Affordable and efficient infrastructure of university portal

The Portal of Slovak Universities (portalvs.sk) came into being with the support of the Ministry of Education, Science, Research and Sport of the Slovak Republic within the scope of central development projects. It is the main goal of the portal to secure the generation of systematically organized and expertly guaranteed pieces of information relating to universities, to give space for exchange of experiences and provision of information about conferences, seminars, and educational products.

Among other benefits of the portal is the use of a central database of accredited curricula, a unified database of Slovak universities and faculties or the utilization of the central register of students, electronic applications, and the system of their authorisation.

Design

TEMPEST implemented a geographically dislocated geocluster with a view to secure the accessibility of applications of the Portal of Slovak Universities and its parts. The design was built from scratch on a greenfield site, including the infrastructure that is located in two data centres and primarily based on the products by Oracle (Sun Microsystems) and Symantec (Veritas).

The design was proposed as highly accessible and automated, and produced in consideration of preferred low investment cost demands. It is an interesting feature of the design that SAN (Storage Area Network) for the interconnection of localities and the disk arrays within them is absent. Further savings were achieved by aptly chosen software components for monitoring and the presentation layer itself, as well as by implementation of design in commodity servers.

Benefits:

- high accessibility
- fast implementation
- low cost
- centralized management

Design Potential

Based on customer demands, cost effective alternatives to hardware components were identified and suitably complemented with software licences to ensure the operation in case of failure of the entire data centre of its connectivity.

It has been taken into account since the start that the customer doesn't dispose of and doesn't plan to dispose of the interconnection of data centres, e.g. by means of a DWDM (Dense Wavelength Division Multiplexing) technology. Owing to this TEMPEST drafted a proposal of the infrastructure that enabled data replication over IP network and was independent from the used technology of disk arrays. This design also excluded the need for licensing of native replication technologies of disk arrays.

Combining these facts with experiences of TEMPEST determined the use of the Symantec Storage Foundation software package for HA (High Availability) with the special feature of Global Cluster Option (GCO). The Veritas Volume Replicator–a component of the software package–was proposed for the replication of production data between data centres.

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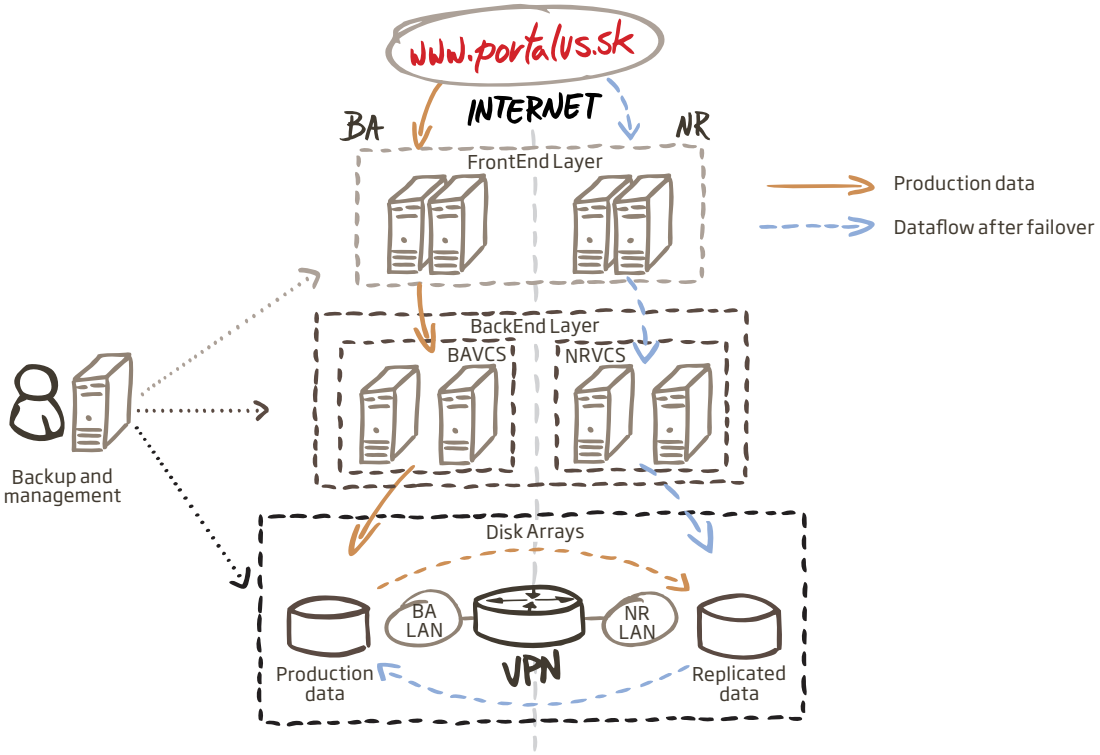
Design Implementation

Implementation was divided into two phases. The first phase comprised logistics–infrastructure distribution, installation into racks, and cabling. The second phase took place by means of remote access via VPN into customer's data centres. As software components were the same in both data centres, environments in Bratislava and Nitra could be prepared parallelly.

A two node Veritas Cluster Server in each of the localities of Bratislava (BAVCS) and Nitra (NRVCS) became the heart of the design. Their logical interconnection is done by Veritas Cluster Server with a Geo Cluster Option, which is an extension of the "failover" option and high accessibility of applications between geographically distant localities.



This design ensures accessibility of three databases, namely Oracle, MySQL server, and NFS (Network File System) by web servers where clustering of these services was designed during the second implementation phase.

Subsequently the most important functionality–the operation switchover from Bratislava to Nitra–was tested. After debugging of the operation switchover (so called "failover" tests) management and monitoring tools were installed and configured in the dedicated hardware. The infrastructure was added to the Symantec NetBackup system, and backups and recovery of important software components were tested on a robotized tape drive.

Server infrastructure and software components

- 2 x Oracle StorageTek 2540
- 8 x Oracle SunFire 4150 Server
- Oracle 10g
- Veritas Storage Foundation 5.0
- Veritas Cluster Server Global Cluster Option
- Veritas Volume Replicator
- Veritas Netbackup 6.5

Summary

The design proposed and implemented by TEMPEST enabled an effective fulfillment of the assignment and meeting of all set project goals at very short notice. For the customer, this design is another step to the successful development of the portal.

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