# Cloudmesh Raspberry PI Cluster Case

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## Contents



# 1 Raspbery PI 5 node Cluster Case

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TODO: move designs form

https://drive.google.com/drive/folders/1D8YjtOAh8FemuruPYPWuV4zYNxszW_wN

to this github, only keep final design here.

## 1.1 Abstract

When we started designing the case we had only a few elements we wanted to incorperate. Our idea was to make an easily replicatable, easy to assemble case that could be made with as little pieces as possible while being as flexable as possible. We also wanted to keep it open source so that anyone, anywhere could use our case without having to get past some sort of paywall first. Another goal was to make the case as easy to assemble as possible, not using glue and as few little parts as possible, while making it structurally sound enough to actually protect the case. Finally we wanted to design the cases to integrate well into a shelf that could connect many clusters together.

- case for cluster
- iu course
- case easy to assmple no screws, glue

- easy replicatable
- open source
- modifiable
- integrated into box product
- (integrated into shelf)

## 1.2 Introduction

Our first big hurdle in the design process was desiding on an initial design and learning our modeling program well enough to actually build it. First, we brainstormed a fairly simple first design, then we decided to jump in and start modeling. Our program of choice, OpenSCAD took a little time to get used to, because of the program first orientation, but we eventually learned enough to build our first prototype. It was very simple compared to the most current versions now, but all things considered was very impressive, and it had many of the elements still central to our current design. We had two major innovations present in our first prototypes, in one of them, the peg and slot system still used today, and the other, the smaller interlocking pieces used to distribute strain in the case. They had none of the refinements of the newer prototypes, but were a very important and large step in the process. These prototypes started what has been the most used and most important process in the design of the case: design, build, test, analyze, repeat. This process allowed us to rapidly design and test, moving the case closer and closer to completion, removing problems and adressing the requirements along the way.

## 1.3 Requirements

There were a few requirements presented to us at the beginning of the design process: The cluster had to hold at least 5 Raspberry Pi 3 computers as well as a network hub and a power brick, it could not use any glue to stay together, it had to fully incase all parts while having holes for any ports and ventilation, it had to keep all components secure and safe, and the code had to use only variables to define the parts so any change could be easy to adjust to. While there were other components that would be nice to have, these were the main pieces that had to be incorperated.

## 1.4 Design

The list of parts not including the custom made lazer cut parts is provided in Table 1.

COMMENT: Not sure what else to put here. Should it be a description of the design process, a description of the current design, or none of the above? Thanks for the clarification.

Table 1: Parts list as copied from https://github.com/cloudmesh-community/book/blob/master/chapters/pi/case.md

| Price | Description | URL |
|---|---|---|
| $29.99 | Anker 60W 6-Port USB Wall Charger, PowerPort 6 for iPhone 7 / 6s / Plus, iPad Pro / Air 2 / mini, Galaxy S7 / S6 / Edge / Plus, Note 5 / 4, LG, Nexus, HTC and More | link |
| $8.90 | Cat 6 Ethernet Cable 1 ft White (6 Pack) - Flat Internet Network Cable - Jadaol Cat 6 Computer Cable short - Cat6 Ethernet Patch Lan Cable With | link |
| $19.99 (1) | D-link 8-Port Unmanaged Gigabit Switch (GO-SW-8G) | link |
| $10.49 | SanDisk Ultra 32GB microSDHC UHS-I Card with Adapter, Grey/Red, Standard Packaging (SDSQUNC-032G-GN6MA) | link |
| $8.59 | Short USB Cable, OKRAY 10 Pack Colorful Micro USB 2.0 Charging Data Sync Cable Cord for Samsung, Android Phone and Tablet, Nexus, HTC, Nokia, LG, Sony, Many Digital Cameras-0.66ft (7.87 Inch) | link |
| $7.69 | 50 Pcs M2 x 20mm + 5mm Hex Hexagonal Threaded Spacer Support | link |
| $7.99 | Easycargo 15 pcs Raspberry Pi Heatsink Aluminum + Copper + 3M 8810 thermal conductive adhesive tape for cooling cooler Raspberry Pi 3, Pi 2, Pi Model B+ | link |
| $34.49 | Raspberry Pi 3 Model B Motherboard (you need at least 3 of them) | link |
| $59.99 (2) | 1TB drive | link |
| $15.19 | 64GB flash | link |
| $6.99 | HDMI Cable, Rankie 2-Pack 6FT Latest Standard HDMI 2.0 HDTV Cable - Supports Ethernet, 3D, 4K and Audio Return (Black) - R1108 | link |
| $12.99 | AUKEY USB C Adapter, USB C to USB 3.0 Adapter Aluminum 2 Pack for Samsung Note 8 S8 S8+, Google Pixel 2 XL, MacBook Pro, Nexus 6P 5X, LG G5 V20 (Gray) | link |
| $19.19 | For Raspberry Pi 3 2 TFT LCD Display, kuman 3.5 Inch 480x320 TFT Touch Screen Monitor for Raspberry Pi Model B B+ A+ A Module SPI Interface with Touch Pen SC06 | link |

(1) items were replaced with similar

(2) item was not available

### 1.5 Alternatives

There were a few alternatives we looked into for creating the case before settling on the current solution.

- This program creates basic boxes based on any dimension provided by the user.
  - https://www.festi.info/boxes.py/

### 1.6 Manufacturing Facilities

### 1.7 Product

Here is the progression of our design, from the first prototype to our most recent model.

COMMENT: Not sure if I should put anything else in this section

- box with stuff in it

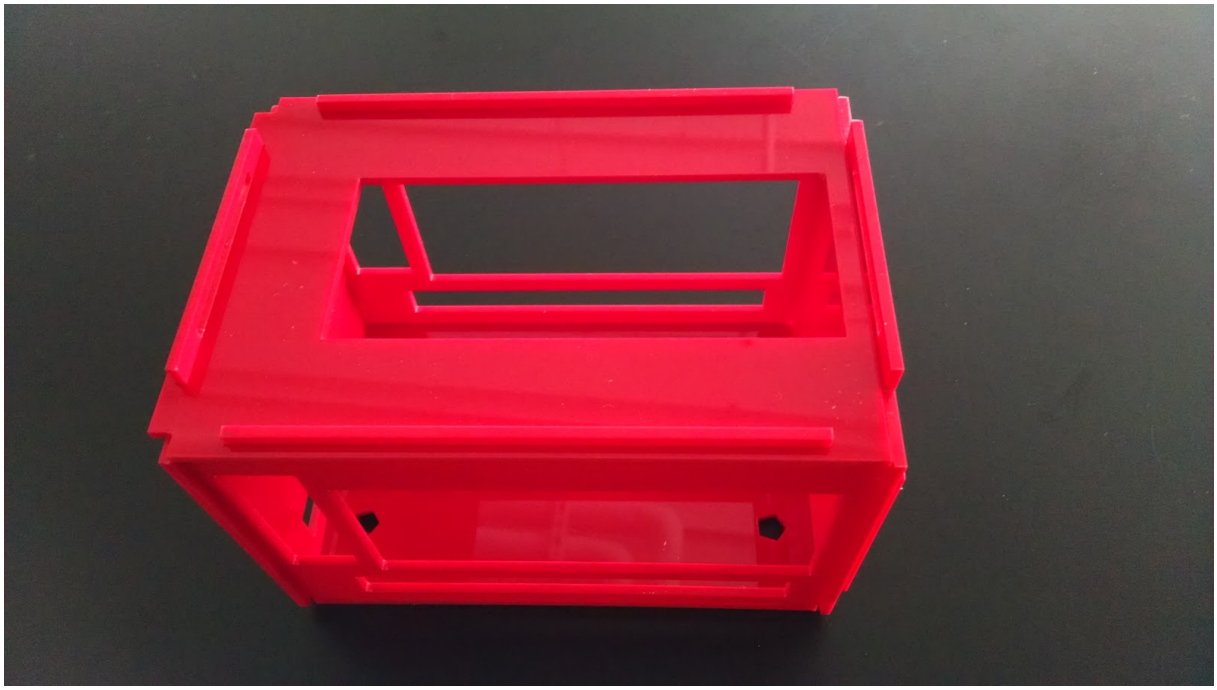

**Figure 1:** Prototype 1

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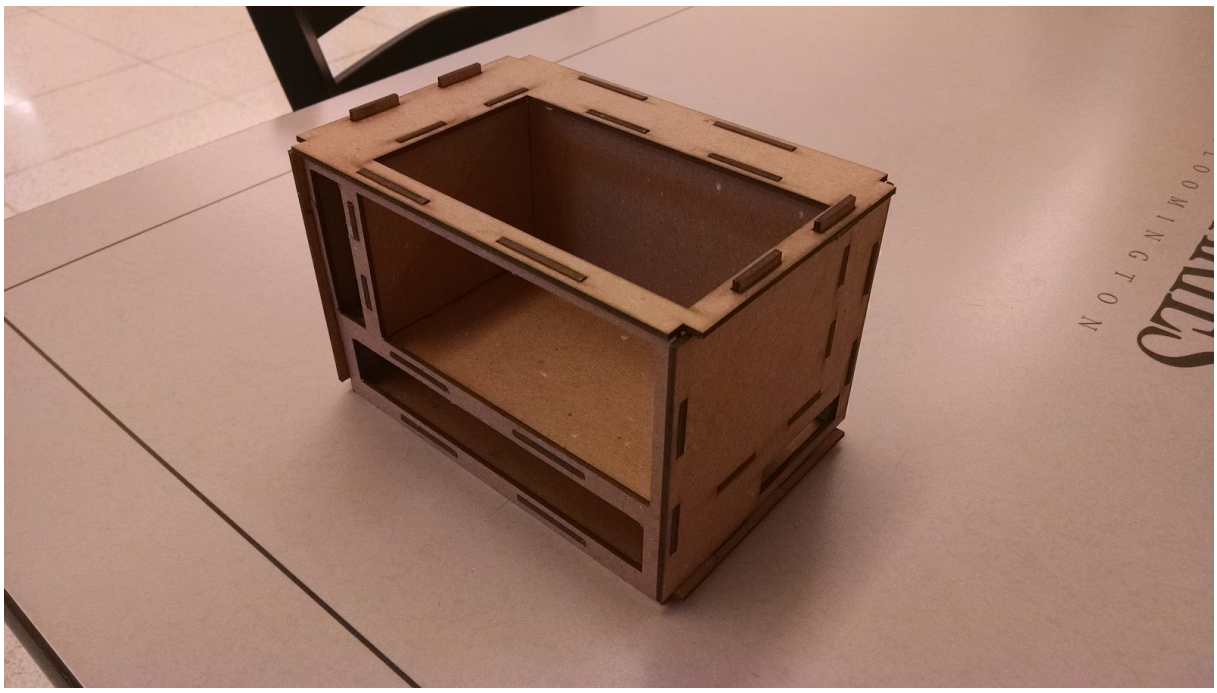

**Figure 2:** Prototype 2

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### 1.8 Future work

We will continue to work on the current design, but it is nearing completion, and we have a few more related projects for the future: * 19 inch rack for 40 nodes via bitscope, https://www.festi.info/boxes.py/Rack19Box * Shelf for 5 Pi cases.

COMMENT: Should I add more here?

### 1.9 Refernces

- Other cases are at https://github.com/cloudmesh-community/book/blob/master/chapters/pi/case.md