

Curriculum Vitae

Paolo Bellavista



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SOME SUMMARIZED AND PRIMARY ELEMENTS OF MY CV

Source: **Google Scholar** (April 2024)

Citations=11355; h-index=46; i10-index=202

Source: **Scopus** (April 2024)

Citations= 6826; h-index=38

In total I am co-author of around **140 articles in international journals/magazines** (in publication venues that are considered excellent in my research fields, such as ACM Computing Surveys, IEEE Communication Surveys&Tutorials, IEEE Transactions on Software Engineering, IEEE Journal on Selected Areas in Communications, ACM Transactions on Internet Technology, IEEE Transactions on Vehicular Networks, Elsevier Pervasive and Mobile Computing Journal, Elsevier Journal of Network and Computer Applications, Elsevier Future Generation Computer Systems, IEEE Computer, IEEE Internet Computing, IEEE Pervasive Computing, IEEE Access, IEEE Communications, IEEE Wireless Communications). In addition, I have served as guest editor for around **15 special issues of international journals/magazines** (e.g., IEEE Communications, Elsevier Pervasive and Mobile Computing J., Elsevier J. Network and Computing Applications, and Springer Mobile Networks and Applications J.). Moreover, I am co-author of around 15 chapters in international peer-reviewed books and of more than **200 additional papers** presented in **international conferences** organized by the primary professional associations and publishers (IEEE, ACM, Springer, ...).

About organization and reviewing activities, I am Editor-in-Chief of the MDPI Computers Journal (2017-) and I am (or have been) member of the Editorial Boards of several international journals/magazines, among which IEEE Communications Surveys&Tutorials (2019-; Associate Editor In Chief currently), ACM Computing Surveys (2020-), IEEE Transactions on Computers (2011-2015), IEEE Transactions on Network and Service Management (2011-), IEEE Transactions on Services Computing (2008-2017), IEEE Networking Letters (2019-), IEEE Communications Magazine (2003-2011), Elsevier Pervasive and Mobile Computing Journal (2010-), Elsevier Journal on Network and Computing Applications (2015-), Elsevier Journal of Systems Architecture (2003-), Springer Journal of Network and Systems Management (2008-), MDPI Sensors Journal, and SAGE International Journal of Distributed Sensor Networks. About most recent conference organization activities, I have served or am serving as Technical Program Co-Chair of IEEE Mobile Cloud 2015, General Co-Chair of Smart Cloud Networks & Systems (SCNS) 2018, Technical Program Co-Chair of ACM Int. Conf. Distributed Computing and Networking (ICDCN'17), General Co-Chair of ACM ICDCN'18, Workshop Co-Chair of MobiArch'17 (within ACM SIGCOMM), and Technical Program Co-Chair of Int. Conf. on Telecommunications (ICT'17).

Finally, among the roles I am covering and covered to serve my community, I can list the fact that I was member of the Academic Senate of Alma Mater Studiorum – Università di Bologna (2015-2018), I am member of the Gruppo Tematico di Ateneo (GTA) on ICT (2017-), I am the UNIBO representative and member of the Giunta of the national Group of Computer Engineering (Gruppo Ingegneria Informatica – GII, 2018-), and I am Senior Member of both IEEE (2006-) and ACM (2009-), I am elected Chair of the IEEE ComSoc Internet Technical Committee (started Dec. 2021), I am member of the Steering Committee of the European Technology Platform called Networked European Software and Service Initiative (NESSI, 2009-), and I am the UNIBO representative in the EIT Digital KIC National Steering Committee (2017-).

QUALIFICATIONS AND SENIOR MEMBERSHIPS

- I was an **Invited Professor at Université Pierre et Marie Curie (UPMC) – Sorbonne Université** (formerly Paris 6), Paris, France, for three months (from June 10 to September 10, 2017). UPMC is ranked the top university in France and 6th in Europe by both Shanghai and Taiwan rankings. The “Professeur Invité” status is prestigious, and the associated appointment process is highly selective, being the status given to only 3 people per year for the whole School of Engineering
- **Invited Professor at University College London (UCL)**, UK, for one month (from July 15 to August 15, 2019)
- **IEEE Senior Member** since 2006 and **ACM Senior Member** since 2009
- Elected **Chair of the IEEE ComSoc Internet Technical Committee** (Dec. 2021-Nov. 2023)
- I am the UNIBO representative at the BI-REX Competence Center for Industry 4.0, starting from Feb. 2022
- I am the UNIBO representative at the Consorzio Interuniversitario Nazionale per l’Informatica (CINI – Inter-university national consortium for Computer Science), starting from Jan. 2022

SCIENTIFIC ACTIVITIES - PRIMARY RESEARCH TOPICS

- Architectures and systems to support mobile, context-aware, and pervasive applications
- Middleware for dynamic and adaptive mobile services in pervasive computing scenarios and integrated wired-wireless IoT systems in general. Application domains:
 - Integrated management of networks, systems, and services
 - Federation of cloud infrastructures and resources, with special focus on Quality of Service and dynamic resource migration
 - Efficient and scalable integration, with exploitation of dynamically determined localities, of sensors/actuators and cloud computing for Cyber Physical Systems, with special focus on edge/fog computing techniques
 - Online stream processing of big data for cloud-Internet of Things environments
 - Wireless sensor networks and smart space services, with special focus on smart buildings and high scalability in wide-scale urban environments
 - Opportunistic and completely decentralized urban monitoring via vehicular ad-hoc sensor networking
 - Resource replication and dissemination in mobile ad-hoc and dense networks
 - Framework extensions and services for scalability in IP Multimedia Subsystem (IMS) and, more in general, for cloud-based virtual network functions in 4G/5G ecosystems
 - Provisioning of continuous and context-aware services with guarantees/indications of Quality of Service towards mobile users and devices, e.g., by considering predictive and proactive management of horizontal/vertical handovers
 - Opportunistic and cooperative sharing of resources in highly decentralized and heterogeneous environments (integration/federation of heterogeneous subnetworks, simultaneous exploitation of different network interfaces, sharing incentives, ...)

RECENT PARTICIPATION IN COMPETITIVE RESEARCH PROJECTS

- EU H2020 ICT-11 Innovation Action, “IoTwins”, Coordinator Bonfiglioli Riduttori, Scientific Coordinator Paolo Bellavista (2019-2022), overall budget 20.6M€; overall scientific coordinator
- EU H2020 NMP Research & Innovation Action, “SimDome”, Coordinator UNIBO (2019-2022), overall budget 4.6M€; leading UNIBO activities on ontologies for material modeling
- EU H2020-NMBP-TO-IND Research & Innovation Action, “OntoTrans”, Coordinator TU Wien Austria (2020-2023), overall budget 5.5M€, leading UNIBO activities on ontology platforms and interoperability solutions
- EU H2020 H2020DT Innovation Action, “Change2Twin”, Coordinator SINTEF Norway (2020-2023), overall budget 8.0M€, leading UNIBO activities on distributed and hybrid digital twins for SMEs

- EU H2020 ICT-56-2020, “NexT GEnERation SMart INterconnectEd IoT (Terminet)”, Coordinator Univ. Western Macedonia (2020-2023), overall budget 7.9M€, leading UNIBO activities on edge cloud computing for IoT
- EU H2020 CSA “OntoCommons - Ontology-driven data documentation for Industry Commons”, Coordinator TU Wien (2020-2023), overall budget 4.2M€, leading UNIBO activities on ontology interoperability and associated frameworks
- EU FP7 Large-scale IP, FP7 Future Networks Call, “Mobile Cloud Networking (MCN)”, Coordinator SAP Germany (2012-2016), overall budget 15.7M€; UNIBO leader
- Artemis Joint Undertaking, Innovation Pilot Project, “Arrowhead Tools”, Coordinator Lulea U. Technology Sweden (2019-2022), overall budget 21M€; task leader.
- EU FP7 STREP, ICT Call 8 (FP7-ICT-2011-8), “Cooperative Self-Organizing System for low Carbon Mobility at low Penetration Rates (COLOMBO)”, Coordinator DLR Germany (2012-2015), overall budget 2.4M€; task leader

- PNRR Research Infrastructures, SoBigData.it, Coordinator CNR (2022-2025); UNIBO leader
- PNRR Innovation Ecosystems, EcosistER, Coordinator Università di Bologna (2023-2025)
- PNRR Partenariato Esteso 14, Telecommunications of the Future, RESTART, Coordinator Università di Roma Tor Vergata (2023-2025)
- Casa delle Tecnologie Emergenti, Coordinator Città Metropolitana di Bologna (2023-2025); WP3 Leader (Research & Development)
- PRIN 2022, JOint ResoUrce Management in Reconfigurable I4.0 Factories (JOULE) (2023-2025); National Coordinator

The above research topics are covered also via the coordination and supervision work of a research group, namely Mobile Middleware Research Group – <http://middleware.unibo.it>. This group, which is coordinated by Antonio Corradi and me, consists of around 10-15 people, including the colleagues Professors Luca Foschini, Rebecca Montanari, Mirco Musolesi, Ph.D. students, PostDoc collaborators and research grant staff, who actively contribute to our research activities and projects.

SOME RECENT PUBLICATIONS

- Ningxiong Mao, Hongjie He, Fan Chen, Paolo Bellavista, Yaolin Yang: Reversible data hiding of JPEG images based on block sorting and segmented embedding. **Biomed. Signal Process. Control.** 87(Part A): 105555 (2024)
- Andrea Sabbioni, Andrea Garbugli, Luca Foschini, Antonio Corradi, Paolo Bellavista: Serverless Computing for QoS-Effective NFV in the Cloud Edge. **IEEE Commun. Mag.** 62(4): 40-46 (2024)
- Carlo Mazzocca, Nicolò Romandini, Rebecca Montanari, Paolo Bellavista: Enabling Federated Learning at the Edge through the IOTA Tangle. **Future Gener. Comput. Syst.** 152: 17-29 (2024)
- Paolo Bellavista, Giuseppe Di Modica: IoTwins: Implementing Distributed and Hybrid Digital Twins in Industrial Manufacturing and Facility Management Settings. **Future Internet** 16(2): 65 (2024)
- Abdullah Lakhan, Tor-Morten Grønli, Paolo Bellavista, Sajida Memon, Maher Alharby, Orawit Thinnukool: IoT workload offloading efficient intelligent transport system in federated ACNN integrated cooperated edge-cloud networks. **J. Cloud Comput.** 13(1): 79 (2024)
- Shah Zeb, Aamir Mahmood, Sunder Ali Khowaja, Kapal Dev, Syed Ali Hassan, Mikael Gidlund, Paolo Bellavista: Towards defining industry 5.0 vision with intelligent and softwarized wireless network architectures and services: A survey. **J. Netw. Comput. Appl.** 223: 103796 (2024)
- Muhammad Zawish, Fayaz Ali Dharejo, Sunder Ali Khowaja, Saleem Raza, Steven Davy, Kapal Dev, Paolo Bellavista: AI and 6G Into the Metaverse: Fundamentals, Challenges and Future Research Trends. **IEEE Open J. Commun. Soc.** 5: 730-778 (2024)
- Paolo Bellavista, Nicola Bicocchi, Mattia Fogli, Carlo Giannelli, Marco Mamei, Marco Picone: ODTE: A Metric for Digital Twin Entanglement. **IEEE Open J. Commun. Soc.** 5: 2377-2390 (2024)

- Sapna Jha, Aditya Trivedi, K. K. Pattanaik, Himanshu Gauttam, Paolo Bellavista: Efficient data harvesting from boundary nodes for smart irrigation. **Peer Peer Netw. Appl.** 17(1): 139-162 (2024)
- Isam Mashhour Al Jawarneh, Paolo Bellavista, Antonio Corradi, Luca Foschini, Rebecca Montanari: SpatialSSJP: QoS-Aware Adaptive Approximate Stream-Static Spatial Join Processor. **IEEE Trans. Parallel Distributed Syst.** 35(1): 73-88 (2024)
- Matteo Mendula, Paolo Bellavista, Marco Levorato, Sharon Ladron de Guevara Contreras: Furcifer: a Context Adaptive Middleware for Real-world Object Detection Exploiting Local, Edge, and Split Computing in the Cloud Continuum. **PerCom** 2024: 47-56
- Federico Montori, Ivan D. Zyrianoff, Lorenzo Gigli, Alessandro Calvio, Riccardo Venanzi, Simone Sindaco, Luca Sciullo, Federica Zonzini, Matteo Zauli, Nicola Testoni, Alessandro Bertacchini, Elisa Londero, Enrico Alessi, Marco Di Felice, Luciano Bononi, Paolo Bellavista, Luca De Marchi, Alessandro Marzani, Paolo Azzoni, Tullio Salmon Cinotti: An IoT Toolchain Architecture for Planning, Running and Managing a Complete Condition Monitoring Scenario. **IEEE Access** 11: 6837-6856 (2023)
- Paolo Bellavista, Nicola Bicocchi, Mattia Fogli, Carlo Giannelli, Marco Mamei, Marco Picone: Requirements and design patterns for adaptive, autonomous, and context-aware digital twins in industry 4.0 digital factories. **Comput. Ind.** 149: 103918 (2023)
- Paolo Bellavista, Mattia Fogli, Carlo Giannelli, Cesare Stefanelli: Application-Aware Network Traffic Management in MEC-Integrated Industrial Environments. **Future Internet** 15(2): 42 (2023)
- Isam Mashhour Al Jawarneh, Luca Foschini, Paolo Bellavista: Efficient Integration of Heterogeneous Mobility-Pollution Big Data for Joint Analytics at Scale with QoS Guarantees. **Future Internet** 15(8): 263 (2023)
- Shuai Liu, Shichen Huang, Shuai Wang, Khan Muhammad, Paolo Bellavista, Javier Del Ser: Visual tracking in complex scenes: A location fusion mechanism based on the combination of multiple visual cognition flows. **Inf. Fusion** 96: 281-296 (2023)
- Carlo Mazzocca, Nicolò Romandini, Matteo Mendula, Rebecca Montanari, Paolo Bellavista: TruFLaaS: Trustworthy Federated Learning as a Service. **IEEE Internet Things J.** 10(24): 21266-21281 (2023)
- Isam Mashhour Al Jawarneh, Luca Foschini, Paolo Bellavista: Polygon Simplification for the Efficient Approximate Analytics of Georeferenced Big Data. **Sensors** 23(19): 8178 (2023)
- Rahul Mishra, Dharavath Ramesh, Paolo Bellavista, Damodar Reddy Edla: Redactable Blockchain-Assisted Secure Data Aggregation Scheme for Fog-Enabled Internet-of-Farming-Things. **IEEE Trans. Netw. Serv. Manag.** 20(4): 4652-4667 (2023)
- Alessandro Staffolani, Victor-Alexandru Darvari, Paolo Bellavista, Mirco Musolesi: RLQ: Workload Allocation With Reinforcement Learning in Distributed Queues. **IEEE Trans. Parallel Distributed Syst.** 34(3): 856-868 (2023)
- Lorenzo Rosa, Andrea Garbugli, Antonio Corradi, Paolo Bellavista: INSANE: A Unified Middleware for QoS-aware Network Acceleration in Edge Cloud Computing. **Middleware** 2023: 57-70
- Andrea Garbugli, Andrea Sabbioni, Antonio Corradi, Paolo Bellavista: TEMPOS: QoS Management Middleware for Edge Cloud Computing FaaS in the Internet of Things. **IEEE Access** 10: 49114-49127 (2022)
- Alessandro Costantini, Giuseppe Di Modica, Jean Christian Ahouangonou, Doina Cristina Duma, Barbara Martelli, Matteo Galletti, Marica Antonacci, Daniel Nehls, Paolo Bellavista, Cedric Delamarre, Daniele Cesini: IoTwins: Toward Implementation of Distributed Digital Twins in Industry 4.0 Settings. **Comput.** 11(5): 67 (2022)
- Paolo Bellavista, Luca Foschini, Alessio Mora: Decentralised Learning in Federated Deployment Environments: A System-Level Survey. **ACM Comput. Surv.** 54(1): 15:1-15:38 (2022)
- Juan Luis Herrera, Jaime Galán-Jiménez, Luca Foschini, Paolo Bellavista, Javier Berrocal, Juan Manuel Murillo: QoS-Aware Fog Node Placement for Intensive IoT Applications in SDN-Fog Scenarios. **IEEE Internet Things J.** 9(15): 13725-13739 (2022)
- Paolo Bellavista, Luca Foschini, Rebecca Montanari, Nicolò Romandini: FlowChain: The Playground for Federated Learning in Industrial Internet of Things Environments. **IEEE Internet Things Mag.** 5(2): 78-83 (2022)

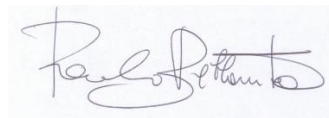
- Michele Girolami, Piergiorgio Vitello, Andrea Capponi, Claudio Fiandrino, Luca Foschini, Paolo Bellavista: A mobility-based deployment strategy for edge data centers. **J. Parallel Distributed Comput.** 164: 133-141 (2022)
- Sunder Ali Khowaja, Kapal Dev, Parus Khuwaja, Quoc-Viet Pham, Nawab Muhammad Faseeh Qureshi, Paolo Bellavista, Maurizio Magarini: IIFNet: A Fusion-Based Intelligent Service for Noisy Preamble Detection in 6G. **IEEE Netw.** 36(3): 48-54 (2022)
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- Khan Muhammad, Tanveer Hussain, Hayat Ullah, Javier Del Ser, Mahdi Rezaei, Neeraj Kumar, Mohammad Hijji, Paolo Bellavista, Victor Hugo C. de Albuquerque: Vision-Based Semantic Segmentation in Scene Understanding for Autonomous Driving: Recent Achievements, Challenges, and Outlooks. **IEEE Trans. Intell. Transp. Syst.** 23(12): 22694-22715 (2022)
- Hyunbum Kim, Jalel Ben-Othman, Lynda Mokdad, Paolo Bellavista: A Virtual Emotion Detection Architecture With Two-Way Enabled Delay Bound toward Evolutional Emotion-Based IoT Services. **IEEE Trans. Mob. Comput.** 21(4): 1172-1181 (2022)
- José Luis Hernández Ramos, Sara Nieves Matheu, Angelo Feraudo, Gianmarco Baldini, Jorge Bernal Bernabé, Poonam Yadav, Antonio F. Skarmeta, Paolo Bellavista: Defining the Behavior of IoT Devices Through the MUD Standard: Review, Challenges, and Research Directions. **IEEE Access** 9: 126265-126285 (2021)
- Shabir A. Parah, Javaid A. Kaw, Paolo Bellavista, Nazir A. Loan, Ghulam Mohiuddin Bhat, Khan Muhammad, Victor Hugo C. de Albuquerque: Efficient Security and Authentication for Edge-Based Internet of Medical Things. **IEEE Internet Things J.** 8(21): 15652-15662 (2021)
- Claudia Cavallaro, Armir Bujari, Luca Foschini, Giuseppe Di Modica, Paolo Bellavista: Measuring the impact of COVID-19 restrictions on mobility: A real case study from Italy. **J. Commun. Networks** 23(5): 340-349 (2021)
- Khan Muhammad, Tanveer Hussain, Joel J. P. C. Rodrigues, Paolo Bellavista, Antônio Roberto L. de Macêdo, Victor Hugo C. de Albuquerque: Efficient and Privacy Preserving Video Transmission in 5G-Enabled IoT Surveillance Networks: Current Challenges and Future Directions. **IEEE Netw.** 35(2): 26-33 (2021)
- Isam Mashhour Al Jawarneh, Paolo Bellavista, Antonio Corradi, Luca Foschini, Rebecca Montanari: QoS-Aware Approximate Query Processing for Smart Cities Spatial Data Streams. **Sensors** 21(12): 4160 (2021)
- Paolo Bellavista, Christian Esposito, Luca Foschini, Carlo Giannelli, Nicola Mazzocca, Rebecca Montanari: Interoperable Blockchains for Highly-Integrated Supply Chains in Collaborative Manufacturing. **Sensors** 21(15): 4955 (2021)
- Sourabh Bharti, K. K. Pattanaik, Paolo Bellavista: Value of Information Based Sensor Ranking for Efficient Sensor Service Allocation in Service Oriented Wireless Sensor Networks. **IEEE Trans. Emerg. Top. Comput.** 9(2): 823-838 (2021)
- Paolo Bellavista, Carlo Giannelli, Marco Mamei, Matteo Mendula, Marco Picone: Application-Driven Network-Aware Digital Twin Management in Industrial Edge Environments. **IEEE Trans. Ind. Informatics** 17(11): 7791-7801 (2021)
- Georgios Bouloukakis, Kyle E. Benson, Luca Scalzotto, Paolo Bellavista, Casey Grant, Valérie Issarny, Sharad Mehrotra, Ioannis D. Moscholios, Nalini Venkatasubramanian: PrioDeX: A Data Exchange Middleware for Efficient Event Prioritization in SDN-Based IoT Systems. **ACM Trans. Internet Things** 2(3): 19:1-19:32 (2021)
- Isam Mashhour Al Jawarneh, Paolo Bellavista, Antonio Corradi, Luca Foschini, Rebecca Montanari: Efficient QoS-Aware Spatial Join Processing for Scalable NoSQL Storage Frameworks. **IEEE Trans. Netw. Serv. Manag.** 18(2): 2437-2449 (2021)
- Paolo Bellavista, Antonio Corradi, Andy Edmonds, Luca Foschini, Alessandro Zanni, Thomas Michael Bohnert: Elastic Provisioning of Stateful Telco Services in Mobile Cloud Networking. **IEEE Trans. Serv. Comput.** 14(3): 710-723 (2021)
- Sunder Ali Khowaja, Kapal Dev, Parus Khowaja, Paolo Bellavista: Toward Energy-Efficient Distributed Federated Learning for 6G Networks. **IEEE Wirel. Commun.** 28(6): 34-40 (2021)

- Ankush Jain, K. K. Pattanaik, Ajay Kumar, Paolo Bellavista: Energy and congestion aware routing based on hybrid gradient fields for wireless sensor networks. **Wirel. Networks** 27(1): 175-193 (2021)
- Isam Mashhour Al Jawarneh, Paolo Bellavista, Antonio Corradi, Luca Foschini, Rebecca Montanari, Javier Berrocal, Juan Manuel Murillo: A Pre-Filtering Approach for Incorporating Contextual Information Into Deep Learning Based Recommender Systems. **IEEE Access** 8: 40485-40498 (2020)
- Paolo Bellavista, Carlo Giannelli, Dmitriy David Padalino Montenero, Filippo Poltronieri, Cesare Stefanelli, Mauro Tortonesi: HOlistic pRocessing and NETworking (HORNET): An Integrated Solution for IoT-Based Fog Computing Services. **IEEE Access** 8: 66707-66721 (2020)
- Mansoor Nasir, Khan Muhammad, Paolo Bellavista, Mi Young Lee, Muhammad Sajjad: Prioritization and Alert Fusion in Distributed IoT Sensors Using Kademia Based Distributed Hash Tables. **IEEE Access** 8: 175194-175204 (2020)
- Panagiotis G. Sarigiannidis, Thomas Lagkas, Konstantinos Rantos, Paolo Bellavista: The Big Data era in IoT-enabled smart farming: Re-defining systems, tools, and techniques. **Comput. Networks** 168 (2020)
- Paolo Bellavista, Kaoru Ota, Zhihan Lv, Irfan Mehmood, Seungmin Rho: Towards smarter cities: Learning from Internet of Multimedia Things-generated big data. **Special Issue Editorial of Future Gener. Comput. Syst.** 108: 879-881 (2020)
- Rafik Hamza, Zheng Yan, Khan Muhammad, Paolo Bellavista, Faiza Titouna: A privacy-preserving cryptosystem for IoT E-healthcare. **Inf. Sci.** 527: 493-510 (2020)
- Isam Mashhour Al Jawarneh, Paolo Bellavista, Antonio Corradi, Luca Foschini, Rebecca Montanari: Big Spatial Data Management for the Internet of Things: A Survey. **J. Netw. Syst. Manag.** 28(4): 990-1035 (2020)
- Paolo Bellavista, Alessandro Dolci, Carlo Giannelli, Dmitriy David Padalino Montenero: SDN-Based Traffic Management Middleware for Spontaneous WMNs. **J. Netw. Syst. Manag.** 28(4): 1575-1609 (2020)
- Paolo Bellavista, Carlo Giannelli, Dmitriy David Padalino Montenero: A Reference Model and Prototype Implementation for SDN-Based Multi Layer Routing in Fog Environments. **IEEE Trans. Netw. Serv. Manag.** 17(3): 1460-1473 (2020)

Please see the full list of publications at:

<https://www.unibo.it/sitoweb/paolo.bellavista>

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