

# Michał Bultrowicz

## Curriculum Vitae

### Contact

michal.bultrowicz@gmail.com

(+48) 790 467 660

<https://bultrowicz.com/>

<https://github.com/butla>

### Summary

I'm a software developer with a drive for constant improvement and a curiosity about inner workings of technologies.

I love Python, Linux, and creating resilient distributed systems.

I have a strong belief in continuous testing and gradual change.

I can design, implement, and consult the creation of IT solutions, especially:

- business process automation and measurement (dashboards, statistics, alerting)
- data pipelines
- highly available web applications
- automated test suites (back-end, front-end, load, chaos)
- Python-based software

I can also train your IT staff in maintenance and further development of the systems I create, so that you aren't dependent on me forever.

### Computer skills

- expert in Python programming
- secondary programming languages: Bash, Java, C++, JavaScript, C#
- writing understandable and testable code
- web development with AioHTTP, Falcon, Flask, and Django
- advanced web application testing (including microservices)
- ensuring high availability (HA)
- good knowledge of optimizing SQL for PostgreSQL (and scaling it out with CitusDB)
- working with various data stores: Redis, Kafka (and AWS Kinesis), ElasticSearch, S3/MinIO, Amazon Redshift
- using containers for deployments and testing (Docker, Kubernetes, Helm)
- implementing web security (X.509, mTLS, JWT, OAuth2)
- automated infrastructure management with Terraform and Ansible
- data engineering (building data pipelines and ETL systems)
- working with AWS, GCP, and DigitalOcean clouds
- implementing Continuous Delivery with the help of Gitlab CD (Jenkins in the past)

- exposure to building front-end with ReactJS
- proficiency in GIT
- able to work with just the terminal, without a graphical environment

## Soft skills

- coordinating a Scrum or Kanban team
- teaching developers through meticulous code reviews
- knowledge of software legal compliance and licensing issues
- analyzing tensions between teams within a project (are the incentives set up correctly?)

## Experience

**2018.11 – 2021.01**

### **Senior DevOps Engineer at British Telecom (BT)**

*Remote, with occasional meetings in London, Ipswich, and Brentwood*

I worked on a team of external contractors, tasked with developing a web application for designing telecom infrastructure and an automated initial configuration of Cisco and Juniper routers. To do that we had to work intensely with BT engineers from various teams, piecing together the knowledge about company's current processes, and helping design the requested solution, that was supposed to fit into a grander project.

We were all supposed to be universal developers, writing code, preparing its deployments and interacting with any hardware necessary. We didn't have a traditional team leader, which was an interesting exercise in self-organization. My application team had 4 to 8 persons (it was growing), and the entire project team was around 80 people.

The whole project was also part of the organization's agile transformation, with our contractor team leading the way.

Prominent technologies used:

- Django and Django REST Framework - most of our back-end and front-end
- PostgreSQL - our main database
- Kubernetes and Helm - deployments
- Nginx - reverse proxy
- Docker Compose - running a local, development instance of the app with its dependencies
- Minio - serving our web app's static assets, and storing media files
- Celery - running asynchronous graphs of tasks (with the "canvas" feature)
- ReactJS - a few more dynamic front-end pages
- Faust - reading streams of events from other systems from Kafka
- Redis - caching, Celery broker
- Sentry - error tracking

- Prometheus - metrics
- Junos PyEZ - managing Juniper routers
- netmiko - managing Cisco routers
- GitLab - code repository / continuous delivery pipelines
- Factory Boy - easy creation of ORM objects for tests
- terminal servers - logging in over SSH and getting a serial port terminal to the routers

My niches in the team were:

- code and infrastructure design for new features
- setting up automated tests and speeding them up
- refactoring for testability
- thorough code reviews
- teaching advanced Python and testable design to other team-members
- advocating for simple and tried OpenSource solutions we could control over heavier enterprise ones there wasn't enough team expertise in
- taking care of deployments and infrastructure (along with one other team member)

Examples of things I introduced to the team:

- Faust workers for parsing Kafka event streams; they were able to write to our database by wrapping Django's synchronous ORM code with asyncio's executors
- Makefiles automating local development and testing; they were also used in GitLab, so we had high probability that tests passing locally would pass in CI
- enabling local development and testing (even without network connectivity) by ensuring copies or mocks of all services required by our app run in its Docker Compose
- testing without DB isolation - it was getting in the way of many useful and realistic testing scenarios

## 2017.05 – 2018.09

**Python back-end developer at Iterio Data (<https://iteriodata.com/>)**

*Remote*

My main project was a data pipeline for advertisement campaign and site traffic analysis. I worked as the main developer and the de facto architect of the system. Later on I also took over the maintenance and design of our cloud infrastructure. Other than that I did some ETL, the occasional simple data analysis, and polished up some old automations.

An important thing I learned here is that with the right tools and the right engineers, a small team (4, in this case) can create a web application processing the data of tens of millions of people.

My duties included:

- creating back-end APIs with asynchronous Python (AioHTTP) and stuffing them in Docker containers
- designing our systems on AWS (ECS, Lambda, Kinesis, S3, CloudWatch)
- encoding our infrastructure and doing deployments with Terraform
- creating test strategies and tools for our cloud applications
- helping in the design of our CitusDB (distributed PostgreSQL) schema
- setting up logging (CloudWatch, Google Stackdriver), metrics, and alerts (Sentry, PagerDuty)
- working out our development practices (trunk-based development, zero down-time deployments, etc.)
- maintaining old scripts that used enterprise SOAP web services (introduced Zeep to make that easier)

We worked like start-ups do, so there was context-switching and were always time-starved. Because of that the code I wrote had to be immediately understandable for me and my boss, who isn't a senior Python developer and was even more time-starved than me. He wanted to jump in real quick and tweak a few things from time to time, so extending the code had to be obvious as well.

Another hard job was picking what to test and how to do it. Tests were meant to actually save us time by not having to "deploy and poke around to see if everything seemed fine" after a change. We sometimes invested a lot of time in working out testing techniques for areas like AWS Lambda and microservices, because there doesn't seem to be enough literature on the topic. But sometimes there was just not enough time to test everything. Luckily, some parts of the system weren't user-facing, and putting them offline for a couple of minutes wasn't an issue (since we had queues, payload backups, etc.). So if anything went wrong, we'd be notified by our alerting system, and immediately implement fixes.

## 2017.05 – 2017.10

### **Ansible contractor at ScyllaDB (<https://www.scylladb.com/>)**

*Remote*

I was contracted to develop Ansible scripts for installation of ScyllaDB database. I managed to create automation for single instance installation. Later I started working on scripts for set up of an entire cluster, but I didn't finish them. I was too overworked with this contract and Iterio, so I canceled this one.

The challenge here was mainly about having to base my work on existing complex shell scripts. They did things like modifying the kernel settings for maximized performance. The problem was that they were usually non-idempotent, and they were prone to modifying the machine's state. So I had to propose changes to them and recombine their parts into the Ansible scripts.

## 2017.01 – 2017.06

**Software contractor at Techno Service SA (<https://tspcb.pl/>) / Siled (<http://siled.pl/>)**

*Remote*

The company had a multi-step manual process for creating solder joint quality reports from specialized machines. I was hired to automate the process.

The old process looked like this:

- a person goes to the machine with a pendrive
- they run a software tool on the machine to download a set of testing results
- they copy the data to their computer
- they run a script that transforms the data into an Excel spreadsheet
- they send that spreadsheet to a person preparing a final report
- that last person manually copies fields from the sent spreadsheet into the final report

I created a desktop application through which you could specify batches of PCBs you were interested in, fill out some info, and immediately get the final report spreadsheet. That's was possible because the PCB testing machine was connected to the network, and was running an MS SQL Server instance with all the data.

Technologies used:

- Python 3.6
- Tkinter, chosen because the GUI was very minimal and the application had to be very easy to install on Windows
- openpyxl for reading and writing Excel files
- PyAutoGUI for testing the GUI
- VirtualBox running Windows XP and Microsoft SQL Server 2005 - used that to test data extraction from the PCB testing machine (it was running that version of SQL Server)

## 2014.03 – 2016.04

**Software Applications Developer at Intel Technology Poland**

*Gdańsk*

Examples of assignments on this position, from the latest:

### Leading a development team

I lead one of the teams that worked on Trusted Analytics Platform (TAP) project. TAP is a PaaS platform with main focus on data analytics. My team mainly did the integration of other teams' work, we overseen builds, deployments, releases and utility tools, but we also developed some back-end microservices. I was responsible for planning, estimating and coordinating work, also teaching and mentoring of other team members.

Furthermore I:

- acted as Python expert for all project teams
- created *mountepy* - a Python library to aid isolated microservice tests and increase our code quality
- influenced development procedures for all teams
- enforced software legal compliance and communicated with lawyers

## **Back-end microservices' development for TAP**

I developed a few Spring Boot (Java) microservices and created one in Python. It was a data set indexing and search service backed by Elasticsearch. We used Cloud Foundry PaaS as a base for our applications. Sometimes there was a need to fiddle with virtual machines on which Cloud Foundry cluster was based on.

## **Maintenance of a secure back-end for remote firmware updates (Intel Upgrade Service)**

We had a quite mature distributed system, encompassing C# back-end services, ASP.NET front-end, a C++ server and a C++ client. The whole system was based on EPID digital signature scheme. I had to deliver patches to almost all of the application-layer components and do deployments to a large Windows-based infrastructure spread out geographically.

I also needed to run tests that touched everything from firmware on a client machine, through its drivers and application level software up to multi-tier back-end services and ending at server HSMs (Hardware Security Modules).

## **Implementing hardware-backed secure tunnels for certificate exchange**

I needed to create a C++11 application for embedded Linux that could create, manage and transfer X.509 certificates. The certificates' private keys and the keys used to secure the connection to transfer them were created and stored in a hardware cryptography module (TPM). OpenSSL and TrouSerS were used for setup of MTLS (TLS with authentication of both parties) connections.

## **Researching using SIM cards as secure elements (SE)**

Did that alone as my first task on the team. Had to look into JavaMicro edition and smart cards.

It turns out that some SIM cards (or smart cards with SIM card's for factor) are capable of asymmetric cryptography, but we couldn't use them easily. We would either need to get SIM operator rights to be able to push our code onto the cards with OTA, or we would need to get fresh custom cards from a smart card manufacturer. Both options weren't feasible for us.

## **2011.05 – 2014.02**

### **Test Engineer Intern at Intel Technology Poland**

*Gdańsk*

I maintained and developed a heterogeneous (Windows, Linux, Android) distributed framework for automated software, firmware and hardware testing. I've coded mainly in C# and Java (SE and Android versions), but I've helped myself with Python scripting.

My main focus was designing and implementing a versatile RPC-style communication between applications on different platforms (used WCF on Windows, JAX-WS on Linux, and my own protocol for Android). There was a tight collaboration with our client - the validation teams.

Solving some problems required knowledge of obscure inner workings of .NET, Java and Windows system (e.g. discrepancies in implementations of TCP sockets on both programming platforms).

## **Noteable conference talks**

### **TDD of Python microservices**

*EuroPython 2016 talk.* <https://youtu.be/d-ka10jngQQ>

Presentation of tools (some implemented by me) and solutions that enable Test-Driven Development of Python microservices. Told from the perspective of a maintainer of a single service.

### **Python microservices on PaaS done right**

*EuroPython 2015 talk.* <https://youtu.be/WYXkpiaGBms>

A collection of tips and practices that allow to have a successful microservices-based project. Concerns development, testing and work organization. There's a slight focus on Python.

## **Education**

### **2016.03 – 2016.05**

#### **Cryptography I course**

*Stanford (through Coursera platform)*

## **2012 – 2015**

### **Master of Science in Computer Science**

*Gdańsk University of Technology*

Overall score – good plus

Specialized in Intelligent Interactive Systems

#### **Master thesis**

*Calling remote Java methods in Android system from .NET platform*

Supervisor: Jacek Lebień, PhD MEng

The goal of this work was to create a set of libraries that would enable convenient remote code execution in Android system from .NET platform. The work was successful and had the side-effect of an upstream patch on *jsonrpc4j* library, enabling it to work on Android.

## **2008 – 2012**

### **Bachelor of Science in Computer Science**

*Gdańsk University of Technology*

Overall score – good plus

#### **Final project**

A C++ application using OpenCV that could learn and recognize faces using the eigenvectors method.

## **Languages**

- Polish, native
- English, fluent

## **Interests**

- Technology and engineering in general
- Evolutionary Psychology
- Mythology (mainly Slavic, Nordic and Greek)
- History
- Martial arts