BENJAMIN CHETIOUI

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SUMMARY

Trained as a Software Engineer, my lifelong passion for learning and solving puzzles eventually led me to **Information Security**. This gave me exposure to the problematics associated with **Software Correctness**, just as my industrial experience exposed me to the ones associated with **Software Optimization**. When looking through the lens of **Programming Languages**, these seemingly uncorrelated problems at the core of current societal issues are in fact interlinked. My ambition is to build the tools that will allow all developers to produce verifiably correct and highly optimized code.

HACKING

I am a founding member of several competitive hacking (CTF) teams, including **The Flat Network Society** (current), **TeamBaguette**, and **Inshall'Hack**. Over the last four years, I have published numerous write ups of challenges centered around **Cryptography** and **Web Application Security**. I also produced several challenges myself for various CTF events, and dabble in **Vulnerability Research**. I — along with my current team — notably placed 11th in the CTFTime World ranking in 2020, and 1st in the CTFTime French ranking in 2021, 2020, and 2019.

Here is a collection of relevant links:

2020 World Ranking
ctftime.org/stats/2020

CTF challenges I developed
github.com/bchetioui/My-CTF-challenges

CVEs
CVE-2019-6453 (RCE mIRC <7.55)

TEACHING

Software Security	2019–20
Programming Languages	2018–19
Data Structures	2018
Web Programming	2015–16
Go (board game)	2013–15

INTERESTS

CTF	**World-class player**
Dancing	**Boogie Woogie**
Poker	**Two Hendon lines**
Go game	**International competitions**
Music	**Singer & lyricist**

EDUCATION

PhD student — University of Bergen — 11/2017 – ongoing

The principal goal of my work is to provide developers with the keys to producing *high-quality software*, where high-quality means that it is secure (data can't be compromised), safe (guaranteed not to cause harm), robust (can withstand attacks), reliable (performs as intended), and optimized (exploits hardware capabilities to their full extent).

I focus on generic programming as a foundational methodology to produce such software. To that end, I experiment with the Magnolia research programming language (compiler available at github.com/magnolia-lang/magnolia-lang).

Array programming is a key domain in which these ideas can have a significant impact. I study the Mathematics of Arrays formalism as a strong theoretical foundation on which to build my work in that domain.

During the course of my PhD, I have taken classes in *Homotopy Type Theory*, *Software Specification*, and *Category Theory*.

Coq – Haskell – Magnolia – Compilers – Generic programming – Information security

Master's in Software Engineering — Université de Strasbourg — 09/2015 – 09/2017

Bachelor's in Computer Science — Université de Strasbourg — 09/2012 – 06/2015

INDUSTRY EXPERIENCE

Software Engineer — Google — 09/2022 – ongoing

11/2023 – ongoing Senior Software Engineer
09/2022 – 10/2023 Software Engineer III

I work as a developer on XLA GPU, Google's optimizing compiler for Machine Learning. As of November 2023, I am leading the integration of Triton as a backend into XLA's compilation flow.

C++ – XLA – JAX – Machine Learning – GPU – Triton

Software Engineering Intern — Google Brain — 07/2020 – 12/2020

During this 6-month internship, I implemented a robust translation layer from JAX to TensorFlow along with an extensive suite of test harnesses. This translation layer also provides experimental support for TF.js and TF Lite. JAX is an open source library for high-performance machine learning research with an extensible system for function transformations. DeepMind uses JAX to accelerate their research. I remain one of the top contributors to the repository.

Python – JAX – TensorFlow – XLA – Dex – Machine Learning

R&D apprentice position — Synovo — 06/2015 – 08/2017

09/2016 – 08/2017 Project lead
06/2015 – 08/2016 Assistant researcher

My work consisted in the design and implementation of a fast and efficient algorithm aiming at solving a NP-hard Multi-depot Capacitated Heterogeneous Pickup Delivery Vehicle Routing Problem with Time Windows. This led to the implementation of a hybrid multiobjective memetic algorithm, running both on CPU and GPU simultaneously, able to produce competitive real-time results.

C++11 – Python – C# – Distributed Computing – Genetic algorithm – CUDA

Video game developer intern (Remote) — Plutono Studios — 2014

Lua – LÖVE

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LANGUAGES

French
English
Norwegian
German
Spanish

NONPROFITS

RTFM **(PR, CTF, CFP…)**
Read The Fancy Manual
02/2019 – 02/2020

UiBdoc **(misc, head of PR…)**
PhDs and postdocs organization in Bergen
09/2018 – 09/2020

AIUS **(secretary, counselor…)**
Computer Science Student Association
10/2012 – 09/2017

ALCANES **(board member)**
Chemistry Student Association
11/2013 – 09/2017

Strasbourg/Metz Go Club **(teacher)**
2013 – 2015

PUBLICATIONS

P^3 Problem and Magnolia Language: Specializing Array Computations for Emerging Architectures
Benjamin Chetioui, Marius Larnøy, Jaakko Järvi, Magne Haveraaen, and Lenore Mullin
Frontiers in Computer Science, 2022

Revisiting Language Support for Generic Programming: When Genericity Is a Core Design Goal
Benjamin Chetioui, Jaakko Järvi, and Magne Haveraaen
The Art, Science, and Engineering of Programming, 2022

Padding in the Mathematics of Arrays
Benjamin Chetioui, Ole Abusdal, Magne Haveraaen, Jaakko Järvi, and Lenore Mullin
ARRAY @ PLDI, 2021, Virtual, Canada

Attacks on Integer-RLWE
Alessandro Budroni, Benjamin Chetioui, and Ermes Franch
ICICS, 2020, Copenhagen, Denmark

An Alignment Cost-Based Classification of Log Traces Using Machine-Learning
Mathilde Boltenhagen, Benjamin Chetioui, and Laurine Huber
ML4PM2020, 2020, Padua/ Virtual, Italy

Finite Difference Methods Fengshui: Alignment Through a Mathematics of Arrays
Benjamin Chetioui, Lenore Mullin, Ole Abusdal, Magne Haveraaen, Jaakko Järvi, and Sandra Macià
ARRAY @ PLDI, 2019, Phoenix, AZ, USA

SELECTED TALKS

Revisiting Language Support for Generic Programming (slides) <Programming> 2023 — 03/2023
What does the programming experience look like in a programming language designed for generic programming?

Padding in the Mathematics of Arrays (slides) ARRAY 2021 — 06/2021
A presentation of a formalization of array padding in the Mathematics of Arrays formalism.

Coq: Running your Cake and Proving it too (slides) Rootcamp 2021 — 03/2021
An introduction to Coq and theorem proving.

Composable Transformations of Programs with JAX (slides) BLDL seminars — 02/2021
A presentation of the JAX library with a focus on the jax2tf transformation.

Modern OS Security (slides) ICT Research School 2019 — 10/2019
A lecture giving an overview of the recent (at the time) security mechanisms on iOS.

SERVICE TO THE COMMUNITY

Subreviewer @ NWPT'21 — 2021

Organizer @ SIGSEGv2 Paris — 2019
SIGSEGv is a French information security conference mainly focused on hacking, reverse-engineering, and offensive security.

Organizer @ ICT Research School's Annual Meeting Bergen — 2019

Subreviewer @ ARRAY'19 — 2019

SPORT

2nd World Mind Sports Games	*17th place*	@ French team representative	2012
French Go U19 Team	*Member*	@ French team representative	2009 – 2013