Raspberry Pi Headless Setup

This document describes how to boot up a Raspberry Pi with the right operating system and network specifications. “Headless” in this sense means without an additional monitor and keyboard, which is common for Raspberries used as an IoT Edge Server. In general, having access to a small monitor and an external keyboard simplifies handling the device, also in regard to running software on it.

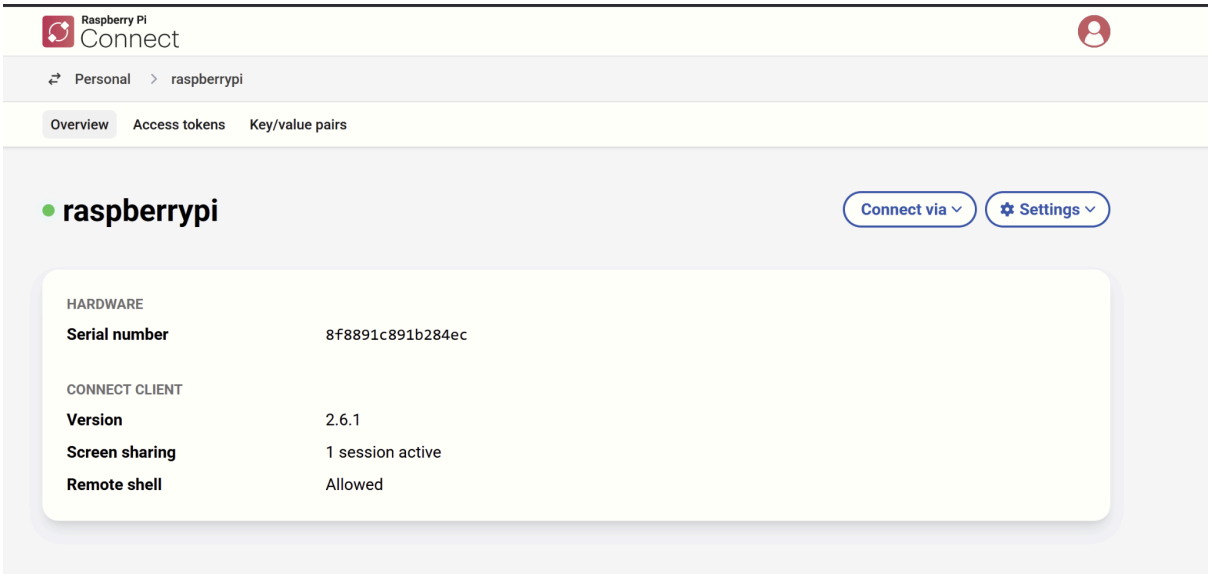
The raspberry does not come with a pre-installed operating system, therefore it needs a special boot media. Usually this is an external microSD card, on which the image is written by the Raspberry imager app, available to download on the official website. While it is theoretically possible to boot from an USB Stick or over the network, the method from a microSD card is the easiest and most reliable, as for example a too old USB stick might not be fast enough to boot up properly. Most modern computers do not have a SD or microSD card slot anymore, so it is advisable to have a microSD to USB adapter at hand to be able to connect the card to the laptop. For this I used my personal microSD card and adapter, but it would be worth considering to get one specific for the raspberry.

The following link leads to the official raspberry documentation and guides through the setup process: https://www.raspberrypi.com/documentation/computers/getting-started.html

A few notes considering the setup process:

- Select the model Raspberry PI 5
- Raspberry Pi OS (64 bit)
- Select storage device (be aware that the image setup formats the sd card and deletes everything on it)
- Select hostname (e.g. raspberrypi)
- Localization to used keyboard and timezone
- Select user name and password (e.g. test and test)
- WIFI information (an idea is to use a mobile hotspot, as eduroam at ZUT needs an additional certificate and can’t be configured via this install client)
- Allow SSH with password
- Activate Raspberry Connect and link with account (highly recommend)
- Check summary and write image (takes 5 to 10 minutes)

Raspberry Connect is the official tool to remotely connect to a Raspberry Pi, and automatically builds the connection needed for a remote screen or access to the shell, as long as the model has internet access. This is especially convenient for a setup without a monitor available, as the graphical interface can be accessed from a laptop via Connect. This is also possible with tools like VNC Viewer and remotely SSH-connecting to the Pi, but Connect handles the technical networking without the need for the user to intervene, making it a useful tool. If everything is set up correctly in the operating system image, after a few minutes of booting up (inserting the microSD card and after that plugging in the power cable) the device should be visible in the Connect overview.



From there, the remote screen can be accessed, but this needs a good internet connection. Usually, if the session timeout or the error “Connect is not installed on the device” appears, it is because of a too weak internet connection. To connect to eduroam, one needs to follow the guidelines of the specific university. The connection at ZUT needs a special certificate, which can be downloaded on the website and via an USB stick transferred to the Raspberry Pi. In the settings, the advanced WIFI options can be set. This is unfortunately tricky to configure via the remote shell, as a change in WIFI connection will cause the remote session to end. For the username and password the personal credentials should be used. After successfully installing the operating system, the Raspberry Pi can run the programs the user wants. The installed linux is based on Debian, and with linux packet managers the required packages can easily be installed (e.g. Python).