

News Release

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SCIENTISTS REACH BACK 2,000 YEARS TO BRING RARE CHILD MUMMY BACK TO LIFE

Using 3D Models Rendered with Unprecedented Realism on SGI Computers, Stanford Researchers Put Age, Sex and Face to Child Who Lived During Time of Christ

MOUNTAIN VIEW, Calif., (August 3, 2005)—Two thousand years ago in the sands of Egypt, grieving parents put their tiny child to rest in a way that was customary even during the time of Christ. They removed all of the youth's organs except for the heart, packed the remains in salt to cure them, and wrapped them in linen coated with perfumed resin. Like all Egyptians of the age, they were certain that their careful efforts would prepare their loved one to someday come back to life.

Today in Silicon Valley, a team of world-renowned experts proved those parents right – although the mummy's high-tech resurrection may not quite be what ancient Egyptians had in mind.

In a press conference at the headquarters of Silicon Graphics (NYSE: SGI), researchers allowed attendees to literally come face to face with the rare mummified remains of the ancient Egyptian child. Equipped with the most detailed 3D models ever created of a mummy, the team of experts showed how 60,000 exceptionally high-resolution 2D scans helped them give life to the mummy without disturbing its delicate form.

The result is the highest quality interactive visualization of a mummy ever seen – one that allowed specialists in various fields from Stanford University School of Medicine and the Stanford-NASA National Biocomputation Center to arrive at several conclusions about the child who lived and died 2,000 years ago.

Curators at San Jose's Rosicrucian Egyptian Museum and Planetarium, which has housed the mummy since about 1930, have named the child Sherit, an ancient Egyptian name that means "little one."

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History-making scan and visualization

For the project, radiologists at Stanford University School of Medicine used an AXIOM Siemens scanner, one of only five CT scanners in the world capable of producing such high-resolution images. Stanford Radiology's state-of-the-art scanner generated 2D slices as thin as 200 microns – several times thinner than the 750-micron slices used to create the popular 3D visualization of King Tutankhamen's mummy. In fact, at 92GB, Stanford Radiology's child mummy scans generated nearly 35 times more information than the scans conducted on King Tut.

To combine that information into a fully interactive 3D model of the entire mummy and its contents, researchers relied on the powerful Silicon Graphics Prism™ visualization platform with Intel® Itanium® 2 processors running VGL® software from Germany's Volume Graphics GmbH. With Volume Graphics' real-time ray tracing technology – similar to that used to create hit animated motion pictures – researchers were able to generate a 3D model of incomparable quality and fidelity.

After conducting detailed analyses of several areas – including the hands, teeth, feet, skull, groin, spine and chest plate – researchers were able to arrive several conclusions about the mummy. Among them:

- Sherit was a female who was between 4½ and 5½ years old when she died;
- Her remains show no signs of injury, which suggests she likely died from a common intestinal illness or other disease (in fact, half of all Egyptian children died before their fifth year); and
- Scented resin was mixed and applied on the mummy's golden face mask, a sign that her family was wealthy.

“Real anatomy exists in three dimensions, so any time you can view anatomical data in 3D, you'll have a much more accurate picture of the subject,” said Paul Brown, DDS, of the Stanford-NASA National Biocomputation Center. Brown and a team of fellow dentists, orthodontists and oral surgeons determined the mummy's age and other features by studying the 3D visualization. “Even multiple two-dimensional CT slices can never allow you to understand a subject's dental condition as quickly or as accurately as a quality 3D visualization.”

According to Brown, high-resolution scanning and visualization technology already is transforming medical, dental and orthodontic procedures, with specialists using them to speed diagnoses, plan surgeries and predict growth patterns. Technologies like the ones used on the child mummy will only accelerate those advances.

“I've worked with high-resolution 3D visualizations for years,” added Brown, who has performed more than 35,000 root canals and today conducts research at Stanford and teaches at two other California universities. “By far, this is the best visualization I've ever seen. There is no comparison.”

“Mummy visualizations are certainly growing more prevalent, but in terms of enabling technology, nothing else comes close to the quality, resolution and interactivity that we've achieved with SGI visualization systems,” said Lisa Schwappach-Shirriff, curator, Rosicrucian Egyptian Museum and Planetarium, which previously had relied on X-rays taken in the 1960s for information on the child mummy. “With SGI making historic use of higher-resolution scans and volume visualization applications, scientists were able to

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model Sherit with unprecedented realism. The images of this little girl are breathtaking, and the details that we can see on her are nothing short of amazing.”

Team brings child mummy to life

Leading doctors, scientists and computer experts assembled for the mummy project and presented their findings today in the immersive SGI® Reality Center® Theater, equipped with a curved, 25-foot, 3,000-by-1,024 pixel projection screen. A Silicon Graphics Prism visualization system powered by 24 Itanium 2 processors and 30GB of main memory allowed attendees to interactively study the mummy’s remains, the linen bandages surrounding her body, and the gilded chest plate and face mask that remain of the mummy’s plaster cartonnage or casing.

Press conference attendees also had a unique chance to peer across 2,000 years of history to see the girl’s face as real as life itself. After digitally modeling her skull from CT data, a team of scientists led by reconstructive surgeon Stephen Schendel, MD, DDS, professor of surgery at Stanford, displayed a physical replica precisely constructed to match the girl’s actual skull. Using that physical model, which was created by Medical Modeling Inc. of Golden, Colo., along with clues derived from studying one of her still-intact ears and knowledge of facial characteristics common to Egyptian children, the team created a clay bust of the little girl’s face.

“The bust brings to life the story of this little girl who lived at a time when Egyptians, Romans, Jews and Christians all lived side by side,” said Schwappach-Shirriff. “This mummy is no longer just a fascinating artifact, but a lively young child who lived many ages ago.”

To engage all the human senses, SGI worked with local scientists who took microscopic samples from the resin protecting the mummy’s face mask. The team identified key elements of the resin using Gas Chromatography, Mass Spectrometry and other techniques at Evans Analytical Group, a company based in Silicon Valley. In the process, they discovered components of a natural perfume within the resin. SGI then turned to Mandy Aftel, an alchemist and a renowned designer of natural fragrances, to recreate the ancient formula. At the press conference, Aftel described how she recreated the perfume. Then she distributed samples of it at the event, giving guests a rare chance to experience the genuine aroma of ancient funerary perfumes.

Taking mummy visualization to the next level

Ever since SGI pioneered detailed mummy visualization in 2003 with a groundbreaking project at the British Museum in London, museums around the world have conducted scan-based visualizations of their ancient mummified artifacts using a broad range of technologies.

While all of these efforts are aimed at engaging museum patrons with interactive 3D fly-throughs of mummies, today’s SGI systems allow researchers to view and interact with exceptionally large and detailed 3D models. And in the two years since the British Museum project, SGI technology has grown more powerful and more affordable, making it an ideal solution for Egyptologists and institutes looking to maximize their understanding and appreciation of these unique objects of antiquity, while keeping the mummies fully intact.

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“In just the past three years, both scanner technology and SGI visualization solutions have improved dramatically, as this new child mummy project attests,” said Afshad Mistri, advanced visualization marketing, SGI. “The resulting difference in quality between this and all other previous scans is instantly recognizable.”

The data explosion caused by next-generation scanners in turn requires world-class visualization solutions to create realistic, interactive 3D models. From San Jose to London, curators and archeologists are leveraging this technology to discover the wealth of information locked beneath the bandages that have encased their relics for thousands of years

“With the latest SGI systems and new ways to visualize volume data with such tools as Volume Graphics’ latest VGL graphics technology, these mummies come to life, and seeing them projected on a large, immersive screen makes their impact even greater,” said Mistri. “This is one more way in which SGI continues to push the limits of computing as the source of discovery and innovation for 3D visualization.”

While they are key to medical imaging and research, SGI visualization technologies are also widely used by businesses across all major industries as unique strategic-planning, evaluation and research tools to solve some of the world's toughest business problems. These include seismic data analysis for oil and gas exploration and crash simulation and product design for the automobile industry.

The Rosicrucian Egyptian Museum and Planetarium in San Jose, Calif. celebrates its 75th Anniversary this year. Located in San Jose, Calif., the museum houses the largest collection of authentic ancient Egyptian artifacts on exhibit in western North America. For more information visit www.egyptianmuseum.org or call (408) 947-3636.

Stanford University School of Medicine is the oldest medical school in the western United States. It is a research-intensive enterprise that aims to improve health through leadership and collaborative discoveries and innovation in patient care, education and research.

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SGI, also known as Silicon Graphics, Inc. (NYSE: SGI), is a leader in high-performance computing, visualization and storage. SGI's vision is to provide technology that enables the most significant scientific and creative breakthroughs of the 21st century. Whether it's sharing images to aid in brain surgery, finding oil more efficiently, studying global climate, providing technologies for homeland security and defense or enabling the transition from analog to digital broadcasting, SGI is dedicated to addressing the next class of challenges for scientific, engineering and creative users. With offices worldwide, the company is headquartered in Mountain View, Calif., and can be found on the Web at www.sgi.com.

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