



openway

be fast. be smart. be unique.

#1 digital payment software platform provider



Complex Monitoring: Product view

Openway Service

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2017

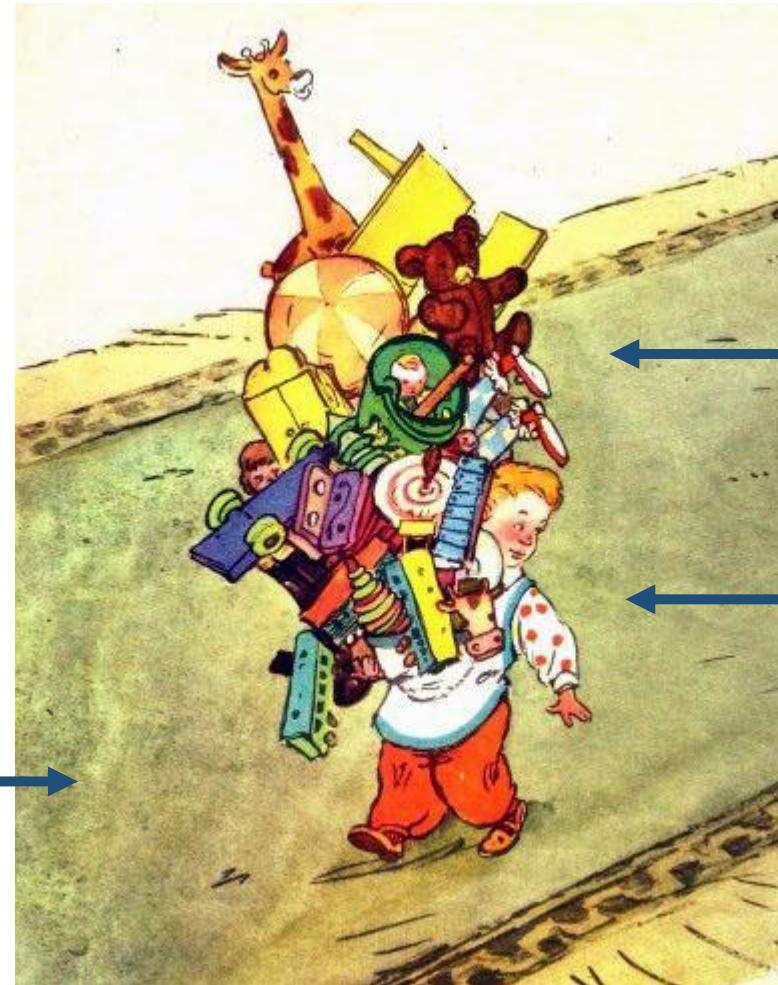
Main Problem – many important* components

Большой карман

Мой знакомый мальчуган
Снят на этой карточке.
У него большой карман
Спереди на фартучке.

С. Я. Маршак

Roadmap



Components

Client

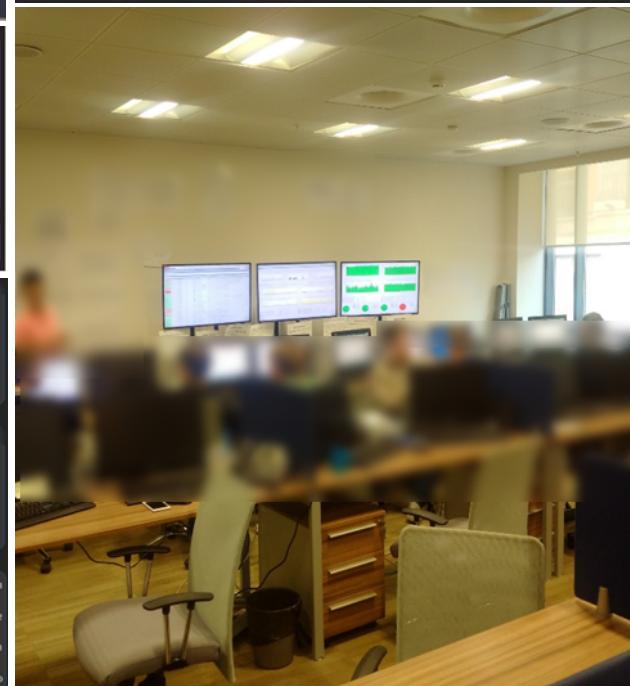
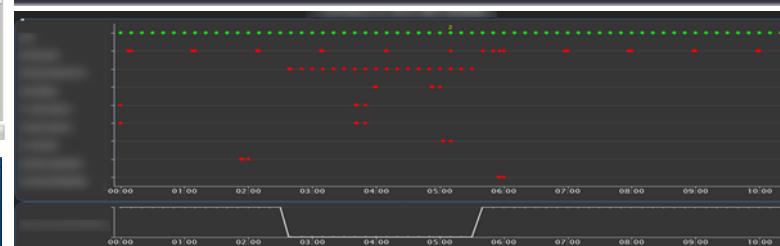
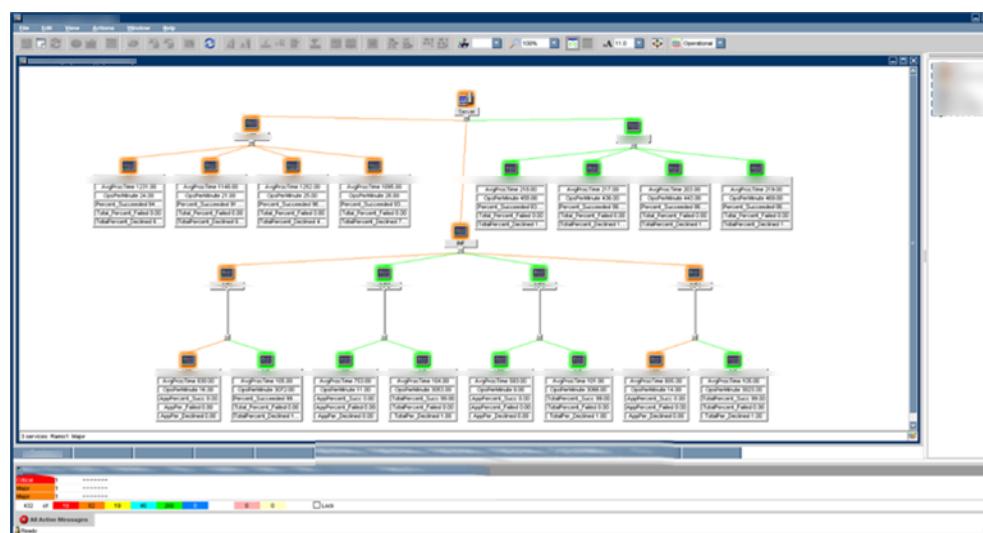
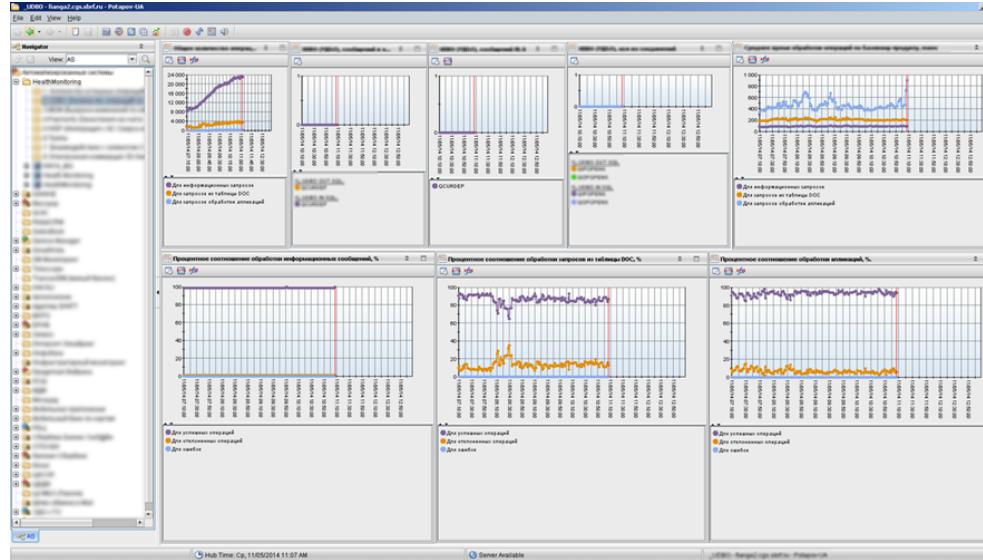
* Important component must be under monitoring

Other issues in Openway Service context

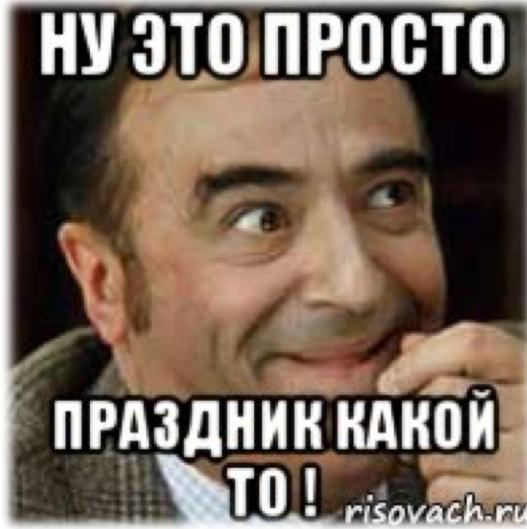
- 100+ independent/different banking-oriented clients
- AIX Power / Solaris SPARC / Linux/Windows x86_64*
- Isolated (no internet) / mixed environment
- No client resources to “monitoring deep dive”
- Linked external monitoring resources (DB / MQ / WS / ...)
- No client resources to setup/maintain it.

* - mixed environment

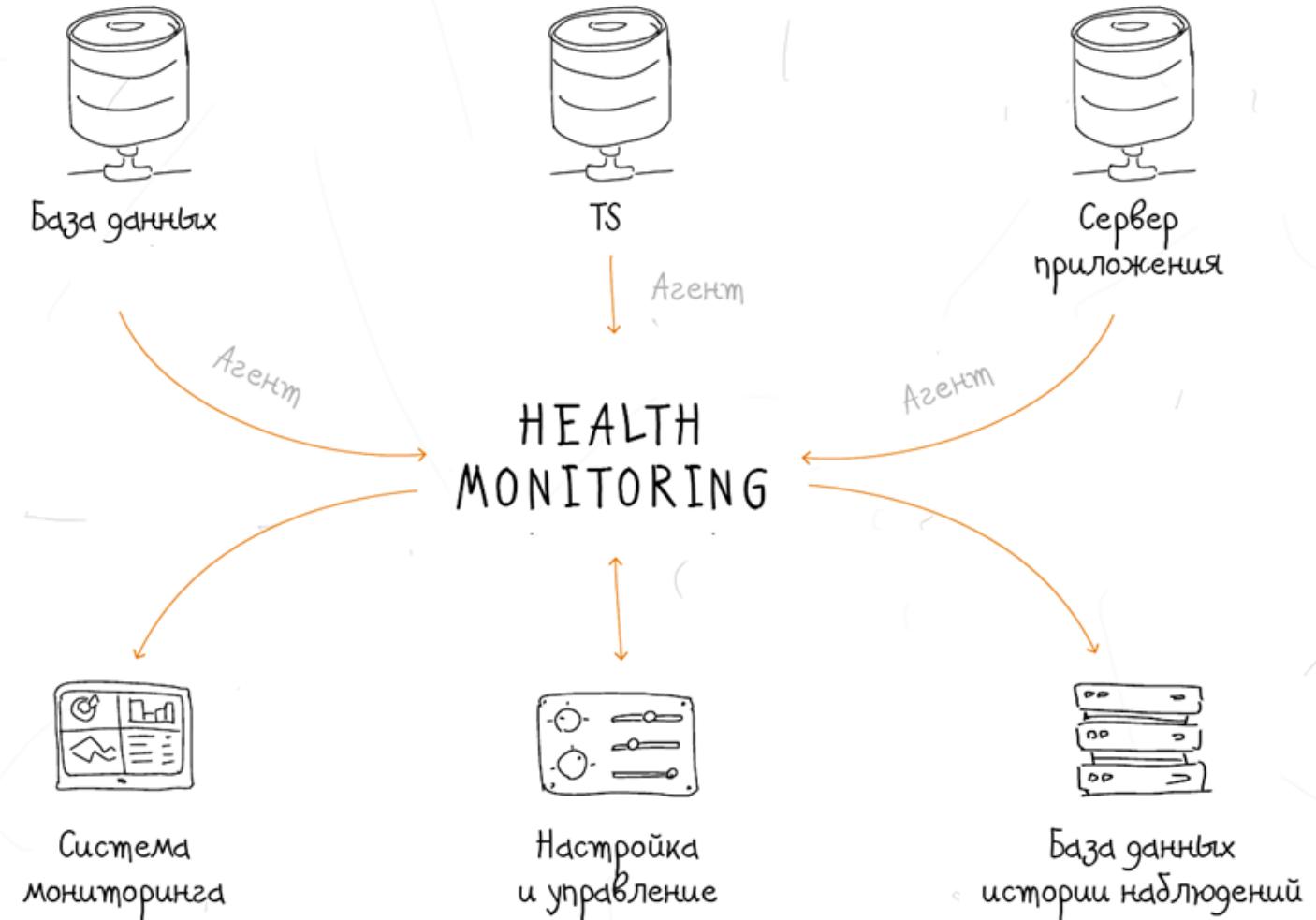
Monitoring Wanted



Handsome Architecture



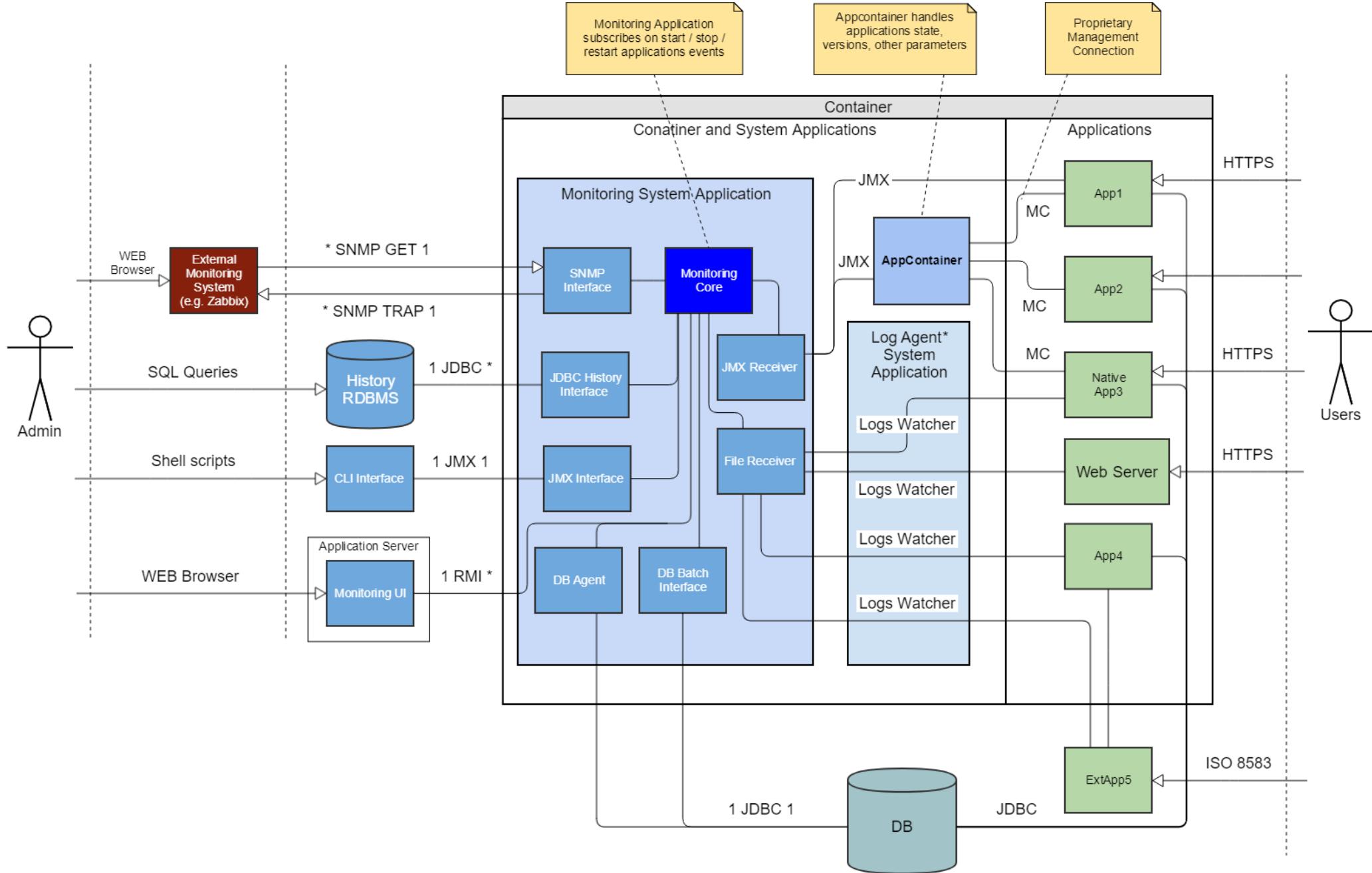
ДИАГНОСТИКА



Ноу?



Real Architecture

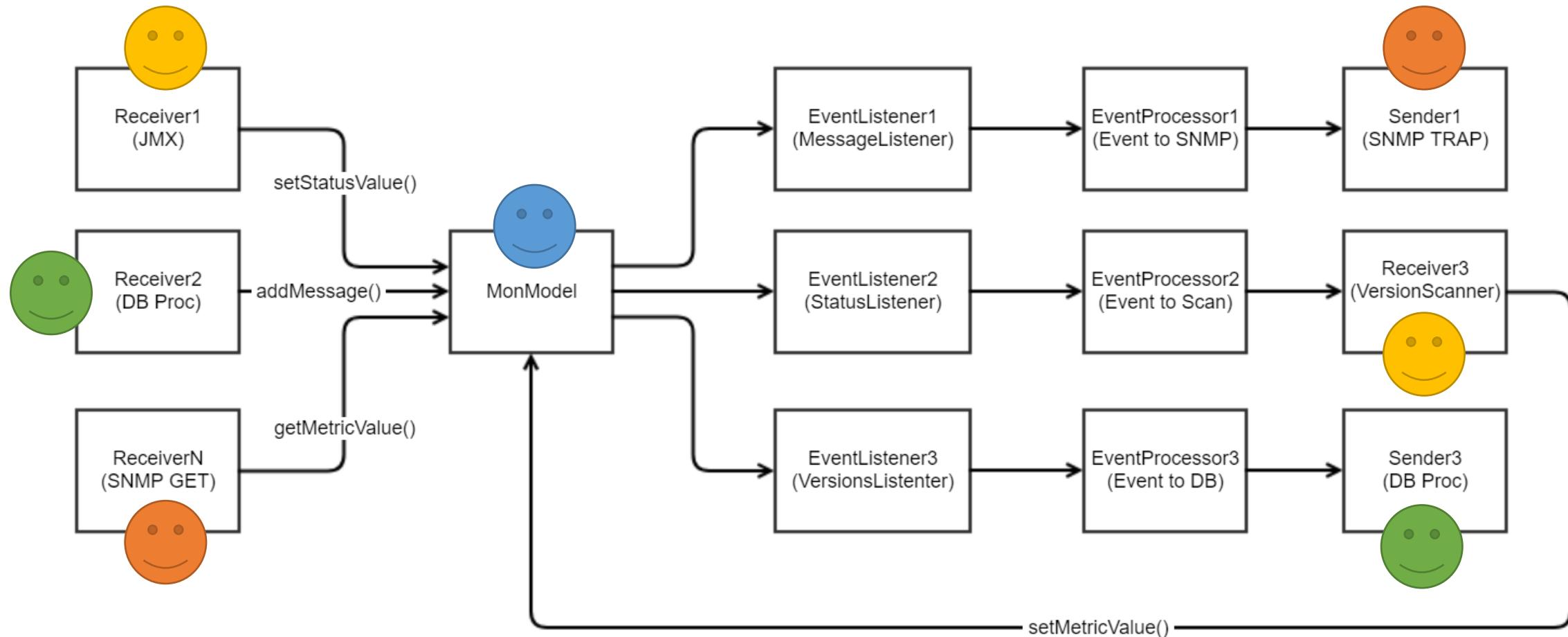


Monitoring domain – monitoring objects

Monitoring:

- Object
 - Metric
 - Stream (of messages)
 - Status
-
- ```
graph TD; Root[monitoring [qa-111:2299]] --> DEFAULT[DEFAULT]; Root --> Processes[Processes]; Root --> Status[Status]; DEFAULT --> Metric1((m) Instance.NDelayedJobs); DEFAULT --> Metric2((m) Instance.NInvalidJobs); DEFAULT --> Metric3((m) Instance.State); Processes --> Stream[3-DSecureEnrollment]; Stream --> StreamDefault[$ Default]; Status --> Process1[Applybufferedbalances(parallel)]; Status --> Process2[CloseDeviceCycle]
```

# Core – domain, API, SPI and implementation



# Spring 4 on Groovy 2.4 in 2015.2

**Start with:**

- Tech holy war architect question – what technology/platform?
- Configuration? Distributed configuration? Zero configuration?
- Update in client case with no DevOps / ProdOps?

**End with:**

- Change log-level for debug reasons without restart monitoring?

**DISCUSS all non-functional requirements with your team!**



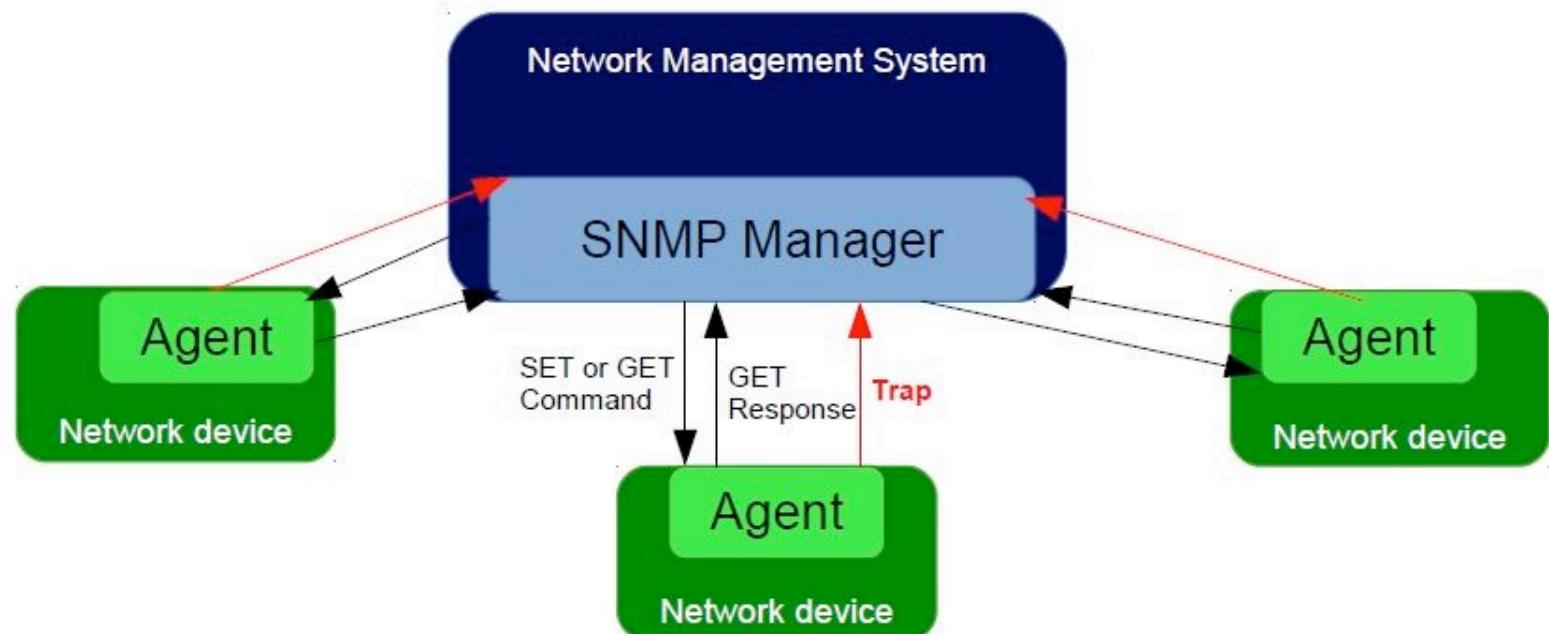
# SNMP / Static MIB

**SNMP:** Simple Network Management Protocol

**MIB:** Management Information Base

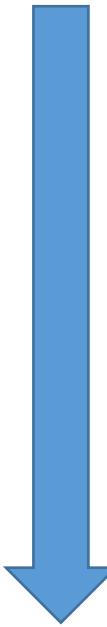
Examples:

1. [HP-LASERJET](#)
2. [ILOM - E24707 01](#)
3. [CentOS 7](#)



# Dynamic MIB

1. Add mon objects
2. Exec monitoring mib.generate
3. OPENWAY-SNMP-MONITOR.mib:



Logged as hmainadmin [Logout](#)

Monitoring tree Properties group

The screenshot shows a monitoring interface with two main panes. The left pane, 'Monitoring tree', displays a hierarchical list of monitored objects under 'm\_web\_console' and 'monitoring'. One object under 'monitoring' is expanded to show sub-objects like '01', 'BILLING', 'E\_COMMERC', etc. A specific metric, 'OpsPerSecond.Declined', is highlighted with a red oval. The right pane, 'Properties group', shows a detailed view of this metric. It includes fields for 'SNMP OID' (1.3.6.1.3.566.2.2.58.25.4.1.2.1.4), 'Path' (/01/E\_COMMERC/Input/AllMsg/OpsPerSecond.Declined), 'Reg date' (2017-07-11T21:30:53.218+03:00), and 'Enabled' (true). Below this, the 'Metric value' section shows 'Type name: OpStat:OpsPerSecond', 'Measure unit: Per Second [s]', 'Value: 0.0', 'Valid from: 2017-07-11T21:25:00.000+03:00', 'Valid to: 2017-07-11T21:30:00.000+03:00', and 'Expire period: 10 minutes'. Buttons for 'Refresh value' and 'Delete' are also present.

--1.3.6.1.3.566.2.2.58.25.4.1.2.1.4 server/01/E\_COMMERC/Input/AllMsg/OpsPerSecond.Declined  
ns-01-e-commerce-input-allmsg-opspersecond-declined OBJECT-TYPE  
SYNTAX INTEGER -- multiplier: 1000

# SNMP Walk on dynamic monitoring tree

```
/usr/bin/snmpwalk -v 1 -c public localhost:1161 1.3.6.1.3.566.2.2.52
```

...

```
SNMPv2-SMI::experimental.566.2.2.52.1.1.0 = STRING: "Database connection pool
opening..."
```

```
SNMPv2-SMI::experimental.566.2.2.52.2.1.1.0 = ""
```

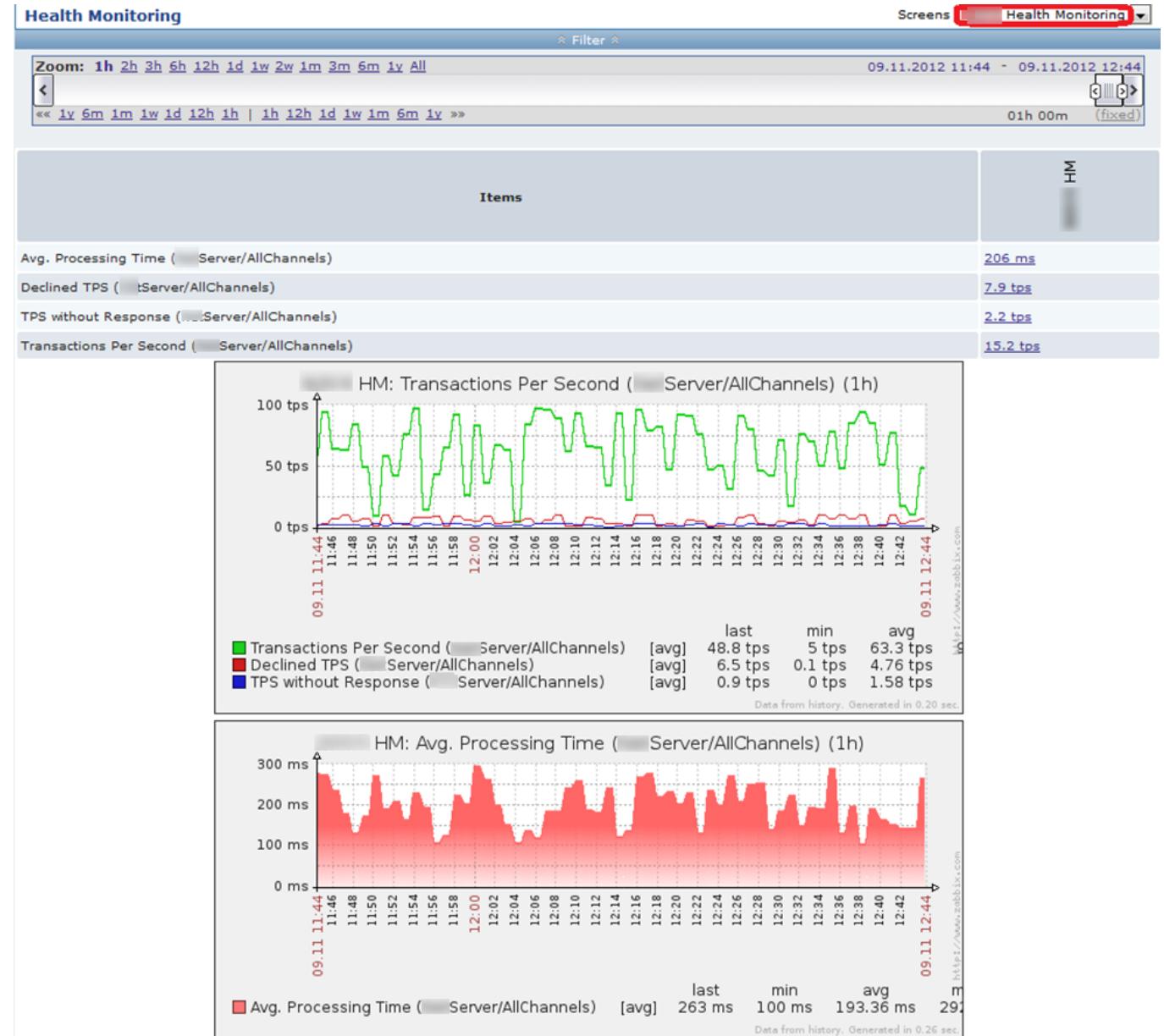
```
SNMPv2-SMI::experimental.566.2.2.52.2.1.2.0 = STRING: "Process Access Server :
Active. Parameters: HOSTNAME=server1;CONNECTION_
GROUP_ID=main;CONNECTION_POOL_ID=WAY4U Kernel Notifications;"
```

```
SNMPv2-SMI::experimental.566.2.2.52.2.2.1.0 = ""
```

```
SNMPv2-SMI::experimental.566.2.2.52.2.2.2.0 = STRING: "Application
WAY4Processes/ApplyProductChanges is C"
```

# SNMP4J

- <http://www.snmp4j.org/>
- Really multiplatform
- SNMPv1/v2c/v3
- UDP/TCP
- Security in SNMPv3
- SNMP
  - GET/TRAP
  - WALK



# CLI and UI

Monitoring JMX CLI returned:

```
{
 "monObject": "MonStatus",
 "path": "ATM1/Status",
 "numId": 1,
 "regDate": 1469097915942,
 "updDate": 1469097915942,
 "monObjectType": "appserver-app",
 "enabled": true,
 "statusValueType": "ApplicationStatusValue",
 "statusValue": {
 "finishTime": 1499627511786,
 "statusValue": "STOPPED",
 "startTime": 1499627511786
 },
 "statusValueClass": "ApplicationStatus"
}
```

**Monitoring tree**

- Unknown [01:1099]
  - monitoring [-9:2299]
    - ATM1
      - Default
      - Status
    - ATM2
    - ATM3
    - ATM4
    - ATM5
    - [redacted]
    - DEFAULT
    - Mojo
    - Sch
    - W4W\_internal
    - appserver
    - authgate
    - ccc
    - container
    - database
    - internal
    - logagent
    - m2\_web\_console
    - monitoring
    - monitoring\_ui
    - monitoring\_ui1
    - [redacted]-db
    - sch\_41
    - smsh

**Status**

St **SNMP OID:** 1.3.6.1.3.566.2.2.50.9.1  
**Path:** ATM1/Status  
**Reg date:** 2016-07-21T13:45:15.942+03:00  
**Enabled:** true

**Status value**

**Value:** stopped  
**Reg date:** 2017-07-09T22:11:51.786+03:00  
**Expire period:** Unexpired

Show raw value

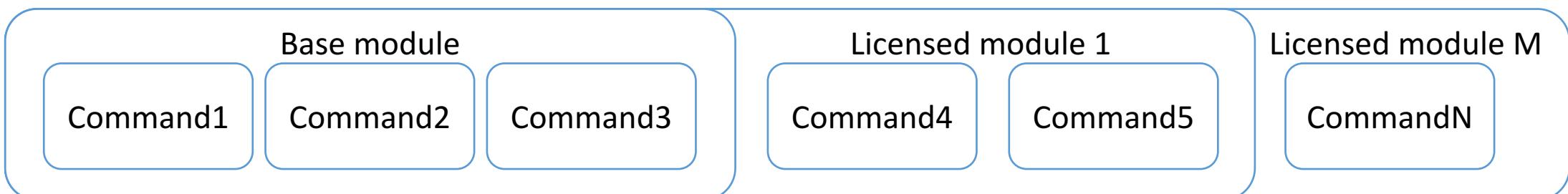
**Refresh value** **Delete**

# JMX Beans as CLI and licensing

```
@ManagedOperation(description = 'Register process
statuses for last ${period} day(s)')
@ManagedOperationUtilityDescription("cards.register.statuses")

void registerStatuses(String period) {
 if (!dbAgentsExecutor.componentStarted) {
 ...
 log.debug("Registered process statuses for last $period
day(s)")
 }
}
```

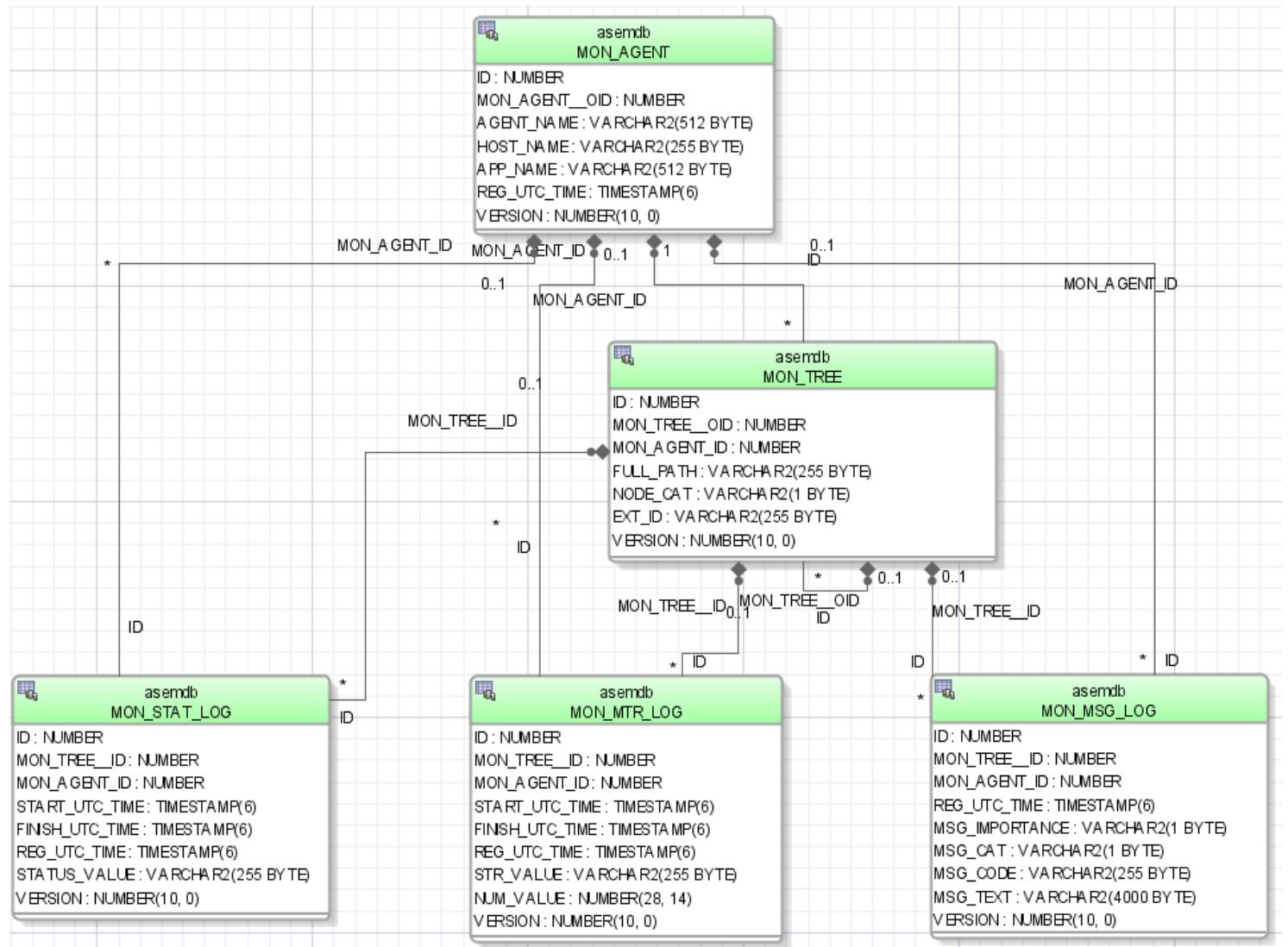
[way4@srv bin]\$ ./monitoring  
Monitoring JMX CLI  
Usage: monitoring [<group\_name>.]<command> [arguments]  
Please use --help as argument to see the full syntax of the command  
Available commands:  
Group 'historyDatabase' - History database management  
    update.history.database                 -     Update history database  
Group 'certificate' - Certificate management  
    certificate                             -     Manage certificates  
Group 'remoteSqlExecutionService' - SQL Statement Executor on  
WAY4 CARDS schema  
    **cards.register.statuses - Register process statuses for last  
\${period} day(s)**  
Group 'jmxReceiver' - Application server JMX gate  
    versions  
...



# Mini-History DB on Liquibase + Hibernate

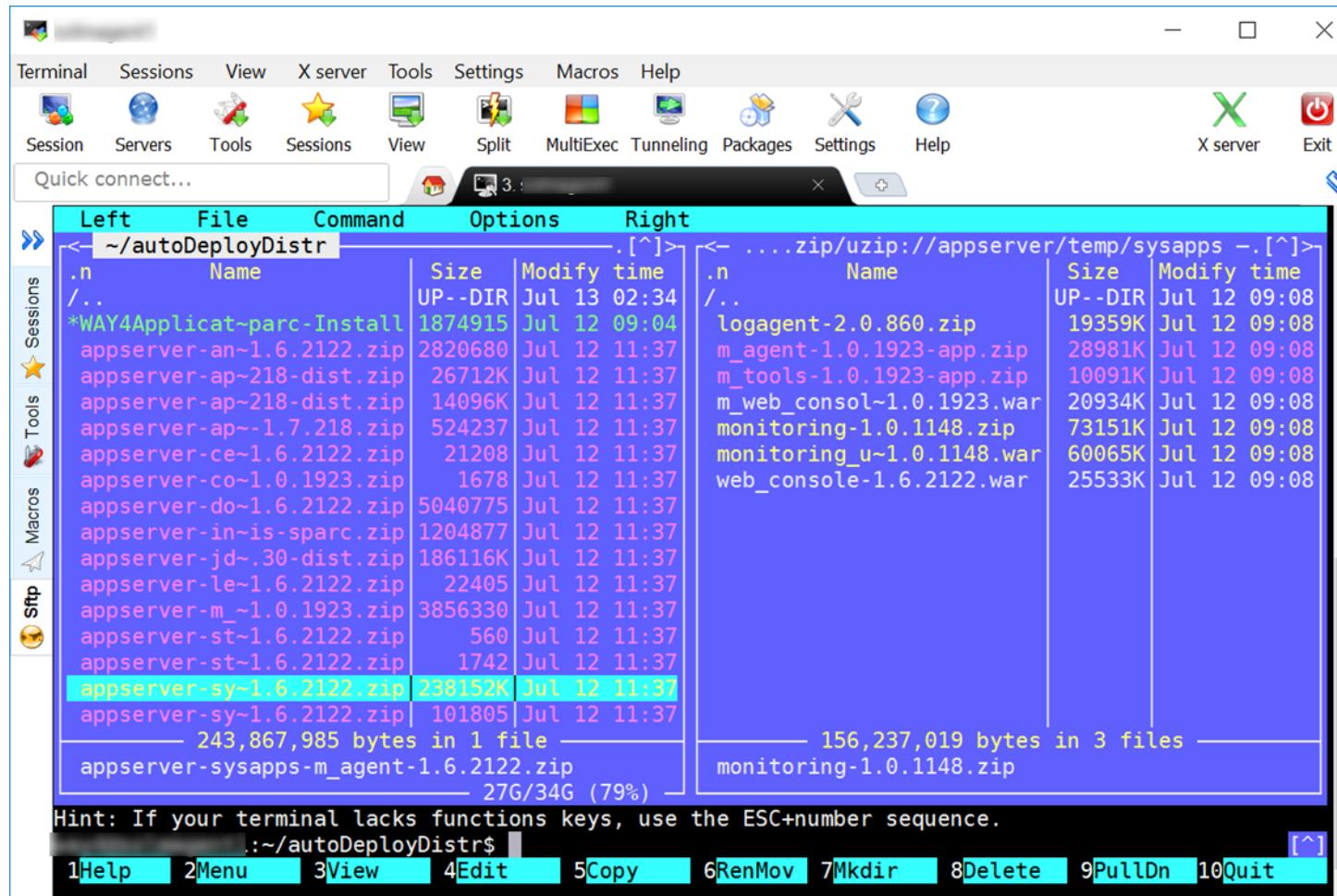
- 5 tables
- Hibernate
- Liquibase
- Typical queries
- Row / partition HSK

```
select mon_msg_log.reg_utc_time,
 msg_importance, msg_cat,
 msg_code, msg_text,
 agent_name
 from mon_msg_log, mon_agent
 where /* ERROR ("E") , WARN ("W") , ... */
 msg_cat in ('E', 'W') and
 mon_tree_id in (...
```



# Deployment

- “Bundled with” main component (deploy with main component)
- Standalone distro is also available



The screenshot shows a terminal window with a menu bar (Terminal, Sessions, View, X server, Tools, Settings, Macros, Help) and a toolbar (Session, Servers, Tools, Sessions, View, Split, MultiExec, Tunneling, Packages, Settings, Help). A sidebar on the left lists Sessions, Tools, Macros, and Ssh. The main area displays two file lists side-by-side:

| Left                      | File                                   | Command      | Options     | Right                                         |
|---------------------------|----------------------------------------|--------------|-------------|-----------------------------------------------|
| ..                        | Name                                   | Size         | Modify time | ..                                            |
| *WAY4Aplicat~parc-Install | 1874915                                | Jul 12 09:04 |             | .n Name Size Modify time                      |
| appserver-an~1.6.2122.zip | 2820680                                | Jul 12 11:37 |             | /.. UP--DIR Jul 12 09:08                      |
| appserver-ap~218-dist.zip | 26712K                                 | Jul 12 11:37 |             | logagent-2.0.860.zip 19359K Jul 12 09:08      |
| appserver-ap~218-dist.zip | 14096K                                 | Jul 12 11:37 |             | m_agent-1.0.1923-app.zip 28981K Jul 12 09:08  |
| appserver-ap~1.7.218.zip  | 524237                                 | Jul 12 11:37 |             | m_tools-1.0.1923-app.zip 10091K Jul 12 09:08  |
| appserver-ce~1.6.2122.zip | 21208                                  | Jul 12 11:37 |             | m_web_consol~1.0.1923.war 20934K Jul 12 09:08 |
| appserver-co~1.0.1923.zip | 1678                                   | Jul 12 11:37 |             | monitoring-1.0.1148.zip 73151K Jul 12 09:08   |
| appserver-do~1.6.2122.zip | 5040775                                | Jul 12 11:37 |             | monitoring_u~1.0.1148.war 60065K Jul 12 09:08 |
| appserver-in~is-sparc.zip | 1204877                                | Jul 12 11:37 |             | web_console-1.6.2122.war 25533K Jul 12 09:08  |
| appserver-jd~.30-dist.zip | 186116K                                | Jul 12 11:37 |             |                                               |
| appserver-le~1.6.2122.zip | 22405                                  | Jul 12 11:37 |             |                                               |
| appserver-m~1.0.1923.zip  | 3856330                                | Jul 12 11:37 |             |                                               |
| appserver-st~1.6.2122.zip | 560                                    | Jul 12 11:37 |             |                                               |
| appserver-st~1.6.2122.zip | 1742                                   | Jul 12 11:37 |             |                                               |
| appserver-sy~1.6.2122.zip | 238152K                                | Jul 12 11:37 |             |                                               |
| appserver-sy~1.6.2122.zip | 101805                                 | Jul 12 11:37 |             |                                               |
|                           | 243,867,985 bytes in 1 file            |              |             |                                               |
|                           | appserver-sysapps-m_agent-1.6.2122.zip |              |             | 156,237,019 bytes in 3 files                  |
|                           |                                        |              |             | monitoring-1.0.1148.zip                       |
|                           |                                        |              |             | 27G/34G (79%)                                 |

Hint: If your terminal lacks functions keys, use the ESC+number sequence.

1Help 2Menu 3View 4Edit 5Copy 6RenMov 7Mkdir 8Delete 9PullDn 10Quit



# Product Quality

## 1. CD



## 2. Code coverage

Overall Coverage Summary

| Package     | Class, %        | Method, %         | Line, %         |
|-------------|-----------------|-------------------|-----------------|
| all classes | 87.7% (512/584) | 84.1% (1215/1444) | 83% (7889/9503) |

## 3. Tests

▼  MAgent AIX 7 gradle tests | ▾  
#1.6.2122       Tests passed: 248 | ▾

LET'S DEPLOY ALL PRODUCTS

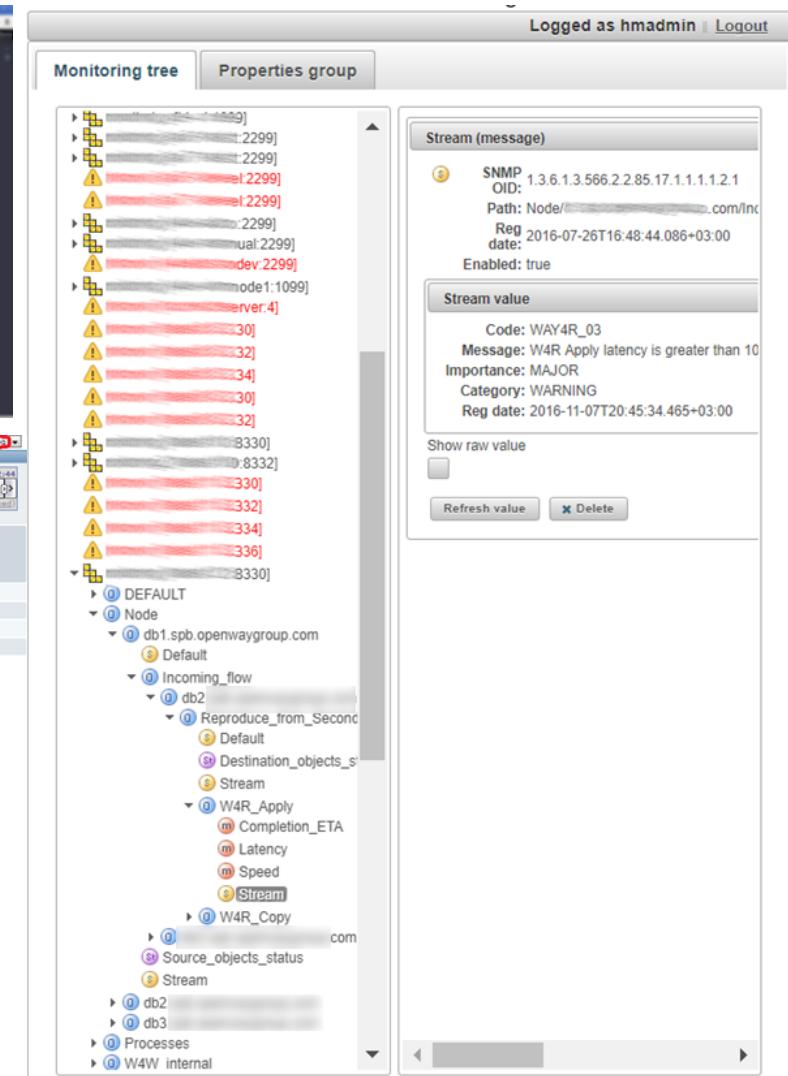
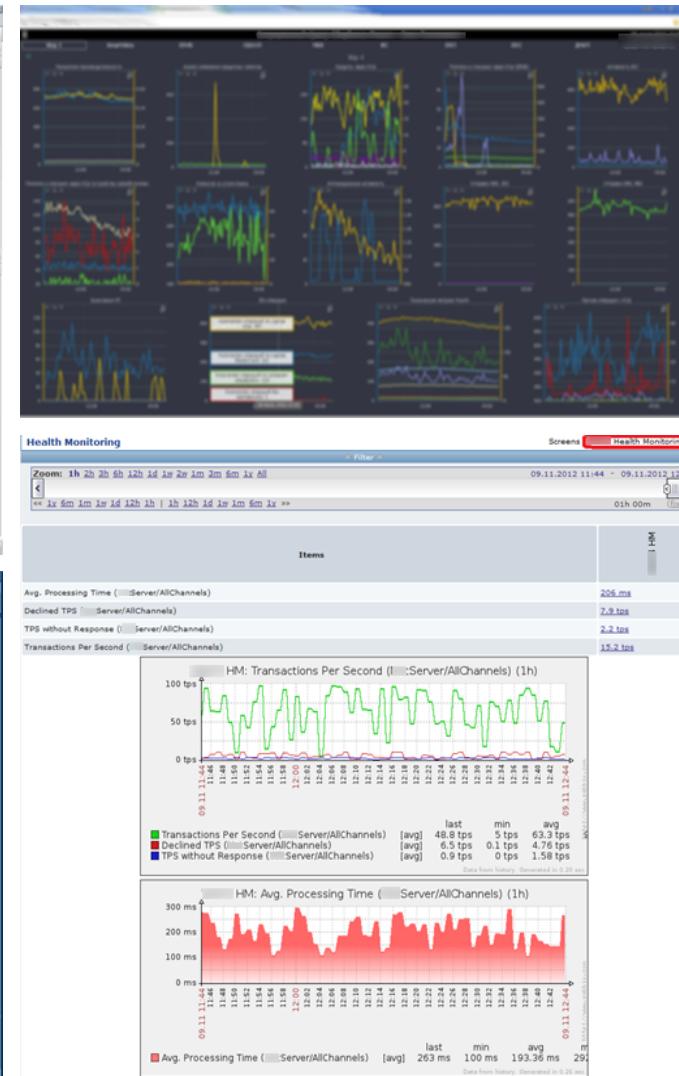
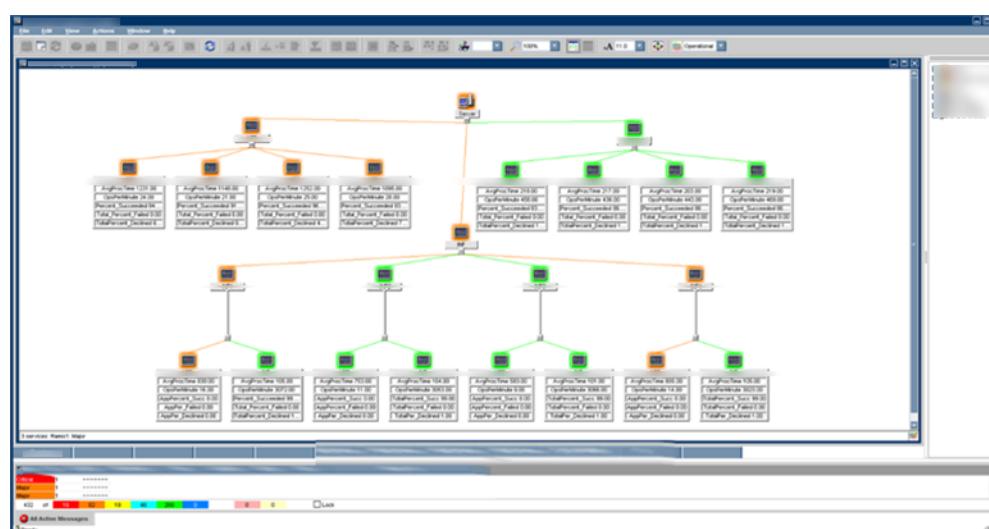
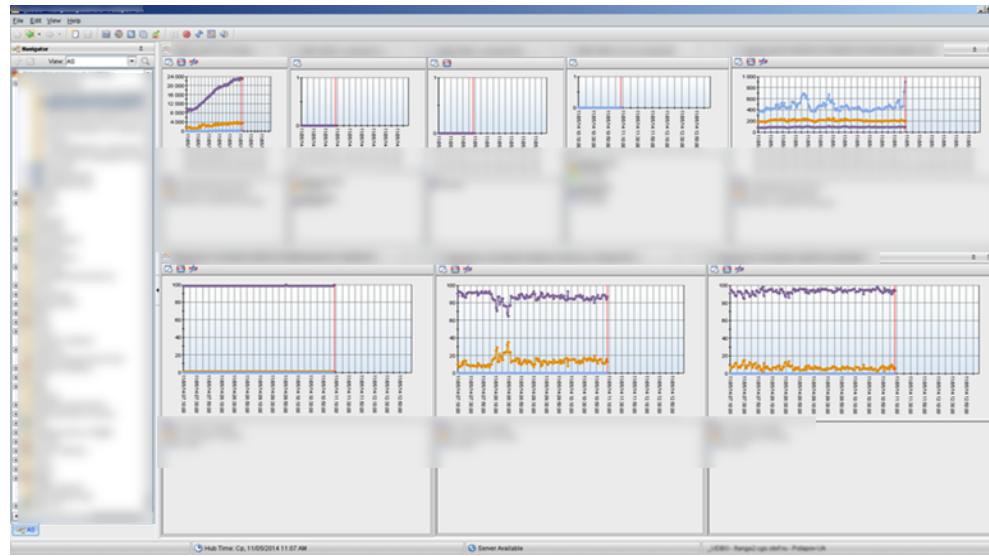


## 4. Deploy to infrastructure / production

# What would be better

- Use Kotlin for development – it is stable now
- Look at Prometheus - <https://prometheus.io/>
- Look at Elasticsearch / Splunk for logs/events search
- Get rid of RMI in heterogeneous environments
- Get rid of heterogeneous environments ☺
- Look at SCM (Ansible, Chef, Puppet, SaltStack) for large deployments

# Result



# Summary

- Remember your Roadmap
- Define domain
- Do/implement it in parallel
- Do simple
- Complex test it / think about continuous delivery



100+ independent/different banking-oriented clients

# We've done it!





**thank you!  
questions**

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