Matthieu Gouel | Ph.D. Student

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Experience

Sorbonne Université — **Paris, France**
Ph.D. Student — *2020 - Present*

Conduct research as a Ph.D. student in the Network Performance Analysis (NPA) team of the LIP6 laboratory and specifically in the Dioptra research group. Also affiliated with the LINCS laboratory. My research field is collecting and analyzing the features of the internet via active and passive measurements. These features can be the IP-level topology of the internet, as well as other levels such as the router-level or the AS-level topology. I also work on geolocation of infrastructure IP addresses.

- Development of a multi vantage-points measurement platform for IP-level internet topology discovery using **Python**, **ClickHouse**, **Redis**, **JavaScript** and **AWS/GCP** cloud infrastructures
- Development of a **reinforcement learning algorithm** to allocate probing directives more efficiently
- Analysis of the dynamics of an IP geolocation database
- Two months research visit at Naval Postgraduate School (Monterey, CA) to study internet topology dynamics
- Co-organizer of LINCS Internet Measurements reading group

LIP6 — **Paris, France**
Research Engineer — *2019 - 2020*

Worked in the Network Performance Analysis (NPA) team of the LIP6 laboratory and specifically in the Dioptra research group. Helped in the engineering of ongoing research projects in **Python** and **C++**, developed and maintained measurement infrastructure in a production environment using **Docker**, **Kubernetes** and **GitHub Actions**.

- Participated in ongoing researches about IP-level internet topology, IP geolocation and Alias Resolution
- Building and maintaining network measurement infrastructure

Société Générale — **Paris, France**
DevOps Engineer — *2018 - 2019*

Worked inside an agile software development team for a global private cloud development project. This team was responsible for network-oriented capabilities of the cloud. I was the lead developer of the team and built APIs in **Python** which communicate with Avi Networks appliances. I also developed and open-sourced a **Python** package to facilitate API end-to-end testing.

- Development of APIs in Python providing SDN capabilities for the internal private cloud
- CI/CD of programming projects using **Github Actions**, **Ansible** and **Jenkins**
- Organized according to Scrum and SAFe agile methodologies

Ministry of Armed Forces — **Paris, France**
Network-oriented Software Engineer — *2016 - 2018*

Worked in a team managing network infrastructure for Data-Centers and Campus. My main role was to bring development skills to automate network infrastructure deployment and maintenance in operational conditions. I also participated to networking troubleshooting and on-call duty periods.

- Development of network automation software in Data-Center and Campus networks in **Python**, **Go** and **JavaScript**
- Deployment with **Docker**, **Kubernetes** and **Gitlab CI**
- Network administration and development in production environment

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Ministry of Armed Forces — **Paris, France**
Network-oriented Software Intern, 6 month — *2016*

Internship at the end of the engineering school. The project was to develop a proof-of-concept networking solution to do routing in Data-Centers with BGP on Cisco/Arista hardware. The solution had to be automated using **Python**, **Ansible** and Zero-Touch provisioning.

- Automation of a BGP "Top of Rack" solution into Data-Centers

EBRC — **Luxembourg**
Software Intern, 3 month — *2015*

Internship during the second year of engineering school. The project was to develop a knowledge system to help security operators to keep track of internal procedures. Developped in **Python** and **Javascript**.

- Development of a knowledge database system for security operations in a Security Operation Center
- Integration in a production environment

Education

TELECOM Nancy — **Telecommunications, Networks and Security**
Engineering degree (Diplôme d'ingénieur), Nancy, France — *2013–2016*

Classes préparatoires aux grandes écoles — **Physics, Technology and Engineer Science**
Blaise Pascal School, Rouen, France — *2010–2013*

Publications

Zeph & Iris cartographient l'internet
M Gouel, K Vermeulen, M Mouchet, J P Rohrer, O Fourmaux, T Friedman
CoRes, 2022

Zeph & Iris map the internet: A resilient reinforcement learning approach to distributed IP route tracing
M Gouel, K Vermeulen, M Mouchet, J P Rohrer, O Fourmaux, T Friedman
ACM SIGCOMM Computer Communication Review, 2022

IP Geolocation Database Stability and Implications for Network Research
M Gouel, K Vermeulen, O Fourmaux, T Friedman, R Beverly
IFIP Network Traffic Measurement and Analysis Conference (TMA), 2021

Alias Resolution Based on ICMP Rate Limiting
K. Vermeulen, B. Ljuma, V. Addanki, M. Gouel, O. Fourmaux, T. Friedman, R. Rejaie
Springer Passive and Active Measurement Conference (PAM), 2020

Teaching

Networks Architecture — **Sorbonne Univeristé**
Master degree program, Teaching assistant (40h/year) — *2019, 2020, 2021*

Internet Measurements — **Sorbonne Univeristé**
Master degree program, Teaching assistant (28h/year) — *2019, 2020, 2021*

Routing in networks — **Sorbonne Univeristé**
Licence degree program, Teaching assistant (36h/year) — *2019*

Open Source

https://github.com/matthieugouel

Reinforcement learning algorithm
Zeph (in *Python*): Maximize the coverage IP-level topology measurements

IP-level internet measurement platform
Iris (in *Python*): allow to perform internet-scale multi vantage-points IP-level measurements (accessible here)

API end-to-end testing
Spintest (in *Python*): package to easily perform functional scenarios to APIs

Hobby projects
Gibica (in *Python*) and Bjorn (in *Rust*): implementation of toy programming languages
Alchina (in *Python*): implementation of classic machine learning algorithms

Languages

English: Fluent — *Full professional proficiency*

French: Native speaker — *Full professional proficiency*