

## Enhanced Global Cloud Computing Platform Services

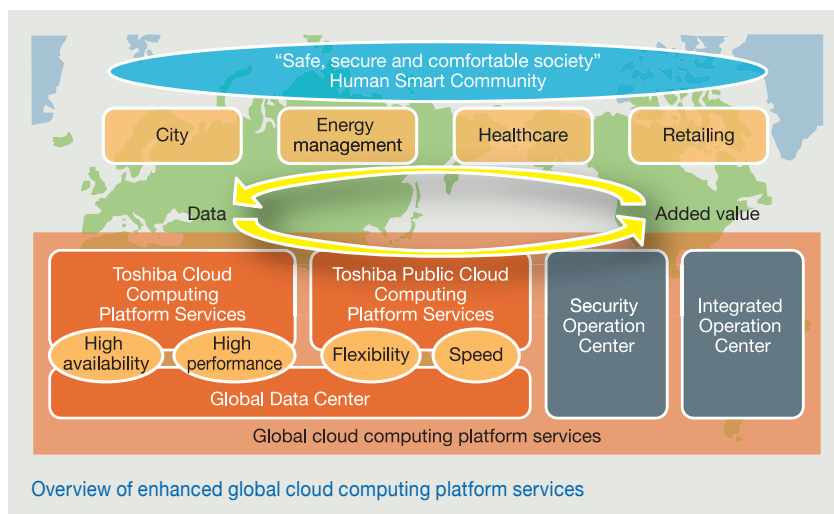
The Toshiba Group has extensive business operations ranging from energy and infrastructure to consumer electronics, and provides solutions spanning multiple business sectors. Information and communication technology (ICT) is the basis for all solutions.

To accommodate diverse needs, we have enhanced our global cloud computing platform services in terms of the geographical regions where services are available and the range of support offered, as well as service reliability. We have launched these services in Asia and Europe, followed by North America, and created globally unified service menus so that service subscribers can deploy their businesses worldwide more rapidly.

Previously, our focus was on providing high-availability and high-performance cloud computing platform services to meet unique requirements for energy, infrastructure, and mission-critical systems. Now, the range of our services has been expanded by adding the Toshiba Public Cloud Computing Platform Services, which are ideal for consumer and other applications that are subject to significant changes in workloads.

In order to ensure service reliability, an enhanced ability to respond to sophisticated cyberattacks and potential threats is necessary. To realize a safe and secure system, we have released a security monitoring service operated by a dedicated operation center.

We will continue to expand the service integration business by combining our rich service menus and providing our customers with optimal cloud computing solutions.



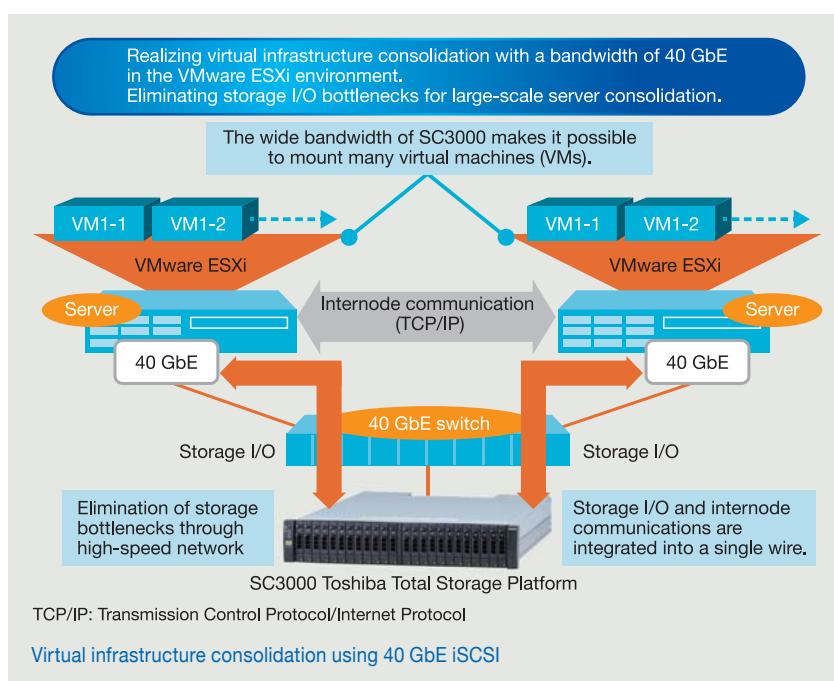
## Storage Solutions Supporting IT Infrastructure in Era of Big Data

The Toshiba Total Storage Platform (TTSP), which meets a wide range of performance and capacity requirements for on-premises storage, and the Toshiba Cloud Storage Array Service (TCSAS), which provides storage as a service (STaaS), are key offerings of Toshiba's storage solutions that support the information technology (IT) infrastructure in the era of big data.

To enhance storage usage efficiency in a consolidated virtual environment, TTSP incorporates the SC3000 disk array storage with a 40-Gigabit Ethernet (GbE) Internet Small Computer System Interface (iSCSI) as well as a storage management framework for the entire range of TTSP products.

The data transfer bandwidth of 40 GbE and a high-performance storage controller that supports multicore parallel processing combine to eliminate storage input/output (I/O) bottlenecks in a consolidated virtual environment and thus realize large-scale server consolidation.

In addition to the enhancement of our storage array product, we have released TCSAS, which helps to improve the performance and security of public cloud storage services without compromising the advantages of cloud services such as pay-as-you-go pricing and maintenance-free storage.



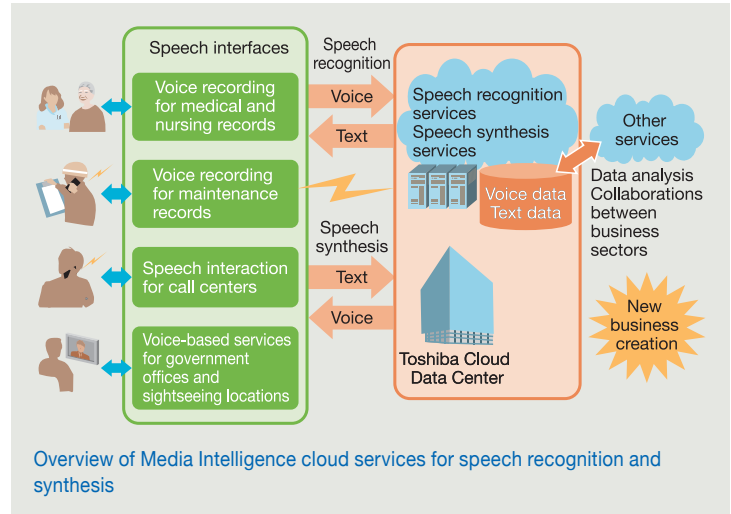
## “Media Intelligence” Cloud Services for Speech Recognition and Synthesis

Toshiba has been developing “Media Intelligence” solutions that will make people’s daily lives more convenient and promote business innovation. Media Intelligence combines media and knowledge processing technologies to process speech, image, text, and other types of data simultaneously. These technologies have been cultivated within the Toshiba Group over many years.

We have launched Media Intelligence services that provide speech recognition and synthesis functions on a cloud platform. Our voice processing technologies make it possible to recognize spoken language with considerable accuracy and provide human-like natural speech synthesis. Furthermore, compared with conventional systems, our solution requires less than one-third the workload for customization and thus facilitates the process of improving the speech recognition rate and speech synthesis ability.

To contribute to the growth of our customers’ businesses, we have provided human-friendly voice recording services for medical, nursing, and maintenance records; speech interaction services for call centers; and voice-based services for government offices and sightseeing locations.

In addition, since our Media Intelligence services are available in the cloud computing environment, they can easily be incorporated as part of other services. This simplifies the creation of new businesses, including those that require data analysis or collaborations among multiple business sectors.



## Conferencing Audio Utilization System Supporting Efficient Business Operations

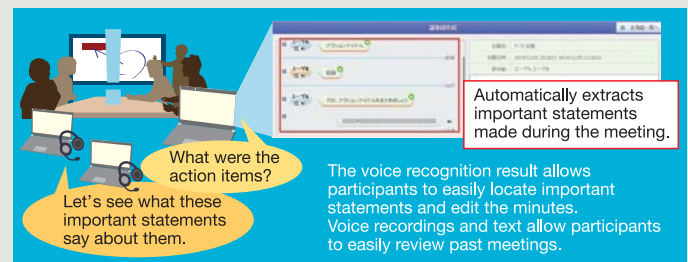
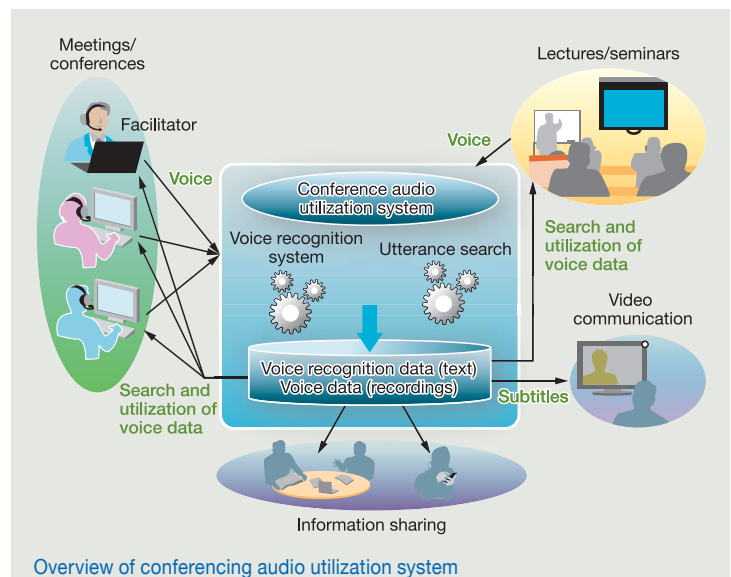
Toshiba Solutions Corporation has developed a system that makes it possible to utilize audio recordings of lectures and meetings that have previously been difficult to use. The newly developed system incorporates our large-vocabulary voice recognition technology noted for the high accuracy of its spoken language recognition.

This audio system can be used to record meetings and create text transcripts, and therefore helps participants to review past meetings and prepare minutes.

One of the characteristic features of the system is its ability to automatically extract important statements made by meeting participants that contain predefined keywords and display them on the screen. This allows participants to check missed utterances and summarize the contents of past meetings.

The system can also be combined with a videoconferencing system to transcribe utterances and display them in real time as subtitles. This feature will help to expand the application of the system to global business activities.

We will continue to enhance the features of the system for application to various types of meetings and conferences.



## New OCR Solution for Mobile Applications (Mobile OCR)

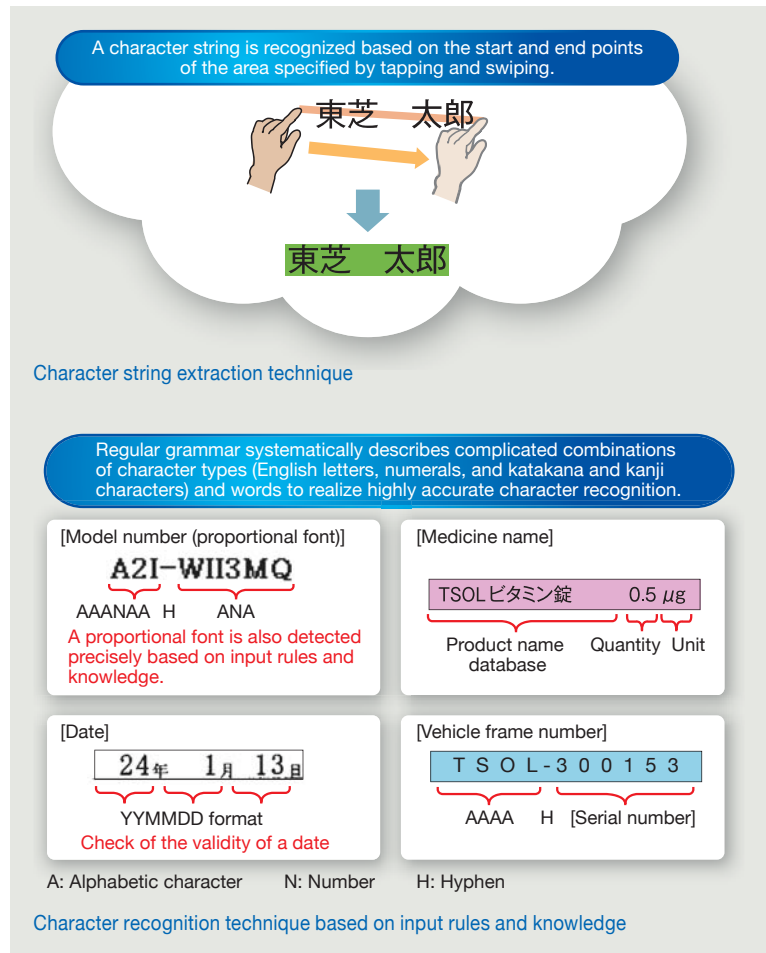
Toshiba Solutions Corporation has released a distributed data entry solution using mobile devices such as smartphones and tablets. The newly developed solution employs a mobile camera to take photos of forms and other documents, detects the areas of images to be read, and utilizes an optical character reader (OCR) to recognize text in the detected areas. The OCR results are then transferred to a server or a cloud system.

The new OCR solution reduces the time required for data entry compared with the conventional methods that, for example, involve copying personal ID documents and sending them through the post. This system also reduces the risk of information leakage because data do not remain in the mobile device.

We have developed techniques for (1) distortion correction, (2) shadow removal, (3) text recognition, and (4) flexible post-OCR processing based on input rules and word knowledge.

The character string to be read can be indicated by tapping and swiping its image on a touch panel. It is then automatically read by OCR with high accuracy. This eliminates the need for a form definition that has been required by conventional solutions prior to a read operation.

The new OCR solution expands the possible applications of various free-size forms and documents.



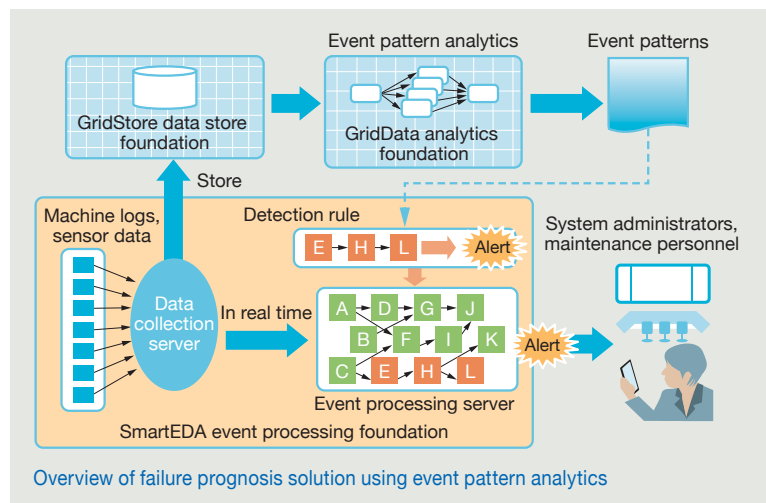
## Event Pattern Analytics Application: Prognosis of Machine Failure from Big Data to Predict Time of Failure

Big-data analytics, utilizing massive collections of various types of data known as big data, has become a focus of attention in recent years. A large number of companies now use big-data analytics to improve their products, services, and operations. In many business sectors, there is growing demand for technologies, products, and services related to big-data analytics.

Against this background, Toshiba Solutions Corporation has developed an event pattern analytics application that is specifically designed to predict machine failures through big-data analytics. In order to detect signs of machine failure, the application analyzes big data consisting of various time-series data including sensor data and machine logs.

The advantage of event pattern analytics is its ability to extract event patterns together with time intervals between events, which cannot be performed with the commonly used sequential pattern mining technique. As a result, event pattern analytics makes it possible to predict the remaining time until machine failure.

The new application thus allows its users to draw up effective maintenance plans, including parts replacement schedules. Furthermore, this information can be utilized to improve product quality.



## GridStore/NewSQL Database Accelerating Big-Data Analytics

Toshiba Solutions Corporation has developed the GridStore/NewSQL database consisting of Structured Query Language (SQL) engines and key-value stores (KVSs).

Our big-data solutions have two types of data stores: KVS NoSQL (Not Only SQL) databases and NewSQL databases.

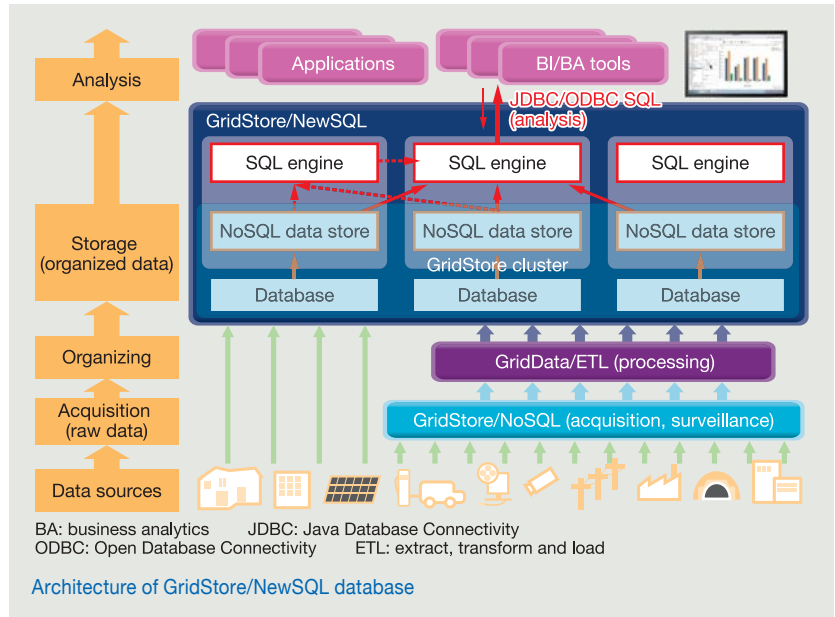
GridStore is a highly efficient database that supports data permanence and transaction processing. It functions as an in-memory database as well as a hybrid disk/solid-state drive (SSD) database.

The NewSQL database not only offers the same access environment as a relational database management system (RDBMS) but also exceeds the system extension limit for a relational database in a scale-up architecture.

The system can be extended in a scale-out architecture by adding more nodes according to increases in the data volume and/or access count. This capability has the following features:

- The system can be kept online when it is scaled out. Thus, the downtime can be as short as a few seconds.
- The system load can be optimized by rebalancing data as nodes are added.

Support of SQL improves the productivity and portability of application codes. Furthermore, SQL codes can be used together with business intelligence (BI) tools to expand their application to big-data analytics and other areas.



## Development and Overseas Deployment of Toshiba Total Sorting Solution for Efficient Logistics Services

Toshiba Solutions Corporation has released the Toshiba Total Sorting Solution, which improves the efficiency of sorting of mail items including parcels, booklets, and letters. Centralized control of various sorting machines realizes efficient sorting at logistics centers in and outside of Japan.

With a view to overseas deployment, the interfaces of the Toshiba Total Sorting Solution are designed to comply with the relevant European standards in order to provide interoperability among not only Toshiba sorters but also those from other vendors in many countries.

Mail items are scanned by sorting machines, and the scanned images are then recognized by an OCR. Unrecognizable images are sent to an operator for video coding to optimize the sequence of operations for mail items rejected by the OCR. This makes it possible to process millions of mail items every day.

The Toshiba Total Sorting Solution also provides integrated management of information, including statistics and monitoring and sorting information, as well as machine setups (sorting plans) according to the characteristics of individual sorters.

