Antonis Papaioannou
Postdoctoral Researcher
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SUMMARY

I am a Senior Database Researcher at Huawei Research (Edinburgh), working on the development of GaussDB, Huawei's high-performance, AI-enhanced relational database family supporting distributed hybrid transactional-analytical (HTAP) workloads. My work focuses on core database internals including query optimization (IDP), incremental view maintenance (IVM), and the execution engine of next-generation cloud-native analytics platforms.

Before joining Huawei, I was a postdoctoral researcher at the Institute of Computer Science (ICS) of the Foundation for Research and Technology – Hellas (FORTH), targeting challenges in large-scale distributed storage and stream-processing systems. My research has been recognized with multiple awards, including the Hellenic Foundation for Research and Innovation (H.F.R.I.) PhD scholarship, the Maria Michail Manasaki Doctoral Fellowship, the Best Poster Award at ACM EuroSys'22, and the Grand Challenge Audience Award at ACM DEBS'22. More recently, I received Huawei's "Future Star" Award (2023) and contributed to two team awards for impactful technological breakthroughs.

I hold a PhD in Computer Science from the University of Crete, where I developed efficient adaptation mechanisms for distributed data stores, applied in real-world systems like Apache Cassandra, MongoDB, Redis, RocksDB, Apache Flink, and Apache Samza. I am passionate about bridging research with practice, mentoring students, and contributing to community initiatives such as organizing technical events and academic workshops.

EXPERIENCE

SENIOR DATABASE RESEARCHER
Sept. 2022 - Present

HUAWEI RESEARCH (EDINBURGH)

Contributing to the advancement of GaussDB, Huawei's high-performance, AI-enhanced relational database supporting distributed HTAP workloads. Key projects include:

- Designing and implementing query plan segmentation and scheduling for a next-generation cloud-native analytics platform, targeting serverless execution environments.
- Integrating Iterative Dynamic Programming (IDP) into the query optimizer to enhance plan selection for complex queries.
- Leading the development of core features for Incremental View Maintenance (IVM) to enable low-latency, delta-based updates to materialized views.

POSTDOCTORAL RESEARCHER
Dec. 2021 - Aug. 2022

INFORMATION SYSTEMS LABORATORY (ISL), ICS - FORTH

Research Area: Adaptation techniques in large-scale distributed data stores and stream-processing systems

RESEARCH ASSISTANT
Jan. 2019 - Nov. 2021

INFORMATION SYSTEMS LABORATORY (ISL), ICS - FORTH

Research Area: Adaptation techniques in large-scale distributed data stores
Advisor: Prof. Kostas Magoutis

SYSTEMS AND NETWORK ADMINISTRATOR
Mar. 2018 - Dec. 2018

HELLENIC ARMY, RESEARCH AND INFORMATION CORPS

Duties:
•Systems administrator
Maintenance and support of the infrastructure that hosts critical applications of Hellenic Army.
Initial configuration and deployment of Dell PowerEdge VRTX servers.
•Network administrator
Redesign and deployment of the local area network topology supporting the HQ of a high formation military unit.
Bridge the local network with the private network of Hellenic Army. The network is used for highly classified information and enforces a strict security policy.

RESEARCH ASSISTANT   *Nov. 2016 - Feb. 2018*

INFORMATION SYSTEMS LABORATORY (ISL), ICS - FORTH
Research Area: Adaptation techniques in large-scale distributed data stores
Advisor: Prof. Kostas Magoutis

RESEARCH ASSOCIATE   *Nov. 2013 - Nov. 2014*

COMPUTER ARCHITECTURE AND VLSI SYSTEMS (CARV) LABORATORY, ICS - FORTH
Research Area: Cloud Computing, Distributed Storage Systems

RESEARCH ASSISTANT   *Nov. 2012 - Oct. 2013*

COMPUTER ARCHITECTURE AND VLSI SYSTEMS (CARV) LABORATORY, ICS - FORTH
Research Area: Evaluating Distributed Application Deployments in Multi-Clouds
Advisor: Prof. Kostas Magoutis

SOFTWARE DEVELOPER, DATABASE ADMINISTRATOR   *April 2012 - Sept. 2012*

HELP AT HOME, HERAKLION, CRETE, GREECE
Job description: Design and develop a data model for customer's data.
Design and develop an application to assign task to employees based on customer's requests.

RESEARCH ASSISTANT   *Nov. 2011 - Oct. 2012*

DISTRIBUTED COMPUTING SYSTEMS (DCS) LABORATORY, ICS - FORTH
Research Area: Impact of social media plugins on the web
Advisor: Prof. Evangelos Markatos

DATABASE ADMINISTRATOR   *Nov. 2009 - April 2010*

ANAPTIXI, HERAKLION, CRETE, GREECE
Job description: Design and develop a sustainable data model for customer's data.
Responsible for database infrastructure, maintenance, tuning, data backup and replication.

RESEARCH PROJECTS

STREAMSTORE   *2020 - present*
https://streamstore-project.eu
Funded by the Hellenic Foundation for Research and Innovation (HFRI) (Grant ID: HFRI-FM17-1998)
The project aims to fully support highly elastic, scalable, and fault-tolerant stateful stream-processing systems, through the evolution of the elasticity, predictability, and availability of scalable data store technology beyond the state of the art.

EVOLVE   *2019 - 2021*

https://www.evolve-h2020.eu
Funded by the European Union (GA No. 825061)
The project aims to merge High-performance computing (HPC), Cloud and Big Data in a large-scale testbed applied in 7 domains, from mobility to agriculture to urban planning.
My work focuses on the design of microservices to support streaming analytics to support continuous data processing using state of the art frameworks, specially optimized to take advantage of HPC resources.

PAASAGE   *2012 - 2016*

http://wwww.paasage.eu
Funded by the European Union (GA No. 317715)
PaaSage is a development and deployment platform, with an accompanying methodology and language, with which developers of enterprise systems can access services of cloud platforms in a technology neutral approach that abstracts the technical details while guiding them to configure their applications for best performance. I designed and implemented a framework for evaluating distributed application deployments in multi-Cloud platforms. I was involved to the design of the Metadata Database containing historical data from past application executions. I was also responsible for the deployment and maintenance of the database backend of the social network developed within the project.

HONORS AND AWARDS

- *Future Star Award*, Huawei Research, 2023
  Individual recognition for outstanding contributions and research leadership in database field.
- Presidents Award - Significant Business Contribution Award, Huawei Research, 2024
  Team recognition for impactful contributions to the first implementation of the adaptive SQL query engine.
- *Database Key Technology Breakthrough Team*, Huawei Research, 2023
  Team award for the successful integration of Iterative Dynamic Programming (IDP) into the query optimizer.
- Grand Challenge Audience Award at the 16th ACM International Conference on Distributed and Event-Based Systems (DEBS'22) June 2022
- Best poster award at the 17th ACM SIGOPS European Conference on Computer Systems (EuroSys'22) April 2022
- Maria Michail Manasaki Doctoral Fellowship (2019-2020)
- PhD scholarship, Hellenic Foundation for Research and Innovation (HFRI/EΛIΔEK)
                                                                          Sep 2017 – Sep 2018
- Travel Grant for the 37th IEEE International Conference on Distributed Computing Systems (ICDCS 2017) at Atlanta, GA, USA, June 2017
- HiPEAC attendance grant for the Tenth International Summer School on Advanced Computer Architecture and Compilation for High-Performance and Embedded Systems (ACACES) at Fiuggi, Italy, July 2014
- Graduate student scholarship, FORTH   Nov. 2011 to Aug. 2017

EDUCATION

PHD IN COMPUTER SCIENCE   *November 2021*

COMPUTER SCIENCE DEPARTMENT, UNIVERSITY OF CRETE, GREECE
Area of Study: Parallel and Distributed Systems
Research topic: Efficient adaptation mechanisms for improving performance during internal or external changes in distributed data stores
Advisor: Prof. Kostas Magoutis

M.SC. IN COMPUTER SCIENCE   *November 2013*

COMPUTER SCIENCE DEPARTMENT, UNIVERSITY OF CRETE, GREECE

Areas of study:
- Major: Parallel and Distributed Systems
- Minor: Information Systems

GPA: 9.21/10.0

Thesis Topic: Design and Implementation of a System for Evaluating Distributed Application Deploymets in Multicloud

Advisor: Prof. Evangelos Markatos

Co-Advisor: Prof. Kostas Magoutis

B.Sc. in Computer Science *June 2010*

Computer Science Department, University of Crete, Greece

GPA: 7.21/10.0

Thesis Topic: Security Assessment on Information Systems Exposed to Web Attacks

Advisor: Dr. Manifavas Harry

Peer-Reviewed Publications

S. Kalogerakis and **A. Papaioannou** and K. Magoutis, Efficient Processing of High-Volume Tick Data with Apache Flinki for the DEBS 2022 Grand Challenge, in the *16th ACM International Conference on Distributed and Event-Based Systems*, Copenhagen, Denmark, June 2022 **Grand Challenge Audience Award!**

A. Papaioannou and K. Magoutis, Amoeba: Aligning Stream Processing Operators with Externally-Managed State, in the *14th IEEE/ACM International Conference on Utility and Cloud Computing*, Leicester, UK, December 2021
available for open access: https://doi.org/10.1145/3468737.3494096

A. Papaioannou, Chrysostomos Zeginis and K. Magoutis, The Case for Better Integrating Scalable Data Stores and Stream-Processing Systems, in *the IEEE Cluster Conference 2020*, Kobe, Japan, September 2020. (two page proceedings paper accompanying a poster)
https://doi.org/10.1109/CLUSTER49012.2020.00057

A. Papaioannou, Novel adaptation mechanisms for distributed data stores, in *the 14th EuroSys Doctoral Workshop (EuroDW)*, 2020

A. Chronarakis, **A. Papaioannou** and K. Magoutis, On the impact of log compaction on incrementally checkpointing stateful stream-processing operators, in *Proceedings of the 38th International Symposium on Reliable Distributed Systems Workshops (SRDSW)*, Lyon, France, October 1, 2019
url: https://doi.org/10.1109/SRDSW49218.2019.00008

A. Papaioannou and K. Magoutis, Replica-group leadership change as a performance enhancing mechanism in NoSQL data stores, in *Proceedings of the 38th IEEE International Conference on Distributed Computing Systems (ICDCS 2018)*, Vienna, Austria, July 2 - 5, 2018
url: https://doi.org/10.1109/ICDCS.2018.00147

A. Papaioannou and K. Magoutis, Incremental elasticity for NoSQL data stores, in *Proceedings of the 36th IEEE International Symposium on Reliable Distributed Systems (SRDS 2017)*, Hong Kong, China, September 26-29, 2017
url: https://doi.org/10.1109/SRDS.2017.26

A. Papaioannou and K. Magoutis, Incremental elasticity for NoSQL data stores, in *Proceedings of the 37th IEEE International Conference on Distributed Computing Systems (ICDCS 2017)*, Atlanta, GA, USA, June 5-8, 2017, (two page paper accompaning a poster)
url: https://doi.org/10.1109/ICDCS.2017.177

F. Karniavoura, **A. Papaioannou** and K. Magoutis, C2C: An Automated Deployment Framework for Distributed Applications on Multi-Clouds, in *9th Symposium and Summer School on Service Oriented Computing*, 2015, Crete, Greece, June 2015; appears as IBM Technical Report RC25564, 2015

A. Papaioannou, D. Metallidis and K. Magoutis, Cross-layer Management of Distributed Applications

on Multi-Clouds, in *2015 IEEE International Symposium on Integrated Network Management - IM'15*, Ottawa, Canada, May 2015, Ottawa, ON, 2015, pp. 552-558.
url: http://dx.doi.org/10.1109/INM.2015.7140336

A. Papaioannou and K. Magoutis, An architecture for evaluating distributed application deployments in multi-clouds, in *in Proceedings of the 2013 IEEE International Conference on Cloud Computing Technology and Science - Cloudcom '13*, Bristol, UK, December 2013, pp. 547-554.
url: http://dx.doi.org/10.1109/CloudCom.2013.79

G. Baryannis, P. Garefalakis, K. Kritikos, K. Magoutis, **A. Papaioannou**, D. Plexousakis, and C. Zeginis, Lifecycle management of service-based applications on multi-clouds: A research roadmap, *in Proceedings of 2013 International Workshop on Multi-cloud Applications and Federated Clouds (Multi-Cloud'13) ACM, New York, NY, USA, 13-20*,
url: http://dx.doi.org/10.1145/2462326.2462331

I. Kitsos, **A. Papaioannou**, N. Tsikoudis, and K. Magoutis, Adapting data-intensive workloads to generic allocation policies in cloud infrastructures, in *Network Operations and Management Symposium (NOMS), 2012, Maui, HI, 2012, pp. 25-33*.
url: http://dx.doi.org/10.1109/NOMS.2012.6211879

Journal Papers

Antonis Papaioannou and Kostas Magoutis, Addressing the read-performance impact of reconfigurations in replicated key-value stores, in the *IEEE Transactions on Parallel and Distributed System (TPDS)*, 2021
available for open access: https://doi.org/10.1109/TPDS.2021.3135137

Kostas Magoutis, Christos Papoulas, **Antonis Papaioannou**, Flora Karniavoura, Dimitrios-Georgios Akestoridis, Nikos Parotsidis, Maria Korozi, Asterios Leonidis, Stavroula Ntoa and Constantine Stephanidis Design and implementation of a social networking platform for cloud deployment specialists, *SpringerOpen Journal of Internet Services and Applications*, 2015
url: http://dx.doi.org/10.1186/s13174-015-0033-5

Posters

A. Papaioannou and K. Magoutis, Streamstore: Aligning Stream-processing Systems with Externally-Managed State, in *the 7th ACM SIGOPS European Conference on Computer Systems (EuroSys'22)*, Rennes, France, April 2022. **Best poster award!**

A. Papaioannou and K. Magoutis, The Case for Better Integrating Scalable Data Stores and Stream-Processing Systems, in *the IEEE Cluster Conference 2020*, Kobe, Japan, September 2020

A. Chronarakis, **A. Papaioannou** and K. Magoutis, On the impact of log compaction on incrementally checkpointing stateful stream-processing operators, in the *38th International Symposium on Reliable Distributed Systems (SRDS)*, Poster session, Lyon, France, October 1, 2019

A. Papaioannou and K. Magoutis, Incremental elasticity for NoSQL data stores, in the *37th IEEE International Conference on Distributed Computing Systems (ICDCS 2017)*, Atlanta, GA, USA, June 5-8, 2017

A. Papaioannou, D. Metallidis, and K. Magoutis. SmartM: Automated Lifecycle Management Framework for Distributed Applications on Multi-Clouds. *Proc. of the Tenth International Summer School on Advanced Computer Architecture and Compilation for High-Performance and Embedded Systems (ACACES), Poster session, Fiuggi, Italy, July 2014*

Teaching Experience
Teaching Assistant
Department of Computer Science, University of Crete

- CS-590.45 Modern Topics in Scalable Storage Systems   Spring 2021, 2020
- CS-452 Introduction to the Science and Technology of Services   Fall 2020

- CS-559 Infrastructure Technologies for Large-Scale Service-Oriented Systems
  Fall 2020, 2019, Spring 2015, 2013
- CS-335 Computer Networks   Fall 2019
- CS-240 Data Structures   Spring 2019, 2015 – 2017, Fall 2014 – 2017
- CS-345 Operating Systems   Fall 2012
- CS-459 Internet Measurements   Spring 2012
- CS-463 Information Retrieval Systems   Fall 2011, Fall 2010
- CS-359 Web Programming   Spring 2011

ACTIVITIES

- Organizer of the "Next-Generation Data Management Systems" industry event, in conjunction with EDBT 2025, Barcelona, Spain.
- Shadow program committee member for the EuroSys 2020.
- Volunteer in the organization of EyroSys 2020
- Volunteer in the organization of the 14th EyroSysDoctoral Workshop (EuroDW), 2020
- Lead the organising committee of the Career Fair: Prepare for the Interview, 2021
- Volunteer in the organization of the 1st Graduate Student Conference in Computer Science, Computer Science Department, University of Crete, Greece, October 2019
- Subreviewer for the 22nd International Conference on Distributed Applications and Interoperable Systems (DAIS 2022).
- Subreviewer for 14th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid2014).
- Subreviewer for 19th International European Conference on Parallel and Distributed Computing (Euro-Par 2013).
- ACACES'14 - Tenth International Summer School on Advanced Computer Architecture and Compilation for High-Performance and Embedded Systems. Fiuggi, Italy, July 2014
- Chair of the Graduate Students Association, Computer Science Department, University of Crete, 2020-2021