

# Giorgos Vasiliadis

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- PERSONAL DETAILS Nationality: Greek  
Languages: English, Greek  
Military Service: Fulfilled (Feb 2009 - Jan 2010)
- EDUCATION Ph.D. in Computer Science Feb. 2010 – May 2015  
Computer Science Department, University of Crete, Greece  
Thesis: *Accelerating Stateful Network Packet Processing Using Graphics Hardware*  
Supervisor: Prof. Evangelos P. Markatos  
Advisor: Dr. Sotiris Ioannidis
- M.Sc. in Computer Science Oct. 2006 – Nov. 2008  
Computer Science Department, University of Crete, Greece  
GPA: 9.20 (out of 10)  
Major: Parallel and Distributed Systems  
Minor: Information Systems  
Thesis: *Improving the Performance of Network Intrusion Detection Systems Using Graphics Processors*  
Supervisor: Prof. Evangelos P. Markatos
- B.Sc. Degree in Computer Science Sep. 2002 – Jul. 2006  
Computer Science Department, University of Crete, Greece  
GPA: 8.21 (out of 10); ranked *second* in class  
Advisor: Prof. Evangelos P. Markatos
- WORK EXPERIENCE Research Scientist January 2016 – present  
Cyber Security, Qatar Computing Research Institute  
• Research on real-time network security analytics.
- Postdoc Researcher May 2015 – December 2015  
Distributed Computing Systems Lab, FORTH-ICS  
• Work on improving the performance of network packet processing applications using commodity heterogeneous commodity processors.
- Research Intern* March 2013 – June 2013  
Symantec Research Labs, Los Angeles, CA  
Supervisor: Petros Efstathopoulos  
• Work on implementing security features in web proxies.
- R&D Engineer / Research Assistant* March 2010 – December 2014  
Distributed Computing Systems Lab, FORTH-ICS  
• Research on network packet processing on GPUs.  
• Research on fast pattern matching for network intrusion detection systems.  
• Research on using GPUs for security applications.
- R&D Engineer / Research Assistant* July 2005 – Sep. 2008  
Distributed Computing Systems Lab, FORTH-ICS  
• Participation in the development and implementation of the EU-funded projects LOBSTER (distributed passive network monitoring), and NoAH (network of affined honeypots).  
• Implementation of a prototype Network Intrusion Detection System, namely Gnort, using GPGPU programming.

HONORS AND  
AWARDS

Recipient of a Student Travel Grant for the 10th ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS), at Marina del Rey, CA, USA, October 2014

Recipient of the Maria M. Manassaki Bequest Scholarship, University of Crete. Given to the *best* Ph.D. student of the Computer Science Department, 2013.

Recipient of the Symantec Research Labs Graduate Fellowship, 2012.  
<http://www.symantec.com/about/careers/college/fellowship.jsp>

Recipient of a Student Travel Grant for the 2011 IEEE International Symposium on Workload Characterization (IISWC) at Austin, TX, USA, November 2011.

Recipient of a Student Travel Grant for the 18th ACM Conference on Computer and Communications Security (CCS) at Chicago, IL, USA, October 2011.

Graduate Research Scholarship, ICS-FORTH, Dr. Sotiris Ioannidis, March 2010 – *present*.

Recipient of a Student Attendance Grant for the 11th International Symposium On Recent Advances In Intrusion Detection (RAID) at MIT, Cambridge, MA, USA, September 2008.

Graduate Research Scholarship, ICS-FORTH, Prof. Evangelos P. Markatos, October 2006 – September 2008.

Undergraduate Research Scholarship, ICS-FORTH, Prof. Evangelos P. Markatos, July 2005 – September 2006.

Scholarship and award from the National Foundation of Scholarships for ranking *first* at the third year of my undergraduate studies, 2005.

TEACHING  
EXPERIENCE

*Teaching Assistant, University of Crete*  
University of Crete

September 2006 – Spring 2014

CS100 – Introduction to Computer Science. Fall 2010

CS120 – Digital Design. Fall 2012

CS150 – Programming in C/C++. Spring 2011, Fall 2011

CS335 – Computer Networks. Spring 2008, Spring 2012

CS345 – Operating Systems. Fall 2006, Fall 2007, Fall 2013

CS459 – Internet Measurement. Spring 2010, Spring 2014

CS463 – Information Retrieval Systems. Spring 2007

EXTERNAL SERVICE Program Committee member for the 8th IEEE International Workshop on Information Forensics and Security (WIFS'16).

Program Committee member for the 22nd IEEE International Conference on Parallel and Distributed Systems (ICPADS 2016).

Program Committee member for the 11th International Workshop on Security Organization (IWSEC 2016).

Program Committee member for the 9th European Workshop on System Security (EuroSec 2016).

Technical Program Committee member for the 2015 IEEE JSAC Special issue on Measuring and Troubleshooting the Internet (JSAC-SI-MT).

Publicity Chair for the 18th International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2015).

Program Committee member for the 6th European Workshop on System Security (EuroSec 2013).

Program Committee member for the 5th European Workshop on System Security (EuroSec 2012).

Program Committee member for the 7th European Conference on Computer Network Defense (ec2nd

2011).

External Reviewer for the 21st ACM Symposium on Access Control Models and Technologies (SACMAT 2016); External Reviewer for the 2015 Annual Computer Security Applications Conference (ACSAC 2015); External Reviewer for the 18th International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2015); External Reviewer for the 15th International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2012);

Reviewer: International Journal of Information Security (IJIS); IEICE Transactions on Information and Systems; IEEE Transactions on Parallel and Distributed Systems (TPDS); IEEE Transactions on Information Forensics & Security; IEEE Software Journal 2015 - SWSI: Security and Privacy on the Web; Transactions on Embedded Computing Systems (TECS); Elsevier Computer Communications Journal; Concurrency and Computation: Practice & Experience; Journal of Parallel and Distributed Computing; Elsevier Computers & Security Journal; 20th ACM Conference on Computer and Communications Security (CCS 2013); IEEE Transactions on Parallel and Distributed Systems (TPDS); IET Information Security; IEEE Transactions on Dependable and Secure Computing (TDSC); 19th ACM Conference on Computer and Communications Security (CCS 2012); 21st International Conference on Parallel and Compilation Techniques (PACT 2012); 27th IFIP International Information Security and Privacy Conference (IFIP SEC 2012); 15th IEEE Global Internet Symposium; 16th International Conference on Financial Cryptography and Data Security 2012 (FC'12); 17th International Conference for Programming Languages and Operating Systems (ASPLOS 2012); The Journal of Systems and Software; 1st SysSec Workshop (SysSec 2011); 15th International Conference on Financial Cryptography and Data Security 2011 (FC'11); 16th IEEE Symposium on Computers and Communications (ISCC'11); 9th International Conference on Applied Cryptography and Network Security (ACNS'11); 14th International Symposium on Recent Advances in Intrusion Detection (RAID'2011); Elsevier Microprocessors and Microsystems;

MAJOR PROJECTS    *GANDALF: A GPU-based Architecture for Network and Data Level Flows*    2014 – 2015  
<http://www.gandalf.gr>

GANDALF is a novel GPU-based middlebox architecture and framework for building efficient and feature-rich data flow processing applications, that facilitates the rapid development of GPU-based applications and improves the performance of data movement between graphics processors and other system components. Besides providing rich functionality and high-level programming primitives to application developers, the proposed architecture offers significant performance improvements through OS-level support for high-throughput cross-device communication, and increased scalability through transparent load balancing across multiple GPUs.

I was the author and technical manager responsible for the total development cycle of the project, from the requirements analysis phase and design till implementation phase and performance evaluation.

*Lobster*    2005 – 2007  
<http://www.ist-lobster.org/>

Lobster is an advanced European Infrastructure for accurate Internet traffic monitoring. It is based on a novel Distributed Monitoring Application Programming Interface which enables the creation of sophisticated applications and empowers a large number of researchers and system administrators into reaching a better understanding of the kind of traffic that flows through their networks.

I primarily involved in the implementation of the programming interface, as well as in the task of fixing the bugs reported by the users and for taking care of enhancements suggested by users.

*NoAH*    2005 – 2008  
<http://www.fp6-noah.org/>

The project, funded by EU, aims to gather and analyse information about the nature of Internet cyberattacks. The infrastructure developed is able to detect and provide early warning of such

attacks, so that appropriate countermeasures may be taken to combat them. I was involved in the implementation of the core infrastructure.

*Mitos*

2006 – 2007

<http://google.csd.uoc.gr:8080/mitos/>

Mitos is an experimental search engine that was developed in the Computer Science Department of the University of Crete, Greece, as part of the “Information Retrieval Systems” course. It is available online at <http://google.csd.uoc.gr:8080/mitos/>.

I mainly focused on the design and implementation of the indexing process, as well as the optimization on the index performance during the query evaluation process.

*Puggle*

2006 – 2010

<http://puggle.sourceforge.net>

A graphical desktop search application that was started on my spare time, enabling the user to search documents, music, photos, web pages and more that are stored locally on a computer. It is written in Java and it is portable to both Linux and Microsoft Windows. The project is open-source and it is available online at <http://puggle.sourceforge.net>.

PEER-REVIEWED  
CONFERENCE  
PUBLICATIONS

Lazaros Koromilas, Giorgos Vasiliadis, Elias Athanasopoulos, Sotiris Ioannidis. GRIM: Leveraging GPUs for Kernel Integrity Monitoring. In *19th International Symposium on Research in Attacks, Intrusions and Defenses (RAID)*. September 2016, Paris, France.

Panagiotis Papadopoulos, Thanasis Petsas, Giorgos Christou and Giorgos Vasiliadis. MAD: A Middleware Framework for Multi-Step Attack Detection. In *Proceedings of the 4th International Workshop on Building Analysis Datasets and Gathering Experience Returns for Security (BADGERS)*. Kyoto, Japan, November 2015.

Evangelos Ladakis, Giorgos Vasiliadis, Michalis Polychronakis, Sotiris Ioannidis, and Georgios Portokalidis. GPU-Disasm: A GPU-based x86 Disassembler. In *Proceedings of the 18th Information Security Conference (ISC)*. September 2015, Trondheim, Norway.

Giorgos Vasiliadis, Elias Athanasopoulos, Michalis Polychronakis and Sotiris Ioannidis. PixelVault: Using GPUs for securing cryptographic operations. In *Proceedings of the 21st ACM Conference on Computer and Communications Security (CCS)*. November 2014, Scottsdale, AZ, USA.

Dimitris Deyannis, Lazaros Koromilas, Giorgos Vasiliadis, Elias Athanasopoulos and Sotiris Ioannidis. Flying Memcache: Lessons Learned from Different Acceleration Strategies. In *Proceedings of the 26th International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD)*. October 2014, Paris, France.

Lazaros Koromilas, Giorgos Vasiliadis, Ioannis Manousakis and Sotiris Ioannidis. Efficient Software Packet Processing on Heterogeneous and Asymmetric Hardware Architectures. In *Proceedings of the 10th ACM/IEEE Symposium on Architecture for Networking and Communications Systems (ANCS)*. October 2014, Los Angeles, CA, USA.

Giorgos Vasiliadis, Lazaros Koromilas, Michalis Polychronakis, and Sotiris Ioannidis. GASPP: A GPU-Accelerated Stateful Packet Processing Framework. In *Proceedings of the USENIX Annual Technical Conference (USENIX ATC)*. June 2014, Philadelphia, PA, USA.

Evangelos Ladakis, Lazaros Koromilas, Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. You Can Type, but You Can't Hide: A Stealthy GPU-based Keylogger. In *Proceedings of the European Workshop on System Security (EuroSec)*. April 2013, Prague, Czech Republic.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. Parallelization and Characteri-

zation of Pattern Matching using GPUs. In *Proceedings of the IEEE International Symposium on Workload Characterization (IISWC)*. November 2011, Austin, TX, USA.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. MIDeA: A Multi-Parallel Intrusion Detection Architecture. In *Proceedings of the 18th ACM/SIGSAC Computer and Communications Security Conference (CCS)*. October 2011, Chicago, IL, USA.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. GPU-assisted Malware. In *Proceedings of the 5th IEEE International Conference on Malicious and Unwanted Software (MALWARE)*. October 2010, Nancy, France.

Giorgos Vasiliadis and Sotiris Ioannidis. GrAVity: A Massively Parallel Antivirus Engine. In *Proceedings of the 13th International Symposium On Recent Advances In Intrusion Detection (RAID)*. September 2010, Ottawa, Canada.

Giorgos Vasiliadis, Michalis Polychronakis, Spiros Antonatos, Evangelos P. Markatos and Sotiris Ioannidis. Regular Expression Matching on Graphics Hardware for Intrusion Detection. In *Proceedings of the 12th International Symposium On Recent Advances In Intrusion Detection (RAID)*. September 2009, Saint-Malo, France.

Grigoris Antoniou, Antonis Bikakis, Polyvios Damianakis, Mixalhs Foukarakis, Giorgos Iacovidis, Marianna Karmazi, Haridimos Kondylakis, Antreas Makridakis, Giorgos Nikiforos, Grigoris Papadourakis, Manolis Papoutsakis, Aggeliki Psyharaki, Giorgos Stratakis, Panagiotis Turlakis, Petros Tsialiamanis, Giorgos Vasiliadis, Gerd Wagner and Dimitris Velegarakis. A Multi-agent Environment for Serving Proof Explanations in the Semantic Web. In *Proceedings of the 5th Hellenic Conference on Artificial Intelligent (SETN)*, October 2008, Syros, Greece.

Giorgos Vasiliadis, Spiros Antonatos, Michalis Polychronakis, Evangelos P. Markatos and Sotiris Ioannidis. Gnort: High Performance Network Intrusion Detection Using Graphics Processors. In *Proceedings of the 11th International Symposium On Recent Advances In Intrusion Detection (RAID)*, September 2008, Boston, MA, USA.

#### JOURNALS

Giorgos Vasiliadis, Lazaros Koromilas, Michalis Polychronakis, Sotiris Ioannidis. Design and Implementation of a Stateful Network Packet Processing Framework for GPUs. To appear in *ACM/IEEE Transactions on Networking*.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. GPU-assisted Malware. In *International Journal of Information Security, Volume 14, Issue 3, Page 289-297*, 2015.

Antonios Papadogiannakis, Giorgos Vasiliadis, Demetres Antoniadis, Michalis Polychronakis, Evangelos P. Markatos. Improving the Performance of Passive Network Monitoring Applications with Memory Locality Enhancements. In *Computer Communications, Volume 35, Issue 1, Pages 129-140*, January 2012.

#### OTHER PUBLICATIONS, THESES, AND TECHNICAL REPORTS

Giorgos Vasiliadis. Accelerating Network Packet Processing Using Graphics Hardware. *Doctoral Dissertation, University of Crete*, December 2014.

Giorgos Vasiliadis. Improving the Performance of Network Intrusion Detection Systems Using Graphics Processors. *Master Thesis, University of Crete*, November 2008.

Panagiotis Papadakis, Giorgos Vasiliadis, Yannis Theoharis, Nikos Armenatzoglou, Stella Kopidaki, Yannis Marketakis, Manos Daskalakis, Kostas Karamaroudis, Giorgos Linardakis, Giannis Makrydakis, Vangelis Papathanasiou, Lefteris Sardis, Petros Tsialiamanis, Georgia Troullinou, Kostas

Vandikas, Dimitris Velegarakis and Yannis Tzitzikas. The Anatomy of Mitos Web Search Engine. In *CoRR, Information Retrieval, abs/0803.2220*, March 2008.

#### INVITED TALKS

Security applications of GPUs: The Good, the Bad, and the Ugly. Keynote Talk. European Workshop on System Security (EuroSec), April 2015, Bordeaux, France.

PixelVault: Using GPUs for securing cryptographic operations. Free and Open Source Software Developers' European Meeting (FOSDEM), February 2015, Brussels, Belgium.

Signature-based Malware Detection using GPUs. Symantec Research Labs, April 2013, Culver City, CA, USA.

#### PRESS

Selected Articles on our stealthy GPU-based keylogger

- The Register. Infosec bods demo GPU keylogger. Don't tell the NS... oh, wait. John Leyden, May 2015.
- Ars Technica. GPU-based rootkit and keylogger offer superior stealth and computing power. Dan Goodin, May 2015.
- ComputerWorld. New Linux rootkit leverages GPUs to hide. Lucian Constantin, May 2015.
- PCWorld. New Linux rootkit leverages graphics cards for stealth. Lucian Constantin, May 2015.
- ExtremeTech. Proof-of-concept GPU rootkit hides in VRAM, snoops system activities. Joel Hruska, May 2015.
- SecurityAffaris. GPU-based malware, the evolution of rootkits and keyloggers. Pierluigi Paganini, May 2015.

Selected Articles on using GPUs for Intrusion Detection and Malware Scanning

- The Inquirer. Sotiris Ioannidis of FORTH-ICS on using GPUs for intrusion detection. Wendy M. Grossman, January 2011.
- ICAEW. Using GrAVity to defeat viruses. Leo Waldock, August 2010.

Selected Articles on our GPU-assisted Malware study

- The Register. Researchers up evilness ante with GPU-assisted malware - Coming to a PC near you. Dan Goodin, September 2010.
- Slashdot. Malware Running On Graphics Cards. September 2010.
- HotHardware. New Whitepaper Claims GPUs Threaten Malware Security. Joel Hruska, September 2010.
- HardOCP. GPU Assisted Malware.

#### REFERENCES

Upon request.