



**epsc**

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UNIVERSITAT POLITÈCNICA DE CATALUNYA

# ANNEXES

**TITLE: A High Availability platform design using Heartbeat and integration in a production environment**

**MASTER DEGREE: Master of Science in Telecommunication Engineering & Management**

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# ANNEX 1. RPM CREATION

In this chapter all scripts to create RPM installed in the platform will be written.

## 1.1. RPM creation for package gbrokertunning

This RPM will configure the system to improve and optimize services.

### 1.1.1. create\_gbroker-tunning.sh

```
#!/bin/sh

cd /etc/gbroker-build
rm -f -R gbrokertunning-1.0

# Copy etc
mkdir -p gbrokertunning-1.0/etc/gbrokertunning/scripts/
cp /etc/gbrokertunning/scripts/tunning.sh gbrokertunning-
1.0/etc/gbrokertunning/scripts/

#Create tgz
tar -Pcvzf gbrokertunning-1.0.tgz gbrokertunning-1.0
rm -f -R gbrokertunning-1.0

cp -f gbrokertunning.spec /usr/src/redhat/SPECS
cp -f gbrokertunning-1.0.tgz /usr/src/redhat/SOURCES
rm -f gbrokertunning-1.0.tgz
rpmbuild -ba /usr/src/redhat/SPECS/gbrokertunning.spec
```

### 1.1.2. Gbrokertunning.spec

```
#!/bin/sh

cd /etc/gbroker-build
rm -f -R gbrokertunning-1.0

# Copy etc
mkdir -p gbrokertunning-1.0/etc/gbrokertunning/scripts/
cp /etc/gbrokertunning/scripts/tunning.sh gbrokertunning-
1.0/etc/gbrokertunning/scripts/

#Create tgz
tar -Pcvzf gbrokertunning-1.0.tgz gbrokertunning-1.0
rm -f -R gbrokertunning-1.0

cp -f gbrokertunning.spec /usr/src/redhat/SPECS
cp -f gbrokertunning-1.0.tgz /usr/src/redhat/SOURCES
rm -f gbrokertunning-1.0.tgz
rpmbuild -ba /usr/src/redhat/SPECS/gbrokertunning.spec
[root@gbrouter old]# cat gbrokertunning.spec
#
# gbroker tunning
#
Summary: gbroker tunning
Name: gbrokertunning
Version: 1.0
Release: 3
```

```

Copyright: GPL
Group: Productivity/Networking
URL: https://www.genaker.net
Vendor: Genaker
Packager: Genaker
Source: gbroker-tunning-1.0.tgz
AutoReqProv: no
BuildRoot:    %{_tmppath}/%{name}-%{version}-build

%description
Gbroker tunning

%prep
%setup

%build

%install
if [ -n "%{?buildroot}" ] ; then
  [ %{buildroot} != "/" ] && rm -rf %{buildroot}
fi

# Install Etc's
mkdir -p %{buildroot}/etc/gbroker-tunning/scripts
cp -R etc/gbroker-tunning/scripts/. %{buildroot}/etc/gbroker-tunning/scripts/

%post
# Execute tunning
chmod 755 /etc/gbroker-tunning/scripts/tunning.sh
/etc/gbroker-tunning/scripts/tunning.sh

%clean

%changelog
* Mon Jul 09 2007 V.1.0 Genaker.
- First gbroker-tunning Release

%files
/etc/gbroker-tunning/scripts/*
%doc README

```

## 1.2. RPM creation for package gbroker-pos

This RPM will configure the system to pass a security test performed by the client.

### 1.2.1. create\_gbroker-pos.sh

```

#!/bin/sh
VERSION=1.0

cd /etc/gbroker-build
rm -f -R gbroker-pos-$VERSION

# Copy etc's
mkdir -p gbroker-pos-$VERSION/etc/gbroker-pos
cp -R /etc/gbroker-pos/* gbroker-pos-$VERSION/etc/gbroker-pos/

cp README_pos gbroker-pos-$VERSION/README

echo "hola"
#Remove unnecessary files
rm -fR gbroker-pos-$VERSION/etc/gbroker-pos/backup-*

#Create tgz
tar -Pcvzf gbroker-pos-$VERSION.tgz gbroker-pos-$VERSION
rm -f -R gbroker-pos-$VERSION

cp -f gbroker-pos.spec /usr/src/redhat/SPECS
cp -f gbroker-pos-$VERSION.tgz /usr/src/redhat/SOURCES

```

```
rm -f gbroker-pos-$VERSION.tgz
rpmbuild -ba /usr/src/redhat/SPECS/gbroker-pos.spec
```

## 1.2.2. Gbroker-pos.spec

```
#
# gbroker tomcat
#
Summary: RPM para POS de TME
Name: gbroker-pos
Version: 1.0
release: 4
Copyright: GPL
Group: Productivity/Networking
URL: http://www.genaker.net
Vendor: Genaker
Packager: Genaker
Source: gbroker-pos-1.0.tgz
AutoReqProv: no
BuildRoot:    %{_tmppath}/%{name}-%{version}-build
#1.5.0_12-fcs
Requires: gbrokertunning

%description
Pasa las auditorias de seguridad de TME
%prep
%setup
%build
%install
if [ -n "%{?buildroot}" ] ; then
  [ %{buildroot} != "/" ] && rm -rf %{buildroot}
fi

# Install Etc's
mkdir -p %{buildroot}/etc/gbroker-pos
cp -R etc/gbroker-pos/. %{buildroot}/etc/gbroker-pos

%post
chmod 750 /etc/gbroker-pos/scripts/run.sh
echo "Ejecute /etc/gbroker-pos/scripts/run.sh"

%clean
%changelog
* Mon Nov 19 2007 V.1.0 Genaker.
Version RPM para pasar el pos
%files
/etc/gbroker-pos/*
%doc README
```

## 1.3. RPM creation for package gbroker-frontend

This RPM will configure each node in frontend cluster.

### 1.3.1. create\_gbroker-frontend.sh

```
#!/bin/sh
VERSION=1.0

cd /etc/gbroker-build
rm -f -R gbroker-frontend-$VERSION

# Copy etc's
mkdir -p gbroker-frontend-$VERSION/etc/gbroker-frontend
cp -R /etc/gbroker-frontend/* gbroker-frontend-$VERSION/etc/gbroker-frontend/

#Remove unnecessary files
rm -fR gbroker-frontend-$VERSION/etc/gbroker-frontend/frontup-*
```

```

#Create tgz
tar -Pcvzf gbroker-frontend-$VERSION.tgz gbroker-frontend-$VERSION
rm -f -R gbroker-frontend-$VERSION

cp -f gbroker-frontend.spec /usr/src/redhat/SPECS
cp -f gbroker-frontend-$VERSION.tgz /usr/src/redhat/SOURCES
rm -f gbroker-frontend-$VERSION.tgz

rpmbuild -bb /usr/src/redhat/SPECS/gbroker-frontend.spec

```

## 1.3.2. Gbroker-frontend.spec

```

Summary: Configurador cluster gbroker-frontend
Name: gbroker-frontend
Version: 1.0
release: 1
Copyright: GPL
Group: Productivity/Networking
URL: http://www.genaker.net
Vendor: Genaker
Packager: Genaker
Source: gbroker-frontend-1.0.tgz
AutoReqProv: no
BuildRoot:    %{_tmppath}/%{name}-%{version}-build
Requires: jdk
#1.5.0_12-fcs
Requires: httpd = 2.0.52
Requires: heartbeat = 2.0.8
Requires: heartbeat-pils = 2.0.8
Requires: heartbeat-stonith = 2.0.8
Requires: gbrokertunning

%description
RPM para configurar el cluster de frontend
%prep
%setup
%build
%install
if [ -n "%{?buildroot}" ] ; then
  [ %{buildroot} != "/" ] && rm -rf %{buildroot}
fi

# Install Etc's
mkdir -p %{buildroot}/etc/gbroker-frontend
cp -R etc/gbroker-frontend/. %{buildroot}/etc/gbroker-frontend

%post
echo "Instalacion: ejecute /etc/gbroker-frontend/scripts/install.sh"

%clean
%changelog
* Mon Jul 09 2007 V.1.0 Genaker.
- First gbroker-frontend Release
%files
/etc/gbroker-frontend/*

```

## 1.4. RPM creation for package gbroker-backend

This RPM will configure each node in backend cluster.

### 1.4.1. create\_gbroker-backend.sh

```

[root@gbrouter gbroker-build]# cat create_gbroker-backend.sh
#!/bin/sh
VERSION=1.0

cd /etc/gbroker-build

```

```

rm -f -R gbroker-backend-$VERSION

# Copy etc's
mkdir -p gbroker-backend-$VERSION/etc/gbroker-backend
cp -R /etc/gbroker-backend/* gbroker-backend-$VERSION/etc/gbroker-backend/

#Remove unnecessary files
rm -fR gbroker-backend-$VERSION/etc/gbroker-backend/backup-*

#Create tgz
tar -Pcvzf gbroker-backend-$VERSION.tgz gbroker-backend-$VERSION
rm -f -R gbroker-backend-$VERSION

cp -f gbroker-backend.spec /usr/src/redhat/SPECS
cp -f gbroker-backend-$VERSION.tgz /usr/src/redhat/SOURCES
rm -f gbroker-backend-$VERSION.tgz

rpmbuild -bb /usr/src/redhat/SPECS/gbroker-backend.spec

```

## 1.4.2. Gbroker-backend.spec

```

Summary: Configurador cluster gbroker-backend
Name: gbroker-backend
Version: 1.0
release: 1
Copyright: GPL
Group: Productivity/Networking
URL: http://www.genaker.net
Vendor: Genaker
Packager: Genaker
Source: gbroker-backend-1.0.tgz
AutoReqProv: no
BuildRoot:    %{_tmppath}/%{name}-%{version}-build
Requires: jdk
#1.5.0_12-fcs
Requires: httpd = 2.0.52
Requires: heartbeat = 2.0.8
Requires: heartbeat-pils = 2.0.8
Requires: heartbeat-stonith = 2.0.8
Requires: gbrokertunning

%description
RPM para configurar el cluster de backend
%prep
%setup
%build
%install
if [ -n "%{?buildroot}" ] ; then
    [ %{buildroot} != "/" ] && rm -rf %{buildroot}
fi

# Install Etc's
mkdir -p %{buildroot}/etc/gbroker-backend
cp -R etc/gbroker-backend/. %{buildroot}/etc/gbroker-backend

%post
echo "Instalacion: ejecute /etc/gbroker-backend/scripts/install.sh"

%clean
%changelog
* Mon Jul 09 2007 V.1.0 Genaker.
- First gbroker-backend Release
%files
/etc/gbroker-backend/*

```

## 1.5. RPM creation for package gbroker-snmpp



This RPM will configure SNMP for each node.

### 1.5.1. create\_gbroker-snmp.sh

```
[root@gbrouter gbroker-build]# cat create_gbroker-backend.sh
#!/bin/sh
VERSION=1.0

cd /etc/gbroker-build
rm -f -R gbroker-backend-$VERSION

# Copy etc's
mkdir -p gbroker-backend-$VERSION/etc/gbroker-backend
cp -R /etc/gbroker-backend/* gbroker-backend-$VERSION/etc/gbroker-backend/

#Remove unnecessary files
rm -fR gbroker-backend-$VERSION/etc/gbroker-backend/backup-*

#Create tgz
tar -Pcvzf gbroker-backend-$VERSION.tgz gbroker-backend-$VERSION
rm -f -R gbroker-backend-$VERSION

cp -f gbroker-backend.spec /usr/src/redhat/SPECS
cp -f gbroker-backend-$VERSION.tgz /usr/src/redhat/SOURCES
rm -f gbroker-backend-$VERSION.tgz

rpmbuild -bb /usr/src/redhat/SPECS/gbroker-backend.spec
```

### 1.5.2. Gbroker-snmp.spec

```
Summary: gbroker snmp
Name: gbroker-snmp
Version: 1.0
release: 12
Copyright: GPL
Group: Productivity/Networking
URL: http://www.genaker.net
Vendor: Genaker
Packager: Genaker
Source: gbroker-snmp-1.0.tgz
AutoReqProv: no
BuildRoot:    %{_tmppath}/%{name}-%{version}-build
Requires: net-snmp >= net-snmp-5.3.0.1-1.EL4

%description
Se incluye el modulo de la mib de Genaker. Tambien se incluye el fichero de
configuracion y de definicion de la MIB.
%prep
%setup
%build
%install
if [ -n "%{?buildroot}" ] ; then
    [ %{buildroot} != "/" ] && rm -rf %{buildroot}
fi

# Install Etc's
mkdir -p %{buildroot}/etc/gbroker-snmp
cp -R etc/gbroker-snmp/. %{buildroot}/etc/gbroker-snmp

%post
echo "Instalacion: ejecute /etc/gbroker-snmp/scripts/install.sh"

%clean
%changelog
* Tue Apr 29 2008 V.1.0 Genaker.
- First gbroker-snmp Release
%files
/etc/gbroker-snmp/*
%doc README
```

## ANNEX 2. CLUSTER MANAGEMENT

### 2.1. Heartbeat configuration files

In this subsection configuration files for a cluster will be explained. All these configuration files are included within the RPM package and they are configured using `gbroker.conf` included in every RPM.

#### 2.1.1. `ha.cf` for a cluster node

This file is common for every cluster node. Here, interfaces to exchange heartbeat messages are defined. Some cluster configuration parameters such as cluster node names are also set.

```
keepalive 2
deadtime 30
warntime 10
initdead 60
udpport 694
ucast eth1 10.1.3.200
ucast eth2 10.253.46.74
auto_failback off
watchdog /dev/watchdog
node zipi
node zape

use_logd yes

crm yes
respawn root /usr/lib/heartbeat/pingd -m 500 -d 1s -a pingd
```

#### 2.1.2. `/var/lib/heartbeat/crm/cib.xml`

This file is the main file to configure cluster resources in a R2 cluster style configuration. This file contains several XML sections:

```
<cib>
.....
<configuration>
.....
</configuration>
<status>
.....
</status>
</cib>
```

There is only one `cib.xml` file in the whole cluster. The DC is the component that sends the `cib.xml` over the network to every cluster node.

In next subsections all `cib.xml` files for both frontend cluster nodes and backend nodes will be written.

### 2.1.3. Cib.xml for frontend cluster

Cluster main configuration file for frontend cluster. The installer takes care of replacing some values in this configuration file before copying it on the proper folder.

```
<cib>
  <configuration>
    <crm_config>
      <crm_config>
        <cluster_property_set id="cib-bootstrap-options">
          <attributes>
            <nvpair id="id-default-action-timeout" name="default-action-timeout"
value="180s"/>
            <nvpair id="cib-bootstrap-options-default-resource-failure-stickiness"
name="default-resource-failure-stickiness" value="-100"/>
            <nvpair id="cib-bootstrap-options-default-resource-stickiness" name="default-
resource-stickiness" value="1000"/>
            <nvpair id="cib-bootstrap-options-stonith-enabled" name="stonith-enabled"
value="False"/>
          </attributes>
        </cluster_property_set>
      </crm_config>
    </nodes/>
    <resources>
      <group id="group_tomcat" ordered="true" collocated="true">
        <primitive id="resource_drbd0" class="heartbeat" type="drbddisk"
provider="heartbeat">
          <instance_attributes id="resource_drbd0_instance_attrs">
            <attributes>
              <nvpair id="resource_drbd0_target_role" name="target_role"
value="started"/>
              <nvpair id="9a0b82a4-a3e7-4295-9372-29e05753fbf2" name="1" value="r0"/>
            </attributes>
          </instance_attributes>
          <operations>
            <op id="e01b0c7e-1334-451a-af68-68ea5646f867" name="status" interval="10s"
timeout="15s" start_delay="10s"/>
          </operations>
        </primitive>
        <primitive id="resource_filesystem_drbd0" class="ocf" type="Filesystem"
provider="heartbeat">
          <instance_attributes id="resource_filesystem_drbd0_instance_attrs">
            <attributes>
              <nvpair id="resource_filesystem_drbd0_target_role" name="target_role"
value="started"/>
              <nvpair id="3c93c347-fc87-443b-8def-23609d226ae8" name="device"
value="/dev/drbd0"/>
              <nvpair id="85a9d1d8-2318-4edb-9c5d-44c322647700" name="directory"
value="/drbd0"/>
              <nvpair id="20107bf9-b0fc-415e-8aec-57790a0aa3ed" name="fstype"
value="ext3"/>
              <nvpair id="3fd6f2e8-6e9c-4bdf-988f-47195c67797f" name="options"
value="rw"/>
            </attributes>
          </instance_attributes>
          <operations>
            <op id="c11f8c3d-87f7-416e-8a33-064b5cf08a04" name="status" interval="10s"
timeout="15s" start_delay="10s"/>
          </operations>
        </primitive>
        <primitive id="resource_ip_tomcat_eth3" class="ocf" type="IPAddr"
provider="heartbeat">
          <instance_attributes id="resource_ip_tomcat_eth3_instance_attrs">
            <attributes>
              <nvpair id="resource_ip_tomcat_eth3_target_role" name="target_role"
value="started"/>
              <nvpair id="8b842621-397c-45f9-b975-8f81d8076391" name="ip"
value="@IP_ETH2_VIRTUAL"/>
              <nvpair id="f4b1742e-49b6-4405-89df-9b981cbf9e0d" name="netmask"
value="@MASK_ETH2_VIRTUAL"/>
              <nvpair id="4f2a6e7a-7b45-49ae-ae32-b4197af258a7" name="nic"
value="eth3"/>
            </attributes>
          </instance_attributes>
        </primitive>
      </group>
    </resources>
  </configuration>
</cib>
```

```

        </attributes>
      </instance_attributes>
    </primitive>
    <primitive id="resource_ip_tomcat_eth4" class="ocf" type="IPAddr"
provider="heartbeat">
      <instance_attributes id="resource_ip_tomcat_eth4_instance_attrs">
        <attributes>
          <nvpair id="resource_ip_tomcat_eth4_target_role" name="target_role"
value="started" />
          <nvpair id="ac47fb7c-2b6d-4a49-a2ae-0e4f7f81dc62" name="ip"
value="@IP_ETH4_VIRTUAL" />
          <nvpair id="4852c0fe-9c66-4cc9-8e11-8394ecd36f" name="netmask"
value="@MASK_ETH4_VIRTUAL" />
          <nvpair id="c5cc575e-6c9e-4475-9a90-a5f82fed1f75" name="nic"
value="eth4" />
        </attributes>
      </instance_attributes>
    </primitive>
    <primitive id="resource_tomcat_gatekeeper" class="heartbeat"
type="tomcat_gatekeeper" provider="heartbeat">
      <instance_attributes id="resource_tomcat_gatekeeper_instance_attrs">
        <attributes>
          <nvpair id="resource_tomcat_gatekeeper_target_role" name="target_role"
value="started" />
        </attributes>
      </instance_attributes>
      <operations>
        <op id="13911a67-8216-4ce4-8a6b-da7cbdf67011" name="status" interval="10s"
timeout="15s" start_delay="10s" />
      </operations>
    </primitive>
    <primitive id="resource_tomcat_licensing" class="heartbeat"
type="tomcat_licensing" provider="heartbeat">
      <instance_attributes id="resource_tomcat_licensing_instance_attrs">
        <attributes>
          <nvpair id="resource_tomcat_licensing_target_role" name="target_role"
value="started" />
        </attributes>
      </instance_attributes>
      <operations>
        <op id="f31e939a-5000-42f7-bfc6-50e97a9cb631" name="status" interval="10s"
timeout="15s" start_delay="10s" />
      </operations>
    </primitive>
    <primitive id="resource_tomcat_o_m" class="heartbeat" type="tomcat_o_m"
provider="heartbeat">
      <instance_attributes id="resource_tomcat_o_m_instance_attrs">
        <attributes>
          <nvpair id="resource_tomcat_o_m_target_role" name="target_role"
value="started" />
        </attributes>
      </instance_attributes>
      <operations>
        <op id="f74d5749-9aed-44a1-ba94-4022a9ce0920" name="status" interval="10s"
timeout="15s" start_delay="10s" />
      </operations>
    </primitive>
    <primitive id="resource_tomcat_swupgrade" class="heartbeat"
type="tomcat_swupgrade" provider="heartbeat">
      <instance_attributes id="resource_tomcat_swupgrade_instance_attrs">
        <attributes>
          <nvpair id="resource_tomcat_swupgrade_target_role" name="target_role"
value="started" />
        </attributes>
      </instance_attributes>
      <operations>
        <op id="c38f572f-2abe-4c0e-ad5b-185521bed8f3" name="status" interval="10s"
timeout="15s" start_delay="10s" />
      </operations>
    </primitive>
    <primitive id="resource_apache" class="ocf" type="apache" provider="heartbeat">
      <instance_attributes id="resource_apache_instance_attrs">
        <attributes>
          <nvpair id="resource_apache_target_role" name="target_role"
value="started" />
          <nvpair id="c493f082-13aa-462c-a620-608da0ad5f52" name="configfile"
value="/etc/httpd/conf/httpd.conf" />

```

```

        <nvpair id="9e2001f8-e499-4f77-b645-8f405b572386" name="httpd"
value="/usr/sbin/httpd"/>
        </attributes>
    </instance_attributes>
    <operations>
        <op id="69982aed-9cce-4676-9c24-813a92cedfa2" name="status" interval="10s"
timeout="15s" start_delay="10s" disabled="false" role="Started"/>
    </operations>
</primitive>
</group>
</resources>
<constraints>
    <rsc_location id="resource_ip_tomcat_eth4:connected"
rsc="resource_ip_tomcat_eth4">
        <rule id="resource_ip_tomcat_eth4:connected:rule" score_attribute="pingd" >
            <expression id="resource_ip_tomcat_eth4:connected:expr:defined"
attribute="pingd" operation="defined"/>
        </rule>
    </rsc_location>
</constraints>
</configuration>
</cib>

```

## 2.1.4. Cib.xml for backend cluster

Cluster main configuration file for backend cluster. The installer takes care of replacing some values in this configuration file before copying it on the proper folder.

```

<cib>
  <configuration>
    <crm_config>
      <cluster_property_set id="cib-bootstrap-options">
        <attributes>
          <nvpair id="id-stonith-enabled" name="stonith-enabled" value="False"/>
          <nvpair id="cib-bootstrap-options-default-action-timeout" name="default-
action-timeout" value="180s"/>
          <nvpair id="cib-bootstrap-options-default-resource-failure-stickiness"
name="default-resource-failure-stickiness" value="-100"/>
          <nvpair id="cib-bootstrap-options-default-resource-stickiness" name="default-
resource-stickiness" value="1000"/>
        </attributes>
      </cluster_property_set>
    </crm_config>
    <nodes/>
    <resources>
      <primitive id="resource_ip_bbdd_broker" class="ocf" type="IPAddr"
provider="heartbeat">
        <instance_attributes id="resource_ip_bbdd_broker_instance_attrs">
          <attributes>
            <nvpair id="e202e122-cb33-414b-9a53-e48755dda80f" name="ip"
value="@IP_ETH3_VIRTUAL"/>
            <nvpair id="53fdd77a-a9bd-459c-9c75-5ed8f25eb3cb" name="netmask"
value="@MASK_ETH3_VIRTUAL"/>
            <nvpair id="f799699b-8388-4123-80d6-e481be3c6f86" name="nic"
value="eth3"/>
          </attributes>
        </instance_attributes>
      </primitive>
    </resources>
    <constraints>
      <rsc_location id="resource_ip_bbdd_broker:connected"
rsc="resource_ip_bbdd_broker">
        <rule id="resource_ip_bbdd_broker:connected:rule" score_attribute="pingd">
          <expression id="resource_ip_bbdd_broker:connected:expr:defined"
attribute="pingd" operation="defined"/>
        </rule>
      </rsc_location>
    </constraints>
  </configuration>
</cib>

```

```
</rsc_location>  
</constraints>  
</configuration>
```

## 2.2. DRBD

In this subsection DRBD will be covered. Configuration files will be written and some management information will be explained.

### 2.2.1. DRBD setup

There is no RPM package for Red Hat Enterprise Linux for DRBD software. Therefore, source code must be compiled and installed manually. Once compiled, the module will be included in the frontend RPM package. This will work provided kernel and operative system is the same for all machines.

DRBD version used in this project is 0.7.24 and can be downloaded from <http://oss.linbit.com/drbd/0.7/drbd-0.7.24.tar.gz>

DRBD is a complex step though. Therefore there is part of the installation that should be configured manually. The process is written below:

- Make a partition on device `/dev/sdb`. The physical disk used for DRBD is the second one.
- Create a new partition with the command `fdisk /dev/sdb`.
  - Press “n” for a new partition
  - Press “p” for primary partition
  - Press “1” for the number of partition.
  - Press Enter twice to accept default values (the whole disk will be used)
  - The kind of partition assigned is 83 (ext3 Linux)
  - Press “w” to modify partition table

The size of the partition where DRBD will be used must be the same for both nodes. Otherwise, some data corruption might happen.

Next step is to initialize DRBD partition. These set of commands should be typed in the primary node:

- Load DRBD module manually: “`modprobe drbd`”
- Enable DRBD partition: “`drbdadm up all`”
- Initialize metadata: “`drbdadm -- --do-what-I-say primary all`”
- Format cluster partition: “`mke2fs -j /dev/drbd0`”

In primary node, only the load of DRBD module and DRBD partition enable must be done (“`modprobe drbd`” and “`drbdadm up all`”).

## 2.2.2. DRBD management

To visualize the state of DRBD, `/proc/drbd` system file must be shown. If everything is going alright, then there should be something like the following lines:

```
version: 0.7.24 (api:79/proto:74)
SVN Revision: 2875 build by root@estribor, 2007-07-06 12:39:58
0: cs:Connected st:Primary/Secondary ld:Consistent
ns:4 nr:0 dw:4 dr:21 al:0 bm:1 lo:0 pe:0 ua:0 ap:0
```

If both nodes in fronted cluster are active and belongs to the same membership layer, then these lines will show the word "Consistent". The field "st" shows node state. In this case "Primary/Secondary" shows that the node where we are looking at is the primary node, where as the secondary is the standby node.

At the beginning of the installation, data is copied from primary node to secondary node. Then the `/proc/drbd` file will show this content:

```
version: 0.7.24 (api:79/proto:74)
SVN Revision: 2875 build by root@estribor, 2007-07-06 12:39:58
0: cs:SyncSource st:Primary/Secondary ld:Consistent
ns:785888 nr:8 dw:16 dr:786673 al:0 bm:113 lo:195 pe:452 ua:194 ap:0
[=====>.....] sync'ed: 70.1% (337892/1121964)K
finish: 0:01:22 speed: 4,048 (2,456) K/sec
```

Moreover, there are also some other parameters which will be explained on the following lines:

cs : connection state

- Unconfigured : Device waits for configuration.
- StandAlone : Not trying to connect to peer, IO requests are only passed on locally.
- Unconnected: Transitory state, while `bind()` blocks.
- WFConnection : Device waits for configuration of other side.
- WFReportParams : Transitory state, while waiting for first packet on a new TCP connection.
- Connected : Everything is fine.
- Timeout, BrokenPipe, NetworkFailure : Transitory states when connection was lost.
- WFBitsMap{S,T} : Transitory state when synchronization starts; "dirty"-bits are exchanged.
- SyncSource : Synchronization in progress, this node has the good data.
- SyncTarget : Synchronization in progress, this node has inconsistent data.
- PausedSync{S,T} : see SyncPaused.
- SkippedSync{S,T} : you should never see this. *"Developers only"*

st:Local/Remote: state, the respective node's role for this device.

- Primary : the active node; may access the device.

- Secondary: the passive node; must not access the device; expects mirrored writes from the other node.
- Unconfigured: this is not a role, obviously (a node with drbd module loaded in memory but not initialized)

ld: local data consistency

ns,nr,dw,dr,... : statistic counters in number of blocks (1KB) respectively number of requests

ns : network send

nr: network receive

dw: disk write

dr: disk read

al: activity log updates

bm: bitmap updates

lo: reference count on local device

pe: pending (waiting for ack)

ua: unack'd (still need to send ack)

ap: application requests expecting io-completion

## 2.3. Heartbeat management

In this subsection Heartbeat management will be covered. Some interesting commands for cluster management will be explained.

### 2.3.1. Visualizing cluster state

There are several options to visualize the cluster state. Heartbeat GUI shows obviously the cluster state, but due to connectivity constraints, is quite common to use command line commands via SSH session.

The command “crm\_mon” will show the following information:

```
Refresh in 11s...

=====
Last updated: Sat Jul 14 05:08:38 2007
Current DC: zipi (73fa026c-7165-41e9-860f-9fb9b4e1bab3)
2 Nodes configured.
1 Resources configured.
=====

Node: zipi (73fa026c-7165-41e9-860f-9fb9b4e1bab3): online
Node: zape (f97f23b7-fd50-43b0-8ac2-002c18d0bded): OFFLINE

Resource Group: group_tomcat
  resource_drbd0      (heartbeat:drbddisk):   Started zipi
  resource_filesystem_drbd0 (heartbeat::ocf:Filesystem): Started zipi
  resource_ip_tomcat_eth2 (heartbeat::ocf:IPaddr):   Started zipi
  resource_ip_tomcat_eth4 (heartbeat::ocf:IPaddr):   Started zipi
  resource_tomcat_gatekeeper (heartbeat:tomcat_gatekeeper): Started zipi
  resource_tomcat_licensing (heartbeat:tomcat_licensing): Started zipi
  resource_tomcat_o_m (heartbeat:tomcat_o_m): Started zipi
  resource_tomcat_swupgrade (heartbeat:tomcat_swupgrade): Started zipi
  resource_apache     (heartbeat::ocf:apache):   Started zipi
```



This example shows 2 node-cluster configurations with a set of resources started on the only active node named zipi.

### **2.3.2. Application high availability in Heartbeat**

Cluster resources can be configured with a status operation. That means that heartbeat will call function status in resource agent scripts to retrieve resource status. If the status returns a stopped value, then the resource agent will restart the resource. Therefore, to achieve application high availability a monitor operation should be configured for every resource.

However, there are a maximum number of times that a resource can fail. Every time that a resource fails, then a counter is incremented. A useful command to retrieve failcount for a resource is the following one:

```
crm_failcount -G -U hostname -r resource_name
```

If the counter reaches its maximum value, then all resources will be failed over the secondary cluster node and the sick node will not be able to run resources until the system administrator cleans counters with the command:

```
crm_failcount -D -U hostname -r resource_name
```

### **2.3.3. Starting cluster resources**

It is important that CRM knows about the state of a resource. Therefore, it is highly recommended to use the following command to start a resource instead of the LSB script restart method. For example:

```
crm_resource -r resource_apache -p target_role -v started
```

### **2.3.4. Stopping cluster resources**

The opposite action to start resources is to stop them. The command to stop a cluster resource is the following one:

```
crm_resource -r resource_apache -p target_role -v stopped
```

### **2.3.5. Migrate cluster resources**

Resources can be migrated to another node. In this project, all resources are within a group. It is easier to manage a group than a set of ungrouped resources. To migrate all resources to another node, it is only necessary to migrate the group with the following command:

```
crm_resource -M -r group_tomcat -H zape
```

If cluster resources are migrated to another node, then the failcount counter is set to `-INFINITY`, so in case of resource failure, it will be restarted infinite times and will not be failed over to the secondary node.

## **ANNEX 3. EXTENDING THE MIB**

The code will have to be compiled once against net-snmp package source code. The module obtained will be included in gbroker-snmp RPM and will be installed on every node.

The source code here presented was not done by me, but another one in the company. The solution design was the important thing in this point and not the implementation.

This plugin integrates Genaker's MIB with net-snmp package for Linux. Moreover it allows configuring dynamically the plugin without any need to recompile.

### **3.1. Functional description**

This program is integrated with net-snmp package for Linux as a dynamic loadable module. It registers its own OID to main agent and answer to queries to these OID.

In order to define the managed OID, a configuration file is used to specify:

- The OID
- Data type for this OID
- The program executed to retrieve this value with one parameter

This configuration allows extend and completely configure all OID associated with Genaker's MIB. Therefore, when this MIB is modified, only this configuration file has to be modified and therefore there is no need to recompile the whole module.

All OID define must be associated to Genaker's PEN number registered at IANA (29302). Data types allowed can be 32 bit integers ("Integer32") and strings ("OCTET-STRIN").

These programs can be any type of executable that Linux can understand. For instance it can be a bash script, perl script, C and so on.

### **3.2. Requirements**

In order to compile the module the following components are needed:

- Module source code distributed as a tar file ("gensnmp.tar.gz")
- Compilation tools: gcc, make.

- SNMP development libraries (net-snmp-devel). In this project the package used was net-snmp-devel-5.3.0.1-1.EL4.

### 3.3. Compilation

The procedure is described below:

- Uncompress the tar.gz file: `tar -zxvf gensnmp.tar.gz`
- Execute make. There is a Makefile that helps to compile and install the module.

### 3.4. Installation

When the code is compiled it must be installed by executing `make install`. This command will copy the module to the default path `/usr/lib/snmp`.

After that there are three components that can be installed too:

- Genaker's MIB definition file
- Example executable scripts
- Example configuration file

For further information, Makefile can be edited.

### 3.5. Configuration

When the module is installed, then it is time to configure the snmp service to load the module. This can be achieved by modifying the `snmpd.conf` configuration file located at `/etc/snmp/snmpd.conf` and adding the line written below:

```
dlmod gensnmp /usr/lib/snmp/dlmod/gensnmp.so
```

The configuration file is distributed by means of the `gbroker-snmp` RPM which contains the `snmpd.conf` configuration file with all directives pre-configured. This RPM package will also copy the module to the proper path.

The configuration of the module is done by means of a configuration file `/etc/gensnmp.conf`.

Syntax follows the following rules:

- It accepts comments. Every line starting with `#` is considered a comment.
- It accepts blank lines.

- Every OID definition must contain the following fields separated with a blank space:
  - SubOID: OID identifier, without the prefix .1.3.6.1.4.1.29302 (“enterprises.genaker”) beginning with a dot “. For example “.2.1.1” identifies the OID .1.3.6.1.4.1.29302.2.1.1.
  - Data type: A character “I” indicates that it is an Integer and “s” if it is a string
  - Path to executable: absolute path to the executable file.
  - Parameter: a parameter to the main program. If it is not used, then something must be specified, for example “NOTHING”.

If the configuration file is modified, the snmpd service must be restarted so that the changes take effect.

### 3.6. Configuration file for snmp plugin

The configuration file used in every node is the following one:

```
#Configuracion gensnmp
#gbroker oids
#genaker.gbroker
#system .1.1
#   conectivity .1.1.1
#   IpAddressingAvailable integer
#   RoutingEnabled      integer
#   SccsAvailable       integer
#   BackendAvailable    integer
#   FrontendAvailable   integer
#   NtpServerAvailable  integer
#
.1.1.1.1.0 i /etc/gbroker-snmpp/utills/ipAddressingAvailable.sh NADA
.1.1.1.2.0 i /etc/gbroker-snmpp/utills/sccsAvailable.sh NADA
.1.1.1.3.0 i /etc/gbroker-snmpp/utills/backendAvailable.sh NADA
.1.1.1.4.0 i /etc/gbroker-snmpp/utills/ntpServerAvailable.sh NADA
# clusterNodesAvailable .1.1.2
#   Node1Available integer
#   Node2Available integer
.1.1.2.1.0 i /etc/gbroker-snmpp/utills/nodeAvailable.sh 0
.1.1.2.2.0 i /etc/gbroker-snmpp/utills/nodeAvailable.sh 1
# clusterActiveNode string
.1.1.3.0 s /etc/gbroker-snmpp/utills/clusterActiveNode.sh NADA
# clusterResources .1.1.4
#   status .1.1.4.1
#   drbdAvailable integer
#   ipEth2Available integer
#   ipEth3Available integer
#   ipEth4Available integer
#   tomcatGatekeeperAvailable integer
#   tomcatLicensingAvailable integer
#   tomcatSWupgradeAvailable integer
#   tomcatOmAvailable integer
#   httpdAvailable integer
#
.1.1.4.1.1.0 i /etc/gbroker-snmpp/utills/ipEth2VirtualAvailable.sh NADA
.1.1.4.1.2.0 i /etc/gbroker-snmpp/utills/ipEth4VirtualAvailable.sh NADA
.1.1.4.1.3.0 i /etc/gbroker-snmpp/utills/tomcatAvailable.sh gatekeeper
.1.1.4.1.4.0 i /etc/gbroker-snmpp/utills/tomcatAvailable.sh licensing
.1.1.4.1.5.0 i /etc/gbroker-snmpp/utills/tomcatAvailable.sh swupgrade
.1.1.4.1.6.0 i /etc/gbroker-snmpp/utills/tomcatAvailable.sh o_m
.1.1.4.1.7.0 i /etc/gbroker-snmpp/utills/httpdAvailable.sh NADA
.1.1.4.1.8.0 i /etc/gbroker-snmpp/utills/tomcatAvailable.sh licensingdemos
#
#   failcounts .1.1.4.2
#
#   failcounts .1.1.4.2
```

```

# drbdstatus integer
# ipeth2 integer
# ipeth3 integer
# ipeth4 integer
# tomcatGatekeeper integer
# tomcatLicensing integer
# tomcatSWupgrade integer
# tomcatOm integer
# httpd integer
#
#
.1.1.4.2.1.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_ip_tomcat_eth2
.1.1.4.2.2.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_ip_tomcat_eth4
.1.1.4.2.3.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_tomcat_gatekeeper
.1.1.4.2.4.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_tomcat_licensing
.1.1.4.2.5.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_tomcat_o_m
.1.1.4.2.6.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_tomcat_swupgrade
.1.1.4.2.7.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_apache
.1.1.4.2.8.0 i /etc/gbroker-snmpp/utills/queryFailcount.sh resource_tomcat_licensingdemos
# powerSupplyRedundancy
.1.1.5.0 i /etc/gbroker-snmpp/utills/powerSupplyRedundancy.sh NADA
#
#application .1.2
# gatekeeper .1.2.1
#   cpuUsage integer
#   memUsage integer
# gatekeeperTotalTransactions15min
# gatekeeperTotalTransactions24h
# gatekeeperServedTransactions15min
# gatekeeperServedTransactions24h
# gatekeeperDeniedTransactions15min
# gatekeeperDeniedTransactions24h
# gatekeeperUserEperience15min
# gatekeeperUserEperience24h
#
.1.2.1.1.0 i /etc/gbroker-snmpp/utills/cpuUsage.sh gatekeeper
.1.2.1.2.0 i /etc/gbroker-snmpp/utills/memory_monitoring.pl gatekeeper
.1.2.1.3.0 i /etc/gbroker-snmpp/utills/gatekeeperTotalTransactions.sh 15
.1.2.1.4.0 i /etc/gbroker-snmpp/utills/gatekeeperTotalTransactions.sh 1440
.1.2.1.5.0 i /etc/gbroker-snmpp/utills/gatekeeperServedTransactions.sh 15
.1.2.1.6.0 i /etc/gbroker-snmpp/utills/gatekeeperServedTransactions.sh 1440
.1.2.1.7.0 i /etc/gbroker-snmpp/utills/gatekeeperDeniedTransactions.sh 15
.1.2.1.8.0 i /etc/gbroker-snmpp/utills/gatekeeperDeniedTransactions.sh 1440
.1.2.1.7.0 i /etc/gbroker-snmpp/utills/gatekeeperDeniedTransactions.sh 15
.1.2.1.8.0 i /etc/gbroker-snmpp/utills/gatekeeperDeniedTransactions.sh 1440
.1.2.1.9.0 i /etc/gbroker-snmpp/utills/gatekeeperUserEperience.sh 15
.1.2.1.10.0 i /etc/gbroker-snmpp/utills/gatekeeperUserEperience.sh 1440
#
# licensing .1.2.2
# licensingCpuUsage
# licensingMemUsage
# licensingTotalTransactions15min
# licensingTotalTransactions24h
# licensingServedTransactions15min
# licensingServedTransactions24h
# licensingDeniedTransactions15min
# licensingDeniedTransactions24h
# licensingUserEperience15min
# licensingUserEperience24h
#
.1.2.2.1.0 i /etc/gbroker-snmpp/utills/cpuUsage.sh licensing
.1.2.2.2.0 i /etc/gbroker-snmpp/utills/memory_monitoring.pl licensing
.1.2.2.3.0 i /etc/gbroker-snmpp/utills/licensingTotalTransactions.sh 15
.1.2.2.4.0 i /etc/gbroker-snmpp/utills/licensingTotalTransactions.sh 1440
.1.2.2.5.0 i /etc/gbroker-snmpp/utills/licensingServedTransactions.sh 15
.1.2.2.6.0 i /etc/gbroker-snmpp/utills/licensingServedTransactions.sh 1440
.1.2.2.7.0 i /etc/gbroker-snmpp/utills/licensingDeniedTransactions.sh 15
.1.2.2.8.0 i /etc/gbroker-snmpp/utills/licensingDeniedTransactions.sh 1440
.1.2.2.9.0 i /etc/gbroker-snmpp/utills/licensingUserEperience.sh 15
.1.2.2.10.0 i /etc/gbroker-snmpp/utills/licensingUserEperience.sh 1440
.1.2.2.11.0 s /etc/gbroker-snmpp/utills/licensingPackUnderZero.sh 1
.1.2.2.12.0 s /etc/gbroker-snmpp/utills/licensingPackUnderZero.sh 2
#
#
# swupgrade .1.2.3
#   cpuUsage integer
#   memUsage integer

```

```

#
.1.2.3.1.0 i /etc/gbroker-snmp/utils/cpuUsage.sh swupgrade
.1.2.3.2.0 i /etc/gbroker-snmp/utils/memory_monitoring.pl swupgrade
#
# om .1.2.4
# cpuUsage integer
# memUsage integer
#
.1.2.4.1.0 i /etc/gbroker-snmp/utils/cpuUsage.sh o_m
.1.2.4.2.0 i /etc/gbroker-snmp/utils/memory_monitoring.pl o_m
#
#
#otros proyectos
#.2.0 i /tmp/cpload.sh NADA
.1.2.5.1.0 i /etc/gbroker-snmp/utils/cpuUsage.sh licensingdemos
.1.2.5.2.0 i /etc/gbroker-snmp/utils/memory_monitoring.pl licensingdemos

```

### 3.7. MIB definition file

MIB definition file is the definition of all OID within the Genaker's subtree. It uses ASN.1 notation. Adventnet Agent Toolkit Java Edition 6.0.0 is software that helps editing the mib definition file.

MIB SNMP v3 definition (se RFC 2576) has been followed.

The MIB definition file /usr/share/snmp/mibs/GBROKER-MIB.txt is written below:

```

GBROKER-MIB DEFINITIONS ::= BEGIN
    IMPORTS
        snmp
            FROM RFC1213-MIB
        NOTIFICATION-GROUP
            FROM SNMPv2-CONF
        enterprises, MODULE-IDENTITY, OBJECT-IDENTITY, NOTIFICATION-TYPE, OBJECT-
TYPE, Integer32
            FROM SNMPv2-SMI;

    genaker MODULE-IDENTITY
        LAST-UPDATED "200711271444Z"
        ORGANIZATION "eSI Mobile Solutions. S.L.L (GENAKER)"
        CONTACT-INFO "helpdesk@genaker.net"
        DESCRIPTION "MIB de Genaker"
        REVISION "200711271444Z"
        DESCRIPTION "MIB de Genaker"
        ::= { enterprises 29302 }

    gbroker OBJECT-IDENTITY
        STATUS current
        DESCRIPTION "Rama de la mib de genaker correspondiente a los
productos de genaker"
        ::= { genaker 1 }

    system OBJECT-IDENTITY
        STATUS current
        DESCRIPTION "De este objeto cuelgan todas las referencias a la
parte de sistemas de la arquitectura gbroker"
        ::= { gbroker 1 }

    application OBJECT-IDENTITY
        STATUS current
        DESCRIPTION "De este objeto cuelgan todas las referencias a la
parte de aplicacion de la arquitectura gbroker"
        ::= { gbroker 2 }

    gbrokerNotifications OBJECT-IDENTITY
        STATUS current

```

```

        DESCRIPTION          "Conjunto de traps de sistema y aplicacion"
        ::= { gbroker 3 }

gbrokerNotificationsGroup  NOTIFICATION-GROUP
    NOTIFICATIONS {          connectivityLost,          connectivityReady,
powerSupplyRedundancyLost, powerSupplyRedundancyReady, failcountWarnLevel,
failcountCriticalLevel,  failcountReset,  nodeOutOfService,  nodeReady,  backupError,
licensePackUnderZero, backendReachable, backendUnreachable, clusterTakeover }
    STATUS                  current
    DESCRIPTION            "Grupo de notificaciones definidas anteriormente"
    ::= { gbroker 4 }

conectivity  OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Informacion de conectividad del sistema"
    ::= { system 1 }

clusterNodesAvailable OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Informacion sobre los nodos disponibles en el
cluster"
    ::= { system 2 }

clusterActiveNode  OBJECT-TYPE
    SYNTAX          OCTET STRING
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     "Hostname del nodo activo del cluster."
    ::= { system 3 }

clusterResources  OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Informacion del conjunto de recursos del cluster"
    ::= { system 4 }

powerSupplyRedundancy OBJECT-TYPE
    SYNTAX          Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION     "Retorna 0 si hay redundancia, retorna 1 si no hay
redundancia de fuentes de alimentacion"
    ::= { system 5 }

gatekeeper  OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Modulo de gatekeeper"
    ::= { application 1 }

licensing  OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Modulo de licensing"
    ::= { application 2 }

swupgrade  OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Modulo de Software Upgrade"
    ::= { application 3 }

om  OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Modulo de O&M"
    ::= { application 4 }

licensingdemos OBJECT-IDENTITY
    STATUS    current
    DESCRIPTION "Description"
    ::= { application 5 }

connectivityLost  NOTIFICATION-TYPE
    STATUS    current
    DESCRIPTION "Se ha perdido la conectividad"
    ::= { gbrokerNotifications 1 }

connectivityReady  NOTIFICATION-TYPE
    STATUS    current
    DESCRIPTION "Se ha recuperado la conectividad"
    ::= { gbrokerNotifications 2 }

```



```

powerSupplyRedundancyLost NOTIFICATION-TYPE
  OBJECTS { powerSupplyRedundancy }
  STATUS current
  DESCRIPTION "Se ha perdido la redundancia de fuentes de
alimentacion"
  ::= { gbrokerNotifications 5 }

powerSupplyRedundancyReady NOTIFICATION-TYPE
  OBJECTS { powerSupplyRedundancy }
  STATUS current
  DESCRIPTION "Se ha recuperado la redundancia de fuentes de
alimentacion"
  ::= { gbrokerNotifications 6 }

failcountWarnLevel NOTIFICATION-TYPE
  OBJECTS { ipEth2VirtualFailcount, ipEth4VirtualFailcount,
tomcatGatekeeperFailcount, tomcatLicensingFailcount, tomcatSWUpgradeFailcount,
tomcatOmFailcount, httpdFailcount, tomcatLicensingFailcount }
  STATUS current
  DESCRIPTION "Indicador del contador de fallos. Este nivel
indica que la suma de fallos del grupo de recursos del cluster es 3."
  ::= { gbrokerNotifications 7 }

failcountCriticalLevelNOTIFICATION-TYPE
  OBJECTS { ipEth2VirtualFailcount, ipEth4VirtualFailcount,
tomcatGatekeeperFailcount, tomcatLicensingFailcount, tomcatSWUpgradeFailcount,
tomcatOmFailcount, httpdFailcount, tomcatLicensingFailcount }
  STATUS current
  DESCRIPTION "Indicador del contador de fallos. Este nivel
indica que la suma de fallos del grupo de recursos del cluster es 4.Es importante
resolver el problema, ya que con 5 fallos los recursos del nodo activo migraran al nodo
pasivo."
  ::= { gbrokerNotifications 8 }

failcountReset NOTIFICATION-TYPE
  STATUS current
  DESCRIPTION "El contador de fallos se ha resetado en todos los
recursos"
  ::= { gbrokerNotifications 9 }

nodeOutOfService NOTIFICATION-TYPE
  OBJECTS { node1Available, node2Available }
  STATUS current
  DESCRIPTION "El nodo ha dejado de formar parte del cluster."
  ::= { gbrokerNotifications 10 }

nodeReady NOTIFICATION-TYPE
  OBJECTS { clusterActiveNode, node1Available, node2Available
}
  STATUS current
  DESCRIPTION "El nodo ha recuperado su funcionalidad dentro del
cluster"
  ::= { gbrokerNotifications 11 }

backupError NOTIFICATION-TYPE
  STATUS current
  DESCRIPTION "La copia de seguridad ha fallado."
  ::= { gbrokerNotifications 12 }

licensePackUnderZero NOTIFICATION-TYPE
  OBJECTS { licensePackUnderZeroString1,
licensePackUnderZeroString2 }
  STATUS current
  DESCRIPTION " Atencion!!! el PoC Broker, genaker5031, ha
agotado la bolsa de licencias. Seguirá funcionando hasta llegado un punto que ede
detenerse. Es urgente que se ponga en contacto con los responsables del sistema PyH, o
directamente con Genaker llamando al +34 932 422 885 - http://www.genaker.net"
  ::= { gbrokerNotifications 13 }

backendReachable NOTIFICATION-TYPE
  OBJECTS { backendAvailable }
  STATUS current
  DESCRIPTION "Se ha recuperado la conectividad con el backend y
el servicio de MySQL está accesible"
  ::= { gbrokerNotifications 14 }

```

```

backendUnreachable NOTIFICATION-TYPE
  OBJECTS { backendAvailable }
  STATUS current
  DESCRIPTION "Se ha perdido la conectividad con el backend o no
hay conexión con la base de datos"
  ::= { gbrokerNotifications 15 }

clusterTakeover NOTIFICATION-TYPE
  OBJECTS { clusterActiveNode, node1Available, node2Available }
  STATUS current
  DESCRIPTION "Todos los recursos del cluster han conmutado al
otro nodo."
  ::= { gbrokerNotifications 16 }

ipAddressingAvailable OBJECT-TYPE
  SYNTAX Integer32 ( -2147483648 .. 2147483647 )
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Indica si el direccionamiento IP de la maquina es
el que esta definido en el archivo de configuracion gbroker.conf. El valor de retorno es
0 si la configuracion es correcta. En caso contrario retornara 1."
  ::= { connectivity 1 }

sccsAvailable OBJECT-TYPE
  SYNTAX Integer32
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Indica si el servidor ldap (SCCS) esta disponible.
El valor de retorno es 0 si esta disponible. En caso contrario retornara 1."
  ::= { connectivity 3 }

backendAvailable OBJECT-TYPE
  SYNTAX Integer32
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Indica si el cluster del backend esta disponible.
El valor de retorno es 0 si esta disponible. En caso contrario retornara 1."
  ::= { connectivity 4 }

ntpServerAvailable OBJECT-TYPE
  SYNTAX Integer32
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Indica si el servidor NTP esta disponible. El
valor de retorno es 0 si esta disponible. En caso contrario retornara 1."
  ::= { connectivity 6 }

node1Available OBJECT-TYPE
  SYNTAX Integer32
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Indica si el nodo 1 forma parte del cluster. El
valor de retorno es 0 si forma parte del cluster. En caso contrario retorna -1."
  ::= { clusterNodesAvailable 1 }

node2Available OBJECT-TYPE
  SYNTAX Integer32
  MAX-ACCESS read-only
  STATUS current
  DESCRIPTION "Indica si el nodo 2 forma parte del cluster. El
valor de retorno es 0 si forma parte del cluster. En caso contrario retorna -1."
  ::= { clusterNodesAvailable 2 }

status OBJECT-IDENTITY
  STATUS current
  DESCRIPTION "Estado de los diferentes recursos del cluster"
  ::= { clusterResources 1 }

failcounts OBJECT-IDENTITY
  STATUS current
  DESCRIPTION "Contadores de fallo de los recursos del cluster"
  ::= { clusterResources 2 }

gatekeeperCpuUsage OBJECT-TYPE
  SYNTAX Integer32 ( -2147483648 .. 2147483647 )
  MAX-ACCESS read-only

```

```

STATUS current
DESCRIPTION "consumo de CPU del recurso tomcat."
::= { gatekeeper 1 }

gatekeeperMemUsage OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "consumo de Memoria en KiloBytes del recurso
tomcat"
::= { gatekeeper 2 }

gatekeeperTotalTransactions15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero total de transacciones realizadas por el
modulo en los ultimos 15min."
::= { gatekeeper 3 }

gatekeeperTotalTransactions24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones servidas correctamente por
el modulo."
::= { gatekeeper 4 }

gatekeeperServedTransactions15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en los ultimos 15min"
::= { gatekeeper 5 }

gatekeeperServedTransactions24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en las ultimas 24h"
::= { gatekeeper 6 }

gatekeeperDeniedTransactions15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en los ultimos 15min"
::= { gatekeeper 7 }

gatekeeperDeniedTransactions24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en las ultimas 24h"
::= { gatekeeper 8 }

gatekeeperUserEperiencel5min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Tiempo en milisegundos del percentil 90 del tiempo
de transaccion en los ultimos 15min"
::= { gatekeeper 9 }

gatekeeperUserEperience24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Tiempo en milisegundos del percentil 90 del tiempo
de transaccion en las ultimas 24h"
::= { gatekeeper 10 }

licensingCpuUsage OBJECT-TYPE

```

```

SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "consumo de CPU del recurso tomcat."
 ::= { licensing 1 }

licensingMemUsage OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "consumo de Memoria en KiloBytes del recurso
tomcat"
 ::= { licensing 2 }

licensingTotalTransactions15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero total de transacciones realizadas por el
modulo en los ultimos 15 min."
 ::= { licensing 3 }

licensingTotalTransactions24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones servidas correctamente por
el modulo en las ultimas 24h."
 ::= { licensing 4 }

licensingServedTransactions15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en los ultimos 15 min."
 ::= { licensing 5 }

licensingServedTransactions24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en las ultimas 24h"
 ::= { licensing 6 }

licensingDeniedTransactions15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en los ultimos 15min"
 ::= { licensing 7 }

licensingDeniedTransactions24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "numero de transacciones con error procesadas por
el modulo en las ultimas 24h"
 ::= { licensing 8 }

licensingUserEperience15min OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Tiempo en milisegundos del percentil 90 del tiempo
de transaccion en los ultimos 15min"
 ::= { licensing 9 }

licensingUserEperience24h OBJECT-TYPE
SYNTAX Integer32 ( -2147483648 .. 2147483647 )
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Tiempo en milisegundos del percentil 90 del tiempo
de transaccion en las ultimas 24h"
 ::= { licensing 10 }

```

```

licensePackUnderZeroString1 OBJECT-TYPE
    SYNTAX OCTET STRING
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "String que lanza la aplicacion de licensing"
    ::= { licensing 11 }

licensePackUnderZeroString2 OBJECT-TYPE
    SYNTAX OCTET STRING
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "String que lanza la aplicacion de licensing"
    ::= { licensing 12 }

swupgradeCpuUsage OBJECT-TYPE
    SYNTAX Integer32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "consumo de CPU del recurso tomcat"
    ::= { swupgrade 1 }

swupgradeMemUsage OBJECT-TYPE
    SYNTAX Integer32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "consumo de Memoria en KiloBytes del recurso
tomcat"
    ::= { swupgrade 2 }

omCpuUsage OBJECT-TYPE
    SYNTAX Integer32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "consumo de CPU del recurso tomcat"
    ::= { om 1 }

omMemUsage OBJECT-TYPE
    SYNTAX Integer32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "consumo de Memoria en KiloBytes del recurso
tomcat"
    ::= { om 2 }

licensingdemosCpuUsage OBJECT-TYPE
    SYNTAX Integer32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Description"
    ::= { licensingdemos 1 }

licensingdemosMemUsage OBJECT-TYPE
    SYNTAX Integer32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Description"
    ::= { licensingdemos 2 }

ipEth2VirtualAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
    ::= { status 1 }

ipEth4VirtualAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
    ::= { status 2 }

```

```

tomcatGatekeeperAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
 ::= { status 3 }

tomcatLicensingAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
 ::= { status 4 }

tomcatSWUpgradeAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
 ::= { status 5 }

tomcatOmAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
 ::= { status 6 }

httpdAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
 ::= { status 7 }

tomcatLicensingdemosAvailable OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica si el recurso del cluster esta funcionando.
El valor de retorno es 0 si el funcionamiento es correcto. En caso contrario retornara
1."
 ::= { status 8 }

ipEth2VirtualFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
 ::= { failcounts 1 }

ipEth4VirtualFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
 ::= { failcounts 2 }

tomcatGatekeeperFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
 ::= { failcounts 3 }

```

```

tomcatLicensingFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
    ::= { failcounts 4 }

tomcatSWUpgradeFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
    ::= { failcounts 5 }

tomcatOmFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
    ::= { failcounts 6 }

httpdFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
    ::= { failcounts 7 }

tomcatLicensingdemosFailcount OBJECT-TYPE
    SYNTAX Integer32 ( -2147483648 .. 2147483647 )
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION "Indica el contador de fallos del recurso. Retorna
el valor entero del contador"
    ::= { failcounts 8 }

END

```

### 3.8. /etc/snmpd/snmpd.conf

This file is the configuration file for snmpd. It will configure active monitoring and will load the snmp plugin.

Below, this file is written:

```

#####
#
# snmpd.conf
#
# - created by the snmpconf configuration program
#
#####
# SECTION: Monitor Various Aspects of the Running Host
#
# The following check up on various aspects of a host.
#
# proc: Check for processes that should be running.
# proc NAME [MAX=0] [MIN=0]
#
# NAME: the name of the process to check for. It must match
# exactly (ie, http will not find httpd processes).
# MAX: the maximum number allowed to be running. Defaults to 0.
# MIN: the minimum number to be running. Defaults to 0.
#
# The results are reported in the prTable section of the UCD-SNMP-MIB tree
# Special Case: When the min and max numbers are both 0, it assumes

```

```

# you want a max of infinity and a min of 1.

#proc heartbeat 1 1

# disk: Check for disk space usage of a partition.
# The agent can check the amount of available disk space, and make
# sure it is above a set limit.
#
# disk PATH [MIN=100000]
#
# PATH: mount path to the disk in question.
# MIN: Disks with space below this value will have the Mib's errorFlag set.
# Can be a raw byte value or a percentage followed by the %
# symbol. Default value = 100000.
#
# The results are reported in the dskTable section of the UCD-SNMP-MIB tree

disk /opt 20%
disk /usr 20%
disk / 20%
disk /boot 20%
disk /home 20%
disk /var 20%
disk /tmp 20%

# load: Check for unreasonable load average values.
# Watch the load average levels on the machine.
#
# load [1MAX=12.0] [5MAX=12.0] [15MAX=12.0]
#
# 1MAX: If the 1 minute load average is above this limit at query
# time, the errorFlag will be set.
# 5MAX: Similar, but for 5 min average.
# 15MAX: Similar, but for 15 min average.
#
# The results are reported in the laTable section of the UCD-SNMP-MIB tree

load 12 5 4

#####
# SECTION: System Information Setup
#
# This section defines some of the information reported in
# the "system" mib group in the mibII tree.

# syslocation: The [typically physical] location of the system.
# Note that setting this value here means that when trying to
# perform an snmp SET operation to the sysLocation.0 variable will make
# the agent return the "notWritable" error code. IE, including
# this token in the snmpd.conf file will disable write access to
# the variable.
# arguments: location_string

syslocation B_CERDA

# syscontact: The contact information for the administrator
# Note that setting this value here means that when trying to
# perform an snmp SET operation to the sysContact.0 variable will make
# the agent return the "notWritable" error code. IE, including
# this token in the snmpd.conf file will disable write access to
# the variable.
# arguments: contact_string

syscontact helpdesk@genaker.net

#####
# SECTION: Trap Destinations
#
# Here we define who the agent will send traps to.

# trap2sink: A SNMPv2c trap receiver
# arguments: host [community] [portnum]

```



```

#trap2sink 10.236.252.169 GENAKER

trap2sink 10.1.1.2 GENAKER

# informsink: A SNMPv2c inform (acknowledged trap) receiver
# arguments: host [community] [portnum]

#informsink 10.1.1.232 GENAKER

# trapcommunity: Default trap sink community to use
# arguments: community-string

trapcommunity GENAKER_ADMIN

#####
# SECTION: Access Control Setup
#
# This section defines who is allowed to talk to your running
# snmp agent.

# rocommunity: a SNMPv1/SNMPv2c read-only access community name
# arguments: community [default|hostname|network/bits] [oid]

rocommunity GENAKER

# rwcommunity: a SNMPv1/SNMPv2c read-write access community name
# arguments: community [default|hostname|network/bits] [oid]

rwcommunity GENAKER_ADMIN

createUser internal
iquerySecName internal
rouser internal

# Default monitors
monitor -u internal -r 2 -o prNames -o prErrMsg "procTable" prErrorFlag != 0
monitor -u internal -r 2 -o memErrorName -o memSwapErrorMsg "memory" memSwapError != 0
monitor -u internal -r 2 -o extNames -o extOutput "extTable" extResult != 0
monitor -u internal -r 2 -o dskPath -o dskErrorMsg "dskTable" dskErrorFlag != 0
monitor -u internal -r 2 -o laNames -o laErrMsg "laTable" laErrorFlag != 0
monitor -u internal -r 2 -o fileName -o fileErrorMsg "fileTable" fileErrorFlag != 0

# Interface monitoring linkUp / LinkDown
notificationEvent linkUpTrap linkUp ifIndex ifAdminStatus ifOperStatus
notificationEvent linkDownTrap linkDown ifIndex ifAdminStatus ifOperStatus
monitor -u internal -r 2 -e linkUpTrap "Generate linkUp" ifOperStatus != 2
monitor -u internal -r 2 -e linkDownTrap "Generate linkDown" ifOperStatus == 2

# Notification Events for backendUnreachableTrap
notificationEvent backendUnreachableTrap backendUnreachable backendAvailable
monitor -u internal -r 30 -e backendUnreachableTrap "Generate backendUnreachable"
backendAvailable != 0

# Notification Events for backendReachableTrap
notificationEvent backendReachableTrap backendReachable backendAvailable
monitor -u internal -r 30 -e backendReachableTrap "Generate backendReachable"
backendAvailable == 0

# Notification Events for psRedundancyLostTrap
notificationEvent psRedundancyLostTrap powerSupplyRedundancyLost powerSupplyRedundancy
monitor -u internal -r 300 -e psRedundancyLostTrap "ps redundancy lost"
powerSupplyRedundancy != 0

# Notification events for psRedundancyReadyTrap
notificationEvent psRedundancyReadyTrap powerSupplyRedundancyReady
powerSupplyRedundancy
monitor -u internal -r 300 -e psRedundancyReadyTrap "ps redundancy recovered"
powerSupplyRedundancy == 0

# Notification event for trap connectivityLost
notificationEvent connectivityLostTrap connectivityLost
monitor -u internal -r 300 -e connectivityLostTrap -o ipAddressingAvailable "IP
addressing is incorrect" ipAddressingAvailable != 0
monitor -u internal -r 30 -e connectivityLostTrap -o sccsAvailable "SCCS is not
available" sccsAvailable != 0
monitor -u internal -r 30 -e connectivityLostTrap -o ntpServerAvailable "NTP Server is
not available" ntpServerAvailable != 0

```

```

# Notification event for trap connectivityReady
notificationEvent connectivityReadyTrap connectivityReady
monitor -u internal -r 300 -e connectivityReadyTrap -o ipAddressingAvailable "IP
addressing is correct" ipAddressingAvailable == 0
monitor -u internal -r 300 -e connectivityReadyTrap -o sccsAvailable "SCCS is available"
sccsAvailable == 0
monitor -u internal -r 300 -e connectivityReadyTrap -o ntpServerAvailable "NTP Server is
available" ntpServerAvailable == 0

# Notification event for trap nodeOutOfService
notificationEvent nodeOutOfServiceTrap nodeOutOfService node1Available node2Available
# Monitor operation on nodeOutOfService event
monitor -u internal -r 30 -e nodeOutOfServiceTrap "nodeOutOfServiceTrap - node 1"
node1Available != 0
monitor -u internal -r 30 -e nodeOutOfServiceTrap "nodeOutOfServiceTrap - node 2"
node2Available != 0

# Notification event for trap nodeReady
notificationEvent nodeReadyTrap nodeReady clusterActiveNode node1Available
node2Available
# Monitor operation on nodeReady event
monitor -u internal -r 30 -e nodeReadyTrap "nodeReadyTrap monitor - node 1"
node1Available == 0
monitor -u internal -r 30 -e nodeReadyTrap "nodeReadyTrap monitor - node 2"
node2Available == 0

# Notification event for trap backupError
#notificationEvent backupErrorTrap backupError
# Monitor operation on backupError event
#monitor -u internal -r 30 -e backupErrorTrap "backupErrorTrap monitor" condition == 0

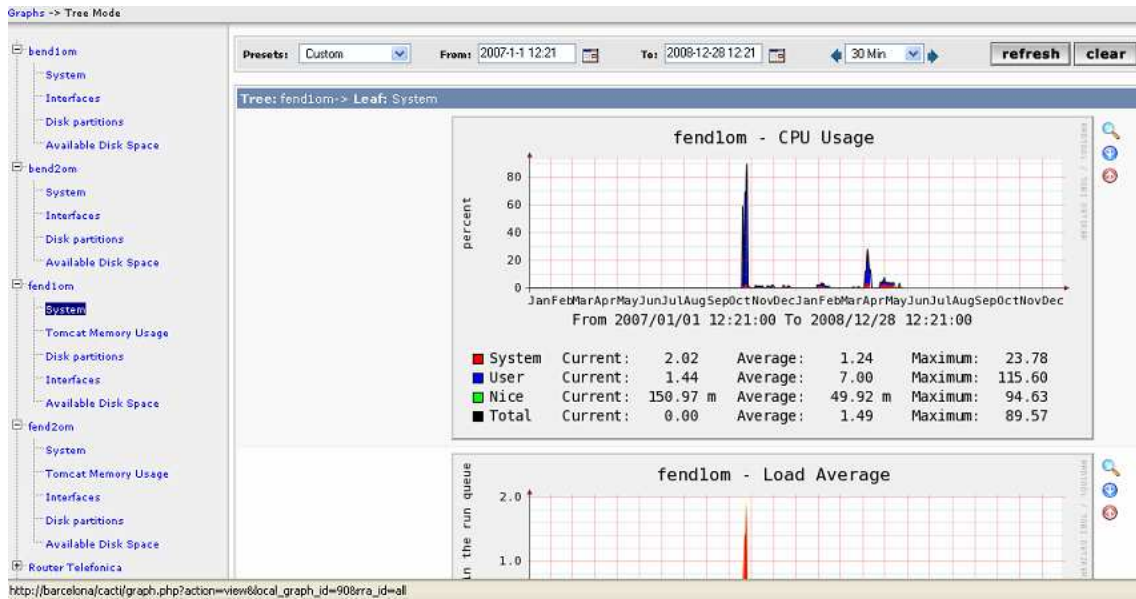
# Notification event for trap clusterTakeover
#notificationEvent clusterTakeoverTrap clusterTakeover
# Monitor operation on clusterTakeover event
#monitor -u internal -r 30 -e clusterTakeoverTrap "clusterTakeoverTrap monitor"
condition == 0

dlmod gbroker_snmp /usr/lib/snmp/dlmod/gbroker_snmp.so

```

### 3.9. Example of SNMP monitoring using cacti framework

In following picture the implementation of SNMP monitoring using cacti can be seen. Menus are shown on the left side whereas graphs are shown in the center. This figure is just an example of cacti framework and all graphs will not be shown.



**Fig. 3.1** Example of cacti framework based on SNMP monitoring of development scenario.

## ANNEX 4. Installers

In this chapter, installer for frontend and backend clusters will be written.

### 4.1. Frontend installer

The frontend installer consists on a set of scripts and configuration files organized in the path `/etc/gbroker-frontend` with the following folder structure:

- `drbd`. It contains `drbd` module files already compiled.
- `etc`. It contains configuration files for frontend cluster
- `scripts`. It contains installation scripts.
- `Soft`. It contains `tomcat` core files and some other modules.
- `Gbroker.conf`. Configuration file with a set of lines with the structure `KEY=VALUE`

#### 4.1.1. Internal structure

The main files in this RPM are located in `scripts` folder. There is a set of bash scripts that configures the system properly depending on the configuration file `gbroker.conf`.

In the following lines there is a brief description of the action performed by each script.

- `Install.sh`. This script will prompt for confirmation to perform the installation. It will call all other scripts which are necessary to configure the system.
- `config_apache.sh`. This script configures authentication for apache and installs `mod_cband.so` module for bandwidth management.
- `config_drbd.sh`. Configure `drbd` configuration file.
- `config_eth.sh`. This is a support script for configuring interfaces
- `config_heartbeat_comun.sh`. This script configures common parameters for all cluster nodes,
- `config_heartbeat_frontend.sh`. This script configures frontend nodes with a predefined `cib.file`.
- `config_java.sh`. Configures path for java runtime
- `config_network.sh`. This script loads parameters from `gbroker.conf` file and configures interfaces, hostname and some other network parameters.
- `config_tomcats.sh`. It deploys a fresh install of tomcat.
- `delete_eth.sh`. Support script for deleting a nic.
- `disable_eth.sh`. Support script for disabling a nic.
- `get_mac.sh`. Support script for parsing mac address of a interface.

- return\_ip.sh. Support script for IP address parsing.
- return\_mask.sh. Support script for mask parsing.
- set\_parameters.sh. Support script for setting parameters in a file.
- write\_hostname\_gw.sh. This script writes hostname.
- write\_hosts.sh. This script writes the file /etc/hosts with the proper information from gbroker.conf

## 4.2. Backend installer

The backend installer consists on a set of scripts and configuration files organized in the path /etc/gbroker-backend with the following folder structure:

- etc. It contains configuration files for backend cluster
- scripts. It contains installation scripts.
- Gbroker.conf. Configuration file with a set of lines with the structure KEY=VALUE

### 4.2.1. Internal structure

In the same way than the frontend cluster installer, main files are located in scripts folder. The system will be configured with values set in gbroker.conf configuration file. In the following lines there is a brief description of the action performed by each script.

- Install.sh. This script will prompt for confirmation to perform the installation. It will call all other scripts which are necessary to configure the system.
- config\_cluster\_backend.sh. This script configures backend nodes with a predefined cib.file.
- config\_eth.sh. This is a support script for configuring interfaces
- config\_heartbeat\_comun.sh. This script configures common parameters for all cluster nodes,
- config\_mysql.sh. This scripts configures replication and mysql parameters
- config\_network.sh. This script loads parameters from gbroker.conf file and configures interfaces, hostname and some other network parameters.
- delete\_eth.sh. Support script for deleting a nic.
- disable\_eth.sh. Support script for disabling a nic.
- get\_mac.sh. Support script for parsing mac address of a interface.
- mysql\_secure\_install.sh. It performs some queries to default installation of MySQL engine.
- return\_ip.sh. Support script for IP address parsing.
- return\_mask.sh. Support script for mask parsing.
- set\_parameters.sh. Support script for setting parameters in a file.
- write\_hostname\_gw.sh. This script writes hostname

- `write_hosts.sh`. This script writes the file `/etc/hosts` with the proper information from `gbroker.conf`