Jana Toljaga

Ph.D. Student in Computer Science — Inria Saclay & Télécom SudParis, IP Paris

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Research Interests

Ph.D. candidate in operating systems (Benagil team, Inria & Télécom SudParis), advised by Gaël Thomas, Nicolas Derumigny and Mathieu Bacou. I specialize in **storage and memory systems**, using **virtualization** to rethink conventional system-stack abstractions and give applications access to hardware features for better performance and lower engineering cost. Main contribution: **VoliStorM**, a crash-consistent I/O cache with two kernels instead of two caches, published at **SOSP 2026**.

Education

Ph.D. in Computer Science Sep. 2023 – present
Inria Saclay & Télécom SudParis, IP Paris — Benagil team, Samovar laboratory France

- Thesis on leveraging virtualization to efficiently use low-latency storage (PMEM, NVMe).

M.Sc. in Parallel and Distributed Systems Sep. 2022 – Sep. 2023
Institut Polytechnique de Paris (Télécom SudParis), PDS track, Master 2 France

- **Grade:** 18.75/20 | **Rank:** 1/102
- **Coursework:** Advanced Programming for Multicore Architectures, Fundamentals of Distributed Systems, Cloud Infrastructures, High Performance Runtimes.
- **Research:** Disaggregated memory management for a managed runtime (led by Gaël Thomas).
- **Scholarships:** French Government Scholarship (Campus France); "Dositeja" Scholarship for Serbian students abroad.

B.Sc. in Software Engineering Oct. 2018 – Jul. 2022
School of Electrical Engineering, University of Belgrade Serbia

- **Grade:** 9.85/10
- **Coursework:** Operating Systems, Compiler Construction, System Software, Concurrent and Distributed Programming, Algorithms and Data Structures, Computer Networks, Computer Architecture, Databases.
- **Scholarships:** Ministry of Education of Serbia scholarship for gifted students; City of Belgrade scholarship for best-performing students.

Experience

Ph.D. Candidate Sep. 2023 – present
Inria Saclay & Télécom SudParis, IP Paris France

- Research on using virtualization to improve storage systems and memory-intensive applications, ensuring data integrity across crashes and reboots while staying transparent for legacy applications and language runtimes.
- Co-supervising Master and Ph.D. students on projects stemming from my work (cache coherence for disaggregated systems, hardware-optimized key-value stores).

Research Intern Mar. 2023 – Aug. 2023
Télécom SudParis France

- Built a runtime that uses virtualization to expose a page table to user applications, enabling custom memory-management policies entirely in user space. Still maintained and actively used for research by the team.

Research Intern Jul. 2022 – Sep. 2022
EPFL, Distributed Computing Laboratory (Rachid Guerraoui) Switzerland

- Implemented an efficient distributed communication protocol in Rust in a collaborative project.

Software Engineer Intern Feb. 2022 – May 2022
Microsoft, Maps data team Serbia

- Developed a full-stack web application for monitoring Open Maps data pipelines and extended the pipelines with requested features.

Teaching Assistant 2020 – 2026
École polytechnique, Télécom SudParis, University of Belgrade

- **École polytechnique** (Sep. 2025 – Jan. 2026): Object-Oriented Programming in C++.
- **Télécom SudParis** (Sep. 2023 – Jan. 2024): Object-Oriented Programming in C++, Algorithms in Java, Introduction to Operating Systems.

- **University of Belgrade** (Oct. 2020 – Jun. 2022, student TA): lab exams and evaluation in Operating Systems, Algorithms and Data Structures, Databases, Computer Architecture, Object-Oriented Programming.

Publications

[1] **Jana Toljaga**, Nicolas Derumigny, Tara Aggoun, Mathieu Bacou, Gaël Thomas. **VoliStorM: A Crash-Consistent I/O Cache with Two Kernels Instead of Two Caches.** *32nd Symposium on Operating Systems Principles (SOSP)*, 2026.

[2] Subashiny Tanigassalame, Yohan Pipereau, Adam Chader, **Jana Toljaga**, Gaël Thomas. **Privagic: Automatic Code Partitioning with Explicit Secure Typing.** *25th International Middleware Conference (Middleware)*, 2024.

[3] Subashiny Tanigassalame, Yohan Pipereau, Adam Chader, **Jana Toljaga**, Gaël Thomas. **FastSGX: A Message-passing based Runtime for SGX.** *International Conference on Advanced Information Networking and Applications (AINA)*, 2024.

Research Projects

Leveraging Virtualization to Efficiently Use Low-Latency Storage Mar. 2023 – present
Main Ph.D. topic

- A runtime providing a transparent I/O cache for modern storage (PMEM, NVMe) via a secondary low-latency kernel, implemented as a virtualized, process-like abstraction with direct userland page table access.
- **Publication:** [1]. **Poster/Workshop:** Userland Page Table: A Key for Transparent Persistent Memory (Middleware 2024).

Optimizing Key-Value Store Performance by Leveraging Userland Page Tables Mar. 2024 – present
Problem definition and design (continuation of my Ph.D. work)

- A key-value store that achieves array-like efficiency for lookups while efficiently supporting range queries, by using the page table managed by the MMU as the store's tree-based structure. This enables hardware-accelerated tree traversal, providing efficient operations and range queries while improving scalability and memory efficiency.

Intra-Process Isolation of Untrusted Libraries with Userland Page Tables Jan. 2026 – present
Design (continuation of my Ph.D. work)

- Uses the userland page table to isolate untrusted libraries within a process: trusted code runs in ring 0 on supervisor pages, untrusted libraries in ring 3 on user pages, and all shared data goes through a mediated region.

Confidential Computing Made Practical with Secure Typing Jul. 2023 – Oct. 2023
Experimental evaluation

- A compiler extending language typing with security annotations to automatically partition legacy applications for Intel SGX, minimizing the trusted computing base.
- **Publications:** [2], [3].

Talks & Posters

Nov. 2026	**Invited talk**, Per3S 2026 — *VoliStorM*	Paris, France
Sep. 2026	**Talk & Poster**, SOSP 2026 — *VoliStorM*	Prague, Czechia
Jun. 2025	**Talk & Poster**, Compas 2025 — *Userland Page Table Towards Transparent PMEM*	Bordeaux, France
May 2025	**Invited talk**, Per3S 2025 — *VolipMem: A System-Level PMEM Runtime*	Paris, France
Dec. 2024	**Poster**, Middleware 2024 — *Userland Page Table for Transparent PMEM*	Hong Kong
Apr. 2024	**Poster**, EuroSys 2024 Doctoral Workshop	Athens, Greece
Feb. 2024	**Invited talk**, SLB — *Virtualization for Crash-Consistency*	Clamart, France
Nov. 2023	**Talk**, JetBrains School on Distributed Systems	Paphos, Cyprus
Sep. 2023	**Poster**, DARE 2023 Summer School	Brussels, Belgium

Selected Undergraduate Projects

- **Multi-threading kernel** (2020): preemptive time-sharing kernel with context switching, semaphores, events and signals. C++, x86 assembly
- **Buddy and slab allocator** (2021): kernel memory allocation with object caches backed by a buddy page allocator. C
- **Assembler, linker and emulator** (2021) for a RISC-like machine, emulating CPU, memory and I/O devices. C++, Flex, Bison
- **MicroJava compiler** (2022): lexical, syntax and semantic analysis and bytecode generation. Java, JFlex