# Olga Papaemmanouil

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## RESEARCH INTERESTS

My main research interests are in the area of experimental systems and lie in the intersection of distributed systems, databases and application-level networking. They encompass large-scale distributed systems, data management, query processing, distributed stream processing, peer-to-peer computing, publish/subscribe systems, and optimization of overlay networks.

## EDUCATION

**Ph.D., Computer Science** — Summer 2008 (expected)
Brown University — Providence, RI, USA
Thesis: An Extensible, Self-Tuning, Overlay-Based Infrastructure for Large-Scale Stream Processing and Dissemination
Advisor: Ugur Cetintemel

**M.Sc., Computer Science** — May 2004
Brown University — Providence, RI, USA
Thesis: Semantic Multicast for Content-Based Publish-Subscribe Systems
Advisor: Ugur Cetintemel

**M.Sc., Information Systems** — June 2001
Athens University of Economics & Business — Athens, Greece
Thesis: Personalization techniques in the context of interactive TV
Advisor: George I. Doukidis

**B.S., Computer Engineering & Informatics** — June 1999
University of Patras, School of Engineering — Patra, Greece
5 year program, Degree with Honors (top 1% of class)

## RESEARCH EXPERIENCE

**Graduate Research Assistant** — 2002–present
Computer Science Department — Brown University

*XPORT* (*Extensible Profile-driven Overlay Routing Trees*): Designed and implemented XPORT, a general-purpose infrastructure that provides the core functionalities of large-scale profile-driven dissemination applications. XPORT can be extended to support diverse profile management logic, stream types, and performance targets and, given these specifications, it automatically creates and optimizes an overlay-based publish-subscribe dissemination tree. Its optimization is driven by metric-independent operations, which can refine the structure of the overlay network [4, 5, 7].

*XFlow* (*Extensible Distributed Stream Processing*): Designed and implemented XFlow, an extensible, highly-scalable and adaptive framework for distributing and optimizing stream processing queries. XFlow leverages XPORT's architecture; it creates and optimizes an overlay network of multiple, dynamic, overlay stream dissemination trees. Its optimization process relies on generic, customizable performance metrics, and refines the placement and execution of the operators, the structure of the underlying overlay network, as well as the statistics collection process, to meet the application-defined query performance and resource utilization expectations [1].

*SemCast* (*Semantic Multicast*): Designed SemCast, a system for content-based data filtering and dissemination over conventional multicast channels. SemCast splits input data streams into multiple pieces, using a cost-model on data contents, rates, and destinations, and spreads the pieces across multiple multicast channels for delivery. Each channel can be implemented as a standard overlay dissemination tree. This approach eliminates the need for content-based filtering and routing at interior nodes of the overlay, thus simplifying and improving the dissemination efficiency [9, 10].

*Pulse* (*Continuous-time stream processing*): I was involved in the design of the Pulse framework, which processes continuous queries over continuous-time data models. Pulse translates regular queries to work on continuous-time inputs and reduces computational overhead and latency while meeting error bounds on query results [3].

*Borealis* (*Distributed Stream Processing*): Borealis is a distributed stream processing engine that deploys a network of cooperating stream processing engines and distributes query processing across multiple machines. I was involved in the design and implementation of the statistics collection mechanism, which was used by the optimization protocols [6, 8].

**Research Intern** June-August 2007
Networking Group Hewlett-Packard Labs, Palo Alto

*Sharing-Aware In-Network Stream Processing*: In distributed shared processing environments, run-time reconfigurations of the query deployment must be well-coordinated in order to guarantee strict, and potentially conflicting, QoS expectations of queries that share processing operators. I designed and implemented an adaptive optimization approach that allows nodes to collaborate and make fast operator placement decisions. These decisions resolve any existing QoS violations and conflicts, as well as they respect the resource constraints of the nodes in the system [2].

**Research Assistant** Fall 1999–Spring 2001
Information Systems Department Athens University of Economics and Business

*iMEDIA* (*Intelligent Mediation Environment for Digital Interactive Advertising*): The project involved the design and development of an end-to-end solution for the provision of personalized interactive advertisement in Digital TV environments. I participated in the analysis, design and implementation of a profile-based mechanism for targeting advertisements to specific customer groups.

*ACTIVE* (*Advertising and Commerce Through Internet in the context of Virtual Enterprise*): The project involved the design and development of a global electronic commerce platform. I participated in the design and implementation of a mechanism that combined data mining and collaborative filtering techniques to derive dynamic online recommendations for e-commerce applications [11, 12].

## INDUSTRY EXPERIENCE

**Software Engineer** Sept 2000-June 2002
Athens Stock Exchange Athens, Greece
I participated in the upgrade and optimization of various trade settlement services provided by the Central Securities Depository, as well as in the design and implementation of the stock transactions settlement and clearing system of the Athens Derivatives Exchange.

**Software Engineer** June 1999-September 2000
Vodafone Group, R & D Department Athens, Greece
I was member of a research team that explored data mining techniques for effective targeted marketing. My involvement included the design and implementation of customer classification tools which were based on clustering algorithms.

## TEACHING & MENTORING EXPERIENCE

**Guest Lecturer** Spring 2007
Computer Science Department Brown University

*Computer Science: An Integrated Introduction (CS 018)*: Delivered lectures on Java programming focusing on data structures.

**Teaching Seminar** Fall 2006-Spring 2007
Sheridan Center for Teaching & Learning Brown University

*Teaching Certificate* I: Attended a year-long seminar that included lectures, workshops and teaching consultations regarding reflective teaching practices, establishing clear goals in a syllabus, addressing different learning styles, and learning to communicate effectively in the classroom.

**Advising** 2005-2006
Computer Science Department Brown University

*Master thesis advisor (Spring-Fall 2005)*: With Ugur Cetintemel, co-advised Austin Park whose master project was on the implementation of a distributed content-based publish-subscribe system.

*Research intern supervisor (Summer 2005 & 2006)*: With Ugur Cetintemel, supervised summer interns Yenel Yildirim, Mohit Gogia and Swati Goyal. Their projects included the implementation of an RSS feed dissemination application, as well as a multiplayer network game, both developed on the XPORT [4,5] extensible overlay-based infrastructure.

**Graduate Teaching Assistant** Spring 2004
Computer Science Department Brown University

*Computer Networks (CS 168)* : Held office hours to assist students with the course material and weekly homeworks. Mentored two teams on the design and implementation of a TCP-like network protocol. Participated in the grading of homeworks, projects and exams.

**Teaching Assistant** Spring 1996
Computer Engineering & Informatics Dept. University of Patras

*Programming Languages*: Participated in the grading of weekly programming projects.

## PUBLICATIONS

### Under Submission

1. **O. Papaemmanouil**, U. Cetintemel, J. Jannotti. *XFlow: Dynamic Dissemination Trees for Extensible In-Network Stream Processing*. Brown University, CS Department. November 2007.

### Conference & Workshop Papers

2. **O. Papaemmanouil**, S. Basu, S. Banerjee. *Adaptive In-Network Query Deployment for Shared Stream Processing Environments*. In Proceedings of 4th International Workshop on Networking Meets Databases (**NetDB '08**), April 2008. (*to appear*). (It appears also as Technical Report, HPL-2007-178, HP Labs).
3. Y. Ahmad, **O. Papaemmanouil**, U. Cetintemel, J. Rogers. *Simultaneous Equation Systems for Query Processing on Continuous-Time Data Streams*. In Proceedings of the 24th International Conference on Data Engineering (**ICDE '08**), April 2008. (81/671=12.1% accepted)
4. **O. Papaemmanouil**, Y. Ahmad, U. Cetintemel, J. Jannotti, Y. Yildirim. *Extensible Optimization in Overlay Dissemination Trees*. In Proceedings of the 25th ACM Special Interest Group on

Management of Data (**SIGMOD '06**), June 2006. (58/446=13% accepted)

5. **O. Papaemmanouil**, Y. Ahmad, U. Cetintemel, J. Jannotti, Y. Yildirim. *XPORT: Extensible Profile-driven Overlay Routing Trees*. (Demonstration). In Proceedings of the 25th ACM Special Interest Group on Management of Data (**SIGMOD '06**), June 2006. (24/81=29.6% accepted)
6. Y. Ahmad, B. Berg, U. Cetintemel, M. Humphrey, J. Hwang, A. Maskey, A. Jhingran, **O. Papaemmanouil**, A. Rasin, N. Tatbul, W. Xing, Y. Xing, S. Zdonik. *The Borealis Distributed Stream Processing Engine*. In Proceedings of the 2nd International Conference on GeoSensor Networks (**GSN '06**), Boston, October 2006. (Invited Demonstration)
7. **O. Papaemmanouil**, Y. Ahmad, U. Cetintemel, J. Jannotti. *Application-aware Overlay Networks for Data Dissemination*. In Proceedings of the International Workshop on Semantics enabled Networks and Services (**SeNS '06**) (In conjunction with ICDE'06), Atlanta, April 2006. (Invited Paper)
8. Y. Ahmad, B. Berg, U. Cetintemel, M. Humphrey, J. Hwang, A. Jhingran, A. Maskey, **O. Papaemmanouil**, A. Rasin. N. Tatbul, W. Xing, Y. Xing, S. Zdonik. *Distributed Operation in the Borealis Stream Processing Engine*. In Proceedings of the 25th ACM Special Interest Group on Management of Data (**SIGMOD '05**), June 2005. (24/71=33.8% accepted) **Best Demonstration Award**
9. **O. Papaemmanouil**, U. Cetintemel. *SemCast: Semantic Multicast for Content-based Data Dissemination*. In Proceedings of the 21st International Conference on Data Engineering (**ICDE '05**), April 2005. (67/521=12.8% accepted)
10. **O. Papaemmanouil**, U. Cetintemel. *Semantic Multicast for Content-Based Stream Dissemination*. In Proceedings of the 7th International Workshop on the Web and Databases (**WebDB '04**) (In conjunction with SIGMOD'04) , June 2004. (16/61=26.2% accepted)
11. G. Prassas, K. C. Pramataris, **O. Papaemmanouil**. *Dynamic Recommendations in Internet Retailing*. In Proceedings of the 9th European Conference on Information Systems (**ECIS 2001**), June 2001. ($\sim$ 30% accepted) **Best Paper Award**
12. G. Prassas, K. C. Pramataris, **O. Papaemmanouil**, G. I. Doukidis. *A Recommender System for Online Shopping Based on Past Consumer Behavior*. In Proceedings of the 14th Bled eCommerce Conference (**BLED'01**), June 2001. ( $\sim$ 30% accepted)

## PATENTS

**O. Papaemmanouil**, S. Basu, S. Banerjee. *Adaptive Overlays for Shared Stream Processing Environments*. U.S. Patent application filed, November 2007.

## HONORS & AWARDS

Best Demonstration Award, SIGMOD 2005

Conference Travel Award, Brown University, SIGMOD 2004, ICDE 2005, ICDE 2006

Kanellakis Fellowship from Brown University, Fall 2002, Spring 2003

Best Paper Award, 9th European Conference in Information Systems, 2001

Fellowship from Greek Ministry of Education, 2001

Honorary Distinction Award from Technical Chamber of Greece, 2000

Fellowship from Greek Scholarship Foundation, 1998, 1999

Fellowship from Greek Employment Organization, 1997, 1998, 1999

## ACADEMIC ACTIVITIES

Faculty Search Graduate Committee co-Chair, Computer Science Dept., Brown University, 2005

Faculty Search Graduate Committee Member, Computer Science Dept., Brown University, 2004

Graduate Student Recruitment co-Head, Computer Science Dept., Brown University, 2004

External Reviewer for ICDE, SIGMOD, VLDB, ICDCS, DEBS

Student volunteer: ICDCS 2003, ICDE 2004

## STATUS

Citizenship: Greek (Resident of USA under F1 VISA)

## REFERENCES

**Ugur Cetintemel**
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