SGI® UV™ 300H
Configuration Best Practices
for SAP HANA® TDI Solution
with EMC Storage

Scale-up, Single-node Architecture Enables Real-time
Operations at Extreme Scale and Lower TCO

May, 2015

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Scope of this document

This document provides best practices and tips for setting up and configuring an SAP HANA TDI solution using an SGI® UV™ 300H in-memory computing system with EMC VNX or EMC VMAX storage.

Audience

This document is intended for system integrators, systems administrators, customers and partners.

1.0   Objectives

Run Your Business in Real-Time at Extreme Scale and Lower TCO

The ability to combine database, data processing, and application platform capabilities in-memory with the SAP HANA® platform is truly game-changing.

Imagine if your operations, financial, research, or marketing teams could operate in real time. Now imagine leveraging SAP HANA in your enterprise at extreme scale and lower total cost of ownership (TCO). SGI is making this possible.

SAP® Certified
Hardware for SAP HANA®

2.0   Benefits

Unleash the power of SAP HANA in your business

Building on SGI's proven in-memory computing technology and unique scale-up architecture, SGI enables large enterprises to confidently leverage the power of SAP HANA for enterprise resource planning software.

Boost heavy, multi-engine analytics that require single-node systems, reduce overhead and raise service levels for cluster-supported environments that become a struggle.

It's now possible to:

- Achieve real-time business at extreme scale and lower TCO

- Run SAP Business Suite powered by SAP HANA with future-ready scalability

- Perform complex joins at massive scale

- Run multiple analytic engines to include text, geospatial, and live data streaming simultaneously

- Run SAP Business Warehouse powered by SAP HANA free from the complexity of clusters; reducing overhead costs and maximizing return on investment

- Make faster, smarter decisions based on real-time insight across your large enterprise

- Gain competitive advantage by fully realizing the value of SAP HANA

Real-time insight leads to better-informed decisions for achieving business objectives.

3.0   Introduction

About the SGI UV 300H

SGI UV 300H ("System") is a purpose-built advanced symmetric multiprocessing (SMP) system for the SAP HANA platform, enabling real-time transactional and analytical processing for large enterprises.

The System utilizes a single-node coherent shared-memory coupled with Intel® Xeon® E7 8890 v2 processors that scales seamlessly from 4 to 32 sockets, subject to SAP certification.

An examples of a System is an eight-socket SGI UV 300H system (2 chassis) with:

- Eight Intel® Xeon® E7-8890 v2 processors

- 6TB memory (using 32GB DIMMs)

- Four Dual port 8Gbit/s FC Gen2 PCIe Cards (two per chassis to provide four ports into each chassis)

  Note: SGI offers the following PCIe FC HBA:

  - Dual port 8Gbit/s FC Gen2

  - Quad port 8Gbit/s FC Gen2

  - Dual port 16Gbit/s FC Gen3

  - Quad port 16Gbit/s FC Gen3

The System is preconfigured with the following software:

- SUSE Linux Enterprise Server for SAP Applications.
- SGI Foundation Software for SAP Applications

4.0   Preparing to Configure the System

Administrative Network Information

The following procedure describes the information you need to gather before you begin the configuration. Obtain information for the administrative network, and verify that the site network is provisioned for the system:

Information	Value
Password	_____
IP Address	_____
Hostname	_____
Gateway	_____
Subnetwork mask	_____
NTP Server	_____
Time zone	_____

See the following URL for the site's time zone code:
http://www.cs.berkeley.edu/CT/ag4.0/appendid.htm

5.0 Connecting the Storage System

Connecting to an EMC VNX Series Storage System

The UV 300H connects via fibre channel (FC) to the EMC VNX Storage using either Dual or Quad Port Host Bus Adapters (8Gbit/s FC Gen2 PCIe HBA Cards) - see below illustration.

For high availability and to meet minimum bandwidth requirements, two host bus adapters each having a single port connected to a dual fabric SAN environment are required. Both ports must be zoned to the I/O module ports of the VNX storage processor.

For detailed descriptions on storage connection, configuration and scalability please refer to EMCs Whitepaper: "Storage Configuration Best Practices for SAP HANA TDI on EMC VNX Series unified Storage Systems" (Section "VNX storage configuration overview" on Page 6)

Connecting to an EMC VMAX Storage System

The UV 300H connects via fibre channel (FC) to the EMC VMAX Storage using either Dual or Quad Port Host Bus Adapters (8Gbit/s FC Gen2 PCIe HBA Cards).

For high availability and to meet minimum bandwidth requirements, two host bus adapters each having a single port connected to a dual fabric SAN environment are required. Both ports must be zoned to the FA (Front-End Adapter) ports of the VMAX engine. For each HBA, one additional port can be connected to the VMAX engine.

For detailed descriptions on storage connection, configuration and scalability please refer to EMCs Whitepaper: "Storage Configuration Best Practices for SAP HANA TDI on EMC VMAX and VMAX3 Storage Systems" (Section "Configuration recommendations using VMAX (10K, 20K, and 40K arrays) for SAP HANA" on Page 14)

UV 300H HBA connections:
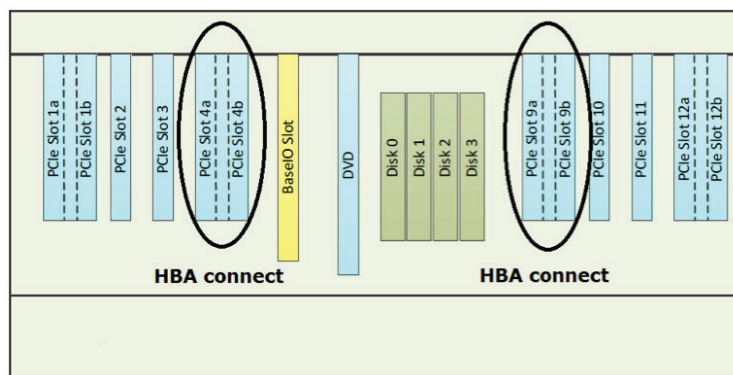
6.0 Configuring the RMC (Remote Management Console)

Connecting to the RMC

The following procedure explains how to connect to the RMC via an attached laptop through a serial connection (alternatively, you can connect to the RMC via an existing network connection):

1. Use the cable that has a USB-A connector at one end and a micro USB-B connector at the other end. Plug the end with the USB-B connector into the RMC's serial port (CNSL), and plug the end with the micro USB-A connector into the laptop

   RMC Ports:

2. In the serial terminal window, use your terminal emulation program's instructions to set the following parameters:

- Baud rate: 115200

- Data bits: 8 (default)

- Parity: No (default)

- Stop bits: 1 (default)

- Hardware flow control (RTS/CTS): No

3. Press Enter to display the login prompt

4. Log in as the root user

5. (The RMC does not prompt you for a password when you log in over a serial connection. When a user logs into the RMC over the network, the RMC prompts for a password). Retrieve the administrative network information you collected and change to the configuration file directory:
   > cd /etc/sysconfig

6. Use a text editor to open file ifcfg-eth1 and search for the following:
   BOOTPROTO=dhcp

7. Insert a pound character (#) into column 1 of the BOOTPROTO=dhcp line to comment it out

8. Search for the following:
   BOOTPROTO=static

9. Remove the pound character and the space character from columns 1 and 2 of the BOOTPROTO=static line

10. Specify network information, and remove the leading comment and space characters in the block of lines that follow the BOOTPROTO=static line

    These lines are as follows in an unedited file:

    # IPADDR=

    # NETMASK=

    # GATEWAY=

    # HOSTNAME=

    For example, the network lines in the file might look as follows after editing:

    IPADDR=100.100.100.100

    NETMASK=255.255.255.0

    GATEWAY=100.100.100.110

    HOSTNAME=RMC_HOSTNAME

11. (Conditional) Add a line for the site NTP server:

    Complete this step if the gateway server and the NTP server are separate servers.

    After the HOSTNAME= line, add the following line for the NTP server address:

    NTPHOST=NTP_ip_addr (i.e. NTPHOST=110.110.110.110)

12. Save and close the file

13. Use a text editor to open the timezone file and search in the file for TZ= (default time zone is UTC) and add the code for the site time zone

14. Save and close the file

15. Type the following command, and follow the prompts, to change the password on the RMC:

    > passwd

    (You need to use the password you define in this step in order to log into the RMC over your site network)

16. Type the following command to reboot the server:

    > reboot

17. Open another terminal window, and type the following command to test the RMC's new IP address and password:

    ssh root@new_rmc_ip_address

18. Remove the cable from the RMC and from your laptop, and replace the bezel on the RMC

7.0   Powering up the RMC, Verifying the Configuration and Booting

This procedure explains how to verify that the server is running correctly and can boot.

You can perform this procedure when directly cabled to the RMC, or you can perform this procedure from another computer at the site that can reach the server over a network connection.

1. Log into the RMC in four different windows

2. In window 1, type the following command:
   > uvcon
   This is the console window. In this window, you can observe the actions of the other windows.

3. In window 2, type the following command and observe the output:
   > config –v
   Output for properly configured BMCs (Baseboard Management Controllers):
   SSN: UV300-00000025
   CMCs: 1
   r001i02c UV300
   BMCs: 2
   r001i01b IP127-BASEIO
   r001i06b IP127
   Partitions: 1
   partition000 BMCs: 2
   Output for not properly configured BMCs:
   WARNING: 2 BMC(s) are not configured
   (If you receive the preceding warning message, or if the two BMCs fail to present,
   contact SGI Technical Support)

4. In window 3, type the following command to observe the status messages:
   uvcon <first_bmc> (For first_bmc, type the identifier for the first BMC. The config -v command output earlier in this procedure shows the identifier)
   e.g. > uvcon r001i01b

5. In window 2, type the following command to power-on the system:
   > power on
   Wait for the > prompt to reappear (this can take 3–4 minutes).

6. In window 4, type the following command to watch the BIOS status display:
   > watch -n 4 bios –s

7. The operating system login prompt appears in window 1 after 10–20 minutes.

Below is an output example for all four windows:

```
*** Window 2 ***                              *** Window *** 3

harp25-rmc RMC:r001i02c> config -v           PCI Platform Post-Initialization (After resource allocation)

SSN: UV300-00000025                          Loading driver at 0x0006B4E9000 EntryPoint=0x0006B4E92C0
                                             IVTCPU is : 0x1 IoApicEnable 0x1F
CMCs:           1                            mNumofBitShift! 5
        r001i02c UV300                       ACPI NumberOfCPUs 240, NumberOfEnabledCPUs 240
                                             SSDT: Suprt Pages fails - no 'superpage0' variable found :
BMCs:           2                            PublishTables: Cannot Locate RSD pointer in Legacy region
        r001i01b IP127-BASEIO                Loading driver at 0x0007E317000 EntryPoint=0x0007E3172C0
        r001i06b IP127                       Legacy Bios Not Found! Skip InstallAdditionalOpRom
                                             SMM: r001i01b00h0s0 responding
Partitions:     1                            SMRAM distribution completed
        partition000 BMCs:    2              ACS capable port is B4.D0.F0 - ACS Cap offset - 0x0
                                             The InterruptRemap value is 01
Accessories:    0                            The RMRR Mem Base is 0x7E4C4000
                                             PublishTables: Cannot Locate RSD pointer in Legacy region
                                             Loading driver at 0x0006A064000 EntryPoint=0x0006A068000
                                             [Bds]Booting SAP default
                                             ConvertPages: Incompatible memory types
                                             ***************************************************
                                             *******   END OF CACHED CONSOLE OUTPUT   *******
                                             ***************************************************
                                             uvcon: escape codes
                                             uvcon:    ctrl-] s    steal console
                                             uvcon:    ctrl-] r    release cosole
                                             uvcon:    ctrl-] b    send break
                                             uvcon:    ctrl-] c    connection status
                                             uvcon:    ctrl-] q    quit (if active console)
                                             uvcon:    ctrl-] ?|h  this help


*** Window 1 ***                              *** Window 4 ***

harp28-rmc RMC:r001i01c>uvcon --nocache       Every 4s: bios -s
uvcon: ttyp mode disabled, use 'CTRL-C' to exit   2014-08-04 17:48:36
uvcon: attempting connection to localhost...
uvcon: connection to SMN/CMC (localhost) established.  ==== 1/2 BMC(s) [r001i06b] ====
uvcon: requesting baseio console access at r001i01b...  [S:0x02,DF:0x001e01] Sleeping   - Handoff (SlaveHandoff)
uvcon: requesting access established (OWNER)   ==== 1/2 BMC(s) [r001i01b] ====
uvcon: CMC <--> BASEIO connection active       [S:0x03,DF:0x008e00] Booted      - CoreExitBootServices
uvcon: escape codes:
uvcon:    ctrl-] s    steal console
uvcon:    ctrl-] r    release cosole
uvcon:    ctrl-] b    send break
uvcon:    ctrl-] c    connection status
uvcon:    ctrl-] q    quit (if active console)
uvcon:    ctrl-] ?|h  this help

Welcome to SLES for SAP Applications 11.3 (x86_64)

harp28-sys login:
```

8.0 Setting up the Storage Configuration

Configuring the EMC VNX Series Storage System

Configuration of the EMC VNX Storage System can be accomplished using either the EMC Unisphere for VNX graphical user interface or the Navisphere command line interface (naviseccli).

The Step-by-step instructions are detailed in the EMC Whitepaper: "Storage Configuration Best Practices for SAP HANA TDI on EMC VNX Series unified Storage Systems" (Section "Configuring VNX storage with EMC Unisphere for VNX" on Page 13)

Configuring the EMC VMAX Storage System

Configuration of the EMC VMAX Storage System can be accomplished using either the EMC Unisphere for VMAX graphical user interface or the Solutions Enabler command line interface.

Configuration recommendations of the VMAX Storage System are described in the following EMC Whitepaper: "Storage Configuration Best Practices for SAP HANA TDI on EMC VMAX and VMAX3 Storage Systems" (Section "Configuration recommendations using VMAX for SAP HANA" on Page 14 / Section "Configuration recommendations using VMAX3 for SAP HANA" on Page 18)

9.0 Setting up the FileSystem

Building the file system on the EMC VNX storage

Building the file system on the VNX storage is described in the EMC Whitepaper: "Storage Configuration Best Practices for SAP HANA TDI on EMC VNX Series unified Storage Systems" (Section "Accessing VNX storage from the SAP HANA nodes" on Page 20)

Accessing the file system on the EMC VMAX storage

Accessing the VMAX block devices from the HANA nodes is described in the EMC Whitepaper: "Storage Configuration Best Practices for SAP HANA TDI on EMC VMAX and VMAX3 Storage Systems" (Section "Accessing VMAX storage from the SAP HANA nodes" on Page 25)

10.0   References

SGI UV for SAP HANA Website – Solution Brief
http://www.sgi.com/pdfs/4497.pdf

Technical Publication – SGI UV for SAP HANA Getting Started Guide
http://techpubs.sgi.com/library/tpl/cgi-bin/init.cgi

Technical Publication – SGI UV RMC Software User Guide
http://techpubs.sgi.com/library/tpl/cgi-bin/getdoc.cgi?coll=linux&db=bks&fname=/SGI_Admin/books/UV_RMC_UG/

EMC Whitepaper – Storage Configuration Best Practices for SAP HANA TDI on EMC VNX Series Unified Storage Systems
http://www.emc.com/collateral/white-paper/h13047-storage-config-best-practices-sap-hana-tdi-vnx-wp.pdf

EMC Whitepaper – Storage Configuration Best Practices for SAP HANA TDI on EMC VMAX and VMAX3 Storage Systems
http://www.emc.com/collateral/white-paper/h12342-storage-config-best-practices-sap-hana-tdi-vmax-vmax3-wp.pdf