

**Exhibit 1 – CV of Dr. Steven Gribble**

## Curriculum Vitae

Steven D. Gribble  
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### Employment

Associate Professor, Department of Computer Science and Engineering, University of Washington.  
(9/16/2005 – present)

Assistant Professor, Department of Computer Science and Engineering, University of Washington.  
(11/1/2000 – 9/15/2005)

### Research interests

Operating systems, distributed systems, and networking, with particular interests in virtual machine monitors, the measurement and analysis of content delivery systems and peer-to-peer file-sharing networks, and operating system support for modern security threats such as spyware and worms.

### Education

**B.Sc.**, University of British Columbia, June 1995, combined Computer Science and Physics honours program. Physics thesis supervisor: Dr. Kristin Schleich. Computer Science thesis supervisor: Dr. Maria Klawe.

**M.Sc.**, University of California at Berkeley, December 1997, Computer Science program. Thesis supervisor: Dr. Eric A. Brewer. Member of the Bay Area Research Wireless Access Network (BARWAN) and Global Mobile Computing by Proxy (GloMop) research groups.

**Ph.D.**, University of California at Berkeley, September 2000, Computer Science program. Thesis supervisor: Dr. Eric A. Brewer. Senior student on the “Ninja” research group. Dissertation title: “A Design Framework and a Scalable Storage Platform to Simplify Internet Service Construction.”

### Teaching

**University of Washington CSE142:** Computer Programming I (Winter 2006). Basic programming-in-the-small abilities and concepts. Highlights include procedural and functional abstraction with simple built-in data type manipulation. Basic abilities of writing, executing, and debugging programs.

**University of Washington CSE451:** Undergraduate Operating Systems (Winter 2001, Winter 2005). The principles and architecture of modern operating systems, including process management, memory management, storage management, resource allocation, protection, and security. Students implement projects that modify or enhance aspects of the Linux operating system kernel.

**University of Washington CSE461:** Undergraduate Networks (Fall 2005). Computer network architectures, protocol layers, network programming, transmission media, encoding systems, switching, multiple access arbitration, network routing, congestion control, flow control, transport protocols, real-time, multicast, and network security. Students implement a set of routing, transport, and application protocols on a packet simulator and emulator.

**University of Washington CSE551:** Graduate Operating Systems (Spring 2001-2005, 2007, PMP2008). This course focuses on operating system design and construction techniques. Topics

covered include concurrent programming, operating system kernel structure, protection, transaction processing, design methodologies, file systems, virtual memory, and distributed systems.

**University of Washington CSE552:** Graduate Distributed Systems (Winter 2002, PMP Winter 2004). In this course, we covered classical distributed systems results, including consensus, Byzantine fault tolerance, time and logical clocks, group membership, causally and totally ordered group communications, and security protocols.

**University of Washington CSE590IS:** Graduate Internet Systems (Winter 2003). In this reading course, we covered many aspects of Internet services, including web caching, content distribution, security, and programming models.

**UC Berkeley CS39c:** “From Smoke Signals to the Internet, From the Abacus to the Handheld PC” – a freshman seminar on the history of communications and computing. While a graduated student at Berkeley, I co-instructed this course for the three years with Prof. Randy H. Katz and Prof. Armando Fox (now at Stanford University).

## Current Graduate Students

- Tanya Bragin:** Pre-quals. Co-advised with Hank Levy.
- Paul Gauthier:** Post-quals. Co-advised with Brian Bershad. *Currently on leave at a startup.*
- Roxana Geambasu:** Post-quals. Co-advised with Hank Levy.
- Alex Moshchuk:** Post-quals. Co-advised with Hank Levy.
- Charlie Reis:** Currently taking generals exam. Co-advised with Hank Levy.
- David Richardson:** Pre-generals. *Currently on leave at a startup.*

## Graduated Ph.D. Students

- Krishna Gummadi:** Graduated in Fall 2005, joined the Max Planck Institute as head of the networked systems research group. Dissertation topic: techniques for and analysis of large-scale Internet measurement. Co-advised with Hank Levy.
- Stefan Saroiu:** Graduated December 2004. Assistant Professor at the University of Toronto Department of Computer Science. Co-advised with Hank Levy.
- Andrew Whitaker:** Graduated Fall 2005, joined Amazon.com. Dissertation topic: design, implementation, and applications of the Denali virtual machine monitor.

## Honors and awards

**Torode Family Endowed Career Development Professorship in Computer Science, 2006-2008.**

**Alfred P. Sloan Research Fellowship, 2004-2006.**

**NSF CAREER award, 2002-present.** Grant ANI-0132817, “Enabling New Network Applications and Distributed Systems using Mobile, Lightweight Protection Domains.”

### Teaching Awards

Received a plaque of appreciation from my CSE451 students at the end of the Winter 2001 quarter. Won the department-wide “best teacher” award from the UW undergraduate ACM chapter for the 2001-2002 academic year, and the 2005-2006 academic year.

### Graduate Studies Awards

Cal @ Silicon Valley Fellowship, UC Berkeley CS, 1999, for academic excellence.

NSERC PGS-B Fellowship, 1997-1999, Canadian Federal Government, for academic excellence.  
Canadian Space Agency NSERC Supplement, 1997-1999, for academic excellence.  
NSERC PGS-A Fellowship, 1995-1997, Canadian Federal Government, for academic excellence.  
Canadian Space Agency NSERC supplement, 1995-1997, for academic excellence.  
Regent's Fellowship, UC Berkeley, 1995, graduate program entrance award.

### **Undergraduate Studies Awards**

Computing Research Association Outstanding Undergraduate Researcher, 1995 (honorable mention).  
Banks Scholarship, UBC, 1995, for academic excellence.  
Rick Semple Memorial Award, UBC CS, 1995, awarded to a research intern.  
McDonald Memorial Scholarship, UCB Physics, 1995, for excellence in physics.  
NSERC Undergraduate Summer Research Grant, UBC, 1993 and 1994.  
Science Scholar, UBC, 1993-1995, awarded to the top 20 students in the faculty of science.  
Canadian Information Processing Society Award, 1993. Awarded to the top UBC Co-op student.  
National Entrance Scholarship, UBC, 1990-1995, the top UBC entrance scholarship.  
Canada Scholarship, Canadian Federal Government, 1990-1995.

## **Technology transfer and industrial experience**

**illumita, inc.**, 6/2006 – 6/2007: I cofounded this company to transfer virtualization technology out of the university. I took a 50% leave of absence from the university, and served as acting CEO and CTO to establish the company. I returned from my leave midway through the Spring '07 quarter.

**Microsoft, inc.** 7/2006. I served on an “alt-TAB,” a topic-specific technical advisory board, for Microsoft. This topic of this TAB was scalable architectures.

**Isilon Systems**, 4/2001 - present: I serve on the technical advisory board of this company, which is develops high-performance distributed storage systems designed for the needs of rich-media content delivery and hosting markets.

**Silicon Chalk, Inc.**, 11/2000 - 2002: I helped to define the business and technical strategy of Silicon Chalk, a Vancouver, Canada based startup working on in-classroom educational technologies.

**Proxinet, Inc.**, 06/1997 - 12/1998: This company was created for the aggressive technology transfer of the proxy computing technology that I helped develop at UC Berkeley. Proxinet has since been acquired by Puma Technologies.

**Wink Communications**, 06/1996 - 08/1996: I helped to transfer prototypes of the Berkeley BARWAN group's proxy technology into Wink's set-top box technology, thereby bringing the web to their interactive TV infrastructure.

**Software releases:** many of the research prototypes I have built have been released to the public, either as free software or as freely available Internet services. My releases include Top Gun Wingman, a graphical web browser for the Palm Pilot (<http://www.isaac.cs.berkeley.edu/pilot>), TranSend, a web accelerator proxy service, Parallelisms, a related web page locator, Sanctio, an instant messaging protocol and language translation proxy, and the Ninja service platform (<http://ninja.cs.berkeley.edu>). Wingman and TranSend have been particularly successful, having been adopted by tens of thousands of users during their lifetime. I have published several traces, including a Web trace gathered from the UC Berkeley dial-up modem pool (<http://ita.ee.lbl.gov/html/contrib/UCB.home-IP-HTTP.html>).

## **Grants**

**NSF Cybertrust, 2006-2009, \$948,723.39.** Grant CNS-0627367, “CT-T: The Detection and Prevention of Spyware.” PI, Hank Levy is Co-PI.

**NSF CNS, 2006-2008, \$700,000.** Grant CNS 0614975, “CSR – PDOS: Simplifying Administration in the Outsourced Home.” Co-PI with Hank Levy.

**Google research award, September 2005, \$90,000.** “Domestic operating systems.” Co-PI with Brian Bershad and Hank Levy.

**NSF Cybertrust, 2004-2007, \$450,000.** Grant CNS-0430477, “OS Support for Application Installation, Execution, and Management in an Untrustworthy World.” PI.

**Alfred P. Sloan Research Fellowship, 2004-2006. \$40,000.**

**NSF CAREER award, 2002-2007, \$499,290.** Grant ANI-0132817, “Enabling New Network Applications and Distributed Systems using Mobile, Lightweight Protection Domains.” PI.

**NSF ITR/SI, 2001-2004, \$780,000.** Grant CCR-0121341, “ITR/SI: Adaptive Wide-Area Information Delivery.” Co-PI; Hank Levy is the PI.

**NSF ITR, 2002-2004, \$790,000.** Grant IIS-0205635, “ITR: (Software & Hardware Systems) Piazza: A Platform for Wide-scale Distributed Data Sharing and Integration.” Co-PI; Alon Halevy is the PI.

**Nortel Corporation gift, 2000, \$65,000.** To support research related to the Denali virtual machine monitor project. PI.

**Intel Corporation gift, 2001-2003, \$260,000.** To support research related to the Denali virtual machine monitor project. PI.

## Publications

All of the following publications may be downloaded from:

<http://www.cs.washington.edu/homes/gribble/pubs.html>

### Award Papers

**Nominated for forwarding to journal** A Safety-Oriented Platform for Web Applications, by Richard S. Cox, Jacob Gorm Hansen, Steven D. Gribble, and Henry M. Levy. Proceedings of the 2006 IEEE Symposium on Security and Privacy, Oakland, CA, May 2006.

**Best student paper** Stefan Saroiu, Krishna P. Gummadi, Richard J. Dunn, Steven D. Gribble, and Henry M. Levy. An Analysis of Internet Content Delivery Systems. *Proceedings of the Fifth Symposium on Operating Systems Design and Implementation (OSDI 2002)*, Boston, MA, December 2002.

**Best student paper** Krishna P. Gummadi, Stefan Saroiu, and Steven D. Gribble. King: Estimating Latency between Arbitrary Internet End Hosts. *Proceedings of SIGCOMM IMW 2002*, Marseille, France, November 2002.

**Best Paper** Stefan Saroiu, P. Krishna Gummadi, and Steven D. Gribble. A Measurement Study of Peer-to-Peer File Sharing Systems. *Proceedings of Multimedia Computing and Networking 2002 (MMCN'02)*, San Jose, CA, USA, January 2002.

**Best Paper, awarded out of all 2001 Journal of Computer Networks papers** Steven D. Gribble et al., The Ninja Architecture for Robust Internet-Scale Systems and Services, *Journal of Computer Networks*, Volume 35, Issue 4, March 2001.

## Refereed Publications:

- [1] Alexander Moshchuk, Steven D. Gribble, and Henry M. Levy. Flashproxy: Transparently Enabling Rich Web Content via Remote Execution. Proceedings of the 6th International Conference on Mobile Systems, Applications, and Services (MobiSys 2008), Breckenridge, Colorado, June 2008.
- [2] Charles Reis, Steven D. Gribble, Tadayoshi Kohno, and Nicholas C. Weaver. Detecting In-Flight Page Changes with Web Tripwires. Proceedings of the 5<sup>th</sup> USENIX Symposium on Networked Systems Design and Implementation (NSDI '08), San Francisco, CA, April 2008.
- [3] Roxana Geambasu, Cherie Cheung, Alexander Moshchuk, Steven D. Gribble, and Henry M. Levy. Organizing and Sharing Personal Web-Service Data. Proceedings of the 17<sup>th</sup> International World Wide Web Conference (WWW 2008), Beijing, China, April 2008.
- [4] Charles Reis, Steven D. Gribble, and Henry M. Levy. Architectural Principles for Safe Web Programs. Proceedings of the Sixth Workshop on Hot Topics in Networks (HotNets 2007), Atlanta, Georgia, November 2007.
- [5] Alexander Moshchuk, Tanya Bragin, Damien Deville, Steven D. Gribble, and Henry M. Levy. SpyProxy: On-the-fly Protection from Malicious Web Content. Proceedings of the 16th USENIX Security Symposium (USENIX Security 2007), Boston, MA, August 2007.
- [6] Roxana Geambasu, Magdalena Balazinska, Steven D. Gribble, and Henry M. Levy. HomeViews: Peer-to-Peer Middleware for Personal Data Sharing Applications. Proceedings of the 2007 SIGMOD International Conference on Management of Data (SIGMOD 2007), Beijing, China, June 2007.
- [7] Eytan Adar, Daniel Weld, Brian Bershad, and Steven Gribble. Why We Search: Visualizing and Predicting User Behavior, by. Proceedings of the 16th International World Wide Web Conference (WWW 2007), Banff, Alberta, Canada, May 2007.
- [8] Richard Dunn, Henry Levy, Steven Gribble, and John Zahorjan. The Importance of History in a Media Delivery System. Proceedings of the 6th International Workshop on Peer-to-Peer Systems (IPTPS 2007), Bellevue, WA, February 2007
- [9] Tobias Holgers, David E. Watson, and Steven D. Gribble. Cutting through the Confusion: A Measurement Study of Homograph Attacks. *Proceedings of the 2006 USENIX Annual Technical Conference (USENIX '06)*, Boston, MA, May 2006.
- [10] Richard S. Cox, Jacob Gorm Hansen, Steven D. Gribble, and Henry M. Levy. A Safety-Oriented Platform for Web Applications. *Proceedings of the 2006 IEEE Symposium on Security and Privacy*, Oakland, CA, May 2006.
- [11] Alexander Moshchuk, Steven D. Gribble, and Henry M. Levy. A Crawler-based Study of Spyware in the Web. *Proceedings of the 13<sup>th</sup> Annual Network and Distributed System Security Symposium (NDSS 2006)*, San Diego, CA, February 2006.
- [12] David W. Richardson, Steven D. Gribble, and Edward D. Lazowska. The Limits of Global Scanning Worm Detectors in the Presence of Background Noise. *Proceedings of the 3<sup>rd</sup> Workshop on Rapid Malcode (WORM 2005)*, Fairfax, VA, November 2005.
- [13] Richard J. Dunn, John Zahorjan, Steven D. Gribble, and Henry M. Levy. Presence-Based Availability and P2P Systems. *Proceedings of the 5<sup>th</sup> IEEE International Conference on Peer-to-Peer Computing*, Konstanz, Germany, August/September 2005.
- [14] Andrew Whitaker, Richard S. Cox, Marianne Shaw, and Steven D. Gribble. Rethinking the Design of Virtual Machine Monitors. *IEEE Computer*, Volume 38, number 5, pages 57-62, May 2005.

- [15] Krishna P. Gummadi, Harsha V. Madhyastha, Steven D. Gribble, Henry M. Levy, and David Wetherall. Improving the Reliability of Internet Paths with One-hop Source Routing. *Proceedings of the Sixth Symposium on Operating Systems Design and Implementation (OSDI '04)*, San Francisco, CA, December 2004.
- [16] Andrew Whitaker, Richard S. Cox, and Steven D. Gribble. System Administration as Search: Finding the Needle in the Haystack. *Proceedings of the Sixth Symposium on Operating Systems Design and Implementation (OSDI '04)*, San Francisco, CA, December 2004.
- [17] Robert Grimm, Janet Davis, Eric Lemar, Adam MacBeth, Steven Swanson, Tom Anderson, Brian Bershad, Gaetano Borriello, Steven Gribble, and David Wetherall. System Support for Pervasive Applications. *ACM Transactions on Computer Systems*, 22(3), November 2004.
- [18] Andrew Whitaker and Steven D. Gribble. Using Time Travel to Diagnose Computer Problems. *Proceedings of the 11<sup>th</sup> ACM SIGOPS European Workshop*, Leuven, Belgium, September 2004.
- [19] Andrew Whitaker, Richard S. Cox, Marianne Shaw, and Steven D. Gribble. Constructing Services with Interposable Virtual Hardware. *Proceedings of the First Symposium on Networked System Design and Implementation (NSDI '04)*, San Francisco, CA, March 2004.
- [20] Stefan Saroiu, Steven D. Gribble, and Henry M. Levy. Measurement and Analysis of Spyware in a University Environment. *Proceedings of the First Symposium on Networked System Design and Implementation (NSDI '04)*, San Francisco, CA, March 2004.
- [21] Krishna P. Gummadi, Richard J. Dunn, Stefan Saroiu, Steven D. Gribble, Henry M. Levy, and John Zahorjan. Measurement, Modeling, and Analysis of a Peer-to-Peer File-Sharing Workload. *Proceedings of the 19th ACM Symposium on Operating Systems Principles (SOSP-19)*, Bolton Landing, New York, October 2003.
- [22] Krishna P. Gummadi, Ramakrishna Gummadi, Steven D. Gribble, Sylvia Ratnasamy, Scott Shenker, and Ion Stoica. The Impact of DHT Routing Geometry on Resilience and Proximity. *Proceedings of ACM SIGCOMM 2003*, Karlsruhe, Germany, August 2003.
- [23] Luke McDowell, Oren Etzioni, Alon Halevy, Henry Levy, Steven D. Gribble, William Pentney, Deepak Verma, and Stani Vlasseva. Mangrove: Enticing Ordinary People onto the Semantic Web via Instant Gratification. *Proceedings of the Second International Semantic Web Conference (ISWC '03)*, Sanibel Island, Florida, USA, October 2003.
- [24] Luke K. McDowell, Susan J. Eggers, and Steven D. Gribble. Improving Server Software Support for Simultaneous Multithreaded Processors. *Proceedings of the 2003 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP '03)*, San Diego, CA, June 2003.
- [25] Stefan Saroiu, Krishna P. Gummadi, and Steven D. Gribble. Measuring and analyzing the characteristics of Napster and Gnutella hosts. *Multimedia Systems*, volume 9, number 2, 170-184, 2003. Springer Verlag.
- [26] Andrew Whitaker, Marianne Shaw, and Steven D. Gribble. Scale and Performance in the Denali Isolation kernel. *Proceedings of the Fifth Symposium on Operating Systems Design and Implementation (OSDI 2002)*, Boston, MA, December 2002.
- [27] Stefan Saroiu, Krishna P. Gummadi, Steven D. Gribble, and Henry M. Levy. An Analysis of Internet Content Delivery Systems. *Proceedings of the Fifth Symposium on Operating Systems Design and Implementation (OSDI 2002)*, Boston, MA, December 2002.

- [28] Krishna P. Gummadi, Stefan Saroiu, and Steven D. Gribble. King: Estimating Latency between Arbitrary Internet End Hosts. *Proceedings of SIGCOMM IMW 2002*, Marseille, France, November 2002.
- [29] Andrew Whitaker, Marianne Shaw, and Steven D. Gribble. Denali: A Scalable Isolation Kernel. *Proceedings of the Tenth ACM SIGOPS European Workshop*, Saint-Emilion, France, September 2002.
- [30] Eric Brewer, Nikita Borisov, Mike Chen, Rob von Behren, Matt Welsh, David Culler, Josh MacDonald, Jeremy Lau, and Steven D. Gribble. Ninja: A Framework for Network Services. *Proceedings of the 2002 USENIX Technical Conference*, June 2002, Monterey, CA USA.
- [31] Jared Saia, Amos Fiat, Steve Gribble, Anna Karlin, and Stefan Saroiu. Dynamically Fault-Tolerant Content Addressable Networks. *Proceedings of the 1st International Workshop on Peer-to-Peer Systems (IPTPS '02)*, March 2002, Cambridge, MA USA.
- [32] Stefan Saroiu, P. Krishna Gummadi, and Steven D. Gribble. Exploring the Design Space of Distributed and Peer-to-Peer Systems: Comparing the Web, TRIAD, and Chord/CFS. *Proceedings of the 1st International Workshop on Peer-to-Peer Systems (IPTPS '02)*, March 2002, Cambridge, MA USA.
- [33] Stefan Saroiu, P. Krishna Gummadi, and Steven D. Gribble. A Measurement Study of Peer-to-Peer File Sharing Systems. *Proceedings of Multimedia Computing and Networking 2002 (MMCN'02)*, San Jose, CA, USA, January 2002.
- [34] Robert Grimm, Janet Davis, Eric Lemar, Adam MacBeth, Steven Swanson, Steven Gribble, Tom Anderson, Brian Bershad, Gaetano Borriello, and David Wetherall. System-Level Programming Abstractions for Ubiquitous Computing. *Proceedings of the Workshop on Application Models and Programming Tools for Ubiquitous Computing (UbiTools '01)*, Atlanta, GA, USA, September 2001.
- [35] Steven Gribble, Alon Halevy, Zachary Ives, Maya Rodrig, and Dan Suciu. What Can Peer-to-Peer Do for Databases, and Vice Versa? *Proceedings of the Fourth International Workshop on the Web and Databases (WebDB 2001)*, Santa Barbara, CA, USA, May 2001.
- [36] Steven Gribble. Robustness in Complex Systems. *Proceedings of the 8<sup>th</sup> Workshop on Hot Topics in Operating Systems (HotOS VIII)*, Schloss Elmau, Germany, May 2001.
- [37] Robert Grimm, Janet Davis, Ben Hendrickson, Eric Lemar, Adam Macbeth, Steven Swanson, Tom Anderson, Brian Bershad, Gaetano Borriello, Steven Gribble, and David Wetherall. Systems Directions for Pervasive Computing. *Proceedings of the 8<sup>th</sup> Workshop on Hot Topics in Operating Systems (HotOS VIII)*, Schloss Elmau, Germany, May 2001.
- [38] Steven D. Gribble, Matt Welsh, Rob von Behren, Eric A. Brewer, David Culler, N. Borisov, S. Czerwinski, R. Gummadi, J. Hill, A. Joseph, R.H. Katz, Z.M. Mao, S. Ross, and B. Zhao. The Ninja Architecture for Robust Internet-Scale Systems and Services, *Journal of Computer Networks*, Volume 35, Issue 4, March 2001.
- [39] Steven D. Gribble, Eric A. Brewer, Joseph M. Hellerstein, and David Culler. Scalable, Distributed Data Structures for Internet Service Construction. *Proceedings of the Fourth Symposium on Operating Systems Design and Implementation (OSDI 2000)*, San Diego, CA, USA, October 2000.
- [40] Ian Goldberg, Steven D. Gribble, David Wagner, and Eric A. Brewer. The Ninja Jukebox. *Proceedings of the 2<sup>nd</sup> Usenix Symposium on Internet Technologies and Systems (USITS '99)*, Boulder, Colorado, USA, October 1999.



- [41] Steven D. Gribble, Matt Welsh, Eric A. Brewer, and David Culler. The MultiSpace; an Evolutionary Platform for Infrastructural Services. *Proceedings of the 1999 Usenix Annual Technical Conference*, Monterey, California, USA, June 1999.
- [42] Eric A. Brewer, Randy H. Katz, Elan Amir, Hari Balakrishnan, Yatin Chawathe, Armando Fox, Steven D. Gribble, Todd Hodes, Giao Nguyen, Venkata N. Padmanabhan, Mark Stemm, Srinivasan Seshan, and Tom Henderson. A Network Architecture for Heterogeneous Mobile Computing. *IEEE Personal Communications*, 5(5), October 1998. Pages 8-24.
- [43] Armando Fox, Ian Goldberg, Steven D. Gribble, David C. Lee, Anthony Polito, and Eric A. Brewer. Experience with Top Gun Wingman: A Proxy-Based Graphical Web Browser for the 3Com PalmPilot. *Proceedings of the IFIP International Conference on Distributed Systems Platforms and Open Distributed Processing (Middleware '98)*, Lake District, England, September 1998.
- [44] Steven D. Gribble, Gurmeet Singh Manku, Drew Roselli, Eric A. Brewer, Timothy J. Gibson, and Ethan L. Miller. Self-Similarity in File Systems. *Proceedings of ACM SIGMETRICS '98, Madison, Wisconsin*, USA, June 1998.
- [45] Armando Fox, Steven D. Gribble, Yatin Chawathe, and Eric A. Brewer. Adapting to Network and Client Variation using Active Proxies: Lessons and Perspectives. *Special Issue of IEEE Personal Communications on Adaptation*, August 1998.
- [46] Steven D. Gribble and Eric A. Brewer. System Design Issues for Internet Middleware Services: Deductions from a Large Client Trace. *Proceedings of the 1997 Usenix Symposium on Internet Technologies and Systems*, Monterey, California, USA, December 1997.
- [47] Armando Fox, Steven D. Gribble, Yatin Chawathe, Eric A. Brewer, and Paul Gauthier. Cluster-Based Scalable Network Services. *Proceedings of the 16<sup>th</sup> ACM Symposium on Operating Systems Principles (SOSP-16)*, St. Malo, France, October 1997.
- [48] Armando Fox, Steven D. Gribble, Yatin Chawathe, Anthony Polito, Andrew Huang, Benjamin Ling, and Eric A. Brewer. Orthogonal Extensions to the WWW User Interface using Client-Side Technologies. Demo Session and Short Paper, *10<sup>th</sup> Annual Symposium on User Interface Software and Technology (UIST '97)*, Banff, Canada, October 1997.
- [49] Armando Fox, Steven D. Gribble, Eric A. Brewer, and Elan Amir. Adapting to Client Variability via On-Demand, Dynamic Distillation. *Proceedings of the ACM Seventh International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS VII)*, Cambridge, Massachusetts, USA, October 1996.
- [50] Armando Fox and Steven D. Gribble. Security on the Move: Indirect Authentication using Kerberos. *Proceedings of the 2<sup>nd</sup> ACM International Conference on Mobile Computing and Networking (MobiCom '96)*, Rye, New York, November 1996.
- [51] Randy H. Katz, Eric A. Brewer, et al. The Bay Area Research Wireless Access Network (BARWAN). *Proceedings of the 1996 Spring COMPCON Conference*, Santa Clara, CA, USA, February 1996.
- [52] Kori Inkpen, Kellogg S. Booth, Steven D. Gribble, and Maria Klawe. Give and Take: Children Collaborating on One Computer, *Proceedings of ACM CHI '95*, Denver, Colorado, USA, May 1995.
- [53] Steven D. Gribble, Andrew Csinger, and Kellogg S. Booth. A Distributed Multimedia Architecture for Intent-Based Video Authoring and Presentation. *Proceedings of the MultiComm '94 Conference*, Vancouver, BC, Canada, November 1994.

### **B.Sc. Thesis, M.Sc. Thesis, and Ph.D. Candidacy Proposal:**

- [54] Simplifying Cluster-Based Internet Service Construction with Scalable Distributed Data Structures, by Steven D. Gribble. Ph.D. Candidacy proposal, April 1999.
- [55] System Design Issues for Internet Middleware Services: Deductions from a Large Client Trace, by Steven D. Gribble. Master of Science thesis, UC Berkeley, December 1997.
- [56] Topological Entropy as a Practical Tool for the Identification and Characterization of Chaotic Systems, by Steven D. Gribble. Undergraduate Physics thesis, University of British Columbia, May 1995.
- [57] Knowledge-Based Discourse in Educational Games, by Steven D. Gribble. Undergraduate Computer Science thesis, University of British Columbia, May 1995.

### **Book Chapters:**

- [58] Mobility: Processes, Computers, and Agents. Dejan Milojicic, Frederick Douglish, and Richard Wheeler, editors. Chapter 11.2: “Adapting to Network and Client Variation Using Active Proxies”, by Armando Fox, Steven D. Gribble, Yatin Chawathe, and Eric A. Brewer. Addison Wesley Professional, April 1999, ISBN 0-201-37928-7.

### **Other Publications:**

- [59] Charles Reis, Brian Bershad, Steven D. Gribble, and Henry M. Levy. Using Processes to Improve the Reliability of Browser-based Applications. University of Washington Technical Report 2007-12-01, December 2007.
- [60] Roxana Geambasu, Cherie Cheung, Alexander Moshchuk, Steven D. Gribble, and Henry M. Levy. The Organization and Sharing of Web-Service Objects with Menagerie. University of Washington Technical Report 2007-10-01, October 2007.
- [61] Marianne Shaw and Steven D. Gribble. Hippocrates: Using Virtual Machines and Application-Specific Firewalls to Cope with Network Intrusions. University of Washington Technical Report 2005-03-03, March 2005.
- [62] Paul Gauthier, Brian Bershad, and Steven D. Gribble. Dealing with Cheaters in Anonymous Peer-to-Peer Networks. University of Washington Technical Report 04-01-03, January 2004.
- [63] Marianne Shaw and Steven D. Gribble. Don’t Speak Unless Spoken To. University of Washington Technical Report 2003-09-01, February 2003.
- [64] UC Berkeley Home-IP Web Traces, published in July 1997 in the Internet Traffic Archive. These traces consist of 18 days of client traffic (9 million references from 8,377 clients from UC Berkeley), and are available at “<http://www.acm.org/sigcomm/ITA/>”.

## **Presentations**

### **Invited Talks**

- [1] “Web-borne spyware: measurement and defense.” Cornell Computer Science Department Colloquium, September 2006.

- [2] "Web-borne spyware: measurement and defense." CMU systems seminar, September 2006.
- [3] "Web-borne spyware: measurement and defense." MIT systems seminar, September 2006.
- [4] "Spyware." Invited talk at Ironport Systems, Inc., May 2006.
- [5] "Responding to NSF's Goal of Broadening Participation in Computing." Invited panelist, NSF CyberTrust PI meeting, September 2005.
- [6] "Spyware, Phishing, Worms, and other Web dangers." Invited speaker, Digital Media Protection and Transactions seminar, Seattle, September 2005.
- [7] "Spyware, Phishing, Worms, and other Web dangers." Invited speaker, National Association of Attorneys General summer meeting, Big Sky, Montana, June 2005.
- [8] "Spyware: analysis and mitigation." Distinguished lecture, National Science Foundation, Arlington, VA, April 2005.
- [9] "The Denali Project." Computer Systems Colloquium, Hewlett-Packard Laboratories, Palo Alto, May 2004.
- [10] "File Sharing and Spyware in the Modern Internet." Seminar, Department of Computer Science, Stanford University, March 2004.
- [11] "Content Delivery and File Sharing in the Modern Internet." Seminar, Intel Research Berkeley and the University of California at Berkeley, October 2003.
- [12] "Virtual Machine Monitors and Future Operating Systems." Presentation, Technical Advisory Board meeting, Madrona Venture Group, Seattle, WA, March 2003.
- [13] "Content Delivery in the Modern Internet." Seminar, Department of Computer Science, Boston University, November 2002.
- [14] "Scale and Performance in the Denali Isolation Kernel." Seminar, Department of Computer Science, Stanford University, May 2002.
- [15] "Denali: Lightweight Virtual Machines." PlanetLab working group presentation, Intel Research Berkeley, March 2002.
- [16] "Denali: Lightweight Virtual Machines for Distributed and Networked Systems." Colloquium, Intel Microprocessor Research Lab, Hillsboro, Oregon, February 2002.
- [17] "Denali." Seminar, Department of Computer Science, University of Michigan, November 2001.
- [18] "Denali: Lightweight Virtual Machines for Distributed and Networked Systems." Colloquium, Intel Corporation, Hillsboro, Oregon, November 2001.
- [19] "A Measurement Study of Napster and Gnutella." Seminar, Department of Computer Science, June 2001.
- [20] "Debugging Internet Services." Panelist, Ninth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS-IX), Cambridge, MA, November 2000.
- [21] "Towards an Open Infrastructure of Well-Conditioned Services." Intel Research Summit, Hillsboro, Oregon, September 2000.

[22] “The Ninja Service Platform Architecture.” Seminar, Department of Computer Science, Stanford University, January 1999.

### **Conference Presentations**

[1] “A Safety-Oriented Platform for Web Applications.” 2006 IEE Symposium on Security and Privacy, Oakland, CA, May 2006.

[2] “Measurement and Analysis of Spyware in a University Environment.” First Symposium on Networked System Design and Implementation (NSDI '04), San Francisco, CA, March 2004.

[3] “Denali: A Scalable Isolation Kernel.” Tenth ACM SIGOPS European Workshop, Saint-Emilion, France, September 2002.

[4] “Robustness in Complex Systems.” Eighth Workshop on Hot Topics in Operating Systems (HotOS VIII), Schloss Elmau, Germany, May 2001.

[5] “Scalable, Distributed Data Structures for Internet Service Construction.” Fourth Symposium on Operating Systems Design and Implementation (OSDI 2000), San Diego, CA, October 2000.

[6] “The Ninja Jukebox.” Second USENIX Symposium on Internet Technologies and Systems (USITS '99), Boulder, Colorado, October 1999.

[7] “The MultiSpace: an Evolutionary Platform for Infrastructural Services.” The 1999 USENIX Annual Technical Conference, Monterey, CA, June 1999.

[8] “Experience with Top Gun Wingman: A Proxy-Based Graphical Web Browser for the 3Com PalmPilot.” The 1998 IFIP International Conference on Distributed Systems Platforms and Open Distributed Processing (Middleware '98), Lake District, England, September 1998.

[9] “Self-Similarity in File Systems.” ACM SIGMETRICS 1998, Madison, WI, June 1998.

[10] “System Design Issues for Internet Middleware Services: Deductions from a Large Client Trace.” USENIX Symposium on Internet Technologies and Systems, Monterey, CA, December 1997.

[11] “Security on the Move: Indirect Authentication using Kerberos.” The 2<sup>nd</sup> ACM International Conference on Mobile Computing and Networking (MobiCom '96), Rye, New York, November 1996.

[12] “A Distributed Multimedia Architecture for Intent-Based Video Authoring and Presentation.” MultiComm 1994 Conference, Vancouver, Canada, November 1994.

### **Professional Activities and Community Service**

Program Committee “light” Member, ACM SIGCOMM 2007, August 2007.

Program Committee Member, 12<sup>th</sup> International Conference on Architecture Support for Programming Languages and Operating Systems (ASPLOS XII), October 2006.

Program Committee Member, 2006 Internet Measurement Conference, October 2006.

Program Committee Member, The International Conference on Dependable Systems and Networks (DSN-2006), June 2006.

Program Committee Member, 2006 IEEE Symposium on Security and Privacy, May 2006.

Program Committee Member, Third Symposium on Networked Systems Design and Implementation (NSDI '06), May 2006.

Program Committee Member, 13th Annual Network and Distributed System Security Symposium (NDSS 2006), February 2006.

Member of the NSF CISE advisory committee, 2003-2005.

Program Committee Member, Internet Measurement Conference, August 2005.

Program Committee Member, AAA-IDEA 2005, June 2005.

Program Committee Member, USENIX Annual Technical Conference, April 2005.

Program Committee Member, First Workshop on Real, Large Distributed Systems (WORLDS '04), December 2004.

Program Committee Member and Performance/Reliability track co-chair, the 13<sup>th</sup> International World-Wide Web Conference (WWW 2004), May 2004.

Program Committee Member, USENIX/ACM Symposium on Networked Systems Design and Implementation (NSDI '04), March 2004.

Program Committee Member, the 3<sup>rd</sup> International Workshop on Peer-to-Peer Systems (IPTPS 2004), February 2004.

Program Committee Member, Second ACM Workshop on Hot Topics in Networks (HotNets-II), November 2003.

Program Committee Member, Internet Measurement Conference 2003, October 2003.

Program Committee Member, the 2003 USENIX Annual Technical Conference, June 2003.

Program Committee Member, 9<sup>th</sup> Workshop on Hot Topics in Operating Systems (HotOS 2003), May 2003.

Program Committee Member, the Twelfth International World Wide Web Conference, May 2003.

Program Chair, the Fourth USENIX Symposium on Internet Technologies and Systems (USITS '03), March 2003.

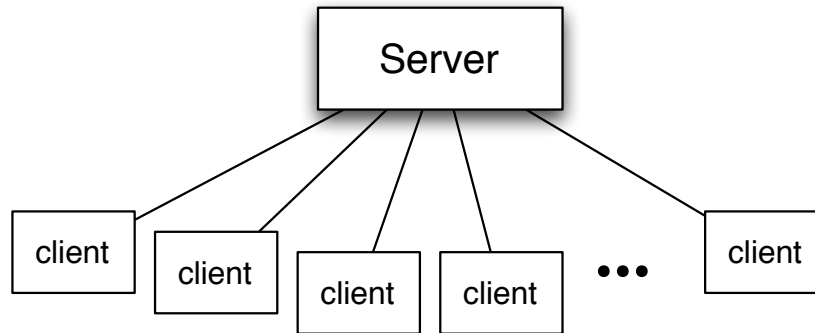
Program Committee Member, Internet Measurement Workshop 2002, November 2002.

Program Committee Member, 1st International Workshop on Peer-to-Peer Systems (IPTPS '02), March 2002.

Program Committee Member and WIP Organizer, the Third USENIX Symposium on Internet Technologies and Systems (USITS '01), March 2001.

Publications and Publicity Chair, the Second IEEE Workshop on Internet Applications (WIAPP '01), July 2001.

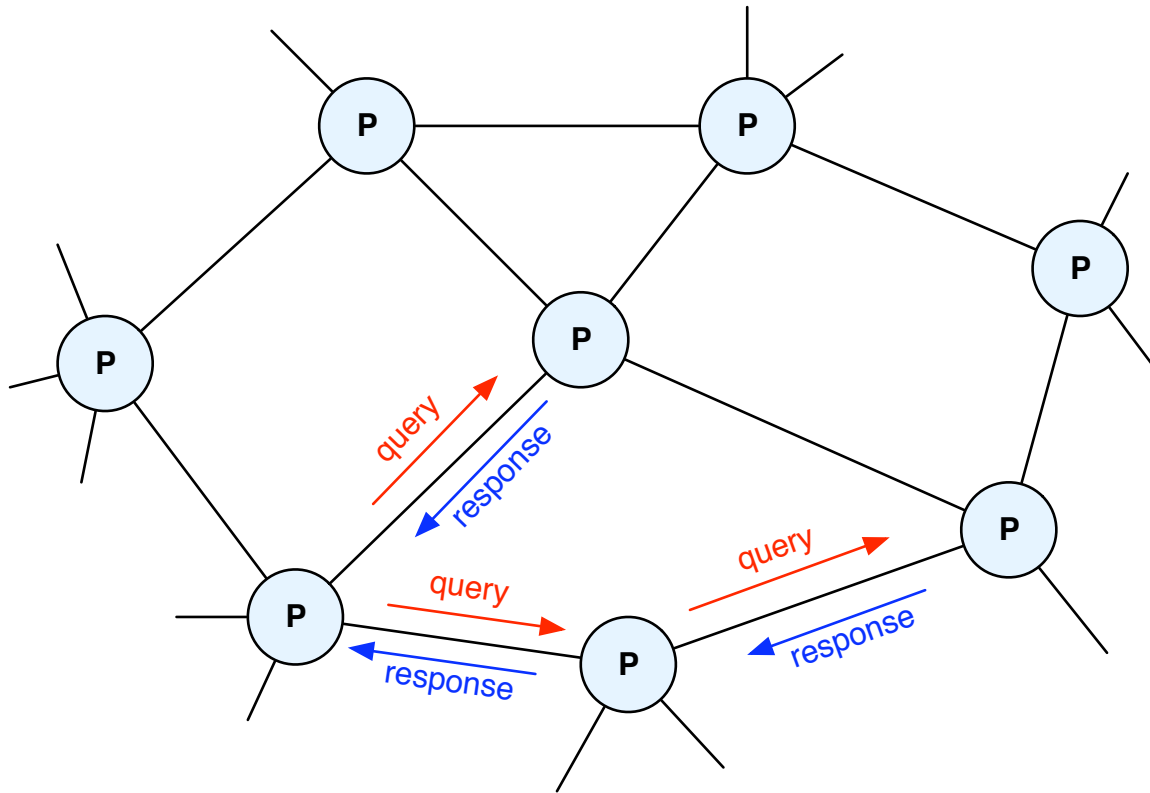
## Exhibit 2



### The client-server architecture

In a client-server based system, there are two classes of hosts: servers and clients. A server provides service to a set of clients. Clients rely on the server for that service, and typically provide no service to each other or to the server. In the World-Wide Web, a popular Web server might consist of hundreds or thousands of computers within a data center, coordinated to serve Web pages to clients. A popular Web server might service millions of different clients each day.

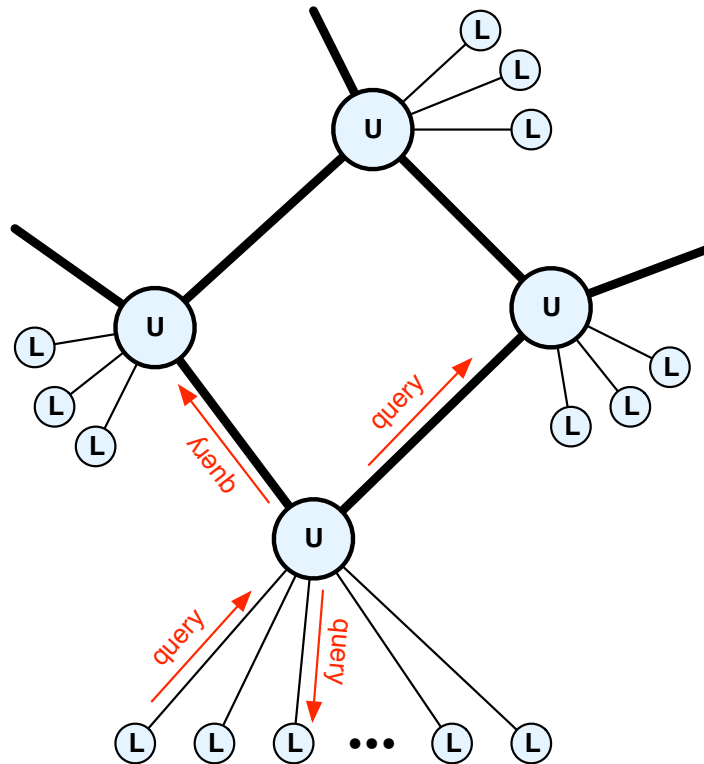
### Exhibit 3



**A decentralized peer-to-peer network; each “P” represents a peer.**

In a pure peer-to-peer network, there is only one class of host: the “peer.” Individual peers cooperate with each other to form a communal network that provides global service. In the diagram above, I show a peer in the bottom-left of the diagram that issues a query that is propagated across the network to several other peers. Peers that receive the query may choose to send a response back over the network. Note that individual peers may request service by issuing queries and provide service by generating responses, forwarding queries, or forwarding responses.

#### Exhibit 4



**A hybrid network architecture. Each “U” represents an ultrapeer, and each “L” represents a leaf node.**

In a hybrid architecture, some peers may play a more pronounced role in the network than others. In this diagram, “ultrapeers” manage the routing of queries on behalf of “leaf” nodes. A query initiated by a leaf node is handled by its ultrapeer; the ultrapeer may route the query to another leaf node, or forward it to other ultrapeers within the network. According to an April 2006 study<sup>1</sup>, Gnutella had approximately 3 million peers and 0.5 million ultrapeers participating at any moment in time. A given ultrapeer usually services 15-45 leaf nodes, and coordinates with roughly 30 other ultrapeers. Any given leaf node typically relies on the services of between one and six ultrapeers.

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<sup>1</sup> “On the Long-Term Evolution of the Two-Tier Gnutella Overlay,” by Amir Rasti, Daniel Stutzbach, and Reza Rejaie. <http://mirage.cs.uoregon.edu/slide/rasti-gi-2006.ppt>



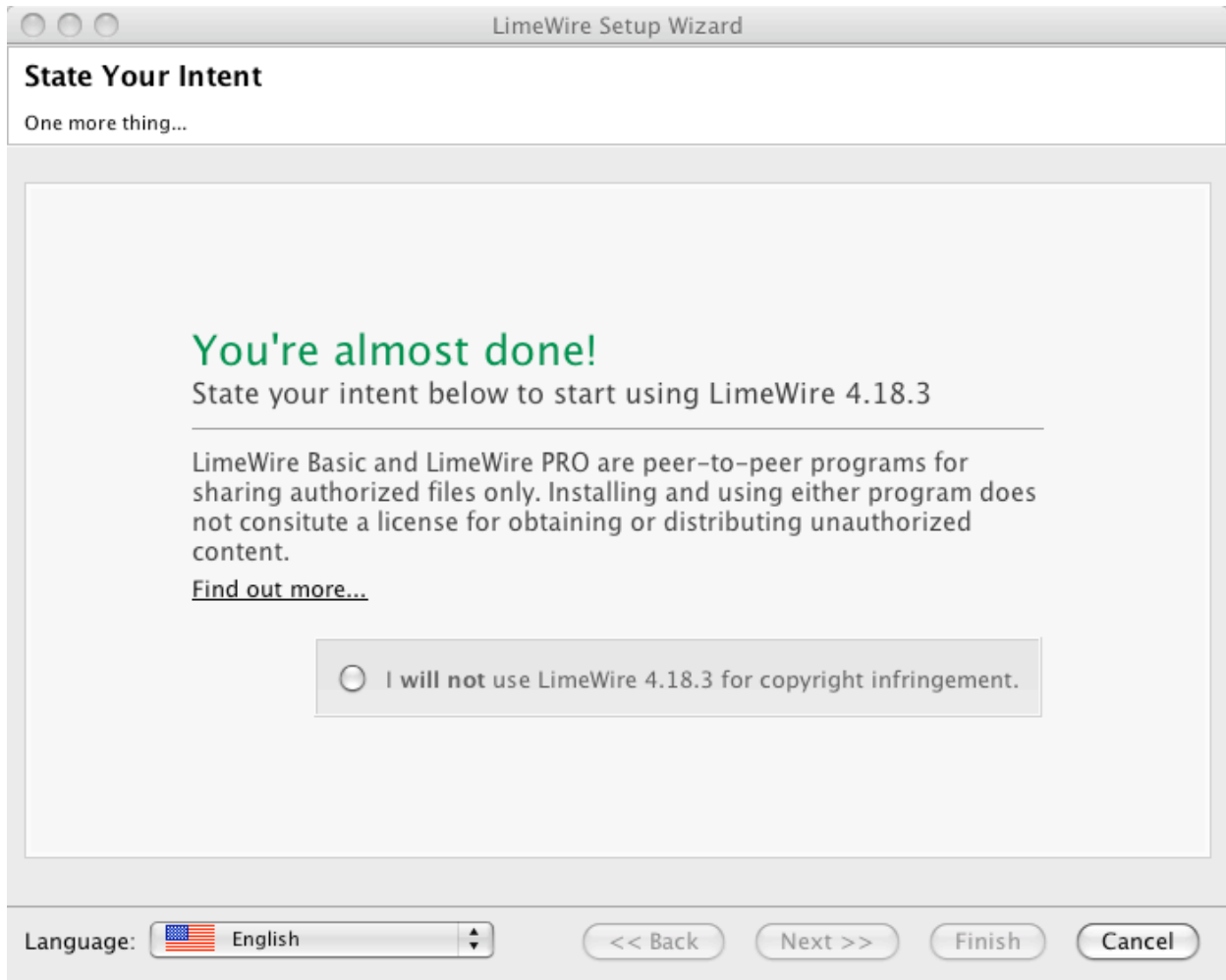
## Exhibit 5

Name	Platform	License	Last Release	Heritage
Acquisition	Mac OS X		200.4 (2007-11-04)	LimeWire
Apollon	Unix-like/KDE	GNU GPL	1.0.2.1 (2005-05-08)	giFT
BearFlix	Microsoft Windows		6.1 (September 2006)	BearShare
BearShare (Before Version 6)	Microsoft Windows		5.2.5.3	Original work
Cabos	Java	GNU GPL	0.7.8 (2008-01-14)	LimeWire
FrostWire	Java	GNU GPL	4.13.5 (February 28, 2008)	LimeWire
giFT	Cross-platform	GNU GPL	0.11.8.1 (2004-11-27)	Original Work
Gnucleus/GnucDNA	Microsoft Windows	GNU GPL, GNU LGPL	2.2.0.0 (2005-06-17)	Original Work
Gtk-gnutella	Unix-like, Mac OS X	GNU GPL	0.96.5 (2008-04-02)	Original Work
iMesh	Microsoft Windows		Unknown	Unknown
KCeasy	Microsoft Windows	GNU GPL	0.19-rc1 (2008-02-03)	giFT
Kiwi Alpha	Microsoft Windows		Unknown	GnucDNA
LimeWire	Java	GNU GPL	4.16.6 (February 9, 2008, 57 days ago)	Original Work
Morpheus	Microsoft Windows		5.5.1 (2007-11-15)	GnucDNA
MP3 Rocket	Java	GNU GPL	5.0.3 (February 28, 2008)	LimeWire
Phex	Java	GNU GPL	3.2.0.102 (2007-07-06)	Original Work
Poisoned	Mac OS X	GNU GPL	0.5191 (August 8, 2006)	giFT
Shareaza	Microsoft Windows	GNU GPL	2.3.1.0 (January 31, 2008, 66 days ago)	Original Work
Symella	Symbian OS	GNU GPL	1.40 (2006-11-31)	Original Work
XFactor	Mac OS X	GNU GPL	Unknown	giFT

**A list of Gnutella-compliant client software packages, taken from Wikipedia**  
[\(<http://en.wikipedia.org/wiki/Gnutella>\)](http://en.wikipedia.org/wiki/Gnutella)

Wikipedia currently lists 20 different client software packages that are compatible with today's Gnutella network. Note that several of these software packages are derived from the open source LimeWire code base, while others are original works (i.e., implemented "from scratch.")

## Exhibit 6



**The dialog box presented to a LimeWire user the first time the user runs the software after installing it.**

A LimeWire user is presented with this dialog box the first time she runs the LimeWire client software after having installed it. Unless the user clicks on the “I will not use LimeWire 4.18.3 for copyright infringement.”, they are not able to proceed and begin using the client software.