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Networked Software' Performance Metrics and Analysis with IBM SVC Config Advisor

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ABSTRACT: IBM SVC is a virtualization product by IBM which deals with storage virtualization. In this IBM SVC, numbers of hetrogenous hosts are connected by means of high speed communication network. To manage configuration of these networked component is very difficult task. To automate this configuration checking is need of the world. Hence IBM SVC Config Advisor tool is developed by IBM. This tool deals with remote configuration check for storage stand including IBM SVC and Storwize products. This paper introduces the IBM SVC Config Advisor tool along with performance statistics. This paper mainly deals with the networked tool's performance statistics collection and analysis. Here IBM SVC Config Advisor is used as networked Tool for analysis. This paper can be useful to analyze software which are highly network dependent in nature.

Key word: IBM SVC, network, virtualization product.

INTRODUCTION

A SAN is a high-speed Fibre Channel network that connects host systems and storage devices with the help of unified connectors. In a SAN, a host system can be connected to a storage device across the network in which other devices are also attached. The connections are made through units such as routers, switches, nodes and storage elements. The area of the network that contains these units is known as network fabric. SAN Volume Controller soft-ware The SAN Volume Controller software performs functions for the host.

The IBM 2145 SAN Volume Controller (SVC) is an inline virtualization or "gateway" device and it logically sits between hosts and storage arrays and presents itself to hosts as the storage provider (target) and presenting itself to storage arrays as one big host (initiator). IBM SVC is physically attached to any available port in one or several SAN fabrics. The virtualization approach allows for non-disruptive replacements of any part in the storage infrastructure, including the SVC devices themselves. It also aims at simplifying compatibility requirements in strongly heterogeneous server and storage arrays. All advanced functions are therefore implemented in the virtualization layer. This virtualization layer allows switching storage array vendors without impact on array performance. Finally, spreading an SVC installation across two or more sites (stretched clustering) enables basic disaster protection paired with continuous avail-ability.

The SAN Volume Controller combines software and hardware into a comprehensive and modular appliance that uses mechanism of virtualization in symmetric fashion. In the storage systems, numbers of heterogeneous hosts are connected to SVC. It is hectic task to configure all devices and hosts manually. Time requirement to configure elements in SVC set up is very large. Error detection is also di cult as there are number of hosts connected to the system. As there are various hosts connected in the system, it is very much difficult to check the configuration mismatch in the system

SVC nodes are always clustered, with a minimum of 2 and a current maximum of 8 nodes, and linear scalability. Each node is a 1U high rack-mounted appliance leveraging IBM System x server hardware, protected by redundant power supplies and an integrated 1U high uninterruptible power supply. An integrated two-row display and ve-button keyboard offer standalone configuration and monitoring options. Each Storwize node has four Fibre Channel ports and two or four 10/1 Gbps Ethernet ports used for FCoE, iSCSI and management. All these Fibre Channel and FCoE ports on the SVC are both targets and initiators, and these are also utilized for inter-cluster communication. The inter-cluster communication includes maintaining read/write cache integrity, sharing status information, heart beat information, and forwarding reads and writes to partner clusters.

The IBM SVC Config Advisor is introduced to overcome the problems with the configuration of system. IBM Config Advisor is able to get the current configuration of all heterogeneous hosts connected in the system and also able to suggest recommended configuration of the components. To have communication with remote machines, standard connection establishment mechanisms can be used. Current solution will work on iSCSI-attached hosts. This will reduce required time to configure hosts and nodes along with detection of config mismatch to check errors in the configuration. Logs are also maintained to track the internal operations.

INTERNALS OF IBM SVC CONFIG ADVISOR

IBM SVC Config Advisor mainly focused on storage stand element health check. As the storage stand configuration check is a tridious task in order to detect a defect in the same. Due to this, defect conformation and fixing of defect becomes more complicated as such. Also verification of defect regarding configuration Is also error prone activity as lots of manual intervention in stand Config check. To overcome these problems, this tool is addressed to. In this project, we have covered IP connectivity to get the details of stand elements. This tool supports SVC nodes along with some other Storwize products like V7000, V5000, TB4, etc which follows nearly similar command sets of CLI. This project should also able to detect the type of operating system to fire appropriate command particular to Operating system.

This tool is capable to get the details from hosts and will also able to detect misconfiguration of the same. Integrated Evidence-Logger tool captures all the logs from cluster and hosts so that evidence for the tests can be maintained and stored on central Infra- server. These logs can be recovered and should show complete cluster status at particular time of test. The Tool's scope also includes the deliverable generation from source code. The Python libraries are collected so that the deliverable in .exe format is generated. Also this .exe should work on the systems where python is not installed. This scope includes python compiler code wrap with source code of the Tool.

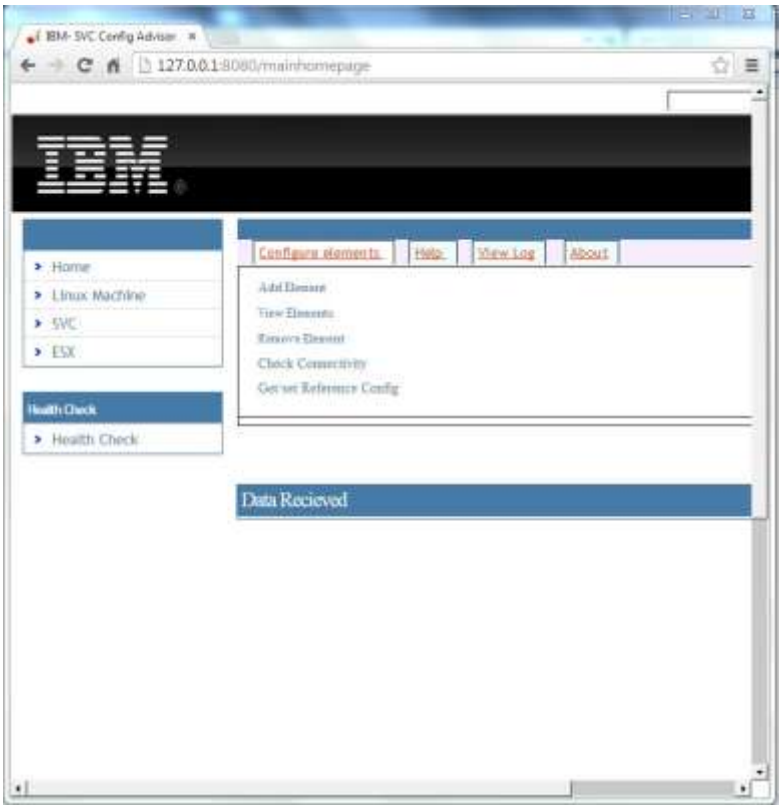
This IBM SVC Config Advisor is introduced to overcome the problems with the configuration of system. This project will be able to get the current configuration of all heterogeneous hosts connected in the system and also able to configure the components. To have communication with remote machines, standard connection establishment mechanisms can be used. Current solution will work on iSCSI-attached hosts. This will reduce required time to configure hosts and to check errors in the configuration. Logs can be maintained to track the internal operations. Connection mechanisms are as below:

1) Connection to remote Linux host is established and information is fetched from that host using Secure Shell (SSH) connectivity mech-anism. SSH is a light weight cryptographic network protocol for secure data communication, remote command-line login. Once connection is established, various data can be collected from host.

2) Connection to remote SAN Volume Controller will be established and information is fetched from SVC. To establish connection, Secure Shell (SSH) connectivity on port 26 can be

used. SVC supports SSH connection on port 26. Once connection is established, configuration information will be collected from SAN Volume controller.

3) In case of windows machine connection, WMI connection mechanism can be used. Windows Management Instrumentation (WMI) is a set of extensions to the Windows Driver Model that provides an operating system interface through which instrumented components provide information and notification. The purpose of WMI is to define a proprietary set of environment independent specifications which allow management information to be shared between management applications. Once WMI connection is established; configuration information will be collected and set from host.



PERFORMANCE ANALYSIS

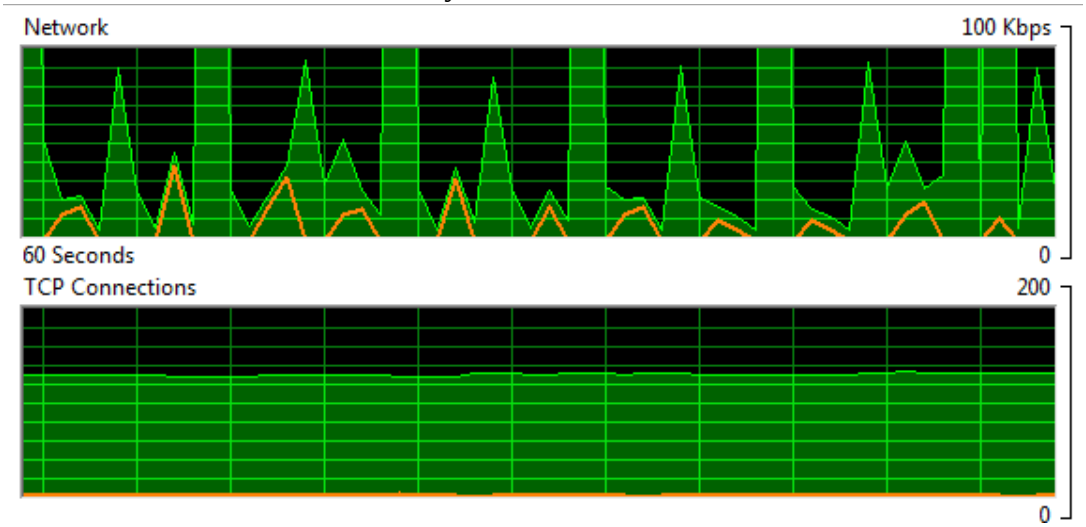
Performance analysis of networked tool should be done by evaluating networked parameters like band traffic, packet efficiency, network connection speed, etc. While stand alone system parameters are also playing important role in e**1) Network traffic:**

1) Network traffic:

Network Traffic analysis is the process of intercepting and examining messages in order to deduce information from patterns in communication between digital equipments. It can be performed even when the messages are encrypted and cannot be decrypted. This is also applied to the plaintext messages. In general, the greater the number of messages observed then there can be more messages inferred from the traffic. Traffic analysis tasks may be supported by dedicated computer software programs, with some commercially available programs such as those offered by IBM and similar industries. Advanced traffic analysis techniques may include various forms of social network analysis.

Bandwidth in bit/s may also refer to consumed bandwidth which is directly corresponding to achieved throughput or goodput. This is same with the average rate of successful data transfer through a communication path. A bit stream's bandwidth is proportional to the average consumed signal bandwidth in Hertz (the average spectral bandwidth of the analog signal representing the bit stream) during a studied time interval. Channel bandwidth may be confused with data throughput. A communication channel with x bps may not necessarily transmit data at x rate, due to overhead of protocols, encryption techniques, and other factors. For instance, a lot of internet traffic uses the transmission control protocol (TCP) which requires a three-way handshake for each communication transaction

In this config advisor tool, the cluster traffic is considered as the customer has its own terrific apart from the traffic of this tool. As most of the customers are using 10G pipe for communication the traffic overhead by this tool is negligible. As a part of design, we are transmitting the command line data string to the cluster and textual data is retrieved from the cluster. This text data has very less overhead when network traffic is concern. Snapshot show a little bandwidth and traffic is consumed by the tool.



2) Physical memory

Physical memory or Random-access memory is a form of computer data storage in the form of 0s and 1s. A random-access memory device allows data items to be read and written in roughly the same amount of time regardless of the order in which data items are accessed. With direct-access data storage media such as hard disks, CD-RWs, and other similar memories, the main performance issue is due to time required to read and write data items varies significantly depending on their physical locations on the recording medium. This mainly caused due to mechanical limitations such as media rotation speeds and arm movement delays.

This config advisor tool is able to work on windows operating system and which consumes a little RAM. Mainly the memory consumption is by Browser to save its current settings and information. As dynamic design approach is select; the memory required to run this tool is very less. The server design has variables in the form of python strings and integers which are not heavy when memory of execution is concern. Figure shows the actual memory consumption of tool.

This tool uses very low rate of page faults as shown in figure. As page faults are less in the system, performance of cache increases by great extent. This will also increase availability of bytes for system. In the IBM SVC Config Advisor tool, it has been analyzed that byte availability is very large with very less cache faults. This excellent statistics are achieved due to command flow structure of code. This minimizes the cache miss in the system and performance boosted.

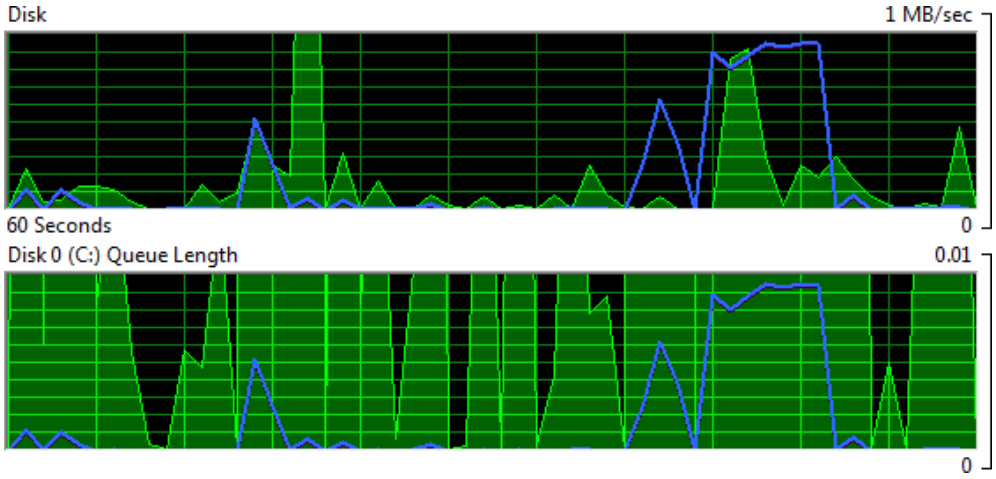
3) Disk Performance:

Higher performance in hard disk drives comes from devices which have faster performance characteristics. These disk devices include those with rotating media, hereby called rotating drives, i.e., hard disk drives and similar disk drives. It also covers devices without moving parts like solid-state drives (SSD). For SSDs, most of the attributes related to the movement of mechanical components are not applicable, but the device is actually affected by some other electrically based element that still causes a measurable delay when isolating and measuring that attribute. These performance characteristics can be grouped into two categories: access time and data transfer time

The command processing time or command overhead is the time it takes for the drive electronics to set up the necessary communication between the various components in the device so it can read or write the data. This is of the order of 0.003 ms, very much less than other overhead times, so it is usually ignored when benchmarking hardware. The settle time is the time it takes the heads to settle on the target track and stop vibrating so they do not read or write off track. This time is usually very small, typically less than 0.1 ms, and modern HDD manufacturers account for it in their seek time specifications.

In the config Advisor tool, very less disk IO at client side is done by the system. In this tool disk IO is only required to fetch the config information stored in files and to retrieve other tool metadata information from files. Write IO happens at the time of storing the command output retrieved from the cluster. This will not take much of the disk time and power. Evidence logger tool is quite exceptional case when disk performance is concern. In this Evidence logger tool all the logs of cluster state has to be stored in persistent storage. This requires a measurable amount of IO write operation at client machine while read IO is happened on cluster to capture the state information from cluster. The hike in the figure show IO for Evidence logger tool while the minimal graph before hike show IO operation performed by Config Advisor tool.

It has been observed that the IBM SVC Config Advisor tool consumes very less disk due to in-place computation capability. As in-place processing is preferred; the resulting disk IO per run/ per command run is very less. This increases disk performance and hence speedup of tool. Integrated Evidence-Logger tool consumes some disk bandwidth as it needs to capture and save cluster logs to infra's file system. In this Evidence-Logger tool, redundant configuration capturing is avoided hence disk usage is optimized in overall tool.

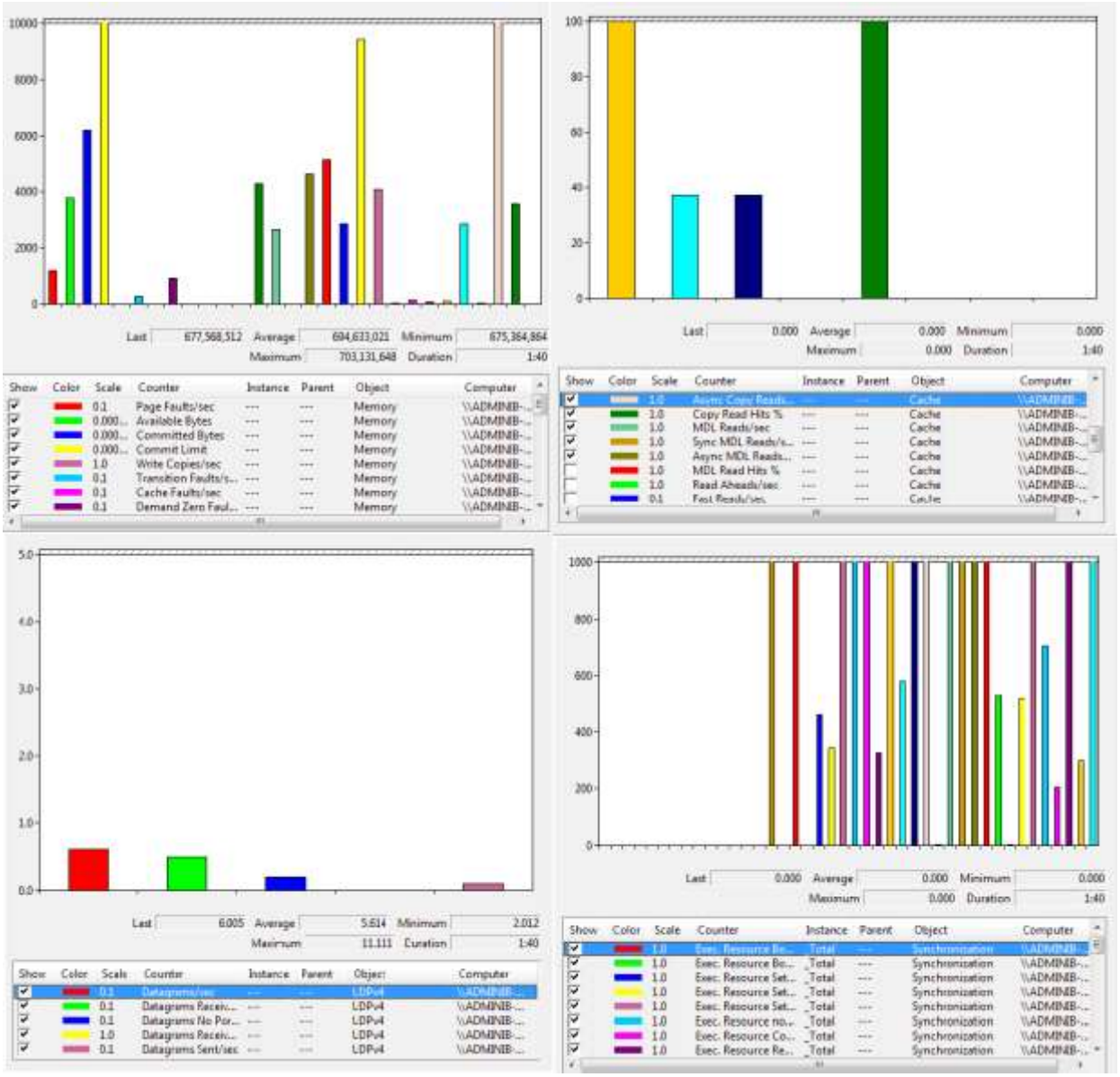


4) UDP Performance:

The User Datagram Protocol (UDP) is one of the core members of the Internet protocol suite. With UDP, computer applications can send messages, in this case referred to as datagrams, to other hosts on an Internet Protocol (IP) network without prior communications to set up special transmission channels or data paths.

In this Config advisor tool Linux and lodestone commands are transferred via UDP protocol by client browser. These commands are small in terms of memory and associated packets are concern. These commands are transferred by UDP packets. Also the result of command execution is transferred by UDP packets to the client. In the Evidence logger tool the requirement of packets is quite larger than that of Config advisor as config file transfer is carried out.

Figure shows tat this tool utilizes UDP packet less than 0.7 % which show that this tool is very efficient when packet transmission is concern.



References

[1]."IBM System Storage"SAN Volume Controller 7.1 Entry Edition and DS3400 36,000 Mailbox Resiliency Exchange 2010 Storage Solution" IBM pvt. Ltd., May 2012
[2].Nick Clayton and Carlos F Fuente, "Planning for Easy Tier with IBM System Storage" Storwize V7000 and SAN Volume Con-troller," Document ID: WP102295, May 2008
[3].Ramapriya Krishnamurthy, "IBM SAN Volume Controller Perfor-mance Con guration Guidelines for Implementing Oracle Databases with Automatic Storage Management (ASM)," Document ID: WP101481
[4].Stephen Wehr, "High Availability Architectures For Linux on IBM System z,"Document ID: WP100752, Augest 2012
[5].Wilhelm Gardt, "Best Practices for Tivoli Storage FlashCopy Manager in a SVC Metro Mirror environment," Document ID: WP102196, June 2011
[6].Narayana Pattipati and Frank Battaglia,"SAS deployment on IBM Power servers with IBM PowerVM dedicated-donating LPARs," Document ID: WP102244, April 2013

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