EcoDNS -

RIPE Green Hackathon @ Amsterdam

Décembre 2024

afnic
Internet
made in France

LC3

Why study DNS?

- As known to us - No prior studies focussing on measuring the energy impact of DNS infrastructure & protocol

- Why such a study is getting important now?
  - Encrypted DNS traffic ≈ 23%
  - Cost of transition from UDP to encrypted communication does increase energy consumption[2]
  - Corporate Social Responsibility – We would like to improve our understanding of the environmental impact of our “core business” technology - the DNS

Diapositive 2

LC3 LC; 06/11/2023

LC5

Objective

Measure

Reduce

Diapositive 3

LC5 LC; 06/11/2023

Before the Hackathon

- **Knew about different tools to study energy consumption**
- **Team of 3 people**
- **Infrastructure**
  - **Generate different DNS traffic types**
  - **DNS resolver**
  - **Using the wattmeter to collect the energy consumption results in graph style**

LC2

Team

Diapositive 5

LC2 LC; 06/11/2023

LC7

During the Hackathon

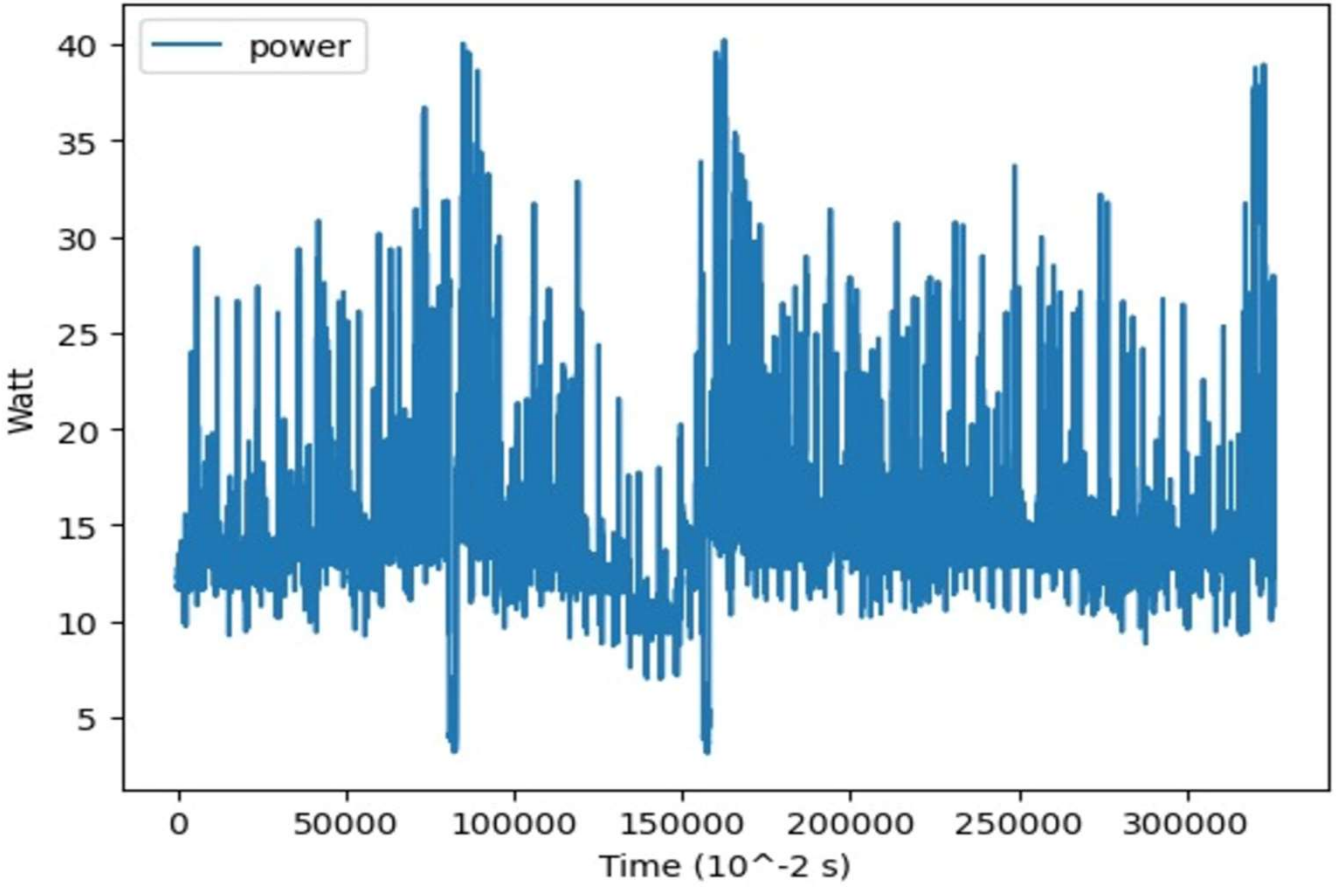
- **Team of 6 with everyone contributing**
- **Infrastructure**
  - **Implemented a Network infrastructure with different VPN connections to set up the test network**
  - **Debugged different Open-source tools (Scaphandre, Ecofloc, Nethogs)**
  - **Documented in Github**
  - **Created an Ansible playbook for easy installation of the test infrastructure for research purpose**

LC7 LC; 06/11/2023

LC14

Yoctopuce (Wattmeter)

Total power consumption of the laptop
In watts



LC14 LC; 06/11/2023

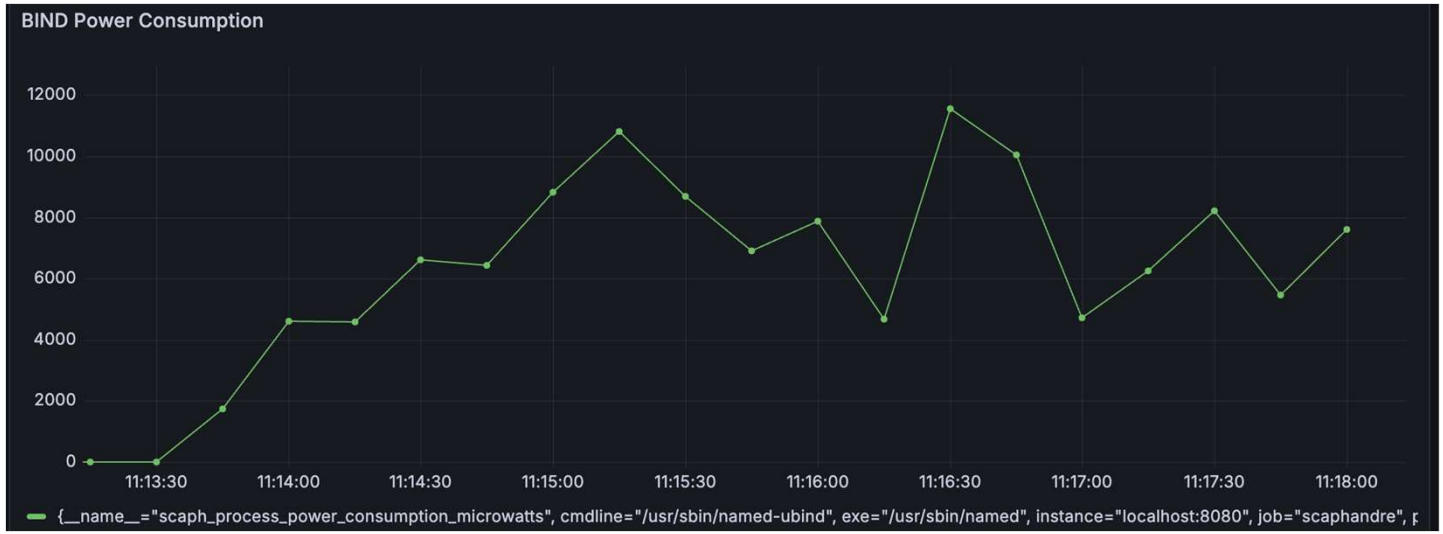
LC15

Scaphandre (Per process energy consumption)

Total power consumption of a single process (BIND) with normal DNS queries (UDP)

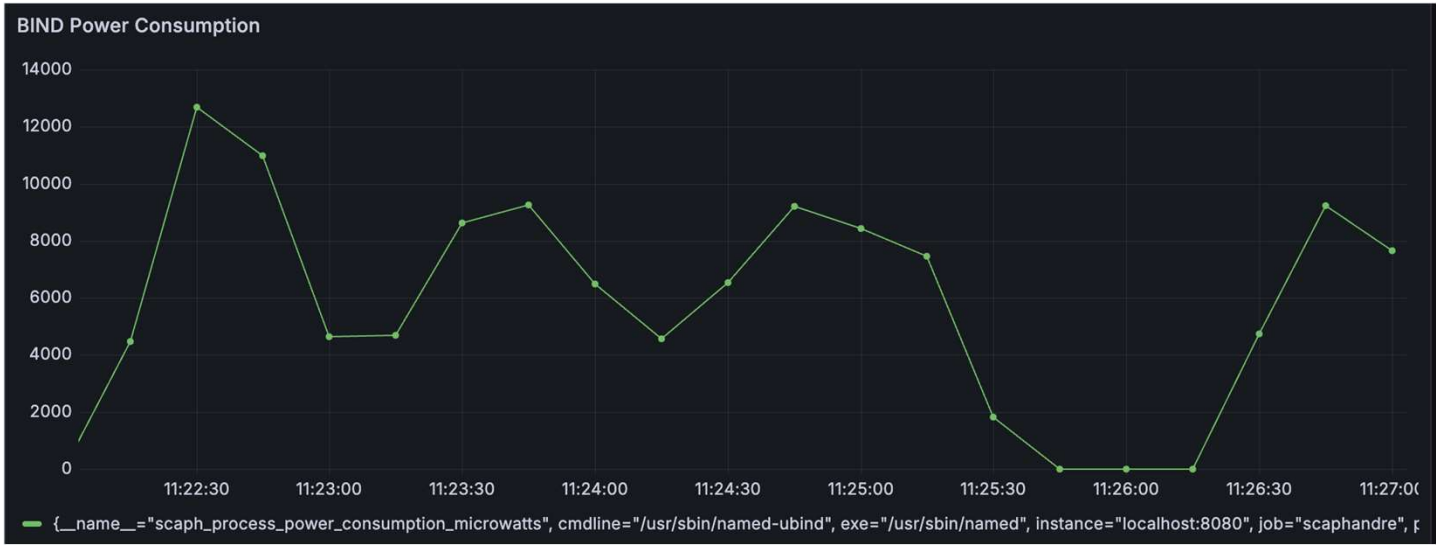
LC15 LC; 06/11/2023

CPU power consumption using ‘dig’

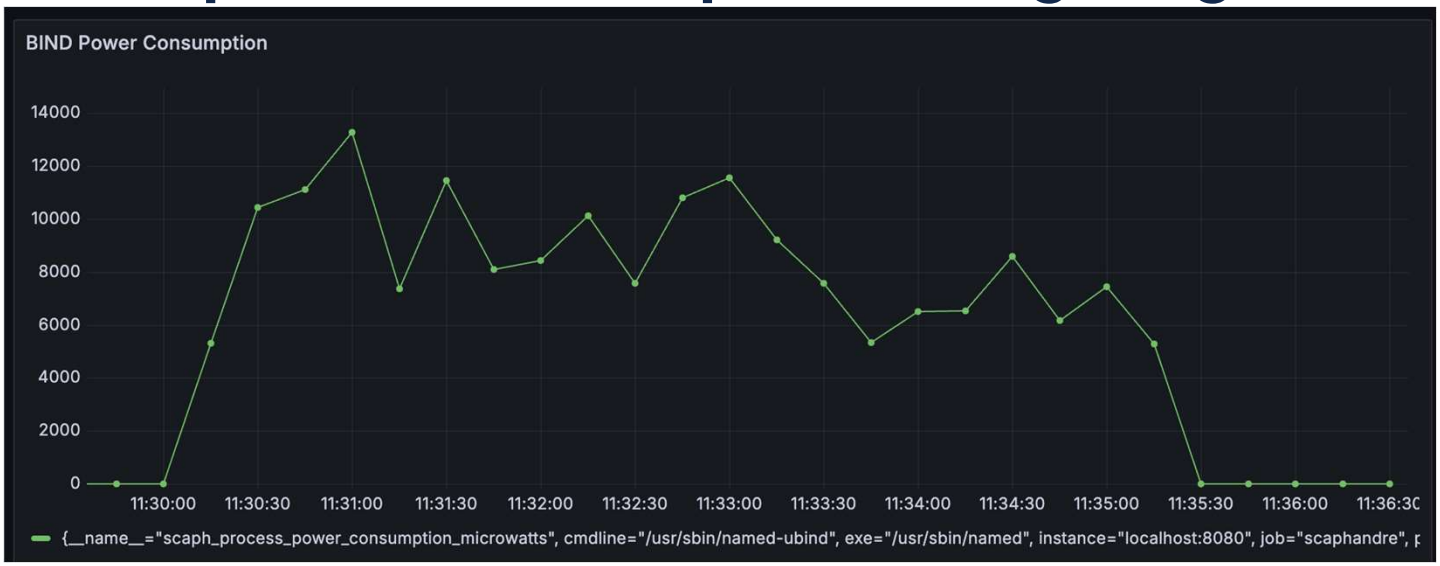


Querying different domains for 5 minutes

Querying afnic.fr for 5 minutes

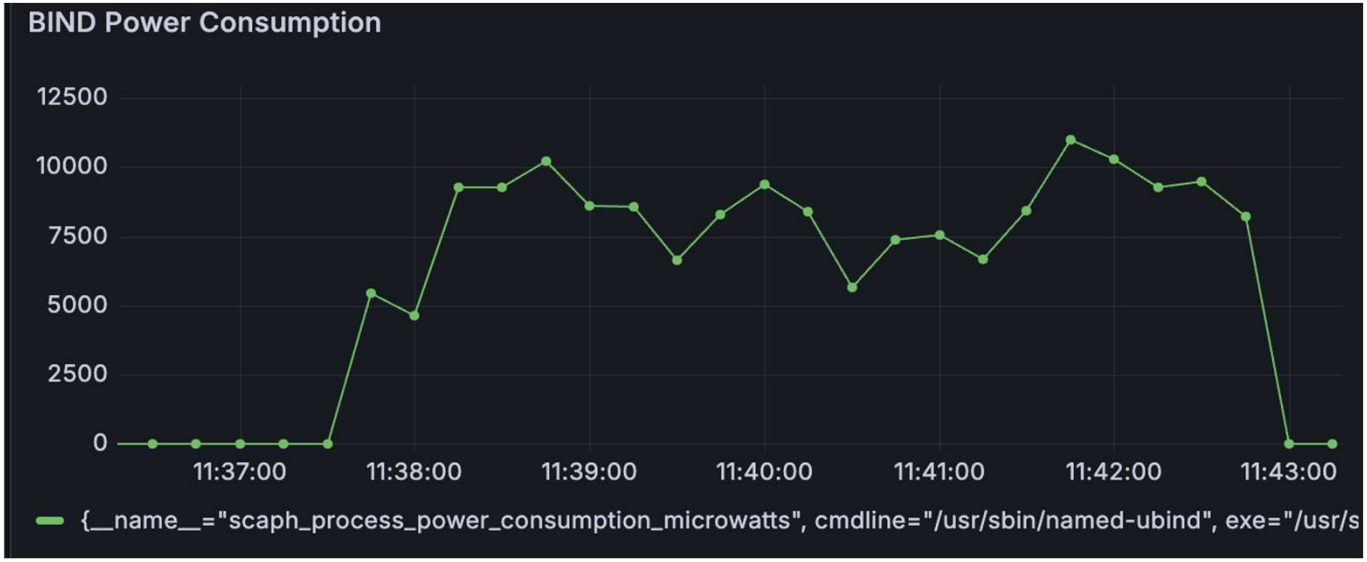


CPU power consumption using ‘dog’



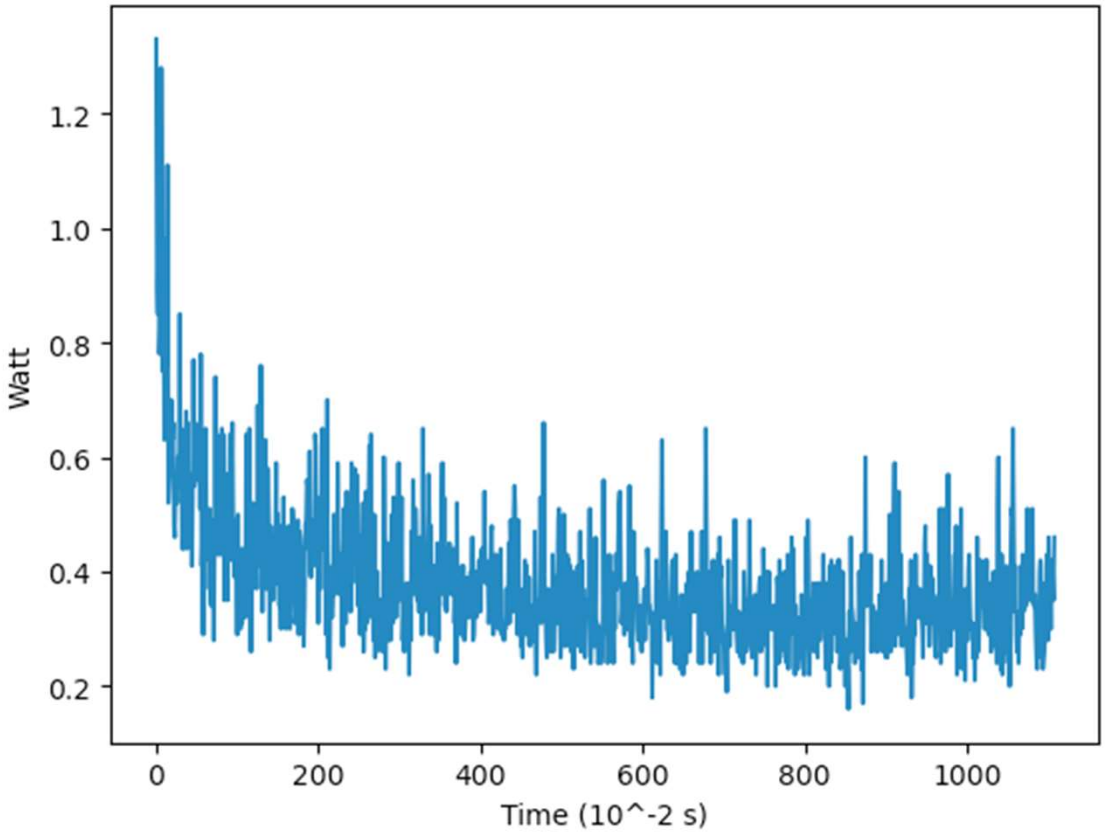
Querying different domains for 5 minutes

Querying afnic.fr for 5 minutes



LC16

Echofloc (Per HW energy consumption - CPU)



Diapositive 11

LC16 LC; 06/11/2023

LC19

Nethogs (per process bandwidth consumption)

- Nethogs dumps data to a file.
- Nethogs-parser is run every second to parse the file out to a csv formatted file.
- Csv-Prometheus-exporter reads the csv file every second and exports the data to Prometheus.
- Prometheus feeds the data to Grafana, the visual analysis tool.

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LC19 LC; 06/11/2023

LC21

Ansible playbook

```
TASK [bind9 : Install bind9] ***************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [bind9 : Start bind9] *****************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [gcc : Install gcc] *******************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [make : Install make] *****************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [venv : install venv] *****************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [ecofloc : clone ecofloc] *************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [ecofloc : install msr-tools] *********************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [ecofloc : Install perf] **************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [ecofloc : Install build-essential] ***************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [ecofloc : install ecofloc] ***********************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : Install nethogs] ***********************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : Install golang] ************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : Install nethogs parser] ****************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : Build nethogs-parser] ******************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : Copy nethogs-parser.sh] ****************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : run nethogs] ***************************************************************************************************************************************************************
changed: [resolver_localhost]

TASK [nethogs : Run nethogs-parser.sh] *****************************************************************************************************************************************************
changed: [resolver_localhost]
```

Diapositive 13

LC21 LC; 06/11/2023

LC18

Dissemination (Creative commons, Open Source)

- Documentation: https://github.com/AFNIC/EcoDNS/tree/main
- Code: https://github.com/AFNIC/EcoDNS/tree/main/Src

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LC18 LC; 06/11/2023