Metrics Collection - Crunchy Containers for PostgreSQL

REVISION HISTORY			
NUMBER	DATE	DESCRIPTION	NAME

Contents

1 Description

PostgreSQL metrics are collected by the crunchy-collect container, which collects 32 different PostgreSQL metrics from a database container and pushes them to a Prometheus time series data store. A web-based graphing dashboard, Grafana, runs from crunchy-grafana, which displays the collected PostgreSQL metrics from the crunchy-prometheus container as a data source and uses the metrics to build dashboards.

To start collection of metrics on a PostgreSQL database, you add the crunchy-collect container into the pod that holds the crunchy-postgres container.

1.1 Overview

Metrics are stored in the crunchy-prometheus container, which runs the Prometheus time series database. The Prometheus pushgateway is found within the crunchy-promgateway container, and the Grafana web application is found within the crunchy-grafana container.

The crunchy-prometheus data in this example is stored in emptyDir volume types. To persist the data and Grafana templates long term, you will want to use NFS volume types as specified in the script examples/openshift/metrics/run-pvc.sh.

When running crunchy-metrics, the following ports are available:

- crunchy-prometheus:9090 - the Prometheus web user interface
- crunchy-promgateway:9091 - the Prometheus pushgateway REST API
- crunchy-grafana:3000 - the Grafana web user interface

1.2 Examples

1.2.1 Docker

You can collect various PostgreSQL metrics from your database container by running a crunchy-collect container that points to your database container.

Metrics collection requires you run the crunchy-metrics set of containers that includes:

- Prometheus
- Prometheus push gateway
- Grafana

To start this set of containers, run the following:

```
cd $CCPROOT/examples/docker/metrics
./run.sh
```

An example has been provided that runs a database container and also the associated metrics collection container, run the example as follows:

```
cd $CCPROOT/examples/docker/collect
./run.sh
```

Every 3 minutes the collection container will collect PostgreSQL metrics and push them to the Crunchy Prometheus database. You can graph them using the Crunchy Grafana container.

1.2.2 Kubernetes

This example starts up Prometheus, Grafana, and Prometheus gateway.

It is required to view or capture metrics collected by crunchy-collect.

Running the example:

```
examples/kube/metrics/run.sh
```

This will start up 3 containers and services:

- Prometheus (http://crunchy-prometheus:9090)
- Prometheus gateway (http://crunchy-promgateway:9091)
- Grafana (http://crunchy-grafana:3000)

If you want your metrics and dashboards to persist to NFS, run this script:

```
examples/kube/metrics/run-pvc.sh
```

In the docs folder of the github repo, check out the metrics.adoc for details on the exact metrics being collected.

This example runs a pod that includes a database container and a metrics collection container. A service is also created for the pod.

Running the example:

```
examples/kube/collect/run.sh
```

You can view the collect container logs using this command:

```
kubectl logs -c collect master-collect
```

You can access the database or drive load against it using this command:

```
psql -h master-collect -U postgres postgres
```

1.2.3 OpenShift

First, create the crunchy-metrics pod which contains the Prometheus data store and the Grafana graphing web application:

```
cd $CCPROOT/examples/openshift/metrics
./run.sh
```

At this point, you can view the Prometheus web console at crunchy-metrics:9090, the Prometheus push gateway at crunchy-metrics:9091, and the Grafana web app at crunchy-metrics:3000.

When accessing the Grafana web application, the default user credentials will be the username **admin** and the password **admin**.

Next, start a PostgreSQL pod that has the crunchy-collect container as follows:

```
cd $CCPROOT/examples/openshift/collect
./run.sh
```

At this point, metrics will be collected every 3 minutes and pushed to Prometheus. You can build graphs off the metrics using Grafana.

2 crunchy-collect Environment Variables

- POLL_INT - number of minutes to sleep until metrics are collected. defaults to 15 minutes
- PROM_GATEWAY - the http URL of the Prometheus pushgateway into which the metrics will be pushed. defaults to http://crunchy-promgateway:9091

3 Collected Metrics

Table 1: Table Connection Metrics

Metric	Description	Scope	Unit
crunchy_connections	the number of active connections	database/cluster	count

Table 2: Table Connection Utilization Metrics

Metric	Description	Scope	Unit
crunchy_connectionutil	the percent utilization of max connections	cluster	percent

Table 3: Table Database Size Metrics

Metric	Description	Scope	Unit
crunchy_databasesize	the size in Megabytes of a database	database	megabytes

Table 4: Table pg_stat_database Metrics

Metric	Description	Scope	Unit
crunchy_xact_commit	Number of transactions in this database that have been committed	database	count
crunchy_xact_rollback	Number of transactions in this database that have been rolled back	database	count
crunchy_tup_returned	tup_returned	database	count
crunchy_tup_fetched	tup_fetched	database	count
crunchy_tup_inserted	tup_inserted	database	count
crunchy_tup_updated	tup_updated	database	count
crunchy_tup_deleted	tup_deleted	database	count
crunchy_conflicts	conflicts	database	count
crunchy_temp_files	temp_files	database	count
crunchy_temp_bytes	temp_bytes	database	count
crunchy_deadlocks	deadlocks	database	count

Table 4: (continued)

Metric	Description	Scope	Unit
crunchy_blks_read	blks_read	database	count
crunchy_blks_hit	blks_hit	database	count
crunchy_hit_ratio	hit_ratio	database	percent
crunchy_blk_read_time	blk_read_time	database	time
crunchy_blk_write_time	blk_write_time	database	time

Table 5: Table bgwriter Metrics

Metric	Description	Scope	Unit
crunchy_checkpoints_timed	checkpoints_timed	cluster	count
crunchy_checkpoints_req	checkpoints_req	cluster	count
crunchy_checkpoint_write_time	checkpoint_write_time	cluster	count
crunchy_checkpoint_sync_time	checkpoint_sync_time	cluster	count
crunchy_buffers_checkpoint	buffers_checkpoint	cluster	count
crunchy_buffers_clean	buffers_clean	cluster	count
crunchy_maxwritten_clean	maxwritten_clean	cluster	count
crunchy_buffers_backend	buffers_backend	cluster	count
crunchy_buffers_backend_fsync	buffers_backend_fsync	cluster	count
crunchy_buffers_alloc	buffers_alloc	cluster	count

Table 6: Table Table Size Metrics

Metric	Description	Scope	Unit
crunchy_database_size	database_size in megs	database	megabytes
crunchy_table_size	table size in megs	database	megabytes
crunchy_index_size	index size in megs	database	megabytes
crunchy_total_size	total size in megs	database	megabytes

Table 7: Table Dead Rows Metrics

Metric	Description	Scope	Unit
crunchy_pct_dead	percentage dead rows in table	database	item

Table 8: Table Lock Metrics

Metric	Description	Scope	Unit
crunchy_lock_count	locks held for a database	database	count

Table 9: Table pg_xlog Metrics

Metric	Description	Scope	unit
crunchy_xlog_count	count of pg_xlog archive files	cluster	count

Table 10: Table cpu Metrics

Metric	Description	Scope	unit
crunchy_cpu_user	percentage of cpu utilization occurring at user level	system	percent
crunchy_cpu_kernel	percent of cpu utilization occurring at the system/kernel level	system	percent
crunchy_cpu_idle	percentage of time cpu is idle	system	percent
crunchy_cpu_iowait	percentage of time cpu is waiting on disk IO	system	percent
crunchy_cpu_nice	percentage of time cpu executing at user level with nice priority	system	percent

Table 11: Table memory Metrics

Metric	Description	Scope	unit
crunchy_mem_total	total amount of real memory	system	bytes
crunchy_mem_free	free amount of real memory	system	bytes
crunchy_mem_used	used amount of real memory	system	bytes
crunchy_mem_cache	amount of real memory used for caching	system	bytes
crunchy_mem_swap_total	total swap space	system	bytes
crunchy_mem_swap_used	total used swap space	system	bytes
crunchy_mem_swap_free	total free swap space	system	bytes

Table 12: Table network Metrics

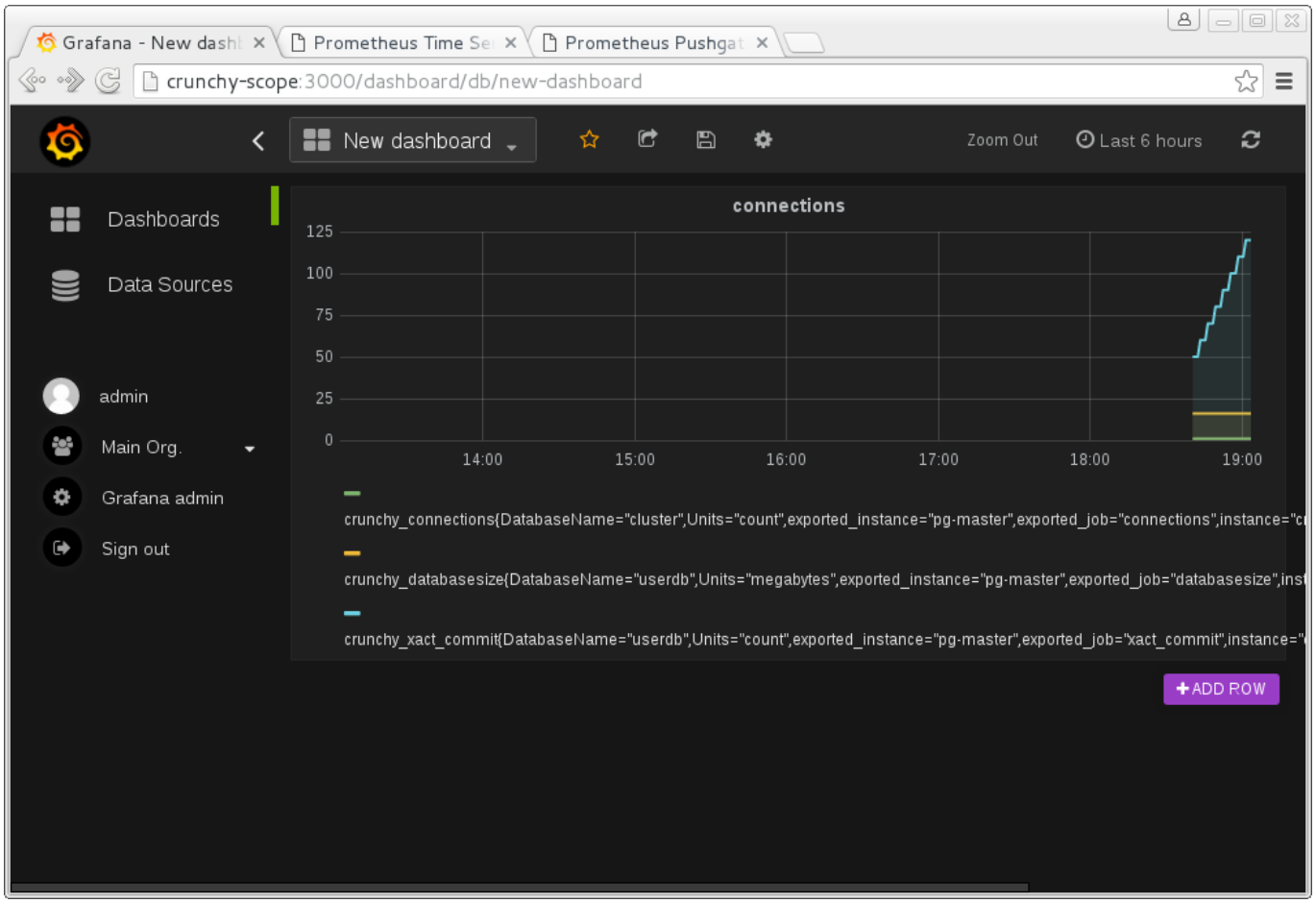
Metric	Description	Scope	unit
crunchy_net_tx	number of bytes transmitted	system	bytes
crunchy_net_rx	number of bytes received	system	bytes
crunchy_net_ipackets	number of packets received	system	count
crunchy_net_opackets	number of packets trasmitted	system	count
crunchy_net_ierrors	number of receive errors	system	count
crunchy_net_oerrors	number of transmit errors	system	count
crunchy_net_collisions	number of collisions	system	count

Table 13: Table storage Metrics

Metric	Description	Scope	unit
crunchy_storage_size	total size of file system	system	bytes
crunchy_storage_used	amount of space used on file system	system	bytes
crunchy_storage_free	amount of space free on file system	system	bytes
crunchy_storage_available	amount of space available on file system	system	bytes
crunchy_storage_inodes_total	total number of inodes in the file system	system	count
crunchy_storage_inodes_used	number of inodes used in the file system	system	count
crunchy_storage_inodes_free	number of inodes free in the file system	system	count
crunchy_storage_inodes_available	number of inodes available in the file system	system	count

4 Grafana Dashboard

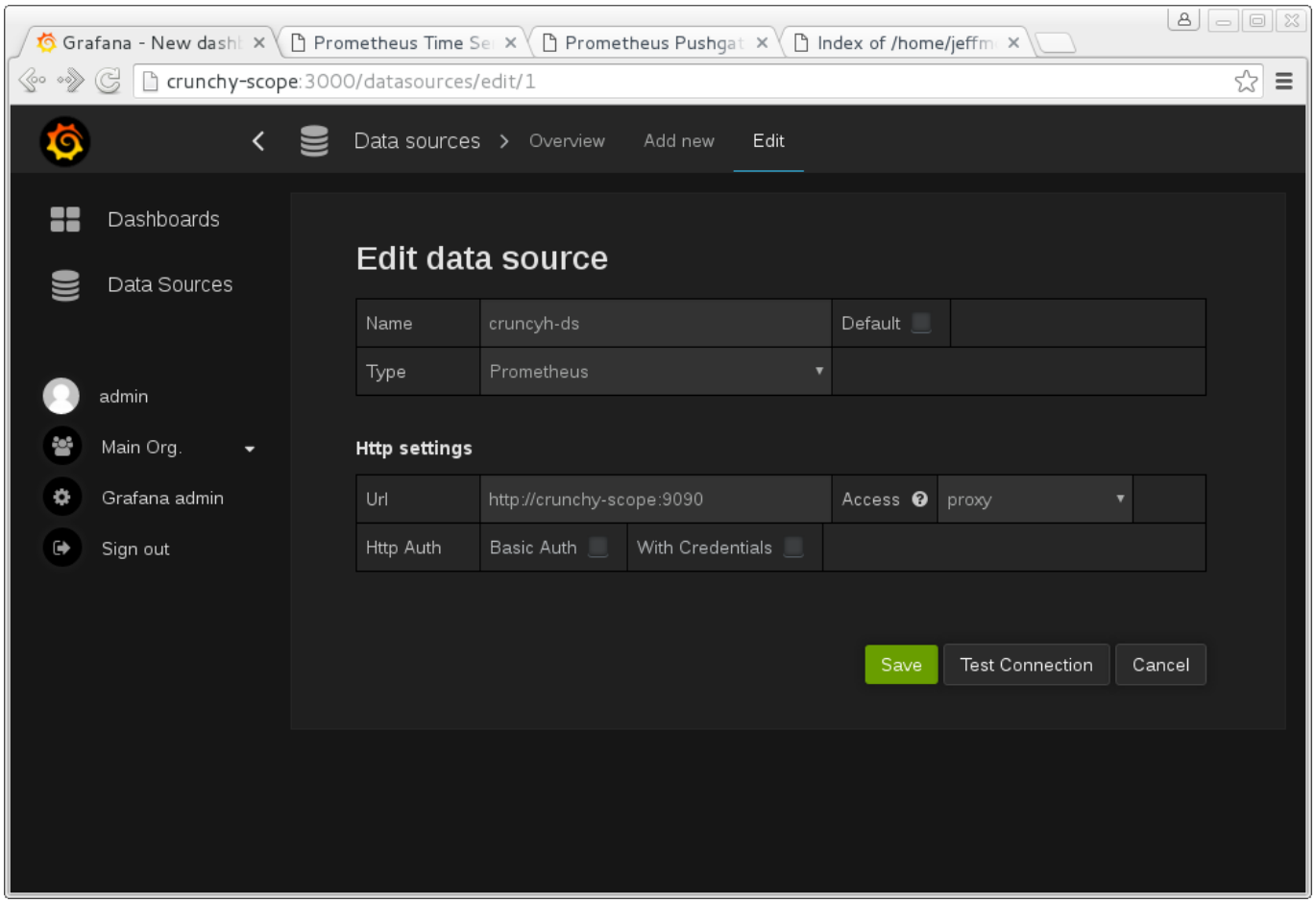
You can create dashboards of various graphs using the Grafana Dashboard editor:



Some more information on creating custom Grafana dashboards can be found in the official documentation - http://docs.grafana.org/guides/getting_started/.

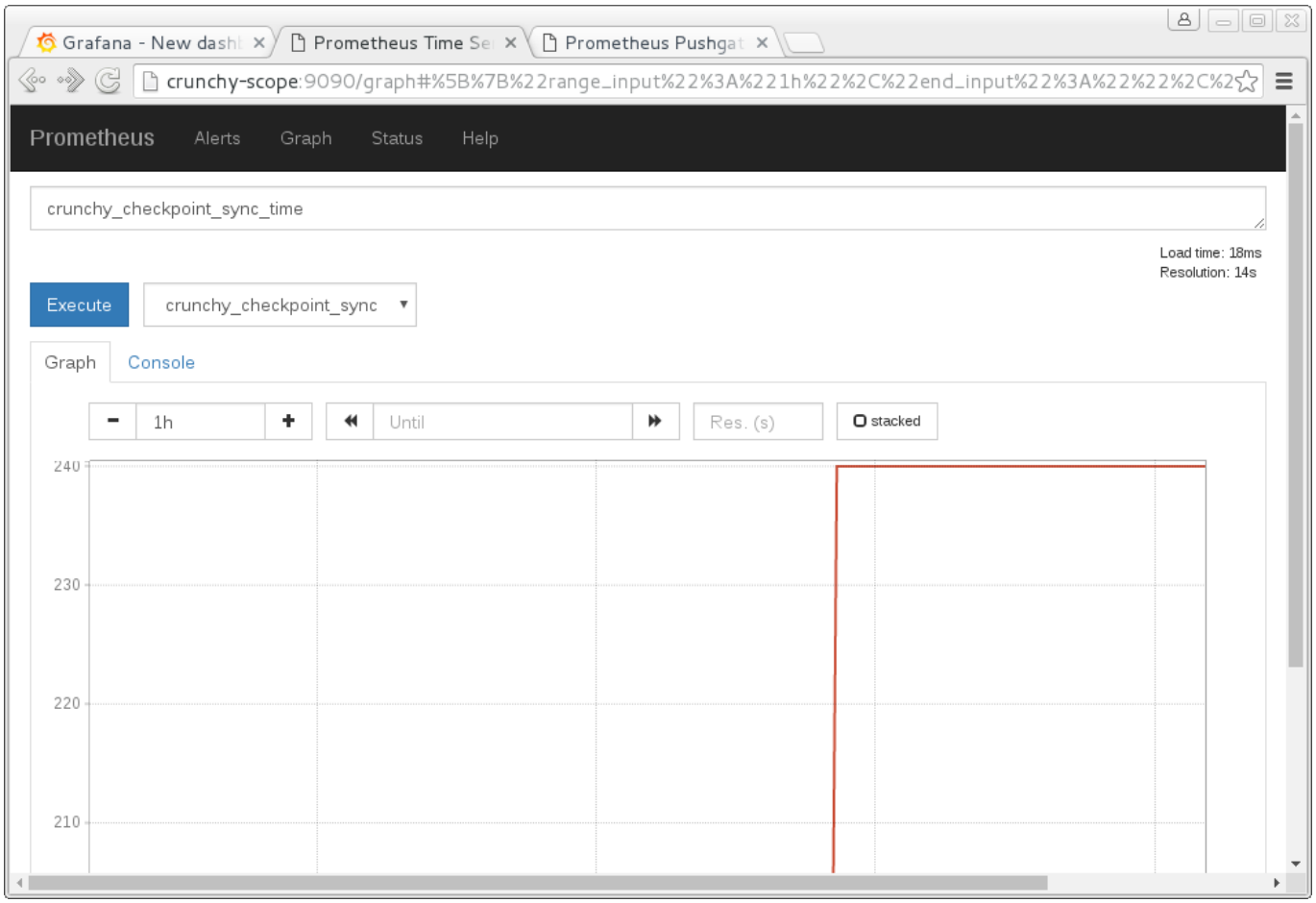
5 Grafana Data Source

You create a Grafana data source that represents the Prometheus database running within crunchy-prometheus:



6 Prometheus Console

You can issue raw queries to Prometheus using its web console:



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