

## Piyush Harsh, PhD

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CONTACT INFORMATION	Zurich University of Applied Sciences ZHAW InIT Cloud Computing Lab - ICCLab  TD O3.02, InIT ICCLab Obere Kirchgasse 2  8401 Winterthur, Switzerland	<i>Phone</i> (lab): +41(0)58.934.7403 <i>Google Voice:</i> +1(352)3278786 <i>Fax:</i> +41(0)58.935.7403 <i>E-mail:</i> piyush.harsh@zhaw.ch <a href="http://piyush-harsh.info/">http://piyush-harsh.info/</a>
CITIZENSHIP	INDIAN	
RESEARCH INTERESTS	Cloud Computing, Cloud Economics, Network Functions Virtualization, CDNs, Datacenter Automation, Computer Networks, Network Security, Cryptography, Distributed Systems, Protocol Design and Analysis, Network Measurements, Usability.	
EDUCATION	<b>University of Florida</b> , Gainesville, Florida USA  Ph.D., Computer and Information Science and Engineering, Summer 2010 <ul style="list-style-type: none"><li>• Thesis Topic: A distributed approach to multicast session discovery - ‘mDNS’, a globally scalable multicast session directory architecture.</li><li>• Advisor: Professor Richard E. Newman</li><li>• Area of Study: Computer Engineering</li></ul> <b>Indian Institute of Technology</b> , Roorkee, Uttaranchal INDIA  B.Tech., Department of Electronics and Computer Engineering, Spring 2003. <ul style="list-style-type: none"><li>• Senior Project Topic: ViralSys: a Viral Infections Diagnostic Tool</li><li>• Advisor: Professor (Ms)Kumkum Garg</li><li>• Area of Study: Computer Science and Technology</li></ul>	
WORK EXPERIENCE	<b>Zurich University of Applied Sciences (ZHAW)</b> , Winterthur, Switzerland  <i>Researcher</i> <b>April 2013 to present</b>  <i>T-Nova: Network Functions as a Service</i> <b><a href="http://www.t-nova.eu/">http://www.t-nova.eu/</a></b> <ul style="list-style-type: none"><li>• Overall T-Nova Architecture Design [WP2].</li><li>• Enabling network applications developer through SDK4SDN [WP4].</li><li>• Rating-Charging-Billing for NFs and integration with the T-Nova marketplace [WP6]</li></ul> <i>Mobile Cloud Networking</i> <b><a href="http://www.mobile-cloud-networking.eu/">http://www.mobile-cloud-networking.eu/</a></b> <ul style="list-style-type: none"><li>• Rating, Charging, Billing engine for cloud services [WP5].</li><li>• Overall Mobile-Cloud Architecture Design [WP2].</li><li>• Content Delivery Network as a Service over IaaS clouds [WP5]</li><li>• Contributor to AAA as a Service [WP5].</li></ul> <i>Datacenter Automation</i> <b><a href="http://blog.zhaw.ch/icclab/">http://blog.zhaw.ch/icclab/</a></b> <ul style="list-style-type: none"><li>• Configuration management tools: Puppet.</li><li>• Bare metal provisioning using Foreman.</li><li>• OpenStack automated installation and management.</li><li>• VM management with Vagrant.</li></ul> <i>Initiative Lead: Rating, Charging, Billing</i> <b><a href="http://blog.zhaw.ch/icclab/">http://blog.zhaw.ch/icclab/</a></b> <ul style="list-style-type: none"><li>• Initiative management - Leading a team of 3 persons.</li></ul>	

- Micro-services architecture design lead.
- Regular progress checks.
- Theoretical models for cloud services' billing.

*Initiative Lead: Dist. Computing in the Cloud* <http://blog.zhaw.ch/icclab/>

- Initiative management - Leading a team of 2 persons.
- One click data processing environment provisioning in the cloud.
- Semi-automated requirements classification system.

**INRIA Rennes Bretagne Atlantique Center**, Rennes, Bretagne, France

*Research and Development Engineer* **January 2011 to April 2013**

*Contrail European Project* <http://contrail-project.eu/>

- Coordinator and main contributor - design and development of Virtual Execution Platform [WP5]. <http://vep.gforge.inria.fr/>
- Federation Architecture Design [WP10].
- Internal Reviewer for several workpackage deliverables including WP2, WP4, WP6.
- Contributor to Cloud Federation Security Team [WP7].

**Clinical & Translational Research Informatics Program**, University of Florida, Gainesville, Florida USA

*Expert Engineer* **September 2010 to January 2011**

- Design and development of research data gathering platform for physicians.
- Database migration from MSSQL to MYSQL.
- Search query engine design for clinical trials federal database.
- Management of study sites developed in CakePHP framework.

ACADEMIC  
EXPERIENCE

**ZHAW**, Winterthur, Canton of Zurich SWITZERLAND

*Instructor* **Summer School 2013, 2014**

- OpenStack lecture and laboratories.
- Cloud Economics lecture and laboratories.

*Instructor* **Bachelor Elective 2014**

- OpenStack lecture and laboratories.
- Cloud Economics lecture and laboratories.

*Bachelor Project Supervision* **Fall 2014**

- Co-supervised student project work titled "IBM TM1 on Cloud"

**University of Florida**, Gainesville, Florida USA

*Graduate Student* **August 2003 to August 2010**

*Instructor* **Summer 04**

- Discussion Session leader for CDA3101 - Introduction to Computer Organization.

*Instructor* **Fall 04, Spring 05, Summer 07**

- Discussion Session leader for COT3100 - Discreet Mathematics.

*Teaching Assistant* **Fall 03, Spring 04**

- Assisted CGS2531 - Problem Solving using Computer Software team.

*Teaching Assistant* **Fall 07, Summer 07**

- Support TA for CEN5501C - Computer Networks.

*Teaching Assistant*

**Fall 05, Spring 06, Fall 08**

- Support TA for CNT5410 - Computer Network Security.

*Teaching Assistant*

**Fall 06, 07, 09, Spring 08, 09, 10, Summer 09**

- Support TA for COP5615 - Distributed Systems.

*Research Assistant*

**Summer 05, Summer 06, Summer 07, Summer 08**

- Designed and implemented covert channel through a Mix-firewall as part of Navy Research Lab sponsored project.
- Lead student researcher for UF-IBA, an Image Based Authentication system.
- Researched multicast usability issues as part of Ph.D. research.
- Designed and implemented the distributed algorithm, protocol suite and routing mechanisms for the global multicast session discovery architecture.

**Indian Institute of Technology, Roorkee, Uttaranchal INDIA**

*Undergraduate Student*

**August 1999 to June 2003**

## JOURNALS

### *Peer Reviewed Articles*

- *Cimmino, A., Pecorella, T., Fantacci, R., Granelli, F., Rahman, T. F., Sacchi, C., Carlini, C. and Harsh, P. (2013), The role of small cell technology in future Smart City applications. Trans Emerging Tel Tech. doi: 10.1002/ett.2766*

## BOOK CHAPTERS

### *Invited Book Chapters*

- *Andy Edmonds, Thijs Metsch, Alexis Richardson, Piyush Harsh, Wolfgang Zeigler, Philip Kershaw, Alan Sill, Mark Carlson, Alex Heneveld, Alexandru-Florian Antonescu, and Thomas Michael Bohnert, "Cloud Standards", as chapter 16 in **Encyclopedia of Cloud Computing** published by Wiley, jointly with IEEE and IEEE Computer Society. SBN-13: 978-1118821978; ISBN-10: 1118821971.*
- *Piyush Harsh, Yvon Jegou, Roberto Cascella, and Christine Morin, "Open Computing Infrastructures for Elastic Services", as chapter 1 in **European Research Activities in Cloud Computing** published by Cambridge Scholars Publishing. ISBN-13: 978-1443835077; ISBN-10: 1443835072*

## CONFERENCE PUBLICATIONS

### *Invited Conference Papers*

- *Roberto Cascella and Christine Morin and Piyush Harsh and Yvon Jegou, "Contrail: A reliable and trustworthy cloud platform", in proceedings of the 1st European Workshop on Dependable Cloud Computing EWDC '12, May 08-11, 2012.*
- *Piyush Harsh, Yvon Jegou, Roberto Cascella, and Christine Morin, "Contrail Virtual Execution Platform: Challenges in Being Part of a Large Federation", to appear in 4<sup>th</sup> European Conference ServiceWave 2011, October 26-28, 2011.*

### *Refereed / Peer Reviewed Conferences*

- *Balazs Meszaros and Piyush Harsh and Thomas Michael Bohnert, "Lightning Sparks all around: A comprehensive analysis of popular distributed computing frameworks", in proceedings of 2nd International Conference on Advances in Big Data Analytics, July 27-30, 2015.*

- Piyush Harsh and Thomas Michael Bohnert, “DISCO: Unified Provisioning of Distributed Computing Platforms in the Cloud”, in proceedings of 21st International Conference on Parallel and Distributed Processing Techniques and Applications, July 27-30, 2015.
- Florian Dudouet and Piyush Harsh and Santiago Ruiz and Andre Gomes and Thomas Michael Bohnert, “A case for CDN-as-a-service in the cloud: A Mobile Cloud Networking argument”, in proceedings of 3rd International Conference on Advances in Computing, Communications and Informatics, September 24-27, 2014.
- Piyush Harsh and Konstantin Benz and Irena Trajkovska and Andy Edmonds and Paolo Maria Comi and Thomas Michael Bohnert, “A Highly Available Generic Billing Architecture for Heterogenous Mobile Cloud Services”, in proceedings of The 2014 World Congress in Computer Science, Computer Engineering, and Applied Computing, July 21-24, 2014.
- Irena Trajkovska and Piyush Harsh and Thomas Michael Bohnert and Joaquin Salvachua, “Real-time Streaming in the Cloud can Increase the Provider’s Profit and the P2P Users’ Benefit”, in proceedings of 2014 IEEE International Conference on Consumer Electronics - Taiwan, May 26, 2014.
- Irena Trajkovska and Pedro Rodriguez and Javier Cervino and Piyush Harsh and Joaquin Salvachua, “P2P Incentive Model for QoS based Streaming Systems”, in proceedings of The 11th Annual IEEE CCNC - P2P Networking and Cloud-based Content Distribution , January 10-13, 2014.
- Yvon Jegou and Piyush Harsh and Roberto G. Cascella and Florian Dudouet and Christine Morin, “Managing OVF applications under SLA constraints on Contrail Virtual Execution Platform”, in proceedings of DMTF SVM’12 - Workshop on Systems and Virtualization Management: Standards and the Cloud, October 26, 2012.
- Piyush Harsh and Florian Dudouet and Roberto G. Cascella and Yvon Jegou and Christine Morin, “Using Open Standards for Interoperability - Issues, Solutions, and Challenges facing Cloud Computing”, in proceedings of DMTF SVM’12 - Workshop on Systems and Virtualization Management: Standards and the Cloud, October 26, 2012.
- Lokesh Kumar Bhoobalan and Piyush Harsh, “An Experimental Study and Analysis of Crowds Based Anonymity”, proceedings of ICOMP’11 - The 2011 International Conference on Internet Computing, July 18–21, 2011.
- Piyush Harsh and Richard Newman, “Recovering from mDNS domain failures”, proceedings of ICOMP’10 - The 2010 International Conference on Internet Computing, July 12–15, 2010.
- Piyush Harsh, Randy Chow, and Richard Newman, “Gray Networking - a step towards next generation computer networks”, proceedings of ACM SAC 2010 - 25th Annual ACM Symposium on Applied Computing, March 21–26, 2010.
- Piyush Harsh and Richard Newman, “Mode Independent Session Directory Service Architecture”, proceedings of ACM SAC 2010 - 25th Annual ACM Symposium on Applied Computing, March 21–26, 2010.
- Piyush Harsh and Richard Newman, “Efficient Distributed Search for Multicast Session Keywords”, proceedings of ICOMP’09 - The 2009 International

*Conference on Internet Computing, July 13–16, 2009.*

- *Piyush Harsh and Richard Newman, “Using Geo-Spatial session tagging for smart multicast session discovery”, proceedings of ACM SAC 2009 - 24th Annual ACM Symposium on Applied Computing, March 09–12, 2009.*
- *Piyush Harsh and Richard Newman, “mDNS - A Proposal for Hierarchical Multicast Session Directory Architecture”, proceedings of ICOMP’08 - The 2008 International Conference on Internet Computing, July 14–17, 2008.*
- *Piyush Harsh and Richard Newman, “An overlay solution to IP-Multicast address collision prevention”, proceedings of EuroIMSA 2008 - The Fourth IASTED European Conference on Internet and Multimedia Systems and Applications, March 17–19, 2008.*

#### **Non-Refereed Conferences**

- *Piyush Harsh and Richard Newman, “Usability and Acceptance of UF-IBA, an Image-Based Authentication System”, proceedings of IEEE ICCST 2007 , 41st Annual IEEE International Carnahan Conference on Security Technology, pages 285–291, October 08–11, 2007.*
- *Richard Newman, Piyush Harsh and Prashant Jayaraman, “Security Analysis of and Proposal for Image-based authentication”, proceedings of IEEE ICCST 2005 , 39th Annual IEEE International Carnahan Conference on Security Technology, pages 141–144, October 11–14, 2005.*

#### **IETF RFC Submissions**

- *Piyush Harsh and Richard Newman, “A Hierarchical Multicast Session Directory Service Architecture”, ID 19409 Submitted: Nov 2009.*

*Document Link: <https://datatracker.ietf.org/doc/draft-mdns-rfc-informational/>*

RESEARCH  
GRANTS

Commission for Technology and Innovation (CTI)

#### **Safe Swiss Cloud**

- Grant 17034.1 PFES-ES “Safe Swiss Cloud: Flexible Billing and Cyber Intelligence in Virtual Data Centres”, Total Project Fund: CHF 635,244.00 (Duration 18 months)

TALKS (PARTIAL  
LIST)

#### **Invited Talks**

- **October 25, 2012 - Cloud Assisted Services (CLASS) Conference**  
*I gave a keynote talk titled *Contrail - facts, objectives and current results**
- **June 26, 2012 - ENS Lyon team Avalon seminar**  
*I gave a talk titled *Contrail Virtual Execution Platform**

#### **Conference Presentations**

- **4<sup>th</sup> European Conference Servicewave 2011, 2011**  
*I gave a talk on *Contrail European project as an invited speaker.**
- **25<sup>th</sup> Annual ACM Symposium on Applied Computing, 2010**  
*I presented my work on *mDNS* that was accepted in the same conference.*
- **24<sup>th</sup> Annual ACM Symposium on Applied Computing, 2009**  
*I presented the research work that was accepted in the same conference.*

- ***The International Conference on Internet Computing - ICOMP' 2008***  
*Worldcomp is the largest gathering of researchers in the field of Computer Science, Computer Engineering and applied computing. I presented the research work that was accepted in this conference.*
- ***The Fourth IASTED European Conference on Internet and Multimedia Systems and Applications, 2008***  
*I presented my research work on efficient multicast address allocation using overlay networks.*

PROFESSIONAL SERVICES

Subject Area Expert,  
Cloud Security - Elsevier and Morgan-Kaufmann Publishers.

Scientific/Technical Program Committee,  
International Conference on Connected Smart Cities.  
Int. Conf. Conference on Cloud Computing and Secure Networking.

Editorial Board,  
Open Journal of Cloud Computing.  
Journal of Computer Engineering & Information Technology.

Coordinator,  
OpenNebula Interoperability Working Group

Reviewer,  
Journal of Supercomputing, CCGrid, ETRI Journal, ISPA, IPDPS, and other conferences.

Professional Member,  
Association for Computing Machinery  
Member Since: 2010 onwards

AWARDS AND GRANTS

Association for Computer Machinery

- SIGAPP STAP Grant, 2009, 2010.

University of Florida

- CISE Teaching Assistantship: 2003–2010
- Office of Research Travel Grant: Feb 2009, 2010.
- CISE Research Assistantship: Summer 2005–2008
- Student Government Travel Grant: May 2008, Mar 2010.
- CISE Travel Scholarship: April 2008, March 2010.

Indian Institute of Technology

- Merit Scholarship, 1999–2002

Delhi Public School

- Merit Scholarship, 1997–1999

TECHNICAL SKILLS Extensive software experience in networking and information technology, especially TCP/IP, UDP, Multicast, protocol design and analysis, security analysis using BAN Logic to name a few. Experienced in cloud technologies including libvirt, KVM, OpenNebula, RESTful API development, etc.

MATLAB experience: linear algebra, statistics, visualization

Software Development Environments: C++Builder, NetBeans, Eclipse

Visualization Tools: gnuplot, MATLAB

Virtualization Tools: VirtualBox, Microsoft VirtualPC, VMware Workstation, OpenNebula, libvirt, KVM - Kernel Based Virtual Machine,

REST API Development Tools: Restlet

Programming: C++, Java, PHP, UNIX shell scripting, HTML/CSS/Javascript, and others

Technical Drawing Tools: Microsoft Visio, ConceptDraw PRO, Gnome Dia

Other Applications:  $\text{T}_\text{E}\text{X}$ ,  $\text{L}_\text{A}\text{T}_\text{E}\text{X}$ ,  $\text{BIB}_\text{T}_\text{E}\text{X}$ , Microsoft Office, and other common productivity packages for Windows, OS X, and Linux platforms

Operating Systems: Microsoft Windows XP/2000/Vista, Apple OS X, Linux, BSD, Solaris, and other UNIX variants

THEORETICAL  
EXPERTISE

Convex Optimization  
Probability, Random Variables, and Stochastic Processes  
Information Theory  
Discrete Mathematics

REFERENCES

**Dr. Richard Newman**

Assistant Professor

Email: [nemo@cise.ufl.edu](mailto:nemo@cise.ufl.edu)

**Dr. Randy Chow**

Professor (Emeritus)

Email: [chow@cise.ufl.edu](mailto:chow@cise.ufl.edu)

**Dr. Christine Morin**

Senior Scientist

Email: [christine.morin@inria.fr](mailto:christine.morin@inria.fr)

**Dr. Yvon Jegou**

Researcher

Email: [yvon.jegou@inria.fr](mailto:yvon.jegou@inria.fr)

**Dr. Thomas Michael Bohnert**

Professor and Head,

Service Engineering Research Group

Email: [bohe@zhaw.ch](mailto:bohe@zhaw.ch)