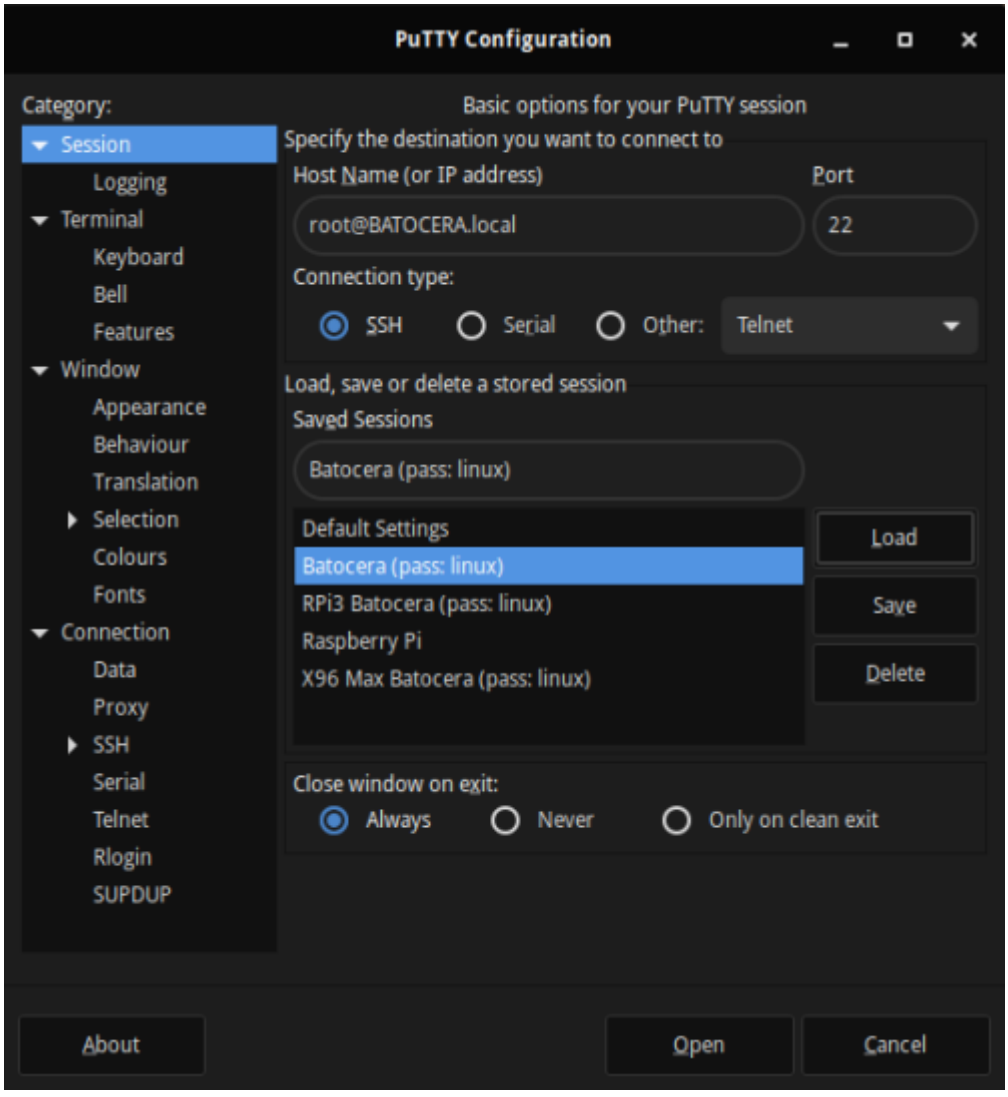
SSH/Xterm and Common Commands

The recommended way to access Batocera's terminal is through SSH from another computer on the same local network (so that you get nice features like command history and ASCII coloration). First, make sure that SSH is enabled on your Batocera machine (it is enabled by default): check `/userdata/system/batocera.conf` and make sure `system.ssh.enabled=1` (with no leading #) is present. Then use your preferred SSH tool to connect; enter `ssh root@batocera` or equivalent in your terminal (or the Command Prompt on Windows 10+).

Windows users are advised to use PuTTY or KiTTY to connect via SSH.

The username is `root`. This is the only user on a Batocera machine. So, the typical address to attempt an SSH connection to the Batocera machine would be `root@batocera.local` or just `root@batocera`. If none of those work, you can connect to `root@192.168.###.###`, where `192.168.###.###` would be the IP address that you get from **MAIN MENU → NETWORK SETTINGS** in the Batocera interface.

For example, this is how PuTTY should look when SSH'ing in:



Click “Save” after everything is set up to create a double-clickable profile for convenience.

Once in the SSH session, enter the password. The default password is `linux`. While typing the password, no asterisks will appear. That is how Linux does things.

If you do not want guest access, turn on “Enforce Security” from **MAIN MENU** > **SYSTEM SETTINGS** > **SECURITY** and specify a password.

Turning on **ENFORCE SECURITY** will also require your username and password to access the network share as well. Despite this, keep in mind that Batocera is not a secure operating system and exposing it to a public network is at your own risk.

A successful login via SSH looks similar to this:



A local terminal can also be accessed on the Batocera machine itself by opening `xterm` from the Applications menu in the file manager (`[F1]` on the system list), however this can only be done on platforms which support the Xorg backend (such as x86_64).

It is also possible to open a new TTY session from anywhere in Batocera by pressing `[Ctrl]+[Alt]+[F5]` (you will be asked to login, refer to above). To return to Batocera after doing this, press `[Ctrl]+[Alt]+[F2]`. In Batocera **v31** and lower, this shortcut is `[Ctrl]+[Alt]+[F3]`. In Batocera **v31** and lower, it is not recommended to use this terminal due to garbled text input; only use it in emergency situations.

Whenever using the command line, try to understand what the commands are doing exactly. Even if it doesn't seem like it, certain commands can be used in harmful ways. For example, putting simply `> empty.txt` without any command will create an empty file called empty.txt in the current working directory. That's fine, right? If you already had a useful file with this name, it'll be empty after this command.

Even more dangerously, a short command like `rm -rf /` or `:(){:|:&};:` could destroy your entire hard drive without prompt!

Copy and paste work differently in PuTTY than in many other Windows programs. For a general introduction to PuTTY features including copy and paste, please refer to the PuTTY documentation.

Password-less authentication

Batocera can remember the SSH client's key such that it no longer requires a password to type in.

1. On Batocera, run the following in terminal:

```
mkdir -p ~/.ssh
touch ~/.ssh/authorized_keys
chmod 700 ~/.ssh
chmod 600 ~/.ssh/authorized_keys
```

2. On the client computer (the one which logs into Batocera via SSH), generate its public keys (if not already done so) and add the public Batocera SSH keys to its SSH configuration.
   - For most **Linux**-based distributions, run the following:

     ```
     ssh-keygen
     ```

     and mash `[Enter]` through all of the questions. Don't worry about setting a master password for the public keys. Then run:

     ```
     cat ~/.ssh/id_rsa.pub | ssh root@batocera.local 'cat >> /userdata/system/.ssh/authorized_keys'
     ```

     replacing `batocera.local` with the IP address of Batocera if using a static IP.

   - For **Windows**, paste the `id_rsa.pub` key from `C:\<yourUsername>\.ssh\id_rsa.pub` into Batocera at `~/.ssh/authorized_keys`.

That's it. You should be able now to SSH into your Batocera system from your SSH client without entering any password.

Basic SSH commands

Once you are connected to Batocera, you can use most standard Unix commands.

When we say most, we mean mostly the GNU coreutils. Batocera is a lean build-root Linux based system, which does not have a lot of the commands or packages that other distributions typically do. A lot of commands aimed at Ubuntu or Mint for example won't work here.

Some command-line tools have an `--help` option describing how to use the program, for example, typing `cp --help` will print how the command is used in the command-line interface.

```
BusyBox v1.31.1 (2020-11-28 14:11:54 CET) multi-call binary.

Usage: cp [OPTIONS] SOURCE... DEST

Copy SOURCE(s) to DEST

    -a    Same as -dpR
    -R,-r    Recurse
    -d,-P    Preserve symlinks (default if -R)
    -L    Follow all symlinks
    -H    Follow symlinks on command line
    -p    Preserve file attributes if possible
    -f    Overwrite
    -i    Prompt before overwrite
    -l,-s    Create (sym)links
    -T    Treat DEST as a normal file
    -u    Copy only newer files
```

Most command-line tools have a syntax similar to `<program> -<option flags> <parameters of program> <path/to/input/file> <path/to/output/file>`, but not all of them. It's worth reading their manual before using them.

The default working directory is the HOME folder of Batocera at `/userdata/system`. This will appear as ~ in your terminal. You can check what directory you are currently in with `pwd`.

Using the command line with paths of files can be confusing at first, there are two types of paths:

- **Absolute paths** : they will always be the same ones regardless of the current directory you are in, and they start with a `/` character; `/userdata/saves` for example.
- **Relative paths** : they are relative to you current position. For example, if you are in the `/userdata` directory, and you use `nano system/batocera.conf`, you will execute the command nano on the file `batocera.conf` located in the `/userdata/system` folder.

If a path, or a filename, contains special characters or spaces, you will need to put either single quotes ' or double quotes " around it.

Most commands can be immediately halted with `[Ctrl]+[C]`. Please note that doing this may corrupt data if that program is in the middle of editing a file.

But if `[Ctrl]+[C]` is used, then how do you copy text from a SSH session? Simple: highlight the text and it will automatically be copied to your host system's clipboard. To paste, right click.

Basic file usage

Batocera includes a powerful command-line explorer called Midnight commander. This will offer a

- `mc` : starts the command-line file explorer **M**idnight **C**ommander, this tool can be used to move, copy, delete, rename, and edit files, as well as create folders, make symbolic links, and change individual file permissions. This utility also supports a mouse input.

If you'd like to instead manipulate files using standard Unix commands, here is a cheat-sheet:

- pwd : tells you the current directory you are in [**P**rint **W**orking **D**irectory], eg. running `cd /userdata` then pwd will output `/userdata`
- `cd` : changes the current working directory [**C**hange **D**irectory], eg. `cd /userdata/roms` puts you in the `/userdata/roms` folder
- `cp` : copies a given file or folder to another path [**C**o**P**y], eg. `cp /userdata/system/batocera.conf /userdata/batocera.conf` will create a copy of `batocera.conf` in the `/userdata` folder.
- `du -sh` : gives you the size of the specified element [**D**isk **U**sage, **S**pecified, **H**uman-readeable], eg. `du -sh /userdata/roms/snes` gives you the size on disk of the snes roms folder (If you use Batocera on x86, or access it from a windows computer with the file manager, the “size” and “size on disk” may not be the same, especially for .wine games. This command lets you see the actual size on disk)
- `ls` : lists the files and folders present in the current directory [**L**i**S**t]. eg. `ls` while in `/userdata/` will output `bios cheats decorations extractions …` etc.
- `mkdir` : creates a directory [**M**a**K**e **DIR**ectory], eg. `mkdir content` will create a directory called `content` in the current working directory.
- `mv` : moves a given file to another path [**M**o**V**e], eg. `mv /userdata/roms/gb/game.zip /userdata/roms/gbc` will move the file `game.zip` from gb to gbc; the `mv` command can also be used to rename files, eg. `mv /userdata/roms/gb/game.zip /userdata/roms/gbc/gb_game.zip` would rename the file in the same directory.
- `nano` : opens a command-line text editor for the specified file, eg. `nano /userdata/system/batocera.conf` opens the file `batocera.conf` to edit it; for more info see this link.
- `rmdir` : deletes a directory if it is empty [**R**e**M**ove **DIR**ectory], eg. `rmdir content` will delete the directory content if it is empty.
- `rm` : deletes a specified file [**R**e**M**ove], eg. `rm invaders-201226-124223.png` will erase the file `invaders-201226-124223.png` in the current working directory.
- `rm -r` : deletes a directory and all the files it contains [**R**e**M**ove, **R**ecursive], use with caution as it has no prompt!
- `unzip` : decompresses a given .zip file in the working directory, eg. `unzip file.zip` will extract all the data in file.zip in the current working directory. You can ask to extract it elsewhere using the `-d` option [**D**irectory], for exemple, `unzip file.zip -d uncompressed` will extract all the data in file.zip inside a subdirectory called uncompressed.

Batocera store

The content downloader, essentially. This was introduced in Batocera **v29** (Fix Me! or close enough to it).

- `batocera-store list` : list all available packages (pre-configured games from the store)

- `batocera-store install <package>` : install a package
- `batocera-store list-repositories` : list all currently configured repositories to fetch data from.
- `batocera-store refresh` : refresh the store list
- `batocera-store update` : update all installed packages to their latest available versions
- `batocera-store clean` : clear the store cache
- `batocera-store clean-all` : clear the store cache and package files

Debugging

Most of these commands require `export DISPLAY=:0.0` to be run first before they can work.

The following commands can be used to debug your Linux-based operating system:

- `aplay -l` : returns the list of playback hardware devices [**A**udio **PLAY**er, **L**ist] (can be used to debug audio issues on PC).
- `xrandr` : returns the list of available displays [**X** Window **R**esize **AND R**otate] and their reported resolutions (can be used to debug video issues on PC). More info on this page.
- `vulkaninfo` : Vulkan API debugging info.
- `blkid` : returns the list of mountable drives connected to the machine. More info on the external storage page.
- `btop` : advanced task manager.
- `htop` : basic task manager.
- `pidof` : gives a list of processes identifyiers (PID) for a running process name [**P**rocess **ID**entification **OF**], for example `pidof retroarch` returns a number when a retroarch-based emulator is running.
- `kill [PID]` : kills a process with a given PID, for example if `pidof retroarch` returned 640, then running `kill 640` would terminate the `retroarch` process.

How to install btop on Batocera v33 and earlier

BPYTOP is a more sophisticated system resource monitor powered by Python.

Starting with Batocera **v34**, an equivalent of bpytop is available for everyone, by simply entering `btop` from the command line (or `btop --utf-force` if your current locale doesn't support UTF-8). For versions prior to Batocera **v34**, follow the install guide below.

To install it:

```
python -m ensurepip --upgrade
pip3 install bpytop --upgrade
batocera-save-overlay
```

This needs to be done every update.

Unique to Batocera:

- `/etc/init.d/S31emulationstation stop` : kills EmulationStation.

- `batocera-es-swissknife --restart` : starts/restarts EmulationStation (can `[Ctrl] + [C]` without closing ES to get back to terminal).
- `/etc/init.d/S31emulationstation start` : starts/restarts EmulationStation (`[Ctrl] + [C]` will bring back control of the terminal **without** closing ES).
- `unclutter-remote -s` : show the mouse cursor on-screen.
- `unclutter-remote -h` : hide the mouse cursor on-screen.
- `batocera-info` : prints out the info seen when logging in.
- `batocera-settings` : autonomously make edits to configuration files, see its own page for usage.
- `batocera-resolution listModes` : Shows a list of the available display modes as they appear in EmulationStation's **Video mode** option.
- `batocera-padinfo` : prints info about the current connected pads (Fix Me! **v32** has this functionality broken, pads use a different input driver now?)
- `batocera-support` : create a Batocera support tarball

Batocera resolution

Most of these commands require `export DISPLAY=:0.0` to be run first before they can work.

- `batocera-resolution` : shows a list of commands related to resolution/display.
- `batocera-resolution listModes` : Shows a list of the available display modes as they appear in EmulationStation's **Video mode** option.
- `batocera-resolution setMode <mode>` : set a mode shown in the list, eg. `batocera-resolution listModes max-1920×1080`
- `batocera-resolution currentMode` : show the name of the current modeline being used (modeline includes setting the resolution, refresh rate and timings).
- `batocera-resolution currentResolution` : show the current resolution being sent to the output.
- `batocera-resolution listOutputs` : list all the available and connected outputs.
- `batocera-resolution setOutput <output>` : switch to the specified <output>, eg. `batocera-resolution setOutput HDMI-1`
- `batocera-resolution minTomaxResolution <width>x<height>` : (outdated from **v32** and higher, use `max-1920×1080` as a `setMode` instead) force a maximum resolution; if the configuration or video mode attempts to exceed this, bring it back down to this specified resolution, eg. `batocera-resolution minTomaxResolution 1280×720`
- `batocera-resolution forceMode <horizontal>x<vertical>:<refresh>` : create a custom modeline and force it on the current display (can result in no display if incompatible settings are used), eg. `batocera-resolution forceMode 1920×1080:60`

Batocera ES swissknife (dev tools)

Batocera features some tools to aid developers. Run `batocera-es-swissknife [FLAG]` to use them. You can run `batocera-es-swissknife --help` to see the current list of flags, but here is a copy of that (last updated Batocera **v32**):

```
  --restart  will RESTART EmulationStation only
  --kodi     will startup KODI Media Center stopping ES
  --reboot   will REBOOT whole system
  --shutdown will SHUTDOWN whole system
```

```
--emukill  will exit any running EMULATORS
--espid    checks if EmulationStation is currently active
    This number is the real PID of the binary!
    If the ouput is 0, then ES isn't active
--emupid   to check if an Emulator is running
    This number is just the PID of emulatorlauncher.py
    If output is 0 then there is no emulator active!

--arch     Shows current architecture running
--version  Shows current version of BATOCERA running
--update   Shows possible update for your install
    default: stable, you can type --update beta

--overlay  will try to backup your overlay file
--remount  toggle write access to <dir>, default /boot
    This switch can have serious effects for your setup
--reset-ra will set all RA settings to default
```

Formatting tools

VERY DANGEROUS

- `batocera-format --help` : summons an angry, sentient tuba
- `batocera-format listDisks` : list all the partitions and disks currently available to format.
- `batocera-format listFstypes` : list the available formats Batocera can format a disk to.
- `batocera-format format <disk> <fstype>` : destroy a whole disk and format it to <fstype>
- `batocera-format format INTERNAL <fstype>` : special exception format, only format the userdata partition of the internal drive to a particular <fstype>.

SMART drive health check

This can check the S.M.A.R.T. health as reported by the drive. If looking for a basic guide on how to use these: https://linuxconfig.org/how-to-check-an-hard-drive-health-from-the-command-line-using-smartctl and https://www.techrepublic.com/article/how-to-check-ssd-health-in-linux/ (skip over the installation part, it's already included in Batocera since **v34**). More rigorous documentation can be found on the Arch Wiki's page about the tool.

- `lsblk` : list all the disks
- `smartctl -i /dev/sdx` : show info about disk `sdx`
- `smartctl -H /dev/sdx` : show current health of disk `sdx` in a single word
- `smartctl –all /dev/sdx` : show **all** SMART info of disk `sdx`
- `smartctl -t conveyance /dev/sdx` : run a short five-minute conveyance test on disk `sdx`
- `smartctl -t select,100-150 /dev/sda` : run a select test on disk `sdx`

Exercise restraint when testing your disks.

Internet functionalities

- `batocera-upgrade` : lets you update batocera using the command-line with the correct URL, see Manual upgrades/downgrades for more details.
- `batocera-install listDisks` : lists the current disks available to install Batocera onto (also visible with the **Install Batocera on a new disk** option in ES).
- `batocera-install listArchs` : downloads the list of current stable architectures that Batocera has available.
- `batocera-install install <disk> <arch|file>` : downloads and installs the latest stable version of Batocera or a specified file onto the target disk. Be careful, as this completely destroys all existing data on that disk! If using a local file, that file must be in `/userdata/system/installs`.
- `batocera-install listFiles` : lists all the files found in `/userdata/system/installs`.
- `pacman -Ss` : let's you search through the pacman packages using the command-line [**PAC**kage **MAN**ager, **S**ync, **S**earch], see Batocera Package Manager (pacman) for more infos.
- `pacman -S` : let's you install a package using it's name [**PAC**kage **MAN**ager, **S**ync], see Batocera Package Manager (pacman) for more info.
- `pacman -Rsd` : let's you remove a package using it's name [**PAC**kage **MAN**ager, **R**emove, recur**S**ive, skip **D**ependancies checks], see Batocera Package Manager (pacman) for more infos.
- `pacman -Scc` : clears the entire cache of the pacman manager [**PAC**kage **MAN**ager, **S**ync, clear **C**ache (extra **c** forces a complete clear)], see Batocera Package Manager (pacman) for more infos.
- `pacman -Sy` : Updates the pacman database [**PAC**kage **MAN**ager, **S**ync (extra **y** refreshes the database)], see Batocera Package Manager (pacman) for more infos.

Logging to a file

Sometimes, you might prefer having the output of a command inside a separated text file instead of reading through the command line interface. to do that you can use the > and >> symbols followed by the path of a filename.

for exemple, the command `ls` gives you the list of all files and folders in your current working directory, if you want to gather this inside a text file named `list-files.txt` at `/userdata/system`, you simply need to use:

- `ls > /userdata/system/list-files.txt`, the command will return nothing, and instead the files will be listed inside a new file called list-files.txt located in /userdata/system. Running the command again will replace the content of list-files.txt.
- `ls >> /userdata/system/list-files.txt` however will add the output of the command to the existing file, without removing the previous infos.

You can also pipe the output to another program by using the vertical line character (|). For example, `dmesg | less` will let you see a scrollable list of the output with the `[Up]`/`[Down]` arrow keys; `dmesg | more` will let you see a full page of the output at a time, moving forward with `[Spacebar]`. Both of these examples can be quit by pressing `[Q]`.

Miscellaneous scripts

- `batocera-screenshot` : Saves a **screenshot** of the current screen in the `/userdata/screenshots` folder.
- `batocera-record` : Starts recording the screen; `[Ctrl]+[C]` to stop.
- `batocera-overclock list` : shows current available oveclocking options (RPi and s922 only)
- `batocera-overclock set <value>` : set and save the selected overclock

  Overclocking your hardware could cause irreversible damage and/or erratic behavior, this is at your own risk. If any issues occur after setting this, this should be the first thing to be returned to default.

- `batocera sync list` : list storage devices that are capable of being synced to
- `batocera sync <storage UID>` : uses rsync to sync the current userdata to the `batocera/` folder on the selected storage device (NTFS not supported, FAT systems don't support syncing Bluetooth settings)
- `batocera-timezone get` : show the current configured timezone
- `batocera-timezone detect` : attempt to automatically guess your timezone
- `batocera-timezone set <timezone>` : manually set a timezone, timezones follow the `<country/continent>/<city/region>` format, eg. `batocera-timezone set Europe/Malta` or `etc/GMT+9`

Custom aliases

While not mandatory, it is good to know you can create aliases of commands, they let you launch a command with a simple keyword. One way to do this can be done by creating a text file in `/userdata/system`, that file must be named `.profile` : it will contain aliases commands and will execute them when Batocera is launched, so be careful of what you do.

The alias command syntax is as follow:

```
alias customname='du -sh /userdata/system/batocera.conf'
```

In this example, once batocera has been restarted, entering `customname` in the command line will do the same as entering `du -sh /userdata/system/batocera.conf` (in this example, it basically returns the size of the batocera.conf file in the command-line interface)

A more useful, yet complicated example, would be to try and use ffmpeg to save a screenshot of Batocera in the screenshots folder for x86_64 devices, as devices other than Raspberry Pi's don't have an equivalent of raspi2png. In this example I call the custom alias “pc2jpeg”.

```
alias pc2jpeg='ffmpeg -hide_banner -loglevel error -f x11grab -i :0.0 -
frames:v 1 /userdata/screenshots/$(date +%y-%m-%d_%H-%M-%S).jpg'
```

This commands does the following :

- `ffmpeg` : an command-line encoder included inside batocera.
- `-hide_banner` : prevents ffmpeg from printing the copyright notice when running this command.

- `-loglevel error` : will only alert in the command-line if there is an actual error preventing the command from working.
- `-f x11grab -i :0.0` : uses `x11grab` to capture the screen 0 (this lets you use the screen as the source).
- `-frames:v 1` : the number of video frames to capture.
- `/userdata/screenshots/$(date +%y-%m-%d_%H-%M-%S).jpg` : the full path to the file we want to save.
    - `$(date +%y-%m-%d_%H-%M-%S)` : executes the `date +%y-%m-%d_%H-%M-%S` command and reurns its result in the command line (for exemple, it will return `20-12-31_21-52-19` the 31st december of 2020 at 21h52m19s), so the path before would be read as `/userdata/screenshots/20-12-31_21-52-19.jpg`.

So by using the `pc2jpeg` custom command, a JPEG file will be created with a filename based off the date of the screenshot.

This functionality has since been integrated into the command `batocera-screenshot`. This example remains here to show you the syntax of alias.

Troubleshooting

Visit the relevant section in the troubleshooting page for further help.

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