

Mina Samuel Guirguis

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EDUCATION **Ph.D. in Computer Science** **January 2007**
College of Arts and Sciences, Boston University, Boston, Massachusetts, USA

- **Thesis:** Reduction of Quality Attacks on Adaptation Mechanisms.
Committee: Azer Bestavros, John Byers, Mark Crovella, Dina Katabi(MIT) and Ibrahim Matta.

MA in Computer Science **January 2005**
College of Arts and Sciences, Boston University, Boston, Massachusetts, USA

- **Thesis:** Exogenous-Loss Aware Traffic Management in Overlay Networks:
Toward Global Fairness.

B.Sc. in Computer Science and Automatic Control **June 1999**
College of Engineering, Alexandria University, Alexandria, Egypt

- **Under-graduate Thesis:** EYERA:
A Virtual Reality Modeling Language (VRML) browser.

RESEARCH INTERESTS Security aspects in Networks and Computing Systems, Internet Traffic Management and Control, Transport Protocols over Wired/Wireless Networks and Network Overlays.

ACADEMIC EXPERIENCE **Assistant Professor** **September 2006 - Date**
Computer Science Department, Texas State University

- CS4310, "Computer Networks" Fall 2006 & Spring 2007
- CS5310, "Network and Communication Systems" Spring 2007

Research Fellow **May 2002 - August 2006**
Computer Science Department, Boston University

Teaching Fellow **January 2001 - May 2002**
Computer Science Department, Boston University

Instructor **August 1997 - March 1999**
Saint George Computer Center, Alexandria, Egypt

PROFESSIONAL EXPERIENCE *Companies marked with a star indicate that I worked as an intern.

Fortress Technologies,* Westford, Massachusetts, USA **June 2005 - June 2006**

- Characterized and profiled the performance of Snort on different platforms under different loads. Instrumented Snort and developed a wide range of client-server applications for data generation. Used OProfile for spotting performance bottlenecks.
- Interfaced SmartBits and developed scripts to integrate and automate the execution of unit tests using STAF.

Microsoft Corporation,* Redmond, Washington, USA **May 2001 - August 2001**

- Worked on the development and implementation of the DITS system. DITS allows employees to schedule tasks, written in XML, to execute on lab machines and collect the output.
- Participated in design, code reviews, integration and debugging and unit test development.

Electronic Data Care, Troy, Michigan, USA

August 2000 - December 2000

- Enhanced the GATS (General Assembly Test System) project that runs in General Motors assembly plants to test the micro-processors on the cars. GATS is developed in VC++ 6.0.

El Alamia, Sakhr Software Company, Cairo, Egypt

August 1999 - August 2000

- Implemented a web application called Tarjim (<http://www.tarjim.com>) for online translation of text and web pages. Interfaced Sakhr Translation SDK, Created ISAPI extensions, ASP files, HTML files and COM objects. Used JavaScript, VB Script and MTS. Also hosted this site (<http://www.tarjim.com.sa>) at El-Alamia @Net in Saudi Arabia on a web farm running windows 2000 and using NLB.
- Implemented Tarjim Translation Services, a web application for administrating, storing and viewing clients' requests, which are saved into a database.
- Designed and implemented tools for analyzing and characterizing traffic on Tarjim. The results obtained were used to design and implement a caching system for Tarjim.
- Designed Sakhr Specialized Dictionaries, a web site for online looking up for words in more than 50 different dictionaries.
- Implemented desktop applications, used by linguistics to quality assure their feedback on collocations. These tools are created using Visual C++ and MFC.

Mitsubishi Electric Internet Services,* Birmingham, UK

June 1998 - July 1998

- Investigated the use of Microsoft's Front Page extensions and other web development tools.
- Amended an existing portfolio application written in Visual Basic and runs under Win 95.
- Wrote an application for the company's employees to sign in and out as they enter and leave the building. This application runs through a web page and was created using InterDev.

International Computer Limited (ICL),* Alexandria, Egypt

July 1997

- Maintained systems running Unix and troubleshot problems on these systems.
- Installed computer components on such systems.

RESEARCH PROJECTS

My main research focuses on studying and characterizing the dynamics involved in complex computing systems and networks. My approach to studying dynamics relies on marshaling tools from optimization and control theory. The results obtained are then confirmed through numerical solutions, simulations and real experiments.

Security aspects in Networks and Computing Systems

We expose unorthodox adversarial attacks, which we term Reduction of Quality (RoQ) attacks, that exploit the transients of a system's adaptive behavior as opposed to its limited steady-state capacity. An optimized RoQ exploit would knock off the system whenever it is about to stabilize, keeping it in a transient state. We formalize the notion of attack "Potency", which exposes the tradeoff between the "damage" inflicted by an attacker and the "cost" of mounting the attack. RoQ attacks present a threat for adaptation components employed in Internet resources [8, 10] as well as Internet end-systems [6, 2, 1].

Internet Traffic and Quality of Service Management

Internet Traffic Managers (ITM) is a research project that investigates the development of basic control strategies for managing Internet traffic. These ITMs are capable of employing different levels of control architectures such as DiffServ, IntServ and Proxy control. We developed an API (itmBench) to program these traffic managers [9]. Elastic TCP tunnels [12] is just an example of an ITM application for providing soft bandwidth guarantees over a best effort network.

Internet Congestion Control

Exogenous packet loss (e.g., wireless packet losses) are typically regarded by end-system transport protocols (e.g., TCP) as congestion signals that require a reduction in the sending rate. In this work, we show that the presence of these independent losses could be surprisingly beneficial, promoting stability, efficiency and fairness to the transmission control loop [14]. eXogenous-aware Queue Management (XQM) is an Active Queue Management (AQM) algorithm that leverages the presence of exogenous losses in the direction of achieving global fairness [3, 13].

SELECTED
PUBLICATIONS

- [1] M. Guirguis, A. Bestavros, I. Matta and Y. Zhang. "Adversarial Exploits of End-Systems Adaptation Dynamics". *The International Journal of Parallel and Distributed Computing*, 2007. (to appear).
- [2] M. Guirguis, A. Bestavros, I. Matta and Y. Zhang. "Reduction of Quality (RoQ) Attacks on Dynamic Load Balancers: Vulnerability Assessment and Design Tradeoffs". In *Proceedings of the 26th IEEE INFOCOM (INFOCOM'07)*, Anchorage, Alaska, May 2007. (to appear).
- [3] M. Guirguis, A. Bestavros and I. Matta. "Exogenous-Loss Aware Traffic Management in Overlay Networks: Toward Global Fairness". *The Computer Networks Journal (COMNET): The International Journal of Computer and Telecommunications Networking. Volume 50, Issue 13, Pages 2331-2348*, September 2006.
- [4] M. Guirguis, A. Bestavros and I. Matta. "On the Impact of Low-Rate Attacks". In *Proceedings of the 41st IEEE International Conference on Communications (ICC'06)*, Istanbul, Turkey, June 2006.
- [5] Y. Zhang, A. Bestavros, M. Guirguis, I. Matta and R. West. "Friendly Virtual Machines: Leveraging a Feedback-Control Model for Application Adaptation". In *Proceedings of the 1st ACM/USENIX Conference on Virtual Execution Environments (VEE'05)*, Chicago, Illinois, June 2005.
- [6] M. Guirguis, A. Bestavros, I. Matta and Y. Zhang. "Reduction of Quality (RoQ) Attacks on Internet End-Systems". In *Proceedings of the 24th IEEE INFOCOM (INFOCOM'05)*, Miami, Florida, March 2005.
- [7] M. Guirguis, A. Bestavros and I. Matta. "Routing Tradeoffs inside a d-dimensional Torus with applicability to CAN". In *Proceedings of the 1st International Computer Engineering Conference New Technologies for the Information Society (ICENCO'04)*, Cairo, Egypt, December 2004.
- [8] M. Guirguis, A. Bestavros and I. Matta. "Bandwidth Stealing via Link Targeted RoQ Attacks". In *Proceedings of the 2nd IASTED International Conference on Communication and Computer Networks (CCN'04)*, Cambridge, Massachusetts, November 2004.
- [9] G. Diamant, L. Veytser, I. Matta, A. Bestavros, M. Guirguis, L. Guo, Y. Zhang and S. Chen. "itmBench: Generalized API for Internet Traffic Managers". In *Proceedings of the 10th IEEE Globecom Workshop on Computer-Aided Modeling, Analysis and Design of Communication Links and Networks (CAMAD'04)*, Dallas, Texas, November 2004.
- [10] M. Guirguis, A. Bestavros and I. Matta. "Exploiting the Transients of Adaptation for RoQ Attacks on Internet Resources". In *Proceedings of the 12th IEEE International Conference on Network Protocols (ICNP'04)*, Berlin, Germany, October 2004.
- [11] M. Guirguis, A. Bestavros and I. Matta. "Adaptation=Vulnerability: Under RoQ Attacks". *Poster in ACM SIGCOMM (SIGCOMM'04)*, September 2004.
- [12] M. Guirguis, A. Bestavros, I. Matta, N. Riga, G. Diamant and Y. Zhang. "Providing Soft Bandwidth Guarantees Using Elastic TCP-based Tunnels". In *Proceedings of the 9th IEEE Symposium on Computer and Communications (ISCC'2004)*, Alexandria, Egypt, July 2004.
- [13] M. Guirguis, A. Bestavros and I. Matta. "XQM: eXogenous-loss aware Queue Management". *Poster in IEEE ICNP (ICNP'03)*, November 2003.
- [14] M. Guirguis, A. Bestavros and I. Matta. "On the Efficiency and Fairness of Transmission Control Loops: A Case for Exogenous Losses". *Technical Report 2003-013*, May 2003.

Additional publications can be found @ <http://cs-people.bu.edu/msg/research/index.htm>

SELECTED
PRESENTATIONS

- "Reduction of Quality Attacks on Adaptation Mechanisms"
Ph.D. Thesis Defense, Boston University, Boston, Massachusetts, August 2006.
- "On the Impact of Low-Rate Attacks"
IEEE International Conference on Communications (ICC'06), Istanbul, Turkey, June 2006.
- "Reduction of Quality (RoQ) Attacks on Internet End-Systems"
24th IEEE INFOCOM (INFOCOM'05), Miami, Florida, March 2005.
- "Bandwidth Stealing via Link Targeted RoQ Attacks"
2nd IASTED International Conference on Communication and Computer Networks (CCN'04), Cambridge, Massachusetts, November 2004.

- Academic Honesty Committee Member, CS Dept.
- Member of the partnership group between Texas State University and Cisco.

Fall 2006

Service to Boston University

- Steering committee member for the Network Reading Group (NRG) in the Computer Science Department at Boston University. Responsibilities included, maintaining the NRG web-site, recruiting speakers and topics for discussion as well as maintaining the NRG mailing list.
- Participated in the organization of open house events as a partnership between Boston University Computer Science and members of the IT industry. Responsibilities included, ordering supplies for poster presenters, organizing the posters in the lab and preparing handouts for visitors.

SKILLS

Platforms: Unix, Linux and Windows.

Programming: C/C++, Visual C++, MFC, ODBC, COM, Visual InterDev, and Visual Basic.

Web Programming: HTML, XML, ASP, JScript, VBScript and PHP.

Scripting: Shell, Tcl, Expect, Perl and Python.

Databases: MS SQL Server and Oracle.

Other Tools: Network Simulator (NS2), Snort, Matlab, MAX+PLUS II, Lex and Yacc.

REFERENCES

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ADDITIONAL REFERENCES

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