Paolo Valente
Curriculum Vitae

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Education

2005 **PhD in Computer Engineering**, *University of Pisa*, Italy.
Advisor: prof. Luigi Rizzo.

2000 **MS in Computer Engineering**, *University of Pisa*, Italy.

Current position

Since 2006 **Assistant professor**, *University of Modena and Reggio Emilia*, Italy.

Research and professional activity

The main focus of my professional activity is the scheduling of shared resources (CPU, storage, network), with the aim of providing bandwidth and delay guarantees. In this context, I have carried on both research on algorithms and their properties, and development of working prototypes and production-quality implementations.

As an outcome of my development effort, most of the scheduling algorithms I have defined and implemented (as a co-author, or as the main or sole author) are now part of the Linux, FreeBSD and/or OS X operating systems. I have also developed a few applications, which are, in some, but not all cases, implementations of algorithms that I have defined as part of my further research activity on bioinformatics.

In the next sections I report: a short description of my major research-and-development results, a list of my industry-funded projects, my main research-specific information (participation to research projects and to conference technical programs, advised students, bibliometrics), and a short list of my main skills.

Research-and-development results

WF^2Q+ Definition and implementation for FreeBSD of an extended version of the WF^2Q+ packet scheduler, compliant with a dynamic set of packet flows. This scheduler provides optimal worst-case service guarantees at a logarithmic cost with respect to the number of packet flows. It is currently available in FreeBSD.

QFQ   Definition and implementation of QFQ, an approximated variant of WF^2Q+. QFQ provides QoS guarantees close to WF^2Q+, but has a constant execution time regardless of the number of competing flows. In particular, the execution time of QFQ has been proved to be lower than that of any competitor providing comparable guarantees. QFQ is now in FreeBSD and OS X, and was in Linux before being replaced by QFQ+ (see next item).

QFQ+	Definition and implementation of QFQ+, a faster version of QFQ, providing QoS guarantees close to QFQ, but with an execution time comparable to that of Deficit Round Robin (DRR), and even lower than that of DRR exactly in the scenarios where using a more accurate scheduler makes a difference with respect to using DRR. QFQ+ replaced QFQ in Linux.
BFQ	Definition and implementation of BFQ, a new storage-device scheduling algorithm that guarantees very low response times to soft real-time and interactive applications. BFQ also achieves a high throughput on both rotational and flash-based devices. Part of the code of BFQ has been included in the Linux block layer, whereas the whole scheduler is being publicly reviewed for inclusion in Linux. Meanwhile, BFQ has already been adopted by various top Linux distributions and kernel variants, on both desktops and smartphones. Examples are ArchLinux, Gentoo and CyanogenMod.
SMF	Definition of the algorithm (with other colleagues), and implementation of the SMF tool for finding sets of *similar* sub-strings in sequences of DNA. Finding these sets is one of the most important tasks in Bioinformatics, and SMF is currently one of the fastest tools available (SMF is written in C++).
Arianna's Crawler	Design and implementation of the first version of the crawler of the italian Arianna search engine (written in C, with a colleague).
IMAGO	Design and implementation of the IMAGO real-time system for presenting visual stimuli and reading responses of human subjects (written mainly in C++).
ConFinder	Graph algorithm for managing social networks and finding connections between nodes, commissioned for intelligence purposes (implementation written in Java, and based on Neo4j).

Industry-funded projects

2015	Reducing application- and system-level latencies related to storage I/O in Linux-based systems. Sponsored by Linaro, €5K.
2014	Guaranteeing lossless network traffic dump on storage devices executing also additional I/O workloads. Sponsored by ntop, €5K.
2013	Preserving application- and system-level low-latency guarantees in virtualized environments. Sponsored by Virtual Open Systems, €15K.

International and national research projects

Research unit leader

2016-2019	EU project ENABLE-S3(H2020-ECSEL-2015-2-IA-two-stage-692455): "European Initiative to Enable Validation for Highly Automated Safe and Secure Systems". Overall project budget: €68,433,166.75(€16,691,820.43 of which funded by the EU). Budget assigned to the Research Unit of the University of Modena: €216,563 (€86,625 of which funded by the EU).

Research unit member

2016-2019	EU project HERCULES(H2020-ICT-04-2015): "High-Performance Embedded Real-Time Architectures for Low-Power Many-Core Systems", funded by EU.

2013-2015	EU project P-SOCRATES(FP7-2013-ICT-611016): "Parallel Software Framework for Time-Critical Many-Core Systems". Overall project budget: €3.624.9424 (€2.762.000 of whom funded by the EU). Budget assigned to the Research Unit of the University of Modena: €492.200 (€378.400 of which funded by the EU).
2009-2010	Italian SFINGI project: "Software router to Improve Next-Generation Internet". Funded by MIUR within the PRIN Program 2009.
2005-2007	EU project RI-MACS (NMP2-CT-2005-016938), "Radically In- novative Mechatronics and Advanced Control Systems".
2005-2007	EU project OCERA (IST-2001-35102), "Open Components for Embedded Real-time Applications".
2002-2005	EU project RECSYS (IST-2001-32515), "Real-Time Embedded Control of Mobile Systems with Distributed Sensing".

Conference Chairing and Technical Program Committees

Conference-session chairing:

2013	"Internet, network protocols and performance" session of IEEE ICCCN 2013

Program Committee membership:

2015	ACM/IEEE ANCS 2016
2013-2014	IEEE REACTION (2013, 2014)
2008	IEEE Hyperio 2008

Advised students

MS Degree	Advisor of more than 10 students.
BS Degree	Advisor of more than 20 students.

Publications and bibliometrics

Public. List	An updated list of my publications can be found here.
G. Scholar	Number of citations: 194. H-index: 7. Click here for my profile on Google Scholar.
Scopus	Author ID: 55926589000.

Skills

Kernel	Linux kernel development
	Kernel testing, debugging and tuning, plus code porting, for BSPs
	Design and implementations of kernel-level components for providing QoS guarantees and high responsiveness
Programming	Design and implementation of user-space applications in C, C++ and Java

Use of personal data

I authorize the use of my personal data