TOSHIBA REVIEW

2001. VOL.56 NO.1

Special Reports I
Platform Technologies for Net Business Systems
Special Reports II
New Memory Era for Mobile and Networking Applications

〰〰〰〰〰〰〰〰〰〰〰〰〰

Special Reports I
Platform Technologies for Net Business Systems

°Aiming at Net Business System Deployment
BANNAI Akira

°Concept of Platform Products
MATSUZAWA Katsuya IWASAKI Motokazu
Platform is a combination of products for solution providers, consisting of necessary and sufficient hardware, operating system, and middleware products for the use of solution providers in constructing their systems, and services that are necessary and useful for their system construction and operation.   The concept of Platform refers to products that meet the requirements of solution providers in the recent net business trends, including (1) rapid business development, (2) security and reliability of system development and operation, (3) a unified contact point for products, (4) keeping abreast of the most recent information technology, and (5) adding value to solutions.

°Net Business Platform
TAKAMORO Hitoshi MORIMOTO Takashi
The Net Business Platform is a Platform that allows solution providers to construct net business solutions.   It provides solution providers with a reliable, secure, and expandable platform by applying Robust Platform and Platform construction services.
    It also enables high value-added solutions to be constructed using Toshiba's core technologies such as the Java remote operating environment, business logic component technology, natural language processing technology, and mobile technology.

°Robust Platform Technology for Net Business
KANEKO Hiroyuki KURANO Masayuki KAGAWA Koichi
Continuous and stable operation of computer systems is important, especially in the Net Business environment.   We have commercialized easy-to-use models consisting of highly reliable and highly available products together with services to integrate these products.   We call these models the Robust Platform.   Robust Platform consists of four models: cluster system configuration model and models relating, system management, data backup, and security.   In the model for cluster system configuration, key technologies reside in the "DNCWARE_TM/ClusterPerfect_TM" integrated clustering software and the "ArrayFort_TM" storage subsystems.

°Digital Document Platform
SAITO Minoru NAGAMURA Eiji TOYOTA Mayo
With the rapid expansion of information in corporate activities, attention is being focused on knowledge management for the storage, sharing, and optimal use of information.   The Digital Document Platform is composed of products and support services which support document management and knowledge management in the steps of information sharing, knowledge sharing, and then knowledge creation. Information sharing provides document management and flow; knowledge sharing provides natural language retrieval, automatic summarization, and automatic categorization; and knowledge creation provides text mining.

These technologies realize a structure for creating knowledge with stored information and producing significant value.

°Business Platform
SHIMIZU Nobuo ISODA Kazuhiko SUZUKI Sadao
Internet technology has been growing in the business environment in recent years.   It is therefore necessary for each company to apply information technology to its business information system.   However, proprietary architecture has been used to run many business information systems and it is difficult to apply information technology to a proprietary architecture.

In response to this issue, we have developed an infrastructure for developing and running business information systems on open architecture.   We call this infrastructure Business Platform.   Business Platform provides many solutions for implementing business information systems with information technology on open architecture.

°Security Technologies for Net Business Platform
KOTOYA Shuhei SHINDO Shuichi TATEOKA Masamichi
Electronic commerce using the Internet is rapidly evolving and becoming more widespread.   With the exchange of electronically processed corporate and personal information on the Internet, such information is constantly exposed to the threat of unauthorized access or alteration.   Moreover, the theft and destruction of data by illegal intrusion and service-disrupting attacks are also increasing.

On the Net Business Platform, illegal intrusion and alteration of Web pages are prevented by intrusion detection and prevention technology, while unauthorized access to or alteration of information on the network are prevented by virtual private network (VPN) technology using encryption.   Safe and secure network access is ensured by the application of these technologies.

°Java Application Remote Operating Environment Expands Range of Uses for Java
ONO Yasushi MURAMATSU Kouji FUJIMOTO Katsufumi
FlyingServ_TM Java Application Remote Operating Environment is our own technology that transfers the graphical user interfaces (GUIs) of Java programs to terminals on the network.   Although HyperText Markup Language (HTML) and Java applets have been adopted as GUIs for Web computing, they have several problems.   Specifically, HTML GUIs are difficult to use because they can be updated only on a page basis, and considerable time is required to start Java applets.   FlyingServ_TM solves these problems by running Java programs on the server and allowing users to perform operations from the terminals.

°Platform Integration Technology and Platform Maintenance Support Technology
KOISHI Makoto ASANUMA Ikuo SUZUKI Hitoshi
The trend of open systems provides computer users with freer system construction and less expensive system installation. However, this trend also makes system construction more complicated and problem solving more difficult and time consuming.

We are proposing service menus based on a Platform Integration technology and a Platform Maintenance Support technology to solve such problems.   Both of these technologies are important service technologies supporting Toshiba's Platform business, together with hardware- and software-related technologies.

〰〰〰〰〰〰〰〰〰〰〰〰〰
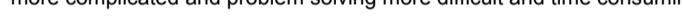
Special Reports II
New Memory Era for Mobile and Networking Applications

°The Dawn of a New Memory Era for Mobile and Networking Applications
NISHIMURA Hidetaro

°Trends in Memory Technologies--Past and Future
MIYAMOTO Junichi
The progress of information technology has led to great demand for semiconductors for application to servers, PCs, cellular phones, and personal digital assistants (PDAs), resulting in a steady annual memory bit growth rate exceeding 60 %.   Miniaturization and design technologies have made it possible for memories, especially dynamic RAM (DRAM), to integrate four times more bits in one chip every three years, and have significantly reduced bit-cost.

Recently, however, with the expansion of memory application fields, the market has been requesting higher-value-added memory products featuring low-voltage operation, low power, and high functionality as benefits of these technologies.   On the other hand, in recent memory development more attention seems to have been paid to the rapid growth of flash memory, recovering demand for static RAM (SRAM), and other emerging memories such as ferroelectric random access memory (FeRAM) and magnetic random access memory (MRAM), which are expected to be an "ultimate memory" in the future.

°Flash Memories Penetrating Emerging Markets
KAWAMOTO Kazuya KATO Hideo TANAKA Shinichi
Small form facror card with NAND flash memories originally developed by Toshiba have recently become widely disseminated.   Moreover, the growth of NOR flash memories, which feature high speed and random access performance, is also expected to increase accompanying the expansion of the cellular phone market.

Recognizing these market trends, Toshiba has successfully developed the world's first 512 Mbit NAND flash with 0.16 μm design technology, as well as the world's smallest 64 Mbit NOR flash.   Toshiba is working to achieve higher density and finer process technology, particularly in the field of NAND flash which has been developed for the file storage market.

°SRAM Technologies for Mobile Era
KIZU Tatsuki
The demand for high-performance and large-scale static random access memories (SRAMs) is expanding rapidly in the mobile and network markets with the innovations taking place in information technology.   Toshiba has been developing leading-edge technologies for the mobile and network sectors and supplies highly efficient SRAMs.

We have developed a low-leakage CMOS cell using shallow trench isolation (STI) and local interconnect (LI) technologies and a Ti salicide process.   Currently, an 8M bit low-power SRAM and an 18M bit high-speed SRAM, corresponding to no turnaround or double data rate (DDR), are under mass production.   Moreover, using the advanced technologies of low-leakage Co salicide and Cu dual-damascene, we are developing a 16M bit low-power SRAM and a 1 GHz super-high-speed SRAM.

°DRAM Technologies for Broadband Network Era
OHSHIMA Shigeo MORI Keizo
Network systems are expected to show the largest growth rate in DRAM market demand in 2001 and thereafter in the category of non-PC application DRAMs.   On the other hand, the specification and performance requirements for DRAMs in the network market do not necessarily coincide with those in the PC market but may significantly vary depending on the application; for example, from low-end to high-end applications.

In order to meet such market demand, we have developed various types of high-performance DRAMs by optimally utilizing state-of-the-art design and device technologies.   In the 256 Mbit generation, we have developed the synchronous DRAM (SDRAM), double data rate (DDR) SDRAM, Rambus DRAM (RDRAM), and fast cycle RAM (FCRAM), each of which can provide the best cost-performance solution for a particular network application.

°ChainFeRAM_TM: The Emerging Nonvolatile Memory
OOWAKI Yukhito KUNISHIMA Iwao YAMAKAWA Koji
Ferroelectric random access memory (FeRAM) has excellent features including nonvolatility and 1,000 times faster programming capability at low voltage compared with conventional nonvolatile memories.   FeRAM is therefore seen as the ultimate memory for a number of applications such as mobile electronic equipment.   However, the memory density, chip cost, access time, and read/write endurance of conventional FeRAMs have not met the requirements of major applications in the real market.

Toshiba has developed an original chainFeRAM_TM architecture and SRO (strontium ruthenium oxide: SrRuO$_3$) electrode technology which offer a solution to these requirements.   Currently, an 8 Mbit FeRAM, which has the highest density and speed, is under development.   Further integration is being promoted with the stacked cell capacitor for major market applications.

°Packaging Technologies Driving Assembly Products toward Higher Density
TAGUCHI Hideo ITO Seigo
Semiconductor packages must be suitable for high-density assembly in order to realize small, thin, and high-performance electronic products such as portable and mobile products.   To meet this demand, Toshiba has developed a ball grid array (BGA) having almost the same size as a semiconductor device, and a stacked multichip package (MCP) allowing two devices to be stacked in one package. We have also developed System Block Module that enables more than two devices to be stacked in one package, and have confirmed 1 Gbit flash memory operation by System Block Module with four devices.

〰〰〰〰〰〰〰〰〰〰〰〰〰

Feature Articles

°Carrier Mobility Enhancement in Advanced SOI-MOSFETs with Strained-Si Channel
MIZUNO Tomohisa SUGIYAMA Naoharu TAKAGI Shin-ichi
We have developed advanced silicon-on-insulator (SOI)-MOSFETs for high-speed sub-100 nm CMOS devices.   These advanced SOI-MOSFETs have a tensile-strained-Si channel on SiGe with a larger lattice constant, which leads to higher mobility caused by changing their Si-band structures.

We have demonstrated electron and hole mobility enhancement in these advanced SOI-MOSFETs of 60 % and 18 %, respectively, in comparison with control SOI-MOSFETs.   Therefore, these newly developed advanced SOI-MOSFETs are promising structures for high-speed CMOS devices with characteristics far superior to those of conventional Si CMOS devices.

°Total Business System for Construction Companies: "Total Kensetsugyo System"
ITO Sosuke TOMORI Satoshi SATO Yoshiyuki
The construction industry in Japan consists of some 460,000 companies that form a hierarchy led by the so-called super general constructors.   Up to now there have not been any business software packages suited to the business processes of construction companies.   Some construction companies have developed information systems for their own purposes, but otherwise insufficient packages have been introduced without the development of add-on functions for the construction industry.   Moreover, most of these packages have not made sense from the viewpoint of business process reengineering (BPR).

Toshiba has newly launched an undertaking to introduce a total business system for construction companies.   This system promotes innovative business operations based on our original "Total Kensetsugyo (Construction Industry) System" package with the incorporation of information technology (IT) and consulting services.

°4-inch Diagonal VGA Reflective Low-Temperature p-Si TFT-LCD
TANAKA Yasuharu OHZEKI Shigeki KIMURA Kouki
We have developed the LTM04C387S 4-inch diagonal color reflective low-temperature polycrystalline silicon (p-Si) thin-film transistor liquid crystal display (TFT-LCD) with 202 pixels per inch (ppi) VGA resolution.   This LCD offers a bright, vivid display of 260,000 colors, the result of an integrated reflective electrode and the adoption of a single polarizer for enhancing the contrast ratio. Because there is no need for a backlight, power consumption is cut by approximately one-third, while the module thickness and weight are both halved.

The LTM04C387S LCD is suitable for application to mobile products.

〰〰〰〰〰〰〰〰〰〰〰〰〰

Techno Notes

°Batteries

〰〰〰〰〰〰〰〰〰〰〰〰〰

Epoch-Making Toshiba Technologies

°12.Notebook PC