コンピュータグラフィックス側面史から検証する名門の DNA
– 米 IT 業界の再編圧力にみるコンピュータグラフィックス関連産業の栄枯盛衰 –

Examining prestige DNA from historical side of computer graphics
- Ups and downs of graphics related industries through pressure of reorganization of the US IT industry -

砂田向壱（博士）/特任教授・九州大学大学院芸術工学研究院先導的デジタルコンテンツ創成支援ユニット

佐藤年成/日本 SGI 株式会社、代表取締役社長兼 CEO

Koichi Sunada,Ph.D[1]/ Professor and Science Producer/"Advanced Digital Content Design Unit"/Kyushu University Faculty of Design

Toshinari Sato[2]/SGI Japan, Ltd.　President and CEO

*1.ksunaphd@design.kyushu-u.ac.jp *2. tn-sato@sgi.co.jp

Abstract: Because of worldwide depression and fierce competition, pressure to review businesses of the US IT industry is severely growing. Sun Microsystems is considering selling itself and Yahoo started to consult with Microsoft on affiliation going back last year. The site of headquarters of Silicon Graphics (SGI) , established by James H. Clark, who was a professor of Stanford University and a famous entrepreneur, is replaced by Google. What Google is most concentrating is prevalence of the technology called cloud computing. Meanwhile, SGI filed for Chapter 11 bankruptcy-court protection for the second time. On April 1st, 2009, Rackable Systems announced to agree to merger with SGI. In addition, on May 11th, Rackable Systems altered its corporate name to Silicon Graphics International（SGI）. There have been ups and downs in the US IT industry. By focusing on historical side of the technology of computer graphics image processing, which is essential for creation of digital content, I look into reorganization of the US IT industry.

Keywords: SIGGRAPH, Coons Award, computer graphics, Silicon Graphics, 3 Dimensional Computer Graphics, 3DCG, science, art, animation, gaming, interactivity,

1. Introduction

In 1988, Ivan E. Sutherland（born on May 16, 1938, an inventor of innovative interface "Sketchpad"）, who is called as a founder of computer graphics, received the Steven A. Coons Award, known as Coons Award, for the first time. The award is held by SIGGRAPH, the computer society in the United States and dubbed "Novel Prize in computer graphics industry". He and his friend and also colleague, David Evans established Evans and Sutherland and the company achieved pioneering results with real-time hardware and accelerated 3D computer graphics and printer languages. Former employees of Evans and Sutherland included John Warnock, the future founder of Adobe systems and Jim Clark, the founder of Silicon Graphics. Jim Clark founded Silicon Graphics in 1982 to release research acheivement which was facilitation of hardware such as 3-D geometry operation (Three dimension coordinate transform, perspective projection transform, hexahedron clipping）and the original of graphics card which is generalized through PC and so on. Silicon Graphics, Inc. known as SGI, as the company name shows, developed computer graphics (CG), especially field of three dimension (3D)image processing. OpenGL was opened special graphics library, which SGI formerly developed.

2. SIGGRAPH

SIGGRAPH (Special Interest Group on Graphics and Interactive Techniques) is the special-interest group conference on computer graphics (CG) of the US computer society. Also it is alias of International Conference and Exhibition on Computer and Interactive Techniques hosted by special-interest group. The special-interest group was set up in 1967 and the first SIGGRAPH conference was in 1974.

2.1. International Conference　SIGGRAPH

International conference SIGGRAPH is held in the United States every summer, dozens of research papers on the latest computer graphics and a number of those technologies are utilized for development of 3D computer graphics software.

<Steven A. Coons Award. Honor roll>
2009　Robert L. Cook　belonged Pixar a founder of Render Man Shading Language
2007　Nelson Max http://nis-lab.is.s.u-tokyo.ac.jp/~nis/lecture/prof_max.htm
2005　Tomoyuki Nishita **Bezier Clipping** http://nis-lab.is.s.u-tokyo.ac.jp/~nis/indxj.shtml
2003　Pat Hanrahan　an authority of visualization
2001　Lance J. Williams　developed **Shadow map**ping
1999　James F. Blinn　developed **Bump mapping**
1997　James Foley published **CG textbook**
1995　Jose Luis Encarnacao　**Society activities**
1993　Ed Catmull/　developed **Z buffer algorithm**/ president of Pixar
1991　Andrei' s van Dam /author of "CG Principle and Practice" /
1989　David C. Evans established **Simulation technology**
1987　Donald P. Greenberg　various lighting shadowing effects/Cornell University
1985　Pierre **Bezier　Bezier Curb**/French engineer
1983　Ivan E. Sutherland　a founder of **Computer graphics**

Table1: Steven A. Coons Award. Honor roll

Emerging Technologies, a demonstration exhibition of interactive technology, is the appeal of the conference. The conference is also famous for prestigious The Steven A. Coons Award which is given to researchers who contribute the industries for a long time. Not only Ivan Edward Sutherland, so-called "a founder of computer graphics" but also Pierre Bézier, a developer of "Bézier Curve", Ed Catmul, a developer of "Z buffer algorithm", James F.Blinn, a developer of "bump mapping", and for the first time in Asia, Tomoyuki Nishita (a professor of Tokyo University), a developer of "Radiosity algorithm" received the award.

2.2. Succeeded DNA

71-year-old Sutherland is now working at Sun Microsystems, which is making inquiries to sell itself to throughout Silicon Valley. With commercializing cheaper work station for corporations, and using

several servers to develop systems, which ended the age of large-sized computer and opened "Downsizing", Sun Microsystems was most thriving corporation. It propounded networking computing at the beginning of popularization of internet, and at one point considered buying up Apple Computer, Inc., however, the company's business performances declined after the collapse of internet bubble. While it was negotiating about selling itself this spring, the prestigious company of high performance graphic computer, SGI, founded by James H. Clark, a famous entrepreneur, went bankrupt. SGI was in global spotlight for its image processing technology, and
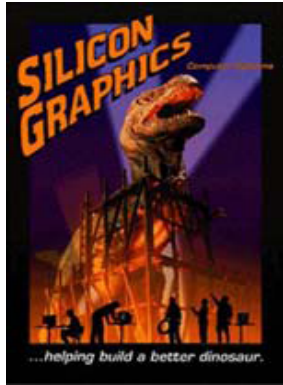

Figure-1:"Jurassic Park" (1993)

computer graphics was utilized in full scale for the first time in the 1993 movie "Jurassic Park"(figure-1). Graphics power enormously became widespread by INDIGO which had R4000 developed by SGI. During the time the US president in power at that time, Bill Clinton visited SGI headquarters as a leading company which was promoting the latest technology. In the late 1990's, aggregate market price exceeded 7 billion dollars. The sale price this April was said only 25 million dollars. Andy Bechtolsheim, a co-founder of Sun, gave initial funding to two students entrepreneurs. The name written on the check was "Google". Three years later, Google invited Eric Emerson Schmit who was CTO of Sun. The former site of SGI headquarters (Figure-2) which they continued admiring was moved in by Google. What Google is now especially focusing on is making technology called cloud computing pervasive. By using the technology, information and software are intensively managed in massive data centers, and are utilized through PCs or mobile phones. That is what Sun's old network computing was developed. Emerging companies such as Facebook or Twitter which use cloud technology are now gaining power.

Figure-2:Google headquarters

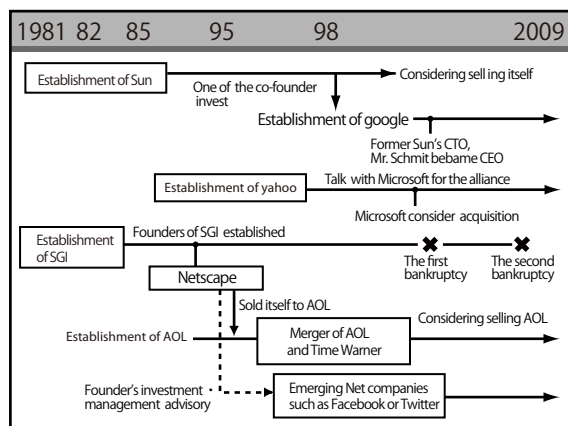## 3. Acquisition of Cray

Table-2 Genealogy of the US IT industry

In February 1996, SGI merged Cray Computer Corporation (CCC) established by Seymour Roger Cray in 1972, and promptly sold super server series to Sun. Using those technologies, Sun developed E10000starfire server which made a great success (Table-2).

Those series are still sold. SGI launched the transition from graphic work station to supercomputer. SGI acquired HIPPI data bus and internodes technology in T3 series, and it cut off the department of Cray Research in August 1998. The department was sold to Tera Computer in March 2000. SGI Japan, Ltd. integrated Cray Japan, Ltd. in 1997.

4. IRIS1000 / Personal IRIS / VWS320/540

In 1983 SGI's first graphic terminal IRIS1400 was produced, when Tokyo Disneyland opened. During the time the market was in chaotic condition because of emerging the trend of personal computer such as Apple Macintosh. In 1987 SGI introduced a workstation with RISC chip "MIPSR2000" for the first time. It was said that it was the most powerful super graphics workstation which has Geometry Engine. Then establishment of CG productions was accelerated thanks to Personal IRIS in 1988 which had GUI with unthinkable low price in the past. In 1991 SGI introduced IRIS Indigo followed by Challenge/Power Challenge, Onyx in 1993. With showing overwhelming graphic power, in April that year SGI concluded JEDI (Joint Environment for Digital Imaging) with Industrial Light & Magic founded by George Lucas, and started a full-scale project of producing movies. Then in 1999, a new machine which users had never thought in the past, was introduced at

Computer Dealers Exhibition, COMDEX. It was Visual Workstation320/540 which was released by cooperation between SGI and Microsoft. (Figure-3)

Figure-3:"VWS320/540"

5. Conclusions

Jim Clark, the founder of SGI, and Mark Andrew of Netscape Communications Corporation assume management consultant of an emerging internet company. There have been ups and downs in the US IT industry. This time I could issue this paper in collaboration with Toshinari Sato, the president and CEO of SGI Japan, Ltd, which takes over the prestigious DNA, and sponsored for 2009 Asiagraph collection of papers. I would like to show my gratitude taking this opportunity. Also I could offer chance to let many researchers and creators, who participated in SIGGRAPH, know pressure of reorganization of the US IT industry afresh from historical side of super graphic machines by which they might be influenced. Finally, I hope that ASIAGRAPH will continue to progress toward the conference for development of the world digital content.

6. Reference

Yasunori Tominaga history of SGI
http://www.sfxbros.com/pages/backnumber/sy001.html
http://ja.wilipedia.org/wiki/SIGGRAPH
Short history of SGI Japan Ltd.
SGI World-No.17,19,20,21,22,23,24
NIKKEI BUSINESS DAILY 2009. Apr16.