Securing the datacenter with IoT

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Economist's perspective

Real sustainable growth does not stem from new resources, but from existing ones rearranged to make them more valuable.

- Paul Romer, Economist @ NY University

Agenda

Introduction
IoT all the things
Achievement unlocked
Building the hack

Live Demo
Real-time alerts
Supported by Pimoroni

Feedback
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Github repo

IoT all the things

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Achievement unlocked

Build a Pi cluster with Docker Swarm

Combine the power and resources of your Raspberry Pis by building a Swarm with Docker

Alex Ellis

Docker is a framework and toolchain used to configure, build and deploy containers on Linux. Containers provide a means to package up an application and all its dependencies into a single unit. This makes them easy to share and ship anywhere, giving a lightweight and repeatable environment.

Each application runs in its own isolated space sharing the host's kernel and resources, in contrast to a virtual machine which needs to ship with a full operating system. A Docker container can be started or stopped within a second, and can scale to large numbers while having minimum overhead on the host's resources.

The Docker community has built out a clustering solution called Swarm which, as of version 1.0, is claimed to be "production ready". Our single Raspberry Pi has 1GB RAM and four cores, but given five boards we have 20 cores and 5GB RAM available. Swarm can help us distribute our load across them.

Get ready to install Arch Linux, compile Docker 1.9.1 from source, build some images and then start up your own swarm for the first time.

01 Install Arch Linux to an SD card

Go to Arch Linux ARM's landing page for the Pi 2 and click the Installation tab (bit.ly/1SyrOqU). You will need to carry out some manual steps on a Linux computer. Follow the instructions to first download the base system target archive. Next, partition the card and create vfat (boot) and ext4 (root) filesystems. Then, expand the base system onto the card. Finally, unmount the partitions. This will take a while as the card finishes syncing.

02 Configure the users

Once the Pi has booted up you can log in with a keyboard as root/root and then change the password. You may also want to remove the standard user account called "alarm" and create your own. Here we've used "ud" as our account name.

```
# passwd root
# useradd ud -m -s /bin/bash -G wheel
# passwd ud
# userdel alarm
```

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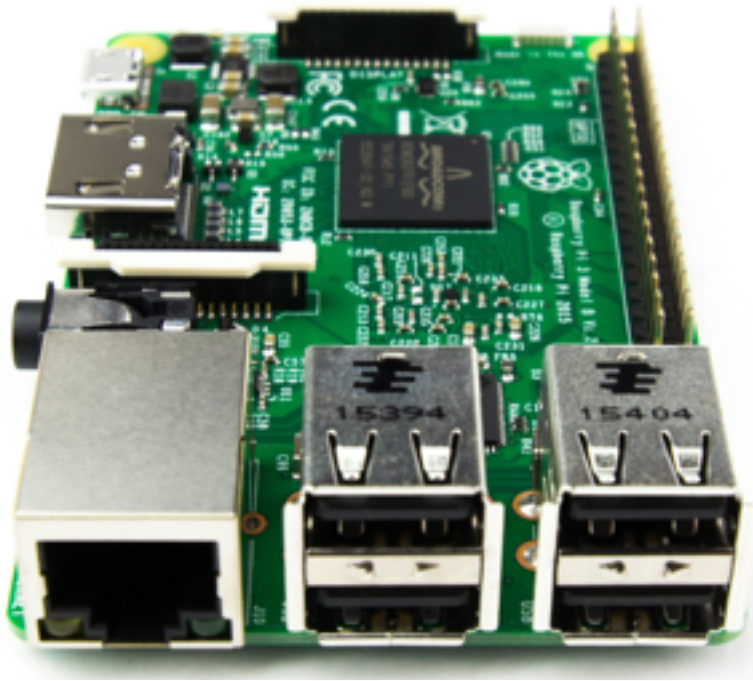
Cool Hacks Contest

Building the hack

Putting the Micro in Microservices

Pi Zero 5 USD micro-computer

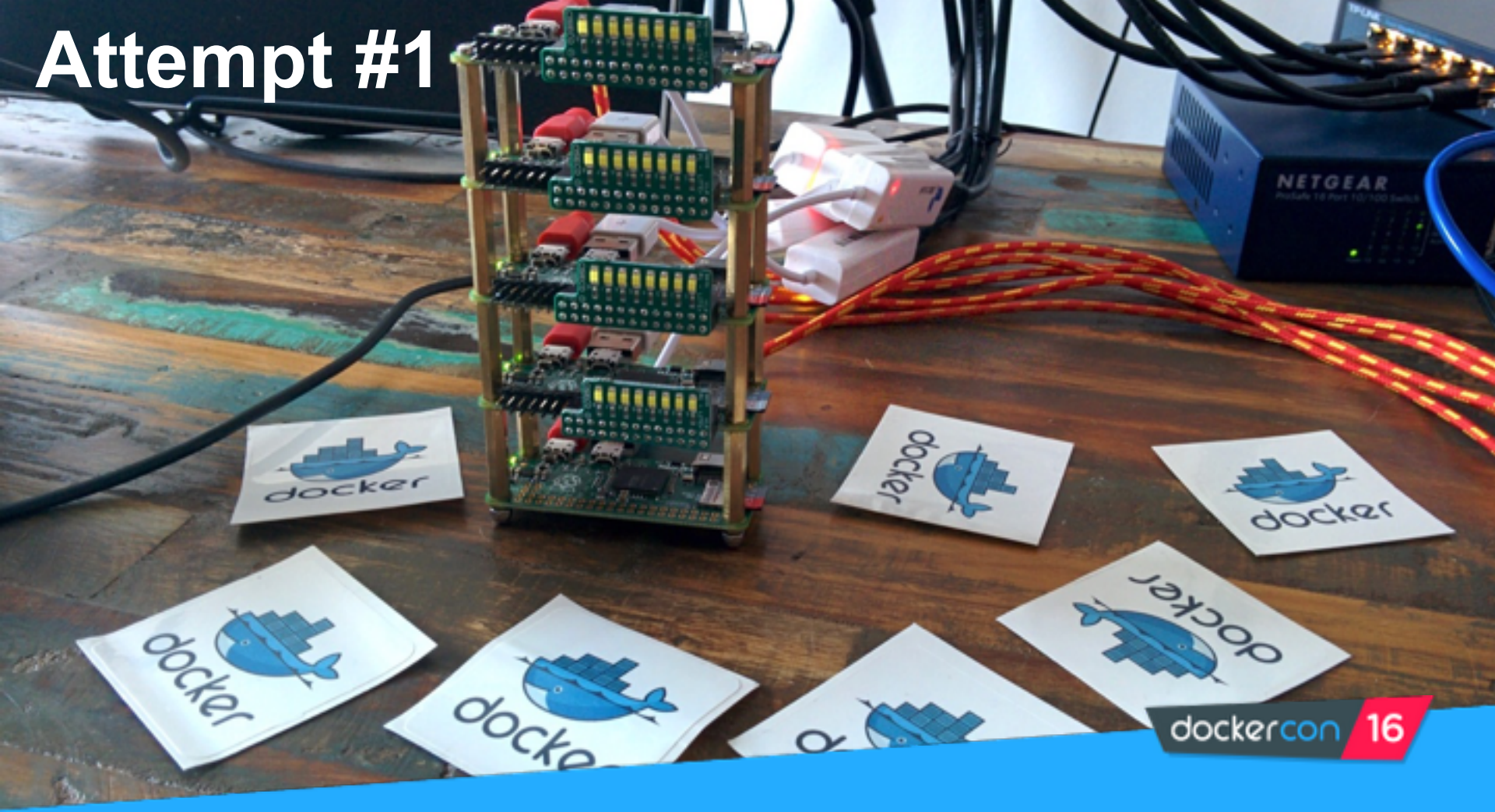
- 1GHz processor
- 512MB RAM



Pi 2/3 4-5x cost

- 4x 1.2GHz processor
- 1GB RAM

Attempt #1



@solomonstre

pimoroni
@pimoroni

Following

@Gadgetoid @alexellisuk @guru Come visit us if you'd like to Alex!

5:04 PM - 22 May 2016




Reply to @pimoroni @Gadgetoid @guru

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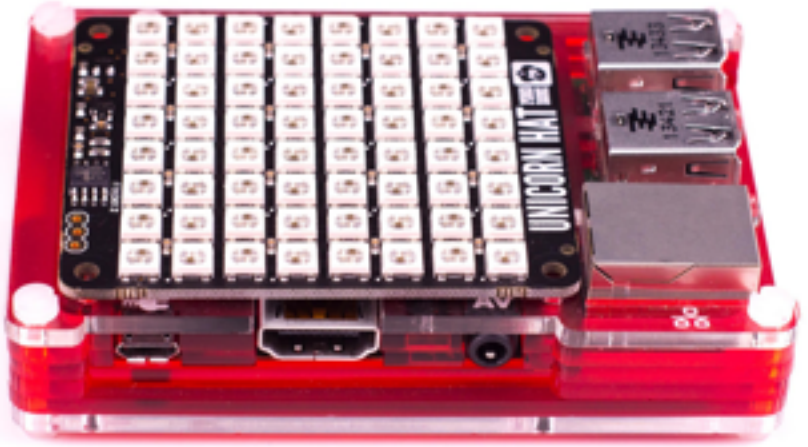
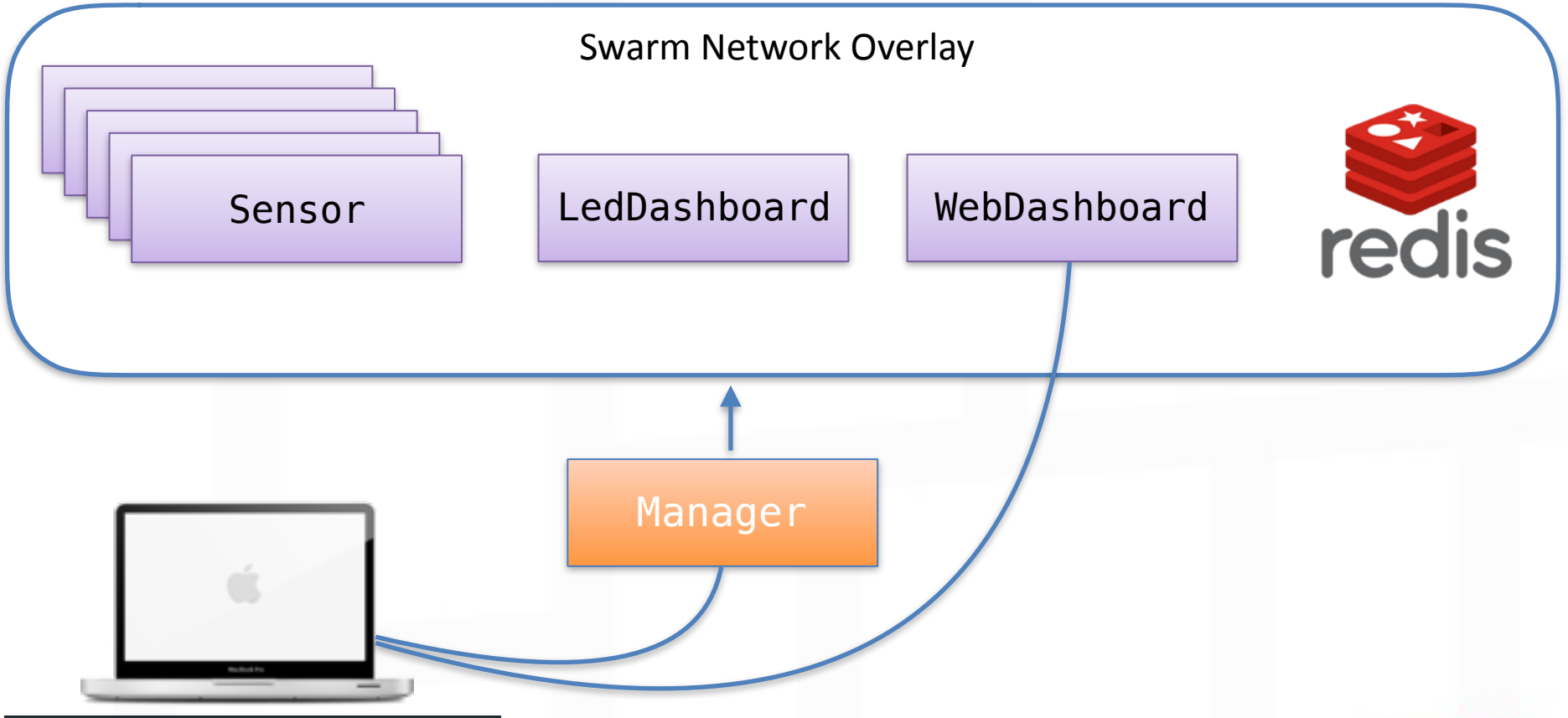
Building a new hack

Custom hardware from Pimoroni



Building a new hack

Software


Swarm Network Overlay
Sensor
LedDashboard
WebDashboard
redis
Manager
$ docker-compose up

enviro-pHAT Sensor

KVPs and pub/sub

e6ca8139.live

e6ca8139.temp

e6ca8139.temp.baseline

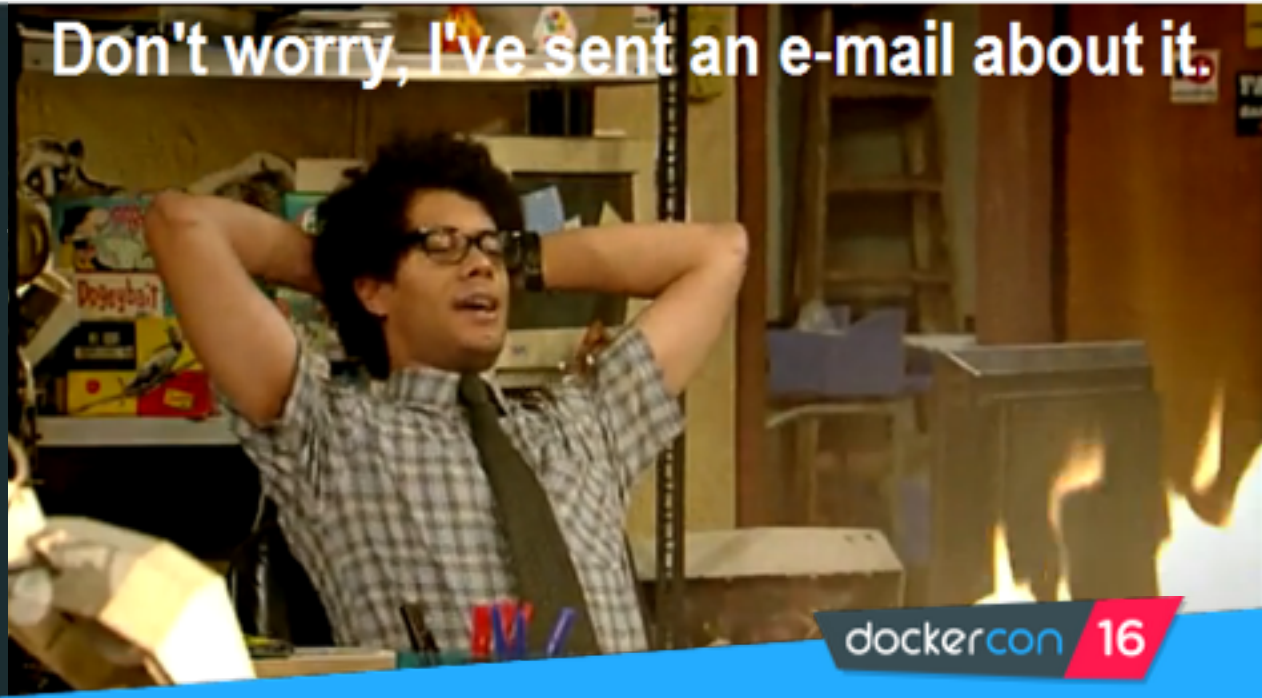
e6ca8139.motion

Demo

```
$ docker info

$ docker-compose up
Creating services...

$ docker-compose \
scale sensor=4
Creating sensor_2..
Creating sensor_3..
Creating sensor_4..
```



Q&A

@alexellisuk

github.com/alexellis/datacenter-sensor

“We only expected to sell a few thousand Raspberry Pis”

— Eben Upton, CEO

Raspberry Pi Trading

8M units sold by Feb ‘16

Thank you!

@alexellisuk