Marco Barletta

Ph.D. student in Information Technology and Electrical Engineering

Place: Naples (Italy) · Age: 26 · Nationality: Italian

`Portfolio` · `Mail ID` · `Mobile` · `GitHub` · `LinkedIn`

SUMMARY

Marco is a Ph.D. student in Information Technology and Electrical Engineering at Federico II University of Naples (Italy), where he received his M.Eng. in computer engineering with honors in 2021. His research interests include virtualization solutions and orchestration systems for cloud computing paradigms applied to real-time and mixed-criticality systems. He is a member of DESSERT (DEpendable and Secure Software Engineering and Real-Time Systems) research group.

EDUCATION

- **Ph.D. in Information Technology and Electrical Engineering**   **(2021-current)**
  Federico II University of Naples

  Advisor: Prof. Marcello Cinque. Expected end: November 2024

- **Master Degree in computer engineering**   **(2019-2021)**
  Federico II University of Naples   110/110 cum laude

  Thesis: Achieving Resource Isolation in Real-Time Containers for Mixed-Criticality Systems
  Advisor: Prof. Marcello Cinque

- **Bachelor Degree in computer engineering**   **(2016-2019)**
  Federico II University of Naples   110/110 cum laude

  Thesis: Detecting AI Synthesized Speech Through Convolutional Neural Networks.
  Advisor: Prof. Luisa Verdoliva

EXPERIENCE

- **University of Illinois at Urbana-Champaign**   **April 2023 – December 2023**
  Visiting Scholar

  Marco has been a Visiting Scholar at UIUC (IL), focusing on orchestration systems' dependability and failure modes.
  Advisors: Proff. Ravishankar K. Iyer and Zbigniew T. Kalbarczyk

- **Nokia Bell Labs**   **June 2022 – September 2022**
  Summer Ph.D. Intern

  Marco has been a Ph.D. intern at Nokia Bell Labs (Stuttgart, Germnay), focusing on wireless network orchestration for industry, collaborating with ARENA 2036 project.
  Advisor: Catello Di Martino

- **Digita Accademy**   **February 2020**
  Salesforce Developer bootcamp

RESEARCH

- **Ph.D. research topic**

  Marco's Ph.D. research activity concerns issues and solutions to the application of orchestration systems in mission-critical environments, like Industry 4.0. Orchestration systems are software systems in charge of placing, spawning, and migrating packaged applications over a set of computing nodes in order to respect a user-defined declarative steady state for the applications. To satisfy the degree of flexibility and reconfigurability requested by evolving

mission-critical scenarios, like Industry 4.0 and 5G networks, hardware industrial equipment is being replaced by virtualized software applications (e.g., containers). Orchestration systems are the solution to automate the management and deployment of applications and to meet the flexibility, reconfigurability, and reliability required by the I4.0 vision. Although orchestration systems are used daily in cloud environments, they are not ready yet to meet industrial requirements like timing guarantees, reduced outage times, resiliency, etc. Marco's research introduces the notion of criticality-aware orchestration, in which application management is differentiated based on the criticality level, and studies orchestration systems' failures and fault tolerance.

SKILLS

- **Soft skills**

  Marco has good critical thinking. He is able to analyze problems from different perspectives to find strengths and weaknesses. He can be very friendly, and this has a great impact on networking, even if this is not immediate. If feeling comfortable, he can inspire other people and become their reference.

  He is not afraid of making decisions, even though he knows that they cannot be perfect decisions every time.

- **Programming Languages**

  C, Golang, Python, C++, C, Java, Rust, Matlab, Assembly, VHDL

- **Research-related Expertise**

  Kubernetes, Xenomai, Linux, Preempt-RT, Docker, Jailhouse, container runtime stack, K3s, Xen, KVM, Helm, etc.

- **Other Software Expertise**

  Oracle Database, MySQL, Keycloak, JMP, Mosquitto, Springboot, Blender, Salesforce, Unity, Prusa Slicer, etc.

- **Languages**

  Italian (mother tongue), English (proficient), Spanish (basic)

AWARDS

- **Student travel grant**   **2024**

  DSN 2024 Student Travel Grant Committee

- **1st Classified for Ph.D. scholarship**   **2021**

  ITEE Course, Federico II University of Naples

- **Best Student Award of Computer Engineering**   **2019**

  DIETI, Federico II University of Naples

- **1st Prize at EBEC challenge Italy**   **2018**

  BEST, Case Study competition

CERTIFICATIONS

- **English language: ISE II Trinity Certification (B2)**

  With Distinction

- **Spanish language: A2 Cervantes Certification**

RESEARCH ARTIFACTS

Journal Papers

- "Criticality-aware Monitoring and Orchestration for Containerized Industry 4.0 Environments"

  M. Barletta, M. Cinque, L. De Simone, R. Della Corte

  published on ACM Transaction on Embedded Computing Systems (TECS) 2024

Conference Papers

- "Mutiny! How does Kubernetes fail, and what can we do about it?"
  M. Barletta, M. Cinque, C. Di Martino, Z. Kalbarczyk, R. Iyer
  in 54th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2024)

- "Achieving isolation in mixed-criticality industrial edge systems with real-time containers"
  M. Barletta, M. Cinque, L. De Simone, R. Della Corte
  presented at 34th Euromicro Conference on Real-Time Systems (ECRTS 2022)

- "Introducing k4. 0s: a Model for Mixed-Criticality Container Orchestration in Industry 4.0"
  M. Barletta, M. Cinque, L. De Simone, R. Della Corte
  presented at 34th Euromicro Conference on Real-Time Systems (ECRTS 2022) – RT cloud workshop

- "Failover Timing Analysis in Orchestrating Container-based Critical Applications"
  M. Barletta, L. De Simone, R. Della Corte, C. Di Martino
  to be presented at 19th European Dependable Computing Conference (EDCC, 2024) – Short Papers

- "Partitioned Containers: Towards Safe Clouds for Industrial Applications"
  M. Barletta, M. Cinque, L. De Simone, R. Della Corte, G. Farina, D. Ottaviano
  in 53rd IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2023) – Disrupt track

- "RunPHI: Enabling Mixed-criticality Containers via Partitioning Hypervisors in Industry 4.0"
  M. Barletta, M. Cinque, L. De Simone, R. Della Corte, G. Farina, D. Ottaviano
  presented at 33rd IEEE International Symposium on Software Reliability Engineering (ISSRE 2022) – Fast abstracts

- "Hierarchical Scheduling for Real-Time Containers in Mixed-Criticality Systems"
  M. Barletta, M. Cinque, R. Della Corte
  in 32nd IEEE International Symposium on Software Reliability Engineering (ISSRE 2021) – Fast abstracts

Magazine Papers

- "SLA-Driven Software Orchestration in Industry 4.0"
  M. Barletta, M. Cinque, C. Di Martino
  in IEEE Internet of Things Magazine, 2022

Others

- "Network Digital Twin: In-production testing SLA-driven networking for industrial wireless networks"
  M. Barletta, M. Cinque, C. Di Martino
  industrial presentation at IEEE Globecom, 2022

- U.S. Patent Application - ID omitted
  Authors omitted, 2023

- "Achieving isolation in mixed-criticality industrial edge systems with real-time containers (Artifact)"
  M. Barletta, M. Cinque, L. De Simone, R. Della Corte
  in 34th Euromicro Conference on Real-Time Systems (ECRTS 2022)

SERVICE

- **Teaching Assistant**
  Marco has been a teaching assistant of the Operating Systems course for the bachelor degree in computer engineering at Federico II University of Naples since 2022.

- **Usenix Annual Technical Conference External Review Commitee member, 2024**

  Marco was a member of the external review commitee for Usenix ATC 2024.

- **Dependable Systems and Networks - Artifact Evaluation PC member, 2024**

  Marco was a member of the artifact evaluation program commitee for DSN 2024.

- **Eurosys shadow PC member, 2022**

  Marco participated in the shadow program commetee for Eurosys 2022, reviewing 8 papers.

REVIEWS

- **1 subreview for IEEE ISSRE, 2024**

- **1 subreview for IEEE ICWS, 2024**

- **3 reviews for Usenix ATC, 2024**

- **1 review for IEEE International Symposium on Computers and Communications, 2023**

- **8 reviews for Shadow PC EuroSys, 2022**

- **1 review for IEEE Transaction on Services Computing, 2022**

REFERENCE LETTERS

- **Luisa Verdoliva**

  Full professor at Federico II University of Naples

  Reference letter for Visiting Scholar position at University of Illinois at Urbana Champaign

- **Nicola Mazzocca**

  Full professor at Federico II University of Naples

  Reference letter for Visiting Scholar position at University of Illinois at Urbana Champaign

- **Alessandro Lieto, Ilaria Malanchini**

  Research Engineers at Nokia Bell Labs (Stuttgart)

  Reference letter for Visiting Scholar position at University of Illinois at Urbana Champaign

Declaration

I hereby declare that the above mentioned information is correct up to my knowledge and I bear the responsibility for the correctness of the above mentioned.