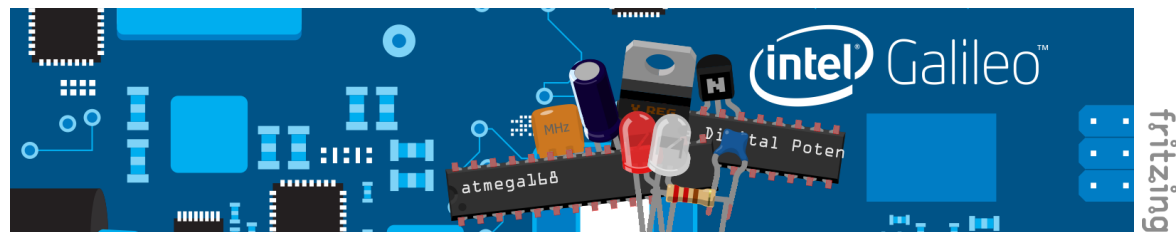


# Module 3: Web Server

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Monday September 16<sup>th</sup> 2014

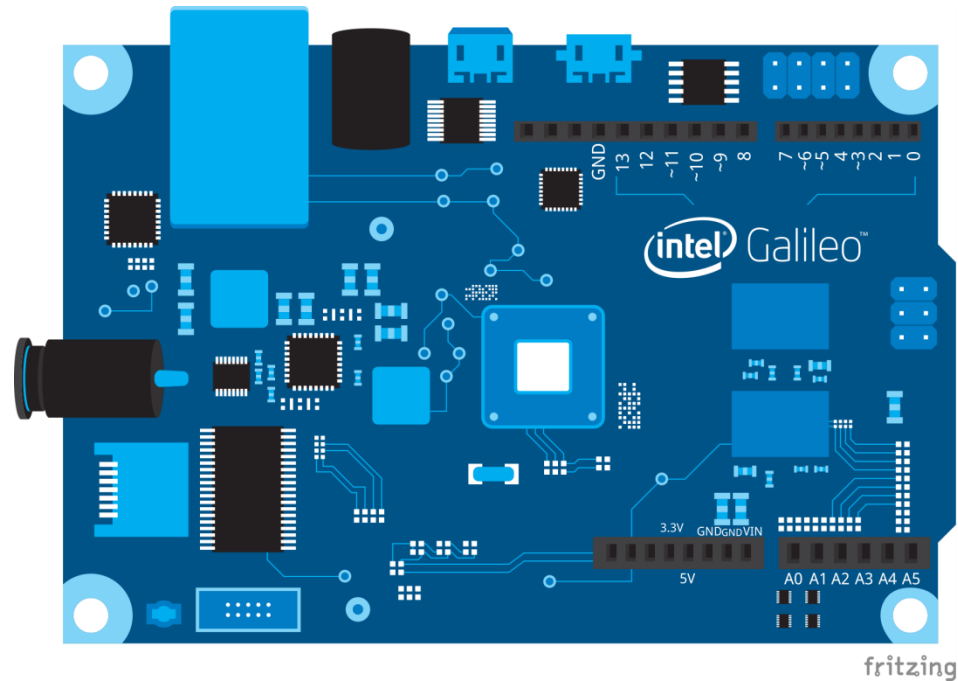
Lab 4 School of Computer Science USM



Parallel & Distributed Computing Center (PDCC), 412-1 Level 4 School of Computer Sciences,  
Universiti Sains Malaysia, 11800 USM Pulau Pinang, MALAYSIA. +604 – 653 3888 (Ext: 2319)

# Agenda

- Successfully setup a web server on Galileo board

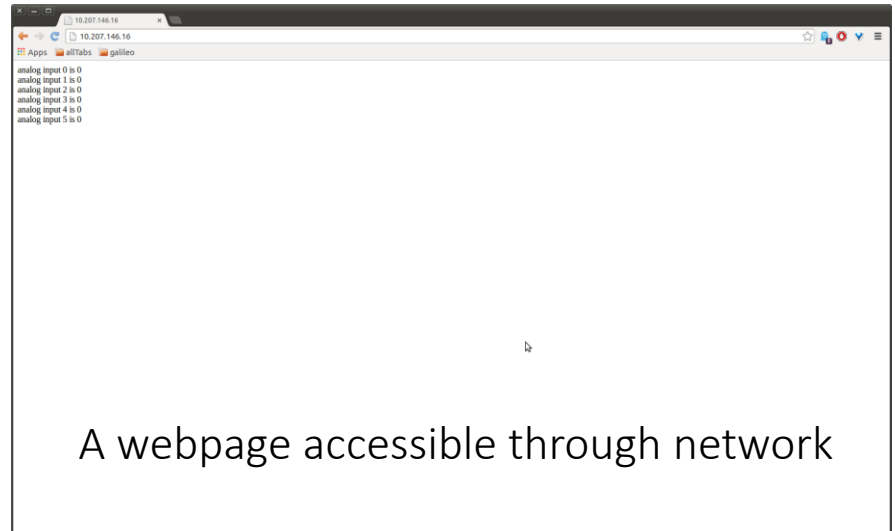


# Overview



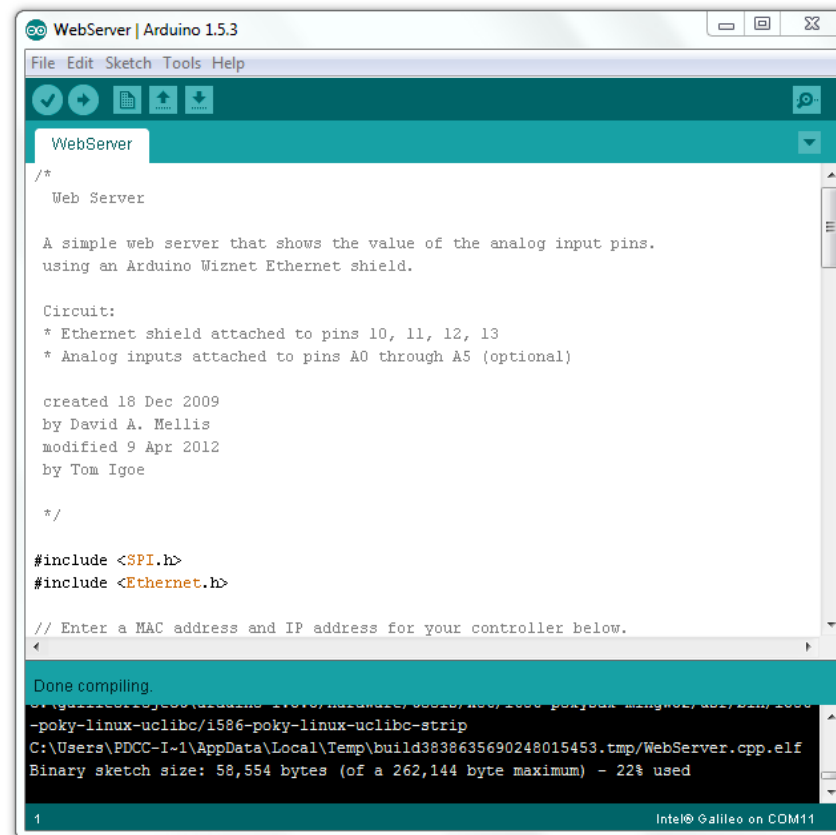
10.207.146.16

Setup a local IP address on Galileo



# Arduino WebServer

- File > Examples > Ethernet > WebServer



The screenshot shows the Arduino IDE interface with the 'WebServer' example code loaded. The title bar indicates 'WebServer | Arduino 1.5.3'. The menu bar includes 'File', 'Edit', 'Sketch', 'Tools', and 'Help'. The toolbar contains icons for opening, saving, and running. The code editor displays the following content:

```
WebServer
/*
  Web Server

  A simple web server that shows the value of the analog input pins.
  using an Arduino Wiznet Ethernet shield.

  Circuit:
  * Ethernet shield attached to pins 10, 11, 12, 13
  * Analog inputs attached to pins A0 through A5 (optional)

  created 18 Dec 2009
  by David A. Mellis
  modified 9 Apr 2012
  by Tom Igoe

  */

#include <SPI.h>
#include <Ethernet.h>

// Enter a MAC address and IP address for your controller below.
```

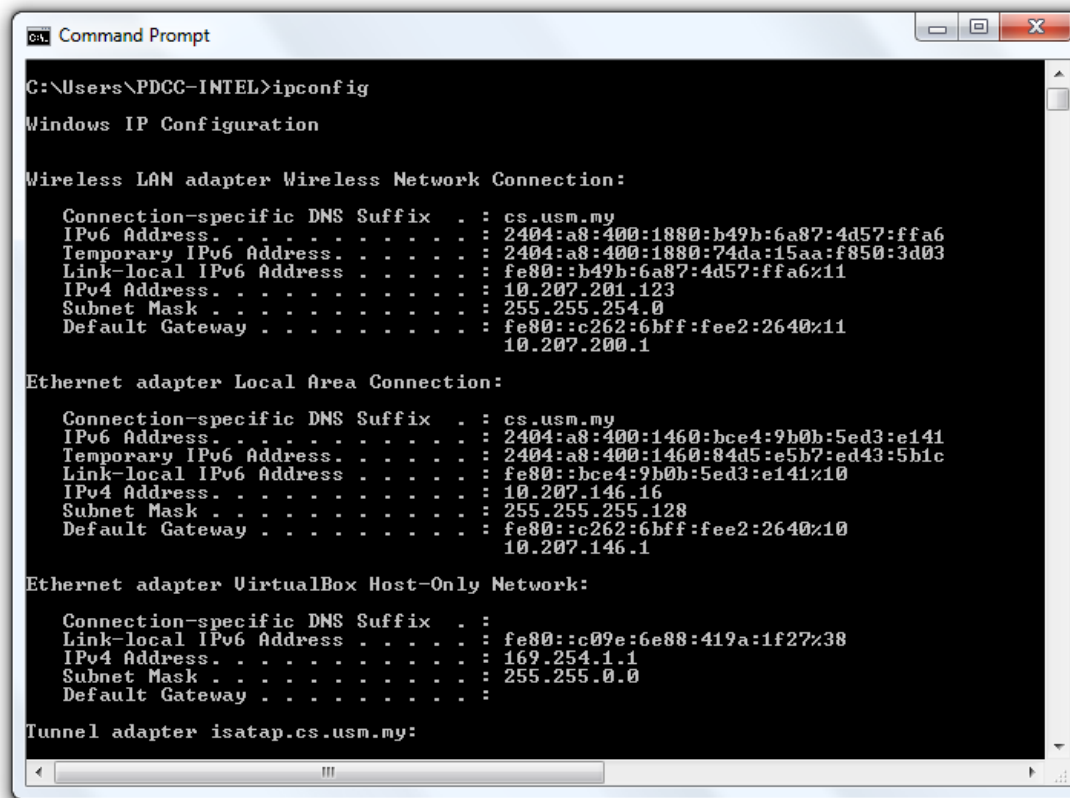
Below the code editor, a status bar shows 'Done compiling.' and the output window displays the following information:

```
C:\Users\PDCC-I-1\AppData\Local\Temp\build3838635690248015453.tmp\WebServer.cpp.elf
Binary sketch size: 58,554 bytes (of a 262,144 byte maximum) - 22% used
```

The status bar at the bottom indicates 'Intel Galileo on COM11'.

# Quick Setup

- Open cmd, type “ipconfig” to show IP address of current PC



```
ca: Command Prompt

C:\Users\PDCC-INTEL>ipconfig

Windows IP Configuration

Wireless LAN adapter Wireless Network Connection:

    Connection-specific DNS Suffix  . : cs.usm.my
    IPv6 Address. . . . . : 2404:a8:400:1880:b49b:6a87:4d57:ffa6
    Temporary IPv6 Address. . . . . : 2404:a8:400:1880:74da:15aa:f850:3d03
    Link-local IPv6 Address . . . . . : fe80::b49b:6a87:4d57:ffa6%11
    IPv4 Address. . . . . : 10.207.201.123
    Subnet Mask . . . . . : 255.255.254.0
    Default Gateway . . . . . : fe80::c262:6bff:fee2:2640%11
                              10.207.200.1

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : cs.usm.my
    IPv6 Address. . . . . : 2404:a8:400:1460:bce4:9b0b:5ed3:e141
    Temporary IPv6 Address. . . . . : 2404:a8:400:1460:84d5:e5b7:ed43:5b1c
    Link-local IPv6 Address . . . . . : fe80::bce4:9b0b:5ed3:e141%10
    IPv4 Address. . . . . : 10.207.146.16
    Subnet Mask . . . . . : 255.255.255.128
    Default Gateway . . . . . : fe80::c262:6bff:fee2:2640%10
                              10.207.146.1

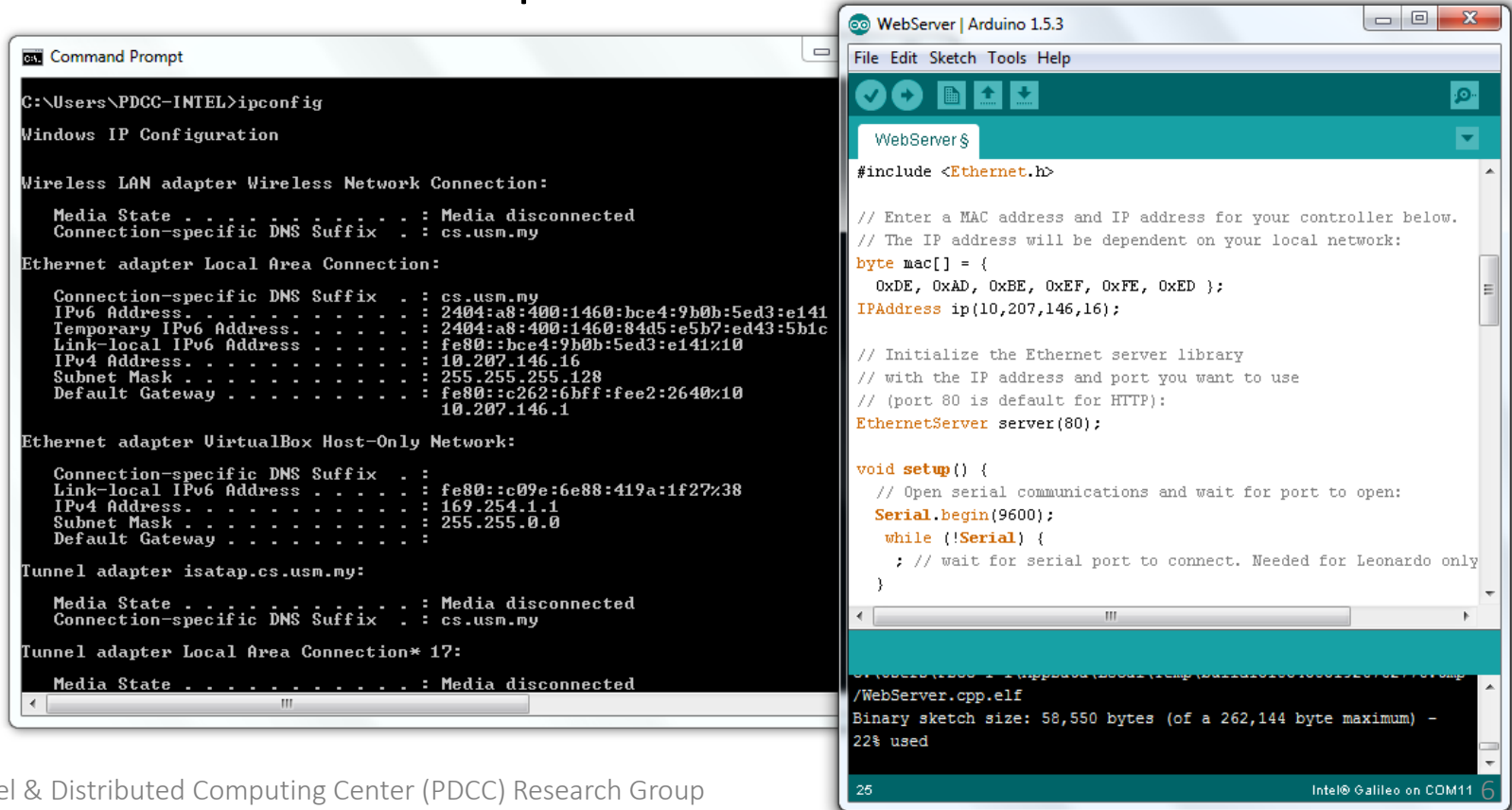
Ethernet adapter VirtualBox Host-Only Network:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::c09e:6e88:419a:1f27%38
    IPv4 Address. . . . . : 169.254.1.1
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . :

Tunnel adapter isatap.cs.usm.my:
```

# Quick Setup (cont)

- Type the IP address accordingly from cmd into WebServer example in Arduino IDE



# Quick Setup (cont)

- Plug RJ45 Ethernet cable to Galileo board



# Quick Setup (cont)

- Compile and Upload the sketch
- Use “ping” command to verify that your webserver is reachable
  - `$ ping <set-ip-address>`
  - E.g : `$ ping 10.207.146.16`



# Quick Setup (cont)

- Verify with “ping” command

```
C:\Users\PDCC-INTEL>ping 10.207.146.16
```

```
Pinging 10.207.146.16 with 32 bytes of data:  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128
```

```
Ping statistics for 10.207.146.16:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
C:\Users\PDCC-INTEL>ping 10.207.146.16
```

```
Pinging 10.207.146.16 with 32 bytes of data:  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128  
Reply from 10.207.146.16: bytes=32 time<1ms TTL=128
```

```
Ping statistics for 10.207.146.16:  
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)  
Approximate round trip times in milli-seconds:  
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

```
C:\Users\PDCC-INTEL>
```

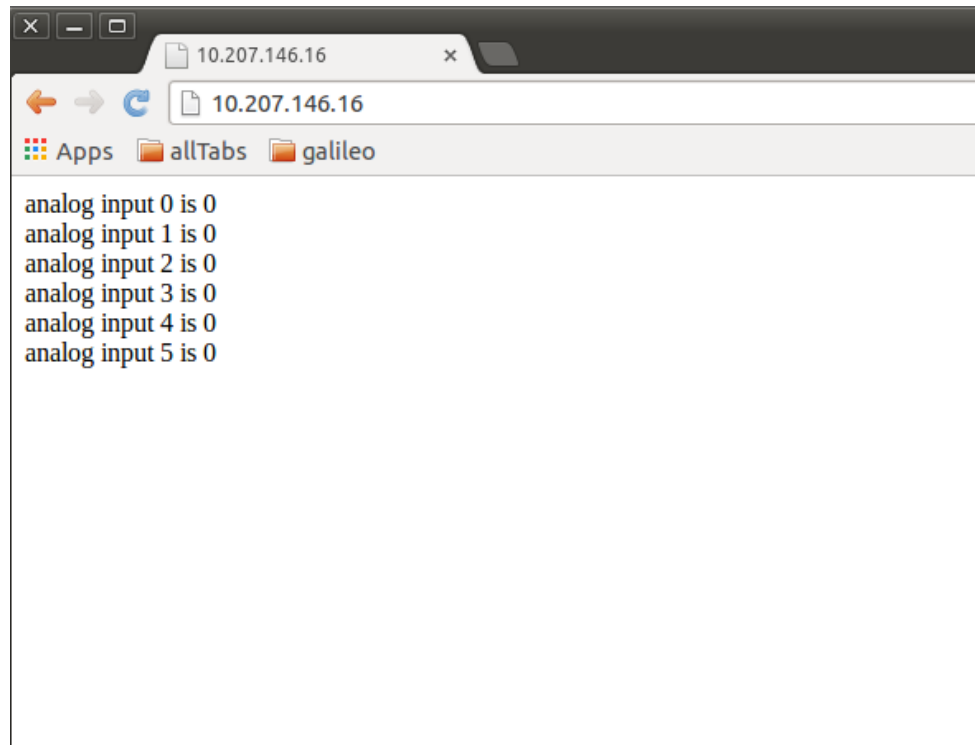
```
#include <SPI.h>  
#include <Ethernet.h>  
  
// Enter a MAC address and IP address for  
// The IP address will be dependent on you  
byte mac[] = {  
    0xDE, 0xAD, 0xBE, 0xEF, 0xFE, 0xED };  
IPAddress ip(10,207,146,16);  
  
// Initialize the Ethernet server library  
// with the IP address and port you want t  
// (port 80 is default for HTTP):  
EthernetServer server(80);  
  
void setup() {  
    // Open serial communications and wait f  
    Serial.begin(9600);  
    while (!Serial) {  
        ; // wait for serial port to connect  
    }  
}
```

```
Done uploading.
```

```
Transfer complete
```

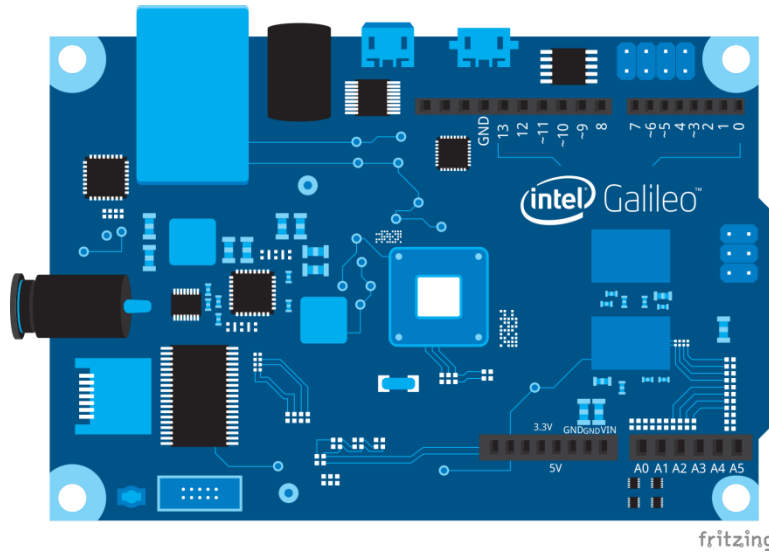
# Quick Setup (cont)

- Make sure webpage is up
  - Open browser, navigate to set IP address



# Check this out

- Arduino Web Server LED Control
  - <http://www.jackbarber.co.uk/notes/arduino-web-server-led-control>
- See through HTML codes



Intel Galileo® : What will you make?