failed-masters>0</failed-masters>
  <async-replicating>0</async-replicating>
  <database-replication-status xmlns="http://marklogic.com/manage/databases">
    <database-replication-configured units="bool">false</database-replication-configured>
  </database-replication-status>
  <compressed-tree-cache-hits>11243612</compressed-tree-cache-hits>
  <compressed-tree-cache-misses>6806220</compressed-tree-cache-misses>
  <compressed-tree-cache-hit-miss-ratio>62</compressed-tree-cache-hit-miss-ratio>
  <list-cache-hits>184833924</list-cache-hits>
  <list-cache-misses>18684708</list-cache-misses>
  <list-cache-hit-miss-ratio>91</list-cache-hit-miss-ratio>
  <document-count>263850497</document-count>
  <query-read-bytes>455305353564</query-read-bytes>
  <journal-write-bytes>14875697572</journal-write-bytes>
  <save-write-bytes>6992236410</save-write-bytes>
  <merge-read-bytes>65127034880</merge-read-bytes>
  <merge-write-bytes>68837973937</merge-write-bytes>
  <backup-read-bytes>0</backup-read-bytes>
  <backup-write-bytes>0</backup-write-bytes>
  <network-send-bytes>207419227336</network-send-bytes>
  <dr-cluster-send-bytes>0</dr-cluster-send-bytes>
  <max-forest-size-bytes>122695974912</max-forest-size-bytes>
  <max-forest-fragments>16199274</max-forest-fragments>
  <merge-count>0</merge-count>
  <merge-size>0</merge-size>
  <reindex-count>0</reindex-count>
  <backup-count>0</backup-count>
  <max-stands-per-forest>8</max-stands-per-forest>
  <on-disk-size-mb>2545047</on-disk-size-mb>
  <in-memory-size>139044</in-memory-size>
  <document-count-per-second>0</document-count-per-second>
  <query-read-bytes-per-second>0</query-read-bytes-per-second>
  <journal-write-bytes-per-second>0</journal-write-bytes-per-second>
  <save-write-bytes-per-second>0</save-write-bytes-per-second>
  <merge-read-bytes-per-second>0</merge-read-bytes-per-second>
  <merge-write-bytes-per-second>0</merge-write-bytes-per-second>
  <backup-read-bytes-per-second>0</backup-read-bytes-per-second>
  <backup-write-bytes-per-second>0</backup-write-bytes-per-second>
```


<network-send-bytes-per-second>50755</network-send-bytes-per-second>
<dr-cluster-send-bytes-per-second>0</dr-cluster-send-bytes-per-second>
<expanded-tree-hit-miss-ratio>0</expanded-tree-hit-miss-ratio>
<compressed-tree-hit-miss-ratio>0</compressed-tree-hit-miss-ratio>
<list-hit-miss-ratio>99.96</list-hit-miss-ratio>
<in-memory-size-minus-in-memory-stands>139044</in-memory-size-minus-in-memory-stands>
<capacity>
 <host>my-domain-u3.uk.loc.com</host>
 <data-dir>/ForestData/Secondary-1</data-dir>
 <forest-count>8</forest-count>
 <used-space>836512</used-space>
 <free-space>9615624</free-space>
 <merge-space-ratio>1.25</merge-space-ratio>
 <required-free-space-using-ratio>1045640</required-free-space-using-ratio>
 <merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
 <required-free-space-using-max-merge>393216</required-free-space-using-max-merge>
 <status>OK</status>
</capacity>
<capacity>
 <host>my-domain-u3.uk.loc.com</host>
 <data-dir>/ForestData/Primary</data-dir>
 <forest-count>16</forest-count>
 <used-space>852782</used-space>
 <free-space>10635858</free-space>
 <merge-space-ratio>1.25</merge-space-ratio>
 <required-free-space-using-ratio>1065977.5</required-free-space-using-ratio>
 <merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
 <required-free-space-using-max-merge>786432</required-free-space-using-max-merge>
 <status>OK</status>
</capacity>
<capacity>
 <host>my-domain-u4.uk.loc.com</host>
 <data-dir>/ForestData/Secondary-1</data-dir>
 <forest-count>8</forest-count>
 <used-space>833544</used-space>
 <free-space>9618773</free-space>
 <merge-space-ratio>1.25</merge-space-ratio>
 <required-free-space-using-ratio>1041930</required-free-space-using-ratio>
 <merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
 <required-free-space-using-max-merge>393216</required-free-space-using-max-merge>
 <status>OK</status>
</capacity>
<capacity>
 <host>my-domain-u4.uk.loc.com</host>
 <data-dir>/ForestData/Primary</data-dir>
 <forest-count>16</forest-count>
 <used-space>842928</used-space>
 <free-space>10721779</free-space>
 <merge-space-ratio>1.25</merge-space-ratio>
 <required-free-space-using-ratio>1053660</required-free-space-using-ratio>
 <merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
 <required-free-space-using-max-merge>786432</required-free-space-using-max-merge>
 <status>OK</status>
</capacity>
<capacity>
 <host>my-domain-u2.uk.loc.com</host>
 <data-dir>/ForestData/Secondary-1</data-dir>
 <forest-count>8</forest-count>
 <used-space>839382</used-space>
 <free-space>9520737</free-space>

```
<merge-space-ratio>1.25</merge-space-ratio>
<required-free-space-using-ratio>1049227.5</required-free-space-using-ratio>
<merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
<required-free-space-using-max-merge>393216</required-free-space-using-max-merge>
<status>OK</status>
</capacity>
<capacity>
  <host>my-domain-u2.uk.loc.com</host>
  <data-dir>/ForestData/Primary</data-dir>
  <forest-count>16</forest-count>
  <used-space>849337</used-space>
  <free-space>10625935</free-space>
  <merge-space-ratio>1.25</merge-space-ratio>
  <required-free-space-using-ratio>1061671.25</required-free-space-using-ratio>
  <merge-space-per-forest-mb>49152</merge-space-per-forest-mb>
  <required-free-space-using-max-merge>786432</required-free-space-using-max-merge>
  <status>OK</status>
</capacity>
</status>
```

Appendix 2 - Alerting Configuration

```
<?xml version="1.0" encoding="UTF-8"?>
<monitoring-config xmlns="KT:Monitoring:config">
  <monitoring-config-item>
    <server-name>my-application-xcc</server-name>
    <check>
      <name>Database Count Change</name>
      <check-type>TREND</check-type>
      <check-over-period-seconds>3600</check-over-period-seconds>
      <path>/status/database-count</path>
      <tolerance>0</tolerance>
    </check>
    <check>
      <name>Server Count Change</name>
      <check-type>TREND</check-type>
      <check-over-period-seconds>3600</check-over-period-seconds>
      <path>/status/server-count</path>
      <tolerance>0</tolerance>
    </check>
    <check>
      <name>Host Count Change</name>
      <check-type>TREND</check-type>
      <check-over-period-seconds>3600</check-over-period-seconds>
      <path>/status/host-count</path>
      <tolerance>0</tolerance>
    </check>
    <check>
      <name>Foreign Cluster Count</name>
      <check-type>TREND</check-type>
      <check-over-period-seconds>3600</check-over-period-seconds>
      <path>/status/foreign-cluster-count</path>
      <tolerance>0</tolerance>
    </check>
    <check>
      <name>Is Bootstrapped</name>
      <check-type>BOOLEAN</check-type>
      <path>/status/is-bootstrapped</path>
    </check>
    <check>
      <name>Long Running Request</name>
      <check-type>LIMIT</check-type>
      <limit>60</limit>
      <path>/status/oldest-request</path>
    </check>
    <check>
      <name>Database Available</name>
      <check-type>BOOLEAN</check-type>
      <path>/status/database-available</path>
    </check>
    <check>
      <name>Failed Masters</name>
      <check-type>LIMIT</check-type>
      <limit>0</limit>
      <path>/status/failed-masters</path>
    </check>
    <check>
      <name>ASync Replicating</name>
      <check-type>LIMIT</check-type>
```

```

        <limit>0</limit>
        <path>/status/async-replicating</path>
    </check>
    <check>
        <name>Stands Per Forest</name>
        <check-type>LIMIT</check-type>
        <limit>50</limit>
        <warn-limit>35</warn-limit>
        <path>/status/max-stands-per-forest</path>
    </check>
    <check>
        <name>Max Forest Fragment Count</name>
        <check-type>LIMIT</check-type>
        <limit>64</limit>
        <warn-limit>55</warn-limit>
        <unit>m</unit>
        <path>/status/max-forest-fragments</path>
    </check>
    <check>
        <name>Max Forest Size</name>
        <check-type>LIMIT</check-type>
        <limit>200</limit>
        <warn-limit>180</warn-limit>
        <unit>gb</unit>
        <path>/status/max-forest-size-bytes</path>
    </check>
    <check>
        <name>DB Fragment count</name>
        <check-type>FOR_INFORMATION</check-type>
        <path>/status/document-count</path>
    </check>
    <check>
        <name>DB Size (mb)</name>
        <check-type>FOR_INFORMATION</check-type>
        <path>/status/on-disk-size-mb</path>
        <unit>mb</unit>
    </check>
    <check>
        <name>Capacity</name>
        <check-type>CAPACITY</check-type>
    </check>
    <check>
        <name>Freshness</name>
        <check-type>FRESHNESS</check-type>
        <path>/status/date-time</path>
        <limit>120</limit>
        <unit>seconds</unit>
    </check>
    <check>
        <name>Last Backup</name>
        <check-type>FRESHNESS</check-type>
        <limit>3</limit>
        <path>/status/last-backup</path>
        <unit>days</unit>
    </check>
</monitoring-config-item>
</monitoring-config>

```