Summer 2017 Webinar Series
Performance Monitoring, Easy As Pi

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Webinar Links:
https://www.mcnc.org/events/training/cne-summer-webinars2017
Agenda

- Discuss differences in the Pi platforms
- Preparing the Pi
- Visualizing the data
- Deployment Options
Differences in the Pi Platform

- Not all Pi’s are created equally
  - Raspberry Pi 1 B+ – 100Mbps
    - 49Mbps Up, 94Mbps Down
  - Raspberry Pi 2 – 100Mbps
    - 94Mbps Up, 94Mbps Down
  - Raspberry Pi 3 – 100Mbps
    - 94Mbps Up, 94Mbps Down
  - Banana Pi Pro – 1Gbps
    - 700Mbps Up, 885Mbps Down
Differences in the Pi Platform

- We have wireless
  - Raspberry Pi 3
  - Raspberry Pi Zero W
  - Banana Pi Pro

- These utilize 802.11n at 2.4Ghz
  - Theoretical limit for 802.11n, 600Mbps 5Ghz and 300Mbps 2.4Ghz
  - Realistic throughputs are 300Mbps 5Ghz and 144Mbps 2.4Ghz
Prepare the Pi

- Use the latest Raspbian image

- Run installDB.py
  - Update OS
  - Install Influxdb and dependencies
  - Change timezone to EST
  - Change keyboard layout to US
  - Prompt password change
Prepare the Pi

- Run smartDB.py

  - On first run
    - Assist with database creation
    - Assist with adding websites for monitoring
    - Then start monitoring process

  - Any run after first
    - It will prompt you to use the existing database or create a new one
    - Monitor the previously entered websites, add to the list, or create a new list of sites to monitor
    - Start monitoring process
Secure the Pi - Example iptables rule set

- sudo iptables -A INPUT -m state --state RELATED,ESTABLISHED -j ACCEPT
- sudo iptables -A INPUT -p icmp -j ACCEPT
- sudo iptables -A INPUT -i lo -j ACCEPT
- #SSH access
  - sudo iptables -A INPUT -p tcp -m tcp -s 10.100.0.0/16 --dport 22 -j ACCEPT
  - sudo iptables -A INPUT -p tcp -m tcp -s 10.101.0.0/16 --dport 22 -j ACCEPT
- #Grafana access for datasource
  - sudo iptables -A INPUT -p tcp -m tcp -s 10.100.0.0/16 --dport 8086 -j ACCEPT
  - sudo iptables -A INPUT -p tcp -m tcp -s 10.101.0.0/16 --dport 8086 -j ACCEPT
- #drop everything else
  - sudo iptables -A INPUT -p tcp --dport 1:8088 -j DROP
  - sudo iptables -A INPUT -p udp --dport 1:8088 -j DROP
  - sudo iptables -A INPUT -j REJECT --reject-with icmp-host-prohibited
  - sudo iptables -A FORWARD -j REJECT --reject-with icmp-host-prohibited
To secure the Pi with iptables

- Install iptable-persistent
  - `sudo apt-get install --y iptables-persistent`

Any changes to iptables will be saved with the following command.

- `sudo iptables-save`
Visualizing the data

- Install Grafana
  - Run installGrafana.py
    - Downloads and installs Grafana and dependencies

- Configure Grafana
  - Run smartGrafana.py
    - Prompts for ip address of pi
    - Prompts for database
    - Builds out dashboard
Visualizing the data - UI Example
Deployment Options

- MDF at each school and the core.

- In a problem class room to test wireless performance complaints.

- You could also utilize the Pi’s with Iperf, Curl via the command line or MTR, for deep dives into an issue.
Tool examples

Curl

- curl -L --output /dev/null --silent --show-error --write-out 'lookup: %{time_namelookup}
connect: %{time_connect}
appconnect: %{time_appconnect}
pretransfer: %{time_pretransfer}
redirect: %{time_redirect}
starttransfer: %{time_starttransfer}
total: %{time_total}
' 'google.com'

lookup: 0.005
connect: 0.013
appconnect: 0.000
pretransfer: 0.013
redirect: 0.069
starttransfer: 0.078
total: 0.148
## Tool examples

### MTR

- `mtr --report --report-cycle 10 www.google.com`

<table>
<thead>
<tr>
<th>Host</th>
<th>Loss%</th>
<th>Snt</th>
<th>Last</th>
<th>Avg</th>
<th>Best</th>
<th>Wrst</th>
<th>StDev</th>
</tr>
</thead>
<tbody>
<tr>
<td>128.109.178.2</td>
<td>0.0%</td>
<td>10</td>
<td>1.2</td>
<td>1.2</td>
<td>1.1</td>
<td>1.2</td>
<td>0.0</td>
</tr>
<tr>
<td>152.46.46.5</td>
<td>0.0%</td>
<td>10</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.2</td>
<td>0.0</td>
</tr>
<tr>
<td>128.109.246.41</td>
<td>0.0%</td>
<td>10</td>
<td>5.7</td>
<td>5.6</td>
<td>5.5</td>
<td>5.7</td>
<td>0.0</td>
</tr>
<tr>
<td>ws-a1a-ip-asr-gw-to-rlasr</td>
<td>0.0%</td>
<td>10</td>
<td>7.6</td>
<td>7.6</td>
<td>7.5</td>
<td>7.7</td>
<td>0.0</td>
</tr>
<tr>
<td>204.85.30.79</td>
<td>0.0%</td>
<td>10</td>
<td>7.1</td>
<td>7.1</td>
<td>7.1</td>
<td>7.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>
**Tool examples**

**Iperf**

**Bandwidth limiting - 100Mb/sec**

[Server] – iperf -s -i 1 -u

**Transfer 1GB of data then stop - 1GB of data**

[Server] – iperf -s -i 1

**Bidirectional testing**

[Server] – iperf -s -i 1
[Client] – iperf -c 10.101.101.101 -t 30 -d or -r

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