St Petersburg State University implemented a new Panasonic optical disc library system for long-term data storage

Founded in 1724 by Peter the Great, St Petersburg State University became the first university in Russia. Today SPbU is an internationally recognized center for education and research. SPbU constantly strives to provide state-of-the-art facilities that allow staff and students to excel in research and academic activity: a unique Research Park, the best university library in Russia and dozens of R&D laboratories.

The present-day university employs over 6,000 academic staff and has over 30,000 students. SPbU scientists regularly conduct research in almost all fields of knowledge, provide expertise and consulting, and enjoy close ties with Russian and international partners.

**SITUATION:**

Being not only the largest educational and research institution, but also a repository for a vast number of paper-based and electronic documents, SPbU pays great attention to cold data storage. These include dozens of terabytes of diverse information such as records of doctoral and candidate's theses defenses, photo and video archives, an accounting digital archive, and research archives. To reduce the risk of information loss, at least three copies of data have to be stored on two types of media (hard disks, optical discs) in geographically distributed storages (different buildings or even cities) so that they would not be lost at once in case of an emergency in one place.

The current storage technologies, such as hard drives and tapes, have their own pros and cons. Hard drives are optimal for use in hot data storage systems. To use them for storing cold data, accessed once every few years, is inexpedient since they require periodic replacement. The best solutions are limited to 5 years of life - afterwards all the data need to be transferred to new carriers. In the course of 20 years the disks need to be replaced 4-5 times.

When using RAID 5 or RAID 6, in the event of a disk failure, you need to replace it, and if another old disk fails during data transfer to a new disk, there is a risk of data loss. As for new 8-10TB hard drives, the copying time to a new disk may take 1-2 weeks, and if disks from one batch were used for RAID building, it is highly probable that another disk may fail, too, during that period.
NIKOLAY KROPACHEV, SPBU RECTOR: “An optical disc robotic library system at St Petersburg University is a one-of-a-kind project for the Russian higher education. No other university in our country uses similar solutions to store large amounts of data. With the Panasonic library we will be able to store our data for many decades, as well as to arrange quick access to any digital materials we have: electronic library resources, lectures, theses defenses, presentations, multimedia products and so on.”

IMPLEMENTATION ADVANTAGES:

✔ Significant reduction of energy consumption by the Data Processing Centre
✔ Increased data storage reliability
✔ No need to expand the Data Processing Centre's area in case of the multiplication of the cold data archive's capacity
✔ Panasonic’s long-standing experience in the field of data storage on optical disks (since 1982 when the technology was introduced)

Tape carriers have historically been used for backup, yet they are very "delicate" and using them for long-term storage requires meeting some stringent conditions, such as a narrow temperature range, forced energy-intensive cooling of premises, and regular cassette rewinding. In case of an emergency, even a short-term increase of the recommended temperature (power outages, fire in the building) leads to destruction of thin magnetic film and loss of data.

Considering these factors, the SPbU executives decided to try a new Panasonic optical disc library system in 2015.

SOLUTION:

After a one-year real life testing of this solution at SPbU the following advantages of storing cold data on optical disks within the Panasonic library system were outlined:

• A long lifetime of the carrier - 50 years or more - makes it possible to skip periodic transfer of data to new carriers (estimated value was obtained using the Eyring acceleration model)
• Data recovery capability with RAID technology
• Immutable medium — physical WORM, protection from failures and potential damage/ modification of archived data
• Backward compatibility from the beginning of technology development and further support of all previous generations of data cartridges
• Resistance to fire extinguishing systems (gas/powder) and electromagnetic fields (for example, in case of transportation during high solar activity)
• Low degradability of carriers in emergency situations (flooding, outages, life support system failures)
• Contactless data reading from the carrier
• An option to withdraw carriers for safe custody or transportation without interruption of device operation
• RFID tags embedded on the carriers to ease the search in offline storage and during transportation
• A modular storage system; an option to increase the available volume of data
•A data storage system operating over a wide temperature range from +10°C to +40°C
•Carriers may be stored at a temperature from +10°C to +55 °C
•A power supply unit with backup for several inputs
•Low power consumption of the storage system
•Using a cache server to optimize reading and writing of frequently accessed documents and files
•Manufactured in Japan under high technological standards
•Unchangeability of data at the physical carrier level: protection from virus attacks, encryptors and unauthorized data modification

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CERTIFICATES:
The quality of Blu-ray and Archival Discs is confirmed by TÜV Rheinland Group, an independent certification company.

Certificates Q 50330615 and AK 50158512

RESULTS:
During pilot running, SPbU researches collected improvement suggestions and transferred them to a Panasonic factory. Part of the suggestions have been realized and tested in the university already, and another part could be added in the near future. As a result of testing, it was decided to make the Panasonic optical disc library system a part of the university's IT infrastructure. The university is planning to use it for storing research results, video materials related to doctoral and candidate's theses defenses, students' diploma defenses, lectures delivered by outstanding workers of science and art, as well as by political figures. It is planned to create a centralised archive consolidating all accumulated knowledge. It will lay the foundation for a digital historical archive. A particular section is planned for the university's partner projects.

Nikolay Kropachev, SPbU Rector, and Kazuhiro Tsuga, President of Panasonic Corporation.
Photo by the SPbU Press Service.

Panasonic actively uses the University Data Processing Centre to demonstrate current solutions to its prospective users. The Data Processing Centre has become a launching platform for the development of the concept of environmentally friendly and highly reliable data centers as well as for testing of new Russian software. Feedback and expertise provided by SPbU researchers will allow Panasonic engineers to optimize the library for wider implementation at Russian educational institutions.

*Panasonic Russia assumes responsibility for the content of this article released in November 2017.*