

Special Reports**e-Government Solutions****Solutions Technologies for e-Japan Strategy II Program**

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Toshiba Solutions' Approach to e-Japan Strategy II Program

MATSUSHITA Kunihiko / NAKANO Kenichi

Japan's central government ministries have already deployed basic electronic government services such as electronic forms and electronic bidding. The central government initiated the e-Japan Strategy II Program, aiming to leverage the level of administrative services and make public management more efficient. It then introduced the Electronic Government Deployment Program, to improve the convenience of citizens and the level of administrative services, innovate business processes with information technology, and provide a common environment. In addition, the central government is also promoting the consolidation of general affairs application programs, a review of the government's 36 legacy systems, outsourcing, and enterprise architecture (EA). On the local government side, attention is being focused on topics such as shared service centers, strategic outsourcing, and public accounting reform.

Toshiba Solutions Corp. is establishing related solutions and technologies in order to contribute to these goals.

Solutions toward Citizen-Focused Government Services

KANO Haruhide / TAKATSU Masaki / TANAKA Yasunari

One of the main objectives of e-government is to improve government services. The key application systems for this objective are e-form systems.

Toshiba Solutions Corp. has developed a Portable Document Format (PDF)-based e-form core system, which has been introduced by the Ministry of Education, Culture, Sports, Science and Technology and is now in operation there. This system has also been introduced by several prefectural governments with an enhancement for public certification authority for residents. In the future, we intend to utilize digital terrestrial broadcasting, the cellular phone network, etc. to expand the means of accessing the system.

Solutions for Enhancing Efficiency, Effectiveness, and Transparency of Public Administration

KAKEFUDA Hideaki / SUGA Nobuhide / UEDA Nariaki

One of the most important purposes of the e-government initiative in the e-Japan Strategy II program is to establish efficient, effective, and transparent public administration by utilizing information technology capabilities in various work processes at national and local government agencies.

To meet the requirements for efficient work processes in the public sector, Toshiba Solutions Corp. has developed a set of solutions. These include a new financial management system, an e-procurement system, and an e-document management system.

e-Government and Universal Design

NAKAHARA Michihiro / SAKAI Masaaki / HIRANO Sayaka

Web applications are the mainstay of e-government. On the one hand, archive systems for document control and accounting systems for financial affairs are prepared for e-government staff, while on the other hand, various electronic application forms are made available for residents. In either case, the systems employ monitor screens for information input and output. The screen displays must be designed for ease of use so that everybody, including those with visual disabilities, can understand what to do at once. Such ease of use is referred to as "Web-accessibility."

Although the World Wide Web Consortium (W3C) guidelines help to secure considerable Web-accessibility, Toshiba is aiming for a higher level of accessibility through enhanced universal design taking broader conditions in terms of sight and color into consideration.

e-Government and Security Technologies

KITAORI Shoji / NAKAMURA Hiroshi / KOMOTO Takafumi

Security technologies are a key aspect of the establishment of e-government. The ISO/IEC15408 specifications of the International Organization for Standardization and the International Electrotechnical Commission define how to develop systems in a secure manner, whereas information security management systems (ISMS) specify how an organization is to keep its information assets secure.

Toshiba Solutions Corp. has developed system development methodologies focusing on information technology security with respect to ISO/IEC15408 and ISMS. A public key infrastructure (PKI) smart card issuing system has also been developed as a typical example of application systems utilizing our security technologies.

Efforts to Build Enterprise Architecture and System Configuration Techniques for e-Government

YOSHIDA Kazuki / IINO Shigehito

As a concept of Enterprise Architecture (EA) is being applied to the e-government strategic plan, Toshiba Solutions Corp. is preparing to be ready to answer e-government requirement concerning EA.

We have been working in the field of research and development of methodology which clarifies the relations among EA, Toshiba Solutions' conventional method a.k.a. Integrated System Development Standard (ISDS), and OMG's Model Driven Architecture (MDA). In the meanwhile, we have applied the EA framework to the sample application system.

In the future, we will tackle the problems remained, such as effective use of Performance Reference Model (PRM), preparation of notations and tools, and accumulation of reference models and their applications.

Feature Articles**AlGaIn/GaN HEMT Power Devices**

TAKADA Yoshiharu / TSUDA Kunio

GaN semiconductors are very attractive for use in switching power devices for motor drive and power supply applications because of their high critical electric field and high mobility in the two-dimensional electron gas (2DEG) channel. Toshiba has fabricated AlGaIn/GaN high electron mobility transistors (HEMTs) that realize a breakdown voltage of 600 V by employing the field plate technique as well as a low on-state resistance of 3.3 m Ω cm², which is 20 times lower than that of silicon MOSFETs. The trade-off characteristics between the breakdown voltage and the on-resistance can be further improved by optimized design of the field plate structure and the electrode contact region. The optimized on-resistance is estimated to be about 0.5 m Ω cm² for a 600 V device.

A DC-DC converter circuit was demonstrated using a fabricated device. Operation of the down chopper circuit was achieved with an input voltage of 200 V at a switching frequency of 500 kHz. These results show that GaN devices are promising candidates for the next generation of power switching devices for power electronics applications.

Operation Training Simulator for Reprocessing Plant

NAKAMURA Kenji / ARAKAWA Akio / TAKIZAWA Youji

Construction of the facilities and chemical tests using actual chemicals at the Rokkasho Reprocessing Plant of Japan Nuclear Fuel Ltd. (JNFL) in Aomori Prefecture are almost completed. Trial runs are currently in progress with the aim of commencing operations in 2006.

Toshiba has developed an operation training simulator for the Rokkasho Reprocessing Plant and supplied it to JNFL in August 2003. The simulator is used for training operators in plant operations in the event of an accident such as a leakage of radioactive material. A salient feature of this simulator is that it provides trainings for operations at five facilities of the Rokkasho Reprocessing Plant in a single system as well as cooperative operations between different facilities.

Building Automation System for Multivendor Applications -- Web-Buildac™ BACnet Version

TAKEMURA Takuya

In recent years, market demand has been increasing for the application of open network technology to building automation systems. Multivendor system construction has also come into view.

Standardization of the communication protocol for open network technology is the key to meeting this market need. Although there are various open network technologies on the market, one of the most promising is BACnet, which was recognized as a standard by the International Organization for Standardization (ISO) in 2003.

Toshiba adopted a new communication protocol compatible with BACnet and has developed the Web-Buildac™ BACnet version, a more flexible building automation system than the conventional types.

Functional Insulating Materials Using Nanoparticle Dispersion Technique

OZAKI Tamon / IMAI Takahiro / SHIMIZU Toshio

Nano-scale hybridization of organic and inorganic materials has attracted special interest as a technique for greatly improving the properties of organic materials. Most conventional research on these polymer-nanocomposites has focused on thermoplastics. Application of these materials will be enhanced by applying this technology to thermosetting resins. For example, thermosetting resins are used in heavy apparatuses such as generators, motors, and switchgears because of their excellent electrical, mechanical, and thermal properties. Innovative apparatuses are expected with the development of high-performance thermosetting nanocomposites.

Toshiba has verified the improvement of material properties for electric power apparatus by the hybridization of thermosetting resins and layered silicate.

GR-NF415GX "Non-fluorocarbon the SENZOHO" Refrigerator

ITO Tatsuya / IMAKUBO Kenji / HAYASHI Hidetake

Energy saving is the first priority of customers for household refrigerators. To meet this need, Toshiba has developed a two-stage compressor with two built-in cylinders and applied it to refrigerators for the first time in the industry. A two-stage parallel freezing cycle was realized to enable optimum temperature control of each individual compartment for freezing and refrigeration by a combination of the two-stage compressor and a newly developed pulse motor valve (PMV) that controls refrigerant flow rates for two compartments at the same time. All compartments are also equipped with the senzoh (freshness preservation) function by cooling, as well as antibacterial and deodorization action, to contribute to food safety, which has been attracting serious concern following the outbreak of bovine spongiform encephalopathy (BSE).

The GR-NF415GX energy-saving refrigerator, named "Non-fluorocarbon the SENZOHO," was introduced on the market in January 2004 equipped with these functions. This model has achieved a low power consumption of 150 kWh/year for the first time in the industry in the 400 L volume class.

Frontiers of Research & Development**Numerical Analysis of Czochralski Si Crystal Growth****Evaluation and Analysis Technique for Train Control Systems**