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# Raymond Klefstad, Ph.D.

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**Website** <http://doc.ece.uci.edu/~klefstad/>

## Academic Experience

**Assistant Adjunct Professor** January 2002 - Present

*Department of Electrical Engineering and Computer Science, UC Irvine*

**Director** June 2000 - Present

*Distributed Object Computing research group, UC Irvine*

**Full-time Lecturer** June 1988 - December 2001

*Department of Information and Computer Science, UC Irvine*

## System Development Experience

### **Chief Architect and Systems Programmer**

June 2000 - Present

*Department of Information and Computer Science, UC Irvine*

Used Java to develop ZEN, a real-time Java ORB. Alpha released June 2002.

### **Software Expert Consultant**

November 2005 - Present

*Joint Tactical Radio System (JTRS) project, Space and Weapons Systems Center*

### **Software Consultant**

November 2001 - January 2002

*QUALCOMM*

Designed and implemented an intelligent news browser for cell phones (in C under QUALCOMM BREW SDK) for Adaptive Info. Won award for Best Content/Most Useful from Qualcomm BREW 2002 Developers Conference.

### **Chief Architect and Systems Programmer**

June 1997 - September 1997

Used C++ and Java to develop Syskill and Webert, a client-server intelligent search engine for the world wide web. Used as the basis for the key product for Prof. Mike Pazzanis startup company.

### **Chief Architect and Project Manager**

June 1996 - September 1996

Used C++ to develop the framework for an extensible, portable compiler to be used for research on optimizing compilers, with Prof. Alex Nicolau and Prof. Nikil Dutt.

### **Software Consultant**

June 2000 - July 2000

*Optum Corp.*

Used C to build a Unix-based custom client-server communication framework for a critical product of Optum Corp. in Costa Mesa, CA. When their programmers were unable to build it, I was consulted to design, implement, test, and deliver it in one week, so that they were able to deliver their product on time.

### **Software Consultant**

June 1981 - June 1988

Designed and implemented Adash, the Ada shell, and Arcturus, an interactive interpreter-based programming environment for Ada. Developed in C on Unix, this system demonstrated concepts developed during graduate school research. Served as proof of principle for dissertation.

### **Co-founder**

June 1981 - June 2001

*Irvine Compiler Corporation*

Designed and implemented compilers and related software tools for Ada, C, C++, Pascal.

# Teaching Experience

## Core Courses Taught

- ECS 255 Distributed Software Architecture and Design
- EECS 144 Engineering Algorithms and Data Structures
- EECS 10 Intro to Computer Science and Engineering
- ICS 21 Intro to Computer Science I
- ICS H21 Honors Intro to Computer Science I
- ICS 22 Intro to Computer Science II
- ICS 141 Programming Languages
- ICS 142 Compilers and Interpreters
- ICS 145a Project in Compiler Construction
- ICS 125b Project in System Design

## Courses created and developed

- EECS 144 Engineering Algorithms and Data Structures
- ICS 54 Operating Systems Programming
- ICS 147 Computer Network Programming
- ICS 80a Programming in Ada
- ICS 80j Programming in Java
- ICS 180a Object-Oriented Design and Programming (with C++)
- ICS 180b User-Interface Programming (with X11-Window System and C++)
- ICS 180c Advance System Programming (with Unix and C++)
- ICS 180j Internet Programming with Java
- UCI Ext. Advanced C++ Programming and Object-Oriented Design
- UCI Ext. UNIX System Programming with C++

## I have taught a variety of courses in industry including the following by title:

- CORBA programming with ACE and TAO
- Design Patterns for Distributed Computing and Communication
- Object-Oriented Design Patterns
- Object-Oriented Design

- C++ Programming
- Advanced C++ Programming
- Java Programming
- Ada Programming

**I have taught these courses for the following companies and organizations:**

- SPAWAR System Center and JTRS Technology Laboratory, San Diego 2006
- Apex Telecom 2003
- Contracted Computer Training (CCT) <http://www.contracted.com> 2003
- SPAWAR System Center and JTRS Technology Laboratory, San Diego 2002
- Point Mugu Naval Air Station 2002
- Raytheon (formerly Hughes Aircraft) 2000, 2001
- Beckman Instruments 1995,1996
- Perkin-Elmer 1993,1994
- Norden Systems (A division of United Technologies) 1988,1989

## Supervising and Advising Experience

### Staff

Peter Martini

### Ph.D. Students

- Juan Colmenares
- Shruti Gorappa
- Trevor Harmon
- Jie Hu
- Hojjat Jafarpour
- Jinhwan Lee
- Mark Panahi
- Krishna Raman
- Yue Zhang

### Former UCI-DOC Lab Members

- Espartaco "Spart" Arguello

- Jaiganesh Balasubramanian
- Darrel Brunsch
- Angelo Corsaro
- Lin Cui
- Mayur Deshpande
- Priyanka Gontla
- Arvind Krishna
- Mingjie Lai
- Hui Liu (MS)
- Malli Machupalli
- Bruce Miller
- Jennifer Offtermatt
- Carlos O'Ryan
- Ossama Othman
- Gunar Schirner
- Nishanth Shankar
- Chia-Yen Shih
- Sudhir Srinivasa

**Ph.D. Committee Member Service**

DongHua Deng, 3/2006

**Ph.D. Candidacy Exam Committee Service**

- Trevor Harmon, 10/2005
- Hojjat J., 9/2005
- Juan Colmenares, 9/2005
- Dan Tsai, 9/2005
- Shruti Gorappa, 8/2005
- Yu Zhang, 5/2005
- Jay Hu, 4/2005
- Haitao Gong, 3/2005
- Liang Zhang, 9/2004

- Moon Kim, 9/2004
- DongHua Deng, 9/2004
- Tao Yu, 6/2004

#### **Ph.D. Preliminary Exam Committee Service**

- Trevor Harmon, 6/2005 (Chair)
- Mark Panahi, 6/2005 (Chair)
- Hojjat J, 6/2005 (Chair)
- Juan, 6/2005 (Chair)
- Junhwan, 6/2005 (Chair)
- Seung-Mok, 6/2004
- Shruti Gorappa, 6/2004 (Chair)
- Yunyun Yang, 6/2004
- Yue Zhang, 6/2004 (Chair)
- Haito Gong, 6/2004
- Moon Choel Kim, 6/2004
- Sevin Fide, 6/2004
- Krishna Raman, 6/2004 (Chair)
- Jie Hu, 6/2004 (Chair)
- Xu Zhang, 6/2004
- Chia-Yen Shih, 6/2004 (Chair)

## **Education**

Ph.D. in Information and Computer Science, Spring 1988, UC Irvine

Dissertation: Maintaining a Uniform User Interface for an Ada Programming Environment. Advisor: Prof. Richard N. Taylor

M.S. in Information and Computer Science, Spring 1982, UC Irvine, concentration in Software Engineering

Advisor: Prof. Thomas A. Standish

B.S. in Information and Computer Science, Spring 1981, UC Irvine

- Graduated Magna Cum Laude in 3 years
- Phi Beta Kappa honors fraternity member

Diploma, Spring 1978, San Geronio High School, San Bernardino, California

## Publications

### Articles

- “Learning Probabilistic User Profiles: applications for finding interesting Web sites, notifying users of relevant changes to Web pages, and locating grant opportunities” Mark Ackerman, Daniel Billsus, Scott Gaffney, Seth Hettich, Gordon Khoo, Dong Joon Kim, Raymond Klefstad, Charles Lowe, Alexius Ludeman, Jack Muramatsu, Kazuo Omori, Michael J. Pazzani, Douglas Semler, Brian Starr, and Paul Yap. *AI Magazine*, Summer 1997, Volume 18, Issue 2, pg. 47-56.

### Books

- *Middleware for Communications* [<http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470862068.html>]. Chapter: Real-time CORBA Middleware. Arvind Krishna, Douglas C. Schmidt, Raymond Klefstad, Angelo Corsaro, and Qusay Mahmoud (editor). John Wiley and Sons, New York, 2003.

### Conference Papers

- “Decentralized Load Balancing on Unstructured Peer-2-Peer > Computing Grids” Jie Hu and Raymond Klefstad. *The 5th IEEE International Symposium on Network Computing and Applications (IEEE NCA06)*, Cambridge, MA, July 24-26, 2006. Acceptance rate: 35%
- “DIRECT: A Robust Distributed Broker Framework for Trust and Reputation Management” Yue Zhang, Kwei-Jay Lin, and Raymond Klefstad. *IEEE Joint Conference on E-Commerce Technology (CEC '06) and Enterprise Computing, E-Commerce and E-Services (EEE '06) (CEC/EEE 2006)*, Palo Alto, California, June 26-29, 2006.
- “A Component Framework for Real-time Java” Juan A. Colmenares, Shruti Gorappa, Mark Panahi, and Raymond Klefstad. *IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) Work In Progress Track*, San Jose, California, April 4-7, 2006.
- “Design, Implementation, and Test of a Wireless Peer-to-Peer Network for Roadway Incident Exchange” James Marca, Trevor Harmon, and Raymond Klefstad. *Applications of Advanced Technology in Transportation (AATT) 2006*, Chicago, Illinois, August 13-16, 2006.
- “A Component Framework for Real-Time Java” Juan Colmenares, Shruti Gorappa, and Raymond Klefstad. *IEEE Real-Time and Embedded Technology Symposium (RTAS 2006)*, 2006. Acceptance rate: 50%
- “Marco - A Middleware Architecture for Distributed Multimedia Collaboration” Chia-Yen Shih, Jie Hu, Raymond Klefstad, Jinhwan Lee, and Doug Tolbert. *IEEE International Symposium of Multimedia (ISM2005)*, Irvine, California, December 12-14, 2005.
- “RTZen: Highly Predictable, Real-time Java Middleware for Distributed and Embedded Systems” Krishna Raman, Yue Zhang, Mark Panahi, Juan A. Colmenares, and Raymond Klefstad. *ACM/IFIP/USENIX 6th International Middleware Conference (Middleware) 2005*, Grenoble, France, November 28th - December 2nd, 2005. Acceptance rate:  $18/100 = 18\%$
- “A Distributed, Scalable, and Synchronized Framework for Large-Scale Microscopic Traffic Simulation” Yue Zhang, MingJie Lie, Raymond Klefstad, Riju Lavanya, and R. Jayakrishnan. *The*

*8th International IEEE Conference on Intelligent Transportation Systems - ITSC*, Vienna, Austria, September 13-16, 2005. Acceptance rate: 208/312 = 66%

- “Patterns and Tools for Achieving Predictability and Performance with Real-time Java” Krishna Raman, Yue Zhang, Mark Panahi, Juan A. Colmenares, and Raymond Klefstad. *The 11th IEEE International Conference on Real-Time and Embedded Computing Systems and Applications (RTCSA)*, Hong Kong, 2005.
- “VADRE: A Visual Approach to Performance Analysis of Distributed, Real-Time Systems” Trevor Harmon and Raymond Klefstad. *The 2005 International Conference on Modeling, Simulation and Visualization Methods*, Las Vegas, Nevada, June 27-30, 2005. Acceptance rate: 34%
- “Adaptive Personalization For Mobile Content Delivery” Daniel Billsus, Michael J. Pazzani, and Raymond Klefstad. *3rd International Conference on Universal Access in Human-Computer Interaction (UAHCI 2005)*, 2005. Acceptance rate: 35%
- “Evaluation of OpenCCM on ZEN” Shruti Gorappa and Raymond Klefstad. *SAC 2004*, 2004. Acceptance rate: 37%
- “Late Demarshalling: A Technique for Efficient Multi-language Middleware for Embedded Systems” Gunar Schirner, Trevor Harmon, and Raymond Klefstad. *Distributed Objects and Applications (DOA)*, 2004. Acceptance rate: 33%
- “Enhancing Real-time CORBA via Real-time Java features [<http://doc.ece.uci.edu/~klefstad/pubs/RT-POA.pdf>]” Arvind Krishna, Douglas C. Schmidt, and Raymond Klefstad. *International Conference on Distributed Computing Systems (ICDCS)*, 2004. Acceptance rate: 15%
- “A CORBA Framework for Distributed Service Location and Creation” Nishanth Shankar and Raymond Klefstad. *IEEE/ISPJ Symposium on Applications and the Internet (SAINT)*, 2004. Acceptance rate: 50%
- “Optimizing the ORB Core to enhance Real-time CORBA predictability [<http://doc.ece.uci.edu/~klefstad/pubs/ORBCore.pdf>]” Arvind Krishna, Douglas C. Schmidt, Krishna Raman, and Raymond Klefstad. *Distributed Objects and Applications (DOA)*, 2003. Acceptance rate: 26%
- “Towards Predictable Real-time Java Object Request Brokers [<http://doc.ece.uci.edu/~klefstad/pubs/Zen-predictability.pdf>]” Arvind Krishna, Raymond Klefstad, and Douglas C. Schmidt. *IEEE Real-time Applications and Systems (RTAS)*, 2003. Acceptance rate: 30%
- “Design and Performance of a Dynamically Configurable, Messaging Protocols Framework for Real-time CORBA [<http://doc.ece.uci.edu/~klefstad/pubs/GIOP.pdf>]” Raymond Klefstad, Sumita Rao, and Douglas C. Schmidt. *Proceedings of the Distributed Object and Component-based Software Systems part of the Software Technology Track at the 36th Annual Hawaii International Conference on System Sciences*, Big Island of Hawaii, January 6-9, 2003. Best Paper award. Acceptance rate: 50%
- “Adaptive Techniques for Minimizing Middleware Memory Footprint for Distributed, Real-Time, Embedded Systems [<http://doc.ece.uci.edu/~klefstad/pubs/ccw03.rtf>]” Mark Panahi, Trevor Harmon, and Raymond Klefstad. *IEEE Computer Communications Workshop (CCW)*, 2003. Acceptance rate: 40%
- “Design and Performance of a Modular Portable Object Adapter for Distributed, Real-Time, and Embedded CORBA Applications [<http://doc.ece.uci.edu/~klefstad/pubs/POA.pdf>]” Raymond Klefstad, Arvind S. Krishna, and Douglas C. Schmidt. *Distributed Objects and Applications (DOA)*, 2002. Acceptance rate: 25%
- “Virtual Component: A Design Pattern for Memory-Constrained Embedded Applications [<http://doc.ece.uci.edu/~klefstad/pubs/virtual-component.pdf>]” Angelo Corsaro, Douglas C. Schmidt,



Raymond Klefstad, and Carlos O'Ryan. *Programming Languages of Patterns (PLoP)*, 2002. Acceptance rate: 91%

- “Towards Highly Configurable Real-time Object Request Brokers [<http://doc.ece.uci.edu/~klefstad/pubs/ZEN.pdf>]” Raymond Klefstad, Douglas C. Schmidt, and Carlos O'Ryan. *IEEE International Symposium on Object-Oriented Real-Time Distributed Computing (ISORC) 2002*, 2002. Acceptance rate: 22%
- “Adaptive Personalization for Mobile Content Delivery [<http://www.cs.umbc.edu/NGDM02/slides/Pazzani-UCI-NGDM.ppt>]” Daniel Billsus, Craig Evans, Raymond Klefstad, and Michael J. Pazzani. *NSF Next Generation Data Mining (NGDM)*, 2002.
- “ZEN: Implementing Real-time CORBA with Real-time Java” Raymond Klefstad, Mayur Deshpande, Carlos O'Ryan, and Douglas C. Schmidt. *Real-Time and Embedded Distributed Object Systems Workshop, Object Management Group (OMG)*, 2002.

## Speaking Events

- “Adaptive Techniques for Minimizing Middleware Memory Footprint for Distributed, Real-Time, Embedded Systems” IEEE Computer Communications Workshop (CCW), October 20, 2003.
- “Reconfigurable and Adaptive Middleware for Distributed, Real-time, Embedded Systems [<http://doc.ece.uci.edu/~klefstad/ppt/Klefstad%20CECS%20Symposium.ppt>]” Center for Embedded Computer Systems Symposium on RASC technology, September 30, 2003.
- “Design and Performance of a Dynamically Configurable, Messaging Protocols Framework for Real-time CORBA” IEEE Hawaii International Conference on System Science (HICSS), 2003.
- “The Key to Success in a High-Tech Career [<http://doc.ece.uci.edu/~klefstad/ppt/ACM.ppt>]” ACM Career Expo at UCI, January 2003.

## Qualifications

- **Advanced concept expertise:** distributed computing, real-time computing, embedded systems, design patterns, multi-threading, compilers, interpreters, object-oriented design, object-oriented programming
- **Middleware:** CORBA, real-time CORBA, Java RMI, Sun RPC, sockets
- **Programming languages:** C++, C, Java, Ada, Lisp, Prolog, Pascal
- **Operating systems programming:** Unix, ACE

## Achievements

- Best Paper: Design and Performance of a Dynamically Configurable, Messaging Protocols Framework for Real-time CORBA. IEEE Hawaii International Conference on System Science (HICSS) 36, January 2003
- Best Content/Most Useful: AdaptiveInfo mobile-phone embedded, intelligent, wireless browser. BREW 2002 Developers Conference, June 2002
- Funniest Faculty. UC Irvine School of Engineering, December 2002
- Outstanding Professor. UC Irvine ICS graduating seniors, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2001, 2002

- Outstanding Non-Senate Teacher Award. ICS Department, 1999, 2000
- Best Professor Award. UC Irvine Greek Fraternity Council, 1994, 1996
- Golden Floppy Award. ICS Department, 1993, 1995, 1996, 1998
- Magna Cum Laude. UC Irvine, 1981
- Phi Beta Kappa. UC Irvine, 1981

## Associations

### Research Institution Affiliations

- Faculty Research Affiliate, Institute for Transportation Studies (ITS), UC Irvine, 2003
- Charter Faculty Member, UCI Networked Systems Center (NSC), 2001
- Faculty Research Affiliate, UCI Center for Embedded Computing Systems (CECS) [<http://www.cecs.uci.edu/home.htm>], 2002

### Grant Review Panels

- Embedded and Hybrid Systems, NSF, March 2005

### Program Committees

- Reviewer, ACM, 2006
- Technical program committee member, International Symposium on Object Real-time Computing (ISORC), 2006
- Session Chair, IEEE International Symposium on Multimedia (ISM2005), 2005
- Program Committee, 26th IEEE Real-Time Systems Symposium (RTSS 2005), December 6, 2005 - December 8, 2005
- Program Committee, ACM Symposium on Applied Computing (SAC), 2006
- Program Committee, Aspect Oriented Software Development (AOSD) Workshop on Aspects, Components, and Patterns for Infrastructure Software (ACP4IS), 2005
- Technical Program Committee, IEEE Hawaii International Conference on System Science (HICSS), 2004, 2005, 2006, 2007
- Technical Program Committee, ACM Symposium on Applied Computing (SAC), Object-Oriented Programming Languages and Systems (OOPS), 2005
- Program Committee, IEEE International Conference on e-Commerce Technology for Dynamic E-Business (CEC04-EAST) [<http://tab.computer.org/tfec/cec04-east/>], 2004
- Session Chair for two mini-tracks: Distributed Object and Component-based Software Systems; Adaptable and Evolvable Software Systems, IEEE Hawaii International Conference on System Science (HICSS) 39, January 2005

- Session Chair, Service Oriented Computing Workshop, International Symposium on Applications and the Internet (SAINT) [<http://www.saint2004.org/program/FrontMatt-Rev-Chair7Nov.pdf>], 2004
- Session Chair, Distributed Object and Component-based Software Systems mini-track, IEEE Hawaii International Conference on System Science (HICSS) 37, January 2004
- Session Chair, Adaptable and Evolvable Software Systems mini-track, IEEE Hawaii International Conference on System Science (HICSS) 37, January 2004
- Session Chair, 9th IEEE Real-time Technology and Applications Symposium (RTAS), 2003
- Program Chair, Object-Oriented programming languages and distributed-object systems track, ACM Symposium on Applied Computing (SAC), 2004
- Mini-track co-chair, Adaptive and Evolvable Software Systems: Techniques, Tools, and Applications, IEEE Hawaii International Conference on System Science (HICSS) 37, January 2004
- Technical program committee member, 4th International Symposium on Distributed Objects and Applications (DOA) [<http://www.cs.rmit.edu.au/fedconf/doa/2002/>], 2002
- Technical program committee member, International Symposium on Object Real-time Computing (ISORC) [<http://dream.eng.uci.edu/isorc2002/>], 2002
- Area session chair, 4th International Symposium on Distributed Objects and Applications (DOA), Irvine CA [<http://www.cs.rmit.edu.au/fedconf/doa/2002/>], October 28, 2002 - November 1, 2002
- Design Pattern Shepherd, PLoP, 2002

## Workshops and Conferences Organized

- Mini-track co-organizer, Adaptive and Evolvable Software Systems: Techniques, Tools, and Applications, IEEE Hawaii International Conference on System Science (HICSS) 37, January 2004
- Organizer, Protocol Engineering Research Center, MURI Workshop, UC Irvine, September 2002

## Reviewer for Professional Submittal

- ACM Transactions on Internet Technology
- ISORC 2006 Special Issue Middleware for Service-Oriented Computing, 2006
- SAC [<http://www.acm.org/conferences/sac/sac2004/>], 2004
- HICSS [<http://www.hicss.hawaii.edu/>], 2004
- ICDCS [<http://www.cse.msu.edu/icdcs/>], 2003
- ISORC [<http://dream.eng.uci.edu/isorc2002/>], 2002
- DOA [<http://www.cs.rmit.edu.au/fedconf/doa/2002/>], 2002

## Memberships

- IEEE
- ACM

- USENIX

## Additional Items

### Research Interests

- Distributed object computing middleware
- High-performance, real-time object request brokers (ORBs)
- Design patterns for object-oriented communication systems
- Object-oriented communication software frameworks
- Flexible and adaptive distributed, parallel, and concurrent systems
- Generative programming and Aspect-Oriented programming
- Model-based design, validation, and generation of distributed, real-time, embedded systems
- Automated software quality measurement for DRE systems

### Grants and Contracts

- April 20, 2006 - May 20, 2006: "ISORC Korea Conference Travel Support," NSF Embedded and Hybrid Systems (EHS). Role: PI, Amount: \$3,000, Status: current. 0 Mo salary/year
- September 1, 2004 - September 30, 2007: "Collaborative Research: Components and Aspects for Embedded Middleware," NSF Embedded and Hybrid Systems (EHS). Role: co-PI (50%), Amount: \$330,000 (\$690,000), Status: current. 2 Mo salary/year
- July 1, 2004 - December 31, 2004: "Optimizing Middleware Layers for Distributed Real-Time and Embedded Applications," Boeing Aerospace Inc. Role: PI, Amount: \$50,484, Status: complete. 4 Mo salary/year (35%)
- July 1, 2004 - December 31, 2004: "Asynchrony Optimization Patterns and Middleware for Middle-tier Servers," Unisys Corporation. Role: PI, Amount: \$100,000, Status: complete. 1 Mo salary/year
- October 15, 2003 - October 15, 2005: Multidisciplinary University Research Initiative (MURI) "Protocol Engineering Research Center" (PERC) (with professors from Stanford, UIUC, UCSB, UCD, UCSC, and UCI), Air Force Office of Scientific Research (AFOSR). Role: co-PI (12.5%), Amount: \$275,000 (\$2,200,000), Status: complete. 1 Mo salary/year
- January 1, 2003 - December 31, 2004: "Optimizing Middleware Layers for Distributed Real-Time and Embedded Applications," Boeing contract part of Defense Advanced Research Projects Agency (DARPA) Program for Composition of Embedded Systems (PCES). Role: PI, Amount: \$803,000, Status: complete. 1 Mo salary/year
- June 1, 2002 - June 30, 2003: "Transparently Fulfilling Scalability and Real-Time Quality-of-Service Requirements through Composition of Middleware Services," Space and Naval Warfare Systems Command (SPAWAR). Role: PI, Amount: \$150,000, Status: complete.