

Building your own video server

ATTIC TV

Marquis, photocase.com

We'll show you how to build your own Linux-based video server that records, stores, and distributes TV programs.

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Video cassettes are becoming a thing of the past as movie buffs move to DVDs or hard disk recorders. Even these recent technologies pose space and convenience issues, so a do-it-yourself video server offers a handy alternative. Using the MythTV media center software, a TV card, and a decommissioned PC, you can quickly build a video server that serves up digital video in your home.

Tinkering Time

Figure 1 shows you how this setup works. The system is based on a standard Linux PC, which will become a digital video recorder under the aegis of MythTV. The software uses the internal TV card to scan TV channels and store them on the internal hard disk. In contrast to hard disk recorders, the hard disk capacity is almost unlimited; if you

start running out of space, you can add a disk or replace an existing one with a bigger model.

Simply plug your server into your home network and move it somewhere out of the way – your attic, for example – where it will serve video and TV material to a tiny media center PC in your living room.

The mini-PC runs the MythTV front end, which has a connection to your server that lets you search your video archive or access the electronic program guide to decide which shows your server should record.

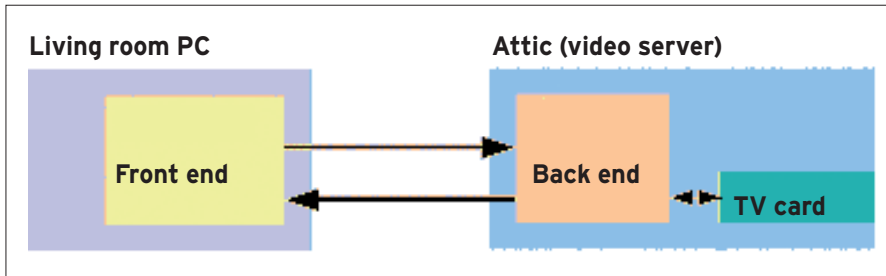


Figure 1: The MythTV back end runs on the video server in the attic while the front end distributes content to a PC in the living room.

Before starting, I'll look at the hardware requirements.

Into the Attic

If you have access to digital TV, the reception device simply needs to grab the TV stream and dump it onto disk, keeping the video server hardware requirements so low that typically a three-year-old computer will be fine. To receive the TV program, you need a TV card that matches your connection. Currently, aerial (DVB-T), cable (DVB-C), and satellite (DVB-S) are your options.

Before heading to your nearest electronics store, check out the Linux TV [1] website. The DVB wiki gives you a database of TV cards with Linux support. Launching the Kaffeine media player (or an equivalent tool on your Linux system) to find out whether your card really works is a good idea. If you don't see a picture, or if your version's menu lacks a *Digital TV* option, check your *dmesg* output. Many TV cards ask you for a firmware file, which you will need to download off the Internet and copy to the correct directory (typically */lib/firmware*). If you need help, try the wiki at *Linuxtv.org*.

Gangway!

In Europe, data transmissions use the DVB (Digital Video Broadcast) standard; that is, videos are streamed over the air in the same format that DVDs use. This means that TV cards will produce a high-bandwidth, continuous data stream, which stresses the CPU and means you need disks capable of writing the data quickly. Currently, North America is transitioning from the NTSC for-

mat to the newer ATSC standard. In any case, make sure your disk can keep up with the throughput.

After you start recording digital video, the volume of data on your disk will rapidly expand. Storing videos on a second hard disk that you can easily replace with a larger model is a good idea. You need enough free space and a file system that will accept the burden without complaining. According to Microsoft, FAT32 will quit at about 4GB, and this also applies to versions 3 and 4 of ReiserFS. Thus, the MythTV document recommends you choose XFS or JFS, although an ext3 disk also will work.

MythTV

After your video server hardware is working, you can install the media cen-

ter software. Although installation takes some effort, the list of steps is reasonable, and any major distribution includes MythTV or lets you download it from a repository.

On openSUSE 10.3, you will need to enable the Packman repository in YaST below *Software | Community Repositories*. Then change to *Software management* and install version 0.20.2 of the *mythtv-backend*, *mythtv-setup*, and *mythtv-frontend* packages. Adding an external repository isn't necessary on Ubuntu 7.10 "Gutsy Gibbon." To add version 0.20.2 of the packages, just run Synaptic or Adept.

If you must build the software, grab the MythTV source code from the project website [2]. If you think the installation is too complicated, try one of the special Live distributions, such as KnoppMyth [3] or Mythbuntu [4].

Split Personality

MythTV is made up of two parts: The front end provides a graphical user interface and runs in your living room, and the back end does all the hard work and resides on the server. The back end stores information you pass to it – such as the time to start a recording – in a MySQL database. Before launching

Building

To compile MythTV, you will need the following libraries and tools: *g++* and *make*, *Qt* (including developer packages and tools; openSUSE calls this package *qt3-devel*), FreeType 2, the Lame MP3 encoder, and the complete MySQL database.

If your TV card ran out of the box without external drivers, you now need to install the Linux kernel sources; if not, you also need to unpack the archive with the external drivers. On openSUSE, you also need to add */usr/lib/qt3/bin* to your *\$PATH* environmental variable;

```
export PATH=$PATH:/usr/lib/qt3/bin
```

If you want to, you can then install XMLTV, a tool that gives you a full-fledged electronic program guide (EPG) that retrieves the necessary data from the Internet. To start the build, unpack the MythTV source code and issue the following commands:

```
$ ./configure --enable-dvb
--dvb-path=/usr/src/linux/include
```

```
$ qmake mythtv.pro
$ make
$ sudo make install
```

If you will be using an external driver for your TV card, search the driver source code for a *frontend.h* file. Now things start getting complicated and you need to change directories (*frontend.h* is stored in *linux/dvb*). Determine the absolute path from the root directory (*/*) to your current working directory and use this path in the previous commands instead of */usr/src/linux/include* (i.e., you need the complete path to *linux/dvb/frontend.h*).

If an error relating to the *dca.h* file occurs while building the program, you will need to install the *libdca* library (*libdts*) and matching developer libraries (*-dev* or *-devel*) [5].

After installing MythTV, Ubuntu users need to add a line for */usr/local/lib* to their */etc/ld.so.conf* files.

Check Local Statutes

Before taping TV broadcasts, check the laws in your country.



Figure 2: The setup program main menu - work through the menu items from the top down. The Tab and arrow keys navigate between fields, and pressing Esc returns you to the main menu. Pressing the space bar selects highlighted options.

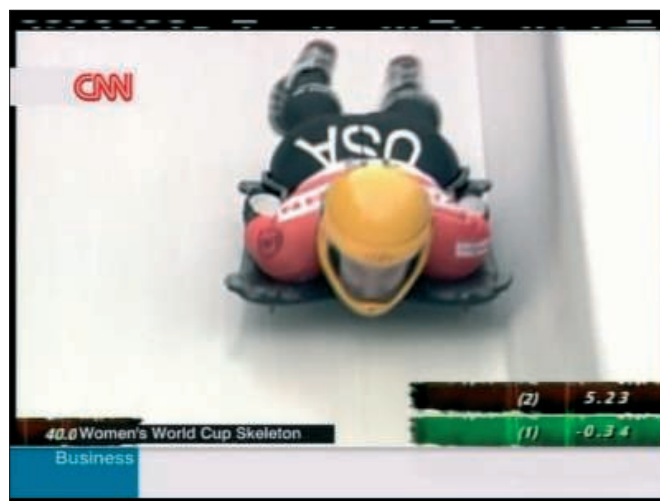


Figure 3: In this dialog, the "IP address for" setting is critical. If you have an entry of 127.0.0.1, as shown here, the front end on the PC in your living room will be unable to access the back-end machine in your attic.

MythTV, you must have the database running in the background.

How to launch the database depends on your distribution. On openSUSE 10.3, become *root* and issue the *rcmysql* command; on Ubuntu, you can *sudo /etc/init.d/mysql restart*. Setting up MySQL on your server automatically to launch when you boot your computer makes sense. If your distribution does not already do this for you (Ubuntu does), use your distribution's system tools to change the settings.

Now MySQL is happily running in the background, but you don't have a database for MythTV. To create the database for the MythTV back end, type *mysql -u root < mc.sql*. The *mc.sql* file is located

in the *database* subdirectory below the MythTV source code archive.

If you install the packetized version on Ubuntu, a wizard helps you set up the database. In the process, make note of the password you see for accessing the database on the back end; if you forget to write it down, you can find the password in the */etc/mythtv/mysql.txt* file.

Basic Settings

Launching *mythtv-setup* on the video server to prepare the back end for access by the MythTV front end is next. From the top, work your way down the configuration menu (Figure 2) and modify your settings. Pressing the Tab and arrow keys navigates between fields, and

pressing Esc gets you back into the main menu. Pressing the left- and right-arrow keys changes the values in a list, and the space bar selects the highlighted button.

First, check in *General* to see whether the IP address for *IP address for* matches your server's address (Figure 3). The default 127.0.0.1 refers to the client itself, an option for running the MythTV back end on the local machine.

Below this setting are a couple of TCP ports that the back end and front end use to communicate. If you use a firewall, you will need to open a couple of holes to match these settings.

Clicking *Next* moves you to a text box in which you can enter the directory where MythTV will store your record-



Figure 4: Immediately after we set the "Card types," the DVB-T USB stick plugged into the machine was detected. In this case, no other settings were needed.

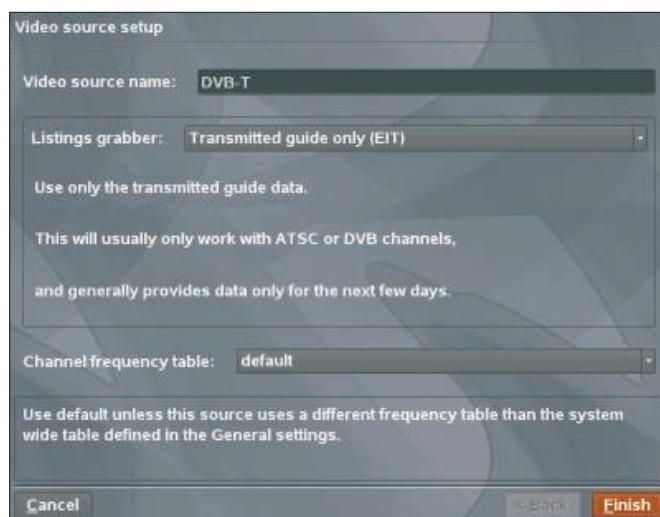


Figure 5: Specify how MythTV retrieves information below Listings grabber. Correct settings for the Video source tell MythTV to glean the electronic program information from the channel stream.



Figure 6: Input connection between the "DVB-T" video source and the TV card.

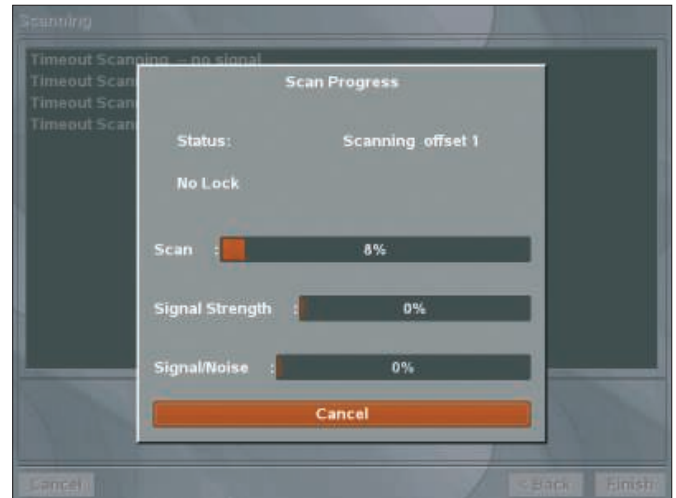


Figure 7: The channel scan occasionally made me worry that MythTV had crashed.

ings. Of course, this directory will be on the hard disk in your server machine. Then set the *TV norm*, *video text norm*, and transmission frequency settings for your region.

Next on the list are the *TV cards*. Start by setting up a (*New capture card*). In the next dialog, select *DVB DTV TV Card (v3.x)* below *Card type* (Figure 4). MythTV will show you the name of the chip set for the card below *Frontend ID*. You will need to check the *DiSEqC* settings for DVB-S cards.

After pressing *Finish*, you are taken back to the list of TV cards where you can set up another card, if you have one; this is useful if you would like the option of watching one channel while recording another. With only a few exceptions, any TV card will give you one channel at a

time, and you have virtually no alternative to this approach. Make sure that you use a different *Card ID* for the two receivers. Pressing *Esc* returns you to the main menu.

Program Guide

The next item, *Video sources*, is where you specify where MythTV will retrieve information for its electronic program guide. In the main menu, select the *Video sources* item and then select (*New video source*). Start by entering a *Name*, and then specify how MythTV will retrieve the information below *Listings grabber* (Figure 5).

Transmitted guide only (EIT) gleans additional information from the data that every DVB variant transmits in addition to the TV stream. If you have in-

stalled XMLTV, you can specify this application as your source; to set this up, you will need to toggle to a terminal window by pressing *Alt + Tab*. This sets the data source for the electronic program guide, but MythTV still does not know to which TV card the information belongs. Selecting *Input connections* in the main menu takes you to a list of TV cards to choose from and map to the new entry in the dialog below *Video sources* (Figure 6).

Next, start a *Scan for channels*. Keeping the defaults, click *Next >*. The channel scan will take a while, and MythTV will need to stop occasionally and process (Figure 7). The results are a complete list of channels for the TV card.

Pressing *Finish* twice and *Esc* once takes you back to the main menu where



Figure 8: The front-end main menu is the control center for the back end. This also shows you the interface you will see on screen in your living room.

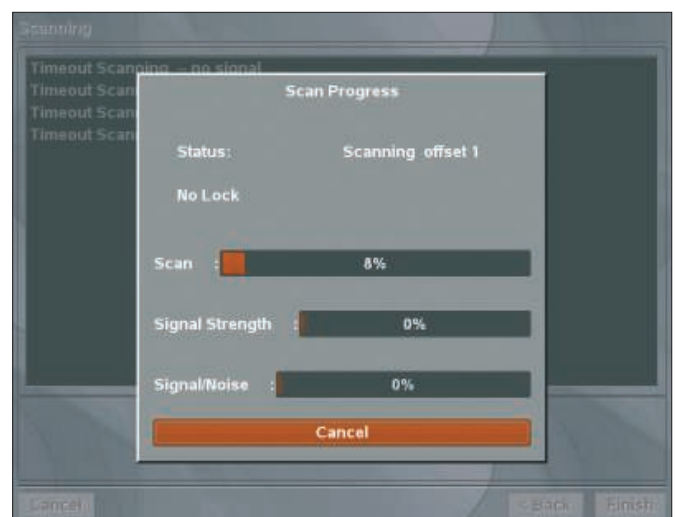


Figure 9: The TV program proves that the back end and front end are both working. Channel information is only shown for a couple of seconds when you switch the channel.

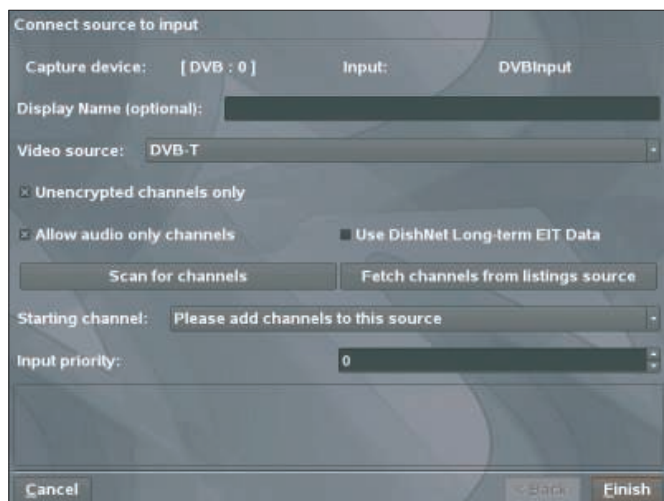


Figure 10: Themes let users change the appearance of the front end. More themes are available from the MythTV website [2].

you can modify the list by clicking *Channel Editor*.

By pressing Esc, quit the setup program and open two terminal windows. In the first window, become root and launch the back end by typing *myth-backend*; you can't use the *sudo /etc/init.d/mythbackend restart* command for this on Ubuntu 7.10.

In the other window, launch the front end by entering *mythfrontend*. Later, this is the interface you will see on your living room PC (Figure 8). For test purposes, select *Watch TV* and then you should see a TV picture (Figure 9).

Pressing the arrow keys navigates channels and pressing Enter switches channels. After completing this functional test, quit the front end by pressing Esc twice and confirming when prompted. Now your server is working and you just need to make sure *myth-backend* will launch automatically at boot time. For the rest of the setup, you will not need the front end on the server.

MPEG Issues

Before the data streams transported by DVB can be displayed on your screen, they must be decoded. Decoding is handled by libraries that some distributions lack, but you should be able to install the missing libraries from a repository by looking for the *multimedia* keyword. OpenSUSE users must enable the Packman repository, as mentioned previously. When launched for the first time, Kaffeine lets you know which libraries you are missing and offers to help you download them.

If you intend to access your MythTV back end's resources from your living room, you will need a PC that is as quiet as possible. Unfortunately, a high-powered CPU needs a fair amount of cooling, which means having a fan to extract the hot air from the case.

Small, quiet computers now on the market are ideal

for home entertainment.

Whether you go for an off-the-rack machine or build one yourself, make sure the machine runs Linux and will play DVDs without stalling. High-definition television (HDTV) is currently the domain of high-performance CPUs. Booting a MythTV Live CD to test your media center candidate at the store makes sense [4][5].

Also, make sure that your PC has the right connectors for your television. If you have a legacy CTR TV, you will either need a TV port on the card (one that supports Linux, of course) or an external VGA-to-TV converter.

After installing your media center PC, you will need to set up MythTV again by following the same steps as for the server, but without running *mythtv-setup*. Instead, launch *mythtv-frontend*, change to *Tools | Configuration*, press Enter, and select *General*. For *localhost*, enter the hostname or IP address of your server; otherwise, you can keep the defaults. With the back end password from earlier, replace the password. Now keep pressing *Next* until you get to *Finish*.

The front end will try to contact the server, and, assuming this works out, you are taken back to the submenu. Selecting *Appearance* lets you modify the appearance of the interface (Figure 10).

No Time

Schedule a recording lets you use the front end in your living room to tell the back end in the attic to record a program. The easiest way to do this is with

the *Program guide*, which gives you a list of programs for the next couple of hours. Pressing Enter selects a program and then you can set the parameters in the new dialog that appears. Pressing the left or right arrow keys changes the values, and the up and down arrow keys toggle the options. Pressing *Save settings* arms the server for the recording.

Manual recording gives you another option: You can set the start and stop times as on a legacy video recorder. *Recording options* takes you back to the familiar screen with more settings.

To avoid needing to launch the front end on your media center PC, auto-launching the program when you boot the machine is a good idea. Then you can replace the keyboard with a remote control. MythTV supports a remote as well as automatic boot and shutdown for the server machine. This way, the server will only be up when you are recording, which can help you to save power. If you ask it to do so, the back end will even cut the ads out of a recording.

Extensions

Numerous extensions available from the MythTV page change the video server into a genuine media server. MythTV will play DVDs and manage your music collection. MythTV extension documentation is available on the website in the *docs* subdirectory below the source code archive directory. ■

Change IP Address

If you change the IP address on the back end, you will need to modify the address in *\$HOME/.mythtv/mysql.txt* on any machine with a back end or front end. Then relaunch *mythtv-setup* on your server and change the IP address. After doing so, communications will be restored.

For a more permanent setup, make sure your server has a static IP address.

INFO

- [1] Linux TV: <http://linuxtv.org>
- [2] MythTV: <http://mythtv.org>
- [3] KnoppMyth: <http://mysettopbox.tv/knoppmyth.html>
- [4] Mythbuntu: <http://www.mythbuntu.org>
- [5] Libdca library: <http://www.videolan.org/developers/libdca.html>