

Airtime

for Broadcasters

The open radio software for scheduling
and remote station management

USER GUIDE

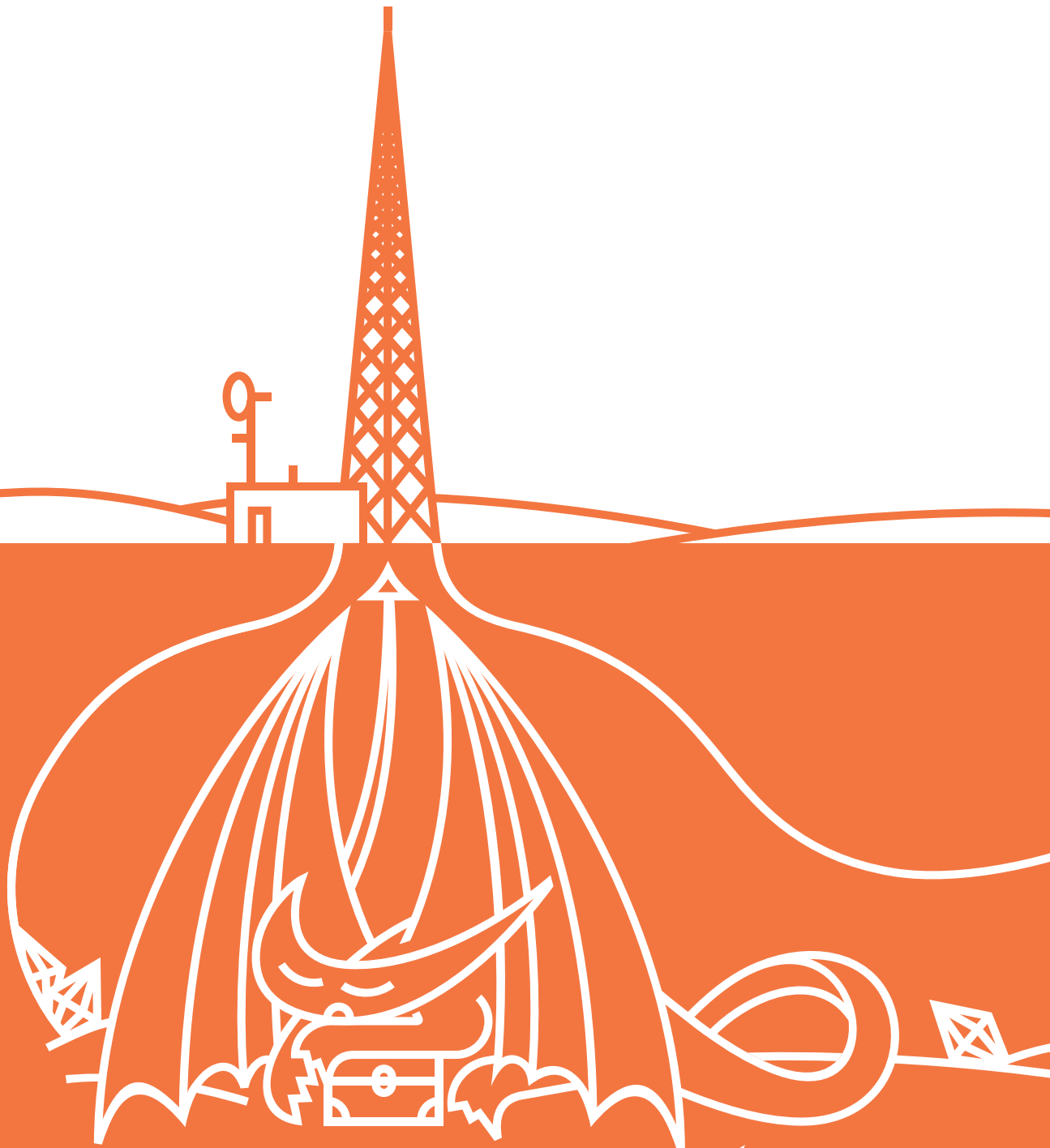


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INTRODUCTION

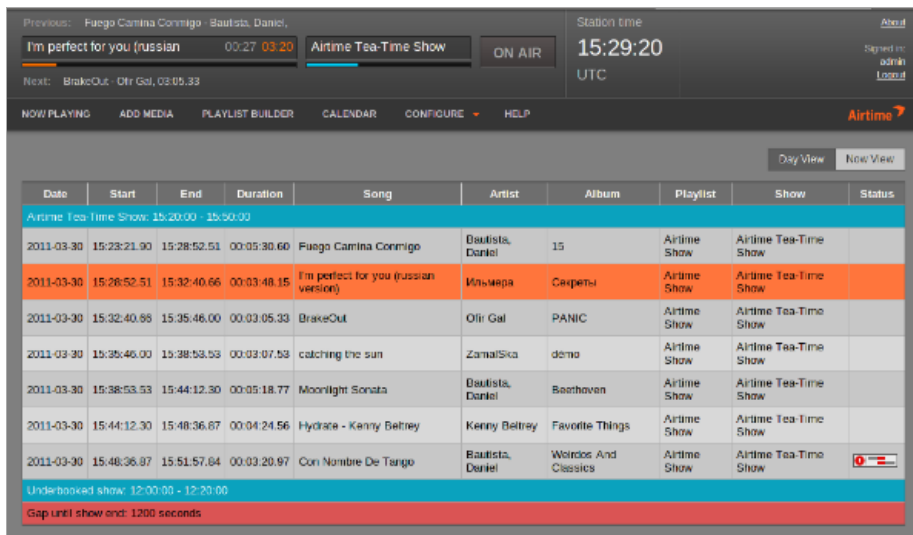
1. WHAT IS AIRTIME?

2. RIGHTS AND ROYALTIES

I. WHAT IS AIRTIME?

Updated for Airtime 1.8.2

Airtime is the open broadcast software for scheduling and remote station management. Web browser access to the station's media archive, multi-file upload and automatic metadata verification features are coupled with a collaborative on-line scheduling calendar and playlist management. The scheduling calendar is managed through an easy-to-use interface and triggers playout with sub-second precision.



| Date | Start | End | Duration | Song | Artist | Album | Playlist | Show | Status |
|--|-------------|-------------|-------------|---------------------------------------|------------------|----------------------|--------------|-----------------------|--------|
| Airtime Tea-Time Show: 15:20:00 - 15:50:00 | | | | | | | | | |
| 2011-03-30 | 15:23:21.90 | 15:28:52.51 | 00:05:30.60 | Fuego Camina Conmigo | Bautista, Daniel | 15 | Airtime Show | Airtime Tea-Time Show | |
| 2011-03-30 | 15:28:52.51 | 15:32:40.66 | 00:03:48.15 | I'm perfect for you (russian version) | Ильмира Саурети | | Airtime Show | Airtime Tea-Time Show | |
| 2011-03-30 | 15:32:40.66 | 15:35:46.00 | 00:03:05.33 | BrakeOut | Ofir Gal | PANIC | Airtime Show | Airtime Tea-Time Show | |
| 2011-03-30 | 15:35:46.00 | 15:38:53.53 | 00:03:07.53 | catching the sun | ZamaSica | demo | Airtime Show | Airtime Tea-Time Show | |
| 2011-03-30 | 15:38:53.53 | 15:44:12.30 | 00:05:18.77 | Moonlight Sonata | Bautista, Daniel | Beethoven | Airtime Show | Airtime Tea-Time Show | |
| 2011-03-30 | 15:44:12.30 | 15:48:36.87 | 00:04:24.56 | Hydrate - Kenny Betrey | Kenny Betrey | Favorite Things | Airtime Show | Airtime Tea-Time Show | |
| 2011-03-30 | 15:48:36.87 | 15:51:57.64 | 00:03:20.97 | Cori Nombre De Tango | Bautista, Daniel | Weirdos And Classics | Airtime Show | Airtime Tea-Time Show | |
| Underbooked show: 12:00:00 - 12:30:00 | | | | | | | | | |
| Gap until show end: 1200 seconds | | | | | | | | | |

Airtime has been intended to provide a solution for a wide range of broadcast projects, from community to public and commercial stations. The scalability of Airtime allows implementation in a number of scenarios, ranging from an unmanned broadcast unit accessed remotely through the Internet, to a local network of machines accessing a central Airtime storage system. Airtime supports the playout of files in both the commonly used MP3 format and the open, royalty-free equivalent Ogg Vorbis.

Airtime manages the Liquidsoap stream generator, which is at the heart of the system. Liquidsoap generates streams from files in the Airtime media archive, which is indexed in a PostgreSQL database. Live shows are automatically recorded with Ecasound, using the soundcard line input. Editors and station controllers can use Airtime to build playlists and manage files (upload, add metadata, manage advertisements) inside the station or via the Internet, using a standard web browser such as Mozilla Firefox or Internet Explorer.

The scheduler in Airtime has a calendar view, organized by months, weeks and days. Here the program editors can schedule playlists and shows for their broadcast station. In some scenarios, the transmitter is situated outside the reach of the broadcaster and all program management has to be maintained through the web interface. Possible reasons for this scenario might be of a pragmatic nature (running many stations from one central office due to limited human resources) or an emergency (running a transmitter in a crisis area without putting staff at risk).

AIRTIME WORKFLOW

This typical workflow is intended to clarify the difference between the various components that make up a complete Airtime system.

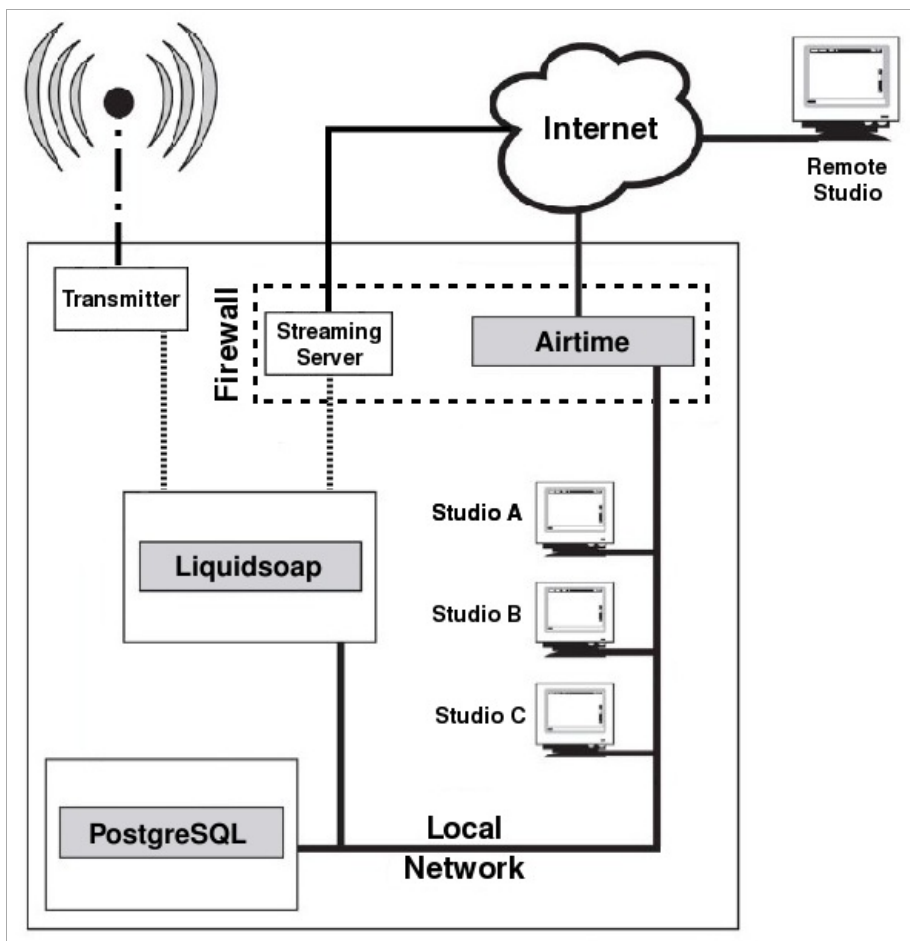
1. There are media files on a server, which include metadata in their tags (title, creator, genre and so on).
2. There is a PostgreSQL database which contains the location of those media files and their metadata. This means you can search for and select a set of media files according to the specific metadata that you require.
3. There is a Liquidsoap stream generator on the server which can take individual media files and assemble them into a continuous stream. This stream can be sent to a soundcard (e.g. for a broadcast mixer, on the way to an FM or DAB transmitter) or to a streaming server for IP network distribution, such as LAN, local WiFi or the Internet. You can stream to a soundcard and to IP networks with the same server, if you wish.
4. Icecast is the default streaming server, but in theory you could stream from Liquidsoap to any online service. If a suitable software interface is not available for your streaming service of choice, you can send audio from Liquidsoap to a separate encoding or streaming machine via a soundcard.
5. Airtime manages all of these components, and provides an easy to use web interface to the system. It enables your station staff to:
 - a) upload media files to the storage server
 - b) automatically import the file metadata into the PostgreSQL database
 - c) edit the metadata for the files, if required

- d) create and edit playlists of media files (playlists are also saved in the database)
- e) schedule shows (which can contain playlists, or be live) for specific dates and times on a calendar
- f) record live shows from the soundcard input with Ecasound, upload them to the storage server and import them into the database automatically
- g) manage presenter access to the schedule calendar
- h) see what is about to be played by Liquidsoap in the 'Now Playing' view

EXAMPLE SYSTEM

Combining Airtime, the Liquidsoap stream generator, the PostgreSQL database and file storage, you can supply a broadcast station with all the functionality needed for automation.

In the diagram below, the media files are stored on a separate machine which also includes a PostgreSQL database, accessible through the local network. Liquidsoap outputs streams to both the transmitter and a streaming media server. The machine running Airtime is behind a firewall because it is connected both to the local network, and to the Internet for remote access. This enables Airtime to offer password-protected access to the media database and scheduling from both inside and outside the studio building.



2. RIGHTS AND ROYALTIES

If you're new to broadcasting, or have not streamed your station online before, reading the following brief explanation of compensation rules for musicians may save you a great deal of trouble later.

Independent music radio on the Internet is not what it might have been, due to royalty demands from SoundExchange in the USA, and similar organisations in other territories. These organisations are usually membership societies or government-sanctioned national authorities which are intended to collect money from broadcasters to compensate musicians for the use of their work. The royalty collection societies require payment before you can stream just about any music released on a commercial CD to the general public – whether you make any money out of streaming, or not. It's not so much the percentage of revenue demanded, but that there is usually an annual minimum fee to pay, which hurts small stations disproportionately.

For example, in the UK, the MCPS-PRS Limited Online Music Licence covers non-commercial music streaming by groups and individuals, as long as their gross revenue is less than £12,500 per year. The cost is on a sliding scale, up to £1,120 plus 20% tax per year for delivering up to 450,000 individual streams or serving 25,000 files; after that, you have to apply for a full MCPS-PRS Online Music Licence. That doesn't sound too bad at first, but 25,000 files per year works out at less than four downloads per hour for a round-the-clock website. This licence only covers publishing rights, not recording rights, so you have to negotiate an additional licence from Phonographic Performance Limited to actually play records or CDs.

Typically, you have to provide full statistical details to the royalty society of all music streamed or downloaded from your site. Even if your radio station is mostly speech, there are many limitations in the small print of these music licences. For instance, you can't use music for promotional purposes, and you can't stream a whole opera, without negotiating separate licences. Weirdly, you are not allowed to play a piece of music in a 'derogatory context' to the writer or performers; no drummer jokes allowed, then.

However, the biggest pitfall is that these MCPS-PRS licences only cover listeners in the UK. So if your Internet station picked up a significant number of listeners in other countries, you would have to pay for similar music licences in those countries as well. It's no wonder that many not-for-profit radio stations have disappeared from the virtual airwaves over the last few years, since not having the right licences could leave the operator liable to legal action. If you want to go down the paid licence route, and you can afford it, check out the <http://www.prsformusic.com> and <http://www.ppluk.com> websites for UK licence details. In the USA, the <http://www.soundexchange.com> website currently quotes a \$500 minimum annual fee for non-commercial webcasters, plus a usage fee above a certain number of listener hours, for the right to stream music from its member record labels.

Free content streaming offers the chance that DIY Internet radio could rise again. Since royalty collection societies like MCPS-PRS and SoundExchange can only represent the interests of their own members, it follows that if you are not a member, you can stream your own self-produced content without paying for their licences. If you state somewhere on your website that the stream is of your own copyrighted material, and is made available to the public under a specific licence, then no-one should misunderstand your intentions. You might be able to persuade other people to allow you to stream their content too, as long as they do not have a conflicting legal obligation, such as having previously joined one of the many royalty collection societies around the world. You can ask for permission to stream when website visitors upload their own music files to you via a HTML form, much as the likes of MySpace do. Or you can collect files licensed under an appropriate Creative Commons (<http://www.creativecommons.org>) or other free content licence.

Explicit permission to stream on your particular server is always going to be the ideal, so think about your own terms and conditions before you accept files from third parties for streaming. How, for example, would you know if someone uploaded a file to your online radio station that unknown to you, had been ripped from a commercially released CD? That's the kind of thing that could get you in trouble with the licensing authorities and copyright holders.

USING AIRTIME

- 3. GETTING STARTED**
- 4. MANAGING USERS**
- 5. NOW PLAYING**
- 6. ADD MEDIA**
- 7. PLAYLIST BUILDER**
- 8. CALENDAR**
- 9. HELP**

3. GETTING STARTED

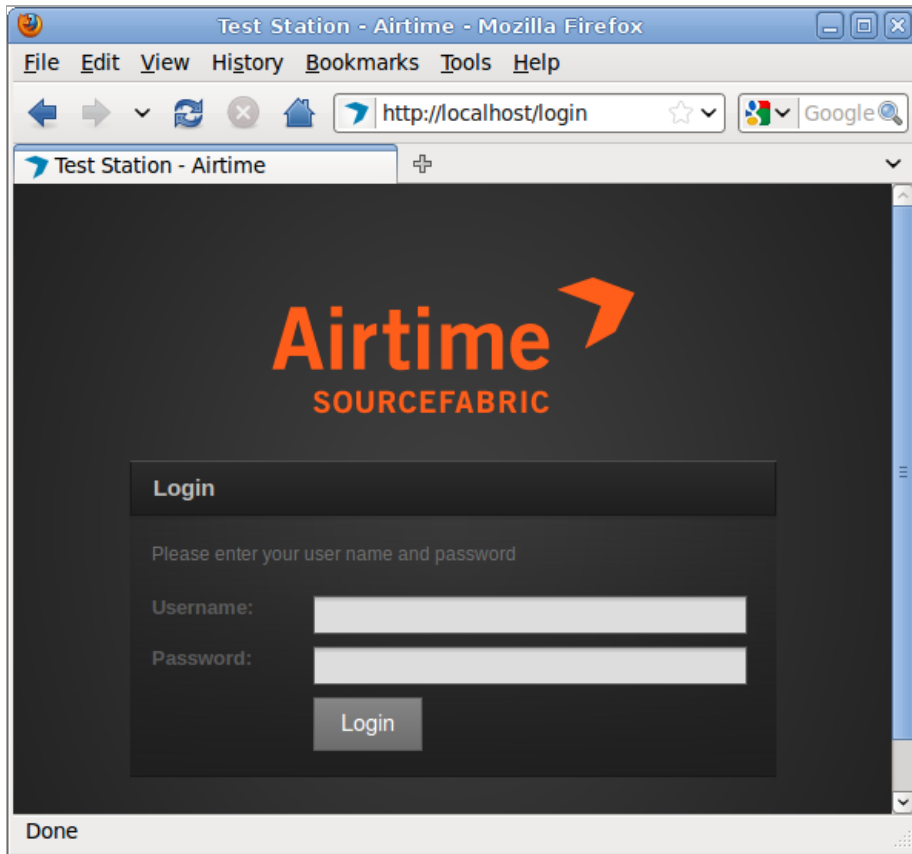
If the Airtime server has a web browser installed, you can access the administration interface by opening the address:

`http://localhost/login`

If you have set up Airtime so that it can be accessed from other computers, you would use a domain name instead. For example:

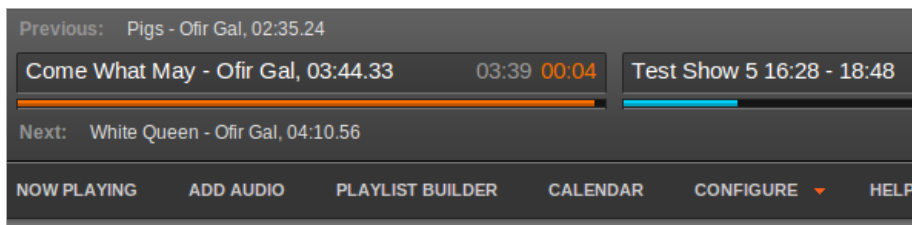
`http://airtime.example.com/login`

You can log in for the first time with the username *admin* and password *admin*.




After you have logged in, you should see the **Master Panel**, which is present at the top of every page of the Airtime interface. On the left hand side, the Master Panel displays the details of the **Previous** file played out, the current file playing (with an orange progress bar and time elapsed/time remaining), and the details of the **Next** file due to play. It also displays the name and scheduled time of the current show, with a blue progress bar.

Beneath this side of the Master Panel is the main navigation menu, with sub-menus labelled **Now Playing**, **Add Audio**, **Playlist Builder**, **Calendar**, **Configure** and **Help**. We'll be looking at the contents of these menus in the following chapters of this book.



On the right hand side, the Master Panel features an **On Air** indicator, which turns from gray to red whenever a file is being played out. There is also a clock indicating the **Station time** and time zone. Over on the far side, an **About** link opens a pop-up window with some information about Airtime. The name of the user currently logged in is displayed, and below this there is the link to **Logout**.

| | | |
|---------------|-----------------|--|
| ON AIR | Station time | About |
| | 17:13:32 GMT | Signed in: admin Logout |
| | | Airtime  |

PREFERENCES

On the **Configure** menu, click **Preferences** to set your **Station Name** and the **Default Fade** time that you would like to set for automated crossfades. The **Stream Label** option allows you to set the metadata that will be sent with direct Icecast streams; *Artist* and *Title*, *Show*, *Artist* and *Title*, or *Station name* and *Show name*.

You can also enable live, read-only access to the Airtime schedule calendar for your station's public website with the **Allow Remote Websites to Access Schedule Info?** option, if you wish. (There is more about this feature in the **Advanced Configuration** section of this book). Then click the **Submit** button.

Preferences

Station Name:

Default Fade:

Stream Label:

Artist - Title
 Show - Artist - Title
 Station name - Show name

Allow Remote Websites To Access "Schedule" Info?
(Enable this to make front-end widgets work.)

Disabled
 Enabled

▶ **SoundCloud Settings**

If your station has a SoundCloud account (on <http://soundcloud.com>), you may want to upload live show recordings to this service automatically. Click the small black triangle next to **SoundCloud Settings** to show this option. Apart from checking the **Upload Recorded Shows To SoundCloud** box, you will need to enter your SoundCloud login email address and password, and the metadata that SoundCloud will use to categorize your show recordings. You can also set a default genre, track type and copyright license here, including one of the Creative Commons licenses (see <http://creativecommons.org/>).

▼ SoundCloud Settings

Upload Recorded Shows To SoundCloud

SoundCloud Email:

SoundCloud Password:

SoundCloud Tags: (separate tags with spaces)

Default Genre:

Default Track Type:

Default License:

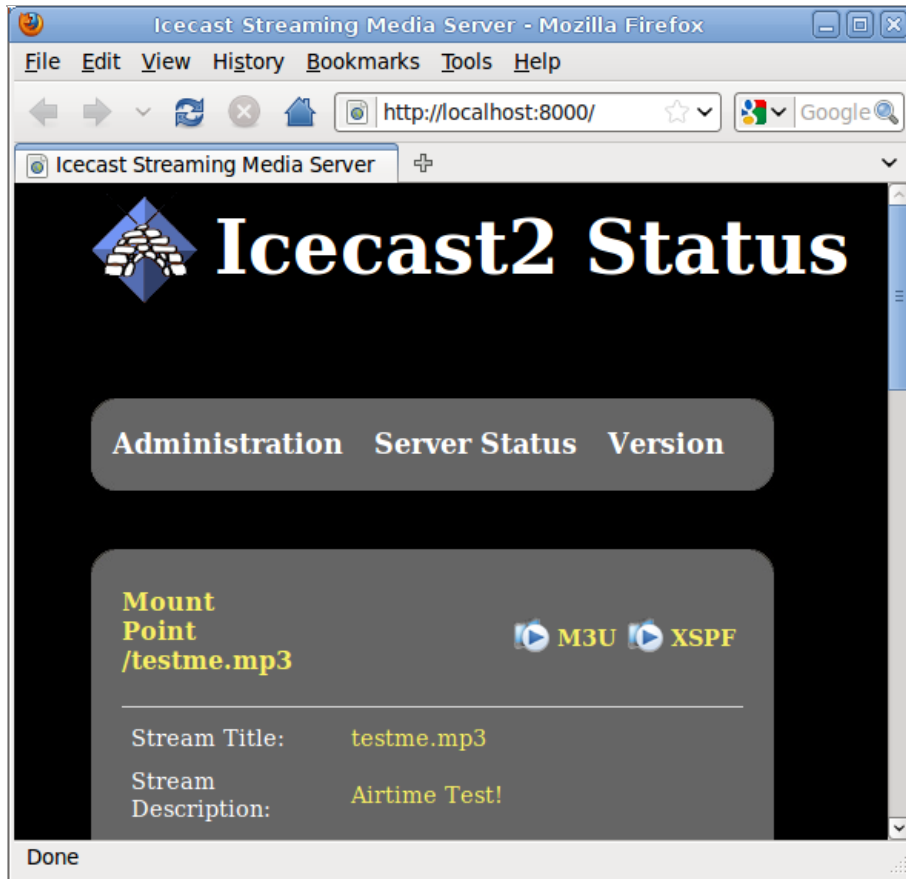
Please note that like most online distribution services, SoundCloud terms of service require you to have copyright in, or permission for Internet distribution from the copyright holder of, any media that you upload.

CHECKING THE STREAM

If you have enabled the streaming option when you installed Airtime, you can check that the Icecast server is running by opening port 8000 of the server in your web browser. For example, on the server itself, you can use:

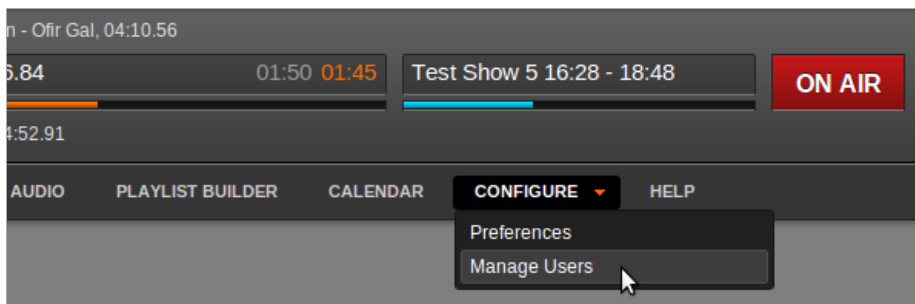
`http://localhost:8000/`

You should see the Icecast status page, with details of the connection that Airtime has made to Icecast. If you have only just installed Airtime, there won't be any media playing out yet.

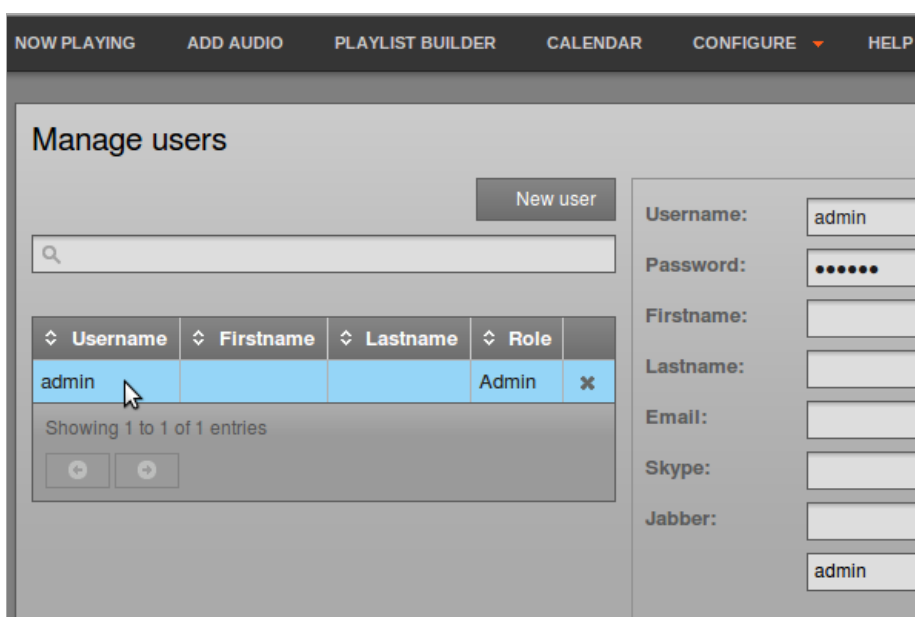


4. MANAGING USERS

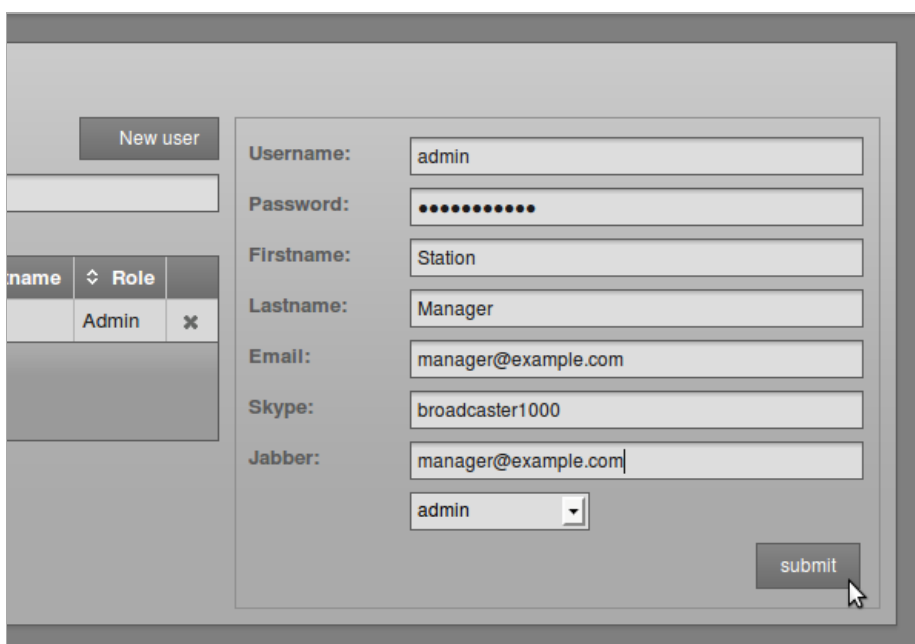
You should set a new administrator password immediately, using the **Manage Users** entry on the **Configure** menu.



On the left hand side of the **Manage Users** page, click on *admin* in the user list. The details for this user will appear in the box on the right hand side. At the moment, the *admin* user only has a **Username** and a **Password**.



Enter a secure password (as long and as varied as is practical) into the **Password** field. Keeping this password secure is essential for the smooth running of your station, because it enables access to all scheduling and management features. You can also enter other details for your user account on this page, including your full name and contact details. Then click the **Submit** button.



To add further user accounts to the system, one for each of your station staff that need access to Airtime, click the **New user** button. Enter a username, password and contact details, and then select the user **Role** from the drop down menu, which can be *admin*, *host*, or *guest*. The difference between these roles is:

- An *admin* (station manager) has read and write access to all the features of Airtime. This role should be reserved for trusted staff members only. If you give the *admin* role to too many people, there could be arguments over scheduling!
- A *host* (presenter, or DJ) only has write access to features related to the specific shows assigned to them by an *admin*. The *host* can read data for other shows, but not write to them. This read access to other shows helps hosts plan their own shows, for instance avoiding the scenario where two DJs play the same music by coincidence.
- A *guest* can log in to read the forthcoming schedule or playlists, but has no write permission for any feature. *Guest* users cannot see the **Add Media**, **Playlist Builder** or **Configure** menus when they log in. The group of guests might include the station accountant, or the show assistants.

New users that you add will be shown in the list on the left-hand side of the **Manage Users** page. If you have a large number of users on the system, you can use the search tool above the list (which has a magnifying glass icon) to identify specific user accounts. Click on the list headings to sort the search results by *Username*, *Firstname*, *Lastname* or *Role*.

To edit a user account, click on that user's row in the list, change the user's details in the box on the right hand side, and then click the **Submit** button. To remove a user account, click the small **x** icon to the right side of its row in the list.

5. NOW PLAYING

This page provides two views of the files your station is playing, which can be switched using the **Day View** and **Now View** buttons in the top right corner of the administration interface. If you've only just installed Airtime, there won't be any files shown in either view yet.

The default is **Now View**, in which files that have already been played are removed from the top of the list automatically. Show titles have a blue background, while individual files have a gray background. The row for the currently playing file is shown with an orange background. Any underbooked shows (shows with insufficient content to fill the time allowed) are displayed with a row indicating the length of the gap in seconds. The **Gap until show end** rows have a red background.

| Date | Start | End | Duration | Song |
|---------------------------------------|-------------|-------------|-------------|---------------------------------------|
| Drive-time Show: 15:57:00 - 16:27:00 | | | | |
| 2011-03-30 | 15:57:00 | 16:00:21.90 | 00:03:21.90 | Ozon |
| 2011-03-30 | 16:00:21.90 | 16:05:52.51 | 00:05:30.60 | Fuego Camina Conmigo |
| 2011-03-30 | 16:05:52.51 | 16:09:40.66 | 00:03:48.15 | I'm perfect for you (russian version) |
| 2011-03-30 | 16:09:40.66 | 16:12:46.00 | 00:03:05.33 | BrakeOut |
| 2011-03-30 | 16:12:46.00 | 16:15:53.53 | 00:03:07.53 | catching the sun |
| 2011-03-30 | 16:15:53.53 | 16:21:12.30 | 00:05:18.77 | Moonlight Sonata |
| 2011-03-30 | 16:21:12.30 | 16:25:36.87 | 00:04:24.56 | Hydrate - Kenny Beltrey |
| 2011-03-30 | 16:25:36.87 | 16:28:57.84 | 00:03:20.97 | Con Nombre De Tango |
| Underbooked show: 12:00:00 - 12:20:00 | | | | |
| Gap until show end: 1200 seconds | | | | |

On the right hand side of the **Now View**, the **Playlist** and **Show** that each file is a part of is displayed. (Creating playlists and shows is covered in later chapters of this book). If a show is overbooked (the total payout length is longer than the time allowed for the show), a red and white warning icon is shown in the **Status** column. The warning icon indicates that the file in this row will be faded out when the show ends.

| Artist | Album | Playlist | Show | Status |
|-------------------|----------------------|--------------|-----------------|--------|
| Airtime | | | | |
| Day View Now View | | | | |
| льмера | Секреты | Airtime Show | Drive-time Show | |
| ir Gal | PANIC | Airtime Show | Drive-time Show | |
| malSka | démo | Airtime Show | Drive-time Show | |
| utista, Daniel | Beethoven | Airtime Show | Drive-time Show | |
| enny Beltrey | Favorite Things | Airtime Show | Drive-time Show | |
| utista, Daniel | Weirdos And Classics | Airtime Show | Drive-time Show | |

A live show that is set for recording is shown with a dark gray bar, since it does not contain any playlists.

| Date | Start | End | Duration | Song | Artist |
|--------------------------------|-------|-----|----------|------|--------|
| Live Show: 15:56:00 - 16:00:00 | | | | | |
| Recording show "Live Show" | | | | | |

The **Day View** is similar to the **Now View**, except that files which have already played out are shown at the top of the window. You can select which day of the schedule you wish to view by clicking on the date box, just to the left of the **Day View** button, and selecting a day from the pop-up calendar.

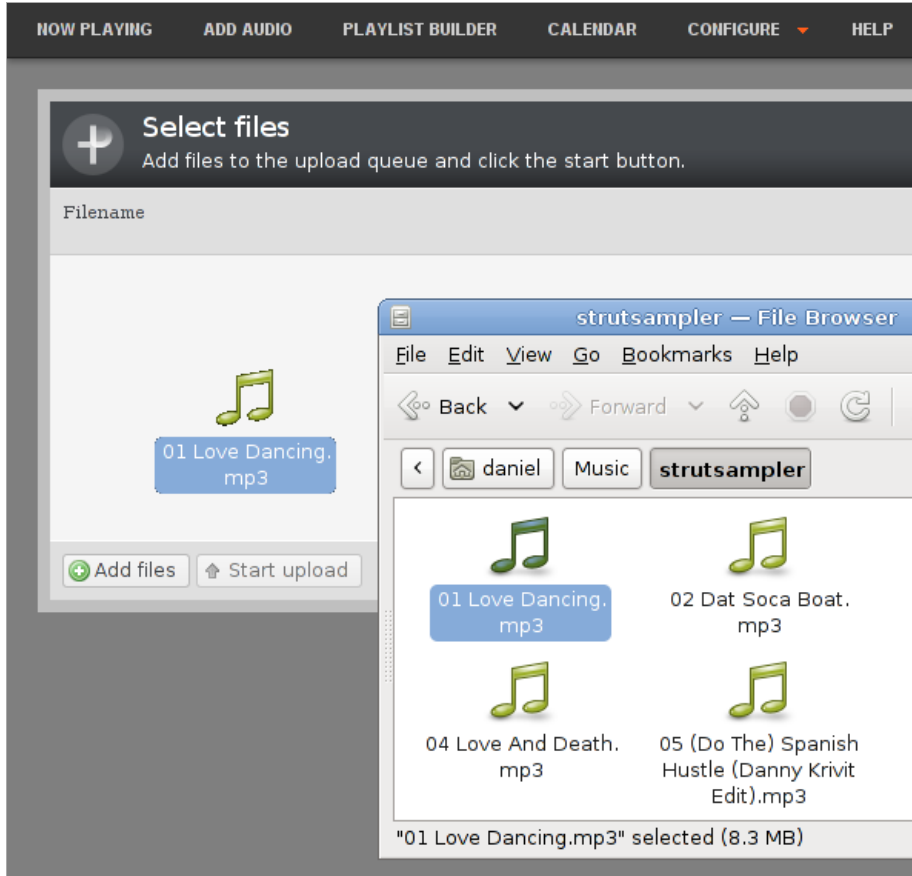
The screenshot shows the Airtime software interface. At the top, there is a navigation bar with buttons for 'NOW PLAYING', 'ADD MEDIA', 'PLAYLIST BUILDER', 'CALENDAR', 'CONFIGURE', and 'HELP'. Below this is a table with columns for 'Date', 'Start', 'End', 'Duration', 'Song', and 'Artist'. A 'Day View' button is visible, and a calendar pop-up is open, showing the date 03/30/2011. The calendar pop-up has a header 'March 2011' and a grid of days from 1 to 31. The 30th is highlighted in green, and the 31st is highlighted in black. The main table shows rows for 'Favorite Things', 'Fatness', 'Orchestra', and 'Daniel'.

| Artist | Album | Status |
|-----------|----------------------|----------------|
| trey | Favorite Things | Short playlist |
| | Fatness | Short playlist |
| Orchestra | Das Summen der Teile | Airtime Show |
| Daniel | 15 | Airtime Show |
| | Секреты | Airtime Show |

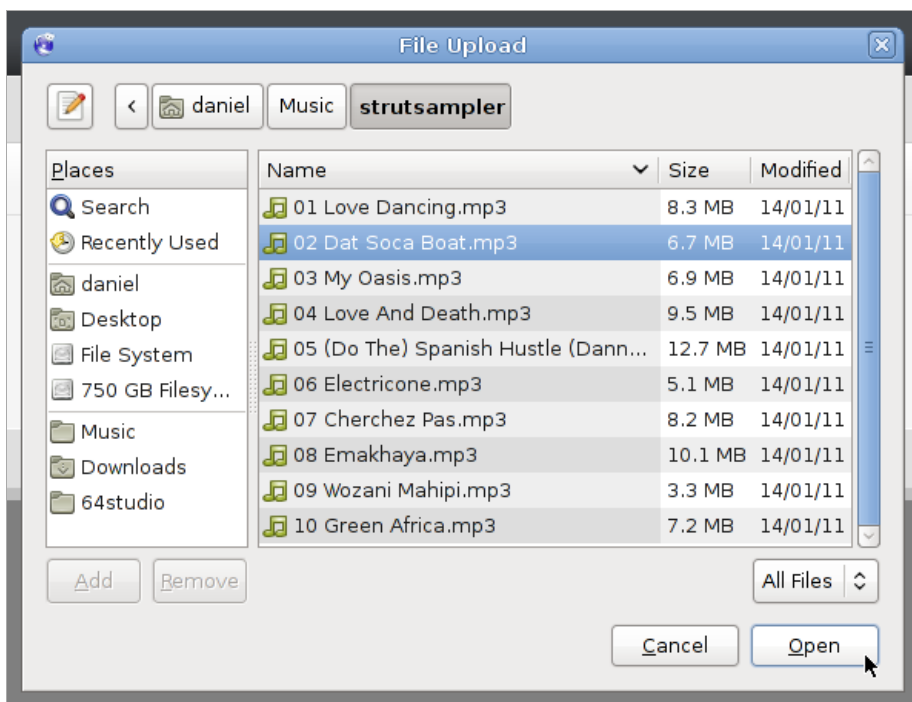
6. ADD MEDIA

If you do not have access to the *airtime-import* script on the server, you can add files to the Airtime database using the **Add media** page of the administration interface. This page includes an upload queue for files which supports drag and drop from your computer's file manager, if you are using the recommended *Firefox 3.6* web browser.

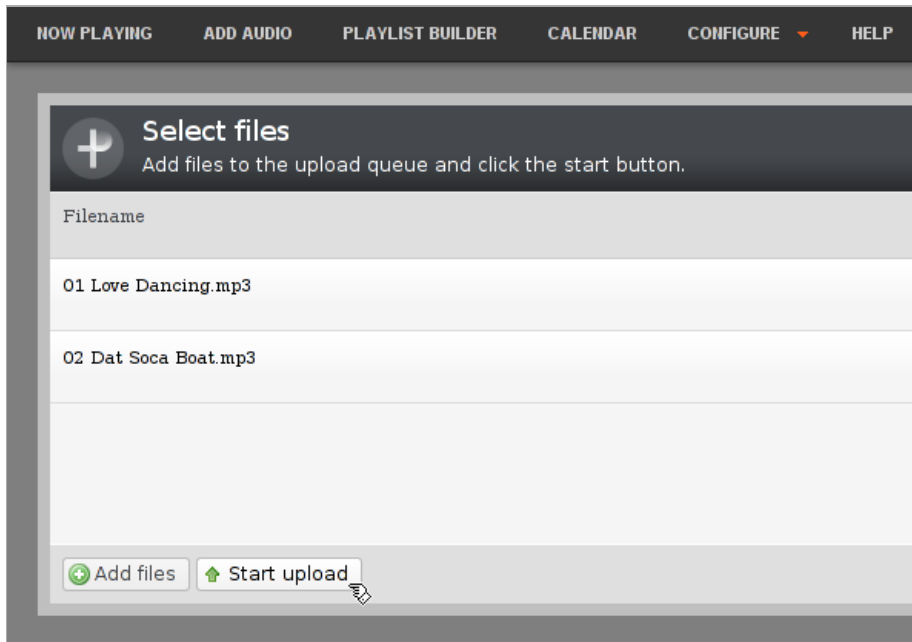
The **Add Media** page is not visible to *Guest* users.



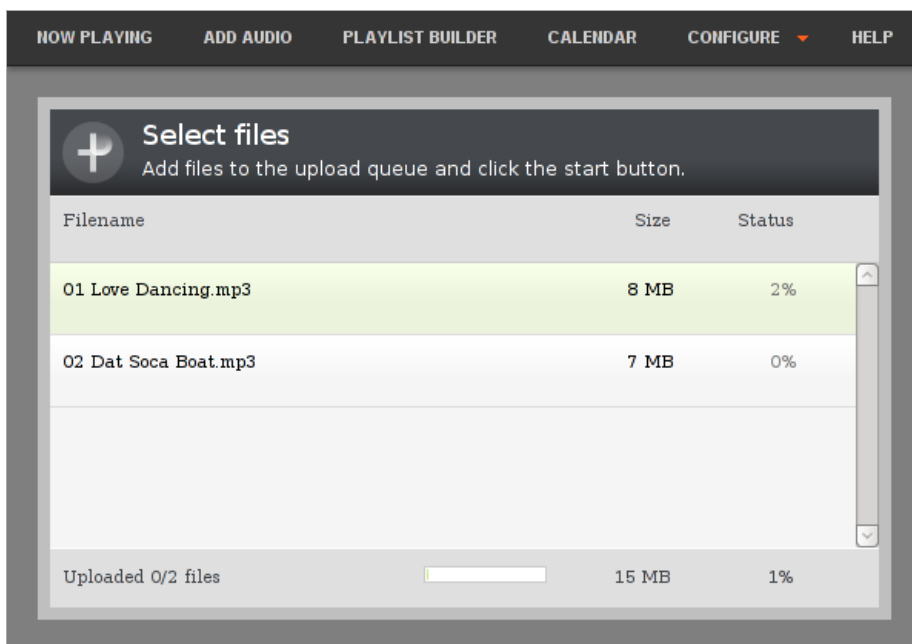
If your web browser does not support drag and drop, you can use the **Add files** button, which has a white plus sign in a green circle icon, to open a file selection window on your computer.



After you have added all the files that you require to the upload queue, click the **Start Upload** button, which has a green arrow icon.



The row of the file currently being uploaded is highlighted in pale green. At the bottom of the upload queue, a progress bar and percentage indicates how much of the upload has taken place so far.



Once it has been uploaded successfully, each file row displays a white check mark in a green circle icon.

| Size | Status |
|------|--------|
| 8 MB | 100% |
| 7 MB | 86% |

15 MB 94%

Your files are now imported into the Airtime database, ready to be included in your broadcast playlist.

7. PLAYLIST BUILDER

This page of the Airtime interface enables you to search the media archive, sort and display the search results by the criteria that you choose, and drag and drop search results into an open playlist. You can also re-arrange the currently open playlist by dragging and dropping.

The **Playlist Builder** page is not visible to *Guest* users.

THE SEARCH TAB

On the right hand side of the Playlist Builder page, the **Search** tab lists both the media and the playlists in the Airtime archive, with ten entries shown per page by default. Click on the **Show entries** drop-down menu in the top right corner to select the display of 10, 25, 50 or 100 entries per page, according to your preference.

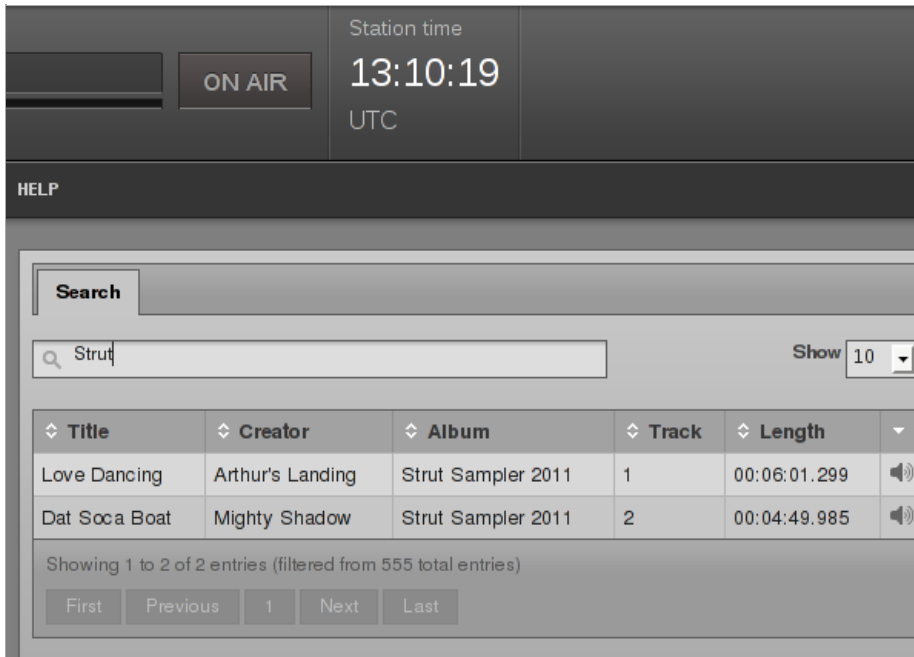
Click the column headings **Title**, **Creator**, **Album**, **Track**, **Length** or **Type** to sort the entries. In the **Type** column, audio files are represented by a loudspeaker icon, while playlists are represented with a document icon. At the bottom of the window, click the **First**, **Previous**, **Next**, **Last** or page number buttons to browse the media archive.

| ◇ Title | ◇ Creator | ◇ Album | Track | ◇ Length | Type |
|--------------------------------|-------------------------|-------------------------|-------|--------------|------|
| Panic | Ofir Gal | PANIC | 1 | 00:03:27.464 | 🔊 |
| Blue Orchid | The White Stripes | Get Behind Me Satan | 1 | 00:02:37.56 | 🔊 |
| Gulag Orkestar | Beirut | Gulag Orkestar | 1 | 00:04:38.961 | 🔊 |
| Seven Nation Army | Ben L'Oncle Soul | Ben L'Oncle Soul | 1 | 00:02:59.43 | 🔊 |
| Dayvan Cowboy | Boards of Canada | Trans Canada Highway | 1 | 00:05:01.453 | 🔊 |
| The High Road | Broken Bells | Broken Bells | 1 | 00:03:52.254 | 🔊 |
| Who Was In My Room Last Night? | Butthole Surfers | Independent Worm Saloon | 1 | 00:04:09.38 | 🔊 |
| Blue Rondo A La Turk | The Dave Brubek Quartet | Time Out | 1 | 00:06:46.177 | 🔊 |
| Balrog Boogie | Diablo Swing Orchestra | The Butcher's Ballroom | 1 | 00:03:53.186 | 🔊 |
| Bombay | El Guincho | Pop Negro | 1 | 00:03:39.324 | 🔊 |

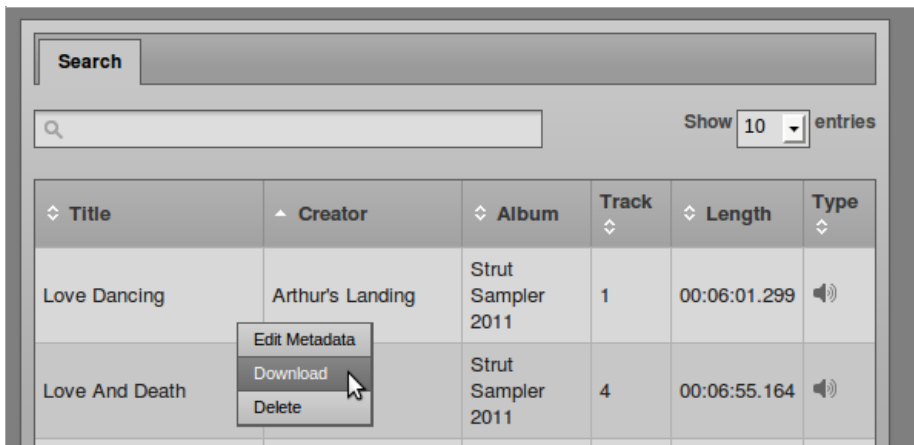
Showing 1 to 10 of 555 entries

First Previous 1 2 3 4 5 Next Last

Type a search term into the box in the upper left corner, with the magnifying glass icon. Like an Internet search engine, the filtered entries shown are refined as you type - there is no need to press the Enter key.

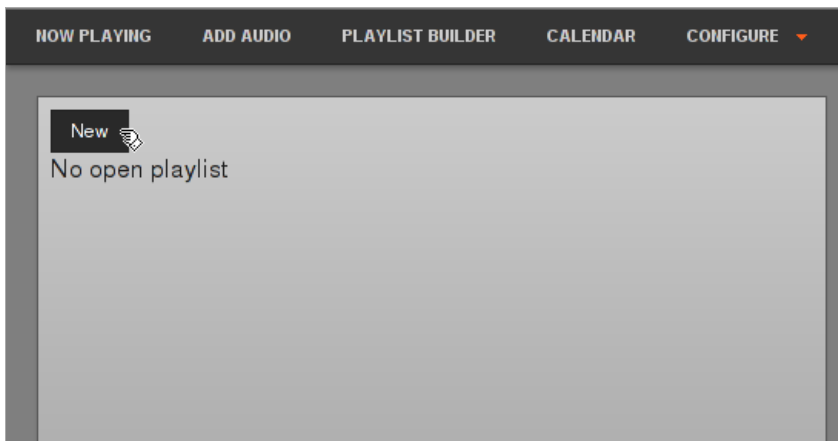


Clicking on a file row in the **Search** tab opens a pop-up menu which enables you to **Edit Metadata** for that file, **Download** it to your local computer or mobile device for audition or editing, or **Delete** it from the Airtime storage server. The **Delete** option should be used with caution, because this action cannot be undone.

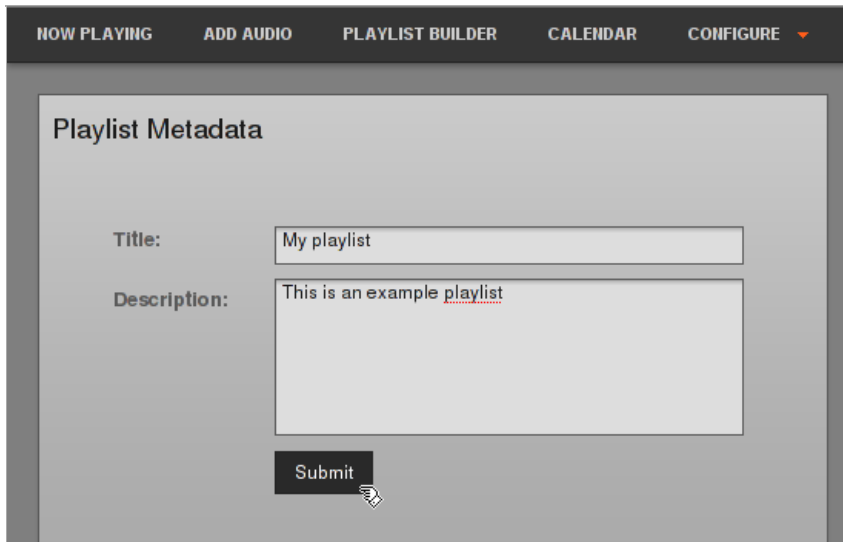


CREATING A NEW PLAYLIST

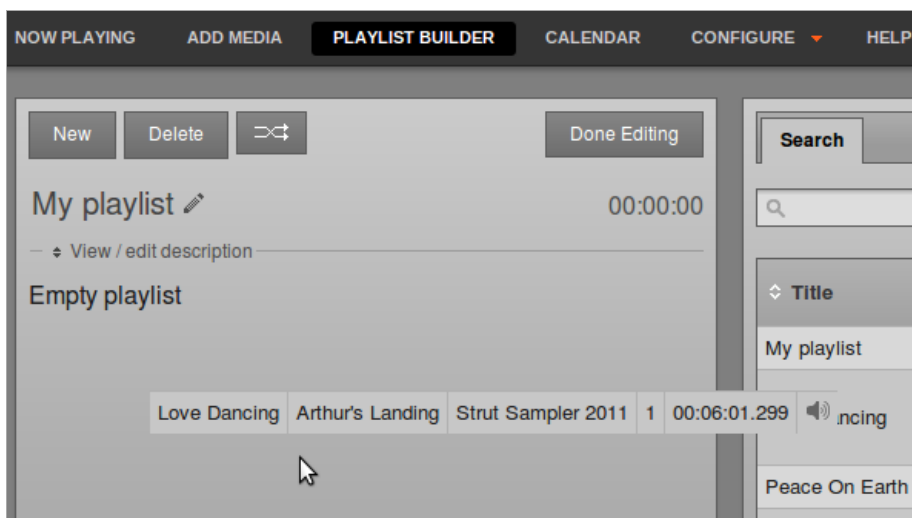
Once you have found the media that you require using the **Search** tab, you can create a new playlist on the left hand side of the **Playlist Builder** page. Click the **New** button to begin.



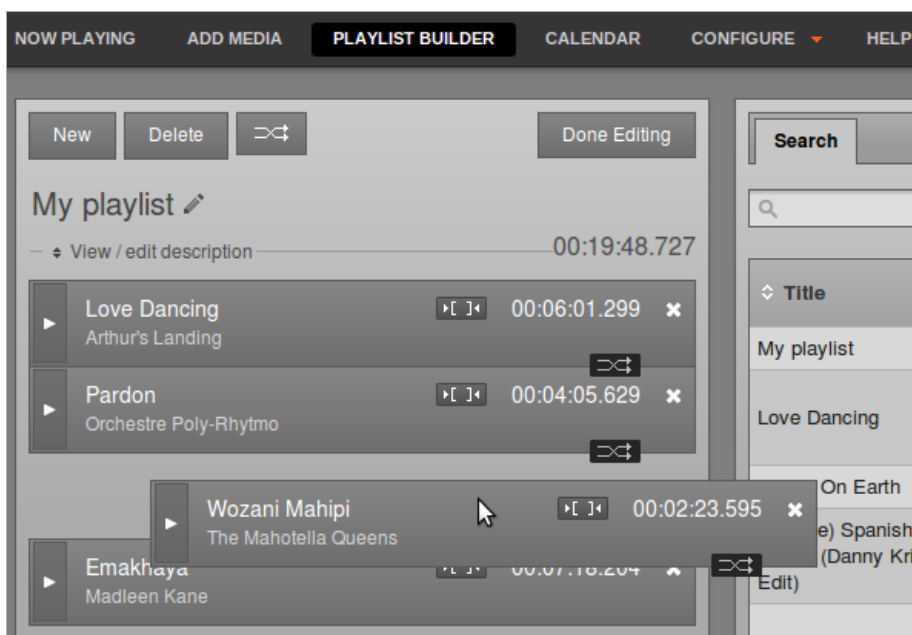
Enter a **Title** and **Description** for the playlist, then click the **Submit** button. Setting good quality metadata here will help you find the playlist using the **Search** tab later, so you should be as descriptive as possible.



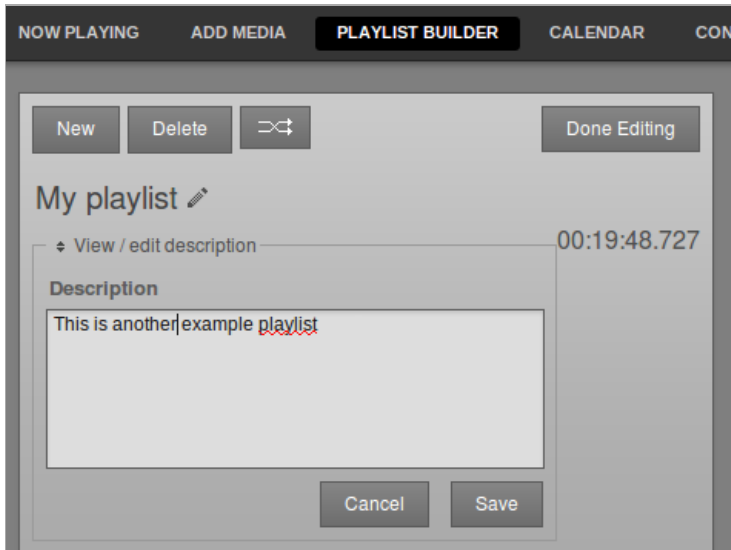
Next, drag and drop files from the Search tab into the new playlist.



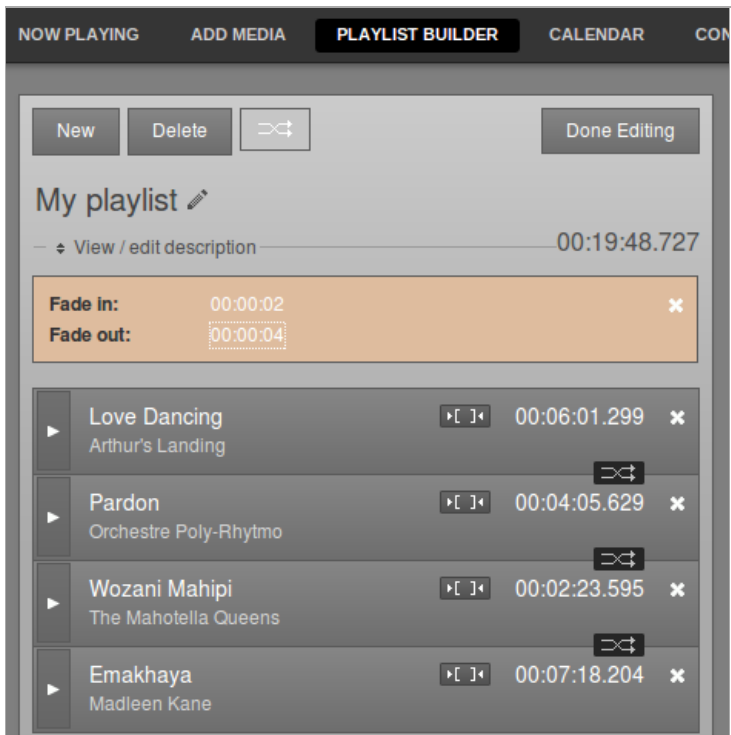
After dragging files into the new playlist, the total playlist time is displayed in the top right corner. Durations for individual files are shown in each row of the playlist. To audition a file in the playlist, click the white triangle **play/pause** button on the left side of each row. Click the small white **x** icon on the right hand side of each row to remove a file from the playlist. You can also drag and drop files to re-order them.



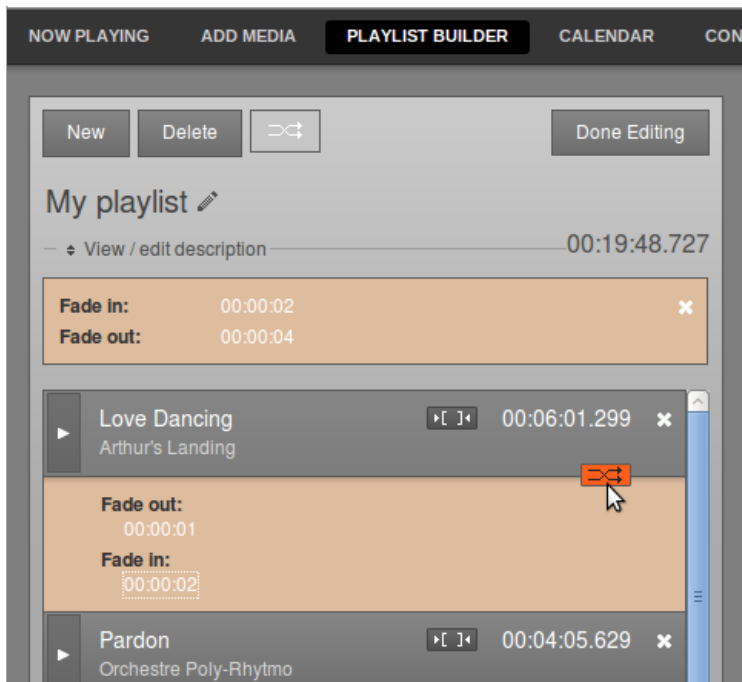
Click on the pencil icon to the right of the name of the playlist to edit it, or click on **View/edit description** to open a box for entering playlist metadata.



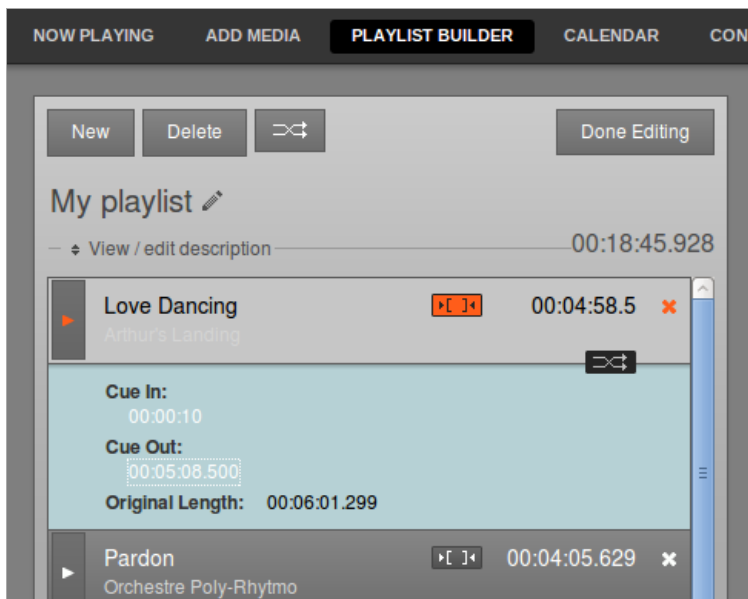
Click the playlist **Crossfade** button (two horizontal white arrows crossing in a gray rectangle), to the right of the **New** and **Delete** buttons, to open a beige bar in which you can set the **Fade in** and **Fade out** times for this playlist.



Click any one of the smaller **Crossfade** buttons between file rows to open a beige bar which enables you to set fade in and fade out times between two adjacent files in the playlist. The crossfade buttons for adjacent files change to an orange background when you click them.



Each file in the playlist also has a button with two square brackets, which enables you to set cue in and cue out times for that particular file. Like the crossfade button, it changes to an orange background when you click it. The length of the file in the playlist is updated automatically, but the **Original Length** of the file is also displayed for your reference.



When your playlist is complete, click the **Done Editing** button. If you want to edit the playlist contents or the playlist metadata later, you can find it by **Title**, **Creator** or **Type** using the **Search** tab. Click on the playlist in the search results list, and select **Edit** from the pop-up context menu. A playlist that is already open for editing will show the option **Close** here instead. You can also **Delete** a playlist from this context menu.

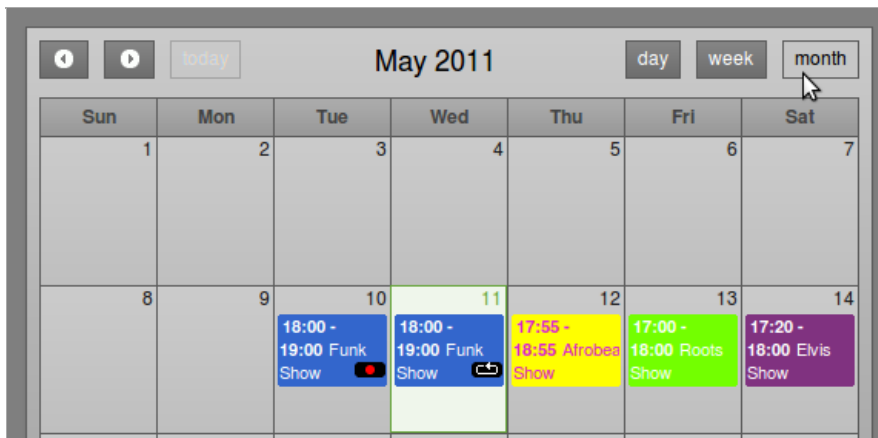
Search

Show 10 entries

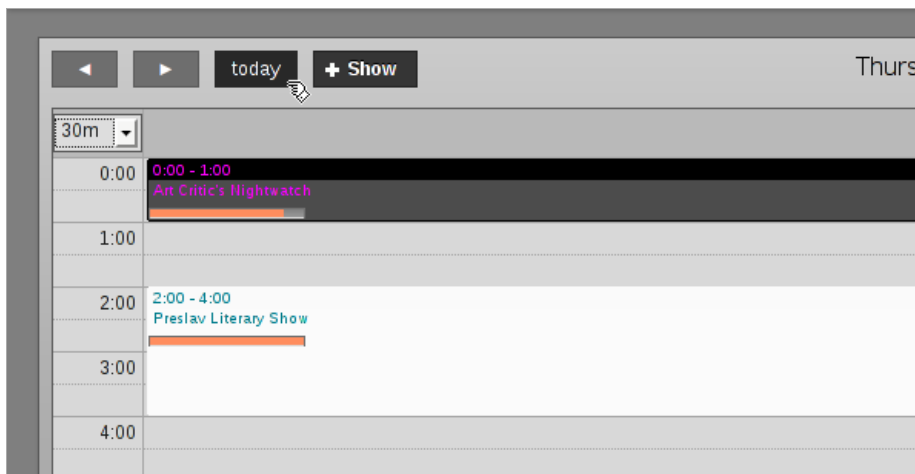
| ◇ Title | ◇ Creator | ◇ Album | Track ◇ | ◇ Length | Type ▼ |
|-----------------------------|-----------------|---|------------|--------------|-----------|
| My playlist | admin | | | 00:19:48.727 | |
| Justo Betal Pa' Bravo Yo | Various Artists | Fania Records 1964-1980 The Original Sound Of Latin New York | 14 | 00:03:45.253 | |
| Dat Soca Boat | Mighty Shadow | Strut Sampler 2011 | 2 | 00:04:49.985 | |

8. CALENDAR

The Calendar page of the Airtime administration interface has three views: **Day**, **Week** and **Month**, which can be switched using the gray buttons in the top right corner. By default, the **Month** view is shown, with today's date highlighted by a pale green background.



In the top left corner of the page, you can go back or forward through the **Calendar** by clicking on the small white triangle buttons. Click the **Today** button to jump to today's date in the current view. In the **Day** or **Week** views, there is also a drop-down menu which allows you to set the resolution displayed for the calendar, ranging from one minute per row to sixty minutes per row.



ADDING A SHOW

To add a new show to the Calendar, click the **+ Show** button in the top left corner of the page, or click on any empty row in the Calendar itself. Either of these actions opens the **Add this show** box, which has five sections, arranged vertically: **What**, **When**, **Record & Rebroadcast**, **Who**, and **Style**. Click the small black triangle to the left of the section name if you wish to minimize or maximize it.

In the **What** box, enter the name and description for the show that you are creating.

Next, in the **When** section, the date that you clicked on in the **Calendar** should already be entered in the **Date Start** field. To set another date for the show, click on the **Date Start** field and then select the alternative date that you require for the show from the small pop-up calendar. Then set the **Start time** and **Duration** for the show in the same way, with the pop-up **Hour** and **Minute** box. The minute values in the pop-up time boxes are rounded to the nearest five minutes, but you can adjust the times manually by clicking into the fields and typing.

To schedule a regular show, check the **Repeats?** box and select either **Weekly**, **Bi-weekly** or **Monthly** from the **Repeat Type** drop-down menu that will appear. Then check the boxes for the days of the week that you want to schedule the regular show on. Set the **Date End** for the regular show to finish, or check the **No End** box to schedule the show indefinitely.

In the **Record & Rebroadcast** section, the **Record?** box enables automatic recording of the soundcard line input, if your Airtime server has one, at the time of the show. Shows set for live recording cannot also contain playlists. The default audio format for live recordings is MP3, and the recording files are saved in the storage directory that was set when Airtime was installed.

If you wish the recording to be played out at a later time, check the **Rebroadcast?** box, and then select up to ten date and time slots in the **Choose Days** box.

Record & Rebroadcast
 Record?
 Rebroadcast?

Choose Days:
 2011-05-17 @ 15:00
 2011-05-24 @ 15:00

| Hour | | | | | Minute | | | |
|------|----|----|----|----|--------|----|----|----|
| 00 | 01 | 02 | 03 | 04 | 05 | 00 | 05 | 10 |
| 06 | 07 | 08 | 09 | 10 | 11 | 15 | 20 | 25 |
| 12 | 13 | 14 | 15 | 16 | 17 | 30 | 35 | 40 |
| 18 | 19 | 20 | 21 | 22 | 23 | 45 | 50 | 55 |

Shows set for recording have a small red dot icon in the calendar, while rebroadcast shows have a white loop icon.

| Sun | Mon | Tue | Wed | Thu |
|-----|-----|-------------------------------|-----|-----|
| 1 | 2 | 3 | 4 | 5 |
| 8 | 9 | 10 18:00 - 19:00 Funk Show | 11 | 12 |
| 15 | 16 | 17 18:00 - 19:00 Funk Show | 18 | 19 |
| 22 | 23 | 24 18:00 - 19:00 Funk Show | 25 | 26 |
| 29 | 30 | 31 | 1 | 2 |

In the **Who** section, type the first few letters of the name of the show presenter to select a name from the database, or check one of the boxes in the vertical scrolling list below.

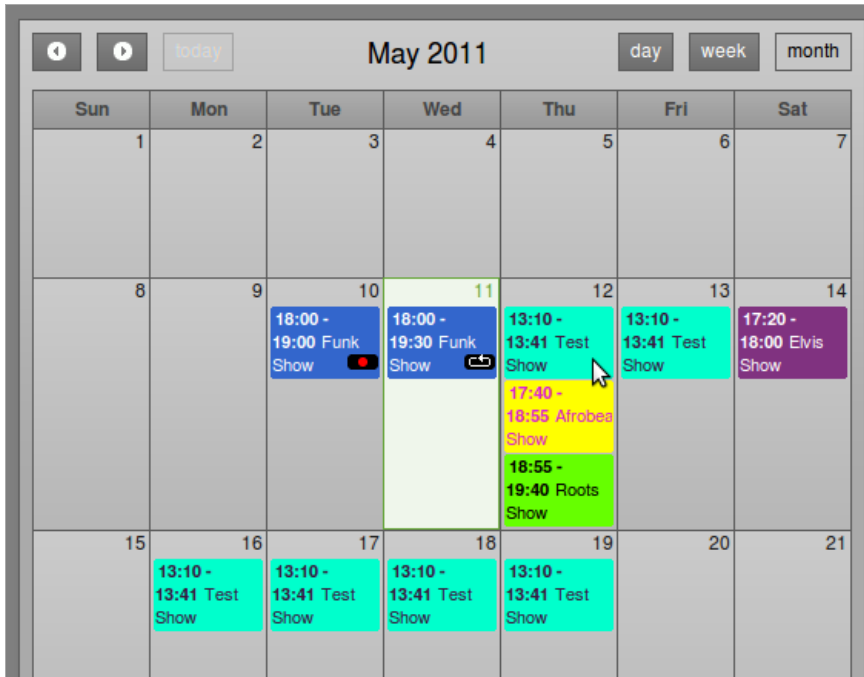
Who
 Type a Host:
 Hosts:

- ccruz
- katerina
- klajn

Finally, select a **Background Colour** and **Text Colour** from the **Style** section, so that the new show can be easily identified in the **Calendar**.



Click the **Add this show** button at the top or bottom of the box. The new show will now be displayed in the **Calendar**, with a regular slot if you have chosen to schedule one.



EDITING A SHOW

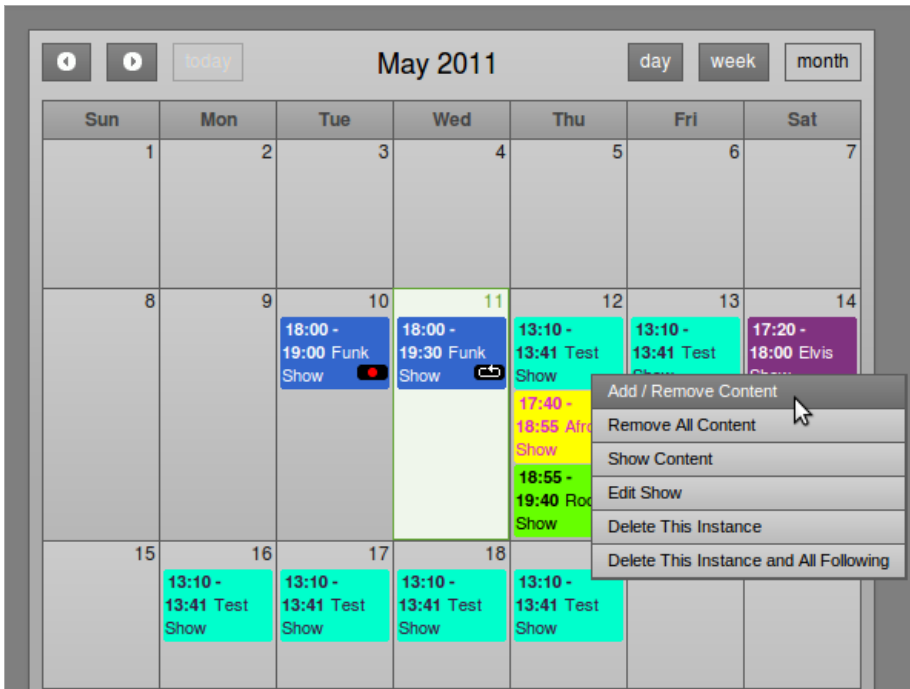
Show configuration and metadata can be changed at any time until broadcast of that show commences. Click on the show in the Calendar, and select **Edit Show** from the pop-up context menu. This opens the **Update Show** box, which is exactly the same as the **Add this Show** box. Click the **Update Show** button at the top or bottom of the box when you are done.

Alternatively, individual shows can be clicked on and dragged to new days and times in the calendar. However, Airtime will not allow you to drag a future show into the past, or drag a show onto a day where this would cause show times to overlap.

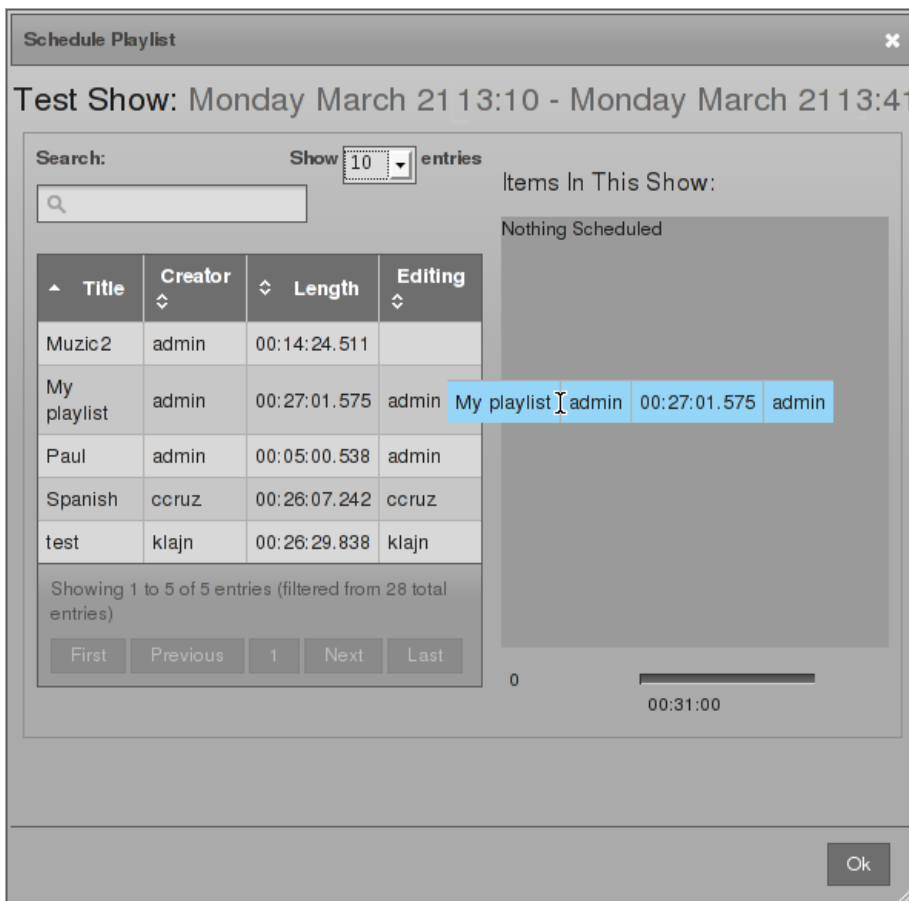
In the **Day** and **Week** views, show length can be adjusted by clicking on the lower edge of the show box, and dragging the edge of the box upwards or downwards. The new show length is calculated automatically. Airtime will not allow you to drag a show end time beyond the start of the next show.

ADDING CONTENT TO A SHOW

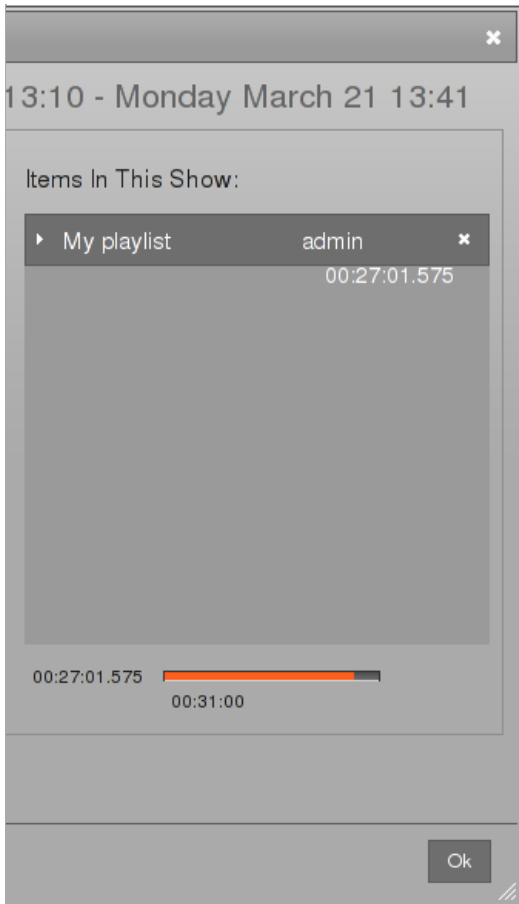
To add content to a show, click on it in the Calendar, and select **Add/Remove Content** from the pop-up context menu.



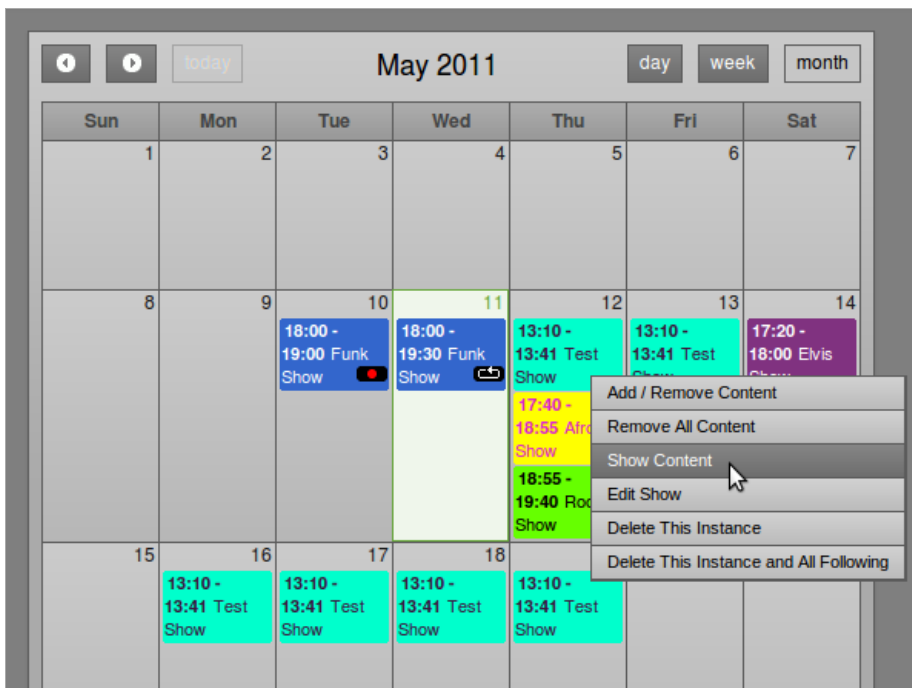
This action opens the **Schedule Playlist** pop-up window. Just like when using the **Playlist Builder** to find files, you can search for playlists and drag them into the **Items In This Show** box.



The orange progress bar underneath the **Items in this Show** box updates automatically to show how much time remains from the allocated show duration. If you add too much media relative to the length of time allocated to the show, Airtime will display a warning, and playout will be cut when the show ends. Click the small white triangle on the left of each row to see details of the playlist, or click the white x icon on the right side to remove it from the show.



When your show has all the required content, click the **OK** button in the bottom right corner to close the window. Back in the **Calendar**, click on the show and select **Show content** from the pop-up context menu to view a list of content now included in the show.



Click on any row in the **Show Contents** window to download the individual file for audition, or further editing. Once you're done, click the **OK** button in the bottom right corner, or the white **x** icon in the top right corner, to close the window.

| Start | Title | Creator | Album | Length | Genre |
|----------------------------|--------------------------------------|---------------------|---|--------------|--------|
| 2011-03-21 13:10:00 | Love Dancing | Arthur's Landing | Strut Sampler 2011 | 00:06:01.299 | |
| 2011-03-21 13:16:01.299 | Баллада № 1 (женский романс) | Ильмера | Секреты | 00:04:18.37 | Blues |
| 2011-03-21 13:20:19.669 | WO QUI NON COIN / COWBOY BEBOP | Aoi Tada | Space Bio Charge | 00:03:42.66 | Anime |
| 2011-03-21 13:24:02.329 | Respect | Aretha Franklin | I Never Loved A Man the Way I Love You | 00:02:24.953 | Oldies |
| 2011-03-21 13:26:27.282 | Cherry Blossom Girl | Air | Talkie Walkie | 00:03:39.472 | Other |
| 2011-03-21 13:30:06.754 | Seven Nation Army | Ben L'Oncle Soul | Ben L'Oncle Soul | 00:02:59.43 | R&B |
| 2011-03-21 13:33:06.184 | Warlock | Desmond Dekker | Rockin' Steady The Best of Desmond Dekker | 00:03:55.391 | Ska |

Ok

REMOVING CONTENT FROM A SHOW

To remove an individual playlist from a show, click on the show in the **Calendar**, and select **Add/Remove Content** from the pop-up menu. In the **Schedule Playlist** window which opens, use the white **x** icon to remove the playlist from the show content. To remove all playlists from a show, click on the show in the **Calendar**, and select **Remove All Content** from the pop-up menu.

The screenshot shows a calendar for May 2011. The calendar grid has columns for Sun, Mon, Tue, Wed, Thu, Fri, and Sat. The dates 1 through 18 are visible. On Wednesday, May 11th, there are several show instances represented by colored blocks: a blue block for '18:00 - 19:00 Funk Show', a light blue block for '18:00 - 19:30 Funk Show', a cyan block for '13:10 - 13:41 Test Show', a yellow block for '17:40 - 18:55 Afrobeat Show', and a purple block for '17:20 - 18:00 Elvis Show'. A context menu is open over the cyan '13:10 - 13:41 Test Show' block, listing the following options: 'Add / Remove Content', 'Remove All Content', 'Show Content', 'Edit Show', 'Delete This Instance', and 'Delete This Instance and All Following'. A mouse cursor is positioned over the 'Remove All Content' option.

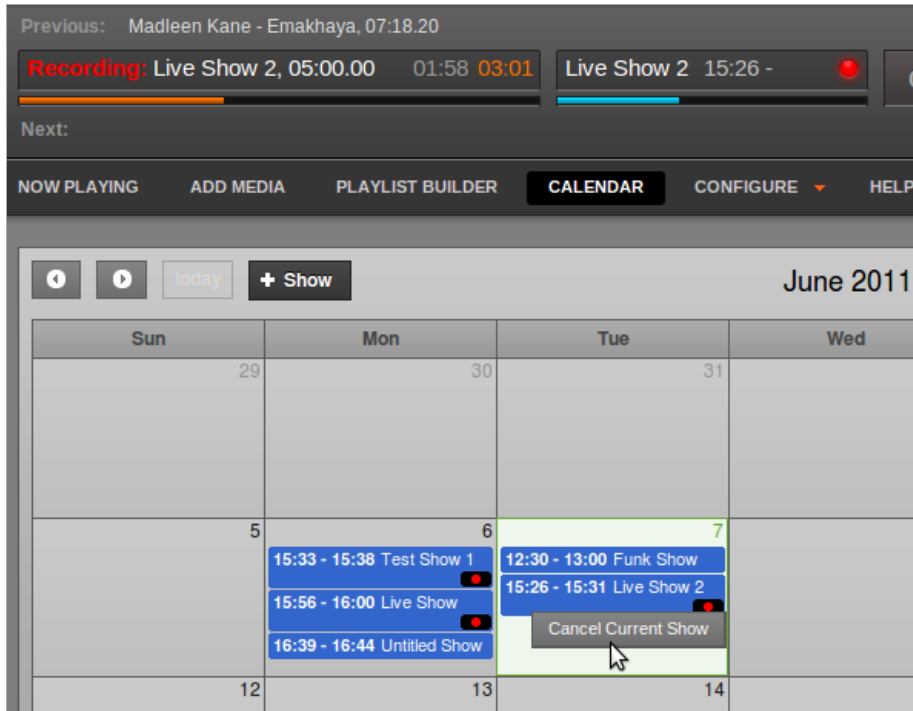
DELETING A FORTHCOMING SHOW

To delete one instance of a forthcoming show, click on the show in the **Calendar**, and select **Delete This Instance** from the pop-up menu. If you wish to delete all future instances of this particular show, select **Delete This Instance and All Following** from the pop-up menu.

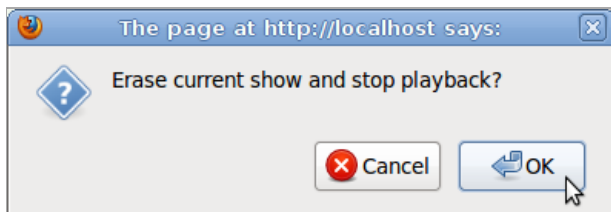
You cannot delete or remove content from shows that have already played out. These shows have only one option on the pop-up menu, which is **Show Content**.

CANCELING PLAYOUT AND RECORDING

If you wish to cancel the recording of a live show and delete the recorded file from the storage server, click on the show in the **Calendar** and select **Cancel Current Show** from the pop-up menu. In the same way, it is also possible to immediately cancel playout of a playlist based or pre-recorded show while it is running.

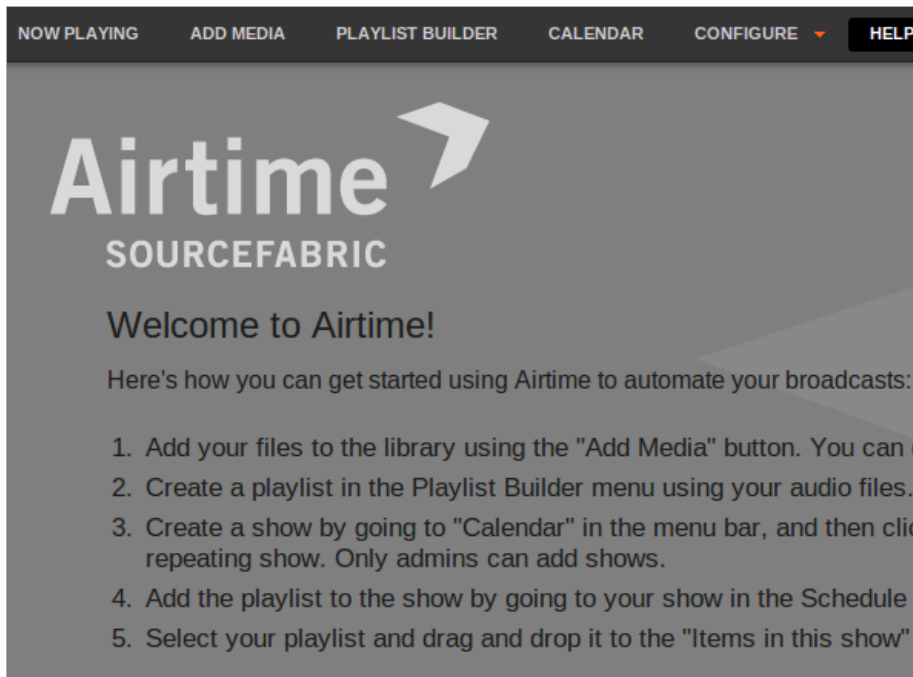


Airtime will ask you if you are sure about this action, as it cannot be undone.



9. HELP

The Help menu in Airtime offers a 'quick start' guide for new users.



You can visit the Airtime online support forum, and sign up for the mailing list, at <http://forum.sourcefabric.org/index.php/f/14/>

This forum is mirrored by the mailing list, so posts on the forum appear on the mailing list and vice versa. You can therefore also post a message there by emailing airtime-support@lists.sourcefabric.org

To subscribe to forum updates via mail, please register or login to the forum by clicking the appropriate link. Then click the 'Subscribe' button at the top of each forum page.

BUG REPORTING

Airtime needs your input to improve. If you think you've found a bug, please visit <http://dev.sourcefabric.org/> and sign in, using the same login and password that you registered for the Airtime forum. Create a bug report by selecting **Create Issue**, then **Airtime**, and then **Bug**. That way, the Airtime team can keep track of your problem and notify you when it has been fixed. You can also suggest improvements and new features for Airtime on that site.

CONTACT

Finally, when all other avenues have been exhausted, email us directly at contact@sourcefabric.org and we'll try to help!

OTHER HELP

The UNESCO wiki *Community Radio - A user's guide to the technology*: <http://cr-userguide.web4all.in/> features a very comprehensive guide to setting up a community radio station. This guide is aimed at people thinking about setting up a radio station in India, but includes lots of practical advice that would be useful in any country.

ADVANCED CONFIGURATION

- 10. PREPARING THE SERVER**
- 11. AUTOMATED INSTALLATION**
- 12. MANUAL INSTALLATION**
- 13. UPGRADING**
- 14. SETTING THE SERVER TIME**
- 15. USING THE IMPORT SCRIPT**
- 16. BACKING UP THE SERVER**
- 17. EXPORTING THE SCHEDULE**
- 18. INTEGRATION WITH MIXXX**

10. PREPARING THE SERVER

The following instructions assume that you have root access (*sudo* on Ubuntu) to a GNU/Linux server, and are familiar with basic command line tasks. Experienced system administrators may prefer to skip to the *Expert install* chapter in the appendix of this book.

The recommended Airtime server platform is Ubuntu 10.04 'Lucid Lynx' LTS. Debian 6.0 'squeeze' is also a good option. The server should have at least a 1GHz processor and 512MB of RAM. The Airtime installation does not use much disk space, but you should allow plenty of storage capacity for the media archive. A hot-swap RAID array is recommended for the media archive, in case of disk failure. You should also consider a UPS or other battery powered system to offer some protection against short-term power failures.

The Airtime web administration interface is intended to work with any browser, on any desktop or mobile platform. The recommended web browser is Mozilla Firefox 3.6.

SOUNDCARDS

If you intend that your Airtime server will have a direct audio output to a broadcast transmitter or a separate stream encoder, your server machine must have a soundcard supported by an ALSA driver. Almost all standard soundcards have ALSA drivers built into the Linux kernel, which do not need to be installed separately. If in doubt about driver support for your soundcard, check the ALSA soundcard matrix at: <http://www.alsa-project.org/main/index.php/Matrix:Main>

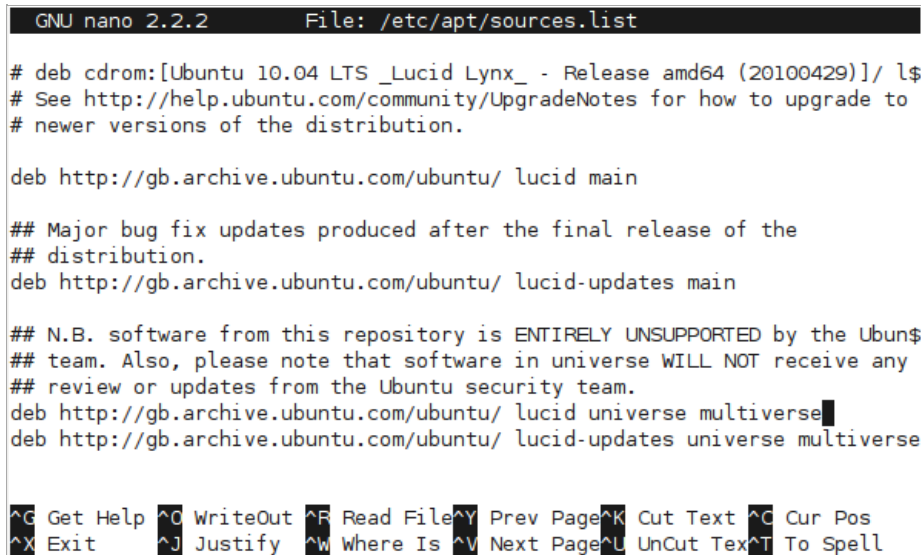
If your Airtime machine will only be used to stream to an Icecast streaming media server, you do not require a soundcard to be installed on the server side. This option is suitable for Airtime installations at your ISP's datacenter, remote from any transmitter.

SET UP REPOSITORIES FOR UBUNTU

When installing on an Ubuntu server, a few of the packages that Airtime relies on are in the Ubuntu *universe* or *multiverse* repositories. If either of these repositories is disabled, you can enable them in the */etc/apt/sources.list* file, by opening the *nano* editor in your server's console with the command:

```
$ sudo nano /etc/apt/sources.list
```

For an Ubuntu Lucid server, find the lines which begin *deb* and end with *lucid universe* or *lucid-updates universe*, adding *multiverse* to the end of these lines, if it is not there already. The *multiverse* repository is required for the *libmp3lame0* library, which is an MP3 encoder.



```
GNU nano 2.2.2      File: /etc/apt/sources.list
# deb cdrom:[Ubuntu 10.04 LTS _Lucid Lynx_ - Release amd64 (20100429)] / l$
# See http://help.ubuntu.com/community/UpgradeNotes for how to upgrade to
# newer versions of the distribution.

deb http://gb.archive.ubuntu.com/ubuntu/ lucid main

## Major bug fix updates produced after the final release of the
## distribution.
deb http://gb.archive.ubuntu.com/ubuntu/ lucid-updates main

## N.B. software from this repository is ENTIRELY UNSUPPORTED by the Ubuntu$
## team. Also, please note that software in universe WILL NOT receive any
## review or updates from the Ubuntu security team.
deb http://gb.archive.ubuntu.com/ubuntu/ lucid universe multiverse
deb http://gb.archive.ubuntu.com/ubuntu/ lucid-updates universe multiverse

^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^L UnCut Text ^T To Spell
```

The exact repository mirror URLs in your *sources.list* file will differ from the above screenshot, depending on your location.

The Sourcefabric repository contains packages for Airtime, and any other packages which Airtime requires. To add the Sourcefabric repository to an Ubuntu Lucid server, scroll to the end of the *sources.list* file and add the following line:

```
deb http://apt.sourcefabric.org/ lucid main
```

For Ubuntu Maverick, substitute *maverick* in place of *lucid* in the line above.

```
GNU nano 2.2.2 File: /etc/apt/sources.list

## Also, please note that software in backports WILL NOT receive any revisions
## or updates from the Ubuntu security team.
# deb http://gb.archive.ubuntu.com/ubuntu/ lucid-backports main restricted
# deb-src http://gb.archive.ubuntu.com/ubuntu/ lucid-backports main restricted

## Uncomment the following two lines to add software from Canonical's
## 'partner' repository.
## This software is not part of Ubuntu, but is offered by Canonical and the
## respective vendors as a service to Ubuntu users.
# deb http://archive.canonical.com/ubuntu lucid partner
# deb-src http://archive.canonical.com/ubuntu lucid partner

deb http://security.ubuntu.com/ubuntu lucid-security main
deb http://security.ubuntu.com/ubuntu lucid-security universe

deb http://apt.sourcefabric.org/ lucid main

^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

Press Ctrl+O (the Ctrl key and the letter O together) to save the file, then Ctrl+X to exit the nano editor.

SET UP REPOSITORIES FOR DEBIAN

On Debian, you will need to install and configure the **sudo** package, if it is not installed already. On a Debian squeeze server, after you have installed and configured sudo, you can edit the `/etc/apt/sources.list` file with the command:

```
$ sudo nano /etc/apt/sources.list
```

You can obtain the `libmp3lame0` library package by adding the following repository to the end of the file:

```
deb http://www.debian-multimedia.org squeeze main non-free
```

To add the Sourcefabric repository to a Debian squeeze server, add the following line to the end of the file:

```
deb http://apt.sourcefabric.org/ squeeze main
```

Press Ctrl+O (the Ctrl key and the letter O together) to save the file, then Ctrl+X to exit the `nano` editor.

INSTALL THE SOURCEFABRIC SIGNING KEY

Reload the system's package list with:

```
$ sudo apt-get update
```

You will see an error message about a missing public key.

```
Hit http://gb.archive.ubuntu.com lucid Release
Hit http://gb.archive.ubuntu.com lucid-updates Release
Hit http://gb.archive.ubuntu.com lucid/main Packages
Hit http://gb.archive.ubuntu.com lucid/universe Packages
Hit http://gb.archive.ubuntu.com lucid/multiverse Packages
Hit http://gb.archive.ubuntu.com lucid-updates/main Packages
Hit http://gb.archive.ubuntu.com lucid-updates/universe Packages
Hit http://gb.archive.ubuntu.com lucid-updates/multiverse Packages
Fetched 491B in 2s (218B/s)
Reading package lists... Done
W: GPG error: http://apt.sourcefabric.org lucid Release: The following signatures couldn't be verified because the public key is not available: NO
_PUBKEY 0888FE5B174C1854
daniel@office:~$
```

To fix this system error, you need to install the `sourcefabric-keyring` package, which contains the package signing key. This encryption key is a security measure which helps ensure that the Airtime packages you will be downloading in future have not been tampered with by a third party. You can install the key with the command:

```
$ sudo apt-get install sourcefabric-keyring
```

When prompted, press the `y` key on your keyboard to install the `sourcefabric-keyring` package without verification. If you wish to verify the authenticity of the package signing key, please contact Sourcefabric for assistance.

```
daniel@office:~$ sudo apt-get install sourcefabric-keyring
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed
  sourcefabric-keyring
0 upgraded, 1 newly installed, 0 to remove and 7 not upgraded.
Need to get 3,610B of archives.
After this operation, 49.2kB of additional disk space will be used.
WARNING: The following packages cannot be authenticated!
  sourcefabric-keyring
Install these packages without verification [y/N]? y
Get: 1 http://apt.sourcefabric.org/ lucid/main sourcefabric-keyring 0.1 [3
,610B]
Fetched 3,610B in 0s (12.3kB/s)
Selecting previously deselected package sourcefabric-keyring.
(Reading database ... 348822 files and directories currently installed.)
Unpacking sourcefabric-keyring (from ../sourcefabric-keyring_0.1_all.deb)
...
Setting up sourcefabric-keyring (0.1) ...

daniel@office:~$ █
```

Update your computer's software sources again, to confirm that you are now using a trusted software repository:

```
$ sudo apt-get update
```

You should no longer see the error message about the missing public key.

INSTALLING THE DATABASE MANAGEMENT SYSTEM

Airtime uses a PostgreSQL database to keep track of media assets and associated metadata in its storage server. Depending on the scale of your Airtime installation and the hardware available, you may wish to install PostgreSQL on a separate server. If you only have one server, you can install the *postgresql* package on the same machine as Airtime with the command:

```
$ sudo apt-get install postgresql
```

INSTALLING A STREAMING SERVER

Optionally, you may wish to stream directly from Airtime to an Icecast media distribution server, without requiring a soundcard or mixer in the broadcast chain. This option is particularly suitable for fully automated stations, in which all shows are played out using Airtime. You can install the *icecast2* package on your server with the command:

```
$ sudo apt-get install icecast2
```

In some scenarios, you may wish to stream from Airtime to a remote Icecast server, for example when Icecast is installed on a server in a datacenter with greater bandwidth available than an Airtime server located at your broadcast studio has. This separation may become necessary if your stream becomes popular, because each additional listener which connects to the Icecast stream uses additional bandwidth. In this case, you do not need to install the *icecast2* package on the Airtime server.

REMOVE PULSEAUDIO

The PulseAudio sound server is not compatible with Airtime, but is installed by default on Ubuntu. To remove PulseAudio from an Ubuntu machine, type the following command:

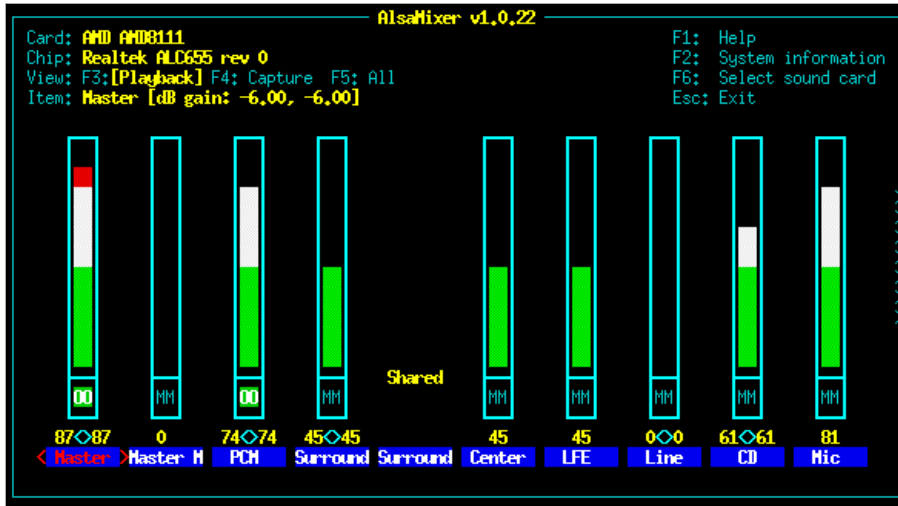
```
$ sudo apt-get purge pulseaudio
```

Removing the *pulseaudio* package on a desktop Ubuntu machine may force the removal of the *ubuntu-desktop* metapackage. However, this metapackage is only installed on the system for managing upgrades; removing it does not remove the GNOME desktop.

After removing PulseAudio, if your Airtime machine has a desktop and a soundcard, you can install a mixer applet which can control the ALSA soundcard driver directly, such as *gnome-alsamixer*:

```
$ sudo apt-get install gnome-alsamixer
```

On a server with a soundcard but without a desktop, you can control sound input and output levels using the command line program *alsamixer*:



This program should already be installed on an Ubuntu or Debian machine with a soundcard. If not, you can install it with the command:

```
$ sudo apt-get install alsa-utils
```

Now your server should be ready for Airtime to be installed.

II. AUTOMATED INSTALLATION

This installation method is intended for computers running Ubuntu or Debian GNU/Linux, and is the recommended method for new Airtime users.

After setting up the Sourcefabric package repository and installing PostgreSQL, as described in the previous chapter, you can install the Airtime package with:

```
$ sudo mkdir -p /tmp/pear/cache
$ sudo apt-get install airtime
```

This command will install all of the Airtime components, plus any other packages that Airtime requires in order to run.

```
daniel@office:~$ sudo apt-get install airtime
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed
  airtime
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 12.7MB of archives.
After this operation, 69.3MB of additional disk space will be used.
Get: 1 http://apt.sourcefabric.org/ lucid/main airtime 1.8.2-6 [12.7MB]
Fetched 12.7MB in 20s (622kB/s)
Preconfiguring packages ...
Selecting previously deselected package airtime.
(Reading database ... 382104 files and directories currently installed.)
Unpacking airtime (from ../airtime_1.8.2-6_all.deb) ...
Setting up airtime (1.8.2-6) ...
```

Once all the packages have been downloaded and installed, you will be asked a few questions about the configuration of the Airtime system. You can accept the default settings by pressing the **Enter** key, or use the **Tab** key to change your selection.

Firstly, you will be asked if you wish to create an Apache virtual host web server configuration automatically.

```
Configuring airtime
This setup script can perform apache web-server configuration so
that you can connect to airtime directly after this installation.

Production systems should choose "dedicated v-host". This option
will ask for a Server host-name (FQDN) and will create a minimal
apache vhost configuration that you can adapt.

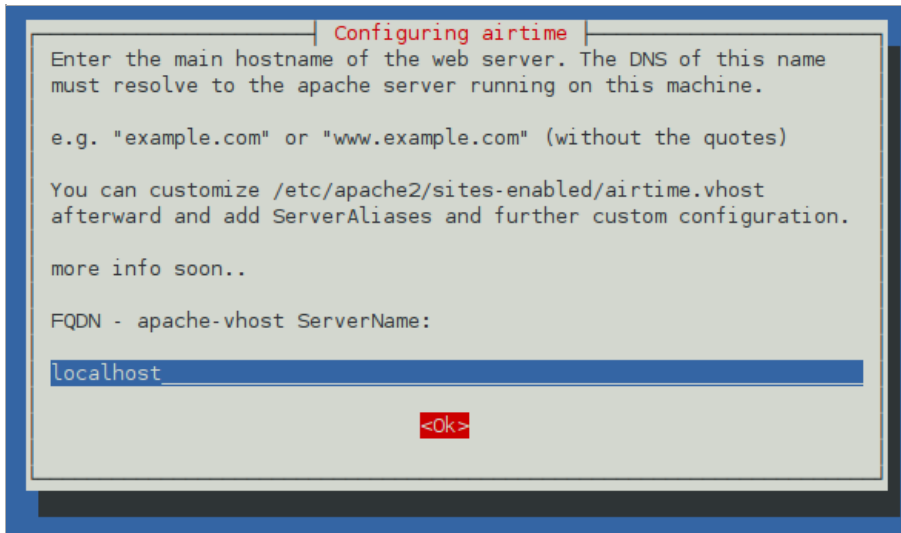
"no, thanks": no problem. You're welcome to set it up however you
like. Note that the files in /etc/airtime/ may come in handy doing
so.

Create apache2 config:

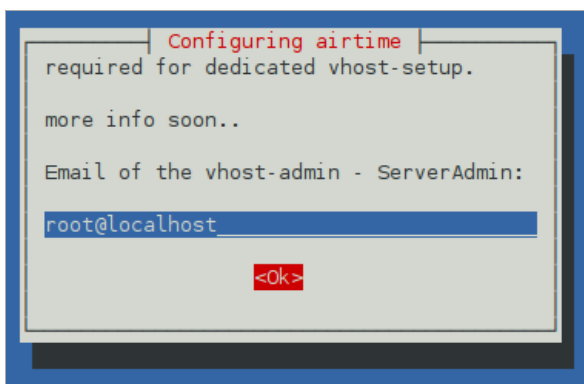
    dedicated v-host
    no thanks

    <Ok>
```

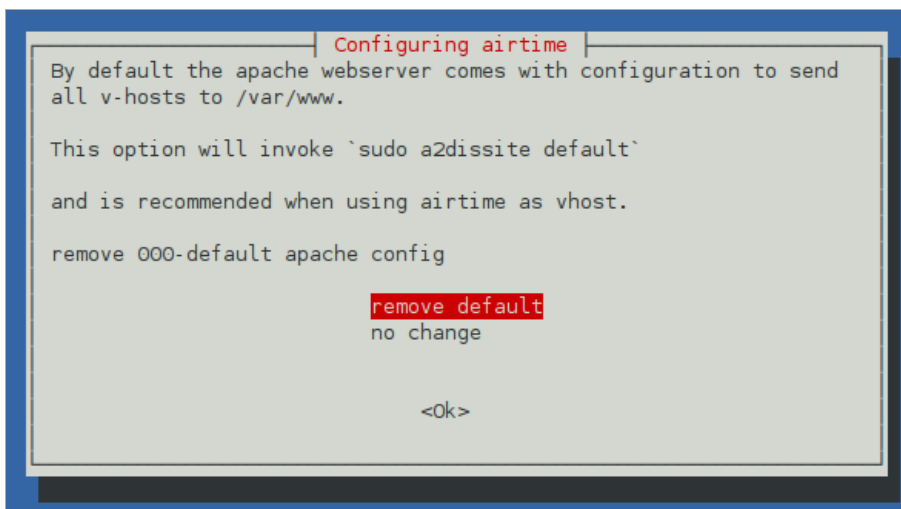
If so, you will need to enter the domain name that your station staff will use to access Airtime. For a test server that will only be accessed directly from the same machine, you can use the setting of 'localhost' here.



Next, set the contact email address of the server administrator, which is good practice in case of any server problems. For a test server, using an address at the localhost is acceptable.



Debian and Ubuntu servers are set up with a default Apache configuration, which might block station staff from accessing Airtime. If you wish, this default configuration can be removed automatically for you.



You may also be warned about upgrading the *rabbitmq-server* package. If you do not have an existing installation of RabbitMQ, it is safe to press the **Enter** key to continue.



The Airtime installer will then run a script to check that your server environment is set up correctly.

```
*** Verifying Correct System Environment ***
CPU                               = Dual Core AMD Opteron(tm) Processor 170
Total RAM                         = 6128244 kB
Free RAM                          = 3779140 kB
OS                                 = Ubuntu 10.04.2 LTS x86-64
AIRTIME_CONFIG_FILES              = OK
POSTGRESQL_DATABASE              = OK
PYTHON_KOMBU_VERSION              = 1.1.2
PYTHON_POSTER_VERSION             = 0.8.0
RABBITMQ_SERVER                   = OK
AIRTIME_VERSION_URL               = http://localhost:80/api/version/api_key/
%%api_key%%
APACHE_CONFIGURED                 = YES
AIRTIME_VERSION                   = 1.8.2
PLAYOUT_ENGINE_PROCESS_ID        = 8260
PLAYOUT_ENGINE_RUNNING_SECONDS   = 19
LIQUIDSOAP_PROCESS_ID            = 8262
LIQUIDSOAP_RUNNING_SECONDS       = 19
ICECAST_PROCESS_ID               = 1520

-- System setup looks OK!

***** Install Complete *****
daniel@office:~$
```

CONFIGURE PHP

Edit the *php.ini* file to change PHP settings for the server to those that Airtime requires.

```
$ sudo nano /etc/php5/apache2/php.ini
```

```

GNU nano 2.2.2      File: /etc/php5/apache2/php.ini      Modified
; Development Value: 60 (60 seconds)
; Production Value: 60 (60 seconds)
; http://php.net/max-input-time
max_input_time = 60

; Maximum input variable nesting level
; http://php.net/max-input-nesting-level
;max_input_nesting_level = 64

; Maximum amount of memory a script may consume (128MB)
; http://php.net/memory-limit
memory_limit = 256M

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; Error handling and logging ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

; This directive informs PHP of which errors, warnings and notices you wo$
; it to take action for. The recommended way of setting values for this
; directive is through the use of the error level constants and bitwise
; operators. The error level constants are below here for convenience as $
; some common settings and their meanings.

^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^L UnCut Tex ^T To Spell

```

This is a long file, so use the search tool (press Ctrl+W) to find the particular lines that you're looking for. The recommended initial settings for Airtime are:

```

memory_limit = 256M
magic_quotes_gpc = Off
file_uploads = On
upload_tmp_dir = /tmp
phar.readonly = Off

```

If any of the above lines are commented out with a semi-colon at the beginning, you will need to remove that semi-colon for the setting to work.

You will also need to set the time zone that Airtime will display to match local time at your station. Find the line in the *php.ini* file which begins *date.timezone*, remove the semi-colon comment if present, and add the required time zone to the end of the line. For example:

```

date.timezone = "America/Toronto"

```

The time zone value should be in quotes, as above. You can find the correct value for your station's time zone in the appendix of this book.

```

GNU nano 2.2.2      File: /etc/php5/apache2/php.ini      Modified

[Date]
; Defines the default timezone used by the date functions
; http://php.net/date.timezone
date.timezone = "America/Toronto"

; http://php.net/date.default-latitude
;date.default_latitude = 31.7667

; http://php.net/date.default-longitude
;date.default_longitude = 35.2333

; http://php.net/date.sunrise-zenith
;date.sunrise_zenith = 90.583333

; http://php.net/date.sunset-zenith
;date.sunset_zenith = 90.583333

^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^L UnCut Tex ^T To Spell

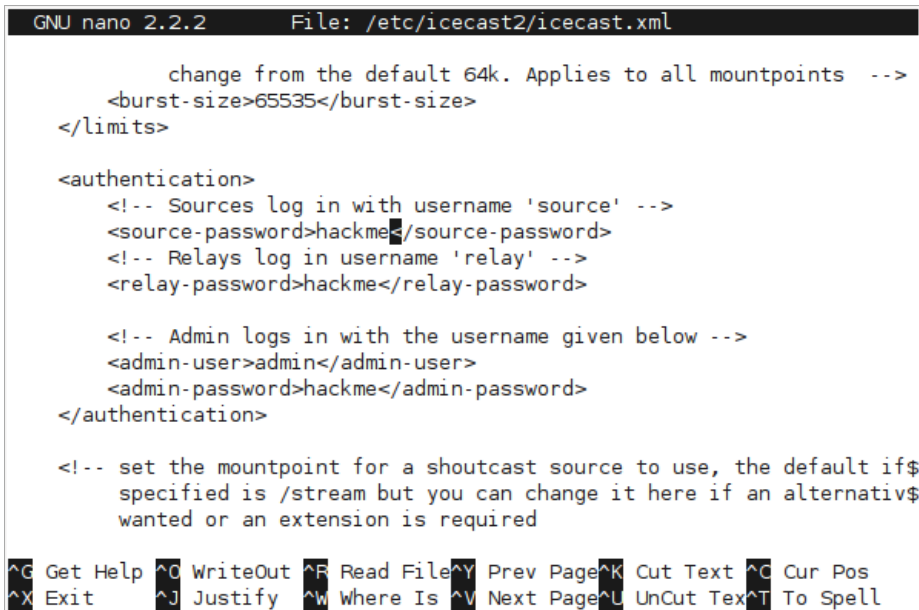
```

Press Ctrl+O to save the *php.ini* file, then Ctrl+X to exit the *nano* editor.

SECURE AND ENABLE ICECAST

If you have installed the Icecast streaming media server, before running it for the first time you should edit the file `/etc/icecast2/icecast.xml` to change the default `<source-password>`, `<relay-password>` and `<admin-password>` values from 'hackme' to something more secure.

```
$ sudo nano /etc/icecast2/icecast.xml
```



```
GNU nano 2.2.2 File: /etc/icecast2/icecast.xml

    change from the default 64k. Applies to all mountpoints -->
    <burst-size>65535</burst-size>
</limits>

<authentication>
  <!-- Sources log in with username 'source' -->
  <source-password>hackme</source-password>
  <!-- Relays log in username 'relay' -->
  <relay-password>hackme</relay-password>

  <!-- Admin logs in with the username given below -->
  <admin-user>admin</admin-user>
  <admin-password>hackme</admin-password>
</authentication>

<!-- set the mountpoint for a shoutcast source to use, the default if$
    specified is /stream but you can change it here if an alternativ$
    wanted or an extension is required
```

Then set up the Icecast server to start automatically:

```
$ sudo nano /etc/default/icecast2
```

by setting the value of `ENABLE` to `true` on the last line of the `/etc/default/icecast2` file:

```
ENABLE=true
```

Save and close the file with `Ctrl+O` and `Ctrl+X`, then start Icecast:

```
$ sudo service icecast2 start
```

The server should respond:

```
Starting icecast2: Starting icecast2
Detaching from the console
icecast2.
```

CONFIGURE LIQUIDSOAP

Before running Airtime, you need to edit the Liquidsoap configuration file to tell the system what kind of output you require: to the soundcard, direct Ogg Vorbis streaming, direct MP3 streaming, or all three. Open the Liquidsoap configuration file with:

```
$ sudo nano /etc/airtime/liquidsoap.cfg
```

For soundcard output, change the value of `output_sound_device` to `true`. You can also set the values of `output_icecast_vorbis`, `output_icecast_mp3` to `true` or `false`, and several other configuration options in this file.

In the `stream settings` section, configure `icecast_host` and `icecast_pass` for your Icecast server, if you are using the direct streaming option. The IP address `127.0.0.1` is the standard address of `localhost`, which you would use if Airtime and Icecast were installed on the same machine. The port number `8000` is the default server port for Icecast.

For a production server, you will probably want to change the `webstream mountpoint names` and `webstream metadata settings` to suit your station.

```
#####
# stream settings                                     #
#####
icecast_host = "127.0.0.1"
icecast_port = 8000
icecast_pass = "hackme"

#####
# webstream mountpoint names                         #
#####
mount_point_mp3 = "airtime.mp3"
mount_point_vorbis = "airtime.ogg"

#####
# webstream metadata settings                       #
#####
icecast_url = "http://airtime.sourcefabric.org"
icecast_description = "Airtime Radio!"
icecast_genre = "genre"

#####
#liquidsoap output settings                         #
#####
output_sound_device = true
output_icecast_vorbis = true
output_icecast_mp3 = false

^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^L UnCut Text ^T To Spell
```

CONFIGURE AIRTIME

Optionally, you may wish to edit the file `/etc/airtime/airtime.conf` to set the directory where Airtime media files are stored. For example, you may wish to store media on a RAID array which is not part of the server's root filesystem.

```
$ sudo nano /etc/airtime/airtime.conf
```

Find the line which begins `base_files_dir` and change the directory path to the one that you require, for example:

```
base_files_dir = /mnt/raid10/media
```

You can also set the PostgreSQL database host, and the username and password to connect to the database with in this file. Save and close the file with `Ctrl+O` and `Ctrl+X`.

```
GNU nano 2.2.2      File: /etc/airtime/airtime.conf      Modified

[database]
host = localhost
dbname = airtime
dbuser = airtime
dbpass = airtime

[rabbitmq]
host = 127.0.0.1
port = 5672
user = guest
password = guest
vhost = /

[general]
api_key = RQ3RR4QT2VC2ZF0GMI GQ
web_server_user = www-data
airtime_dir = /var/lib/airtime
base_files_dir = /mnt/raid10/media

[soundcloud]
connection_retries = 3
time_between_retries = 60

^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^L UnCut Text ^T To Spell
```

Finally, reboot the server so that the software can be initialized correctly. After that, you should be able to log in to the Airtime administration interface, as shown in the **Getting started** chapter.

12. MANUAL INSTALLATION

You do not normally need to install Airtime manually, unless you are testing a development version of the software. Building Airtime from source is not recommended unless you have experience of working with Git repositories and compilers.

To install from the Airtime release tarball, first install the list of dependencies. For example, on Ubuntu 10.04 (Lucid Lynx) LTS you could enter the command:

```
$ sudo apt-get install apache2 curl daemontools daemontools-run ecasound \
gzip libao-ocaml libapache2-mod-php5 libcamomile-ocaml-dev libesd0 \
libmad-ocaml libmp3lame0 libmp3lame-dev libportaudio2 libsamplerate0 \
libsoundtouch-ocaml libtaglib-ocaml libvorbis-ocaml-dev mpg123 multitail \
odbc-postgresql oggvideotools openssl php-pear php5-curl php5-gd \
php5-pgsql poc-streamer pwgen python python-configobj python-mutagen \
python-pip python-setuptools rabbitmq-server tar unzip
```

Install the Python modules that Airtime requires:

```
$ sudo pip install kombu
$ sudo pip install poster
```

The final dependency to install is *phing* (note that you must use the version number shown):

```
$ sudo mkdir -p /tmp/pear/cache
$ sudo pear channel-discover pear.phing.info
$ sudo pear install phing/phing-2.4.2
```

DOWNLOAD AIRTIME

A link to download the latest tarball version of Airtime is available at:

http://www.sourcefabric.org/en/products/airtime_download/

For example, to download version 1.8.2 from SourceForge in the server console you could enter the command:

```
$ wget http://downloads.sourceforge.net/project/airtime/1.8.2/airtime-1.8.2.tar.gz
```

```
daniel@office:~$ wget http://downloads.sourceforge.net/project/airtime/1.8.2/airtime-1.8.2.tar.gz
--2011-06-14 12:40:20-- http://downloads.sourceforge.net/project/airtime/1.8.2/airtime-1.8.2.tar.gz
Resolving downloads.sourceforge.net... 216.34.181.59
Connecting to downloads.sourceforge.net|216.34.181.59|:80... connected.
HTTP request sent, awaiting response... 302 Found
Location: http://garr.dl.sourceforge.net/project/airtime/1.8.2/airtime-1.8.2.tar.gz [following]
--2011-06-14 12:40:21-- http://garr.dl.sourceforge.net/project/airtime/1.8.2/airtime-1.8.2.tar.gz
Resolving garr.dl.sourceforge.net... 193.206.140.34, 2001:760:ffff:b0::34
Connecting to garr.dl.sourceforge.net|193.206.140.34|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 14219875 (14M) [application/x-gzip]
Saving to: `airtime-1.8.2.tar.gz'

100%[=====>] 14,219,875 704K/s in 21s

2011-06-14 12:40:42 (670 KB/s) - `airtime-1.8.2.tar.gz' saved [14219875/14219875]

daniel@office:~$ █
```

Unzip the file you have just downloaded to the installation directory `/var/lib/airtime/` with the following command:

```
$ sudo tar -xvzf airtime-1.8.2.tar.gz -C /var/lib/
```

Change the ownership of the installation directory to the `root` user so that it is more secure:

```
$ sudo chown -R root.root /var/lib/airtime-1.8.2/
```

Then enter the following commands to create the Airtime databases, tables, and directories:

```
$ cd /var/lib/airtime-1.8.2/install/
$ sudo php airtime-install.php
```

The installation script will indicate which files are being installed on your system, and the directories they are being unpacked into. Finally, it will run a script to check that your server environment is set up correctly.

```
*** Verifying Correct System Environment ***
CPU = Dual Core AMD Opteron(tm) Processor 170
Total RAM = 6128244 kB
Free RAM = 3779140 kB
OS = Ubuntu 10.04.2 LTS x86-64
AIRTIME_CONFIG_FILES = OK
POSTGRESQL_DATABASE = OK
PYTHON_KOMBU_VERSION = 1.1.2
PYTHON_POSTER_VERSION = 0.8.0
RABBITMQ_SERVER = OK
AIRTIME_VERSION_URL = http://localhost:80/api/version/api_key/
%%api_key%%
APACHE_CONFIGURED = YES
AIRTIME_VERSION = 1.8.2
PLAYOUT_ENGINE_PROCESS_ID = 8260
PLAYOUT_ENGINE_RUNNING_SECONDS = 19
LIQUIDSOAP_PROCESS_ID = 8262
LIQUIDSOAP_RUNNING_SECONDS = 19
ICECAST_PROCESS_ID = 1520

-- System setup looks OK!

***** Install Complete *****

daniel@office:~$
```

CONFIGURE APACHE

Check that the Apache web server modules that Airtime requires are enabled:

```
$ sudo a2enmod php5 rewrite
```

The server should respond:

```
Module php5 already enabled
Module rewrite already enabled
```

Next, create the Airtime virtual host configuration file for Apache:

```
$ sudo nano /etc/apache2/sites-available/airtime
```

and enter the information below, substituting your system administrator's email address for *admin@example.com*. Make sure you set the *DocumentRoot* and *Directory* paths correctly. This should match the *public* directory that the installer unpacked the web interface into, which by default is the */var/www/airtime/public/* directory.

```
<VirtualHost *:80>
    ServerAdmin admin@example.com
    DocumentRoot /var/www/airtime/public

    SetEnv APPLICATION_ENV "development"

    <Directory /var/www/airtime/public>
        DirectoryIndex index.php
        AllowOverride all
        Order allow,deny
        Allow from all
    </Directory>
</VirtualHost>
```

Press **Ctrl+O** to save the file, then **Ctrl+X** to exit the *nano* editor. Then enter the command:

```
$ sudo a2ensite airtime
```

The server should respond:

```
Enabling site airtime.
Run '/etc/init.d/apache2 reload' to activate new configuration!
```

As suggested by the output of the command above, reload the web server configuration.

```
$ sudo /etc/init.d/apache2 reload
```

The server should respond:

```
* Reloading web server config apache2
```

CONFIGURE PHP

Edit the *php.ini* file to change PHP settings for the server to those that Airtime requires.

```
$ sudo nano /etc/php5/apache2/php.ini
```

```

GNU nano 2.2.2      File: /etc/php5/apache2/php.ini      Modified
; Development Value: 60 (60 seconds)
; Production Value: 60 (60 seconds)
; http://php.net/max-input-time
max_input_time = 60

; Maximum input variable nesting level
; http://php.net/max-input-nesting-level
;max_input_nesting_level = 64

; Maximum amount of memory a script may consume (128MB)
; http://php.net/memory-limit
memory_limit = 256M

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; Error handling and logging ;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

; This directive informs PHP of which errors, warnings and notices you wo$
; it to take action for. The recommended way of setting values for this
; directive is through the use of the error level constants and bitwise
; operators. The error level constants are below here for convenience as $
; some common settings and their meanings.

^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^L UnCut Text ^T To Spell

```

This is a long file, so use the search tool (press Ctrl+W) to find the particular lines that you're looking for. The recommended initial settings for Airtime are:

```

memory_limit = 256M
magic_quotes_gpc = Off
file_uploads = On
upload_tmp_dir = /tmp
phar.readonly = Off

```

If any of the above lines are commented out with a semi-colon at the beginning, you will need to remove that semi-colon for the setting to work.

You will also need to set the time zone that Airtime will display to match local time at your station. Find the line in the *php.ini* file which begins *date.timezone*, remove the semi-colon comment if present, and add the required time zone to the end of the line. For example:

```

date.timezone = "America/Toronto"

```

The time zone value should be in quotes, as above. You can find the correct value for your server's time zone in the appendix of this manual.

Press Ctrl+O to save the *php.ini* file, then Ctrl+X to exit the *nano* editor.

SECURE AND ENABLE ICECAST

If you have installed the Icast streaming media server, before running it for the first time you should edit the file */etc/icecast2/icecast.xml* to change the default *<source-password>*, *<relay-password>* and *<admin-password>* values from 'hackme' to something more secure.

```

$ sudo nano /etc/icecast2/icecast.xml

```



```
GNU nano 2.2.2 File: /etc/icecast2/icecast.xml

    change from the default 64k. Applies to all mountpoints -->
    <burst-size>65535</burst-size>
</limits>

<authentication>
  <!-- Sources log in with username 'source' -->
  <source-password>hackme</source-password>
  <!-- Relays log in username 'relay' -->
  <relay-password>hackme</relay-password>

  <!-- Admin logs in with the username given below -->
  <admin-user>admin</admin-user>
  <admin-password>hackme</admin-password>
</authentication>

<!-- set the mountpoint for a shoutcast source to use, the default if$
    specified is /stream but you can change it here if an alternativ$
    wanted or an extension is required
```

Then set up the Icecast server to start automatically:

```
$ sudo nano /etc/default/icecast2
```

by setting the value of *ENABLE* to *true* on the last line of the */etc/default/icecast2* file:

```
ENABLE=true
```

Save and close the file with **Ctrl+O** and **Ctrl+X**, then start Icecast:

```
$ sudo service icecast2 start
```

The server should respond:

```
Starting icecast2: Starting icecast2
Detaching from the console
icecast2.
```

CONFIGURE LIQUIDSOAP

You can open the *liquidsoap.cfg* file for editing with the command:

```
$ sudo nano /etc/airtime/liquidsoap.cfg
```

To set up Airtime for direct streaming, set the value of *icecast_pass* to the *<source-password>* value that you set in the Icecast configuration file. If you are streaming to a separate Icecast server, set the value of *icecast_host* to the domain name or IP address of the other machine. The value of *icecast_port* can be left as the default of *8000*, unless you have been provided with a different port number by the system administrator of the Icecast server.

```
#####
# stream settings                                     #
#####
icecast_host = "127.0.0.1"
icecast_port = 8000
icecast_pass = "hackme"

#####
# webstream mountpoint names                         #
#####
mount_point_mp3 = "airtime.mp3"
mount_point_vorbis = "airtime.ogg"

#####
# webstream metadata settings                       #
#####
icecast_url = "http://airtime.sourcefabric.org"
icecast_description = "Airtime Radio!"
icecast_genre = "genre"

#####
#liquidsoap output settings                         #
#####
output_sound_device = true
output_icecast_vorbis = true
output_icecast_mp3 = false

^G Get Help ^C WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Tex ^T To Spell
```

You can also configure the values of `mount_point_mp3`, `mount_point_vorbis`, `icecast_url`, `icecast_description`, and `icecast_genre` to suit your station. The option `output_icecast_vorbis_metadata` defaults to `false` because some media player clients are known to disconnect from the stream when Ogg Vorbis metadata changes to show new track information.

If you require direct output to an ALSA soundcard device on the Airtime server, in addition to the Icecast stream, change the value of `output_sound_device` from the default of `false` to `true`:

```
output_sound_device = true
```

If you do not require an Icecast stream in either Ogg Vorbis or MP3 format, you can set the values of `output_icecast_vorbis` or `output_icecast_mp3`, respectively, to `false`. Then save and close the file with `Ctrl+O` and `Ctrl+X`.

CONFIGURE AIRTIME

Optionally, you may wish to edit the file `/etc/airtime/airtime.conf` to set the directory where Airtime media files are stored. For example, you may wish to store media on a RAID array which is not part of the server's root filesystem.

```
$ sudo nano /etc/airtime/airtime.conf
```

Find the line which begins `base_files_dir` and change the directory path to the one that you require, for example:

```
base_files_dir = /mnt/raid10/media
```

You can also set the PostgreSQL database host, and the username and password to connect to the database with in this file. Save and close the file with `Ctrl+O` and `Ctrl+X`.

```
GNU nano 2.2.2      File: /etc/airtime/airtime.conf      Modified

[database]
host = localhost
dbname = airtime
dbuser = airtime
dbpass = airtime

[rabbitmq]
host = 127.0.0.1
port = 5672
user = guest
password = guest
vhost = /

[general]
api_key = RQ3RR4QT2VC2ZFOGMIGQ
web_server_user = www-data
airtime_dir = /var/lib/airtime
base_files_dir = /mnt/raid10/media

[soundcloud]
connection_retries = 3
time_between_retries = 60

^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^U UnCut Tex ^T To Spell
```

Finally, reboot your server so that *daemontools* can initialize correctly. After that, you should be able to log in to the Airtime administration interface, as shown in the **Getting started** chapter.

13. UPGRADING

Before upgrading a production Airtime server, you should back up both the PostgreSQL database and the storage server used by Airtime. This is especially important if you have not already set up a regular back up routine. The extra back up is a safety measure in case of accidental data loss during the upgrade, for example due to the wrong command being entered when moving files. See the chapter *Backing up the server* in this book for details of how to perform these back ups.

If you have deployed Airtime using the *Automated installation* method, you can upgrade in the same way. A new Airtime package available in the Sourcefabric repository can be installed with:

```
$ sudo apt-get update  
$ sudo apt-get upgrade
```

If you have used the *Manual installation* method, you should repeat the installation steps of downloading and unpacking the tarball to an installation directory, changing to that directory, and running the **airtime-install.php** script. The installation script will detect an existing Airtime deployment and back up any configuration files that it finds.

After the upgrade has completed, you may need to clear your web browser's cache before logging into the new version of the Airtime administration interface.

14. SETTING THE SERVER TIME

Accurate time keeping on your server is vital for optimal Airtime performance. You can confirm that the date and time of your server are set correctly with the `date` command:

```
$ date
```

The server should respond with the date, time, time zone and year in a format similar to the following example:

```
Mon Mar 7 14:59:17 GMT 2011
```

The time zone reported should match the continent and city that you set in the `php.ini` file during Airtime installation, such as `GMT` in the example above matching *Europe/London*. If not, see the section **Adjusting the server time zone** below.

Although it is possible to set the date and time of the server manually, this is not recommended because the server clock can drift over time, compromising the accuracy of your broadcast schedule. If your Airtime server is permanently connected to the Internet, you can synchronize your server to a time server with the `ntp` program. If `ntp` is not yet installed, you can enter the following command on Debian or Ubuntu:

```
$ sudo apt-get install ntp
```

Optionally, open the `ntp` configuration file in the `nano` editor to add further time server names:

```
$ sudo nano /etc/ntp.conf
```

On Ubuntu GNU/Linux, the default time server is `ntp.ubuntu.com`, but there are many other time servers available on the public Internet, including the group of servers listed at <http://www.pool.ntp.org/> for each country. Using a variety of NTP servers located closely to your Airtime server will produce the most accurate results. For example, for a server in the United Kingdom you could use the following list:

```
# You do need to talk to an NTP server or two (or three).
server ntp.ubuntu.com
server 0.uk.pool.ntp.org
server 1.uk.pool.ntp.org
server 2.uk.pool.ntp.org
server 3.uk.pool.ntp.org
```

Enter the server names you require, press `Ctrl+O` to write out the `/etc/ntp.conf` file, then `Ctrl+X` to exit `nano`. Restart the `ntp` service with:

```
$ sudo service ntp restart
```

The server should respond:

```
* Stopping NTP server ntpd [ OK ]
* Starting NTP server ntpd [ OK ]
```

Then use the `ntpq -p` command to confirm that `ntp` is working. This command should produce output similar to the following screenshot:

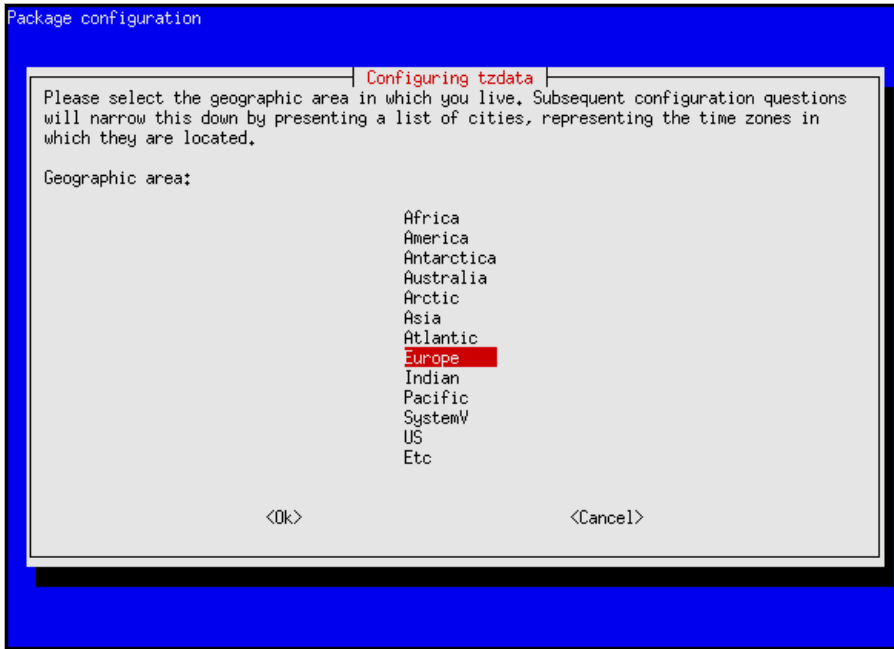
```
daniel@office:~$ ntpq -p
remote           refid           st t when poll reach  delay  offset  jitter
=====
europium.canoni 193.79.237.14   2 u 49 64 3 131.386 141.365 1.328
dnscache-slough 213.222.193.35 2 u 45 64 3 23.594 84.480 31.209
ntp2.exe-networ 195.66.241.10  2 u 45 64 3 32.222 87.153 61.082
time.xilo.net    194.35.252.7   2 u 45 64 3 24.055 86.010 19.211
mantaray.netine 249.240.53.144 2 u 46 64 3 24.754 91.331 65.929
daniel@office:~$
```

ADJUSTING THE SERVER TIME ZONE

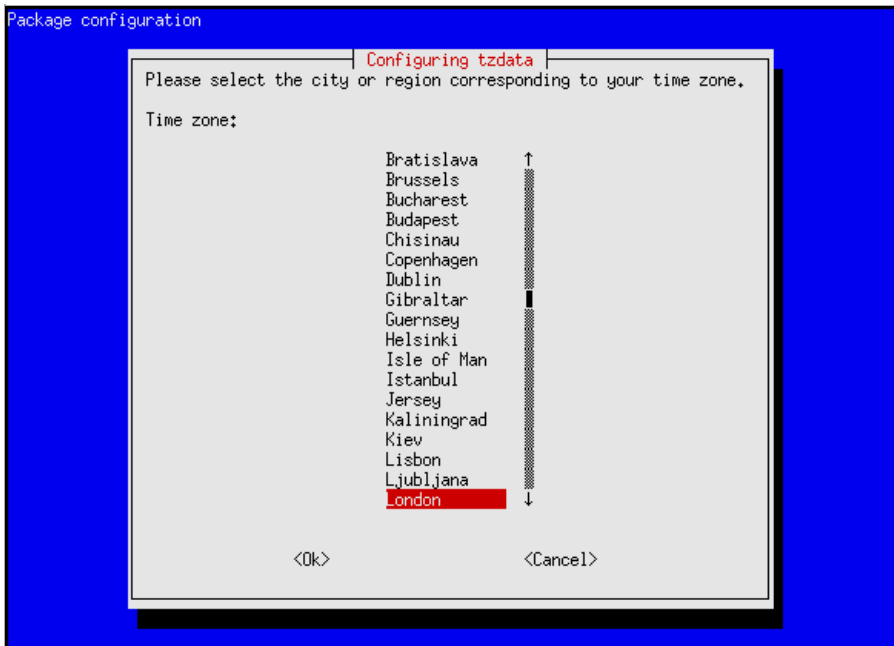
If your server is set to a different time zone than the one that you set during Airtime installation, your broadcast schedule may be played out at incorrect times. The datacenter which hosts your Airtime server could be located anywhere in the world. Some servers are set to Coordinated Universal Time or UTC (similar to Greenwich Mean Time or GMT), regardless of their location. If this is not appropriate for your station, on a Debian or Ubuntu server you can reconfigure the `tzdata` (time zone data) package with the command:

```
$ sudo dpkg-reconfigure tzdata
```

This command opens a menu in which you can select the continent that you require, by pressing the Enter key.



The next step is to select your nearest city, again by pressing the Enter key. The appropriate time zone is selected according to the information that you have entered.



The console output from the `dpkg-reconfigure tzdata` command will confirm the new setting.

```
Current default time zone: 'Europe/London'  
Local time is now:      Mon Mar  7 15:04:58 GMT 2011.  
Universal Time is now:  Mon Mar  7 15:04:58 UTC 2011.
```

15. USING THE IMPORT SCRIPT

If you have a large number of files in your media library, importing these files one at a time into a broadcast automation system would be time-consuming and tedious. That's why Airtime includes a script that can import an entire directory of files in one go.

METADATA QUALITY

The *airtime-import* script automatically imports any metadata that is in the files' ID3 tags. If these tags are incorrect or are missing information, you will have to either edit the metadata before importing them, or suffer the consequences. For example, if the tags have creator or genre metadata missing, it will be impossible to search for, playlist or schedule the media according to these criteria.

The program **Audio Tag Tool** can be useful for batch setting and editing ID3 tags before importing files into your Airtime server. On an Ubuntu desktop machine, you can install Audio Tag Tool with the command:

```
$ sudo apt-get install tagtool
```

After installation, you can run the program with the command:

```
$ tagtool
```

The *Tag Multiple Files* feature of the Audio Tag Tool program is a particularly useful time saver if you have a large archive of untagged files. Sometimes there is useful track or title information in the file name, which can be converted into an ID3 tag automatically.



COPYING VERSUS LINKING

You must specify one of two options for using the import script: Either to **copy** files into Airtime's storage server, or to **link** to files elsewhere. Each option has advantages and disadvantages, so you will have to think about how the files will be used in your station long-term.

- For files that are *copied*, you may run into problems with hard disk space if you do not remove files from the storage server periodically.
- For files that are *linked*, you must make sure that the files are actually going to be there at playout time, otherwise they will be skipped. For this reason, it is not recommended to use the link option for easily-removable storage (like MP3 players or USB memory sticks). There's a strong likelihood that the storage might be unplugged and taken away before playout time. It is also important to make sure that any external hard disk with linked files is powered on, and stays on.

The import script works from the command line, so you must first log into a console on the Airtime server. You need to specify the full file system path to the media files that you wish to import. Copying is specified by including the `-c` switch in the command:

```
$ sudo airtime-import -c /<path>/<to>/<your>/<files>
```

Linking is specified by using the `-l` switch instead:

```
$ sudo airtime-import -l /<path>/<to>/<your>/<files>
```

If the import is successful, the script will report the names of the files imported.

```
daniel@office:~$ sudo airtime-import -l /home/daniel/Music/strutsampler
=====
Airtime Import Script
=====
Importing: [00001] /home/daniel/Music/strutsampler/07 Cherchez Pas.mp3
Importing: [00002] /home/daniel/Music/strutsampler/02 Dat Soca Boat.mp3
Importing: [00003] /home/daniel/Music/strutsampler/04 Love And Death.mp3
Importing: [00004] /home/daniel/Music/strutsampler/10 Green Africa.mp3
Importing: [00005] /home/daniel/Music/strutsampler/06 Electricone.mp3
Importing: [00006] /home/daniel/Music/strutsampler/09 Wozani Mahipi.mp3
Importing: [00007] /home/daniel/Music/strutsampler/03 My Oasis.mp3
Importing: [00008] /home/daniel/Music/strutsampler/01 Love Dancing.mp3
Importing: [00009] /home/daniel/Music/strutsampler/08 Emakhaya.mp3
Importing: [00010] /home/daniel/Music/strutsampler/05 (Do The) Spanish Hus
tle (Danny Krivit Edit).mp3
Importing: [00011] /home/daniel/Music/strutsampler/1-14 Justo Betancourt -
Pa' Bravo Yo.mp3
Importing: [00012] /home/daniel/Music/strutsampler/02 Pardon.mp3
=====
*** Import mode: link
*** Files imported: 12
*** Duplicate files (not imported):
*** Total: 12 files in 4 seconds = 3.0 files/second.
=====
daniel@office:~$ █
```

If you do not have write access to the filesystem, or the files are duplicates of files that have already been imported, the script will warn you with an error message.

AUTOMATED REMOTE IMPORT OVER SFTP

The `airtime-import` script can be combined with the standard `SFTP` (secure FTP) program and `cron` daemon on a GNU/Linux server to enable automated file import from multiple remote desktop computers.

Traditional FTP servers use plain text passwords (without encryption) and are therefore not recommended for upload accounts on Airtime servers accessible from the public Internet. SFTP is a cross-platform protocol which works with many desktop programs including **gFTP** for GNU/Linux (<http://www.gftp.org/>), which can be installed on Debian or Ubuntu desktop computers with the command:

```
$ sudo apt-get install gftp
```

Other popular SFTP clients include **FileZilla** for Windows (<http://filezilla-project.org/>) and **Cyberduck** for Mac and Windows (<http://cyberduck.ch/>).

To enable SFTP uploads, first invoke the `adduser` command to create the `uploads` account on the server. For security reasons this user account is restricted to using SFTP only; it cannot be used for executing general commands in a login shell.

```
$ sudo adduser --home /srv/airtime/uploads --shell /usr/lib/sftp-server uploads
```

The server will then invite you to type in the password for the new `uploads` user, and again for confirmation. The security of your Airtime server depends on the strength of the password that you set, so be sure to use a long and complex password with upper case, lower case and numerical characters. It is not necessary to set a full name or other details for this account.

```
Adding user `uploads' ...
Adding new group `uploads' (1003) ...
Adding new user `uploads' (1002) with group `uploads' ...
Creating home directory `/srv/airtime/uploads' ...
Copying files from `/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
Changing the user information for uploads
Enter the new value, or press ENTER for the default
  Full Name []:
  Room Number []:
  Work Phone []:
  Home Phone []:
  Other []:
Is the information correct? [Y/n] Y
```

Next, create a directory to contain the incoming files:

```
$ sudo mkdir /srv/airtime/uploads/incoming/
```


Then create a script to run once per hour:

```
$ sudo nano /etc/cron.hourly/airtime-upload
```

The script should import the newly uploaded files from the incoming directory specified, using the `-c` (copy) option, and then remove the original uploaded files. This step, rather than simply using the `-l` option to link the uploaded files, ensures that the `uploads` SFTP account does not have direct write access to the Airtime storage path. That would be a security risk if the password was compromised.

```
#!/bin/sh

# Run the import script on fresh uploads

airtime-import -c /srv/airtime/uploads/incoming/

# Clean the incoming directory to save disk space

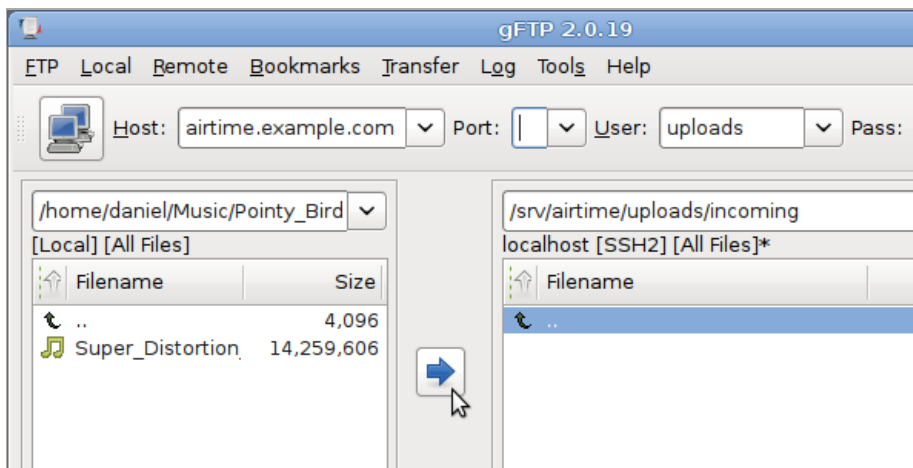
rm -r /srv/airtime/uploads/incoming/*.mp3
rm -r /srv/airtime/uploads/incoming/*.ogg
```

Finally, the script should be made executable so that the cron daemon can run it.

```
$ sudo chmod +x /etc/cron.hourly/airtime-upload
```

By default, Debian and Ubuntu GNU/Linux run `cron.hourly` tasks at 17 minutes past each hour. This value can be adjusted in the file `/etc/crontab` on the server, if required.

Remote users should connect to the Airtime server using their client software of choice, making sure that they specify an SFTP rather than FTP connection. The remote directory for the clients to use would be `/srv/airtime/uploads/incoming/` as configured above.



16. BACKING UP THE SERVER

The following shell commands can be used for database backup and restore on a running PostgreSQL server in an Airtime system.

You can dump the entire database to a zipped file with the combination of the **pg_dumpall** command and **gzip**. The **pg_dumpall** command is executed as the user *postgres*, by using the **sudo** command and the **-u** switch. It is separated from the **gzip** command with the pipe symbol.

```
$ sudo -u postgres pg_dumpall | gzip -c > airtime-backup.gz
```

This command can be automated to run on a regular basis using the standard **cron** tool on your server.

When restoring a production database on a cleanly installed Airtime system, it may be necessary to drop the empty database that was created during the new installation, by using the **dropdb** command. Again, this command is executed with **sudo** as the user *postgres*:

```
$ sudo -u postgres dropdb airtime
```

This **dropdb** command above is necessary to avoid 'already exists' errors on table creation when overwriting an empty Airtime database in the next step. These errors might prevent some data from being restored, such as user account data.

To restore, first unzip the backup file with **gunzip**, then use the **psql** command as the *postgres* user:

```
$ gunzip airtime-backup.gz
$ sudo -u postgres psql -f airtime-backup postgres
```

You should now be able to log in to the Airtime web interface in the usual way.

For safety reasons, your regular database backups should be kept in a directory which is backed up by your storage backup tool of choice; for example, the */srv/airtime/database_backups* directory. This should ensure that a storage restore can be made along with a matching and complete version of the Airtime database from the day that the storage backup was made.

STORAGE BACKUP

Backing up the Airtime database with **pg_dumpall** will not back up the Airtime media storage server, which is likely to need a great deal more backup space. Creating a compressed file from hundreds of gigabytes of storage server contents is likely to take a very long time, and may have little benefit for the amount of CPU power used, if the media files are already stored in a highly compressed format. It is also impractical to copy very large backup files across the network on a daily basis.

Instead, it is preferable to use an incremental backup technique to synchronise the production Airtime server storage with a backup server each day or night. If the backup server also contains an Airtime installation, it should be possible to switch payout to this second machine relatively quickly, in case of a hardware failure or other emergency on the production server.

A standard incremental backup tool on GNU/Linux servers is *rsync* (<http://rsync.samba.org/>) which can be installed using the package manager of your GNU/Linux distribution. However, incremental backup alone cannot help in the scenario where a file which later proves to be important has been deleted by an administrator. For backups that can be rolled back to restore from an earlier date than the current backup, the tool *rdiff-backup* (<http://www.nongnu.org/rdiff-backup/>) can be deployed.

17. EXPORTING THE SCHEDULE

Airtime has a feature which enables your station's weekly schedule and current show information to be displayed on remote websites. This feature is included in Airtime because you would not usually invite the general public to access your Airtime server directly. If you had very large numbers of people requesting data from the Airtime server at once, the burst of network traffic might overload the server, potentially disrupting your broadcasts. If carried out maliciously, this network overload is known as a *denial of service attack*.

Instead, your public-facing web server can retrieve the schedule information from Airtime. This information can then be displayed on your broadcast station or affiliate websites by a content management system, such as Sourcefabric's **Newscoop** (<http://newscoop.sourcefabric.org>).

There are two kinds of information that can be retrieved remotely from Airtime; the metadata for the current 'live' show plus the following show, or the schedule for the current week. This metadata includes show names, times, descriptions and individual show URLs on your public website. That way, the audience for your station can click through from the schedule information to find out more about a particular show, or download a previous show recording that you have made available.

If your Airtime server was accessible at <http://radio.example.com> the live show information could be retrieved by your web server using this URL:

```
http://radio.example.com/api/live-info/?callback
```

The comma-separated text metadata returned to your web server might be something like this:

```
{
  "env":"development",
  "schedulerTime":"2011-05-09 15:01:18",
  "currentShow":[{"start_timestamp":"2011-05-09 16:00:00",
  "end_timestamp":"2011-05-09 17:00:00",
  "name":"Funk Show",
  "id":"8",
  "instance_id":"8",
  "record":"0",
  "url":"http://funk.example.com/"}],
  "nextShow":[{"id":"9","starts":"2011-05-09 17:00:00",
  "ends":"2011-05-09 18:00:00",
  "show_id":"9",
  "record":"0",
  "rebroadcast":"0",
  "instance_id":null,
  "file_id":null,
  "soundcloud_id":null,
  "time_filled":null,
  "name":"Dance show",
  "url":"http://dance.example.com",
  "genre":"Dance",
  "description":"Techno, techno, techno, techno!",
  "color":"000000",
  "background_color":"ffea00",
  "start_timestamp":"2011-05-09 17:00:00",
  "end_timestamp":"2011-05-09 18:00:00"}],
  "timezone":"BST",
  "timezoneOffset":"3600"
}
```

The information for the current week's schedule could be retrieved using the URL:

```
http://radio.example.com/api/week-info/?callback
```

In this case, the metadata returned would be in a different format from the above example, something like the following. To keep the example short, this particular schedule export only contains four shows on a Monday. A full weekly schedule export would contain a great deal more text.

```
{
  "sunday":[],
  "monday":[
    {"show_starts":"2011-05-09 14:25:00",
    "show_ends":"2011-05-09 14:35:00",
    "show_name":"Elvis Show",
    "url":"http://elvis.example.com/"},
    {"show_starts":"2011-05-09 14:50:00",
    "show_ends":"2011-05-09 14:55:00",
    "show_name":"News",
    "url":"http://news.example.com/"},
    {"show_starts":"2011-05-09 16:00:00",
    "show_ends":"2011-05-09 17:00:00",
    "show_name":"Funk Show",
    "url":"http://funk.example.com/"},
    {"show_starts":"2011-05-09 17:00:00",
    "show_ends":"2011-05-09 18:00:00",
    "show_name":"Dance show",
    "url":"http://dance.example.com"}
  ],
}
```

```
"tuesday": [],
"wednesday": [],
"thursday": [],
"friday": [],
"saturday": []
})
```

NEWSCOOP INTEGRATION

Your system administrator can integrate Airtime with a Newscoop site, with the following steps:

1. Create a cron job for a bash script that polls the Airtime server every minute, and writes the metadata returned into a pair of temporary files:

```
#!/bin/sh
curl -s "http://radio.example.com/api/live-info/?callback=***" > /tmp/live-info
curl -s "http://radio.example.com/api/week-info/?callback=***" > /tmp/week-info
```

2. In the Newscoop site's root folder, create the folders *apilive-info/* and *apiweek-info/*

3. Create an index.php file in the *apilive-info/* folder, containing the following code:

```
<?php
$filename = '/tmp/live-info'; // define here the path and name of uploaded live-info file

header('Content-Type: text/javascript');
header("Expires: Thu, 01 Jan 1970 00:00:00 GMT");
header("Cache-Control: no-store, no-cache, must-revalidate");

$callback = empty($_GET['callback']) ? null : $_GET['callback'];
$content = file_get_contents($filename);
$content = str_replace('***', $callback, $content);
echo $content;
?>
```

4. Create an index.php file in the *apiweek-info/* folder, containing the following code:

```
<?php
$filename = '/tmp/week-info'; // define here the path and name of uploaded week-info file

header('Content-Type: text/javascript');
header("Expires: Thu, 01 Jan 1970 00:00:00 GMT");
header("Cache-Control: no-store, no-cache, must-revalidate");

$callback = empty($_GET['callback']) ? null : $_GET['callback'];
$content = file_get_contents($filename);
$content = str_replace('***', $callback, $content);
echo $content;
?>
```

NEWSCOOP WIDGETS

This is the code for a small widget that displays information about the current show (show time elapsed, and show time remaining), as well as some information about the next show (start time and end time).

```
<script>
$(document).ready(function() {
    $("#headerLiveHolder").airtimeLiveInfo({
        sourceDomain: "http://newscoop.example.com/",
        text: {onAirToday: "On air today"},
        updatePeriod: 20 //seconds
    });
});
</script>
```

On a Newscoop site, this widget can be styled with CSS to look like the following screenshot:



The next widget is medium sized, and displays the upcoming show schedule for that day.

```
<script>
$(document).ready(function() {
    $("#onAirToday").airtimeShowSchedule({
        sourceDomain: "http://newscoop.example.com/",
        text: {onAirNow: "On Air Now", offline: "Offline", current: "Current", next: "Next"},
        updatePeriod: 5 //seconds
    });
});
</script>
```

The widget code above can be styled to look like this screenshot:

| On air today | |
|---------------|-----------------------|
| 16:00 - 16:30 | Newslink |
| 16:30 - 17:00 | Pages of History (EN) |
| 17:00 - 17:30 | L'Info Chez-Vous |
| 17:30 - 04:00 | Pages d'histoire |
| 18:30 - 19:00 | Choices (EN) |
| 19:00 - 19:30 | L'Info chez vous (FR) |

Finally, the following code creates a large, bi-lingual widget that enables site visitors to browse through the show schedule for that week:

```
<script>
  $(document).ready(function() {
    $("#scheduleTabs").airtimeWeekSchedule({
      sourceDomain:"http://newscoop.example.com/",
      dowText:{monday:"Lundi", tuesday:"Mardi", wednesday:"Mercredi", thursday:"Jeudi", friday:"Vendredi", saturday:"Samedi", sunday:"Dimanche"},
      miscText:{time:"Temps", programName:"Nom du Programme", details:"Détails", readMore:"Lire La Suite"},
      updatePeriod: 600 //seconds
    });
  });
</script>
```

In Newscoop, using the code above, the first six hours of the schedule each day can be styled to look like this:

| Lundi | Mardi | Mercredi | Jeudi | Vendredi | Samedi | Dimanche | |
|---------------|-------|------------------------------|-------|----------|--------|---------------|--|
| TEMPS | | NOM DU PROGRAMME | | | | DÉTAILS | |
| 00:00 - 00:30 | | Newslink (EN) | | | | LIRE LA SUITE | |
| 00:30 - 00:45 | | The Citizen (EN) | | | | LIRE LA SUITE | |
| 01:00 - 01:30 | | L'Info chez-vous | | | | LIRE LA SUITE | |
| 02:00 - 02:30 | | Music From Countries - Promo | | | | LIRE LA SUITE | |
| 02:30 - 03:00 | | Music From Countries - Promo | | | | LIRE LA SUITE | |
| 03:00 - 03:30 | | Newslink | | | | | |
| 04:00 - 04:30 | | L'info chez-vous (FR) | | | | LIRE LA SUITE | |
| 04:30 - 05:00 | | Fifty Fifty (FR) | | | | LIRE LA SUITE | |
| 05:00 - 05:30 | | Music From Countries - Promo | | | | LIRE LA SUITE | |
| 05:30 - 06:00 | | Music From Countries - Promo | | | | LIRE LA SUITE | |

The value of **sourceDomain** in the code examples above should match the URL that you wish to serve schedule information to the public from. If you have used the *Newscoop integration* method detailed above, this would be the URL of your Newscoop server, which is providing a cache of the schedule information retrieved from the Airtime server.

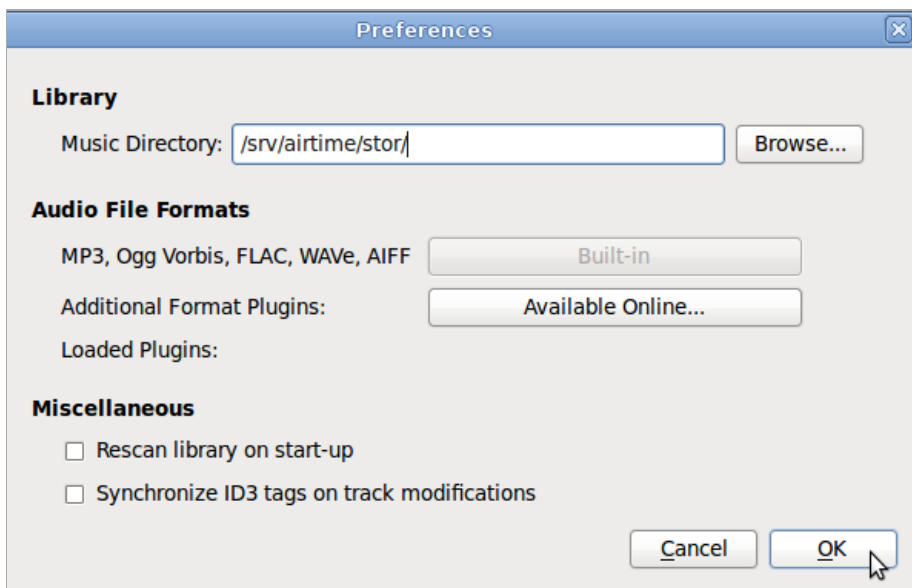
18. INTEGRATION WITH MIXXX

Mixxx is a cross-platform Open Source application for DJs, available from <http://www.mixxx.org/>

Installed on a desktop or laptop computer, Mixxx complements your Airtime server to provide a complete system for both live and scheduled broadcasting. Although Mixxx has many features designed for dance music DJs that require beat matching and pitch independent time stretching, the program can be used for any kind of manually triggered broadcast playout, including live speech shows such as news or current affairs.

Mixxx supports a wide variety of popular hardware control surfaces, which can be connected to your computer using a USB cable. A control surface might replace or augment an analogue mixer in your studio, depending on your live mixing and playout requirements.

If you make the Airtime server's storage directory `/srv/airtime/stor/` accessible to a desktop machine as a read-only location, Mixxx will accept that location as its default music library when starting up for the first time. (This location can also be configured after installation by clicking Options, then Preferences, then Library in the main Mixxx menu).



You may need to adjust file and directory permissions so that the storage directory has read access from the desktop user account. Enabling write access directly to the storage server is not recommended, as this would allow desktop users to delete files which might be needed for playout later.

If the filesystem path has been configured correctly, the metadata for the files in the Airtime storage server will be displayed in the main window of the Mixxx interface. Individual files from the Airtime storage server can then be added to either of Mixxx's live players with a right-click on the filename, or by using the appropriate hardware buttons on a control surface. Therefore it is possible to manage the station's storage archive remotely and collaboratively through Airtime, while using Mixxx as the live playout client in multiple, remote studios.

| Search... | Artist | Title | Duration | |
|-----------|----------------------------------|----------------|----------|---------------|
| Library | Orchestre Poly-Rhythmo | Pardon | 4:06 | /srv/airtime/ |
| Auto DJ | The Heshoo Beshoo Group | Cherchez Pas | 5:55 | /srv/airtime/ |
| Playlists | Ebo Taylor | Love And Death | 6:55 | /srv/airtime/ |
| Crates | Lloyd Miller & The Heliocentrics | Electricone | 3:39 | /srv/airtime/ |
| Browse | Ebo Taylor | Peace On Earth | 7:44 | /srv/airtime/ |
| Analyze | Madleen Kane | Emakhaya | 7:18 | /srv/airtime/ |
| Rhythmbox | Arthur's Landing | Love Dancing | 6:01 | /srv/airtime/ |
| | The Countach | My Oasis | 5:00 | /srv/airtime/ |
| | Mighty Shadow | Dat Soca Boat | 4:50 | /srv/airtime/ |
| | Mulatu Astatke | Green Africa | 5:14 | /srv/airtime/ |
| | The Mahotella Queens | Wozani Mahipi | 2:24 | /srv/airtime/ |

The Airtime storage archive can be exported like any other file server share. The method that you implement would depend on the operating system of your desktop client machines, and whether they were on the same local network as the Airtime server, or remote. For performance and redundancy reasons it is advisable to cache files required for a particular show on the client machine where Mixxx is installed. For example, for a GNU/Linux client machine, a nightly `rsync` download of new media in the archive would guard against network problems at playout time potentially disrupting a broadcast at a remote studio.

Mixxx users can also record a show, encode it, and then upload it through the Airtime web interface on a local or remote server for collaborative or user-generated broadcasts.

APPENDIX

19. EXPERT INSTALL

20. TIME ZONES

21. ABOUT THIS MANUAL

19. EXPERT INSTALL

These quick install steps are suitable for experienced GNU/Linux system administrators. For a more detailed explanation, please read the chapter *Automated installation* in this book.

1. Edit the repositories file for your server:

```
$ sudo nano /etc/apt/sources.list
```

For Ubuntu Lucid servers, use the Sourcefabric repository:

```
deb http://apt.sourcefabric.org/ lucid main
```

and enable the multiverse repository if you need MP3 encoding support:

```
deb http://archive.ubuntu.com/ubuntu/ lucid multiverse
```

For Debian Squeeze servers, use the Sourcefabric repository:

```
deb http://apt.sourcefabric.org/ squeeze main
```

and enable the Debian Multimedia repository if you need MP3 encoding support:

```
deb http://www.debian-multimedia.org squeeze main non-free
```

2. Install the Sourcefabric package signing key:

```
$ sudo apt-get update  
$ sudo apt-get install sourcefabric-keyring
```

3. Install the database management system:

```
$ sudo apt-get install postgresql
```

4. Install the streaming media server (optional):

```
$ sudo apt-get install icecast2
```

5. Remove PulseAudio:

```
$ sudo apt-get purge pulseaudio
```

6. Install Airtime:

```
$ sudo apt-get install airtime
```

Refer to the *Automated installation* chapter for configuration options. Finally, reboot the server.

20. TIME ZONES

Use the appropriate time zone value from the list below in the *php.ini* file on your Airtime server.

AFRICA

Africa/Abidjan, Africa/Accra, Africa/Addis_Ababa, Africa/Algiers, Africa/Asmara, Africa/Asmera, Africa/Bamako, Africa/Bangui, Africa/Banjul, Africa/Bissau, Africa/Blantyre, Africa/Brazzaville, Africa/Bujumbura, Africa/Cairo, Africa/Casablanca, Africa/Ceuta, Africa/Conakry, Africa/Dakar, Africa/Dar_es_Salaam, Africa/Djibouti, Africa/Douala, Africa/El_Aaiun, Africa/Freetown, Africa/Gaborone, Africa/Harare, Africa/Johannesburg, Africa/Kampala, Africa/Khartoum, Africa/Kigali, Africa/Kinshasa, Africa/Lagos, Africa/Libreville, Africa/Lome, Africa/Luanda, Africa/Lubumbashi, Africa/Lusaka, Africa/Malabo, Africa/Maputo, Africa/Maseru, Africa/Mbabane, Africa/Mogadishu, Africa/Monrovia, Africa/Nairobi, Africa/Ndjamena, Africa/Niamey, Africa/Nouakchott, Africa/Ouagadougou, Africa/Porto-Novo, Africa/Sao_Tome, Africa/Timbuktu, Africa/Tripoli, Africa/Tunis, Africa/Windhoek

AMERICA

America/Adak, America/Anchorage, America/Anguilla, America/Antigua, America/Araguaina, America/Argentina/Buenos_Aires, America/Argentina/Catamarca, America/Argentina/ComodRivadavia, America/Argentina/Cordoba, America/Argentina/Jujuy, America/Argentina/La_Rioja, America/Argentina/Mendoza, America/Argentina/Rio_Gallegos, America/Argentina/Salta, America/Argentina/San_Juan, America/Argentina/San_Luis, America/Argentina/Tucuman, America/Argentina/Ushuaia, America/Aruba, America/Asuncion, America/Atikokan, America/Atka, America/Bahia, America/Bahia_Banderas, America/Barbados, America/Belem, America/Belize, America/Blanc-Sablon, America/Boa_Vista, America/Bogota, America/Boise, America/Buenos_Aires, America/Cambridge_Bay, America/Campo_Grande, America/Cancun, America/Caracas, America/Catamarca, America/Cayenne, America/Cayman, America/Chicago, America/Chihuahua, America/Coral_Harbour, America/Cordoba, America/Costa_Rica, America/Cuiaba, America/Curacao, America/Danmarkshavn, America/Dawson, America/Dawson_Creek, America/Denver, America/Detroit, America/Dominica, America/Edmonton, America/Eirunepe, America/El_Salvador, America/Ensenada, America/Fort_Wayne, America/Fortaleza, America/Glace_Bay, America/Godthab, America/Goose_Bay, America/Grand_Turk, America/Grenada, America/Guadeloupe, America/Guatemala, America/Guayaquil, America/Guyana, America/Halifax, America/Havana, America/Hermosillo, America/Indiana/Indianapolis, America/Indiana/Knox, America/Indiana/Marengo, America/Indiana/Petersburg, America/Indiana/Tell_City, America/Indiana/Vevay, America/Indiana/Vincennes, America/Indiana/Winamac, America/Indianapolis, America/Inuvik, America/Iqaluit, America/Jamaica, America/Jujuy, America/Juneau, America/Kentucky/Louisville, America/Kentucky/Monticello, America/Knox_IN, America/La_Paz, America/Lima, America/Los_Angeles, America/Louisville, America/Maceio, America/Managua, America/Manaus, America/Marigot, America/Martinique, America/Matamoros, America/Mazatlan, America/Mendoza, America/Menominee, America/Merida, America/Mexico_City, America/Miquelon, America/Moncton, America/Monterrey, America/Montevideo, America/Montreal, America/Montserrat, America/Nassau, America/New_York, America/Nipigon, America/Nome, America/Noronha, America/North_Dakota/Beulah, America/North_Dakota/Center, America/North_Dakota/New_Salem, America/Ojinaga, America/Panama, America/Pangnirtung, America/Paramaribo, America/Phoenix, America/Port-au-Prince, America/Port_of_Spain, America/Porto_Acre, America/Porto_Velho, America/Puerto_Rico, America/Rainy_River, America/Rankin_Inlet, America/Recife, America/Regina, America/Resolute, America/Rio_Branco, America/Rosario, America/Santa_Isabel, America/Santarem, America/Santiago, America/Santo_Domingo, America/Sao_Paulo, America/Scoresbysund, America/Shiprock, America/St_Barthelemy, America/St_Johns, America/St_Kitts, America/St_Lucia, America/St_Thomas, America/St_Vincent, America/Swift_Current, America/Tegucigalpa, America/Thule, America/Thunder_Bay, America/Tijuana, America/Toronto, America/Tortola, America/Vancouver, America/Virgin, America/Whitehorse, America/Winnipeg, America/Yakutat, America/Yellowknife

ANTARCTICA

Antarctica/Casey, Antarctica/Davis, Antarctica/DumontDUrville, Antarctica/Macquarie, Antarctica/Mawson, Antarctica/McMurdo, Antarctica/Palmer, Antarctica/Rothera, Antarctica/South_Pole, Antarctica/Syowa, Antarctica/Vostok

ARCTIC

Arctic/Longyearbyen

ASIA

Asia/Aden, Asia/Almaty, Asia/Amman, Asia/Anadyr, Asia/Aqtau, Asia/Aqtobe, Asia/Ashgabat, Asia/Ashkhabad, Asia/Baghdad, Asia/Bahrain, Asia/Baku, Asia/Bangkok, Asia/Beirut, Asia/Bishkek, Asia/Brunei, Asia/Calcutta, Asia/Choibalsan, Asia/Chongqing, Asia/Chungking, Asia/Colombo, Asia/Dacca, Asia/Damascus, Asia/Dhaka, Asia/Dili, Asia/Dubai, Asia/Dushanbe, Asia/Gaza, Asia/Harbin, Asia/Ho_Chi_Minh, Asia/Hong_Kong, Asia/Hovd, Asia/Irkutsk, Asia/Istanbul, Asia/Jakarta, Asia/Jayapura, Asia/Jerusalem, Asia/Kabul, Asia/Kamchatka, Asia/Karachi, Asia/Kashgar, Asia/Kathmandu, Asia/Katmandu, Asia/Kolkata, Asia/Krasnoyarsk, Asia/Kuala_Lumpur, Asia/Kuching, Asia/Kuwait, Asia/Macao, Asia/Macau, Asia/Magadan, Asia/Makassar, Asia/Manila, Asia/Muscat, Asia/Nicosia, Asia/Novokuznetsk, Asia/Novosibirsk, Asia/Omsk, Asia/Oral, Asia/Phnom_Penh, Asia/Pontianak, Asia/Pyongyang, Asia/Qatar, Asia/Qyzylorda, Asia/Rangoon, Asia/Riyadh, Asia/Saigon, Asia/Sakhalin, Asia/Samarkand, Asia/Seoul, Asia/Shanghai, Asia/Singapore, Asia/Taipei, Asia/Tashkent, Asia/Tbilisi, Asia/Tehran, Asia/Tel_Aviv, Asia/Thimbu, Asia/Thimphu, Asia/Tokyo, Asia/Ujung_Pandang, Asia/Ulaanbaatar, Asia/Ulan_Bator, Asia/Urumqi, Asia/Vientiane, Asia/Vladivostok, Asia/Yakutsk, Asia/Yekaterinburg, Asia/Yerevan

ATLANTIC OCEAN

Atlantic/Azores, Atlantic/Bermuda, Atlantic/Canary, Atlantic/Cape_Verde, Atlantic/Faeroe, Atlantic/Faroe, Atlantic/Jan_Mayen, Atlantic/Madeira, Atlantic/Reykjavik, Atlantic/South_Georgia, Atlantic/St_Helena, Atlantic/Stanley

AUSTRALIA

Australia/ACT, Australia/Adelaide, Australia/Brisbane, Australia/Broken_Hill, Australia/Canberra, Australia/Currie, Australia/Darwin, Australia/Eucla, Australia/Hobart, Australia/LHI, Australia/Lindeman, Australia/Lord_Howe, Australia/Melbourne, Australia/North, Australia/NSW, Australia/Perth, Australia/Queensland, Australia/South, Australia/Sydney, Australia/Tasmania, Australia/Victoria, Australia/West, Australia/Yancowinna

EUROPE

Europe/Amsterdam, Europe/Andorra, Europe/Athens, Europe/Belfast, Europe/Belgrade, Europe/Berlin, Europe/Bratislava, Europe/Brussels, Europe/Bucharest, Europe/Budapest, Europe/Chisinau, Europe/Copenhagen, Europe/Dublin, Europe/Gibraltar, Europe/Guernsey, Europe/Helsinki, Europe/Isle_of_Man, Europe/Istanbul, Europe/Jersey, Europe/Kaliningrad, Europe/Kiev, Europe/Lisbon, Europe/Ljubljana, Europe/London, Europe/Luxembourg, Europe/Madrid, Europe/Malta, Europe/Mariehamn, Europe/Minsk, Europe/Monaco, Europe/Moscow, Europe/Nicosia, Europe/Oslo, Europe/Paris, Europe/Podgorica, Europe/Prague, Europe/Riga, Europe/Rome, Europe/Samara, Europe/San_Marino, Europe/Sarajevo, Europe/Simferopol, Europe/Skopje, Europe/Sofia, Europe/Stockholm, Europe/Tallinn, Europe/Tirane, Europe/Tiraspol, Europe/Uzhgorod, Europe/Vaduz, Europe/Vatican, Europe/Vienna, Europe/Vilnius, Europe/Volgograd, Europe/Warsaw, Europe/Zagreb, Europe/Zaporozhye, Europe/Zurich

INDIAN OCEAN

Indian/Antananarivo, Indian/Chagos, Indian/Christmas, Indian/Cocos, Indian/Comoro, Indian/Kerguelen, Indian/Mahe, Indian/Maldives, Indian/Mauritius, Indian/Mayotte, Indian/Reunion

PACIFIC OCEAN

Pacific/Apia, Pacific/Auckland, Pacific/Chatham, Pacific/Chuuk, Pacific/Easter, Pacific/Efate, Pacific/Enderbury, Pacific/Fakaofu, Pacific/Fiji, Pacific/Funafuti, Pacific/Galapagos, Pacific/Gambier, Pacific/Guadalupe, Pacific/Guam, Pacific/Honolulu, Pacific/Johnston, Pacific/Kiritimati, Pacific/Kosrae, Pacific/Kwajalein, Pacific/Majuro, Pacific/Marquesas, Pacific/Midway, Pacific/Nauru, Pacific/Niue, Pacific/Norfolk, Pacific/Noumea, Pacific/Pago_Pago, Pacific/Palau, Pacific/Pitcairn, Pacific/Pohnpei, Pacific/Ponape, Pacific/Port_Moresby, Pacific/Rarotonga, Pacific/Saipan, Pacific/Samoa, Pacific/Tahiti, Pacific/Tarawa, Pacific/Tongatapu, Pacific/Truk, Pacific/Wake, Pacific/Wallis, Pacific/Yap

21. ABOUT THIS MANUAL

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