

Anastassios Nanos

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RESEARCH INTERESTS Hypervisor technologies, Systems Software, Unikernel Frameworks, Lightweight workload deployment, I/O Virtualization, Communication Architectures for Clusters, Scalable Storage Architectures based on Clusters.

WORK EXPERIENCE

- ◇ **Researcher / Systems Engineer**, Sunlight.io (Sep 2018 – present)
Architecting, implementing, and optimizing a state-of-the-art hyperconverged hypervisor stack that achieves extreme storage and network performance.
- ◇ **Researcher / Systems Engineer**, OnApp Ltd (Feb 2015 – Sep 2018)
Conducting research in emerging, power-efficient micro-server architectures on scalable network and storage I/O, and energy-driven resource management in cloud architectures. This work consists mostly of architecting and implementing low-level hypervisor and OS mechanisms in the context of EU-funded projects (EUROSERVER, SHARCS, ACTICLOUD, SUPERFLUIDITY, NGPaaS).
- ◇ **Software Engineer**, Up2Metric SA (May 2016 – Sep 2016)
Ported a computer vision algorithm to provide Augmented Reality annotation to staircases for Otolift's core products.
- ◇ **Postdoctoral research fellow**, CSLAB, ECE, NTUA (May 2014 – Jan 2015)
Worked on I/O Virtualization, systems software for high-performance I/O in virtualized environments, communication architectures for clusters, and scalable storage architectures based on clusters.
- ◇ **Co-founder & Systems Engineer**, Mist.io Inc. (July 2013 – Jan 2015)
Design, develop, deploy and maintain the company's product. Mist.io is about cloud server management, monitoring and automation across multiple cloud providers from any web device. Mostly develop in python, Javascript and bash.
- ◇ **Intern**, Maxeler Technologies Ltd. (Sept 2011 – Mar 2012)
Worked on porting the company's custom FPGA boards to virtualized environments. As my task was completed quickly, I joined the hardware group working on the company's new product line (MPC-X), doing performance evaluation at first as well as kernel developing for the board's interface driver and the networking stack (Infiniband).
- ◇ **Systems Engineer**, Unweb.me Ltd. (Jan 2011 – Dec 2013)
Served as a systems engineer, deploying, administering and maintaining the company's infrastructure both on bare-metal servers (co-located) as well as cloud servers (mostly Amazon EC2).
- ◇ **Junior Researcher**, CSLAB, ECE, NTUA (April 2007 – Dec 2013)
For the purpose of my PhD thesis, I worked on scalable block-level storage systems, communication architectures for clusters, custom 10gigE interconnection frameworks and I/O Virtualization.
- ◇ **Senior Unix/Linux Administrator**, CSLAB, ECE, NTUA (April 2007 – Dec 2013)
Maintain, administer and support the lab (10-20 grad students, faculty members and visiting staff) providing services such as: DNS, WWW, Mail, VoiP and DBMS. From Sept 2011, my role is mostly advising the systems administration team.
- ◇ **Senior Unix/Linux Administrator**, Computer Center, ECE, NTUA (Oct 2005 – Sept 2010)
Setup the entire lab (25-30 workstations, 5 servers), migrated from Solaris/SunOS 4.3 to Debian GNU/Linux, and maintained the lab which featured a fully autonomous setup, able to provide the necessary software for students to work on ECE school's projects.

- ◇ **Unix Support Engineer**, PC Systems S.A. (May 2004 – Sept 2004)
Served as backend support for the company's clients mostly Solaris and some Linux-based setups.
- ◇ **Linux/Windows Administrator, Technical Support**, Small accounting business (Sept 2001 – 2006)
Maintained all workstations (5) based on Windows 95/98/XP, migrated the server from Novel Netware to Windows server and finally Linux. Provided support for the integration of commercial software suites specific to the business (accounting) as well as general purpose software (network file sharing, scanning/printing etc.).
- ◇ **Freelance web developer** (2002 – 2005)
Built small sites (static/dynamic) using HTML, PHP and MySQL.

PROGRAMMING *Languages:* C, python, bash, C++, C#, PHP, perl, JS, Java
Linux Kernel Background: Device Drivers (Block–Network), DMA API, Virtual Memory Management, x86 and ARMv7/8, SoC bootstrap
Unikernels: rumpkernels, LKL, OSv
Virtualization: Xen (extensive experience with MM, scheduling, device/drivers integration), KVM (MM, virtio)
Embedded systems: Exynos (5422, 7420), Zynq-7000/Ultrascale+, KU3, LanaiXP, ARM XScale, custom FPGA boards
Interconnects: 10GbE, Infiniband, Myrinet/GM (advanced) – Myrinet/MX, Open-MX (advanced)
DataBase Management Systems: MySQL, PostgreSQL, MongoDB

TECHNICAL & LANGUAGE SKILLS *Operating Systems:* Linux, Unix, Free/Net/OpenBSD, MS Windows
Systems Administration: DNS (bind), WWW (apache, nginx), Mail (sendmail & postfix, dovecot), DBMS (MySQL/Postgres, MongoDB) Auth and Directory services (openLDAP & Heimdal Kerberos), VoIP (Asterisk), Networking (CISCO IOS, iptables, openVPN), Monitoring (collectd, graphite, munin & mrtg). Familiar with setup and deployment of Cloud Computing platforms (OpenStack).
Typesetting: L^AT_EX, MS Word
Languages: English (Fluent), French (Moderate), Greek (mother tongue)

EDUCATION ◇ **Ph.D. in Computer Engineering**, CSLAB, ECE, NTUA, Greece. December 2013. Thesis title: *Efficient I/O Device Sharing in Virtualized Environments*
 ◇ **Diploma in Electrical and Computer Engineering**, ECE, NTUA, Greece. September 2006.
 Thesis title: *Design and implementation of a mechanism transferring data from storage devices to Myrinet networks bypassing the memory hierarchy.*

PUBLICATIONS A. Nanos, S. Gerangelos, I. Alifieraki, and N. Koziris, **V4Vsockets: low-overhead intra-node communication in Xen**, Proceedings of the 5th International Workshop on Cloud Data and Platforms (CloudDP '15), held in conjunction with EuroSys 2015, Bordeaux, France, April 21-34 2015. DOI: 10.1145/2744210.2744215
 I. Mytilinis, D. Tsoumakos, V. Kantere, A. Nanos and N. Koziris **I/O Performance Modeling for Big Data Applications over Cloud Infrastructures** Proceedings of the 2015 IEEE International Conference on Cloud Engineering (IC2E 2015), 9-13 March, Tempe, AZ, USA.
 A. Nanos and N. Koziris **Xen2MX: High-performance communication in Virtualized Environments**, Journal of Systems and Software (2014), <http://dx.doi.org/10.1016/j.jss.2014.04.036>
 A. Nanos and N. Koziris **Xen2MX: Towards High-performance communication in the Cloud**, Proceedings of the 7th Workshop on Virtualization in High-Performance Cloud computing (VHPC 2012), held in conjunction with Euro-par 2012, Rhodes Island, Greece, August 27-31 2012
 A. Nanos, N. Nikoleris, S. Psomadakis, E. Kozyri and N. Koziris **A Smart HPC interconnect for clusters of Virtual Machines**, in Proceedings of the 6th Workshop on Virtualization in High-Performance Cloud computing (VHPC 2011), held in conjunction with Euro-par 2011, Bordeaux, France.

D. Aragiorgis, A. Nanos, and N. Koziris **Coexisting Scheduling Policies boosting I/O Virtual Machines**, in Proceedings of the 6th Workshop on Virtualization in High-Performance Cloud computing (VHPC 2011), held in conjunction with Euro-par 2011, Bordeaux, France.

A. Nanos, G. Goumas and N. Koziris **Exploring I/O Virtualization Data paths for MPI Applications in a Cluster of VMs: A Networking Perspective**, in Proceedings of the 5th Workshop on Virtualization in High-Performance Cloud computing (VHPC 2010), held in conjunction with Euro-Par 2010, Ischia - Naples, Italy.

A. Nanos and N. Koziris, **MyriXen: Message Passing in Xen Virtual Machines over Myrinet and Ethernet**, in Proceedings of the Workshop on *Virtualization in High-Performance Cloud computing* (VHPC 2009), held in conjunction with Euro-Par 2009, Delft, Netherlands.

E. Koukis, A. Nanos and N. Koziris, **GMBlock: Optimizing Data Movement in a Block-level Storage Sharing System over Myrinet**, Cluster Computing, Vol. 13, No. 4, pp. 349-372, 2010. DOI: 10.1007/s10586-009-0106-y

E. Koukis, A. Nanos and N. Koziris, **Synchronized Send Operations for Efficient Streaming Block I/O over Myrinet**, in Proceedings of the Workshop on **Communication Architecture for Clusters** (CAC 2008), held in conjunction with the 22nd **International Parallel and Distributed Processing Symposium** (IPDPS 2008), Miami, FL, USA.

POSTERS /
TALKS

System-level Support for Heterogeneous Architectures, Poster in ARM Research Summit, Sep. 11-13th 2017, Cambridge, UK

Unikernel Support for NFV-like Applications on Xen ARM 64bit, Design Session, Xen Summit 2017, Budapest, July 12th, 2017.

Hypervisor support for emerging scale-out/scale-up architectures, Lightning Talk, VHPC 17, ISC-HPC 2017, Frankfurt, Jun 22nd, 2017.

High-performance I/O in Virtualized environments, Invited Talk, CARV group, FORTH-ICS, Heraklion Crete, Greece, Nov. 1st, 2013.

I/O in Virtualized environments, Invited Talk, WBI seminar, Humboldt University of Berlin, Berlin, Germany, Jun. 12th, 2013.

Experimenting with I/O data paths in Virtualized Environments, ASPLOS 2012 Doctoral Workshop, short presentation, London, UK, Mar 3-7, 2012.

Towards an HPC I/O framework for clusters of Virtual Machines, Poster in ACACES 2011, HiPEAC summer School, Fiuggi, Italy, July 10-16, 2011.

Deploying MPI applications in a cluster of Xen VMs: A Networking Perspective, Poster, ACACES 2010, HiPEAC summer School, Terrassa (near Barcelona), Spain, July 11-17, 2010.

High Performance I/O in Virtualized Environments: A Networking Perspective, Eurosys 2010 Doctoral Workshop, short presentation, Paris, France, April 14, 2010.

Message Passing in Xen VMs, Poster, Cluster 2009, New Orleans, Louisiana, September 2, 2009.

TEACHING AND ◇
SUPERVISING
EXPERIENCE

Teaching Assistance

Operating Systems, ECE, NTUA (2008 – 2009) & (2009 – 2010) & (2010 – 2011)

Operating Systems Lab, ECE, NTUA (2009 – 2010)

Programming Techniques, ECE, NTUA (Mar 2007 – July 2007)

◇ **Co-supervision of Diploma Thesis**

Exploring potential benefits of unikernel frameworks on ARM, CSLAB, ECE, NTUA (2017–2018)

utmem: Towards memory elasticity in Cloud environments, CSLAB, ECE, NTUA (2017–2018)

Supporting big.LITTLE scheduling on Xen Virtual Machines, CSLAB, ECE, NTUA (2016–2017)

GPUSockets: Efficient GPU sharing in Virtualized Environments, CSLAB, ECE, NTUA (2014–2015)

V4Vsockets: Efficient low-overhead intra-node communication in Virtual Machines, CSLAB, ECE, NTUA (2013–2014)

Evaluating and optimizing intra-node communication of co-existing virtual machines, CSLAB, ECE, NTUA (2012–2013)

HPC Interconnects in Virtualized Environments, CSLAB, ECE, NTUA (2010–2011)

Coexisting Scheduling Policies boosting I/O Virtual Machines, CSLAB, ECE, NTUA (2010–2011)

RAID-EC: Exploiting Erasure Codes in distributed storage systems, CSLAB, ECE, NTUA (2009–2010)

Integration of High-performance Interconnect semantics in Virtualized Environments, CSLAB, ECE, NTUA (2009–2010)

Design and implementation of an RDMA mechanism over programmable 10GbE Interfaces, CSLAB, ECE, NTUA (2008–2009)

I/O Tracing on Parallel Filesystems using a network of Virtual Machines, CSLAB, ECE, NTUA (2007–2008)

OTHER
ACTIVITIES

Program co-chair

Workshop on Virtualization for High-Performance Cloud Computing (VHPC) 2012 – 2019,
Workshop on Dependable Parallel, Distributed and Network-Centric Systems (DPDNS) 2015,
Workshop on Middleware on HPC and Big Data systems (MHPC) 2013

TPC Member

Workshop on Virtualization for High-Performance Cloud Computing (VHPC) 2010 – 2018,
Workshop on Dependable Parallel, Distributed and Network-Centric Systems (DPDNS) 2015-2016,
IEEE 4th Symposium on Network Cloud Computing and Applications 2015

External Referee

Shadow PC of the European Conference on Computer Systems (EuroSys) 2015-2017
Workshop on Communication Architecture for Clusters (CAC) 2008, 2009, 2010
International Conference on Parallel Processing (ICPP) 2008
International Forum on Next-Generation Multicore/Manycore Technologies (IFMT) 2008

DISTINCTIONS
& AWARDS

EU “IRAKLITOS II” PhD thesis Scholarship, 2010-2013

Greek State Scholarships Foundation, 2007-2010

Hellenic Mathematical Society, Awards for distinction in the nation-wide mathematical Contest (“THALIS 1998”, “EYKLEIDIS 1998”, “THALIS 1999”)

MEMBER

- ◇ **Technical Chamber of Greece**
- ◇ **IEEE Computer Society student member**
- ◇ **HiPEAC Network of Excellence**

REFERENCES

Available upon request.