

ARM Cluster: The Research Tool

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Which computer should we use?
The Raspberry Pi 2B or the ODROID XU4?

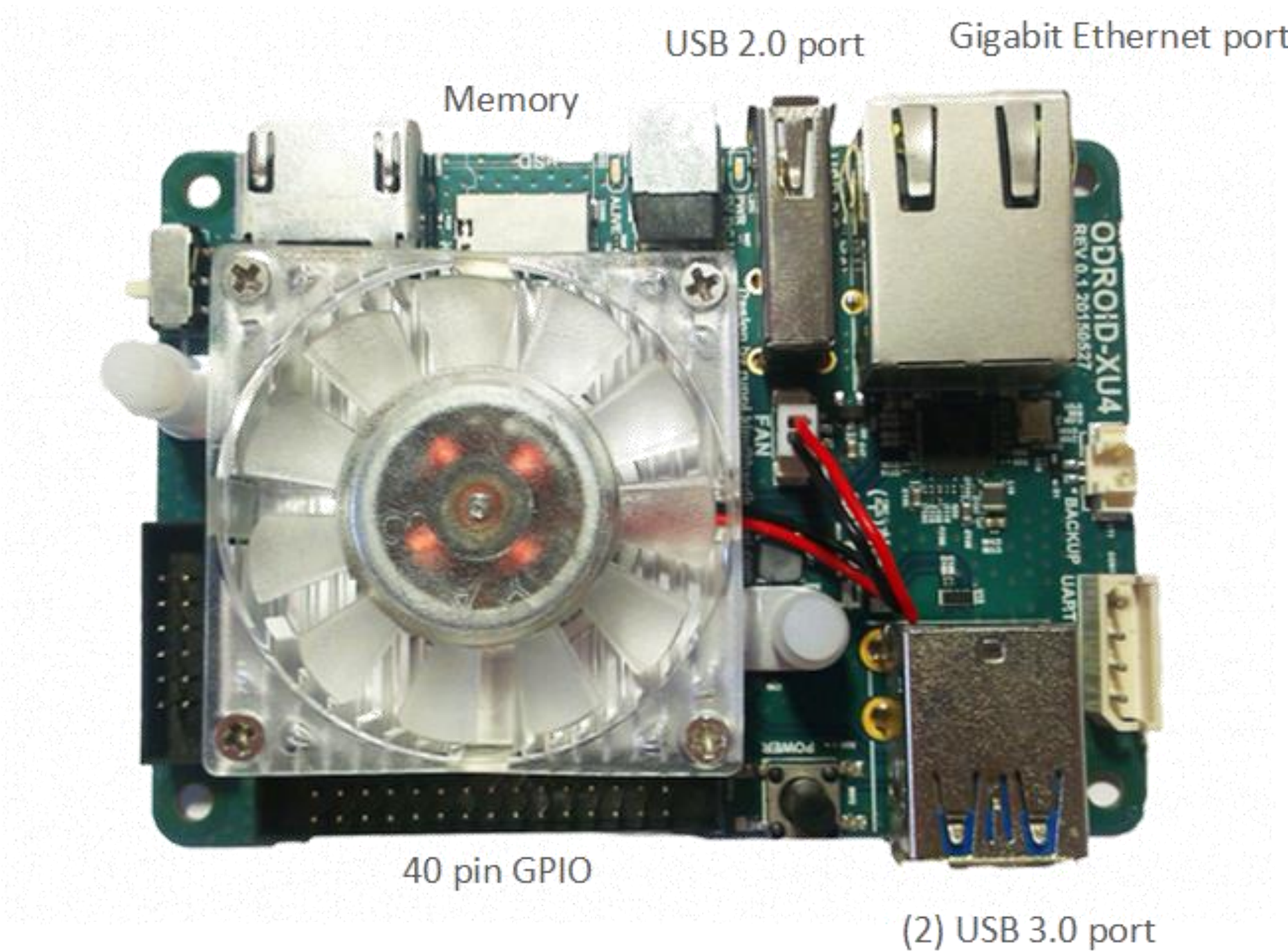
LENGTH OF TIME (SECONDS)				
DEVICE	Addition	Multiplication	Division	Sine
ODROID-XU4	29.925	31.341	37.032	227.40
RASPBERRY PI 2B	221.645	221.034	29.204	1468.63

GIGAFLOPS				
DEVICE	Addition	Multiplication	Division	Sine
ODROID-XU4	0.311	0.297	0.251	0.0410
RASPBERRY PI 2B	0.0420	0.0421	0.0313	0.00634

GIGAFLOPS PER DOLLAR PER WATTS				
DEVICE	Addition	Multiplication	Division	Sine
ODROID-XU4	0.00028	0.000268	0.000226	0.0000369
RASPBERRY PI 2B	0.0003	0.0003	0.000224	0.0000453

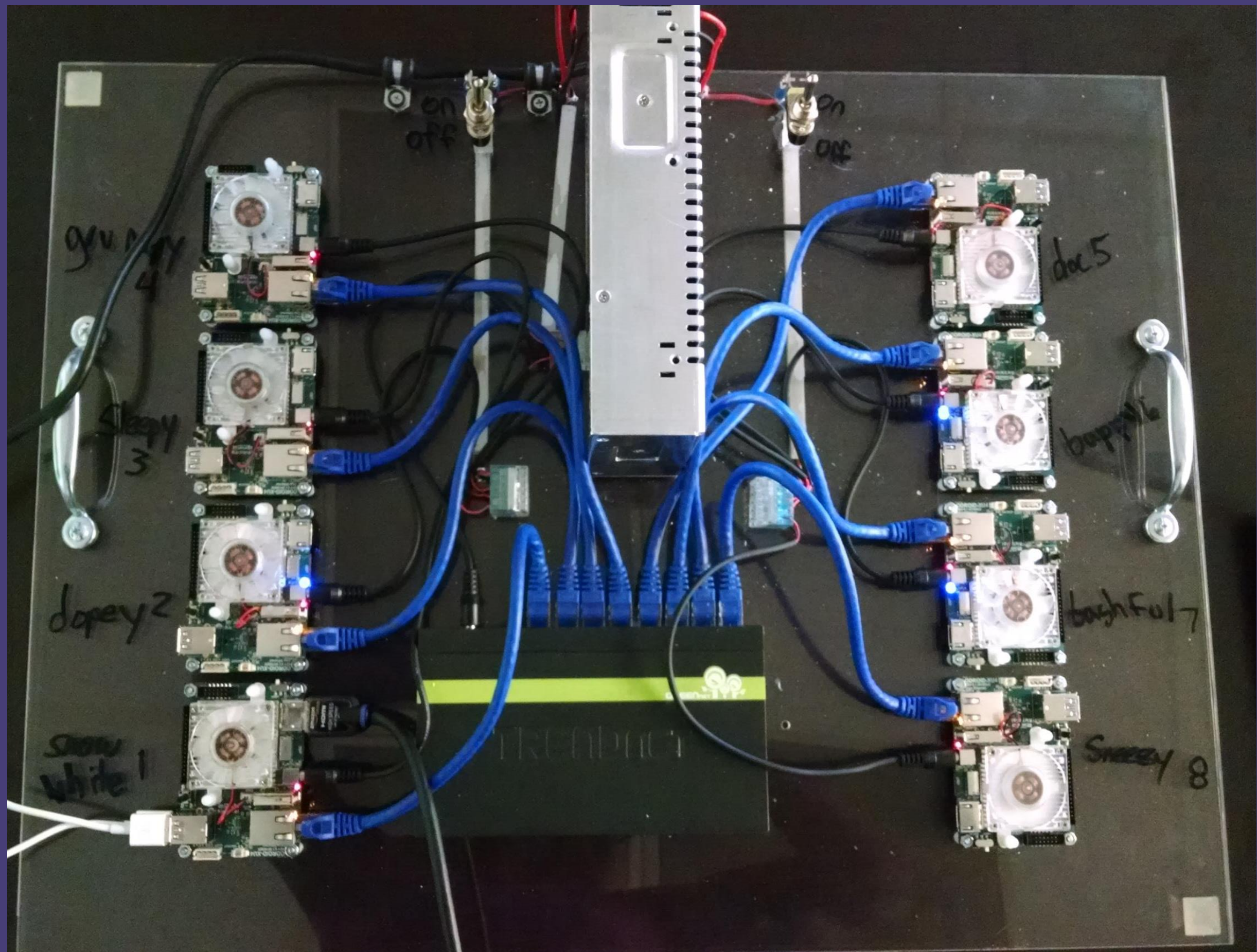
ODROID XU4

2 x USB 3.0 Host
1 x USB 2.0 Host
Gigabit Ethernet Port
2 GB RAM
Added 16 GB storage
7.4 x faster than Pi 2B

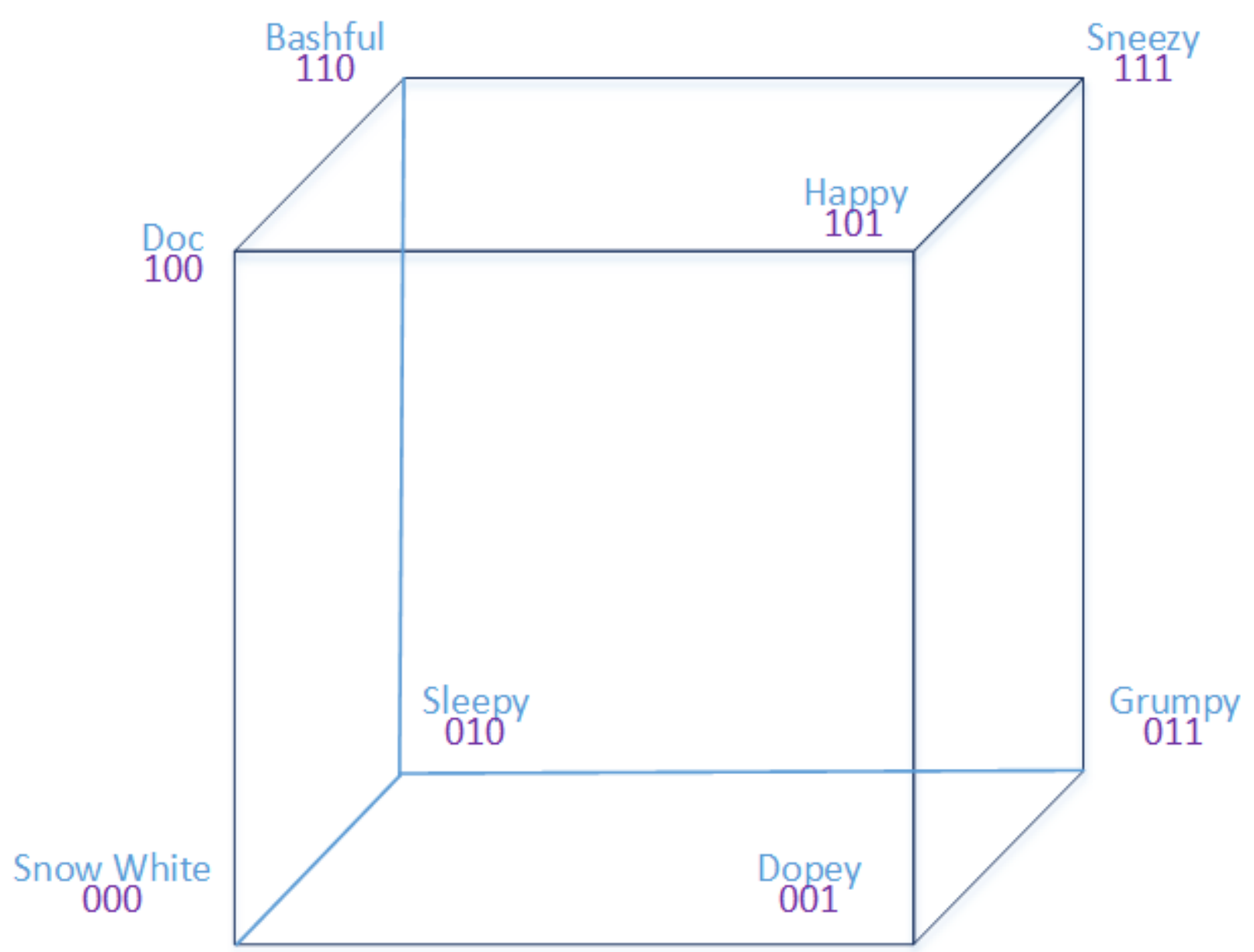
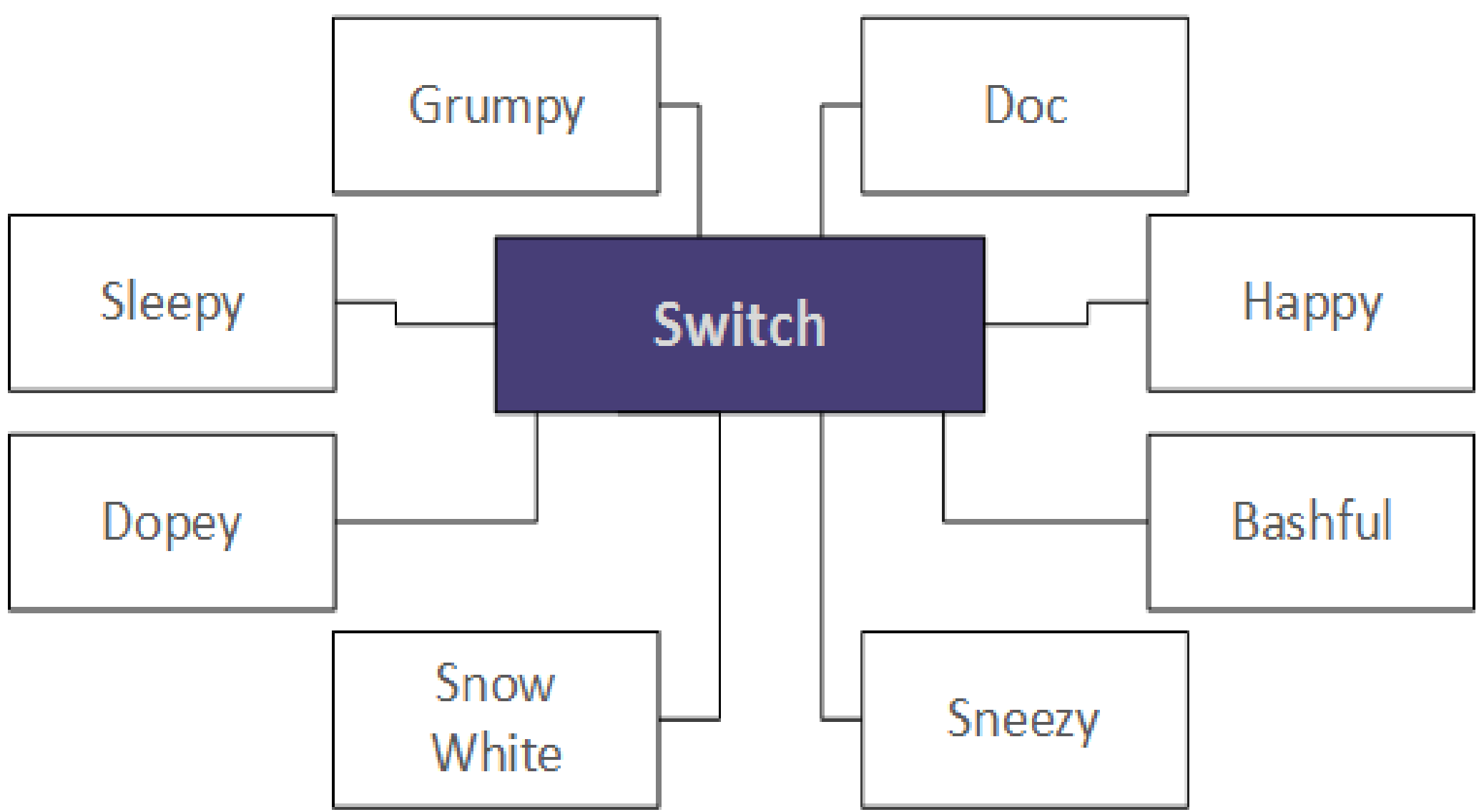


Mission

The fastest and most efficient ARM cluster of single-board computers



How should we connect the ODROIDS?



How do we communicate?

192.168.0.2
192.168.0.3

Snow
White

192.168.0.1

IP Routing Table

A protocol with the path of data to travel across the network. The routing table tells the data which ODROID to travel to though its IP address.

```
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
source-directory /etc/network/interfaces.d

auto eth0
iface eth0 inet static
    address 192.168.0.11
    netmask 255.255.255.0
    up route add -net 192.168.0.10 netmask 255.255.255.255 gw 192.168.0.11
    up route add -net 192.168.0.9 netmask 255.255.255.255 gw 192.168.0.11
    up route add -net 192.168.0.8 netmask 255.255.255.255 gw 192.168.0.10
    up route add -net 192.168.0.7 netmask 255.255.255.255 gw 192.168.0.10

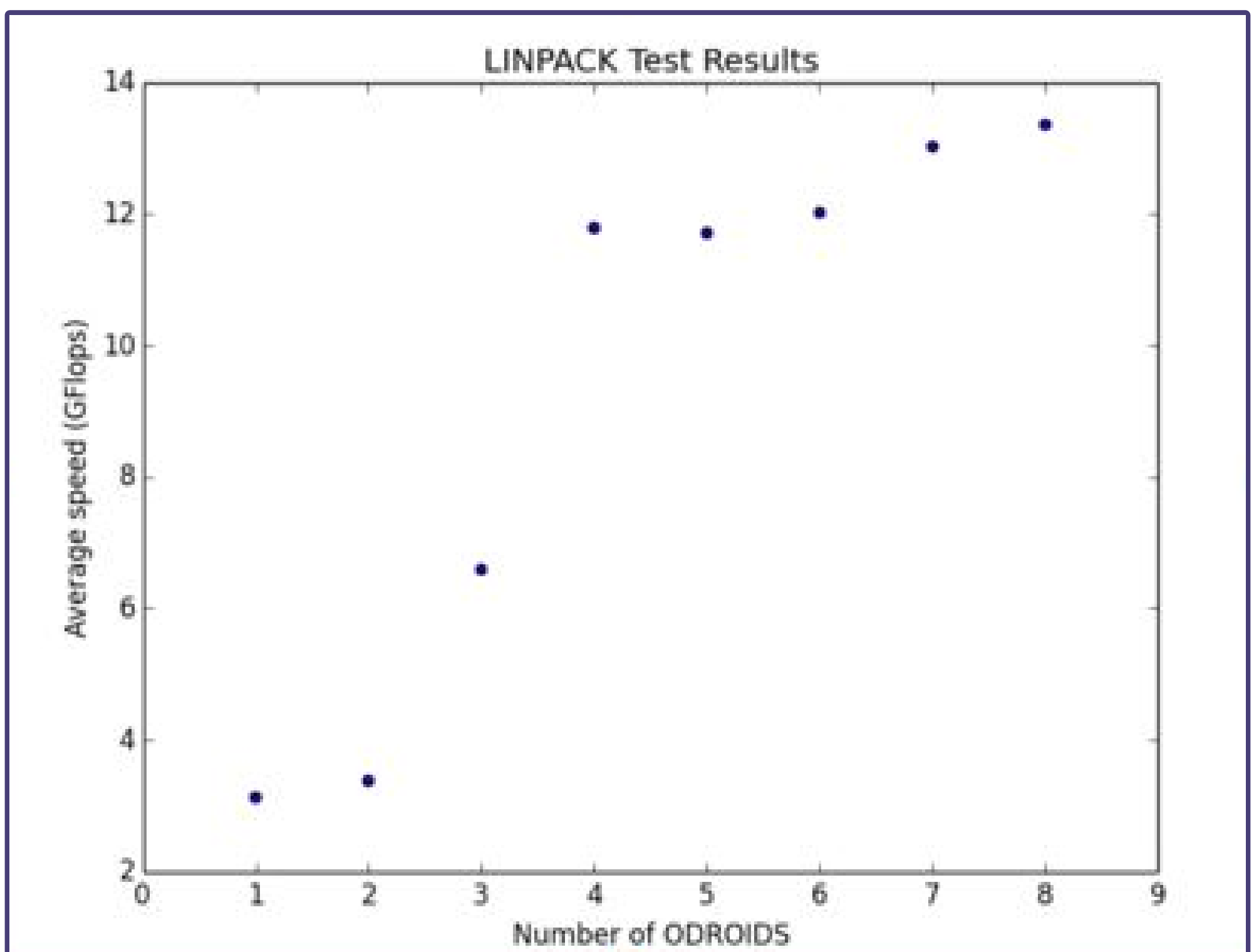
auto eth2
iface eth2 inet static
    address 192.168.0.12
    netmask 255.255.255.0
    up route add -net 192.168.0.13 netmask 255.255.255.255 gw 192.168.0.12
```

How do we benchmark our cluster?

HPLinpack Benchmark

Measures the computing power by solving linear algebra in parallel on the system.

How fast is our cluster?



Tools

LINPACK | C/C++ | WiringPi | GPIO cables | Breadboard | USB cables | Ethernet cables | USB to Ethernet | Python | PyPlot | OpenMPI | MPICH | Ubuntu Linux | Bash