Intel Do-It-Yourself Challenge Networking

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Galileo as a linux server

Boot from SD card

There's an embedded linux on the board,
but you can also boot from a microSD card.

Customize the Yocto build

There's reference Yocto builds on intel's website,
but you can also build your own Yocto
(sources and drivers are available, including for WiFi).

Network

There's an Ethernet port on the board (on a non-intel Arduino board, an Ethernet shield would cost 29e+VAT),
and PCI-e WiFi cards (laptop-style) can be plugged.

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We'll use …

OS

Ubuntu 12.04 LTS (other Oses are supported)

Galileo IDE and drivers

Intel Galileo Arduino SW (IDE and drivers)
https://communities.intel.com/docs/DOC-22226
Download the "Linux image for SD"

Micro SD card

The micro SD card is not provided in the box.
To plug the SD card on a PC, you'll need an adaptor.

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Preparing and booting the SD card

SD card

Format the micro SD Card

Connect the micro SD card to your PC, format as fat32.

Adapters

To connect the microSD to your PC, you can use :

> A SD-microSD adapter if you have a SD slot in your PC

> A USB-microSD adapter

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Boot

Boot loader

The Galileo board is using grub, a common tool.

How to boot

Plug the SD card in the slot of the Galileo board.

Plug the power supply, wait for the green LED, plug via USB.

What's working ?

You can still send sketches from the Arduino IDE, but you now have a linux running with included services and libraries like SSHd, bluez, nodejs, OpenCV.

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Enable networking

Ethernet

Procedure

We'll need to run a sketch from the Arduino IDE to :

> use the "Ethernet" package to enable the Ethernet port
> launch a ifup linux command with "system" to enable the interface.

Then your board will receive an IP address from your local DHCP server (usually your home router),
or will use the fixed IP you provided if DHCP doesn't work.

Then you'll be able to connect with ssh
and get rid of the IDE.

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Ethernet

Procedure

> Plug the Ethernet cable
> Copy/Paste the sketch on next slide to your IDE window
> Edit the MAC (sticker on your board) and IP values
> Validate and upload.
> Determine your IP address.
> ssh to you Galileo IP as root.

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Sketch to copy/paste

```
#include <SPI.h>
#include <Ethernet.h>
// MAC address for the Galileo (there's a sticker on the Ethernet connector)
byte mac[] = { 0x??, 0x??, 0x??, 0x??, 0x??, 0x?? };
//the IP address for the Galileo: (will be used if there's no DHCP server on your network)
byte ip[] = { ???, ???, ???, ??? };

void setup() {
delay(5000); //let the time time to open the serial monitor
Serial.println("Attempting to configure Ethernet using DHCP");
if (Ethernet.begin(mac) == 0) {
        Serial.begin(9600);
        Serial.println("Failed to configure Ethernet using DHCP");
        Serial.println("Attempting to configure Ethernet using Static IP");
        Ethernet.begin(mac, ip);
        Serial.println(" Please check ifconfig");
        }
system("ifup eth0"); // load Ethernet interface!
else Serial.println("Sounds good");
} }
void loop () {}
```

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What’s my IP ?

What's my IP address ?

Fixed IP

If you have no DHCP router and entered an IP, you have it.

Router info page

If you have a home router, you can consult the DHCP log.

Display ifconfig output

Run sketch from the following slide, it will :
> run the ifconfig linux command
> output the result in a file
> display the file content

Sketch to copy/paste

```
char output[500];
void setup(){
        Serial.begin(9600);
}

void loop(){
        system("ifconfig > log.txt");
        FILE *fp;
        fp = fopen("log.txt","r");
        while(fgets(output,500,fp) != NULL)
                Serial.println(output);
        fclose(fp);
        delay(5000);
}
```

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ssh

ssh

Serial log

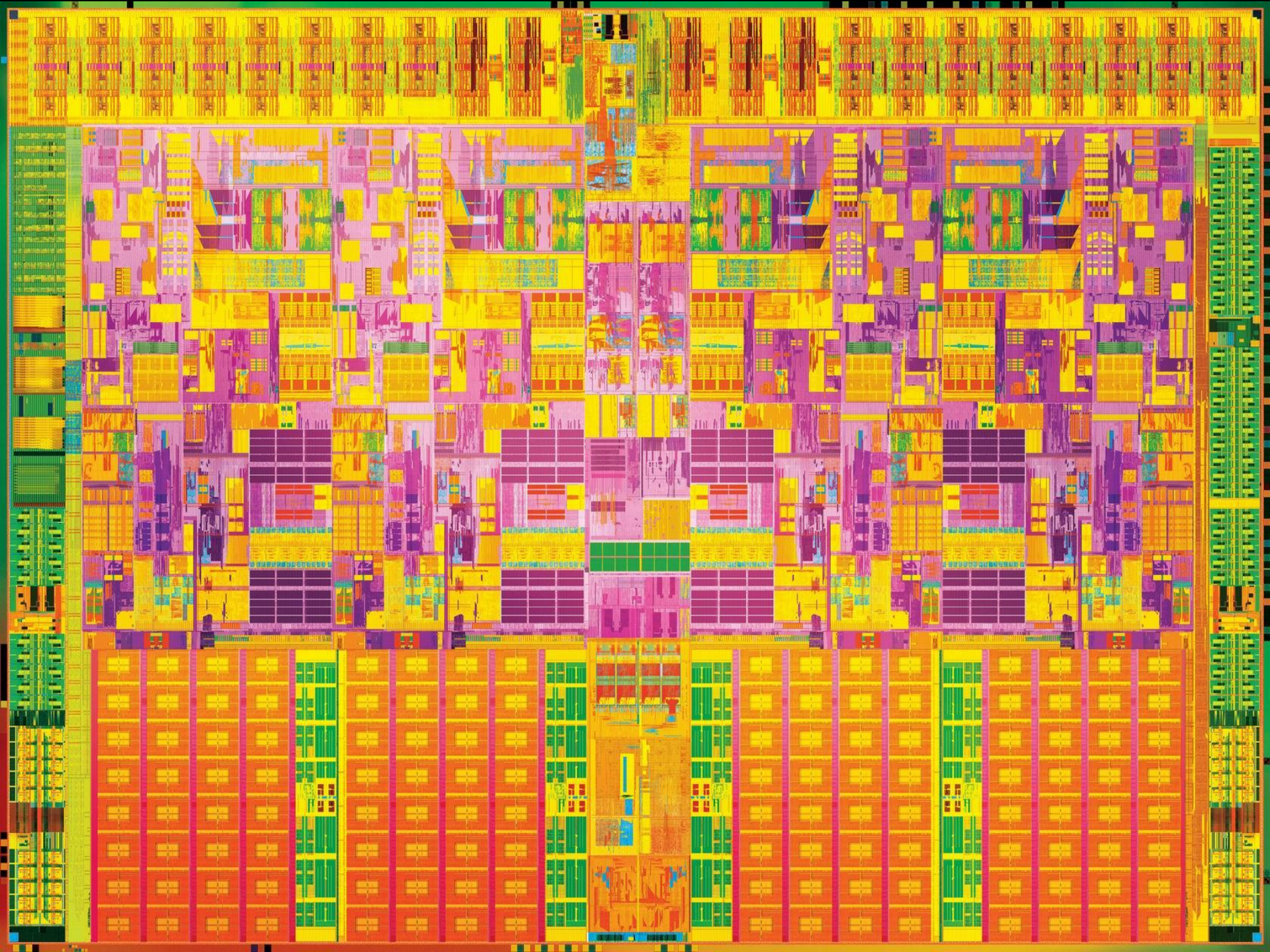
After running the sketch, your board should be connected to your LAN network.

ssh

ssh root@192.168.1.100 # replace with your IP
You should see :
root@clanton:~#

Reboot ?

If you reboot your card, you should be able to reconnect automatically. Wait at least 45 seconds for the OS to load the network and ssh service.



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