Loway
research

Running QueueMetrics with Druid

Version 1.0

Loway - Via Pasteur, 1 – 6830 Chiasso – Switzerland

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Turning Druid into a call-center solution

If you are reading this, you probably already know that using the Druid interface from Voiceroute you can install a fully featured Asterisk-based PBX in a matter of minutes.

The typical usage patterns of a small call center are different from the ones you are likely to find in a classical PBX, because:

- Agents spend almost their whole working day available to answer the phone (as opposed to standard PBX users who use the phone occasionally while doing other work); handling and answering calls for them has to be made as easy as possible
- A call center is usually a high-density commercial enterprise; therefore it has to be run and monitored using tools that are able to quickly see how things are going, identify bottlenecks and address them.

In our opinion, running a successful call center is more a state of mind than a given set of telephone gear. What makes a difference is not the number of extensions, queues or agents you have; is a mindset where you consider that the customers calling in are *actually very important* and you do your best to serve them well within given budget limits.

Maybe you just run a small computer-repair shop and have a couple of lines coming in. What is the cost of having people wait or call multiple times because they cannot talk to anybody within a reasonable time? What will your clients think about you? On the contrary, what will your clients think of your customer service if it always answers on the very first ring? And how do you know if your technicians actually answer the phone when the calls come in or wait five minutes because they are doing other things? These are the questions you should ask. If you follow the guidelines in this document, you'll find an easy way to start answering to questions like these.

Running a call-center, therefore, is not a matter of having multiple PRIs or special hardware. You will not even need a separate box from your main PBX running Druid. You will only need some software and a bit of configuration to set it up correctly.

Call centers 101: the very basics

Before we start building a small call center, we have to focus a bit on the terminology:

- A *campaign* is a set of calls that belong to the same scope, e.g. your technical support versus commercial support line are different campaigns, though they may be
- An *inbound* campaign is devoted to answering people calling in, while an *outbound* campaign is made up by agents dialing out. Call centers often mix inbound and outbound activities in order to optimize the use of personnel.
- A *queue* is the physical implementation of an inbound campaign. The queue receives calls and pipes them to the available agents according to a predefined

logic (usually, FIFO for the calls and round-robin for the agents). In call center terminology, this functionality is often referred to as the ACD (Automated Call Distribution).

- An *agent* is a person working at a call center. The agent is different from a casual user as an agent logs in and out, in order to tell the system when he is available or not. In this way, the ACD searching logic minimizes agent searching time, as it almost never has to ring up an agent who is not available. An agent can be working on one or more queues: whenever he is available, all calls coming in to any queue he's working on will be piped to him.

In this tutorial, we will learn how to create an inbound queue and proper agents to handle it.

Prerequisites

To follow this guide, you will need an already-installed copy of Druid. It may be your home or office PBX. You can follow this guide completely while having your PBX running, so there is no need for a prolonged downtime. You will need at least a couple of telephones to test your setup, and a land line or VoIP trunk you can use.

You should be basically familiar on how to use Druid as a basic PBX: creating extensions, connecting to external lines and such things.

The examples in this tutorial are based on a system installed with the Druid CD, available free of charge from http://www.voiceroute.net/site/index.php?p=download . If you installed Druid manually on a pre-existing system, it is likely that you may find minor differences in setting things up.

For more information on the usage of Druid in call center setting, please refer to Voiceroute documentation section http://www.voiceroute.net/site/index.php?p=docs

You will also need:

- A license for Druid; if you do not have one yet, you may get one free temporary key from http://www.voiceroute.net/site/index.php?p=trydruid&u=druid
- A license for QueueMetrics. Though QueueMetrics will work on small installations without the need of a purchased license, we strongly suggest you get one by filling in the form located at http://queuemetrics.com/sendDemoLicence.jsp

The following examples are taken from a Druid 3.2 installation. The behavior should anyway be very similar for all Druid 3 instances.

Software versions

This tutorial was written using Druid 3.2 and QueueMetrics 1.3.1 as reference versions. You may expect only slight differences in set up using different software versions from the ones detailed here.

Installing QueueMetrics on a Druid system

Installing QueueMetrics on a running Druid system is actually pretty easy.

1. Open a SSH connection to the server you installed Druid upon. The standard access credentials are **root** as login and **password** as password.
2. Type the following command to allow your server to download QueueMetrics from Loway servers:

   ```
   wget -P /etc/yum.repos.d http://yum.loway.it/loway.repo
   yum install queuemetrics
   ```

3. The install process will start. It may take a while to wait for all files to be downloaded on your server.
4. After all the files are downloaded and installed, it's time to create a MySQL database for QueueMetrics. Run the following commands to create an initial database:

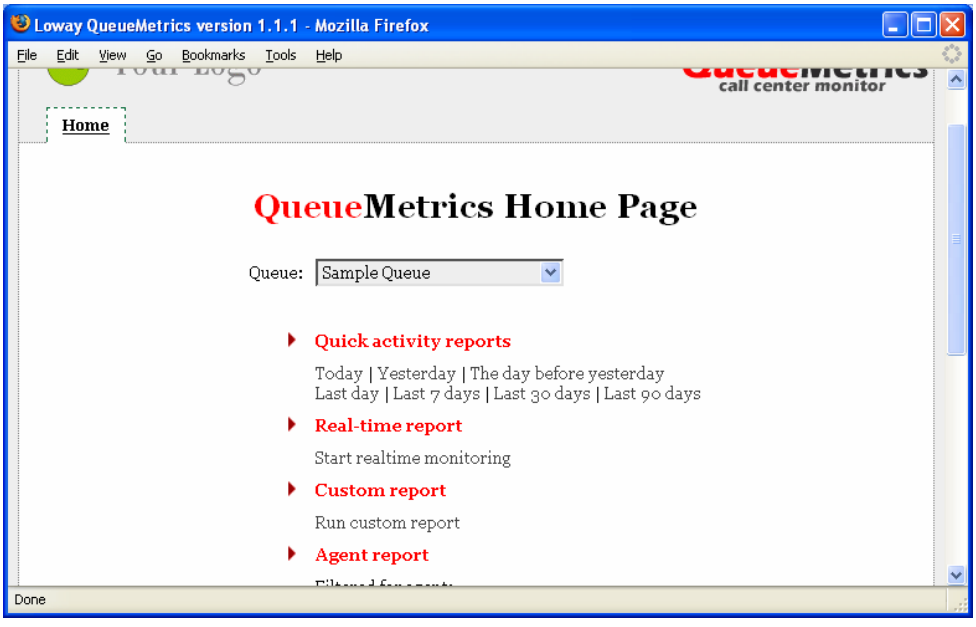
   ```
   cd /usr/local/queuemetrics/webapps/queuemetrics-1.3.1/WEB-
   INF/README
   ./installDb.sh
   ```

   Note: the actual path you may have to type depends on the version of QueueMetrics being installed. It will anyway be printed in a very clear way by the QueueMetrics installer.
5. The InstallDB utility will prompt you for two passwords. On Druid, the first password is simply blank (type Return once) and the second is "*javadude*".
6. You can now access QueueMetrics.

To test that everything is okay, you'll have to point your browser to the address http://myserver:8080/queuemetrics and you should see a screen like the following one.

If you see this screen, you know that QueueMetrics is working fine. As you'll be curious to check it out, you can login immediately with the credentials "**demoadmin**" password "**demo**".

You may notice that the first time you load up a new page, it may take a while to display it, depending on your Druid box CPU speed; this is normal, as QueueMetrics uses Java Server Pages technology and such pages are internally compiled the first time they are accessed.



This is how the first page looks like. Feel free to look around a bit before logging off.

Running QueueMetrics on a Druid box

Running QueueMetrics is very easy, as there is usually nothing you must do to keep it running.

If you have to restart QueueMetrics, you can run the following command as root:

```
/etc/init.d/queuemetrics restart
```

Naturally, you can use the *queuemetrics stop* command to terminate it and *queuemetrics start* to start it again, if you ever need to.

If you need to update your copy of QueueMetrics to the latest version, you just type:

```
yum update queuemetrics
```

And your system will detect if there is a new version available and will install it. Once you do this, point your browser to http://myserver:8080/queuemetrics/dbtest in order to check the database connection and update the database schema if that is necessary for the new version to run.

The data used to run QueueMetrics is all stored in a database called *queuemetrics*. That is the only thing you have to backup.

Updating the QueueMetrics license

If you purchase a commercial license for QueueMetrics or obtain a free 30-day temporary license for it, you'll have to install it manually in QueueMetrics.

First of all, log in using SSH to the Druid server and locate the file *WEB-INF/web.xml* within the QueueMetrics webapp. If you installed your copy of QueueMetrics using yum, the webapp is located at */usr/local/queuemetrics/webapps/queuemetrics-x.x.x*.

Edit the file with a text editor

Locate the section with the license; it looks something like:

```
<init-param>
<param-name>LICENZA_ARCHITETTURA</param-name>
<param-value>..........</param-value>
</init-param>
```

Insert your license key within the *param-value* tag, exactly as it was sent to you and all on one single line without line breaks or spaces.

Save the file.

Restart your servlet container by typing */etc/init.d/queuemetrics restart*

Try and login to QueueMetrics using your browser

Click on the "Licence" label to see your current active license, its expiration date and the maximum number of licensed agents.

Avoiding queue_log file rotation

The information of call center activity that Asterisk produces are stored in a file called queue_log. This file is not very verbose, so we suggest to avoid rotating it in order not to lose data that may be precious in monitoring the call center. This is not important for a simple test, but it is important to run a production system. See http://astrecipes.net/index.php?n=205 for a simple tutorial detailing how to avoid file rotation.

Setting up a call center using Druid

We are going to set up a very simple call- center using Druid. The following setup may be used without modifications for all but the largest call centers – like, for example, customer support lines, internal tech support lines, tickets sale or whatever your business may be.

We will be setting up a single queue named *oper* that we imagine having two agents working on it. This queue is reachable through one extension and distributes calls in a round-robin fashion to the agents logged in. We use logged-in agents instead of connecting simple terminals to the queue because in this way the Asterisk system is aware of who is available to take calls and who is not, and will not waste time trying to send calls to someone who is not there. This way also calls get logged by the person who took them and not their telephone, so people can work from whatever telephone they want within your PBX. The downside of this is that agents will have to log in when they start working and will have to log off in order to tell Asterisk they're not available anymore.

First of all we then have to define a number of extensions in our dial plan so that it is possible to perform a few functions:

- Extension 401 will send customers to the queue *Oper*.
- Extension 299 will be used by agents to log in and log off using callback mode. In callback mode, an agent gets called when the systems finds a suitable call to pass over. If the agent does not answer, after a while the call is offered to the next free agent, and so on.
- Extension 298 will be used by agents to connect to the system in standard mode. While working in standard mode, an agents stays on line and listens to music on hold until a call is sent them. To signal they want to log off, they simply hang up the phone. To terminate each call, they press * (asterisk).

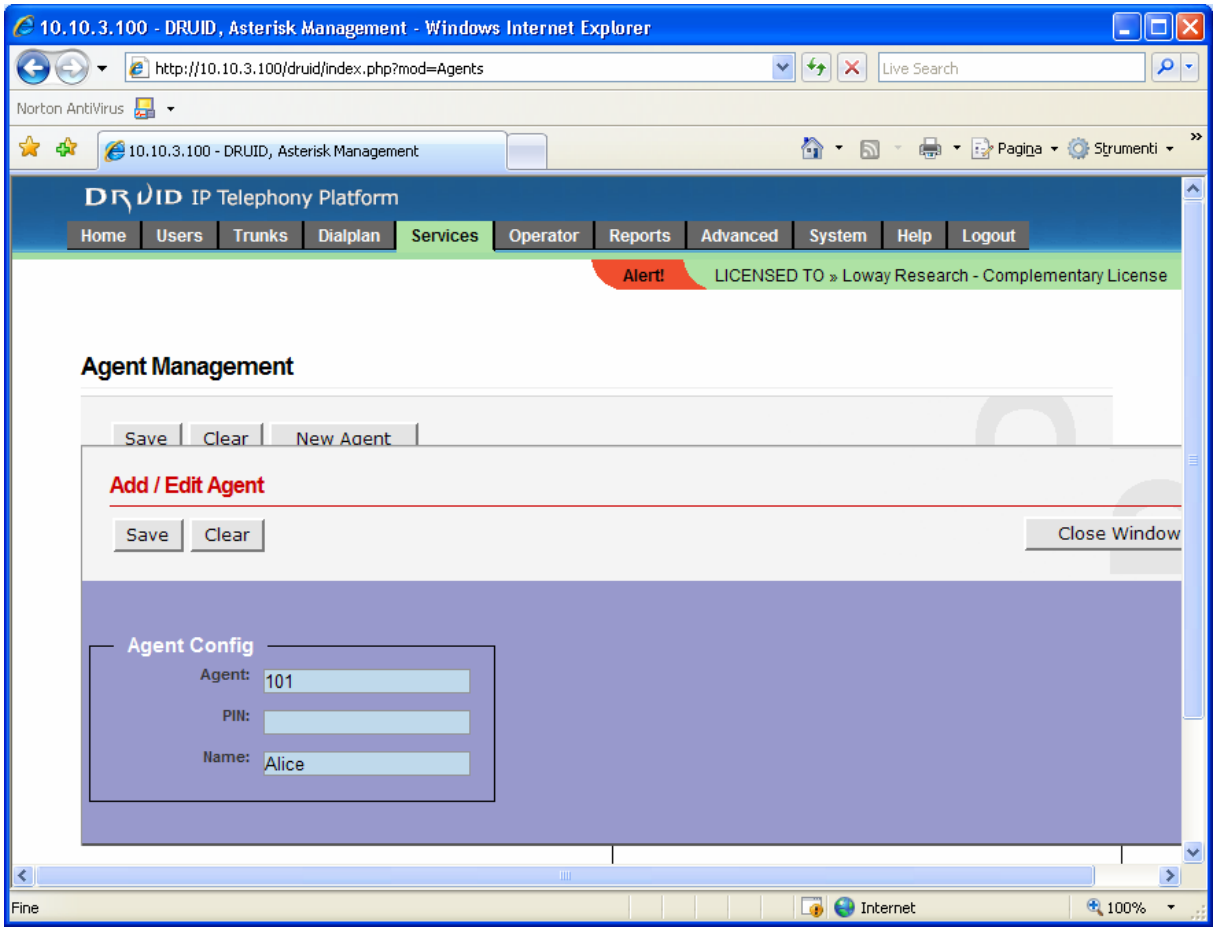
Of course you can connect a trunk directly to extension 401, so that it is possible to call that number straight from a PSTN number, or it can be reached through an operator or an IVR menu. You choose.

We will also have to define a couple of agents for our setup; they will be called as follows:

- Agent/101 will be called Alice
- Agent/102 will be called Bob

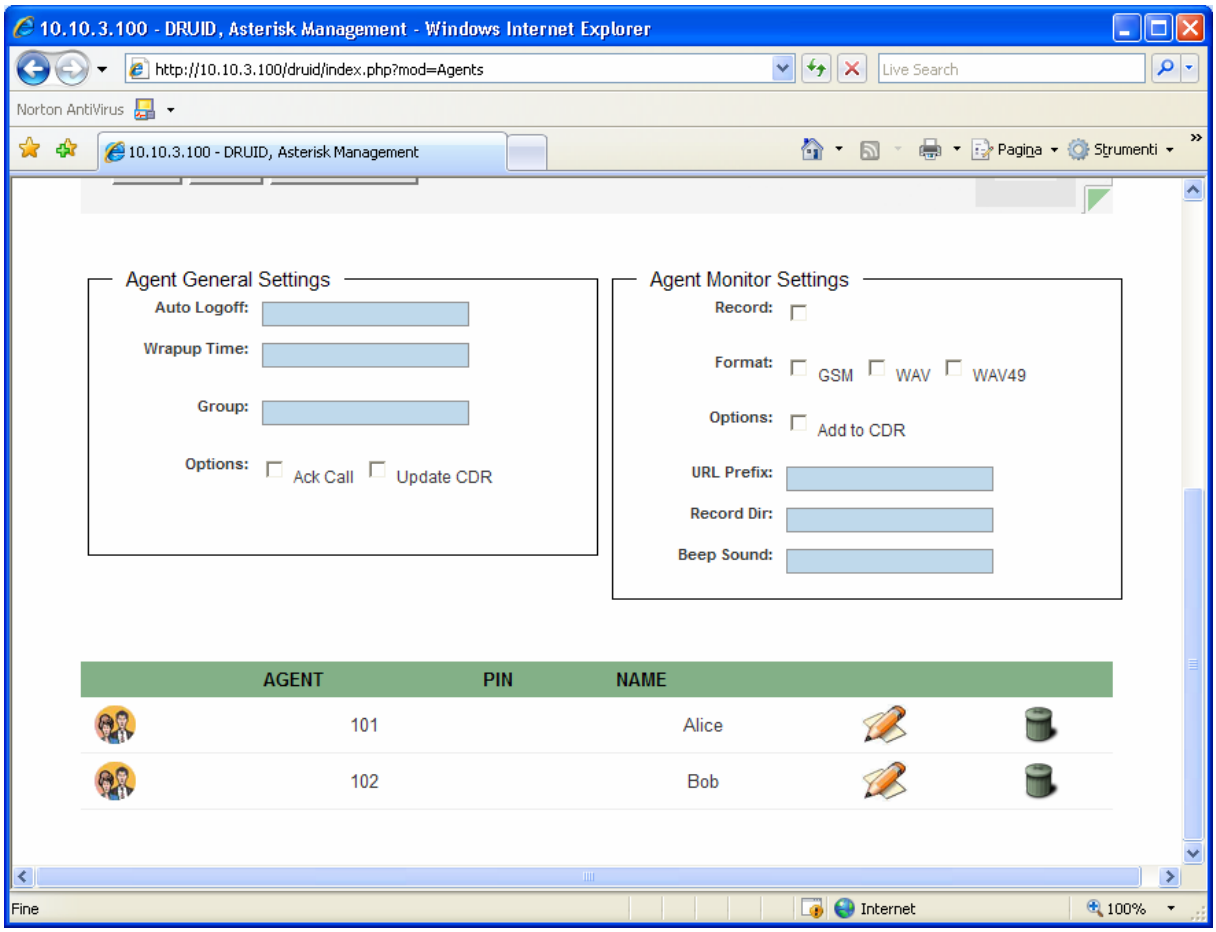
Creating agents in Druid

Once you log on to Druid using standard credentials (login **admin** password **admin**), select Services -> Agents from the main menu. Click on "New agent" to start inputting agent data, like in the following example:



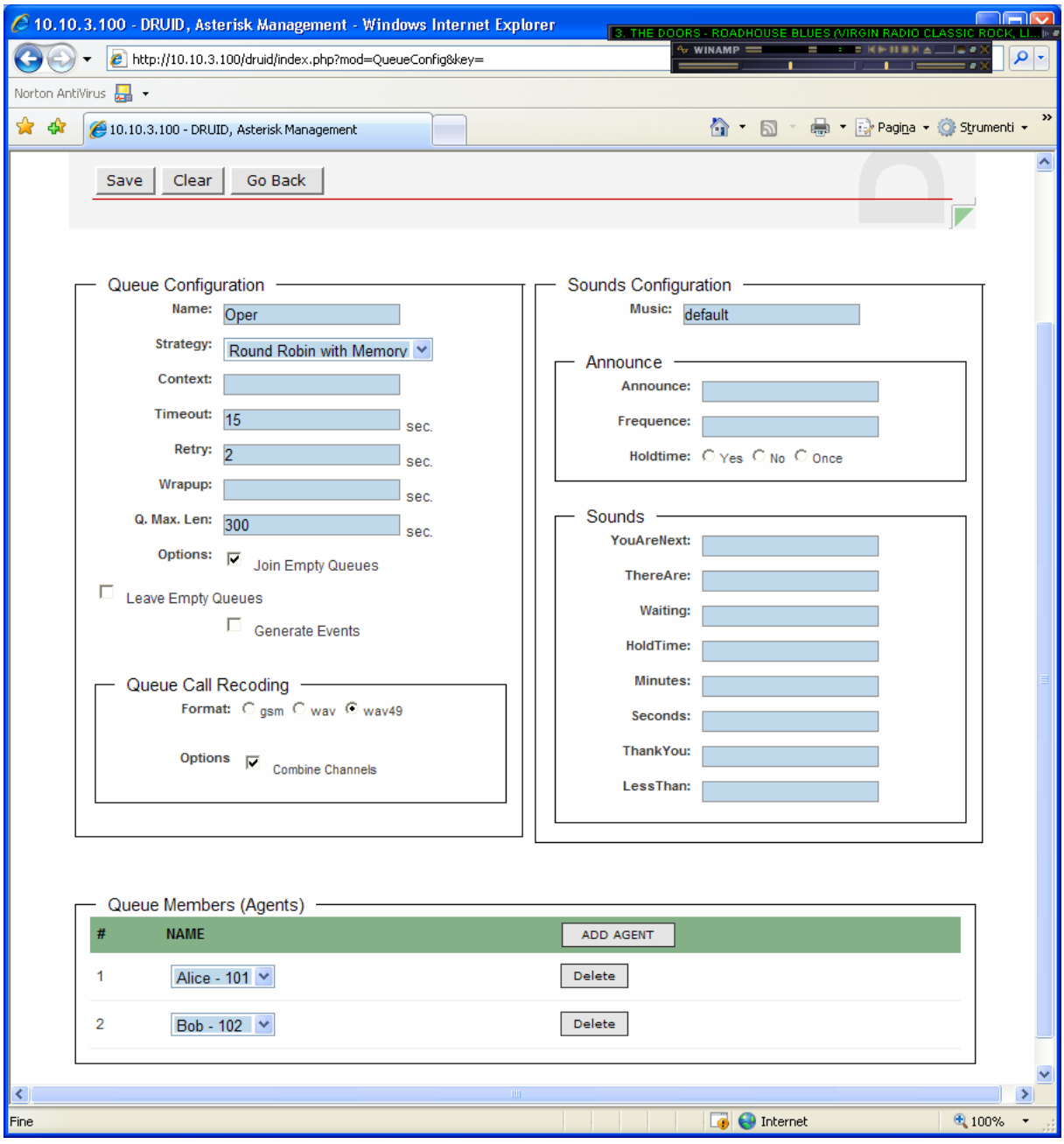
Enter “101” as the agent code, leave “PIN” blank (this is a password you may want to use to make sure the user logging in as the agent is the authorized one, though very few CCs actually use this feature), and enter a reference name for the agent. Press “Save” to save the newly created agent.

Do the same for agent number “102” called “Bob”. The screen should look a like this after you are done:



Creating queues in Druid

We now have to create a queue for our agents to work in. Select Services -> Queues -> New queue and enter relevant queue information like in the following screenshot:



Enter the following parameters:

- Name as *Oper*
- Strategy: Round robin with memory (this is Asterisk's implementation of the classic round-robin strategy that most ACDs use)
- Timeout: 15 seconds (how long an agent will be called before deciding to pass to the next available one)

- Retry: 2 seconds (how long before calling the next agent)
- Q. Max length: 300 seconds
- Join empty queues: Yes
- Music: default (the music on hold people will listen to while waiting in queue)
- Call recording: set to Wav49 (that's a kind of GSM compression that is played by Windows machines) and choose Combine Channels.

Before saving, we will have to add the agents we want to have on this queue, by clicking "Add agent" at the bottom of the page and then selecting the needed agent from the drop-down box. You can click on "Add agent" multiple times. Note that you can have any agent work on multiple queues, as you best see fit.

Clicking on "Save" will save the queue to be used by Asterisk.

Creating the dial-plan in Druid

It is now time to create a dial-plan that will connect the agents and queues we have defined to specific entry-points, i.e. extension numbers. Go to Dialplan -> Dialplan Wizard and select the context "druid-users" from the central combo box as in the following figure. Note that you should have already defined a few telephones and you should see them all here.

Now create a new extensions for agent login:

- Dial pattern: 298, Priority 1
- Application: AgentLogin

Now another extension for callback login:

- Dial pattern: 299, Priority 1
- Application: AgentCallbackLogin
- App data: ||@druid-users (Yes that's two pipes followed by @)

Now another extension for the queue:

- Dial pattern: 401, Priority 1
- Application: Queue
- Queue name: Oper
- Timeout: 300

Now press “Save dialplan” and then force a reload (you should see an alert on-screen telling you that Asterisk has not picked up the new configuration yet).

Testing the queue

To test the queue, we may log in one agent as a callback operator, another as a full agent, and then we try calling the queue from a third telephone.

- To log in as a standard agent, you dial 298 from one of the telephones; a voice will greet you and ask to enter your agent code followed by pound. Type 101# on the keyboard and you will start listening to music on hold. Your agent is ready. To log off, just hang up the phone.
- To log in as a callback agent, you will dial 299; a voice will ask you for your agent number followed by pound, enter 102#, then it will ask you for your current extension number to be called back on; enter one of the telephones followed by #. To log off as a callback agent., repeat the same procedure but simply enter # as your extension.

Note: it is very important that if you use a callback agent, you turn off all “advanced features” for that user, like voicemail, forwarding and what else. This is because the queue system will call the extension as if it were another user calling it, so you do not want the voicemail to answer and therefore being connected to the caller!

- To route a call to the queue, simply dial 401. The queue will start searching for the first available agent and connect him to you. You may want to experiment calling the queue multiple times, with agents logged on and off, in order to check the behavior is correct.

Congratulations, you have configured a working queue!

Monitoring the call-center using QueueMetrics

A call-center, small as it may be, gets to be an important cost center for your business: if you start adding the monthly costs of your operators you realize it is a costly and human-intensive activity. Therefore it is very important to monitor it in order to extract the best possible value for the money spent. A call center is also very often the point of contact of your business to the rest of the world: you want to make sure that people calling in get the best possible impression of your firm. To achieve these results, there is only one possible way: monitor it.

QueueMetrics will help you in understanding what goes on in your call center both in real-time and with historical data. It will provide a wealth if information to have a firm grasp of what is going on, and will help you identify the when and why of any problem that should occur.

Connecting to QueueMetrics is pretty easy: just point your browser to http://myserver:8080/queuemetrics . Log in as **demoadmin** password **demo**.

Preloading the configuration

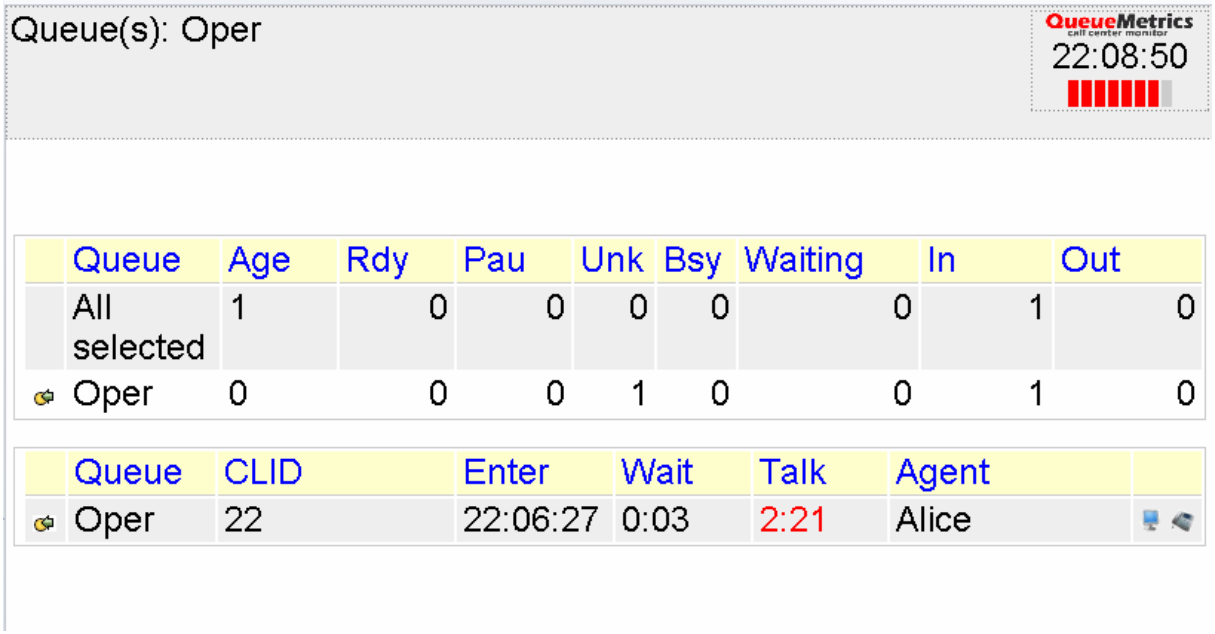
The first thing we have to do is to update QueueMetrics with the current Asterisk information on queues and agents. Luckily we do not have to enter this information manually, just click on the "Setup wizard" link from the main page.

Just follow the wizard, selecting all entries and clicking Okay. In a few clicks agents will have been imported, and so will queues. Once the wizard has terminated, we are ready to run an analysis.

Real-time reporting

Go back to the home page and select the newly created queue "Oper" on the Queue combo, then click on *Realtime report*. You will be lead on a screen that looks like the following picture:

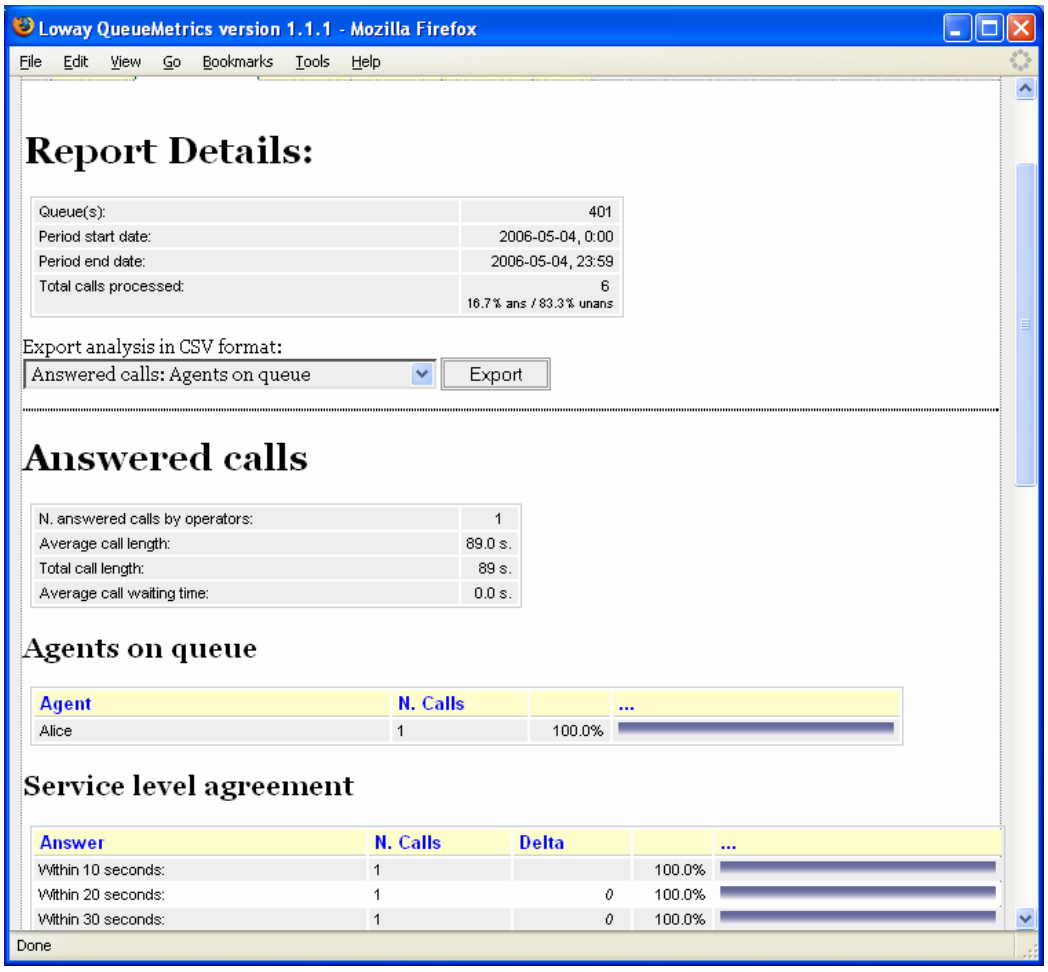
As you can see, here we have one agent logged in (Alice) who is in conversation with a caller whose number is 22. This screen is very detailed and contains a realtime snapshot odf the status of your call center, the calls it is processing on various queues and the agents who are available. A subset of this information, specifically thought for a wallboard or a screen projector, is available from the “Start wallboard” link, so that you can let your agents see in realtime what is going on.



As you can see, the wallboard uses a larger font and displays a subset of the information of the realtime mode. You can set up a Linux box that connect s automatically to QueueMetrics on startup and display the wallboard 24/7 on a large monitor.

Running a report

Once the call is over. if we click on the "Home" tab and then "Quick activity reports" -> "Today", we will be shown today's stats



From the report page, you can access a number of reports; they are well detailed in QueueMetrics user manual, but the following should be a working introduction:

- The “Answered” tab gives statistics about the calls that were answered correctly: how any were handled, who handled them, average duration and average wait times
- The “Detail” button on the bottom of the “Answered” page gives a call-by-call activity detail
- The “Unanswered” tab gives information on calls that were lost, i.e. the user disconnected before talking to a living person
- The “Detail” button on the bottom of the “Unanswered” page gives a call-by-call detail of lost calls
- The “Distrib” tab gives a daily, hourly and day-of-week breakdown of taken and lost calls

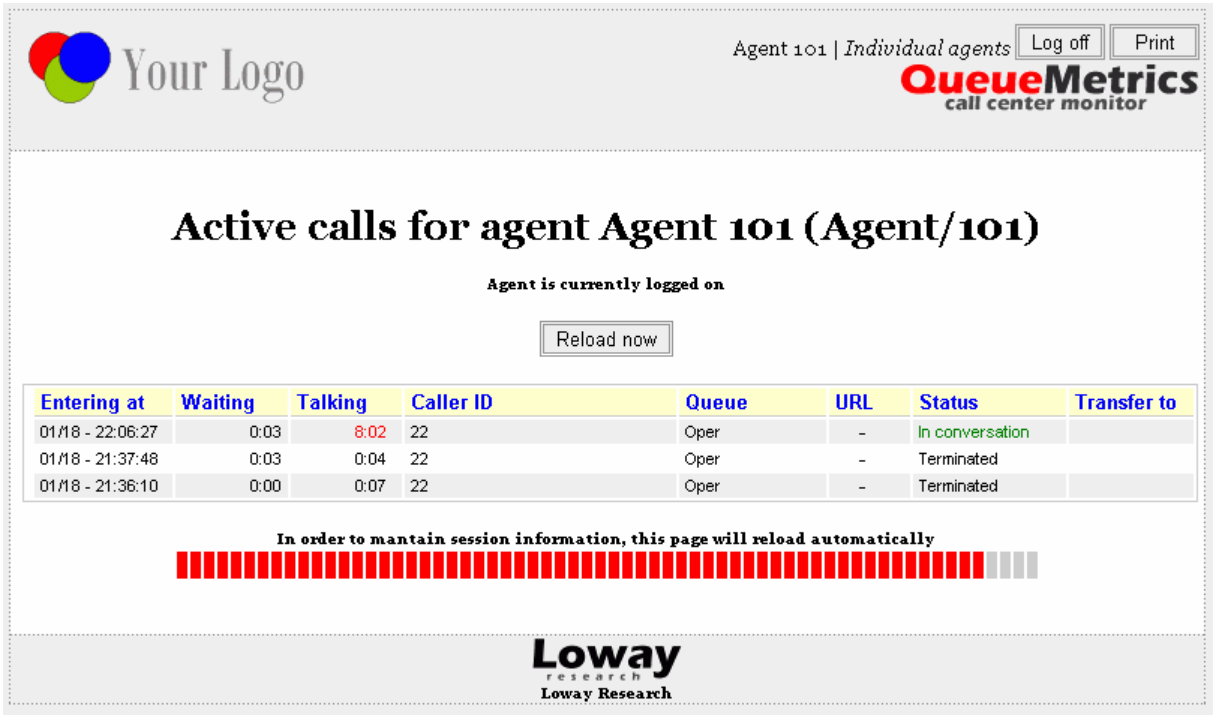
- The “Agents” tab gives detail of agent sessions and calls handled during those sessions
- The “Detail” button on the bottom of the “Agents” page gives a session-by-session detail of agent activity
- The “All” tab is a convenient way to have all the stats on a single page so that it can be saved or printed for future reference.

As you can see, QueueMetrics produces a very large and detailed set of information that lets you monitor your call-center with very high accuracy. It comes with a 100-page User Manual that explains the meaning of all graphs and how to set it up to suit a very large set of environments and monitoring tasks. QueueMetrics has been deployed to monitor call-centers of all sizes, from 3 to over 250 live agents per server, and is a proven industrial solution.

The agent’s page

If you log off of QueueMetrics and log in as “Agent/101”, you will see the Agent’s page. This page is meant to:

- Track the status of the agent (you know that an agent must be logged on in order to take calls)
- Keep track of the calls the agent has just taken
- Open external CRM apps that may be linked to incoming variables, like the caller-id of the call, through the URL field of the Queue command


Your Logo
Agent 101 | Individual agents
Log off
Print
QueueMetrics
call center monitor
Active calls for agent Agent 101 (Agent/101)
Agent is currently logged on
Reload now
Entering at
Waiting
Talking
Caller ID
Queue
URL
Status
Transfer to
01/18 - 22:06:27
0:03
8:02
22
Oper
-
In conversation
01/18 - 21:37:48
0:03
0:04
22
Oper
-
Terminated
01/18 - 21:36:10
0:00
0:07
22
Oper
-
Terminated
In order to mantain session information, this page will reload automatically
Loway
research
Loway Research