



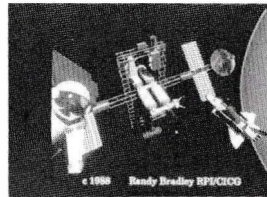
SIGGRAPH '88 Technical Slide Set Credits

*Edited by
Bruce Eric Brown*

The technical slide set represents the state-of-the-art in computer-generated images. This year's set has 78 slides. A mistake was made on number 15 and is corrected here.

Each slide is printed here in black and white to facilitate locating information about the images. The full color 35mm slide set can be ordered from: ACM order department, P.O. Box 64145, Baltimore, MD 21264; 1-800-342-6626. The ACM order number for the SIGGRAPH '88 technical slide set is 915880. The cost is \$30 for members (plus \$4 handling); \$40 for non-members (plus \$5 handling).

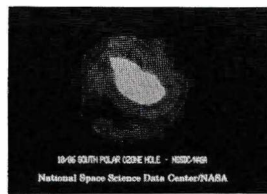
1. **High Frontier** by Randy Bradley. The Clockworks (CICG), an object-oriented visualization system, including raytracing renderer. Sun 4/280, microVAX II, E&S PS300, Raster Tech 1/380, Dunn 635. A 1280x1024 raytraced image showing the high frontier reflected in the faceplate of an astronaut in orbit over the planet. Contact: Randy Bradley, RPI Center for Interactive Computer Graphics, CII 7107, Troy, NY 12180, (518)756-9894.



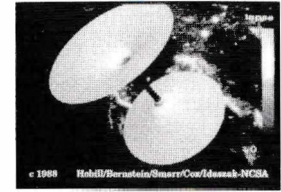
2. **High Frontier** by Randy Bradley. The Clockworks (CICG), an object-oriented visualization system, including raytracing renderer. Sun 4/280, uVAX II, E&S PS300, Raster Tech 1/380, Dunn 635. A 1280x1024 raytraced image showing the high frontier reflected in the faceplate of an astronaut in orbit over the planet. Contact: Randy Bradley, RPI Center for Interactive Computer Graphics, CII 7107, Troy, NY 12180, (518)756-9894.



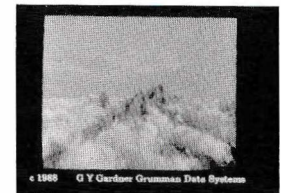
3. **South Pole Ozone Hole** by David Wildenhain, Michael Gough, Craig Goettsche and Lloyd Treinish. NSSDC Graphic System, Common Data Format used on a Dec VAX 8800, I2S frame buffer and a Matrix camera. Daily global ozone for 10/10/86 from the Total Ozone Mapping Spectrometer aboard NASA's Nimbus-7 spacecraft. The sphere is deformed from a nominal level according to the amount of total ozone. The radius and the color-scale (blue to red) correspond to total ozone in Dobson Units from 140 to 540. The view is directly over the South Pole with the prime meridian vertical. The "ozone hole" is quite prominent in the center. Contact: Lloyd A. Treinish, NASA/GSFC-NSSDC (National Space Science Data Center), Code 634, Greenbelt, MD 20771, (301)286-9884.



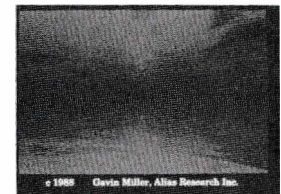
4. **Black Hole Space Times** by David Hobill, Donna Cox, David Bernstein, Larry Smarr and Ray Idaszak. Numerical Relativity Code developed on CRAY X/MP; visualization using wavefront. Alliant FX-8, Cray X/MP. Embedding diagrams of a single Schwarzschild black hole obtained from a numerical solution of Einstein equations which describe the behavior of the gravitational field. The surface of the diagram measures the curvature of space due to the presence of a black hole while the color scale represents the speed at which idealized clocks measure time, i.e. red represents the slowest clocks, while blue represents the faster clocks. Contact: David Hobill, Donna Cox, David Bernstein, Larry Smarr and Ray Idaszak, National Center for Supercomputing Applications, 605 E. Springfield Ave., Champaign, IL 61820, (217) 244-0072.



5. **Functional Scene Model** by Geoffrey Y. Gardner. Data General and Vax 8530, Raster Technologies Model One. Polygonal terrain and quadric clouds with position defined by spectral functions. Contact: Geoffrey Y. Gardner, Grumman Data Systems, MS D12-237, 1000 Woodbury Rd., Woodbury NY 11797, (516)682-8417.



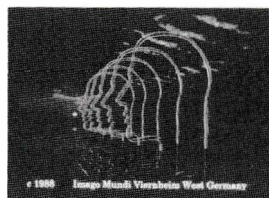
6. **The Final Sunset** by Gavin Miller. Alias 2.3 renderer/natural phenomena option on Silicon Graphics 4D/70 workstation. This is a single image from an animation showing a sunset followed by the catastrophic effect of a nuclear winter on the atmosphere. Contact: Gavin S.P. Miller, Alias Research, Inc., 110 Richmond St. E., Toronto, Canada, M5C 1P1.



7. **Stochastic Sunset** by J. P. Lewis using NYIT rendering software; stochastic modeling software on the SUN-3 and Dicomed film recorder. Non-fractal waves and clouds molded by generalized stochastic subdivision. Contact: J. P. Lewis, NYIT Computer Lab, Old Westbury, NY, NY 11568, (516) 686-7644.



8. **Human Future** by Walter Hertig using the Cubicomp Picturemaker running on the IBM AT, PM-framebuffer and QCR-Z. Title picture of an image brochure. The transparent heads are 3D created, Phong shaded; sky and reflection are video digitized and mirrored. Contact: Walter Hertig, IMAGO MUNDI, Werner-Heisenberg-Str. 8-40, D-6806, Viernheim, West Germany, 06204/2040.



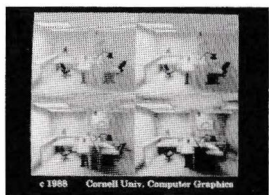
9. **The Sky** by Eihachiro Nakamae and Tomoyuki Nishita, using in house software on the TOSBAC Data System 600/80. Sky color: Depicting the spectral distribution of sky radiation considering both scattering and absorption due to air molecules and aerosols in the atmosphere. Contact: Eihachiro Nakamae, Electric Machinery Laboratory, Hirsohima University, Saijo-cho, Hirsohi- Hirsohima 724, JAPAN, 0824-22-7111.



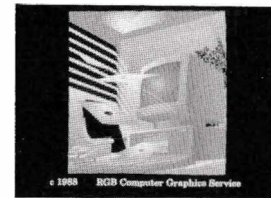
10. **Steel Mill** by Stuart I. Feldman/John R. Wallace using Cornell University Program of Computer Graphics in-house software running on the Digital Equipment VAX 8700 and Hewlett Packard 320 for display. The image was generated in two passes. The global illumination was first estimated using a radiosity progressive refinement approach. This solution was then used to directly solve for the radiosity at 70,000 vertices. This would have been impractical with standard radiosity approaches due to the exorbitant size and cost of the matrix formation and solution. Contact: Michael Cohen, Program of Computer Graphics, Cornell University, 120 Rand Hall, Ithaca, NY 14853, (607)255-6711.



11. **Progressive Radiosity Solution After 1, 2, 24 and 100 Hemi-cubes** by Keith Howie/ Shenchang Eric Chen using the Cornell University Program of Computer Graphics in-house software on the Hewlett Packard 320 workstation with 320SRX graphics accelerator. The images were rendered using a progressive refinement approach to solving the radiosity solution for global illumination. This new approach allows a rapid convergence to final illumination levels and permits viewing of the progressive stages in the solution. The four small images represent the solution after 1, 2, 24 and 100 hemi-cube operations have been performed. Contact: Michael Cohen, Program of Computer Graphics, Cornell University, 120 Rand Hall, Ithaca, NY 14853, (607)255-6711.



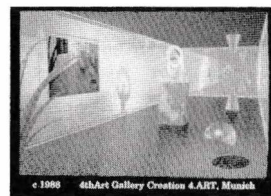
12. **Computer** by Gabriella Monti using Lumena 8 running on the IBM PC AT compatible. Experiment—this image has been completely hand made, using software painting capabilities (office interior with a close up of the computer). Contact: Tullia Redafill Sprealco, RGB Computer Graphics Service, Viale Piave 17 -Milano/Italy, 02/783.992 - 793.223.



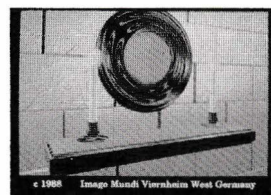
13. **Room without a View** by Gary Mundell and Andrew Pearce using the Alias 12 modeler and renderer running on the Silicon Graphics 4D/70. Label mapping, solid wood texturing, texture mapping, bump mapping and anti-aliased shadow mapping. This image demonstrates the ability to texture all aspects of the surface characteristics. Contact: Andrew Pearce, Alias Research, 110 Richmond St. E., Toronto, Ontario, Canada, M5C-1P1, (416)362-9181.



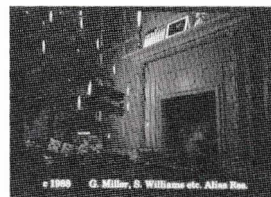
14. **4th Art Gallery** by Christian D.J. Waschke and Claudius Lazzeroni using the Wavefront 2.6 3D animation package NPS paint- and retouch software running on the IRIS 3130 workstation, Sun networkserver, Alliant FX4 rendering 1/2 inch mag-tape, PC base paint and retouch station, EIKONIX (4K) scanner: digitizer tablet. A complex 3D computer graphics still in a fine art style created with all possible effects (ray tracing, reflection mapping, shadow casting, refraction, bump texture mapping, texture design). A gallery of mirrors with 3D objects hanging in the air. Contact: ART GMBH, Kapuzinerstrasse 25 d- Munichich 2, West Germany, 01149 89 53 27 96.



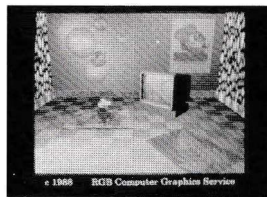
15. **Mirror Mirror** by Jim Hillin, Ken Cope, Geoff Fennell and Frank Little using Digital Arts DGS v 2.0 on a Everex 1800 AT, Intel above board, Targa 32 frame buffer and Definicon Render Engine. This image was the cover for *Opticmusic Film & Video* in March 1988. Contact: Jim Hillin, Imageworks, Mr. Film, 1309 Palisades Drive, Pacific Palisades, CA 90272, (213) 459-4292.



16. **Curling up by the Fire** by Gavin Miller, Steve Williams, Patricia Anderson, Gary Mundell, Andrew Pearce, Robert LeBlanc and William Morris using Alias 2 modeler, Alias 2.4 renderer running on the Silicon Graphics 4D/70 workstation. Procedural snake (see SIGGRAPH '88 paper, "The Motion Dynamics of Snakes and Worms"). Procedural wood and fire textures, procedurally modeled tree. Scanned in wrapping paper and card textures. The fireplace and room were modeled interactively. Contact: Gavin S.P. Miller, Alias Research Inc., 110 Richmond St. E., Toronto, Canada, M5C 1P1, (416)362-9181.



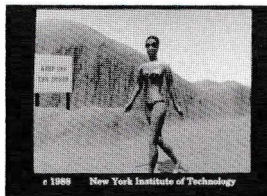
17. **MIKI** by Massimo Ontani using the Crystal3D and Lumena 16 software running on the IBM PC/AT compatible. Mixed image which is composed by various bidimensional elements such as parts which were scanned, self-generated fractals in a 3D environment. Contact: Tullia Redaelli Speafico, RGB Computer Graphics Service, Viale Piave 17-Milano/Italy, 02/783.992 - 793.223.



18. **Glass Grasping** by MIRALab, University of Montreal using the software called Human Factory running on the VAX 8600 and Raster Technologies One/80 and Dunn Instruments film recorder. Frame from the film "Rendez-vous Montreal" by N. Magnenat-Thalman and D. Thalman. Marilyn Monroe grasps a glass using an original "grasp object algorithm," limb shapes are automatically deformed using JLD (joint-local-deformation) operators. Contact: D. Thalman, MIRALab, University of Montreal, IRO, University of Montreal, P.O. Box 6128 Station A, Montreal, Canada H3C 377, (514) 343-6794.



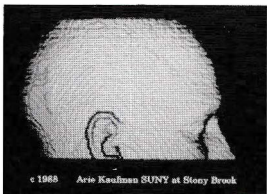
19. **Girl on the Beach** by Dick Lundin and Susan Van Baerle using polygon rendering software running on the VAX 11/780. Frame from an animated sequence demonstrating flexible modeling software at 1024 resolution. Contact: Dick Lundin, New York Institute of Technology, P.O. Box 170, Old Westbury, NY 11568, (516) 686-7644.



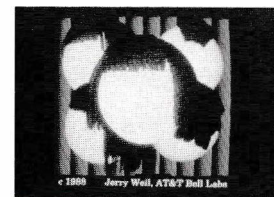
20. **Jemy G. (JG), JG Unfinished, Rocket Roger** using Genographics D. This illustrates the creation of a quasi-realistic illustration using an MX. Contact: Bob Curtin, 204 Bailey St., Lawrence, MA, 01843, (617) 688-4635.



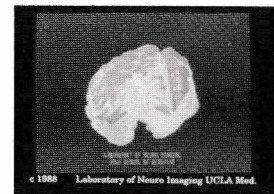
21. **Skull** by Kaufman and Klienstern with Sun View and CUBE architecture software running on the SUN 3-160c or VAX 708 + Ramtek 9400. A 1283 voxel model of the skull has been reconstructed from MRI scans; it is projected and shaded using 3D discrete congruent shading of the CUBE architecture. Contact: Arie Kaufman, SUNY at Stony Brook, Dept. of Computer Science, SUNY at Stony Brook, Stony Brook, NY 11794-4400, (516) 632-8441.



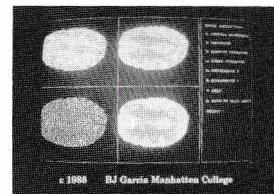
22. **5 Hairy Spheres** by Jerry Weil using in-house hair generation and rendering software on the Adage RDS 3000. Various parameters are used to describe this style, including waviness, curliness and direction of growth. Contact: Jerry Weil, Whitney Demos Productions, 300 Corporate Point, Suite 100, Culver City, CA 90230, (213) 649-6400.



23. **Structure & Function of the Whole Brain** by B. A. Payne, M. Samaie and A. W. Toga with in-house software developed using A-buffer and solid texturing coded in C and Fortran running on the VAX 8530; Gould ip8500. A 3D brain reconstructed from sections. The cortical surface was rendered with transparency to visualize brain physiology on a subcortical structure. Contact: Dr. Artur W. Toga, Laboratory of Neuro Research Center, Reed Neurological Research Center, 710 Westwood Plaza, Room 4-238, Los Angeles, CA 90024-1769, (213) 206-2101.



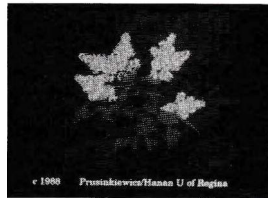
24. **Magnetic Resonance Images -Brain** by B.J. Garcia, T. Horatyshyn and K. Boland using Fortran with Graphical Kernel System (GKS) on the Data General MV10000 with GDC-1000 graphics terminal. GKS-based image processing was used on magnetic resonance brain scan images. These were unprocessed and then processed with three different edge-detection enhancements. Contact: B.J. Garcia, Manhattan College, Dept. of Elec. Eng., 3840 Corlear Ave., Rirerdule NY 10471, (212) 520-0383.



25. **Ambush** by Rosalie Bibona, Richard Fadden and Eduardo Benitez. Edge scan area processor software simulation. The "Static Scene Generator" is a software simulation programmed in C language. The algorithms are hardware simulations of General Electric Company's (SCSD) advanced product line of real time flight simulators. Software simulation runs on multiple platforms. Apollo DN3000 with an AT&T Targa 24 graphics board, or Sun 3/280 with an IVAS, or a VAX 11/780 with a Gould IP8500 DeAnza display. This image depicts a camouflage tank hiding among trees. The foliage was digitized by a 78/99 Eikonix digitizer (110 lin/inch). The texture mapping techniques are integrated into General Electric Company's (SCSD) computer image generator database workstation. Contact: Rosalie Bibona, General Electric Co., 1800 Volusia Ave. - Room 4336, Daytona Beach, FL 32015, (904) 239-2024.



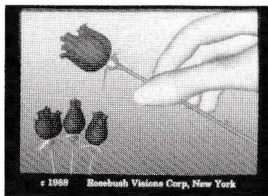
26. **Lilac Twig** by Przemyslaw Prusinkiewicz and James Hanan. In house developed software package for modeling plants, based upon the Lindenmayer systems. Iris 3130 with Matrix 6000 film recorder. The twig architecture is generated by a Lindenmayer system which captures the essential topological and geometrical features of "real" lilac twigs. Contact: Przemyslaw Prusinkiewicz, University of Regina, Department of Computer Science, Regina, Saskatchewan S4S 0A2 Canada, (306) 584-4061.



27. **Test of Voxel-Based Growth Program** by Ned Greene. Software used was "gaudi" and NYIT animation system on a VAX 11/780 with Ikonos frame buffers. This is a frame from "Test of Voxel-Based Growth Program" from SIGGRAPH '87 film and video show. Growth program produced the model of the vines. Contact: Ned Greene, NYIT Computer Graphics Lab, P.O. Box 170, Old Westbury, NY 11568, (516) 686-7644.



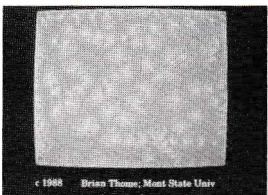
28. **Hand and Rose** by Gail Goldstein, David Tu, Michael Mannix and Caleb Weissler using Visions on a Harris 800 CPU with Dicomed film recorder. The hand is a fully articulated model that uses simple generalized software to cross sections onto a skeleton. Provision is made to change the position and shape of the sections as the hand moves. The rose is made with patches and opens from a bud to a full bloom. Contact: Judson Rosebush, Rosebush Visions Corp., 25 West 45th St. NY, NY 10036, (212) 398-6600.



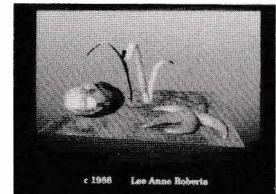
29. **On the Road** by Team DIS13 with KAE in-house animation and rendering software on KAE multiple CPU process control computer MPR 1300 and real-time image generator ATLAS-DIS13 with 600x800x24 framebuffer. Image generated with modified scanline algorithm in realtime used for applications. Contact: Hermann A. Hattermann, Krupp Atlas Elektronik GmbH (KAE) Sebaldsbrucker Heerstr. 235, D2800 Bremen, P.O.B. 448545, (421) 457-2170.



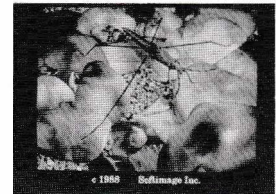
30. **Fractal Moss** by Brian Thome. Inspired by an article entitled "Fractal Growth" by Leonard M. Sander in the Jan. 1987 issue of *Sci. Am.* generated on a Vax 11/750 under BSD.2 UNIX at Montana State Univ. A variation on computer simulation of diffusion limited aggregation. Contact: Brian Thome, Vectrix Corp. 2606 Branchwood Dr., Greensboro, NC 27408, (919) 288-0520.



31. **Mandrill on the Quarter Shell** by LeeAnne Roberts with Silicon Graphics Iris C Library generated on a Silicon Graphics Iris. An underwater scene. The sand, seaweed and starfish are texture mapped with white noise. The sea urchin is texture mapped with a picture of a mandrill. Contact: LeeAnne Roberts, Air Force Institute of Technology, 4987 Kinsgate Ct., Dayton, OH 45431, (531)-252-2761.



32. **Water Strider** by Daniel Langlois with support of Laurent Lauzon, Richard Mercille and Char Davies. This is a still from the short film "Water Strider." It consists of 1560 individual grains of sand, 29 rocks and the water strider of 82 articulated elements rendered using the equivalent of 50,000 polygons and 52 different procedured solid textures. The scene is lit by three light sources and a subtle surface of translucent water is reflecting the water strider and the sky over the scene. All these elements were created using the SOFT-IMAGE 4d graphic environment software on the Silicon Graphics and Pixar. Contact: Daniel Langlois, Softimage, Inc. 3510 Blvd. St. Laurent, Suite 214, Montreal, Quebec, Canada H2X 2V2, (514) 845-1636.



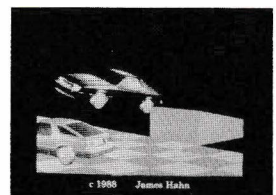
33. **Eric the Dynamic Worm** by Gavin Miller and Freddie Gitelman made on the Alias 2.4 renderer running on the Silicon Graphics 4D/70 workstation. The worm dynamics were modeled procedurally. Background scene was modeled interactively. The wood textures are generated procedurally. Cubic environment maps are used for the reflection. Contact: Gavin S.P. Miller, Alias Research, Inc., 110 Richmond St. E., Toronto, Canada, M5C 1P1, (416) 362-9181.



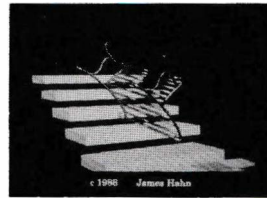
34. **Easy Rider** by Gary Mundell and Andrew Pearce using the Alias/2 modeler and renderer running on the Silicon Graphics 4D/70. Bump mapping, texture mapping and cubic environment maps are applied to a tricycle which is casting an anti-aliased shadow map onto a solid wood textured floor. Contact: Andrew Pearce, Alias Research, 110 Richmond St. E., Toronto, Canada, M5C 1P1, (416) 362-9181.



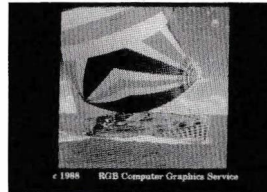
35. **Rigid Body Simulation** by James Hahn, Chrysler Corp. and Evans & Sutherland using Rigid Body Dynamics Software on Symbolics 3620 and Convex C1 computers. The dynamics of rigid body are realistically animated. Contact: James K. Hahn, Ohio State University ACCAD, Research Park 1224 Kinnear Rd., Columbus, OH, (614) 292-3416.



36. Rigid Body Simulation by James Hahn using Rigid Body Dynamics Software on Symbolics 3620 and Convex C1 computers. The dynamics of rigid body are realistically animated. Contact: James K. Hahn, Ohio State University ACCAD, Research Park 1224 Kinnear Rd., Columbus, OH, (614) 292-3416.



37. Boat by Gabriella Monti using the Lumena 16 software on the IBM PC AT computer. The image of the boat was scanned as well as the two skies and the sea which were pasted in afterward. A neon effect of building wire-frame was pasted in transparency. Contact: Tullia Redaelli Spreafico, RGB Computer Graphics Service, Viale Poave 17-Milano Italy, 02/783.992-793.223.



38. The Letter by Ronald Stephan with Cubicomp Picturemaker on the IBM AT, PM-framebuffer QCR-Z. Another study in composite image as a special detail appears, hand lettering for texture mapping. Contact: Walter Hertig, IMAGO MUNDI, Werner-Heisenberg-Str. 8-40, D-6806, Viernheim, West Germany, 06204/2040.



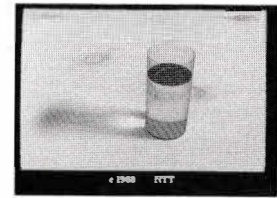
39. Machine Interface by Kurt Fleischer and Demetri Terzopoulos using in-house software on Symbolics. A 3D digitized bust of Victor Hugo (from Henri Maitre of ENST Paris vis University of Utah) undergoes a simulated elastoplastic deformation. Four images in sequence are shown with robot hand. Contact: Kurt Fleischer, Schlumberger Palo Alto Research, 3340 Hill Ave., Palo Alto, CA 94306, (415)496-4614.



40. Creating the Right Impression by Brian Wyvill and Angus Davis with Graphicsland Animation System on the Silicon Graphics IRIS 3020 and SUN 3/280. ISO-surfaces were created from superellipsoids. Blending is controlled by a hierarchical system. Contact: Brian Wyvill, Dept. of Computer Science, University of Calgary, 2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4, (403) 220-6015.



41. A Glass of Water by Mikio Shinya with in-house software running on the VAX 11/780. This image was rendered by pencil tracer. Tracing light pencils and application of the illuminance formula successfully simulated the illuminance pattern focussed by the glass. The light source was rectangular. The image was generated on a VAX11/780 at a resolution of 2048x1366. Contact: Mikio Shinya, Nippon Telegraph and Telephone, Visual Media Laboratory, NTT Human Interface Laboratories, 1-2356, Take, Yokosuka-shi, Kanagawa, Japan, 81-468-59-4716.



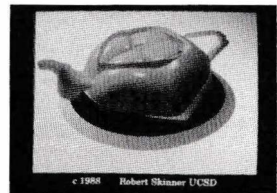
42. Tea Set in Mirrors by T. Slotte (Arabia Ltd.), C. Woodward and P. Rekola (HUT) using CUBIX modeling system. EX-Trace ray tracing system, EX-CELL spatial directory on the SUN-3 260 with a 8-bit frame buffer. Models were designed as B-spline surfaces and converted to Bezier form for rendering. Surface patches were subdivided dynamically for each intersecting ray with no preprocessing. Ray-tracing was accelerated with spatial index to the object space. Contact: Panu Rekola, Helsinki University of Technology, Laboratory of Information Processing Science, Otakaari 1 SF-02150 Espoo FINLAND, 358-0-451258.



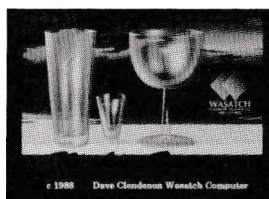
43. Hand With Reflecting Teapot by Dean W. Gonzalez with locally developed ray tracing renderer running on the Data General MV 10000 computer with Ramtek 9460 display device. The classical teapot model is held by a robot whose reflection is seen. Also, the surrounding room's reflection is visible in the teapot. This image was inspired by M. C. Escher's artwork, "Hand With Reflecting Globe." Contact: Dean Gonzalez, The Dept. of Computer Science, USAF Academy, Colorado Springs, CO 80840-4701, (719)472-2136.



44. Not Safe for Stove-Top Use by Robert Skinner and Matt Moore using the flexible object animation system running on the ISI 68020/68881 mainframe. The flexible teapot was modeled using finite element analysis as point masses connected by springs. This is a single frame from an animation of the teapot "melting." Contact: Robert Skinner, University of California, Santa Cruz, Computer and Information Sciences, Applied Sciences Building, Santa Cruz, CA, 95064, (408)429-4043.

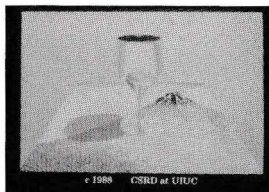


45. **Night Cap** by Dave Clendenon using the Wasatch PC1024 illustration system/ Wasatch PC3D system/ Wasatch PC4096 presentation graphics/ Wasatch scanner software. This image was created using the new scanner software and the new 3D rendering program with multiple 3D images and the presentation layed on top. Contact: Dave Clendenon, Wasatch Computer Tech/ Wasatch Imagination Center, 123 East 200 South, Salt Lake City, UT 84111, (801) 575-8043.



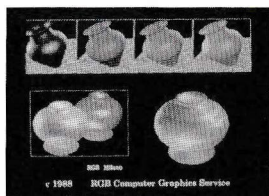
© 1988 Dave Clendenon Wasatch Computer

46. **Steel Glass** by Peter Shirley using CSRD ray tracer on the Alliant FX/8 and Pixar image computer. This image of a metal glass was ray traced concurrently on eight processors. The glass is a tessellated surface generated from a surface of revolution. Contact: Allan Tuchman, Center for Supercomputing Research and Development, 305 Talbot Lab. 104 South Wright, Urbana, IL 61801, (217) 244-0048.



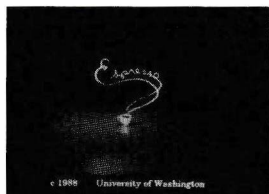
© 1988 CSRD at UIUC

47. **Vases** by Massimo Ontani using Crystal 3D and Lumena 16 software on an IBM PC/AT compatible. This is a study of texture mapping on various solids. Contact: Tullia Redaelli Sprafico, RGB Computer Graphics Service, Viale Piave 17- Milano Italy, 027 83.992.



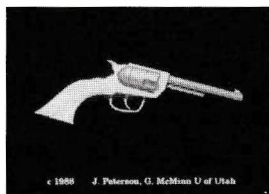
© 1988 RGB Milano
IN3D Computer Graphics Service

48. **Untitled** by Tony DeRose and Dan O'Donnell. The slide demonstrates a new technique for modeling light sources as geometric solids. The image contains only one light source—the espresso sign—and is constructed from two free-form surfaces. Produced on an Adage 3130 and VAX 8550. Contact: Tony DeRose, University of Washington, Department of Computer Science, FR-35, Seattle WA 98195.



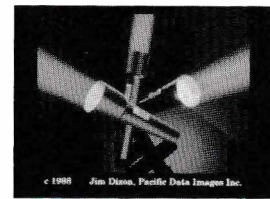
© 1988 University of Washington

49. **Revolver** by John Peterson, Glenn McMinn, University of Utah on Alpha-1 geometric design system using VAX 11/785, E&S PS 300, Grinnell frame buffer and Matrix camera. The gun was modeled with B-spline surfaces (NURBS). It was rendered with a ray tracing package that supports texture, reflection and shadows. Contact: John Peterson, Apple Computer, 20525 Mariani Ave, MS 32E, Cupertino, CA 95014, (408) 973-6124.



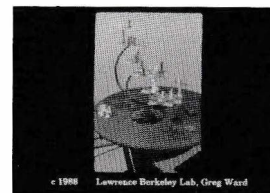
© 1988 J. Peterson, G. McMinn U of Utah

50. **Ikebana** by Jim Dixon using PDI proprietary animation system on a Ridge 3200 computer with Raster Tech One/25 frame buffer and a Dunn camera. The image was created using PDI's modeling and rendering software. Reflection, bump and transparency mapping were used on 8000 polygons which rendered at 512x512 pixels in 15 minutes on a Ridge 3200. The light beams were modeled and "added" instead of "matted" to give a luminous quality. Contact: Jim Dixon, Pacific Data Images, 1111 Karlstad Dr., Sunnyvale, CA 94089, (408) 745-6755.



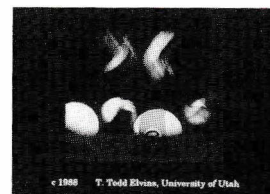
© 1988 Jim Dixon, Pacific Data Images Inc.

51. **Tridimensional Chess** by Greg Ward and Christopher Moll using RADIANCE custom ray tracing software on a Sun 3 with a Dicomed film recorder. Checkmate position in classic Star Trek game. Chess boards are translucent. The wine is pink chablis. Contact: Greg Ward, Lawrence Berkeley Laboratory, 1 Cyclotron Road 90-3111, Berkeley, CA 94720, (415) 486-4757.



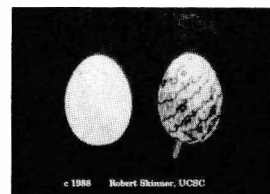
© 1988 Lawrence Berkeley Lab, Greg Ward

52. **Dynamic Pool Balls** by Todd Elvins using Alpha-1 ray tracer "PRT" written by John Peterson on a Sun 3. This is a still from a movie showing dynamic simulation of pool balls in motion. Motion is completely controlled using force and torque calculations. Contact: Todd Elvins, University of Utah, 3190 MEB, Salt Lake City, UT 84108, (801) 581-5642.



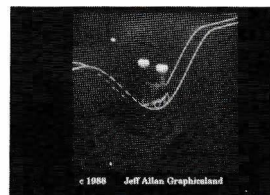
© 1988 T. Todd Elvins, University of Utah

53. **Lee's Eggs** by Robert Skinner and Cathy Skinner using Optik ray tracing package, University of Toronto on an ISI 68020/68881 mainframe and Imagraph frame buffer. The ray tracing package has been extended to create solid textures that are fractal, self-similar and band-limited. Contact: Robert Skinner, University of California, Santa Cruz, Computer and Information Sciences, Applied Sciences Building, Santa Cruz, CA 95064, (408) 429-4043.



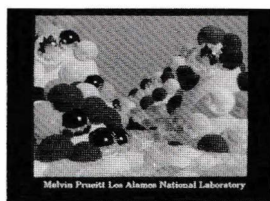
© 1988 Robert Skinner, UCSB

54. **Suspension Bridge** by Jeff Allan using Graphicsland animation system on a Silicon Graphics IRIS 3020 and Sun 3/280. The iso-surface form (train) is deformed by the same function as the ridge object (bridge). Contact: Brian Wyvill, Department of Computer Science, The University of Calgary, 2500 University Drive, N.W., Calgary, Alberta, Canada T2N 1N4, (403) 220-6015.



© 1988 Jeff Allan Graphicsland

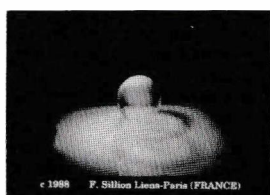
55. Lake Shore Nest by Melvin L. Prueitt using his own software on a Cray computer and Dicomed film recorder. Life on a hypothetical planet. Eggs change color to absorb selected wave lengths of sunlight for "enzyme" synthesis. They turn clear just before hatching to allow the creature to become visually adapted to the world. Contact: Melvin L. Prueitt, Los Alamos National Laboratory, MS-D415, Los Alamos, NM 87545, (505)667-4452.



56. Gossamer Lights by Patricia Search using a solid modeler:TIM and a ray tracer from "Clockworks" software on a Data General MV10000, Raster Tech. One/20 and E&S PS 300. Clockworks is an object-oriented software package for visualization of scientific and mathematical data. In this image clear spheres are colored and textured by refraction and reflection of environmental light. Contact: Patricia Search, Rensselaer Polytechnic Institute, Troy, NY, (518)276-6470.



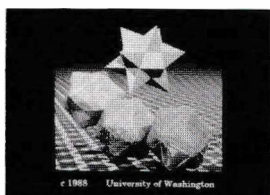
57. Soap Bubble by F. Sillion using the light interreflection calculation system on a Ridge computer. The calculation system combines ray-tracing and radiosity and allows arbitrary shapes to specularly reflect or refract light. Contact: Francois Sillion, Liens, 45 rue D'ULM, 75005 Paris, France, 43 26 59 96.



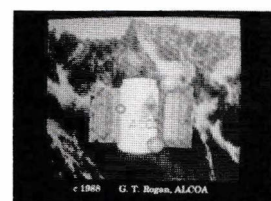
58. Untitled by Peter Shirley using PATH ray tracer on the VAX 11/750 and Pixar image computer. This image of a reflective ball and glossy block rendered using PATH tracing algorithm. Contact: Allan Tuchman, Center for Supercomputing Research and Development, 305 Talbot Lab, 104-South Wright, Urbana, IL 61801, (217) 244-0048.



59. Smooth Subdivision Surface based on Triangles by Gemini Lasswell and Charles Loop using an in-house modeling system and ray tracer on a VAX 8550 and an Ikonas RDS 3000 frame buffer. A refinement operator has been iteratively applied to a stellated dodecahedron, resulting in a sequence of successively smoother approximation surfaces. This technique is a generalization of triangular B-spline refinement. Contact: Charles Loop, University of Washington, Department of Computer Science, FR-35, Seattle, WA 98195, (206)543-9349.



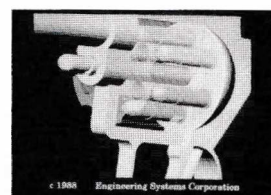
60. Can in Mountain Setting by G.T. Rogan using experimental in house ray tracing program on a VAX with an Adage 3006 display. Digitized on an Amiga 1000. The aluminum can planes and spheres ray traced over digitized image with texture mapping, reflections and shadows. Contact: G.T. Rogan, ALCOA Technical Center, ALCOA Center, PA 15069, (412) 337-2366.



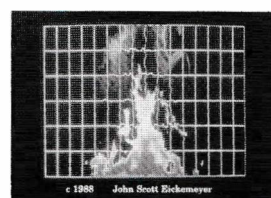
61. Holder by Lasse Holmstrom. Timo Laakko and Pann Rekala using GWB BR modeler, EX-TRACE ray tracer and EXCELL spatial index on a Sun 3-260 with an 8 bit frame buffer. The model was built of planar and curved surface elements under a boundary representation modeler. Most of the edges are filleted. Ray tracing was accelerated by a spatial subdivision method. Contact: Pann Rekala, Helsinki University of Technology, Laboratory of Information Processing Science, Otukaari 1, S F-02150 Espoo Finland, (358)0-451-2158.



62. Ready to Shoot with wireframes by Eddie Moreau and David Hitchner. Made with automatic wireframe to BREP conversion program by S. Mark Courter. Hidden line and shade image rendering by David Vicknair and David Wilbanks on a PC-386 with VMI image manager 1024. The automatic surface finding system of ESC converts randomly created wireframes to BREP solid models. This includes wireframes with curved edges and nonplanar faces. Contact: S. Mark Corter, Engineering Systems Corporation, 3636 S. Sherwood Forest Blvd., Suite 400, Baton Rouge, LA 70816, (504) 769-2226.

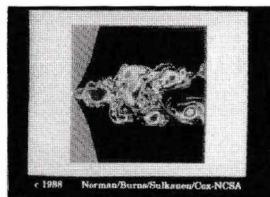


63. Turbulent Campfire 1 by John Scott Eickemeyer with an Intel personal supercomputer (a 32 mode "hypercube" parallel processor); displayed on a Hewlett Packard 9000 workstation. This image was produced by adding "turbulence" to a proledirum definition of a non-turbulent campfire. The turbulence model is described in Ken Perlin's papers in SIGGRAPH '85. The flame and smoke were produced using Perlin's "turbulence" function and the heat distortion of the background grid was produced using Perlin's "Dnoise" function. The method is described in detail in the artist's masters thesis. Contact: John Scott Eickemeyer, University of California, Computer Science Department, 801 Highland Avenue, Los Angeles, CA 90024, (213)825-3691.



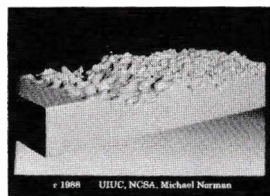
64. Disrupted Jets from Active

Galaxies by Michael Norman, Donna Cox, Martin Sulkanen and Jack Burns using ZUES, ICARE and Imagetool on the CRAY XM/P, Silicon Graphics 2400 and Sun workstation. Astronomers used the CRAY XM/P supercomputer to explain why jets from some galaxies flare dramatically. The magneto-hydrodynamics code solves the equations that describe the flow of a fluid or gas with magnetic fields using finite differences. A special color-map emphasizes the morphology of the simulation. As a jet with Mach number 2.5 passes through the shock wave, the jet abruptly slows and breaks up into a broadened subsonic plume whose morphology is strikingly similar to that of a radio lobe of a wide angle tailed galaxy. This research has given astronomers important clues about why jets from some radio galaxies flare into broad plumes while the jets from others remain remarkably straight and narrow. Contact: Donna Cox and Michael Norman, National Center for Supercomputing Applications, 605 E. Springfield Ave., Champaign, IL 61820, (217)244-0072.



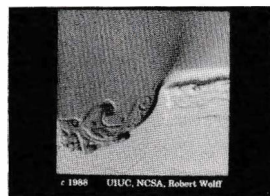
65. 3-D Turbulent Shear Flow at

Mach 1.1 by Craig Upson using Wavefront Technologies, SURF in-house surface contouring software on an Alliant FX-8 and Silicon Graphics IRIS 3130. Smoothed particle hydrodynamics simulation of a transonic mixing layer. Contact: Michael Norman and Craig Upson, National Center for Supercomputing Applications, 152 Computing Applications Bldg., 605 E. Springfield Ave., Champaign, IL 61820, (217)244-6830.



66. Formation of Venus Plasma

Clouds and Streamers by Matthew Arrott and Stefen Fangmeier using Wavefront Technologies in-house relief mapping software on an Alliant FX-8 and Silicon Graphics IRIS 3130. 2D MHD simulation of the formation and evolution of plasma clouds at the Venus Ionopause. The hot (shocked) solar wind is flowing from left to right. Contact: Matthew Arrott and Stefen Fangmeier, National Center for Supercomputing Applications, 152 Computing Applications Bldg., 605 E. Springfield Ave., Champaign, IL 61820, (217)244-6830.



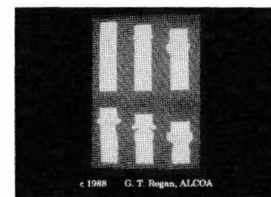
67. Cajon Pass Scientific Drilling

Project by Jeff Yost using Wavefront Technologies in-house cylindrical surface mapping software on an Alliant FX-8 and Silicon Graphics IRIS 3130. Data recorded in the Cajon Pass Well drilled to investigate the stresses in the earth's crust in the vicinity of the San Andreas Fault. Contact: Jeff Yost, National Center for Supercomputing Applications, 152 Computing Applications Bldg., 605 E. Springfield Ave., Champaign, IL 61820, (217) 244-6830.



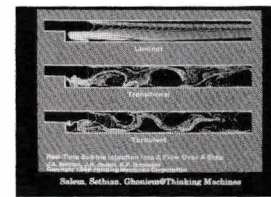
68. Aluminum Channel Buckel-

ing by G.T. Rogan using Scripto-Dyana on a micro VAX with an Adage 3006 display. Buckeling deformation calculated by Dyana and displayed using Scripto. Contact: G.T. Rogan, ALCOA Technical Center, ALCOA Center, PA 15069, (412) 337-2366.



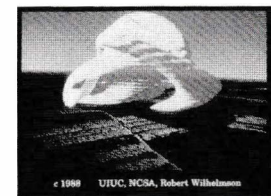
69. Bubble Wire Injection into

Several Types of Flow by James B. Salem, James A. Sethian and A.F. Ghoniem with Connection Machine Visualization Library on a Connection Machine model CM-2. The image shows the path of 80,000 particles injected into flows of various types. This slide contains a series of images produced during a real-time 2D fluid flow visualization. The 10 frames/second update rate is unique amongst flow visualization programs. In the program, each of several hundred thousand processors tracks the path of a dye particle injected into a simulated flow. Contact: James B. Salem, Thinking Machines Corporation, 245 First St., Cambridge, MA 02142, (617)876-1111.



70. Tornadic Thunderstorm by

Stefen Fangmeier using Wavefront Technologies, SURF in-house surface contouring software on an Alliant FX-8 and Silicon Graphics IRIS 3130. The evolution and structure of a severe thunderstorm, which demonstrates the development of the classic radar "hook echo" characteristic of tornado formation. Contact: Stefen Fangmeier and Robert Wilhelmson, National Center for Supercomputing Applications, 152 Computing Applications Bldg., 605 E. Springfield Ave., Champaign, IL 61820, (217)244-6830.



71. Romboy Homotopy by Ray

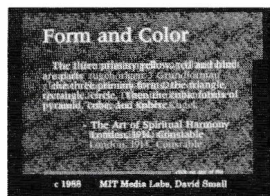
Idaszak, Donna Cox and George Francis using in-house software developed by Ray Idaszak and George Francis on the CRAY XMP/48, Alliant FX/80, Silicon Graphics IRIS 4D/70G. The Romboy Homotopy is a complex deformation in four-dimensional space. The parameterization was created by Francois Apery in 1984 and extended by Professor George Francis. This was the first visualization of the homotopy and resulted in a discovery of a new surface. The shading algorithm used to render these surfaces is unique in that it can correctly smooth-shade single-sided surfaces (e.g. mobius strips, et al) as depicted here. Contact: Ray Idaszak, Donna Cox and George Francis, National Center for Supercomputing Applications, 605 E. Springfield Ave., Champaign, IL 61820, (217)244-0072.



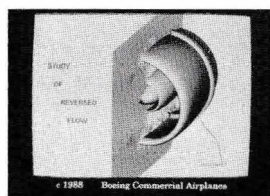
72. **Translucency** by David Small using Transwrite with feedback by Russell Greenlee, VLW, on a Hewlett-Packard 9000 "Bobcat" workstation. Translucency is an important tool for the graphic designer. Contact: David Small, Visible Language Workshop, Media Lab, MIT, 20 Ames St., Room E15-443, Cambridge, MA 02139, (617)253-4416.



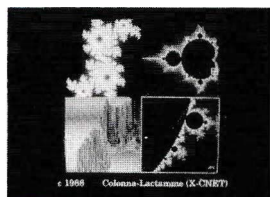
73. **Active Translation** by David Small. Book, electronic book design and transfont by David Small, on a Hewlett-Packard 9000 "Bobcat" workstation. Fading text using translucency allows the user to bring forward a linked text without creating a new window or negating the page design. Contact: David Small, Visible Language Workshop, Media Lab, MIT, 20 Ames St., Room E15-443, Cambridge, MA 02139, (617)253-4416.



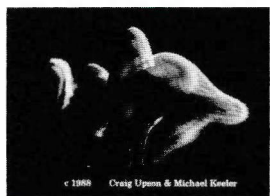
74. **Study of Reversed Flow** by Wayne R. Jones and Tom Tenenrowicz using in-house software on a CRAY XMP with images on an IRIS 3130. Naview-Stokes CFD solution of a reversed pitch fan flowfield. The analysis models the flow behavior in a very high bypass ratio transport engine during landing. Contact: Wayne R. Jones, Boeing Commercial Airplanes, P.O. Box 3707, M/S 7C-36, Seattle, WA 98124-2207, (206) 865-6202.



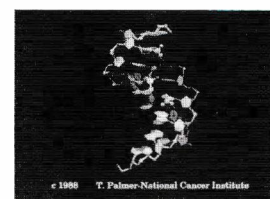
75. **Untitled** by Jean Francois Colonna made with his own software on Bull SPS9 computer and his own frame buffer. This slide shows excerpts from a pedagogical film about fractal sets, upper right Mandelbrot set, lower right 2D magnification of the window, lower left, 3D magnification of the window, upper right, Julie set for the center of the window. Contact: Jean Francois Colonna, LACTAMME, Ecole Polytechnique, 91128 Palaiseau CEDEX, France, 33 1 60 19 40 53.



76. **Tornado** by Craig Upson using a custom visible volume renderer on a Stellar GS 1000 and Alliant FX8. This image is a volume rendering of the rain water content of a simulated tornado. The outer two envelopes (blue and yellow) represent a distribution (of finite thickness) of lower levels of rain water. The red area is a surface of high water content. Contact: Craig Upson, Stellar Computer, 85 Wells Ave, Newton, MA 01259, (617)964-1000.



77. **Simulated Cytotoxic Anti-cancer Drug-DNA Crosslink** by Thomas C. Palmer with locally developed modeling and ray tracing software on a Silicon Graphics IRIS 4D/60T. A schematic visualization of a simulated covalent attachment of the anti-cancer drug phosphoramidate mustard between two strands of helical DNA. The formation of this interstrand crosslink to the DNA in cancer cells renders the strands inseparable resulting in cell death. This structure was calculated using molecular dynamics methods on a Cray X/MP. Molecular data: Dr. Frederick Hausheer. Visualization: Thomas C. Palmer and Dr. Frederick Hausheer. Contact: Thomas C. Palmer, National Cancer Institute-FCRF, P.O. Box B, Building 430, Frederick, MD 21701, (301)698-5797.



78. **Antibody Molecule** by Michael Pique with "Tracer" from Ray-Tracing Corporation running on a Sun 3/160 workstation and a Seiko D-Scan frame buffer. Hypervariable loops (color) of protein make up an antibody molecule's binding pocket. Illustration prepared for March 1988 *Scientific American* article on catalytic antibodies. Rendered (1326 spheres, 3 lights, 1024x1024 antialiased by adaptive supersampling) in 48 hours. Contact: Michael Pique, Research Institute of Scripps Clinic, Molecular Biology MB-5, 10666 North Torrey Pines Road, La Jolla, CA 92037, (619) 457-9775.

