Raspberry Pi Internet Radio

Compiling and installing the Music Player Daemon

A comprehensive guide how to compile and install the Music Player Daemon

Bob Rathbone Computer Consultancy

www.bobrathbone.com

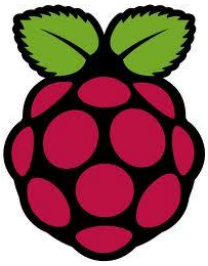
8th of March 2021

MPD Version 0.22.6

Contents

Figures

Chapter 1 - Introduction



This manual describes how download, compile and install the Music Player Daemon (**MPD**) for Raspberry Pi on the **Raspberry Pi OS** operating system (Formally called **Raspbian**). It is a supplement to the **Raspberry Pi Constructors Guide** for building Internet radios. However, it can be used for any package which utilises the Music Player Daemon.

The source and basic construction details for the *Raspberry Pi Internet Radio* are available from the following web site:
https://bobrathbone.com/raspberrypi/pi_internet_radio.html

Motivation for writing this procedure

The Raspberry Pi usually is installed with the **Raspberry Pi OS** operating system. At the time of writing the latest version of **Raspberry Pi OS** is called **Buster** which uses version **5.4.51** of the Linux kernel or later. Unfortunately, **Raspberry Pi OS** is released with a very out-of-date version of the Music Player daemon. This has always been the case to date. The version described in this procedure is **0.22.6** whilst the version released with **Buster** is **0.21.5** which is some twenty-seven versions behind **0.22.6**. The latest version of MPD is also much quicker to load giving a faster start-up time of the radio/media player. Due to its age it is almost impossible to get support on the older version of MPD.

Audience

This guide is intended for anyone that wishes to update their Music Player Daemon to the latest version. However, a certain amount of knowledge of the Linux Operating System is required as well as the ability to edit and change system files. This does not rule this procedure out for use by those less experienced but in such a case caution should be applied as the procedure is classed as moderately advanced.

Pre-requisites

1. **Raspberry Pi OS** Buster installed and updated using **apt-get update** and **apt-get upgrade**.
2. The version of MPD package released with Raspberry Pi OS Buster (**0.21.5**) should be first installed.
3. A reasonable fast Raspberry Pi.

Note: During testing an attempt was made to run this procedure on a **Pi Zero** but without success. The problem was that the compile phase took hours to run and seemed to hang. The suggestion is to put the SD card to be upgraded into a faster Raspberry Pi and then upgrade it or run the compilation procedure on the Raspberry Pi Zero overnight.

Radio software installation

If you have reached this document whilst installing the Raspberry Pi Radio Software (**radiod**) then you should first install and configure the MPD software released with Buster and the radio software as shown in the constructor's manual.
See https://www.bobrathbone.com/raspberrypi/documents/Raspberry%20PI%20Radio.pdf

Conventions used in this tutorial

Installation of the radio program requires you to enter lines at the command line prompt. This requires you to log into the Raspberry PI as user '**pi**'. The default password is **raspberry**.

Note: Don't carry out any of the following commands just yet. They are just examples.

```
Raspberrypi login: pi
Password: raspberry
pi@raspberrypi:~$ Last login: Wed Sep  9 12:17:35 2020 from 192.168.1.200
pi@raspberrypi:~$
```

The prompt line is displayed ending with a **$** sign. The **pi@raspberrypi:~** string means user 'pi' on host machine called 'raspberrypi'. The ~ character means the user 'pi' home directory **/home/pi**. In this tutorial if you are required to do something as user **pi** then only the $ sign will be shown followed by the command as shown in the example below:

```
$ mpc status
```

Copy and paste the highlighted text only to the command line. Omit the $ sign.

Some commands produce a lot output which does not need to be shown. In such a case a colon (':') is used to indicate that some output has been omitted.

```
$ mpd -V
Music Player Daemon 0.22.6 (0.22.6)
Copyright 2003-2007 Warren Dukes <warren.dukes@gmail.com>
Copyright 2008-2018 Max Kellermann <max.kellermann@gmail.com>
:
Other features:
 avahi dbus udisks epoll icu inotify ipv6 systemd tcp un
```

Note that when a command is shown with the resulting output the command which was entered is shown in **bold**.

END OF EXAMPLE COMMANDS.

Chapter 2 Installing the latest version of MPD

This procedure is based upon the following document.
https://www.musicpd.org/doc/html/user.html
You are strongly advised to read both the above document and this one but with caution as either can change. However, there are a number of gaps in the document from **miscpd.org** which can lead to confusion when operating the new version of MPD. This guide has been written for the installation of Music Player Daemon version **0.22.6** dated 8th March 2021.

Upgrade the operating system

Run the following two commands:

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

Reboot the Raspberry Pi.

```
$ sudo reboot
```

Downloading the source

The source is downloaded from **MusicPd** at https://www.musicpd.org/

Figure 1 Music Player Daemon Website

This will list the latest version of the software; in this case it is version **0.22.6**. If downloading a later version than shown then substitute the version number shown in the following examples with the one you are downloading. Either click on the version number to download the software to your PC, or alternatively right click the version number to copy the link then use **wget** to download it via the command line on the Raspberry Pi.

```
$ cd
$ wget http://www.musicpd.org/download/mpd/0.22/mpd-0.22.6.tar.xz
```

Now unzip the archive

```
tar -xvf mpd-0.22.6.tar.xz
```

This will unzip the archive to a directory called **mpd-0.22.6**.

Install Ninja and Meso build utilities

This build uses Ninja and Meson.

```
$ sudo apt-get install meson ninja-build
```

Install pre-requisite libraries

Change to the recently created MPD build directory:

```
$ cd mpd-0.22.6
```

Now install the pre-requisite libraries. Note that the text below is all one line. Do not copy the $.

```
$ sudo apt install meson g++ \
  libpcre3-dev \
  libmad0-dev libmpg123-dev libid3tag0-dev \
  libflac-dev libvorbis-dev libopus-dev libogg-dev \
  libadplug-dev libaudiofile-dev libsndfile1-dev libfaad-dev \
  libfluidsynth-dev libgme-dev libmikmod-dev libmodplug-dev \
  libmpcdec-dev libwavpack-dev libwildmidi-dev \
  libsidplay2-dev libsidutils-dev libresid-builder-dev \
  libavcodec-dev libavformat-dev \
  libmp3lame-dev libtwolame-dev libshine-dev \
  libsamplerate0-dev libsoxr-dev \
  libbz2-dev libcdio-paranoia-dev libiso9660-dev libmms-dev \
  libzzip-dev \
  libcurl4-gnutls-dev libyajl-dev libexpat-dev \
  libasound2-dev libao-dev libjack-jackd2-dev libopenal-dev \
  libpulse-dev libshout3-dev \
  libsndio-dev \
  libmpdclient-dev \
  libnfs-dev \
  libupnp-dev \
  libavahi-client-dev \
  libsqlite3-dev \
  libsystemd-dev \
  libgtest-dev \
  libboost-dev \
  libicu-dev \
  libchromaprint-dev \
  libgcrypt20-dev
```

Press enter to install libraries.

Note: Some constructors have had problems copying and pasting the above command. The system displays that it cannot find the files. If this occurs, try copying the above and paste it into Windows notepad. Re-copy from notepad and then paste into the Raspberry Pi terminal.

Build the MPD package

The package uses a multi-platform software build system called **meson** from **mesonbuild.com**. See https://mesonbuild.com/ for further information. Configure the package with the following command:

```
$ meson . output/release --buildtype=debugoptimized -Db_ndebug=true
```

Normally packages are built and installed with make. In this case the MPD is installed using ninja. For further information see https://ninja-build.org/. Run the following.

```
$ sudo ninja -C output/release
```

This will take quite a long time as it has at least 660 files to compile. On a Raspberry Pi 4 it will take about 10 minutes. On slower Raspberry Pi it will be at least twice that.

Install MPD package

Stop MPD and any software using it. In this example **radiod** is stopped.

```
$ sudo systemctl stop radiod mpd
```

Finally run the following command to actually install the package.

```
$ sudo ninja -C output/release install
```

This will install the **mpd** daemon in the **/usr/local/bin** directory.

```
ninja: Entering directory `output/release'
[1/2] Installing files.
Installing mpd to /usr/local/bin
Installing /home/pi/mpd-0.22.6/systemd/system/mpd.socket to
/usr/local/lib/systemd/system
Installing /home/pi/mpd-0.22.6/output/release/systemd/system/mpd.service to
/usr/local/lib/systemd/system
Installing /home/pi/mpd-0.22.6/systemd/user/../system/mpd.socket to
/usr/local/lib/systemd/user
Installing /home/pi/mpd-0.22.6/output/release/systemd/user/mpd.service to
/usr/local/lib/systemd/user
Installing /home/pi/mpd-0.22.6/mpd.svg to
/usr/local/share/icons/hicolor/scalable/apps
Installing /home/pi/mpd-0.22.6/AUTHORS to /usr/local/share/doc/mpd
Installing /home/pi/mpd-0.22.6/COPYING to /usr/local/share/doc/mpd
Installing /home/pi/mpd-0.22.6/NEWS to /usr/local/share/doc/mpd
Installing /home/pi/mpd-0.22.6/README.md to /usr/local/share/doc/mpd
```

Configuring the new MPD package

If you previously installed version **0.21.5** of MPD released with **Buster**, then it will still be present in the **/usr/bin** directory.

```
$ /usr/bin/mpd -V | grep -i daemon
Music Player Daemon 0.21.5 (0.21.5)
```

The new version is in the **/usr/local/bin** directory.

```
$ /usr/local/bin/mpd -V | grep -i daemon
Music Player Daemon 0.22.6 (0.22.6)
```

The system MPD service unit is no longer **/lib/systemd/system/mpd.service** but is now in **/usr/local/lib/systemd/system/mpd.service.** However, for some reason appears to be unable to find the **/etc/mpd.conf** configuration file.

If MPD doesn't start edit the **/usr/local/lib/systemd/system/mpd.service** (Use sudo vi or nano) Change the ExecStart line from

```
ExecStart=/usr/local/bin/mpd --no-daemon
```

To

```
ExecStart=/usr/local/bin/mpd --no-daemon /etc/mpd.conf
```

Now reload system units.

```
$ sudo systemctl daemon-reload
```

Testing MPD

Start the MPD daemon and check its status.

```
$ sudo systemctl start mpd
$ sudo systemctl status mpd
```

This should display something similar to the following:

```
● mpd.service - Music Player Daemon
   Loaded: loaded (/usr/local/lib/systemd/system/mpd.service; disabled;
vendor preset: enabled)
   Active: active (running) since Wed 2020-10-07 19:41:35 BST; 21s ago
     Docs: man:mpd(1)
           man:mpd.conf(5)
 Main PID: 16218 (mpd)
    Tasks: 6 (limit: 2068)
   CGroup: /system.slice/mpd.service
           └─16218 /usr/local/bin/mpd --no-daemon /etc/mpd.conf
:
```

Note: Note ignore any warnings about wildmidi or bind errors.

Note that the version of **mpd** being used is in **/usr/local/bin** and not **/usr/bin**. This is confirmed with the following command:

```
$ which mpd
/usr/local/bin/mpd
```

If you already have a playlist and MPD has been configured for your sound device the first station should start playing. If you don't have a playlist then create one in **/var/lib/mpd/playlists/<playlist name>.m3u**
For example, **/var/lib/mpd/playlists/_Radio.m3u**

```
#EXTM3U
#EXTINF:-1,BBC Radio 1
http://sc59.lon.llnw.net:80/stream/bbcmedia_radio1_mf_p#BBC Radio 1
#EXTM3U
#EXTINF:-1,BBC Radio 2
http://bbcmedia.ic.llnwd.net/stream/bbcmedia_radio2_mf_p?s#BBC Radio 2
#EXTINF:-1,Nashville FM
http://server-27.stream-server.nl:8300/stream#Nashville FM
#EXTM3U
#EXTINF:-1,UK Country Radio
http://s3.xrad.io:8064/#UK Country Radio
#EXTM3U
#EXTINF:-1,Radio Lichtenstein
http://live.radiol.li:8000/country#Radio Lichtenstein
```

Now load the new radio playlist. Omit the **m3u** extension.

```
$ mpc load _Radio
```

Confirm that it is loaded.

```
$ mpc playlist
BBC Radio 1
BBC Radio 2
UK Country Radio
```

Now play the first station.

```
$ mpc play
BBC Radio 1
[playing] #1/143   0:00/0:00 (0%)
volume: 60%   repeat: off   random: off   single: off   consume: off
```

Adjust the volume as necessary

```
$ mpc volume 70
```

This ends the procedure. If you are running the Rathbone radio software the restart it by rebooting the Raspberry Pi or run **sudo systemctl start radiod**.

Trouble shooting

MPD fails to start

Missing configuration file in mpd.service file

```
$ sudo systemctl start mpd
Job for mpd.service failed because the control process exited with error
code.
See "systemctl status mpd.service" and "journalctl -xe" for details.
```

Check the status

```
$ systemctl status mpd.service
● mpd.service - Music Player Daemon
   Loaded: loaded (/usr/local/lib/systemd/system/mpd.service; disabled;
vendor preset: enabled)
   Active: failed (Result: exit-code) since Fri 2020-05-29 19:30:19 BST;
1min 41s ago
     Docs: man:mpd(1)
           man:mpd.conf(5)
  Process: 1060 ExecStart=/usr/local/bin/mpd --no-daemon (code=exited,
status=1/FAILURE)
 Main PID: 1060 (code=exited, status=1/FAILURE)

May 29 19:30:19 buster03 systemd[1]: Starting Music Player Daemon...
May 29 19:30:19 buster03 mpd[1060]: exception: No configuration file found
May 29 19:30:19 buster03 systemd[1]: mpd.service: Main process exited,
code=exited, status=1/FAILURE
May 29 19:30:19 buster03 systemd[1]: mpd.service: Failed with result 'exit-
code'.
May 29 19:30:19 buster03 systemd[1]: Failed to start Music Player Daemon.
```

In this case /usr/local/bin/mpd cannot find /etc/mpd.conf. Check that the **ExecStart** statement in **/usr/local/lib/systemd/system/mpd.service** contains the configuration file name.

```
ExecStart=/usr/local/bin/mpd --no-daemon /etc/mpd.conf
```

Licences, disclaimer and support

Licences

The software and documentation for this project is released under the GNU General Public Licence.

The GNU General Public License (GNU GPL or GPL) is the most widely used free software license, which guarantees end users (individuals, organizations, companies) the freedoms to use, study, share (copy), and modify the software. Software that ensures that these rights are retained is called free software. The license was originally written by Richard Stallman of the Free Software Foundation (FSF) for the GNU project.

The GPL grants the recipients of a computer program the rights of the Free Software Definition and uses *copyleft* to ensure the freedoms are preserved whenever the work is distributed, even when the work is changed or added to. The GPL is a *copyleft* license, which means that derived works can only be distributed under the same license terms. This is in distinction to permissive free software licenses, of which the BSD licenses are the standard examples. GPL was the first *copyleft* license for general use. This means that you may modify and distribute the software and documentation subject to the conditions of the licences.

See http://www.gnu.org/licenses for up-to-date information on the GNU General Public License.

The licences for the source and documentation for this project are:
GNU General Public License. See http://www.gnu.org/licenses/gpl.html
GNU AFFERO General Public License. See http://www.gnu.org/licenses/agpl.html
GNU Free Documentation License. See http://www.gnu.org/licenses/fdl.html
MPD uses an older version of the license at https://www.gnu.org/licenses/gpl-2.0.txt

Disclaimer

THIS SOFTWARE AND DOCUMENTATION IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS 'AS IS' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BELIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE OR DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Support

The author does not directly support the Music Player Daemon software. You are advised to contact the MPD forum at https://forum.musicpd.org/. However, if you have any comments or feedback about this procedure or document please contact bob@bobrathbone.com

Acknowledgements and Copyrights

Warren Dukes warren.dukes@gmail.com and Max Kellermann max.kellermann@gmail.com and the **musicpd.org** community for their excellent work on the Music Player Daemon.

Appendix A – The MPD service file

Below is the service unit for MPD which is used by the **systemctl** command to stop and start **MPD**.

File **/usr/local/lib/systemd/system/mpd.service**

```
[Unit]
Description=Music Player Daemon
Documentation=man:mpd(1) man:mpd.conf(5)
After=network.target sound.target

[Service]
Type=notify
ExecStart=/usr/local/bin/mpd --no-daemon /etc/mpd.conf

# Enable this setting to ask systemd to watch over MPD, see
# systemd.service(5).  This is disabled by default because it causes
# periodic wakeups which are unnecessary if MPD is not playing.
#WatchdogSec=120

# allow MPD to use real-time priority 50
LimitRTPRIO=50
LimitRTTIME=infinity

# disallow writing to /usr, /bin, /sbin, ...
ProtectSystem=yes

# more paranoid security settings
NoNewPrivileges=yes
ProtectKernelTunables=yes
ProtectControlGroups=yes
ProtectKernelModules=yes
# AF_NETLINK is required by libsmbclient, or it will exit() .. *sigh*
RestrictAddressFamilies=AF_INET AF_INET6 AF_UNIX AF_NETLINK
RestrictNamespaces=yes

[Install]
WantedBy=multi-user.target
Also=mpd.socket
```