



# Jolokia 2.0

Dr. Roland Huß  
Red Hat

JavaZone, 9/2016

# The Chili and me

## ► Software Engineer @ Red Hat

- ❖ fabric8 - Microservices Platform for Kubernetes and OpenShift
- ❖ docker-maven-plugin
- ❖ Jolokia

 <https://rol4nd.de>

 rol4nd

 <https://github.com/rhuss>



## ► Growing Chilis since 2005

# Agenda

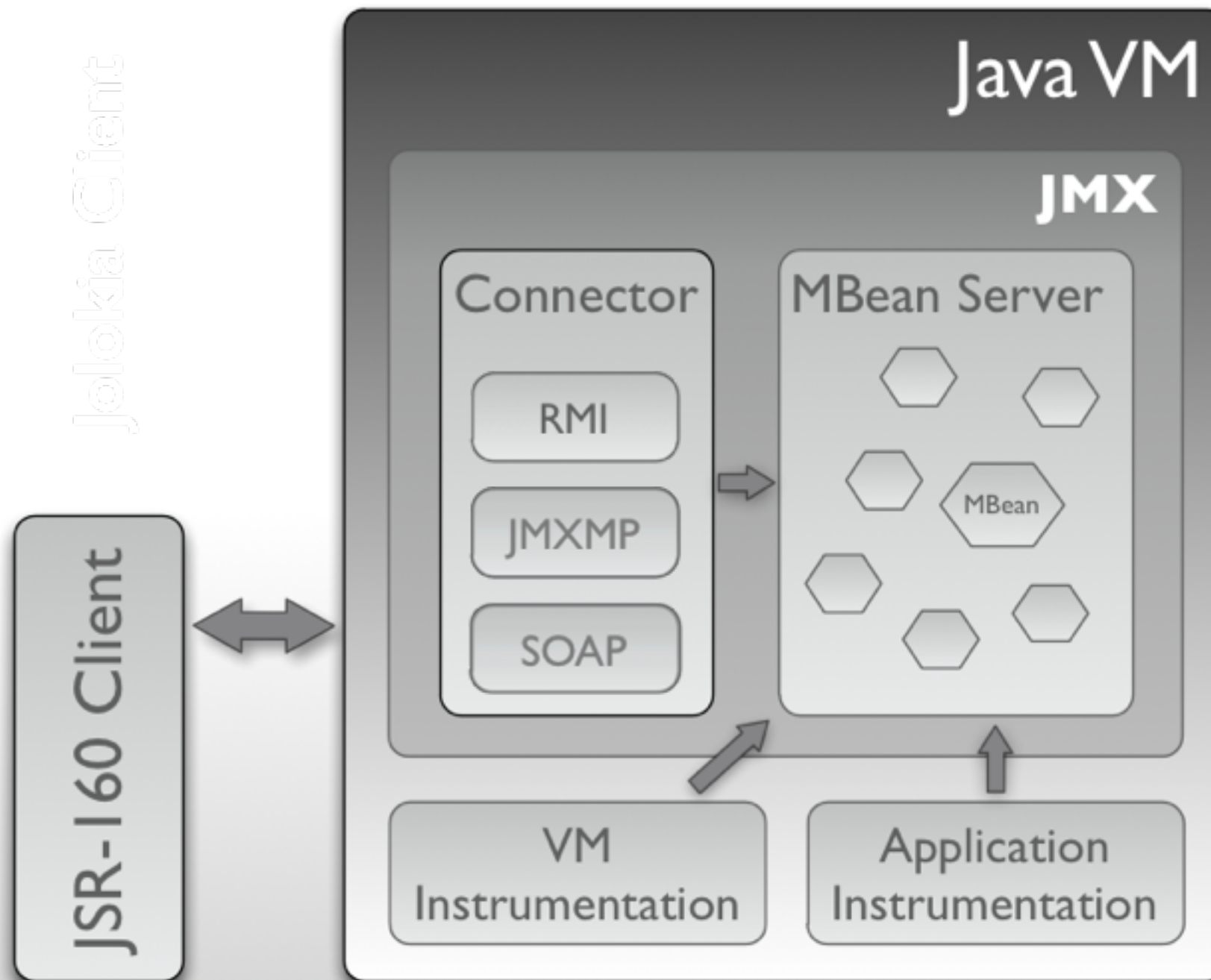
- ▶ JMX & Jolokia
- ▶ Jolokia 2.0
- ▶ Demos



# JMX

- ▶ JSR-3: Java Management Extensions (2000)
- ▶ JMX-Operations
  - ❖ Attribute Reading
  - ❖ Attribute Writing
  - ❖ Execution of Operations
  - ❖ Notifications
- ▶ Available out of the box since JDK 1.5

# Architecture



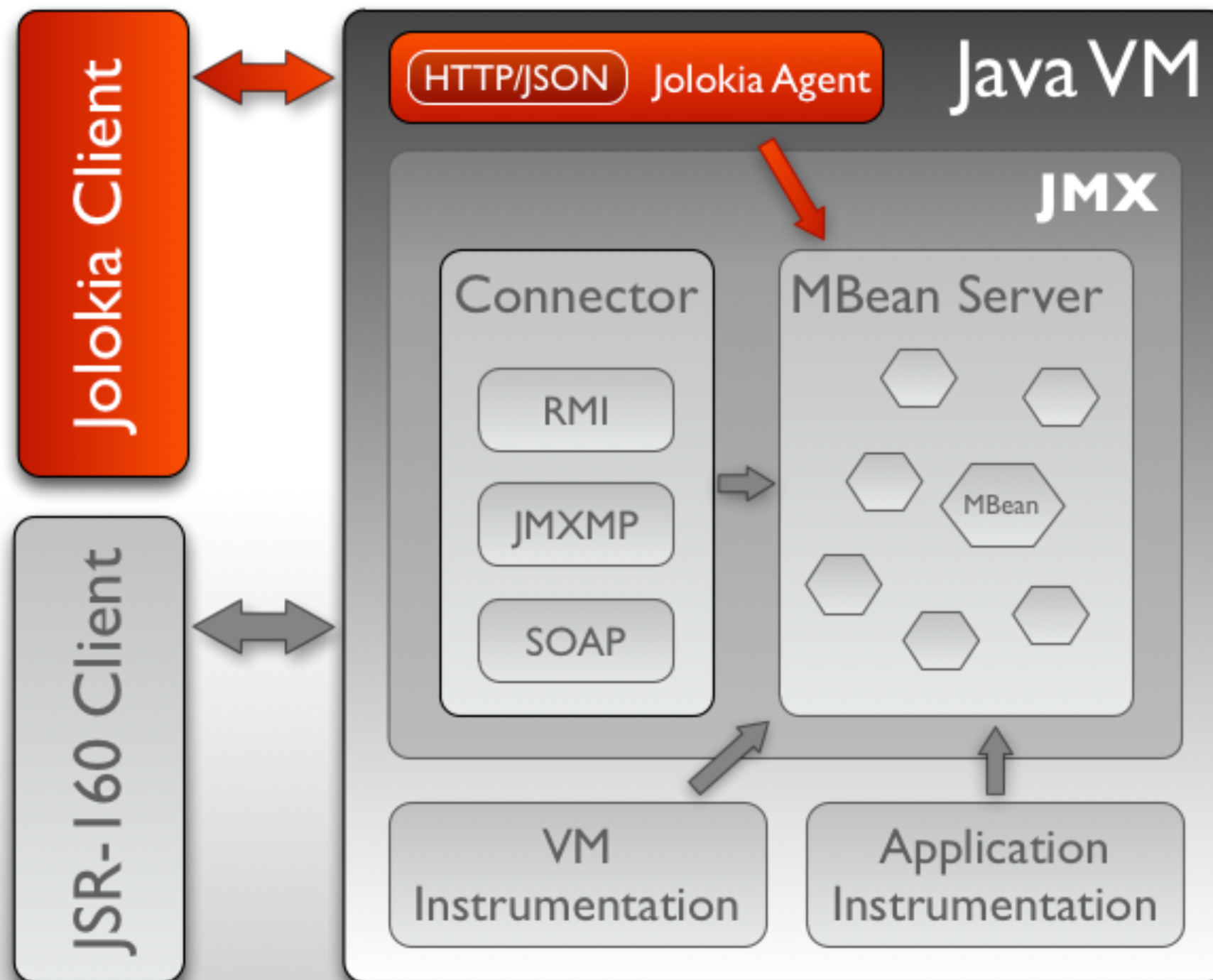
# Problems with JSR-160

- ▶ Firewalls
- ▶ Java only
- ▶ Strongly Typed
- ▶ Security is “all-or-nothing”





# Architecture





# Agents



**Java EE**

**OSGi**

**Mule**

**JVM**

# Protocol



- ▶ Requests:
  - ❖ HTTP GET
  - ❖ HTTP POST with JSON Object
- ▶ Response:
  - ❖ JSON Object
- ▶ <http://www.jolokia.org/reference/html/protocol.html>

# Request



## ► HTTP GET

```
http://localhost/jolokia/read/java.lang:type=Memory/HeapMemoryUsage
```

## ► HTTP POST

```
{  
  "mbean": "java.lang:type=Memory",  
  "type": "read",  
  "attribute": "HeapMemoryUsage"  
}
```

# Response



```
{
  "value":{
    "init":134217728,
    "max":532742144,
    "committed":133365760,
    "used":19046472
  },
  "status":200,
  "timestamp":1244839118,
  "request":{
    "mbean":"java.lang:type=Memory",
    "type":"read",
    "attribute":"HeapMemoryUsage"
  }
}
```

# Request Types



|         |                                |
|---------|--------------------------------|
| read    | Reading of attributes          |
| write   | Writing of attributes          |
| exec    | Execution of operations        |
| search  | MBean search                   |
| list    | MBean metadata                 |
| version | Version and server information |

# Demo





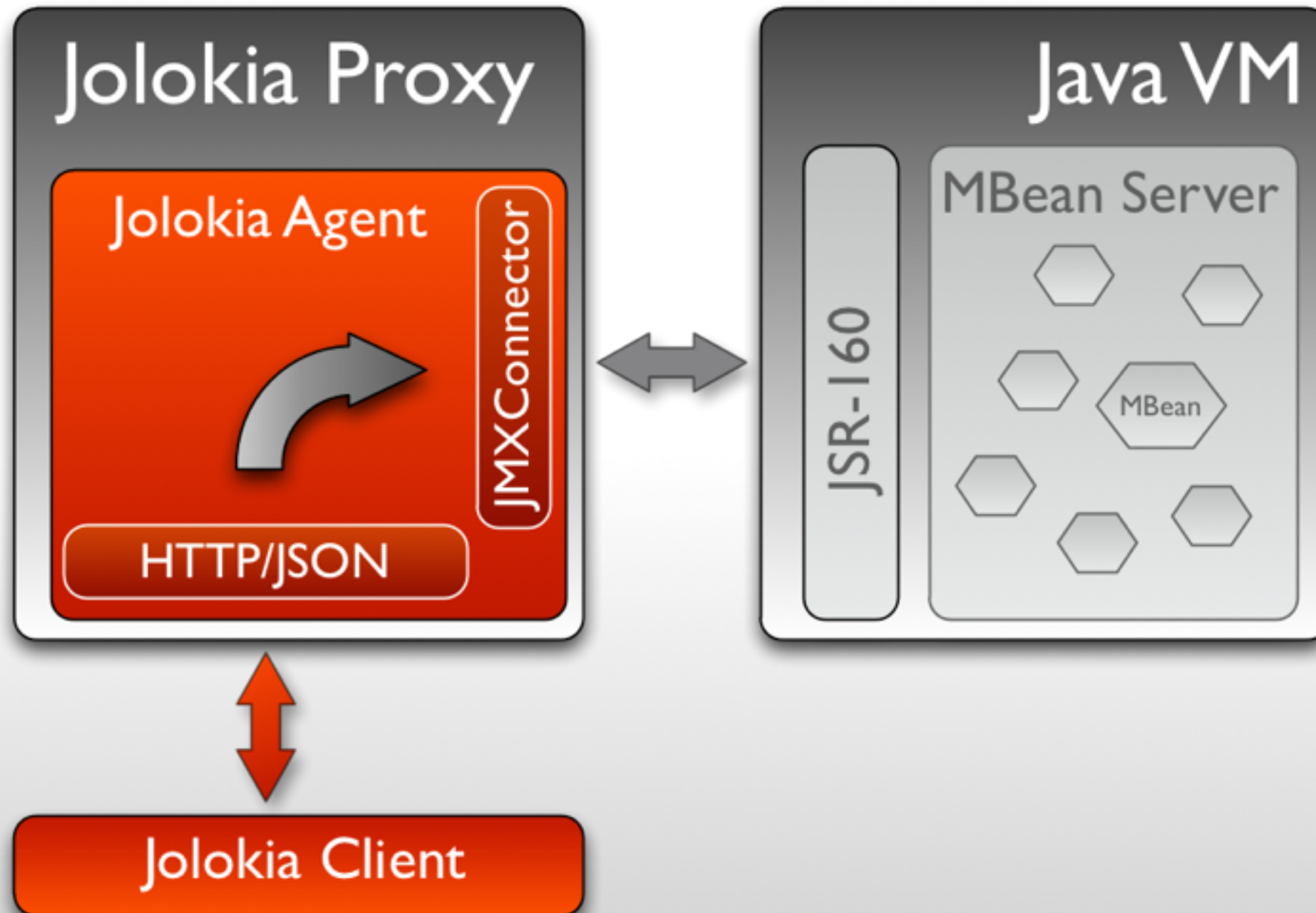


Overview



JSR-160 Proxy

# JSR-160 Proxy





Overview



JSR-160 Proxy



Bulk Requests

# Bulk Requests



- ▶ Many JSON Requests per HTTP-Request

```
[
  {
    "type" : "read",
    "attribute" : "HeapMemoryUsage",
    "mbean" : "java.lang:type=Memory",
    "path" : "used",
  },
  {
    "type" : "search"
    "mbean" : "*:type=Memory,*",
  }
]
```



Overview



JSR-160 Proxy



Bulk Requests



Security

# Security



- ▶ Transport security & authentication
  - ❖ SSL as transport layer
  - ❖ Basic Authentication
  - ❖ Client Certificates
  - ❖ Support for PEM files
- ▶ Fine-grained authorization via XML policy descriptor



# jolokia-access.xml



```
<!-- Network based -->
<remote>
  <host>localhost</host>
  <host>10.0.0.0/16</host>
</remote>

<!-- Commands allowed -->
<commands>
  <command>read</command>
  <command>list</command>
  <command>version</command>
  <command>search</command>
</commands>
```

```
<!-- Allow for forbidden commands -->
<allow>
  <mbean>
    <name>jmx4perl:type=Config</name>
    <operation>write</operation>
    <attribute>*</attribute>
  </mbean>
</allow>

<!-- Deny for allowed commands -->
<deny>
  <mbean>
    <name>
      com.mchange.v2.c3p0:type=*
    </name>
    <attribute>properties</attribute>
  </mbean>
</deny>
```



Overview



JSR-160 Proxy



Bulk Requests



Security



Polyglot

# Polyglot



## ► Client-Libraries:

- ❖ Java
- ❖ JavaScript (Browser & Node)
- ❖ Perl (jmx4perl)
- ❖ Python
- ❖ Golang
- ❖ Ruby
- ❖ .NET

# JavaScript



```
var j4p = new Jolokia("/jolokia");
var data = [];

function run() {
  j4p.request({
    type: "read",
    mbean: "java.lang:type=Memory",
    attribute: "HeapMemoryUsage"
  },
  {
    success: function(resp) {
      data.push([resp.timestamp, resp.value.used]);
      $.plot($("#memory"), [data], { xaxis: { mode: "time" } });
      setTimeout(run, 1000);
    }
  });
}

run();
```



Overview



JSR-160 Proxy



Bulk Requests



Security



Polyglot



Tools



# Tools



|          |                          |
|----------|--------------------------|
| jmx4perl | CLI Tool & Nagios Plugin |
| j4psh    | JMX Shell                |
| hawt.io  | HTML 5 Console           |
| jolokia  | Agent Management         |



# Jolokia 2.0



# Jolokia 2.0

- ▶ JMX Notifications
- ▶ New Backends
- ▶ Modularization

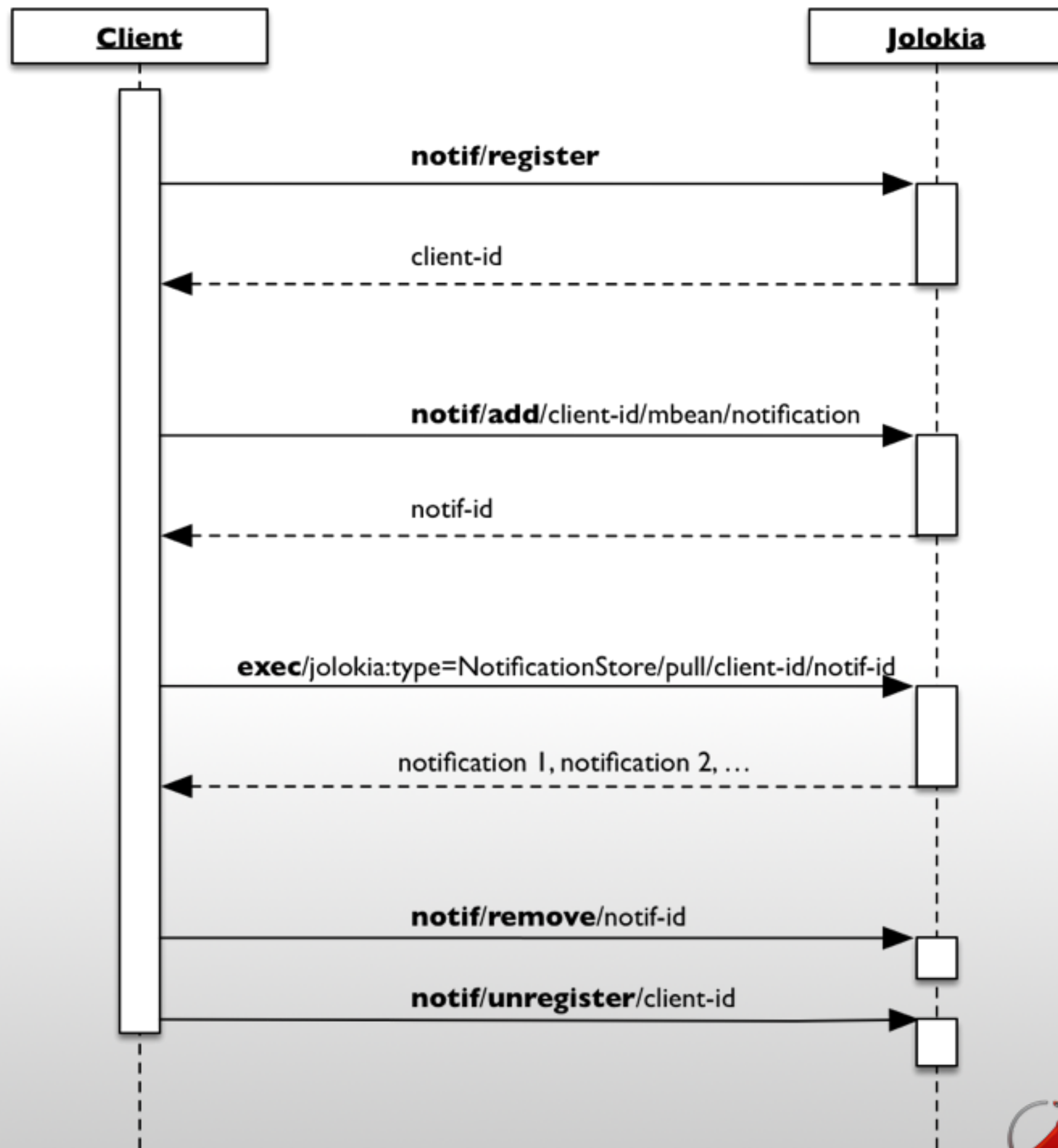
# JMX Notifications

- ▶ Extension of Jolokia Protocol
- ▶ Multiple Notification Provider
  - ❖ Pull
  - ❖ ServerSentEvent Push
    - not for IE ;-(
  - ❖ Planned: WebSocket
- ▶ JavaScript client library support

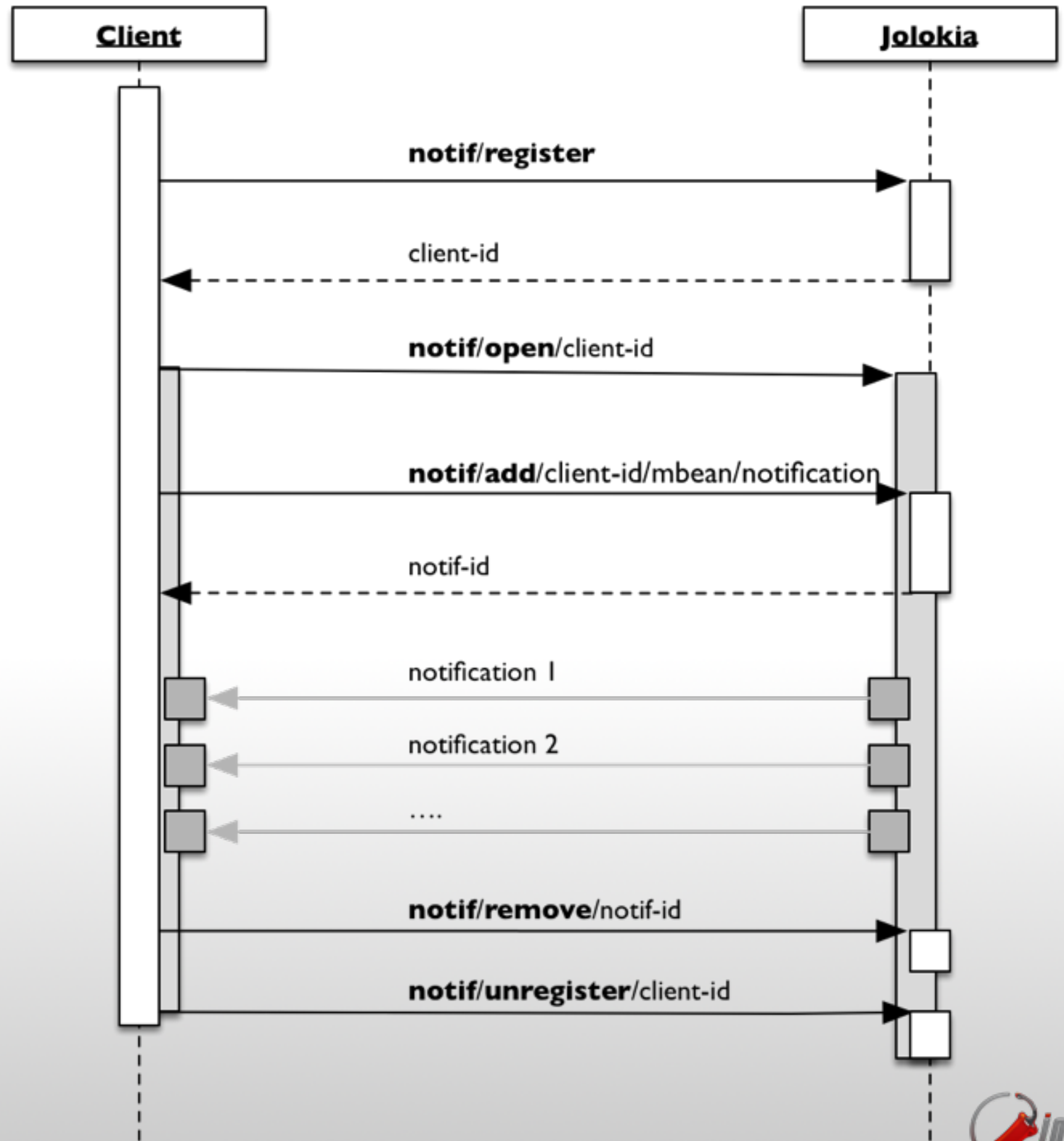
# Demo



# Pull



# Server Sent Events





# New Backends

- ▶ Alternative Backends of JMX
- ▶ JMX still default backend
- ▶ Generalization of an `ObjectName`

```
provider@domain:name=BeanName
```

# Backends

## ► Possible Backends

- ❖ JMX (default)
- ❖ JSR-160 Proxy
- ❖ Spring
- ❖ Zookeeper
- ❖ JNDI
- ❖ ...

## ► 2.0 : JMX + JSR-160 + Spring (Prototype)

# Modularization

- ▶ Motivation: Transition from a personal to a community project
- ▶ Split-up of rhuss/jolokia into multiple repositories below jolokia-org
  - ❖ Java & Javascript client
  - ❖ Alternative Services
  - ❖ Tools
  - ❖ Specialized access libraries (e.g. jolokia-spring)



# Jolokia - JMX on Capsaicin

Pegnitz

<http://www.jolokia.org>

**Repositories**

People 1

Teams 0

Settings

Filters ▾

Find a repository...

New repository

## jolokia-client-javascript

JavaScript ★ 4 📄 2

Jolokia JavaScript Client

Updated 8 hours ago

## jolokia

★ 0 📄 0

Core Jolokia Agents

Updated a day ago

## jolokia-spring

★ 0 📄 0

Jolokia for the Spring Framework

Updated a day ago

## jolokia-client-java

★ 0 📄 0

Jolokia Java Client

Updated a day ago

## jolokia-packer

Java ★ 0 📄 0

Custom assembly of Jolokia agents

Updated a day ago

## People

1 >



rhuss

Roland Huß

Invite someone



# Jolokia Services

|                     |                         |
|---------------------|-------------------------|
| NotificationBackend | Notification delivery   |
| RequestDispatcher   | Dispatch to backend     |
| Serializer          | JSON serialization      |
| RequestInterceptor  | Intercept HTTP requests |
| Init                | Hook into agent startup |
| Detector            | Environment detection   |

# Service Lookup

- ▶ JVM Agent & WAR Agent
  - ❖ ServiceLoader like classpath lookup
- ▶ OSGi
  - ❖ OSGi Services

# jolokia-packer

- ▶ Tool for creating customized Jolokia agents
  - ❖ Service selection
  - ❖ Custom security policies
  - ❖ Configuration included
- ▶ CLI and Web-UI
- ▶ Status: alpha
  - ❖ <https://github.com/jolokia-org/jolokia-packer>



# What else ?

- ▶ Fully backwards compatible
  - ❖ some defaults changed
  - ❖ minor tweaks, but fully documented
  - ❖ drop-in replacement
- ▶ 2.0.0-RC1 available now
- ▶ 2.0 final: still in 2016 ;-)

# Beyond 2.0

- ▶ Extended Client Support
- ▶ Role based authentication
- ▶ New Backends
- ▶ Websocket Support
- ▶ New Website

# Wrap up

- ▶ JMX is cool ....
- ▶ .... but JSR-160 not so
- ▶ Jolokia ....
  - ❖ ... is a JSON-HTTP Bridge for JMX
  - ❖ ... has unique Features
- ▶ Jolokia 2.0
  - ❖ ... is even cooler

# Resources

## ▶ [www.jolokia.org](http://www.jolokia.org)

- Reference-Manual: <http://www.jolokia.org/reference/html/>

## ▶ Source-Repository

- ❖ <https://github.com/rhuss/jolokia> (1.x)
- ❖ <https://github.com/jolokia-org> (2.x repos)

## ▶ Contact us

- ❖ IRC : Freenode #jolokia
- ❖ Forum: <https://groups.google.com/forum/#!forum/jolokia>

# Questions ?

