Application of InfluxDB2 in the monitoring system of the MICC MLIT JINR

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MICC – multifunctional information computing complex

General view of JINR MICC

Work nodes and disk servers

Tape library

Cooling system

UPS
LITmon – MICC monitoring system

- 3 monitoring servers
- About 1800 nodes
- About 16000 service checks

#### Tier-1 Status
- Warning: Tier-1 tape space
- Critical: Tier-1 cmssw status

#### Tier-2 Status
- Warning: Tier-2 cmssw status
- Critical: Tier-2 total space

#### Cloud Status
- OK: Tier-1 cores
- OK: Tier-2 cores

#### CICC Status
- Critical: Tier-1 temp
- Critical: Tier-2 temp

#### Geosrun Status
- OK: Module-4 temp
- OK: Tier-1 pdus

#### HybrILIT Status
- Critical: Tier-2 pdus

#### Tier-1 Jobs
- Filled jobs: Tier-1 jobs
- Spreading jobs: Tier-1 jobs
- Running jobs: Tier-1 jobs

#### Tier-2 Jobs
- Filled jobs: Tier-2 jobs
- Spreading jobs: Tier-2 jobs
- Running jobs: Tier-2 jobs

#### Geosrun Average Load per Day (CPU)
- Average load per day: Geosrun

#### Geosrun Average Load per Day (GPU)
- Average load per day: Geosrun

#### JINR Cloud Status
- Critical: JINR cloud total raw space
- Critical: JINR cloud total RAM

#### JINR Cloud Usage
- Critical: JINR cloud total usage
General view of the JINR CMS Tier-1 dashboard
Structural scheme of the monitoring system

Data representation and visualisation

Legend
- Developed
- Configured
- Unchanged

NagVis

Nodes status
- Icinga2 web interface

Charts
- Grafana
- Pnp4nagios графики

Data aggregation

Notification system
- SMS notification server
  - SMS notification scripts
  - Mail notification system

Icinga2 monitoring system
- Icinga2 notification system
- Configuration files
- Gathering data and manage scripts
  - Icinga2 service

Data Storage system
- rrd
- PHP chart templates
- Grafana configs
- Pnp4nagios

Data sources: facilities, protocols

snmp
TCP/IP

Network devices
Cooling system
UPS
Computing servers
Storage servers
Monitoring data system analysis: The original system based on RRD

365 Gb data for 4 years + 495 GB spool files
Monitoring data system analysis: cons

- More than 20 Gb RAM
- About 5 Gb RAM

- The need for excess disk space and RAM to store charts.
- Low performance compared to competitors.
- Installing extra software.
- There is no option to enable charts automatically.
- Inability to replicate and save data.

RRD

InfluxDB?
Monitoring data system analysis: end of support

This project is no longer active.
Thank you for the many years we have worked together on this project.
Feel free to take over the project.
This repository is no longer maintained!

github.com/lingej/pnp4nagios/blob/master/README

Latest commit 5e09f53 on Jan 16, 2022

History

ADIOS
Optimization of data aggregation and processing layer

- Analysis of the monitoring data storage system
- Evaluation of actual software solutions
- Organize your data migration plan
- Creation of data transfer software
- Integration into the monitoring system
# Evaluation of relevant solutions

<table>
<thead>
<tr>
<th>Software name</th>
<th>Icinga2 support</th>
<th>Query language</th>
<th>Grafana support</th>
<th>Key features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prometheus</td>
<td>+ -</td>
<td>PromQL</td>
<td>+</td>
<td>The monitoring system + time series database</td>
</tr>
<tr>
<td>Graphite</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>Time series database</td>
</tr>
<tr>
<td>InfluxDB 1.8</td>
<td>+</td>
<td>InfluQL (SQL)</td>
<td>+</td>
<td>Time series database</td>
</tr>
<tr>
<td>InfluxDB 2.6</td>
<td>+</td>
<td>Flux</td>
<td>+</td>
<td>Time series database</td>
</tr>
<tr>
<td>Elasticsearch</td>
<td>+</td>
<td>DSL</td>
<td>+</td>
<td>Text information database</td>
</tr>
<tr>
<td>Opentsdb</td>
<td>+</td>
<td>SQL</td>
<td>+</td>
<td>Time series database</td>
</tr>
</tbody>
</table>
## Evaluation of relevant solutions: results

<table>
<thead>
<tr>
<th>Product name</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prometheus</td>
<td>Lack of a developed query language. Icinga2 does not support by default.</td>
</tr>
<tr>
<td>Graphite</td>
<td>Low performance in read/write operations and query execution time (14 times worse than Influxdb2)</td>
</tr>
<tr>
<td>InfluxDB 1.8</td>
<td>An older version of Influxdb that will be deprecated over time.</td>
</tr>
<tr>
<td><strong>InfluxDB 2.6</strong></td>
<td>+</td>
</tr>
<tr>
<td>Elasticsearch</td>
<td>Low query execution speed for operations with the output of points, focus on working with text.</td>
</tr>
<tr>
<td>Opentsdb</td>
<td>Low performance in read/write operations and query execution time (9 times worse than Influxdb2)</td>
</tr>
</tbody>
</table>
import rrdtool
from influxdb_client import InfluxDBClient, Point
from influxdb_client.client.write_api import SYNCHRONOUS

[root@litmon-01 pnp4nagios]# ./rrdflux2.py -h
Updates or dumps passed RRD File to selected InfluxDB database
  -h, --help      Display help and exit
  -u, --update    Only update database with last value
  -m, --dump      Dump full RRD to database
  -f, --file      RRD file to dump
  -H, --host      Optional. Name or IP of InfluxDB server. Default localhost.
  -d, --database  Database name where to store data.
  -U, --user      Optional. Database user.
  -P, --password  Optional. Database password.
  -s, --start     Start days ago.
  -e, --end       End date ego, e.g. now
EXAMPLE: ./rrdflux2.py -H wna000.jinr-tl.ru -s -20d -e now
Operation algorithm of the monitored data storage system

Old
- Disk space - 860 Gb used
- RAM - 30 Gb required
- The need to create a new unix socket when adding a node
- Lack of data replication capability

New
- Disk space – 16 Gb used
- RAM – 5 Gb used
- Automatic creation adding new nodes to the database
- DB replication
Replication data system

Litmon-01.jinr.ru

replication

Litmon.jinr.ru

backup

object Influxdb2Writer "influxdb2" {
    host = "159.93.227.19"
    port = 8086
    organization = "jinr"
    bucket = "icinga2"
}

object Influxdb2Writer "influxdb2_backup" {
    host = "159.93.227.250"
    port = 8086
    organization = "jinr"
    bucket = "icinga2"
}

api checker icingadb ido-mysql influxdb2 influxdb2_backup
A new system for storing traceable data by the LITmon monitoring system has been put into operation.
Thank you for your attention!
Abstract

One of the most important components of the monitoring system LITMon MICC LIT JINR is the data storage system. Initially, it was based on the RRD database and a special pnp4nagios plugin, support for which ended in 2022. Required features no longer work. The RRD database is morally obsolete and has ceased to meet performance requirements and has begun to consume more computing resources of the monitoring system server in comparison with analogues. Migrating data to a database based on InfluxDB software will solve these problems.