VIS 2000 IEEE VISUALIZATION

ADVANCE PROGRAM

October 8 • October 13, 2000
Hilton Salt Lake City Center
Salt Lake City, Utah

IEEE — Networking the World™

IEEE COMPUTER SOCIETY

Sponsored by IEEE Computer Society Technical Committee on Visualization and Graphics In Cooperation with ACM/SIGGRAPH

CONFERENCE-AT-A-GLANCE

	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
7:00am							
	REG.	REG.	REGISTRATION	REGISTRATION	REGISTRATION		
8:00am	Workshop	Tutorials	Information Visualization Symposium / Volume Visualization Symposium / Tutorials	Information Visualization Symposium / Volume Visualization Symposium / Tutorials	Keynote Session	REGISTRATION — Papers / Works in Progress / Case Studies	REGISTRATION — Papers / Panel / Case Studies
9:00am							
10:00am					Papers / Papers / Case Studies	Papers / Papers / Works in Progress / Demonstrations and CAL	Papers / Papers / Works in Progress
11:00am							
12:00pm						Vis 2001 Open Meeting / Demonstrations and CAL	
1:00pm							
2:00pm					Papers / Papers / Case Studies / Demonstrations and CAL	Papers / Papers / Case Studies / Demonstrations and CAL	Capstone Session
3:00pm							
4:00pm					Papers / Panel / Case Studies / Demonstrations and CAL	Papers / Panel / Works in Progress / Demonstrations and CAL	
5:00pm							
6:00pm						BOFs	
7:00pm			Symposium & Tutorial Reception	VizLies	Conference Reception / Demonstrations and CAL		
8:00pm							
9:00pm							

The three conference tracks will cover:

Visualization Algorithms *Volume Rendering, Flow Visualization, Isosurfaces, Compression, Vector and Tensor Visualization, Sonification, etc.*

Visualization Techniques *Information Visualization, Databases, Human Perception, Human Factors, Multivariate Visualization, Virtual Reality, etc.*

Visualization Applications *Archaeology, Astrophysics, Aerospace, Automotive, Biomedicine, Chemistry, Education, Electronics, Environment, Finance, Mathematics, Mechanics, Molecular Biology, Physics, Virtual Reality, WWW, Java, VRML, HTML, AVS, Data Explorer, Iris Explorer, Khoros, vtk, etc.*

Get complete, up-to-date listings of program information from

URL: http://www.erc.msstate.edu/vis2000

InfoVis 2000 URL: http://www.infovis.org/infovis00/

VolVis 2000 URL: http://www.cis.ohio-state.edu/volviz/volviz00.html

FTP server: ftp.erc.msstate.edu, directory vis2000

or contact: **Charles Hansen**, Conference Co-Chair, *University of Utah* • 801·581·3154 • hansen@cs.utah.edu

Chris Johnson, Conference Co-Chair, *University of Utah* • 801·581·7705 • crj@cs.utah.edu

Steve Bryson, Conference Co-Chair, *NASA Ames Research Center* • 650·604·4524 • bryson@nas.nasa.gov

WELCOME TO IEEE VISUALIZATION 2000

The 11th annual IEEE Visualization conference, to be held from October 8 through 13 in Salt Lake City, Utah, will meet to celebrate another year of cutting edge research in scientific visualization.

Our keynote speaker, Michael Cohen, notes that revealing the hidden structure around us is at the core of visualization. His talk will provide an overview of advances in technology in computer vision, image based rendering, non-photorealistic rendering and visualization. As we finish the conference, our capstone speaker, Olivier Faugeras, will present recent research on applications of variational methods for medical imaging and visualization. During the numerous sessions scheduled between these two talks, you will find reports on the state-of-the-art in visualization and its relationship to computer graphics and computer vision.

Preceding the main conference you may attend tutorials by leaders in the field, who will discuss the background of their research as well as the in-depth details of their new work. You will also find two symposia: the symposium on information visualization, where techniques for the visualization of abstract information will be studied; and the symposium on volume visualization, where you will see the latest volume visualization research techniques and applications.

Please join us in Salt Lake City, Utah October 8 through 13, to make this celebration memorable at the 11th visualization conference!

Charles Hansen, University of Utah

Chris Johnson, University of Utah

Steve Bryson, NASA Ames Research Center

IEEE Visualization 2000 Conference Co-Chairs

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VISUALIZATION 2000 TUTORIALS
Sunday, Monday, Tuesday

TUTORIAL 1

Sunday 8:30-5:30

Multiresolution Techniques for Surfaces and Volumes

Instructors: Markus Gross, *Swiss Federal Institute of Technology (ETH)*
Kenneth Joy, *University of California at Davis*
Richard Hammersley, *Schlumberger Austin Technology Center*
Andreas Hubeli, *Swiss Federal Institute of Technology (ETH)*
Hong-Qian (Karen) Lu, *Schlumberger Austin Technology Center*
Hanspeter Pfister, *MERL - A Mitsubishi Electric Research Lab*

Level: Intermediate

Course Description:

Multiresolution methods and hierarchical data organization have become powerful tools for the representation of surfaces and volumes within visualization. Their power lies in the fact that they combine a lot of useful properties, such as level of detail, local support, smoothness, error bounds and fast computations. This allows one to design efficient methods for data approximation, analysis and compression often resulting in computationally less expensive algorithms. Therefore, multiresolution and hierarchical methods have been used widely and successfully in the visualization community and have developed to a core methodology. Prominent examples comprise adaptive surface and mesh simplification, multiresolution visualization, volume compression and rendering.

The goal of this tutorial is twofold: we will describe the most important state-of-the-art surface and volume representations and we will elucidate their usefulness as modeling tools for visualization. The discussed representations include wavelets, hierarchical splines, subdivision surfaces, mesh reduction methods for surfaces and volumes, discrete surface and volume representations, schemes based on signal processing tools and classical representations. In addition we will show the power of the described methods in various applications with a special emphasis on geosciences. In each of them hierarchy is used in a different setting allowing us to demonstrate the versatility of design patterns and strategies for multiresolution methods.

Who Should Attend:

This course is intended for developers, researchers and practitioners of 3D graphics and data visualization who are interested in methods for addressing the problems of very large data sets. Attendees should have a basic understanding of computer graphics principles, data representation, and visualization algorithms such as color mapping and contouring.

TUTORIAL 2

Sunday 1:30-5:30

An Introduction to Information Visualization Techniques for Exploring Large Databases

Instructor: Daniel A. Keim, *University of Halle*

Level: Beginning - Intermediate

Course Description:

The tutorial provides an overview of information visualization techniques which can be used for exploring large databases. The tutorial presents the state-of-the-art in information visualization, classifying the existing visual data exploration techniques into five groups: Geometric, Icon-based, Pixel-oriented, Graph-based, and Hierarchical Techniques. In addition to the visualization techniques, we also discuss a number of distortion and interaction techniques which have to be combined with the visualization techniques to allow an effective data exploration. Besides describing the techniques, the tutorial focuses on new developments in information visualization. In particular, we describe a wide range of recently developed techniques for visualizing large amounts of arbitrary multi-attribute data which does not have any two- or three-dimensional semantics and therefore does not lend itself to an easy display. A detailed comparison shows the strength and weaknesses of the existing techniques and reveals potentials for further improvements. Several examples demonstrate the benefits of visual data exploration techniques in real applications. The tutorial concludes with an overview of existing visual data exploration systems, including research prototypes, as well as commercial products.

Who Should Attend:

Those interested in exploring visual representations for large databases. A basic familiarity with standard visualization techniques would be helpful but is not necessary.

TUTORIAL 3

Monday 8:30-5:30

The Convergence of Scientific Visualization Methods with the World Wide Web

Instructors: Theresa Marie Rhyne, *Lockheed Martin/ U.S. EPA Visualization Center*
Mike Bailey, *San Diego Supercomputer Center & UCSD*
Mike Botts, *University of Alabama in Huntsville*
Bill Hibbard, *University of Wisconsin at Madison*

Level: Intermediate

Course Description:

This tutorial will examine the convergence of visualization methods with the World Wide Web as well as the relationship between real- time interactivity and scientific information exploration. The application of visualization tools and interactive techniques to the examination and interpretation of scientific data and information will be reviewed. We will discuss how visualization tool development is expanding with the evolution of Java Servlets/Java3D, real time streaming, 3D Web tools (e.g. VRML and X3D), the Extensible Markup Language (XML), and other emerging internet technologies.

The process of developing effective visualization paradigms for supporting high speed networking, multi-platform computer architectures, database management, data mining, user interface design, remote collaborative exploration, science education and real time interactive animation will be addressed. Open source visualization tools are highlighted. Highly illustrative atmospheric, oceanographic and geographic examples will be demonstrated in real time. We will also step beyond traditional 3-D graphics displays and present solid freeform fabrication (SFF) as a visualization tool that yields actual physical 3D models from computer graphics data.

Who Should Attend:

Scientific researchers, educators, computer graphics and visualization specialists interested in exploring particular issues associated with handling the visual display of scientific information and large scientific data sets. Experience with scientific visualization systems and terminology is helpful as well as understanding of computer graphics programming.

TUTORIAL 4

Monday 8:30-5:30

Visualization Toolkits: Applications and Techniques

Instructors: Kenneth (Ken) M. Martin, *Kitware Inc.*

Lisa Sobierajski Avila, *Kitware Inc.*

William (Bill) E. Lorensen, *GE Corporate Research & Development*

James (Jim) V. Miller, *GE Corporate Research & Development*

William (Will) J. Schroeder, *Kitware Inc.*

Level: Intermediate

Course Description:

In this tutorial we will discuss fundamental issues regarding the design, implementation and application of 3D graphics and visualization systems with a focus on the implementation used within the open source Visualization Toolkit. This will be used to illustrate important design issues such as graphics portability, interpreted versus compiled languages, multiple versus single inheritance, data flow models, and user interaction methods. In the remainder of this tutorial we will focus on applying visualization techniques and toolkits to solve problems from a selection of application domains.

Who Should Attend:

This course is intended for users, developers, researchers and practitioners of 3D graphics and data visualization. Attendees should have a basic understanding of computer graphics principles, software development techniques, and visualization algorithms such as color mapping and contouring.

TUTORIAL 5

Tuesday 8:30-5:30

An Interactive Introduction to OpenGL Programming

Instructors: Ed Angel, *University of New Mexico*

Dave Shreiner, *Silicon Graphics Incorporated*

Level: Beginning

Course Description:

This course will present an overview of creating interactive three-dimensional graphics applications using the OpenGL programming interface. Using tutorials and simple programming exercises, as well as source code examples, and generated images, students will investigate topics ranging from specifying three-dimensional geometric models, and transformations to lighting, shading, and texture mapping interactively, immediately seeing the effects of inputs on rendered scenes. By the conclusion of the course, students should be able to write simple OpenGL applications utilizing the techniques described during the day.

Who Should Attend:

Visualization researchers, developers, and educators interested in using OpenGL for visualization. Students should be able to program in a structured programming language and have some familiarity with basic matrix operations. Knowledge of computer graphics concepts such as lighting, matrix transforms, and texture mapping is helpful, but not required. The course assumes no prior knowledge of OpenGL.

TUTORIAL 6

Tuesday 8:30-5:30

Image Processing for Volume Graphics and Analysis

Instructors: Terry S. Yoo, National Library of Medicine

Raghu Machiraju, The Ohio State University

Ioannis A. Kakadiaris, University of Houston

Ross T. Whitaker, The University of Utah

Level: Intermediate

Course Description:

This course is designed around the presentation of an idealized volume visualization pipeline. Like a graphics pipeline, there are steps throughout the procedure that are familiar; however, the beginning is the reconstruction of a continuous model or function from sampled data rather than generative geometry/modeling. The later half of the pipeline will cover transfer functions for classification, shading, texturing, and finally the resampling and projection of the resulting models into image space. Each of these areas will be treated from the viewpoint of the mathematical tools that we use to study and manipulate the data.

The afternoon will be dedicated to exploring emerging techniques relevant to both 3D image processing and volume graphics. Topics for discussion include multiscale methods, segmentation techniques, and level set theory. The advantages of these techniques will be illustrated for analysis through suitable examples. Wavelet techniques will be described. Less emphasis will be paid to the actual design issues of such filters. Rather, the emphasis will be on the utility of these techniques. Similarly, the topics of segmentation and level sets are used as a semantic, rather than a syntactic description of image structure.

Who Should Attend:

Members of the graphics community who are interested in gaining a deeper understanding of volume mathematics in the context of existing volume visualization research. Basic knowledge of 3D computer graphics and an understanding of the basic principles of image-processing would be helpful.

TUTORIAL 7

Tuesday 1:30-5:30

Rendering and Visualization in Parallel Environments

Instructors: Dirk Bartz, *University of Tübingen*

Bengt-Olaf Schneider, *IBM T.J. Watson Research*

Claudio Silva, *AT&T Labs - Research*

Level: Intermediate

Course Description:

The continuing commoditization of the computer market has precipitated a qualitative change. Increasingly powerful processors, large memories, big hard disks, high-speed networks, and fast 3D rendering hardware are now affordable without a large capital outlay. A new class of computers, dubbed Personal Workstations, has joined the traditional technical workstation as a platform for 3D modeling and rendering. In this tutorial, attendees will learn how to understand and leverage both technical and personal workstations as components of parallel rendering systems.

We will first discuss the fundamentals of parallel programming and parallel machine architectures. Topics include message passing vs. shared memory, thread programming, a review of different SMP architectures, clustering techniques, PC architectures for personal workstations, and graphics hardware architectures. The second section builds on this foundation to describe key concepts and particular algorithms for parallel polygon rendering and parallel volume rendering. Finally, in section three we put these techniques into the context of concrete parallel rendering implementations.

Who Should Attend:

The tutorial is intended for attendees with an understanding of the basics of 3D graphics and computer architecture. The goal is to provide an overview of existing technology and an introduction of important concepts in parallel rendering and visualization. Furthermore, the tutorial is not targeted at experts in the field. Hence, it will concentrate more on concepts and less on the details of particular techniques.

IEEE SYMPOSIUM ON INFORMATION VISUALIZATION (INFOVIS 2000)

Sponsored by the IEEE Computer Society Technical Committee on Visualization and Graphics

October 9–10, 2000 ■ Hilton Salt Lake City Center ■ Salt Lake City, Utah

Monday, October 9

8:30 - 10:00   **Keynote Address**: *TBD*

10:00 - 12:00   **Papers I**: *Visual Querying and Data Exploration*

(1) **Polaris: A System for Query, Analysis, and Visualization of Multi-Dimensional Relational Databases,** Chris Stolte, and Pat Hanrahan, *Stanford University*

(2) **Getting Portals to Behave**, Chris Olston, *Stanford University*, and Allison Woodruff, *Xerox PARC*

(3) **A Scalable Framework for Information Visualization**, Matthias Kreuseler, Heidrun Schumann, and Norma Lopez, *University of Rostock*

1:30 - 3:00   **Papers II**: *Graphs and Hierarchies*

(1) **Visualizing Massive Multi-Digraphs**, Jeffrey Korn, and James Abello, *Shannon Laboratories, AT&T Labs-Research*

(2) **Density Functions for Visual Attributes and Effective Partitioning in Graph Visualization**, Ivan Herman, Guy Melancon, and M. Scott Marshall, *Centre for Mathematics and Computer Sciences*

(3) **Focus+Context Display and Navigation Techniques for Enhancing Radial, Space-Filling Hierarchy Visualizations**, John Stasko, and Eugene Zhang, *GVU Center and College of Computing*

3:30 - 5:00   **Papers III**: *Taxonomies, Frameworks, and Methodology*

(1) **A Taxonomy of Visualization Techniques Using the Data State Reference Model**, Ed Chi, *Xerox Palo Alto Research Center*

(2) **GADGET/IV: A Taxonomic Approach to Semi-Automatic Design of Information Visualization Applications Using Modular Visualization Environment**, Issei Fujishiro, Rika Furuhata, Yoshihiko Ichikawa, and Yuriko Takeshima, *Ochanomizu University*

(3) **Redefining the Focus and Context of Focus+Context Visualizations**, Staffan Bjork, and Johan Redstrom, *The Interactive Institute*

(4) **From Metaphor to Method: Cartographic Perspectives on Information Visualization**, André Skupin, *University of New Orleans*

(5) **Information Content Measures of Visual Displays**, Julie Yang-Peláez, and Woodie C. Flowers, *MIT*

(6) **Visualizing Sequential Patterns for Text Mining**, Pak Chung Wong, Wendy Cowley, Harlan Foote, Elizabeth Jurrus, and Jim Thomas, *Pacific Northwest National Laboratory*

5:15 - 6:00   **LBHT:** *TBD*

For further information *http://www.infovis.org/infovis2000*

Tuesday, October 10

8:30 - 10:00   **Applications I:** *Document Visualization, Collaborative Visualization, Techniques*

(1) **ThemeRiver: Visualizing Theme Changes over Time**, Susan Havre, Beth Hetzler, and Lucy Nowell, *Battelle Pacific Northwest Division*

(2) **Lighthouse: Showing the Way to Relevant Information**, Anton Leuski, and James Allan, *University of Massachusetts*

(3) **New Methods for the Visualization of Electric Power System Information**, Thomas J. Overbye, *University of Illinois at Urbana-Champaign*, and Jamie D. Weber, *PowerWorld Corporation*

(4) **Collaborative Geographic Visualization: Enabling Shared Understanding of Environmental Processes**, Alan M. MacEachren, and Isaac Brewer, *Penn State University*

10:30 - 12:00   **LBHT**: *TBD*

1:30 - 3:00   **Applications II**: *Algorithm Visualization, 3D Navigation*

(1) **Interactive Problem Solving Via Algorithm Visualization**, Pearl Pu, *Group of Ergonomics of Intelligent Systems & Design, ISR/DMT*, and Denis Lalanne, *LIA-CERI, Universite d'Avignon et des Pays de Vaucluse*

(2) **Metaphor-Aware 3D Navigation**, C. Russo Dos Santos, *Eurécom Institute*, J-P. Paris, *France Telecom-CNET*, D. Loisel, N. Trichaud, P.Abel, and P.Gros, *Eurécom Institute*

(3) **Creativity, Complexity, and Precision: Information Visualization for (Landscape) Architecture**, Monika Buscher, Dan Shapiro, *Lancaster University*, Michael Christensen, Peter Orbaek, and Preben Mogensen, *University of Arhus*

(4) **Using Visualization to Detect Plagiarism in Computer Science Classes**, Randy Ribler, *Lynchburg College*, and Marc Abrams, *Virginia Polytechnic Institute & State University*

3:30 - 5:00   **Capstone Address**, *TBD*

Symposium Chair
Jock Mackinlay, *Xerox PARC*

Program Co-Chairs
Steve Roth, *MAYA Viz*
Daniel A. Keim, *University of Halle*

Late-Breaking Hot Topics
Nahum Gershon, *MITRE Corp.*
Keith Andrews, *Graz University of Technology*

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John Stasko, *Georgia Tech*
James Thomas, *Pacific Northwest National Lab*
Matthew Ward, *Worcester Polytechnic Institute*
Colin Ware, *University of New Hampshire*
Jarke J. van Wijk, *Eindhoven University of Technology*
Graham Wills, *Lucent Technologies, Bell Labs*
Jim Wise, *Integrations Corporation*
Pak Chung Wong, *Pacific Northwest National Lab*
William Wright, *Visible Decisions, Inc.*

IEEE VISUALIZATION 2001

San Diego, California

VOLUME VISUALIZATION AND GRAPHICS SYMPOSIUM (VOLVIS 2000)

Co-sponsored by the IEEE Computer Society and ACM/SIGGRAPH

October 9–10, 2000 ■ Hilton Salt Lake City Center ■ Salt Lake City, Utah

Monday, October 9

9:00 - 9:15 **Opening Remarks**

9:15 - 10:15 **Interactive Volume Rendering**
- (1) **Level-of-Detail Volume Rendering via 3D Textures**, Manfred Weiler, Rüdiger Westermann, Chuck Hansen, Kurt Zimmerman, and Thomas Ertl
- (2) **Gigabyte Volume Viewing Using Split Software/Hardware Interpolation**, William R Volz

11:00 - 12:00 **Iso-Surfacing**
- (1) **Reducing Aliasing Artifacts in Iso-Surfaces of Binary Volume**s, Ross T. Whitaker
- (2) **Time Critical Isosurface Refinement and Smoothing**, C.L. Bajaj, and V. Pascucci

1:30 - 3:00 **Volume Graphics**
- (1) **Fast CSG Voxelization by Frame Buffer Pixel Mapping**, Shiaofen Fang, and Duoduo Liao
- (2) **Volume Scene Graphs**, David R. Nadeau
- (3) **Shape-based Volumetric Collision Detection**, N. Gagvani, and D. Silver

3:45 - 4:45 **Acceleration of Volume Rendering**
- (1) **Accelerating Volume Rendering With Quantified Voxels**, Benjamin Mora, Jean-Pierre Jessel, and Ren Caubet
- (2) **The ULTRAVIS System**, Gunter Knittel

Tuesday, October 10

9:15 - 10:15 **Volume Rendering**
- (1) **A Practicle Evaluation of Four Popular Volume Rendering Algorithms**, Michael Meißner, Jian Huang, Dirk Bartz, Klaus Mueller, and Roger Crawfis
- (2) **ZSWEEP: An Efficient and Exact Projection Algorithm for Unstructured Volume Rendering**, Ricardo Farias, Joseph S. B. Mitchell, and Claudio T. Silva

11:00 - 12:00 **Volume Reconstruction and Backprojection**
- (1) **Mastering Windows: Improving Reconstruction**, Thomas Theussl, Helwig Hauser, and Eduard Groeller
- (2) **Volumetric Backprojection**, Frank Dachille, Klaus Mueller, and Arie Kaufman

1:30 - 2:30 **Time-varying Volume Rendering**
- (1) **Accelerating Time-Varying Hardware Volume Rendering Using TSP Trees and Color-Based Error Metrics**, David Ellsworth, Ling-Jen Chiang, and Han-Wei Shen
- (2) **4D Volume Rendering With the Shear Warp Factorisation**, Kostas Anagnostou, and Tim J. Atherton

3:15 - 4:45 **Capstone Talk,** Arie Kaufmann, *State University of New York, Stony Brook*

Symposium Chair
Bill Lorensen, *GE Corporate R&D Center*

Program Co-Chairs
Roger Crawfis, *The Ohio State University*
Daniel Cohen-Or, *Tel Aviv University*

Symposium Committee
Min Chen, *University of Wales, Swansea*
Raghu Machiraju, *The Ohio State University*
Claudio Silva, *AT&T Labs Research*

Program Committee
Nick England, *University of North Carolina, Chapel Hill*
Issei Fujishiro, *Ochanomizu University*
Sarah Frisken-Gibson, *MERL*
Chris Johnson, *University of Utah*
Arie Kaufman, *State University of New York at Stony Brook*
Ron Kikinis, *Brigham and Women's Hospital, Harvard Medical School*
Kwan-Liu Ma, *University of California, Davis*
Tom Malzbender, *Hewlett-Packard Research Laboratories*
Nelson Max, *University of California, Davis*

Greg Nielson, *Arizona State University*
Hanspeter Pfister, *MERL*
Frits Post, *Delft University of Technology*
Georgios Sakas, *Fraunhofer Institute for Computer Graphics*
Lisa Sobierajski Avila, *Kitware, Inc.*
Roberto Scopigno, *CNUCE-CNR*
Wolfgang Strasser, *University of Tübingen*
Ulf Tiede, *University of Hamburg*
Michael Vannier, *University of Iowa College of Medicine*
Peter Williams, *Lawrence Livermore National Laboratory*
Karel Zuiderveld, *Vital Images*

For further information e-mail: *volviz00@cis.ohio-state.edu* **or see** *http://www.cis.ohio-state.edu/volviz/volviz00.html*

TUESDAY EVENING SPECIAL SESSION

Tuesday, October 10, 7:30pm (VizLies 2000)

How to Lie and Confuse with Visualization

People have misled with statistics and maps for years. Now it's time to look again into what is misleading and confusing in the field of visualization. Your once-a-year big chance to do just that, in the open, will be in this special party session on Tuesday, October 10, 2000 at 7:30 p.m. Your are invited to bring with you visualization lies and confusing articles (yours or others), on MS PowerPoint slides, transparencies, or on video. During this evening, it will be allowed to lie and confuse, but not to take credit for the work of others,* so please do not forget to mention the producers' names. After the informal presentations and truthful debates, the audience will choose the biggest (visualization) lie for 2000. When the evening is over, lying will be outlawed again (for another year). Quite seriously, we hope that by presenting common and uncommon errors occurring in the visual presentation of information, all of us in the visualization community will benefit, or at least have a good laugh at the expense of others. Reservations and advance submissions are now being accepted. Please send them to **Nahum Gershon**, The MITRE Corporation, 1820 Dolley Madison Blvd., McLean, VA 22102-3481. Reservations and advance submissions are not required but are strongly recommended. Confused? for more information (genuine!), please contact gershon@mitre.org.

*It is, rather, allowed to professionally blame those responsible for the lies and confusion.

IRIS EXPLORER USER'S MEETING

Thursday, October 12, 2000 – 7:00pm-8:30pm

Jeremy Walton, *The Numerical Algorithms Group Ltd* jeremyw@nag.co.uk

http://www.nag.com/Welcome_IEC.html.

IRIS Explorer is a visualization toolkit and application builder available from The Numerical Algorithms Group (NAG) for major Unix platforms (including Linux) and Windows NT. The current release (4.0) incorporates a variety of new features, including collaborative visualization (originally presented at IEEE Visualization '96), improved VRML output and an enhanced user interface. This meeting gives users (and prospective users) a chance to hear the latest news about the system (including details of the new features in IRIS Explorer 5.0) and user resources (such as the web-based module repository) from the development team itself.

WORKSHOP REQUIREMENTS

- Participation is limited to 20 people.
- Submit proposals to the organizers by August 15, 2000.
- Submitters will be notified of acceptance by September 15, 2000.

See http://www.erc.msstate.edu/vis2000 for updates on the workshop requirements.

SEMANTIC VISUALIZATION OF NONQUANTITATIVE RELATIONSHIPS

Saturday, October 8, 2000 – 8:00am-5:00pm

Brian Boyle, bboyle@wennet.net

"Information is a difference that makes a difference." — Gregory Bateson (1972) (in reconciling the contradictory definitions of "information" by Claude Shannon, "father of Information Theory" and by Norbert Wiener, creator of "Cybernetics.")

This mini-workshop focuses on the emerging tools and concepts for the transformation, visualization and manipulation of "the next dimension" of information, the inherently nonquantitative semantic interrelationships. Arguably, all visualization is semantic: systems transform and present data and information such that their interrelationships' meaning - their semantics - is visible to humans. The advances of our age rest on the expressive power, for communication and basic understanding, of classic innovative transforms of inherently quantitative dimensions such as isometric projection in space or the now-intuitive left-to-right unfolding of time. But to escape the flood of raw information available via the worldwide web and multimedia channels, increasingly we must climb the ladder of abstraction to the more refined level of the meaning itself, the qualitative relationships that are only now beginning to emerge with more intelligent search engines, more powerful abstracting systems, more intuitive outlining and knowledge-network presentation systems, and the emerging semantic foundation provided by XML, the richer, more rigorous sibling of the first-generation Web's presentation-oriented HTML. As a concrete but only illustrative focus - to seed interactive discussion with a timely, familiar and controversial topic - the workshop facilitators have collected several examples from the legal gladiatorial arena and transformed them into rudimentary XML documents for examination: disputed software and business process patents – highly structured textual and graphic documents with semantics as precise and obscure as any programming language - coupled with some of the relevant "prior art" from the software literature that might invalidate those patents (or even kept them from issuing) if there existed a method for the semantic visualization of the similarities, differences and a metric of novelty and "nonobviousness." This has been widely and publicly discussed by Jeff Bezos (Amazon.com), Tim O'Reilly (O'Reilly Publishing) and Dave Winer (creator of the innovative and widely popular outliners, ThinkTank, MORE!, Ready and now Frontier.)

BIRDS OF A FEATHER (BOF) SESSIONS

Birds of a Feather (BOF) sessions will be held Thursday evening. These sessions will provide participants the opportunity to discuss current topics with others. BOFs are open to all Vis 2000 attendees. If you wish to lead a BOF, please contact Rob Erbacher (erbacher@cs.uidaho.edu). Be sure to check the final program to see what BOFs are offered, and when you arrive, be sure to check for additions.

VISUALIZATION 2000 CONFERENCE PROGRAM

Wednesday, Thursday, Friday

Wednesday, 8:30 - 10:00am

KEYNOTE *Keynote Session:* **"Visualization of Everyday Things",** Michael Cohen, *Microsoft Research*

Wednesday, 10:15 - 12:15pm

P1 *Papers:* **Biomedical Visualization**

(1) **Extracting Regions of Interest Applying a Local Watershed Transformation**, Stanislav L. Stoev and Wolfgang Straßer, *University of Tübingen*

(2) **A Visibility Determination Algorithm for Interactive Virtual Endoscopy**, Rami Hietala and Jarkko Oikarinen, *University of Oulu*

(3) **3D Digital Cleansing using Segmentation Rays**, Sarang Lakare, Ming Wan, Mie Sato, and Arie Kaufman, *State University of New York at Stony Brook*

(4) **CEASAR: Accurate and Robust Algorithm for Extracting a Smooth Centerline**, Ingmar Bitter, Mie Sato, Michael Bender, Kevin T. McDonnell, Arie Kaufman, and Ming Wan, *State University of New York at Stony Brook*

P4 *Papers:* **Information Visualization**

(1) **Creating Reusable Visualizations with the Relational Visualization Notation**, Matthew C. Humphrey, *Intellisure*

(2) **H-BLOB: A Hierarchical Visual Clustering Method Using Implicit Surfaces**, T.C. Sprenger, R. Brunella, and M.H. Gross, *ETH Zurich*

(3) **A Spreadsheet Interface for Visualization Exploration**, T.J. Jankun-Kelly and Kwan-Liu Ma, *University of California, Davis*

(4) **Procedural Annotation of Uncertain Information**, Andrej Cedilnik and Penny Rheingans, *University of Maryland, Baltimore County*

C1 *Cases:* **Techniques**

(1) **Fast Visualization Methods for Comparing Dynamics: A Case Study in Combustion**, Kay A. Robbins and Michael Gorman, *University of Texas at San Antonio*

(2) **Mastering Interactive Surface Rendering for Java-Based Diagnostic Applications**, Lukas Mroz, Rainer Wegenkittl, and Eduard Gröller, *Institute of Computer Graphics, Vienna*

(3) **A Computational Steering System for Studying Microwave Interactions with Space-Borne Bodies**, J. Edward Swan II, Marco Lanzagorta, Doug Maxwell, Eddy Kuo, Jeff Uhlmann, Wendell Anderson, Haw-Jye Shyu, and William Smith, *The Naval Research Laboratory*

(4) **Four-Dimensional Non-Linear Ray Tracing as a Visualization Tool for Gravitational Physics**, Daniel Weiskopf, *University of Tübingen*

Wednesday, 1:45 - 3:45pm

P5 *Papers:* **Tetrahedral Grids**

(1) **Simplification of Tetrahedral Meshes with Accurate Error Evaluation**, P. Cignoni, D. Costanza, C. Montani, C. Rocchini, and R. Scopigno, *Consiglio Nazionale delle Ricerche, Pisa*

(2) **Tetrahedron Based, Least Squares, Progressive Volume Models With Application to Freehand Ultrasound Data**, Tom Roxborough and Gregory M. Nielson, *Arizona State University*

(3) **On-the-Fly Rendering of Losslessly Compressed Irregular Volume Grids**, Chuan-kai Yang, Tulika Mitra, and Tzi-cker Chiueh, *State University of New York at Stony Brook*

(4) **Hardware-Accelerated Volume and Isosurface Rendering Based on Cell-Projection**, Stefan Röttger, Martin Kraus, and Thomas Ertl, *University of Stuttgart*

P6 *Papers:* **Visual & Haptic Displays**

(1) **Color Calibration of Projectors for Large Tiled Displays**, Aditi Majumder, Zhu He, Herman Towles, and Greg Welch, *University of North Carolina at Chapel Hill*

(2) **Methods for Achieving Seamlessness on High-Resolution Displays Using Uncalibrated Cameras**, Yuqun Chen, Douglas W. Clark, Adam Finkelstein, Timothy Housel, and Kai Li, *Princeton University*

(3) **Shock and Vortex Visualization Using a Combined Visual/Haptic Interface**, Dale A. Lawrence, Christopher D. Lee, Lucy Y. Pao, and Roman Y. Novoselov, *University of Colorado, Boulder*

(4) **Six Degree-of-Freedom Haptic Display**, Arthur Gregory, Ajith Mascarenhas, Stephen Ehmann, Ming C. Lin, and Dinesh Manocha, *University of North Carolina at Chapel Hill*

C2 *Cases:* **Biomedical Applications**

(1) **Combining Local and Remote Visualization Techniques for Interactive Volume Rendering in Medical Applications**, Klaus Engel, Peter Hastreiter, Bernd Tomandl, Knut E.W. Eberhardt, and Thomas Ertl, *University of Stuttgart*

(2) **An Integrated Visualization and Design Toolkit for Flexible Prosthetic Heart Valves**, A.J. Fenlon, T. David, and J.P.R.B. Walton, *The Numerical Algorithms Group Ltd.*

(3) **Immersive Virtual Reality for Visualizing Flow Through an Artery**, Andrew Forsberg, Mike Kirby, David Laidlaw, George Karniadakis, Andries van Dam, and Jonathan Elion, *Brown University*

(4) **Mastering Interactive Virtual Bronchioscopy on a Low-End PC**, Rainer Wegenkittl, Anna Vilanova, B. Hegedüs, D. Wagner, Martin Freund, and Eduard Gröller, *Vienna University of Technology*

KEYNOTE SESSION

Visualization of Everyday Things
Speaker: Michael Cohen, *Microsoft Research*

We are surrounded every day with phenonmena that appear so normal and natural that we simply filter them out to allow us to focus on events relevant to the moment. However, in almost each moment there is structure and beauty that we are simply allowing to slip by. The methods and technologies that have been devoted to scientific visualization, computer vision, and computer graphics provide the tools to let us once again "see" what is slipping by us in our everyday lives.

Revealing the hidden structure around us is at the core of visualization. This talk will provide an overview of advances in technology in computer vision, image based rendering, non-photorealistic rendering and isualization and apply these to common everyday events

Biography:
Michael F. Cohen, Senior Researcher, Manager of the Graphics Research Group, joined Microsoft Research in 1994 from Princeton University where he was on the Computer Science faculty. Michael recently received the 1998 SIGGRAPH Computer Graphics Achievement Award. Michael received his Ph.D. in 1992 from the University of Utah. He also holds undergraduate degrees in Art and Civil Engineering from Beloit College and Rutgers University respectively, and an M.S. in Computer Graphics from Cornell. Dr. Cohen also served on the Architecture faculty at Cornell University and was an adjunct faculty member at the University of Utah. His work at the University of Utah focused on spacetime control for linked figure animation. He is perhaps better known for his work on the radiosity method for realistic image synthesis as discussed in his recent book "Radiosity and Image Synthesis" (co-authored by John R. Wallace). Michael has published and presented his work internationally in these areas. At Microsoft, Dr. Cohen has worked on a number of projects. One project focuses on the problem of image based rendering; capturing the complete flow of light from an object for later rendering from arbitrary vantage points. This work, dubbed "The Lumigraph" is analogous to creating a digital hologram. He has since extended this work through the construction of "Layered Depth Images" that allow manipulation on a PC. Michael also is continuing his work on linked figure animation. In the current work, he and colleagues are focusing on means to allow simulated creatures to portray their emotional state (i.e., a happy walk vs. a sad walk), and to automatically transition between verbs. Dr. Cohen also served as paper's chair for SIGGRAPH '98.

CAPSTONE SESSION

Variational Methods in Medical Imagery: Application to the Segmentation of Anatomical Structures
Speaker: Olivier Faugeras, *INRIA*

The shapes of anatomical structures can be extremely complicated and their recovery and representation from Medical Imagery is both a technical and a mathematical challenge. On the other hand, one knows a lot about the appearance and the geometry of these structures. A natural question then is how to design principled methods that can incorporate this knowledge? Variational methods are excellent candidates as a starting point for designing such methods: they are built on such solid ground as the theory of Partial Differential Equations (PDEs) and leave themselves to a formal and quantitative analysis.

I take two examples of this approach. The first example is the problem of the detection of blood vessels in Magnetic Resonance Angiography images. The geometric information is that the small blood vessels are well approximated by three-dimensional curves, i.e. manifolds of the three-dimensional space of codimension 2. This information can be used in the design of a snake-like algorithm that minimizes an energy measure by solving a PDE which evolves tubular structures representing the blood vessels. The second example is the problem of using information about the "average" shape in the segmentation of anatomical structures from MR images. I discuss the representation of an average shape through the use of distance functions and show that this information can be naturally used in another snake-like algorithm that also solves a particular class of PDEs. Both cases are illustrated with many examples.

Biography:
Olivier Faugeras is Research Director at INRIA, France, and Adjunct Professor in the EE and CS Department at MIT where he belongs to the AI Lab. He is a member of the French National Academy of Sciences.

Wednesday, 4:00 - 5:30pm

P10 *Papers:* **Flow Visualization**

(1) **A Level-Set Method for Flow Visualization**, Rüdiger Westermann, *University of Stuttgart,* Christopher Johnson, *University of Utah,* and Thomas Ertl, *University of Stuttgart*

(2) **Hardware-Accelerated Texture Advection for Unsteady Flow Visualization**, B. Jobard, G. Erlebacher, and M.Y. Hussaini, *Florida State University*

(3) **A Flow-guided Streamline Seeding Strategy**, Vivek Verma, David Kao, and Alex Pang, *University of California, Santa Cruz, NASA Ames Research Center*

N1 *Panel:* **"The Impact of Computer Games on Scientific & Information Visualization: 'If you can't beat them, join them'"**
Organizer: Theresa Marie Rhyne, *Lockheed Martin/U.S. EPA Visualization Center*

C3 *Cases:* **Scientific Applications**

(1) **Interactive Visualization of Protein Dynamics**, Henk Huitema and Robert van Liere, *CWI, The Netherlands*

(2) **Interactive Visualization of Particle-In-Cell Simulations**, Patric Ljung, Mark Dieckmann, Niclas Andersson, and Anders Ynnerman, *National Supercomputer Centre, Linköpings Universitet, Sweden*

(3) **Visualization of Time Dependent Confocal Microscopy Data**, Wim C. de Leeuw, Robert van Liere, Pernette J. Verschure, Astrid E. Visser, Erik M. M. Manders, and Roel van Driel, *CWI, The Netherlands*

P7 *Papers:* **Visual Perception**

(1) **Enabling Level-of-Detail Selection for Exterior Scene Synthesis**, Randy K. Scoggins, *U.S. Army Engineer Research and Development Center,* Raghu Machiraju, *The Ohio State University*, and Robert J. Moorhead, *Mississippi State University*

(2) **Visual Cues for Imminent Object Contact in Realistic Virtual Environments**, Helen H. Hu, Amy A. Gooch, William B. Thompson, Brian E. Smits, , *University of Utah,* John J. Rieser, *Vanderbilt University*, and Peter Shirley, *University of Utah*

(3) **Basic Research for Coloring Multichannel MRI Data**, Shigeru Muraki, Toshiharu Nakai, and Yasuyo Kita, *Electrotechnical Laboratory, MITI*

W1 *Works in Progress:* **TBD**

C4 *Cases:* **Environmental Applications II**

(1) **Visual Data Fusion for Applications of High-Resolution Numerical Weather,** Lloyd A. Treinish, *IBM Thomas J. Watson Research Center*

(2) **Comparisons of Hydrothermal Plumes in Simulations to Acoustic Images Acquired by Real-Time Underwater Systems**, Karen G. Bemis, Deborah Silver, Peter A. Rona, and Chengwei Feng, *Rutgers University*

(3) **Vector Fields Simplification - A Case Study of Visualizing Climate Modeling and Simulation Data Sets**, Pak Chung Wong, Harlan Foote, Ruby Leung, Elizabeth Jurrus, Dan Adams, and Jim Thomas, *Pacific Northwest National Laboratory*

P2 *Papers:* **Volume Rendering**

(1) **Volume Illustration: Non-Photorealistic Rendering of Volume Models**, David Ebert and Penny Rheingans, *University of Maryland, Baltimore County*

(2) **Pen-and-Ink Rendering in Volume Visualization**, S.M.F. Treavett and M. Chen, *University of Wales, Swansea*

(3) **Two-Level Volume Rendering-Fusing MIP and DVR**, Helwig Hauser, Lukas Mroz, Gian-Italo Bischi, and Eduard Gröller, *Vienna University of Technology*

(4) **Optimized Software Splatting Using FastSplats on Rectilinear Grid**, Jian Huang, Klaus Mueller, *State University of New York at Stony Brook*, Naeem Shareef, and Roger Crawfis, *The Ohio State University*

P11 *Papers:* **Textures and Geometry**

(1) **Texturing Techniques for Terrain Visualization**, Jurgen Dollner, Konstantin Baumann, and Klaus Hinrichs, *University of Münster*

(2) **Simplification of Surface Annotations**, Frank Suits, James T. Klosowski, William P. Horn, and Frank Barral, *IBM T.J. Watson Research Center*

(3) **Uniform Frequency Images: Adding Geometry to Images to Produce Space-Efficient Textures**, Adam Hunter and Jonathan Cohen, *The Johns Hopkins University*

(4) **Image Based Rendering with Stable Frame Rates**, Huamin Qu, Ming Wan, Jiafa Qin, and Arie Kaufman, *State University of New York at Stony Brook*

W2 *Works in Progress:* **TBD**

P3 *Papers:* **Isosurfaces**

(1) **Topology Preserving and Controlled Topology Simplifying Multiresolution Isosurface Extraction**, Thomas Gerstner, *University of Bonn* and Renato Pajarola, *University of California, Irvine*

(2) **Isosurfacing in Higher Dimensions**, Praveen Bhaniramka, Rephael Wenger, and Roger Crawfis, *The Ohio State University*

(3) **Semi-Regular Mesh Extraction from Volumes**, Zoe Wood, *Caltech,* Mathieu Desbrun, *University of Southern California,* Peter Schröder, and David Breen, *Caltech*

(4) **Scanline Surfacing: Building Separating Surfaces from Planar Contours**, David Weinstein, *University of Utah*

P9 *Papers:* **Multi-Dimensional & Visualization Systems**

(1) **Navigating High-dimensional Spaces to Support Design Steering**, Helen Wright, *University of Hull,* Ken Brodlie, and Tim David, *University of Leeds*

(2) **Visualization of Multi-Dimensional Data with Vector-fusion**, Robert R. Johnson, *University of Utah*

(3) **Real-World Relativity: Image-Based Special Relativistic Visualization**, Daniel Weiskopf, Daniel Kobras, and Hanns Ruder, *University of Tübingen*

(4) **Visualizing Geodesics**, Ingrid Hotz and Hans Hagen, *University of Kaiserslautern*

C5 *Cases:* **Physics, Information, and Fields**

(1) **WEAVE: A System for Visually Linking 3-D and Statistical Visualizations Applied to Cardiac Simulation and Measurement Data**, D.L. Gresh, B.E. Rogowitz, R.L. Winslow, D.F. Scollan, and C.K. Yung, *IBM T.J. Watson Research Center*

(2) **Visualizing High-Dimensional Predictive Model Quality**, Penny Rheingans and Marie desJardins, *University of Maryland Baltimore County*

(3) **Visualizing Volume Data using Physical Models**, David R. Nadeau and Michael J. Bailey, *San Diego Supercomputer Center*

(4) **Visualizing DIII-D Tokamak Magnetic Field Lines**, Greg Schussman, Kwan-Liu Ma, David Schissel, and Todd Evans, *University of California, Davis*

Thursday, 4:00 - 5:30pm

P13 *Papers:* **Collaboration and Network Visualization**

(1) **Geometric Compression for Interactive Transmission**, Olivier Devillers and Pierre-Marie Gandoin, *INRIA, Sophia Antipolis Cedex*

(2) **Toward a Compelling Sensation of Telepresence: Demonstrating a Portal to a Distant (Static) Office**, Wei-Chao Chen, Herman Towles, Lars Nyland, Greg Welch, and Henry Fuchs, *The University of North Carolina at Chapel Hill*

(3) **Multi-User View-Dependent Rendering**, Jihad El-Sana, *Ben-Gurion University*

N2 *Panel:* "**The Transfer Function Bake-Off**"
Organizer: Hanspeter Pfister, *MERL - A Mitsubishi Electric Research Laboratory*

W3 *Works in Progress:* **TBD**

Friday, 8:30 - 10:00am

P14 *Papers:* **Clustering Vector Fields**

(1) **Topology Preserving Compression of 2D Vector Fields**, Suresh Kumar Lodha, Jose C. Renteria, and Krishna M. Roskin, *University of California, Santa Cruz*

(2) **A Continuous Clustering Method for Vector Fields**, Harald Garcke, Tobias Preußer, Martin Rumpf, *University of Bonn*, Alexandru Telea, *Eindhoven University of Technology*, Ulrich Weikard, *University of Bonn*, and Jarke van Wijk, *Eindhoven University of Technology*

(3) **A Topology Simplification Method for 2D Vector Fields**, Xavier Tricoche, Gerik Scheuermann, and Hans Hagen, *University of Kaiserslautern*

N3 *Panel:* "**Next-Generation Visualization Displays: The Research Challenges of Building Tiled Displays**"
Organizers: Mike Papka and Rick Stevens, *ANL/University of Chicago*

C6 *Cases:* **Environmental Applications I**

(1) **Real-time Visualization of the Clear-up of a Former U.S. Naval Base**, Paul Chapman, Derek Wills, Peter Stevens, and Graham Brookes, *Hull, UK*

(2) **Scientific Visualization of Water Quality in the Chesapeake Bay**, Robert J. Stein, Alan M. Shih, M. Pauline Baker, Carl F. Cerco, and Mark R. Noel, *National Center for Supercomputer Applications*

(3) **Multi-Resolution Visualization Techniques for Nested Weather Models**, Lloyd A. Treinish, *IBM T.J. Watson Research Center*

Friday, 10:15 - 12:15pm

P12 *Papers:* **Reconstruction and Modeling**

(1) **Constructing Material Interfaces From Data Sets with Volume-Fraction Information**, Kathleen S. Bonnell, *University of California, Davis*, Mark A. Duchaineau, *Lawrence Livermore National Laboratory*, Daniel R. Schikore, *Computational Engineering International*, Bernd Hamann, and Kenneth I. Joy, *University of California, Davis*

(2) **New Techniques for Topologically Correct Surface Reconstruction**, Udo Adamy, Joachim Giesen, and Matthias John, *ETH Zurich*

(3) **Polyhedral Modeling**, Georges-Pierre Bonneau, and Stefanie Hahmann, *Laboratoire LMC-CNRS, Grenoble*

(4) **Bicubic Subdivision-Surface Wavelets for Large-Scale Isosurface Representation and Visualization**, Martin Bertram, Mark A. Duchaineau, *Lawrence Livermore National Laboratory,* Bernd Hamann, and Kenneth I. Joy, *University of California, Davis*

P8 *Papers:* **Polygon Meshes**

(1) **Anisotropic Geometric Diffusion in Surface Processing**, Ulrich Clarenz, Udo Diewald, and Martin Rumpf, *University of Bonn*

(2) **Fairing of Non-Manifolds for Visualization**, Andreas Hubeli and Markus Gross, *ETH Zurich*

(3) **Interior/Exterior Classification of Polygonal Models**, F.S. Nooruddin, and Greg Turk, *Georgia Institute of Technology*

(4) **Multi-Resolution Dynamic Meshes with Arbitrary Deformation**, Ariel Shamir, Valerio Pascucci, and Chandrajit Bajaj, *University of Texas, Austin*

W4 *Works in Progress:* **TBD**

For information on the Technical Committee on Visualization and Graphics conferences, publications, and programs, check

http://www.cc.gatech.edu/gvu/tccg/

Friday, 1:00 - 3:00pm

CAPSTONE *Capstone Session:* **Awards for Best Paper, Best Panel, Best Hot Topics, and Best Case Study**
Capstone Address: **Variational Methods in Medical Imagery: Application to the Segmentation of Anatomical Structures,** Olivier Faugeras, *INRIA*

VISUALIZATION 2000 DEMONSTRATIONS

Wednesday, Thursday

Visualization 2000 will bring together nearly 600 experts from around the world in the growing field of visualization and its applications. This audience of innovators, representing academia, business and government, purchases and recommends advanced computer hardware and software for their organizations. Join them by participating in one of these demonstration categories:

Corporate Partners   Cost: $5,000

Our Corporate Partners will have a place of prominence at Visualization 2000, as we acknowledge their support of the conference and its goals.

Corporate Demonstrations   Cost $1,750

The demonstrations are informal presentations by companies and research organizations, as opposed to traditional trade show style presentations. The goal is to emphasize research results, novel tools, new equipment, and new applications.

Corporate Support   Cost: $1,000

You can be associated with Visualization 2000 as Corporate Support, providing the conference with your financial assistance without the need to mount a demonstration.

Non-Profit Demonstrator   Cost: $400

The Non-Profit Demonstrator is one whose organization does not sell any visualization products. Examples of Non-Profit Demonstrators from academia, government, or industry are universities, NSF, government sites, and companies whose products are not in any way visualization products.

Publishers Display   Cost: $200

This venue allows publishers to display their visualization-related publications during the conference demonstrations. Parties that are interested need to send their book(s) to the demonstration chair two weeks before the conference. The demonstration co-chairs will arrange a table with book displays in the demonstration area.

Academic Institution Demonstrator   No fee

This category is for academic institutions who do not sell any visualization products. Demonstrations may be proposed in this category and a limited number will be accepted depending on the quality of and interest in the presentation.

We must receive your commitment to participate soon so that we can make arrangements and you can benefit from full publicity for your participation. Don't Delay!

For further information, please contact the demo co-chairs at:

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P.O. Box 1625, MS-3605
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VISUALIZATION 2000 CREATIVE APPLICATIONS LAB

Wednesday, Thursday

The Creative Applications Lab (CAL) is designed to let conference attendees interact with presenters and each other on an individual basis. The CAL will have a variety of computers on which contributors and attendees can install their materials and visualization systems for attendees' experimentation and enjoyment. The CAL will be open in conjunction with demonstrations at Visualization 2000. This is a unique opportunity for conference attendees to interface directly with conference contributors. Please come visit the CAL while you are at Vis 2000! For further information, please contact **Russ Taylor** (taylorr@cs.unc.edu).

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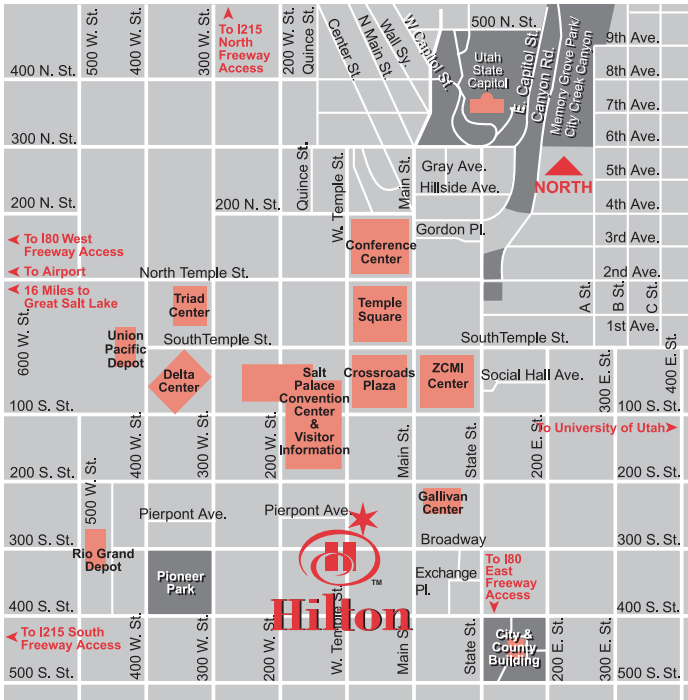## PUBLISHERS DISPLAY

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The Hilton Salt Lake City Center has shuttle service available at $13.00 per person, round trip to and from the Salt Lake International Airport. Current parking rates for overnight hotel guests are $6.00 per night for self-parking and $9.00 per valet parking. Non-guest self-parking rates are $2.00 a day.

All guest rooms are oversized and come with all the comforts of home: coffee maker and complimentary coffee, iron and ironing board, working desk, second phone and data ports in every phone, voice mail, complimentary access for toll-free and credit card calls, and the USA Today delivered to your doorstep weekday mornings.

Hotel dining includes Canyon Ridge Cafe for casual dining or Spencer's for Steaks and Chops with Cigar and Martini Bar. The Hilton Salt Lake City Center also includes complimentary use of our new Health Facilities with indoor lap-pool, sauna, spa, sun deck, and weight and exercise rooms. Enjoy a therapeutic massage at *The Retreat*.

Special nightly rates for the Hilton Salt Lake City Center are $125.00 (U.S.) for a Single/Double.

In addition to the room rate, there is a room tax, currently 10.9%. Check-in time is 3:00 p.m. and check-out time is 12:00 noon. Guests are permitted to check-in earlier or check-out later subject to room availability.

Attendees are encouraged to make reservations early as these special room rates are subject to room availability and are not valid for reservations made after 5:00 p.m. MST, September 15, 2000. (Once our block of special rate rooms are filled, other rates may apply).

To make your hotel reservation, please phone the central reservations office at: 800·HILTONS or the hotel directly at 801·238·2000; or complete the following hotel registration form and send it to the hotel by mail or fax using the address given on the form.

NOTE: *Please sign up at the conference hotel. We understand that you are all on a budget, but so are we. We need your hotel room reservations in the Vis 2000 block at the conference hotel, or else the conference has to pay extra for the conference room rental. Because we have a heavy AV requirement, we have to book a hotel that has large conference rooms and high ceilings. There aren't many of those who will book a small conference like ours. Please help us out by supporting the conference hotel. We don't want to have to raise our rates to cover hotel penalties.*

HOTEL REGISTRATION FORM

Visualization 2000 • October 8 - October 13, 2000

Hilton Salt Lake City Center • 255 South West Temple • Salt Lake City, UT 84101
Reservations: 800·HILTONS • Hotel: 801·328·2000 • Fax: 801·238·4888

Guest Name _____
            First   Middle Initial   Family Name

Arrival Date_____ Departure Date_____

Address to send the confirmation:

Name _____

Address _____

City _____ State_____Zip _____

Country _____ Phone_____

Fax _____

Room type desired: *Smoking preference:*
  ☐   Single   ☐   Smoking
  ☐   Double   ☐   Non-smoking

I have the following special needs: _____

_____

To guarantee with credit card: *Circle one*

Visa   MasterCard   Amex   Diners   CarteBlanche   Discover

Card Number _____

Expiration Date_____

Print the name as shown on credit card:

_____

I authorize the hotel to charge one night's room rate plus tax to this credit card if I fail to show up without cancelling my reservation by 4:00 p.m. on the arrival date.

Signature _____ Date_____

PLEASE RETURN BY MAIL OR FAX BY 5:00 P.M. MST, SEPTEMBER 15, 2000 TO: Hilton Salt Lake City Center • 255 South West Temple • Salt Lake City, UT 84101 • Fax: 801·238·4888

AIRPORT SHUTTLE

Shuttle service is available at $13.00 per person, round trip to and from the Salt Lake International Airport at doors #5 and #10 every twenty minutes Monday - Friday from 6:00 am - 11:00 pm. Weekend shuttles run every 30 minutes 6:00 am - 11:00 pm. Special arrangements can be made for pickup outside those hours by contacting the hotel directly at 801-328-2000.

VIS 2000

IEEE Visualization 2000
ADVANCE REGISTRATION FORM

☐ Mr. ☐ Ms. ☐ Dr. ☐ Prof.

Name: *(please print clearly)* _____

                 Family/Last   *First*   *M.I.*

Organization: _____

Mailing Address: _____

City:_____ State:_____

Zip/Postal Code:_____ Country:_____

Phone:_____ Fax: _____

Email Address:_____

IEEE/Computer Society Membership #: _____ Exp. Date:_____

ACM Membership #: _____ Exp. Date:_____

Sunday / Monday / Tuesday Registration: *You may attend any tutorial or symposium on the day(s) registered. Registration includes Volume Visualization proceedings, Information Visualization proceedings, Monday reception, Wednesday Keynote, Wednesday-Thursday demonstrations, BOFS, the conference videotape, the CD and the Friday Capstone. All tutorial, symposia, and conference proceedings and notes are on the Vis2000 CD.*

Please check the day(s) that you wish to sign up for:

_____Sunday   _____Monday   _____Tuesday

	Early Registration *(received by Sept. 8)*			Late/Onsite Registration *(Sept. 9 or later)*		
	1-day	2-day	3-day	1-day	2-day	3-day
IEEE/ACM member	$250	$350	$450	$300	$420	$540
Nonmember	$325	$450	$575	$380	$540	$700
Full-time student	$155	$195	$235	$190	$230	$270

Sunday-Monday-Tuesday Registration $_____

Conference Registration: *Registration includes technical sessions for Wednesday, Thursday, and Friday, Vis2000 Conference proceedings, Wednesday reception, Wednesday Keynote, Friday Capstone, Wednesday-Thursday demonstrations, and the conference videotape and CD. All tutorial, symposia, and conference proceedings and notes are on the Vis2000 CD.*

	Early Registration *(received by Sept. 8)*	Late Registration *(Sept. 9 or later)*
IEEE/ACM member	$350	$450
Nonmember	$450	$550
Full-time student	$195	$250

Conference Registraton $_____

Total Fee Enclosed (Sunday-Monday-Tuesday, Conference Fee) $_____

Forms received without payment will not be processed.

(US currency only. Checks, money orders or credit cards. Make checks payable to IEEE Computer Society)

Payment Method: ☐ Personal Check   ☐ Company Check   ☐ Visa   ☐ U.S. Gov't P.O.

              ☐ American Express   ☐ MasterCard   ☐ Diners Club

Credit Card number:_____ Expiration Date:_____

Print Card Holder's Name *(As shown on card)*: _____

Signature _____

Additional INFORMATION we need:

1. How did you hear about the Vis2000 conference? *(please check any that apply)*

   ☐ email   ☐ magazine ad
   ☐ mailer   ☐ colleague
   ☐ web   ☐ other
   ☐ attended before

2. ☐ Please do ***NOT*** include my name, mailing/e-mail address, or phone or fax numbers on a published list of attendees.

3. ☐ Please do ***NOT*** include my name and mailing address on mailing lists

4. For *student registration*, please remember to bring a valid student identification card with you to the conference

5. Please check the following if, under the Americans with Disabilities Act, you require specific aids or services during your visit.

   ☐ Audio   ☐ Visual   ☐ Mobile

Additional Information you need:

Make checks payable to IEEE Computer Society. **Advance Registration will not be accepted after 5:00pm (Eastern Time) on Monday, September 8, 2000.** Registration confirmation letters will be sent by postal mail within five days of receiving registration forms with payment. Requests for refunds must be received by September 25, 2000. Refunds are subject to a $50 processing fee. Participants with confirmed registration who fail to attend and do not notify the IEEE Computer Society prior to refund date will be charged the full fee. Participant substitutions are allowed at any time with written notification. Registration will be accepted on site at the late registration fee rate.

FAX your Registration to:
+1·202·728·0884
Attn: VIS 2000 registration

or MAIL to:
IEEE Computer Society
Attn: VIS 2000 Registration, Dept. 6006
Washington, D.C. 20042-6006

or register ON-LINE at:
http://www.erc.msstate.edu/vis2000

Questions about Registration?
Please call +1·202·371·1013 between 8:30am and 5:00pm (Eastern Time) or send email to register@computer.org.

Do not send credit card numbers over email.

Find out more about Visualization 2000 and making your Vis2000 hotel reservation at
http://www.erc.msstate.edu/vis2000

V I S
2000
IEEE VISUALIZATION

R E G I S T R A T I O N   I N F O R M A T I O N

URL: http://www.erc.msstate.edu/vis2000
Phone: 202·371·1013 (Eastern Time)
Fax: 202·728·0884 (Attn: VIS 2000 registration)

CRITICAL DATES

September 8	Close of Early Registration
September 15	Cut-off for Guaranteed Hotel Reservations (*5 p.m. MST*)
October 8	Conference Commences

- **Biomedial Visualization**
- **Information Visualization**
- **Techniques**
- **Tetrahadral Grids**
- **Visual & Haptic Displays**
- **Biomedical Applications**
- **Flow Visualization**
- **Scientific Applications**
- **Visual Perception**
- **Environmental Applications**

- **Volume Rendering**
- **Polygon Meshes**
- **Isosurfaces**
- **Multi-Dimensional & Visualization Systems**
- **Physics, Information, and Fields**
- **Collaboration and Network Visualization**
- **Clustering Vector Fields**
- **Reconstruction and Modeling**
- **Textures and Geometry**

WHAT YOU GET WITH YOUR REGISTRATION

SUNDAY-MONDAY-TUESDAY		
CONFERENCE		
Vis2000 Proceedings	●	
Wednesday Vis2000 Reception	●	
Vis2000 Keynote	●	●
Vis2000 Capstone	●	●
Papers	●	
Panels	●	
Cases	●	
Works in Progress	●	
CD-ROM	●	●
Conference Video	●	●
Tutorial Attendance		●
VolVis 2000 Symposium Attendance		●
VolVis 2000 Symposium Proceedings		●
InfoVis 2000 Symposium Attendance		●
InfoVis 2000 Symposium Proceedings		●
Monday Reception		●
Demonstrations	●	●
BOFs	●	●