

Running a Carpentries Workshop without the Internet

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Abstract

CarpentriesOffline (<https://carpentriesoffline.org>) is an out of the box solution for running a Carpentries workshop from a single device such as a Raspberry Pi (RPi), old laptop or even a dedicated server. It is intended for use in environments where there is limited or no internet access. Everything needed to run the workshop including course notes, data files, software downloads, a Git server, etherpad and a JupyterHub server are provided by the CarpentriesOffline system. It can also provide a backup environment for those with better connectivity in the event of the Carpentries website, etherpad, GitHub etc suffering an outage.

Raspberry Pi Solution



Figure 1. A Raspberry Pi Zero running CarpentriesOffline on RPi OS and powered with a USB Power Bank - tested at RSECon2022

FlashDrive Solution



Figure 2. A bootable flashdrive with Debian based Slax Linux and everything needed to turn a laptop into an access point and a web server

The miniHPC

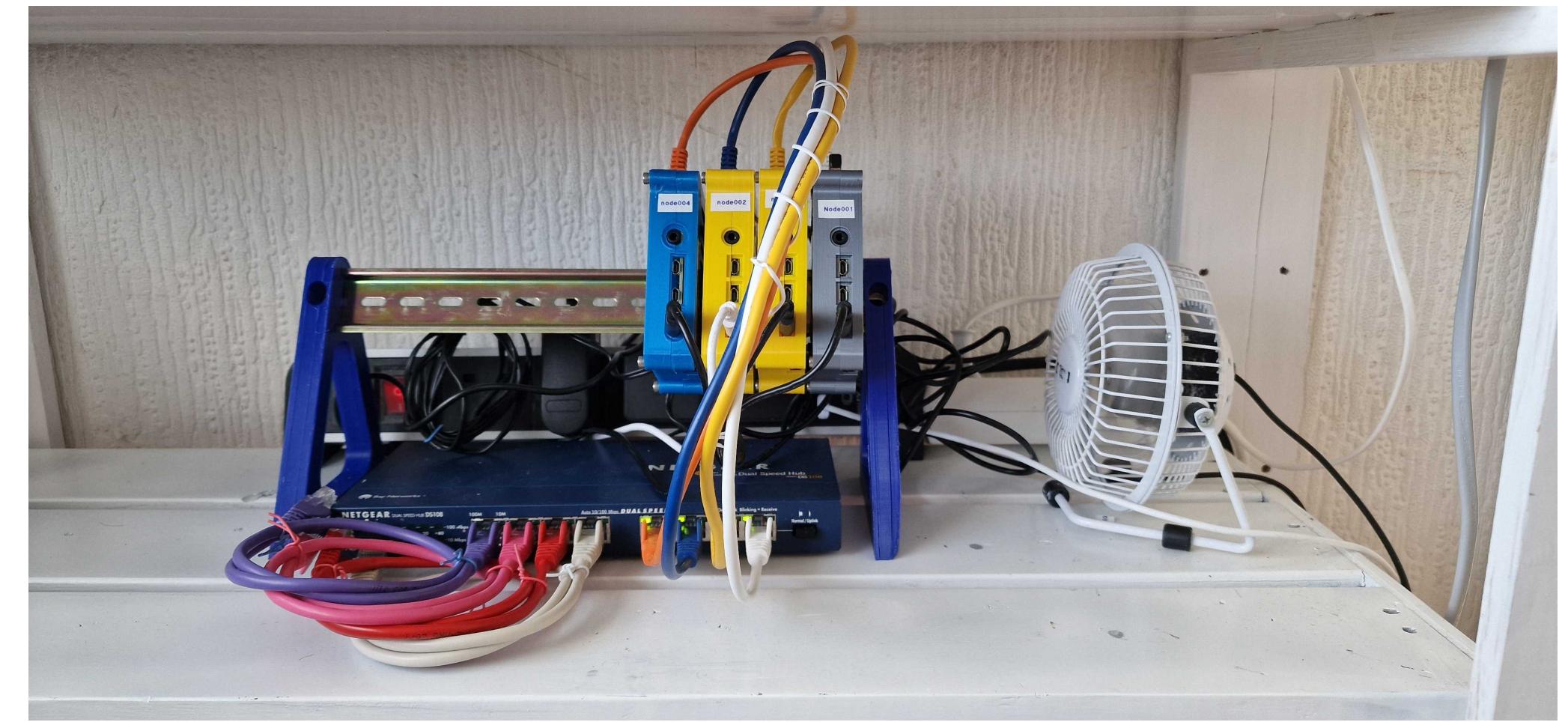


Figure 4. Pixie the prototype miniHPC built from RPi4s using pre-owned RPi 4s. For the next iteration we bought Rock Pi 4C+

Carpentries in your Pocket

RPis are credit card sized computers that are used in education and by hobbyists to learn about computing and electronics. These little computers have many applications including being used as workstations and servers. For CarpentriesOffline we turn a single Raspberry Pi into a WiFi access point as well as a web server that serves Carpentries lessons, offers all the downloads required for learners to install on their computers as well as Gitea which is a replacement service for GitHub. An image that can be written to a microSD card is available for download. Once the image is written to the microSD card it can be inserted into the RPi and with no further effort the RPi should boot into a server offering all the above mentioned services.

Server Software for CarpentriesOffline

Table 1. Pebble the RockPi version

Item
Apache Web Server
Gitea
MinICRAN
Carpentries Lessons
Software downloads

Carpentries on a Stick

RPis are relatively cheap but in communities where Internet access is problematic it is likely that they are either not available or still costly. Most researchers will already have either a laptop of their own or one provided by their institution. Most laptops can boot from a USB device such as a flashdrive. As with the microSD card image for the RPi we have created an image that can be written to a flashdrive and allows the computer to boot into a Linux distro (Debian based Slax) which turns the computer into a server with the same functionality provided on the microSD card. For the moment we only have an image for PCs, but we are looking into creating an option for Macs.

CarpentriesOffline Home Page

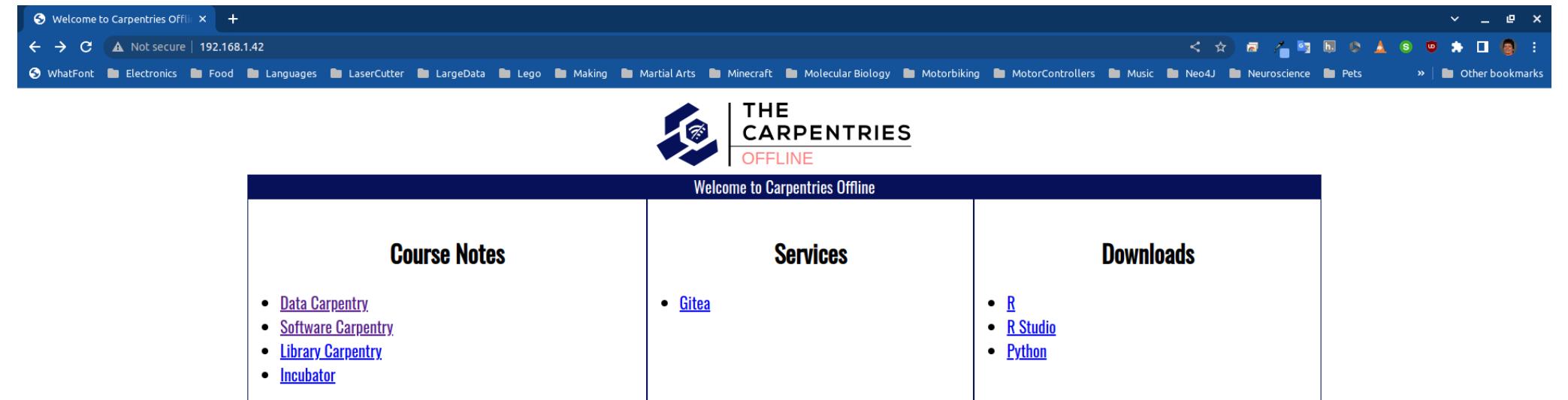


Figure 3. The CarpentriesOffline Home Page allows learners to download everything they need as well as provide Gitea to replace GitHub.

Why?

Why build yet another miniHPC? There are quite a few around already. However, none of these are aimed at continuous use in training and prototyping. We aim to provide detailed instructions for building a miniHPC but then also Carpentries style lessons for instructors to use these miniHPCs in workshops. The advantages are many:

- **More control** over the hardware.
- **Obtaining user accounts** on HPCs can be difficult and often learners do not register in time.
- **Avoids extra load** on a real HPC that is being used for research.
- **Visible hardware** makes the concept of an HPC less abstract to learners.
- **Resource limits** are more apparent.

Bills of Material

Table 2. Pebble the RockPi version

Item	Qty	Product	Purpose
RockPi 4C+	8	Slurm	Job Scheduler
RockPi 4SE	1	lmod	Module System
Power supply	1	MPICH	HPC MPI
10 port switch	1	Ansible	Deployment
4 port strip plug	1	PXE	Boot over Network
Short Cat 6 10baseT	9	NFS	Network File System
Dual Cooling fan	1	Munge	Authentication
DIN Rail	1	DHCP	IP Allocation
3D printed rail stand	2	EasyBuild	Software Building
3D printed DIN rail cases	9		

Table 3. Software
Slurm
lmod
MPICH
Ansible
PXE
NFS
Munge
DHCP
EasyBuild