

**MONTENEGRO**

**MINISTRY OF FINANCE**

**CUSTOMS ADMINISTRATION**

**DESCRIPTION OF THE EXISTING IT SYSTEM IN THE CUSTOMS ADMINISTRATION**

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# **DESCRIPTION OF CURRENT SITUATION**

Hardware platform of data center in MCA consists of several blade servers, storage system and adequate Ethernet and FC modules.

The hardware platform works as a central virtualized platform on which server virtual machines (VMs) are running with services provided by MCA IT center to its users. All the servers within the data center, including ORACLE DB cluster, are virtualized and run on this hardware platform. Software platform used for this virtualization is VMWare vSphere 5.5.

For the purpose of virtualization, a VMWare cluster, consisting of 5 hardware servers, was created (IBM Flex nodes type x240). All servers are installed inside the IBM Flex chassis and via internal FC switch (IMB FC3171) connected to storage system IBM StorWize v7000. From the storage system were presented two basic volumes, used to create a VMWare cluster and start VM with services.

The complete platform, using the internal IBM EN4093 40Gb switches, is connected to the surrounding environment of the MCA data center.

## **SERVER PLATFORM**

As already stated, for the purpose of creating virtualization platform, a VMWare cluster, consisting of 5 hardware servers, was created (IBM Flex nodes type x240). All servers are installed inside the IBM Flex chassis and via internal FC switch (IMB FC3171) connected to storage system IBM StorWize v7000.

In order to establish connection with other parts of MCA datacenter, internal Ethernet switches are connected on Juniper SRX240 server firewall system and with two Juniper EX2200 L2 switches.

All modules installed inside the FLEX chassis have special IP addresses for management. The chassis is designed in the way that inside of it was created internal control bridge, through which all internal modules can be connected to the external management network. The output port is the Ethernet port of the active chassis control module (CMM). The chassis has two such modules built in, one of which is active and the other passive in order to provide redundancy.

## **STORAGE SYSTEM**

Storage system IBM StorWize v7000 is composed of two redundant controllers and two power supply modules that have battery modules for the emergency power failure mode.

Storage system has two disk enclosures:

* Enclosure 1, In which controllers are located, SSD and 10kRPM SAS discs (2 x SSD 400GB and 22 x 600GB 10kRPM)
* Enclosure 2, in which near – online SAS discs are located (12 x 4TB 7600RPM).

The discs are divided in two logical groups:

* Storage Fast Application, in which SSD and fast SAS discs are located
* Storage Slow Application, in which slower SAS discs are located.

This logical groups are used to allocate space and create volumes depending on the performance needs.

Storage is connected to the network with two FC ports from each controller.

Storage is connected to IP network only in the purpose of enabling administration. iSCSI connectors are not used in the current configuration.

## **SAN – Storage Area Network**

SAN or Storage Area Network is designed to transfer data from the storage system to servers. The basic protocol used in this network is Fiber Channel (FC).

FC SAN includes following devices:

* Two FC switches IBM FC3171 with 14 internal and 6 external 8Gbps FC ports each.
* Storage system StorWize v7000 which has 2 controllers with 4 FC ports each (two FC ports are used to connect to the SAN).

## **SERVER NETWORK**

Server segment of network enables communication of VM with surrounding environment. For the purpose of communication between internal Flex nodes with environment, the chassis has 2 40Gbps Ethernet switches. Internal ports on the switches are connected with servers while external ports on switchesare connected with external devices - Juniper SRX240 and Juniper EX2200 L2switches. IBM EN4093switches are used, which have 10Gbps ports to servers and 10Gbps and 40Gbps Ethernet ports to external ports toward external part of the network.

## **VMWARE INFRASTRUCTURE**

For the purpose of optimal and flexible usage of theavailable hardware resources, VMWare vSpere 5.5 cluster systems was installed on hardware platform. This system includes all installed server nodes as hypervisors. Vmware ESXi 5.5 hypervisor is used as a software for virtualization on hardware nodes. Vmware is installed on local discs on nodes 1 and 2 (vmhost5, vhmost4) since they are available on this servers while on the nods 3, 4 and 5 (vmhost1, vmhost 2, vmhost3) vmware ESXi is installed on local flash storage.

VMWare vCenter, installed as VM on a system, is used for supervision of system.

The idea of nodes allocation is to use vmhost1, vmhost2, vmhost3 and vmhost4 for launching internal applications and services and, for that purpose, internal VLANS from server segment are distributed onto them. Node vmhost5 is intended for performing external services i.e. services which are visible on Internet or which are being accessed by users outside of Customs administration. Only external VLANs are being distributed according to it in order to achieve logical separation among internal and external services.

## **BACKUP INFRASTRUCTURE**

The basis of backup system consists of Veritas Backup Exec software solution, installed on DELL R610 server, as logical and management center of backup system, and on DELL TL2000 device as a medium for mass, fast and reliable backup.

Dell PowerVauls TL2000 has a role of a medium for mass, fast and reliable backup, and represents ideal solution for automatization of backup process with minimal manual interventions. Existing Tape Drives supports and operates LTO Ultrium 4 Data Cartridges.

Veritas Backup Exec software solution for backup is installed on DELL R610 server and represents logical and management center of backup system. With its client / server architecture, Backup Exec provides fast and reliable backup and restore of individual servers, applications and workstations over the network.

This backup system was installed and became operational in 2012 which makes it unreliable at the moment from the hardware point of view.

## **NETWORK INFRASTRUCTURE – LAN and WAN**

Communication network of Customs administration consists of several segments that are interconnected with safety network devices.

Central system of Customs administration LAN network is made of two redundant L3 switches Juniper EX3400. This system represents a hub for all other segments of the network infrastructure. Segmentation of the LAN network with the defined rights of each subnet of the separate and client computers in the central building of the Customs Administration has been carried out on it.

The network server segment contains several VLANs and is protected by the Juniper SRX240 series firewall devices. It this segment are located application servers, database servers, backup system, etc.

The public segment of the network is protected by firewalls Juniper SRX220 series with active AppSecure services for deep analysis of traffic. All IPSEC VPN connections with external partners are being realized through this segment, as well as submission of customs declarations by electronic means by companies (forwarding agents). Also, the continuous exchange of data with the EU regarding TIR Carnet transit procedures is being conducted through this segment.

Local connection to Customs administration WAN network is realized via Juniper EX2300 L2 switch and two redundancy Juniper SRX345 firewall devices on central location in the Customs Administration. Through the infrastructure of Montenegrin Telecom, using its MPLS service, 30 remote customs locations (border crossing points and mainland customs offices) are connected to Customs Administration WAN network. On each remote location, the Juniper SRX300 firewall series with the Juniper EX2300 or EX2300C local switches is installed. All remote locations are connected to central location via MPLS network, using safety standards through VPN IPSEC protocols.

**REQUEST FOR SYSTEM EXTENSION**

Due to the implementation of future European projects, which the Customs Administration has to integrate in its system as soon as possible, the need for extension of the existing hardware capacities has been imposed so that the data center of the Customs Administration would be able to follow all installations of future systems and upgrade existing ones.

Complete replacement of system, i.e. procurement of new equipment with significantly expanded capacities in relation to the existing ones would require significantly higher funds than the available ones, so the option of expanding existing capacities, with this procurement, is the only real solution. Also, procurement of equipment from another manufacturer would require the process of system migration from the old to new equipment, which would also require the engagement of external experts which would require additional financial resources which are not at our disposal at this moment.

With this procurement, the Customs Administration of Montenegro wants to achieve the expansion of existing system with compatible server and storage equipment, as well as upgrading or replacement of other existing systems (Backup system, access protection system and power supply system). A part from new equipment is planned to be installed within the existing systems, such as the installation of new servers in the existing Blade Chassis. Request defined in this way will favor some manufacturers for one part of equipment (IBM for Storage system, IBM / Lenovo for Blade Chassis, IBM / Lenovo for Blade Servers and Juniper for Firewall and L2 switches), while request for other specified equipment can be satisfied by several different manufacturers (Backup server, Tape Library).

Regardless of this limiting condition, we expect that several bidders will take part in the process of this public procurement.

Additionally, one of the reasons for specification made in this way is establishing functional technical solution for a *uniform* server and network infrastructure that will not require additional maintenance costs for Customs Administration. The Annual Agreement on maintenance of the CIS System part, which includes the maintenance of server and network infrastructure, specialized system software and service of other IT equipment, is renewed every year by the Customs Administration with an external partner worth up to 50.000 €. Also, the estimated market value of existing server and network equipment in the MCA data center is estimated at over € 500,000.In addition, the customs officials have passed the appropriate training for the existing equipment and took over part of its maintenance, while the expert level of maintenance is transferred every year to an external partner through public procurement for these services

In the case of procurement of equipment from other manufacturers, the Customs Administration would not achieve the desired goal of expanding existing hardware capacities, but would also have the situation of developing a parallel system that would significantly complicate the system of overall administration, connection with existing systems, as well as the problem of migrating certain parts from existing to new hardware. We would get a multiform system that would greatly complicate its exploitation and maintenance. MCA officials should again go through additional training for maintenance of a new kind of equipment, which would require additional costs and new procurement items that the Customs Administration must provide. Moreover, the possible diversity of equipment could also influence the procurement of expert support services by expanding the requirement for new maintenance items, which would also require the engagement of several external partners, which would also significantly increase the value of the existing annual maintenance contract for this part of the system.