

# Biographical and Career Summary

## Warren Keith TOOMEY

### Biographical

**Date of Summary:** 26th July 2012

**Name:** Warren Keith TOOMEY

**Classification:** Assistant Professor

**School:** School of Information Technology, Bond University, Queensland, Australia 4229

**Qualifications:** Ph.D in Computer Science, UNSW, 1997. B.Sc (Hons), UNE, 1988

#### Academic History (Brief)

Jun 2001 – present	Assistant Professor & Associate Dean Teaching (Bond University)
Jan 1999 – Jun 2001	Lecturer (UC UNSW, ADFA)
Mar 1995 – Dec 1998	Associate Lecturer (UC UNSW, ADFA)
Apr 1992 – Mar 1995	Teaching Fellow (UC UNSW, ADFA)
Sep 1989 – Apr 1992	Research Officer (UC UNSW, ADFA)
Mar 1989 – Sep 1989	Systems Administrator (UNE)
Feb 1988 – Sep 1989	Computer Centre Help Desk Assistant (UNE)
Feb 1988 – Sep 1989	Tutor (UNE)
Feb 1987 – Dec 1987	Private H.S.C Tutor

### Academic Career

**Jun 2001 – present** Assistant Professor, School of IT, Faculty of Business, Bond University.

My duties include preparing, co-ordinating and lecturing undergraduate and postgraduate subjects in the areas of Programming, Systems Architecture, Networks, IT Security, Games Programming and Internet Technologies. I have won several school, faculty and federal awards for my teaching excellence, and I have mentored several new academic staff. I supervise Ph.D and Masters candidates, and perform administrative duties as required.

In 2006-2007 I was Associate Dean Teaching & Learning, Faculty of Business. I was responsible for the implementation of faculty-wide T&L strategies and procedures, staff training and professional development. I have also served on many faculty- and university-level committees and working groups.

**Mar 1995 – Jun 2001** Lecturer, School of Computer Science, University College, ADFA, Canberra.

My duties included preparing, co-ordinating and lecturing 1st Year Information Systems, 2nd Year Data Communications, 3rd Year Software Engineering and Systems Administration, Masters-level Operating Systems and Data Networks courses; tutoring in various other courses, and administrative duties as required.

As a member of the Computer Science Curriculum Review Committee, I assisted in the complete review and redesign of the ADFA Computer Science Curriculum, with major input in the areas of Operating Systems, Data Networks, Compilers, Computer Architecture, Theoretical Computer Science and Comparative Programming Languages.

**Apr 1992 – Mar 1995** Teaching Fellow, Department of Computer Science, University College, ADFA, Canberra.

My duties included being enrolled full-time in a Ph.D by research, and lecturing & tutoring duties. My Ph.D focused on the improvement of wide area computer network efficiency at all levels, and specifically at minimising wide area network congestion.

My teaching duties included lecturing 2nd Year Operating Systems and 3rd Year Data Networks units; tutoring 1st Year Computer Science for Engineers, 2nd Year Computer Architecture, 2nd Year Data Structures, 3rd Year Data Networks and Masters-level Data Networks units; and administrative duties as required.

**Sep 1989 – Apr 1992** Research Officer, Department of Computer Science, University College, ADFA, Canberra.

My duties were to conduct research into the design and implementation of RHODOS, a generalised distributed operating system. I designed and built several RHODOS subsystems, namely the Memory Management server, the TCP/IP network stack, and a new communication protocol RRDP. Implementation was done in C and C++.

**1984 – 1988** Undergraduate student, University of New England, Armidale.

I obtained my Bachelor of Science (Hons), IIa with a major in Computer Science and a minor in Pure Mathematics.

## **Systems Development and Administration**

### **Systems Development and Programming Experience**

I am a practicing systems developer as well as an academic. My largest developed system is one that provides Electronic Program Guide (EPG) data to Personal Video Recorders (PVRs) in Australia. This includes a front-end website, *www.oztivo.net*, and a PostgreSQL back-end database (20+ tables, 100,000+ records in some tables) using Model View Controller (MVC) principles. The database was designed using standard database design principles. The system currently has about 10,000 users on a daily basis.

As both a lecturer in IT and a practicing developer of large systems, I am intimately familiar with the software development lifecycle. I use IDEs to develop, refactor and debug software components, profilers to find and remove bottlenecks and dead code, unit testing to find defects, and version control systems to manage software changes and identify regression issues. My focus has always been on high quality, well-tested code with extensive internal and external documentation.

As a person who has primarily worked on Linux and Unix platforms, I have extensive knowledge of the C language, including a strong understanding of the standard Unix/Linux system calls. I am also well versed in both Java and Perl, and have taught both languages at university level. In the course of my teaching career, I have also become familiar with other languages such as SQL, Ada, Lisp and Scheme.

### **Cisco Certified Academic Instructor**

From 2001 to 2007 I managed the Cisco Networking Academy at Bond University. I was trained as a regional Cisco Certified Academy Instructor (CCAI), whereby I could train other staff to be Cisco instructors at Bond University and also at Ashmore TAFE. I scored 975/1000 on my Cisco Certified Network Associate (CCNA) exam. Apart from instructor training, I also delivered the four CCNA courses to students at Bond University and the general public. Many of my graduates have gone on to take up high-level network administration and design positions worldwide.

## **Systems Administration Experience**

I was employed as the sole systems administrator for the Department of Computer Science, UNE in 1989. My duties included the maintenance of user accounts, installation of programs and large packages from both source and binary distributions, filesystem maintenance and partitioning, e-mail configuration, network management, file backup and restores, and kernel configuration & rebuilding.

More recently, I have been the systems administrator for the Linux servers *www.oztivo.net* and *minnie.tuhs.org*. These systems provide complex web and e-mail service for a large community of Internet users. In this capacity I have gained the skills required to configure web, e-mail and database services, design and deploy large databases, modify source code, port, compile, install and maintain 3rd party software, perform system security analysis and strengthening, and deal with users on a continuing basis. I have also presented a number of papers on system security analysis and strengthening at conferences in Australia.

As a lecturer at UNSW and Bond University, I have deployed and managed several servers that were used for teaching and research purposes, including a 40-node computing cluster used for genetic algorithm research. This has involved host-level and router-level firewall configuration to ensure network security. I now use virtual machine (VM) technologies to configure and deploy VM instances for teaching purposes.

## **Expert Witness Experience**

In 2001 I acted as a expert witness in the area of network capacity and throughput in a New Zealand High Court case between PRONET Ltd. and Clear Communications Ltd. My evidence demonstrated a link between the congested network link that Clear was providing PRONET and the high network latency and packet loss that PRONET was experiencing.

## **Teaching**

### **Primary Objectives in Teaching**

My objectives in teaching are to provide students with an understanding of the topic being taught, and the implications of the course material within the scope of the field and within society as a whole. I encourage students to use their initiative to find out more about the parts of the course that interests them, and I encourage students to interact with each other and myself, to increase the understanding of the topic being taught.

### **Current & Previous Teaching Responsibilities**

The majority of the courses that I have taught involved 2 hours lectures, 1 hour tutorial and 2 hours laboratories/week for student contact. I was the lecturer, tutor, lab attendant for all courses, and I wrote all the course material, set and marked the assignments and examinations. At Bond University (2001-2012), the subjects were taught to undergraduates & postgraduates combined.

Network Security, 2009-2012.

Systems Architecture, 2010-2012.

Modular Programming, 2009-2011.

Introduction to Programming, 1993-1996, 2002-2012.

Networks and Applications, 1999, 2001-2012.

Introduction to Games Programming, 2007-2008.

Network Technologies, 2002-2006.

Advanced Software Development, 2003-2005.

Operating Systems, 1992-2005.  
Network Programming, 2001-2004.  
Introduction to Internet Technology, 2002.  
Systems Administration, 1997-2001.  
Introduction to Information Systems, 1995–1999.  
Advanced Software Engineering, 1997.  
Masters Data Networks, 1992–2000.  
Data Structures and Algorithms, 1992 (tutor), 1995.  
Business Computing AFM 171-1, 1989 (tutor).  
Computer Science CS 110-1, 1988–1989 (tutor).

## Student Supervision

Henry Larkin, *Predicting Connectivity in Wireless Ad Hoc Networks*, Ph.D Thesis co-supervisor, 2006.  
Christian Rueb, *Porting FMI/OS to run on the Xen Virtual Machine Monitor*, Diploma Thesis supervisor, 2005.  
Gabriel Shilazi, *Implementing SMP on the Intel Platform for VSTA*, Masters Thesis supervisor, 2004.  
Alexander Gustaffson, *User Migration for UNIX Systems*, Masters Thesis supervisor, 2003.  
Sydney Grenzabach, *Distributed Honeynets*, Masters Thesis supervisor, 2003.  
Ian Bennets, *POSIX Support for Mobile Native Processes*, Masters Thesis supervisor, 2000.  
Chris Keogh, *Deploying IPv6 in the Defence Wide-Area Communications Network*, Honours Thesis supervisor, 2000.  
Peter Reynolds, *The Design and Development of the Rhodos Communications Subsystem*, Honours Thesis supervisor, 2000.  
Jeff Howard, *KuangPlus: A General Computer Vulnerability Checker*, Masters Thesis supervisor, 1999.  
Supervision of 3rd year projects: students in 1996–2010.

## Special Awards for Teaching

Federal-level ALTC Citation for Teaching & Learning: 2007.  
Vice-Chancellor's Award for Teaching Excellence: 2005.  
School/Faculty-level Teaching Awards: over a dozen awards from 2003 to 2012.  
Student Council Award for Academic Excellence: January 2005.

## Teaching Innovations

**2010:** Development of the 'Arjen' technology to add meaning to the cryptic error messages that are returned by compilers, to assist programming students in the understanding of their mistakes: received a teaching & learning grant in 2010 for this work.

**2005:** Modification of the 'james' web portal at Bond University to allow students to address "anonymous questions" to a course lecturer: awarded a university-level teaching award in 2005 for this work.

**2002:** Co-developer of the 'james' web portal at Bond University, a system with similar features to the now-popular Blackboard and WebCT systems.

**1994:** Early use of the World-Wide Web as a means of distributing lecture notes, assignments and other course information in a hyperlinked multimedia format.

## Research

### Statement of Research Interest and Activities

Detection of Code Clones in Software, Improving Learning Outcomes in Introductory Programming Students, Software Archaeology, Network Security.

At present I am researching the fast and efficient detection of code clones (sections of common source code) across multiple source code trees. There are many uses for this technology including the detection of plagiarism, code strengthening & refactoring, and identification of copyright violations.

My other current research interest is in the identification of common mistakes that novice programmers make, and techniques to improve the feedback that they receive about these mistakes so that their learning outcomes are improved.

I have a strong and on-going interest in the new area of software archaeology. The field of computing is now old enough that historical and archaeological techniques can be applied both to the historical narrative of computing and to the hardware and software artifacts of computing. I have had several papers published in this area.

In 1998 I obtained my Ph.D. For my thesis, I was involved in the study and improvement of computer network efficiency in both local-area and wide-area networks. I designed a new network-level congestion mechanism that allow the information on the location and size of a congestion point in a network to be sent to all packet sources that are causing the congestion. Given this information, the sources can react to minimise the congestion.

### Grants and Awards Received

**2010** W. Toomey, Bond University Teaching and Learning Research Grant, *Development and Assessment of Software to Detect and Feedback Common Mistakes for Introductory Programming Students*, \$2,200.

**2007** W. Toomey, ALTC Citation Award, *Supporting and Encouraging Student Learning through Enthusiasm, Imaginative Resources and Timely Feedback Sustained over a Period of Several Years*, \$15,000.

**1992/1993** L.P. Brown, G. Gerrity, W.K. Toomey, Australian Telecommunications & Electronics Research Board, *Evaluation of some Security and Reliability Protocols over Packet Radio*, \$4,000.

### Refereed Publications and Conference Papers

W. Toomey, *Ctcompare: Code Clone Detection Using Hashed Token Sequences*, Proceedings of the 6th International Workshop on Software Clones, June 2012.

W. Toomey, *The Strange Birth and Long Life of Unix*, IEEE Spectrum magazine, December 2011.

W. Toomey, *1st Edition UNIX: Its Creation and Restoration*, IEEE Annals of the History of Computing, 32(3), 74-82. July 2010.

W. Toomey, *The Restoration of Early UNIX Artifacts*, Proceedings of the 2009 USENIX Annual Technical Conference, June 2009.

W. Toomey, *OzTiVo – Toys, Tools, Hacks and a Community*, Proceedings of the Linux Conf Australia, Canberra, April 2006.

H. Larkin, Z. Wu, W. Toomey, *Predicting Network Topology for Autonomous Wireless Nodes*, Proceedings of the 11th European Wireless Conference (EW'05), April 2005.

H. Larkin, Z. Wu, W. Toomey, *Algorithms for Predicting Node Connectivity in Wireless Ad-hoc Networks*, Proceedings of the 2005 International Multiconference in Computer Science and Computer Engineering (ICWN'05), June 2005.

W. Toomey, *Comparing C Code Trees*, Proceedings of the Australian Unix Users Group winter conference, Sydney, August 2005.

W. Toomey, *OzTiVo – Toys, Tools, Hacks and a Community*, Proceedings of the Australian Unix Users Group winter conference, Sydney, August 2005.

W. Toomey, *Installing and Configuring FreeBSD*, invited workshop given at the AUUG Winter conferences in 2000 and 2001.

W. Toomey, *Making Closed Source Unix Open Again*, Third Australian Open Source Symposium, June 2001.

W. Toomey, *Teaching Systems Administration*, seminar given to the Canberra chapter of SAGE-AU in 2000.

W. Toomey, *Saving UNIX from /dev/null*, 1999 AUUG Canberra Summer Conference, Canberra, February 1999. Presented again at the national AUUG conference, Melbourne, September 1999.

W. Toomey, *A Look at Recent Network Security Vulnerabilities*, seminar given to the Canberra chapter of the Network Professionals Association, July 1997.

W. Toomey, *Installing and Configuring FreeBSD*, invited workshop given at the AUUGWet'97 conference, Darwin, February 1997.

W. Toomey, *Monitoring Network Connection Attempts on a FreeBSD Server*, 1996 AUUG Canberra Summer Conference, Canberra, February 1996. Presented again at the national AUUG conference, Melbourne, September 1996.

W. Toomey, *The PDP-11 Unix Preservation Society*, 1996 AUUG Canberra Summer Conference, Canberra, February 1996.

W. Toomey, *FreeBSD*, keynote address at QUESTnet'95, Bond University, September 1995.

## Theses

W. Toomey, *A Rate-Based Congestion Control Framework for Connectionless Packet-Switched Networks*. Thesis submitted to the University of New South Wales for the degree of Doctor of Philosophy, November 1997.

W. Toomey, *An Implementation of GKS in C*. Dissertation submitted to the University of New England in part fulfillment of the requirement of Honours in Computing Science, November 1988.

## Administration

### Administrative Responsibilities

#### Within School/Faculty

- Member of the AACSB Taskforce, 2007-2009
- Associate Dean, Teaching & Learning, 2006 – 2007
- Chair of Faculty Teaching & Learning Committee, 2006 – 2007
- Member of Faculty Teaching & Learning Committee, 2005 – 2007
- Member of School Technical Support Committee, 2005 – 2006
- Curriculum Review Committee, 1993 – 2001
- Information Systems 1st Year Co-ordinator, 1996 – 1999
- Teaching Committee of the ADFA IT Review Working Party, 1994
- Computer Science 2nd Year Co-ordinator, Semester 1, 1993

#### University-Wide

- Member of Emerging Technologies Committee, 2012
- Member of Teaching & Learning Committee, 2006 – 2007
- Proposed Computer Engineering Degree Committee, 1993 – 1996

## Other Professional Involvements

Member of the Australian Unix Users Group Executive, 2001 - 2002

Chair and Secretary of the Canberra Packet Radio Group, 1994 – 1996

## Referees

Prof. Iain Morrison, Head of School,  
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