Tier A (Client)

ThinkSystem SR650

There is one client in this TPC-E configuration. This document describes how it should be setup and configured.

Hardware

- Hardware- Install the hardware components so you have the following in the client:
  - Processors- 2 x 3.00GHz
  - Memory- 12 x 8GB
    - Follow the suggested memory population order on the sticker inside the system cover
  - Internal Storage- 2 x 300GB SAS in drive bays 0 and 7
  - Networking-
    - 2 x Broadcom NX-E dual-port 10Gb PCI-e Ethernet adapters in slots 1 & 5
    - 1 x Intel x550 dual-port 10Gb PCI-e Ethernet adapter in slot 2
  - Power- 2 x 1100W power supplies
- System Settings:
  - Boot the system and press F1 when prompted to drop into UEFI setup. Once there:
    - Load default settings
    - Set the correct date and time
    - Under BMC Settings → Network Settings, set a static IP address & mask for the BMC so it is on your lab network, then choose Save Network Settings
    - Under System Settings → Operating Modes, select "Maximum Performance"
    - Under System Settings → Processors, enable SNC
    - Save settings
  - Power the server off
- Management network:
  - Connect the server's System Management Ethernet port to the lab network
  - Another system, such as the driver, on the lab network can now manage the server via a web browser pointed at the static BMC address entered above
- Update server's code levels:
  - Download the latest system code levels for this server from lenovo.com:
    - BMC
    - UEFI
    - LXPM
  - Connect to the BMC via a web browser. After logging in, click on "Firmware Update" and then "Update Firmware…". Browse to and select the newly downloaded BMC update file. Follow the onscreen directions.
  - When the BMC update is done, restart the BMC and wait until you can log back into it.

- Now use the same BMC firmware update interface to update the server's UEFI and LXPM code levels.

OS

Create the internal OS array:

- Boot the system. Press F1 when prompted to go into UEFI setup.
- Go to System Settings→Storage
- Select the RAID 930-8i adapter
- Select Main Menu → Controller Management
- Under "Advanced Controller Management ":
    - Select "Set Factory Defaults", Confirm, and Yes. OK.
    - Under "Schedule Consistency Check", set "Consistency Check Frequency" to Disable. Apply Changes. OK.
- Under "Advanced Controller Properties":
    - Under Patrol Read:
        - Set Mode to Disabled
        - Set "Setting for Unconfigured Space" to Disabled
        - Apply Changes. OK.
    - Set SMART Polling to 65535
    - Apply Changes. OK.
- ESC back one menu level
- Create the OS Array:
    - Select "Configuration Management" → "Create Virtual Drive – Advanced"
    - RAID-1
    - "Select Drives"
        - Select the two 300GB drives in slots 0 and 7
        - Apply Changes. OK.
    - "Virtual Drive Name" = "OS"
    - Leave default 64K stripe, No Read Ahead, Write Through, Direct, Read/Write, Drive Cache disabled
    - Set "Default Initialization" to Full
    - Save Configuration. Confirm. Yes. OK.
    - The OS array now gets initialized. Wait until it is done, which will be several minutes.

Install the OS:

- Be sure the system date and time are correct in F1 setup
- Insert the Windows Server 2019 installation DVD into the system (or mount its ISO image via the IMM) and boot from it
- Install Windows
    - Language to install = English
    - Time and currency format = English (United States)
    - Keyboard or input method = US [Next]
- Select "Install Now"
- Enter product key [Next]
- Choose "Windows Server 2019 Standard (Desktop Experience)" [Next]
- Accept the license terms [Next]
- Select "Custom" installation type
- Select to install Windows to "Drive 0 Unallocated Space" [Next]
- Windows will now install. This will take several minutes, and the system will reboot more than once. No user interaction is needed.
- Set the new Administrator password and log in.
- You are now brought to the Windows desktop. Windows is installed. You can remove/unmount the installation DVD now.

Configure the OS:

- Server Manager→ Local Server:
  - Enter the computer description, name, and workgroup
  - Turn off Windows Firewall for domain, public, and private networks
  - Turn off Windows Defender
  - Set diagnostics to Basic and turn off feedback
  - Turn off IE enhanced security
  - Set the time zone and the date and time; turn off internet time synchronization
- Setup the lab network (IP address)

- From the Start Menu, select the settings icon:
  - System
    - Display
      - Set the display resolution as appropriate
    - Power & Sleep
      - Set screen to turn off after 4 hours
      - Additional Power Settings
        - Pick "High performance" plan
  - Devices→AutoPlay
    - Turn off AutoPlay
  - Network & Internet
    - Windows Firewall
      - Turn off Windows Firewall for all networks
  - Personalization→ TaskBar
    - Use small taskbar buttons
  - Time & language
    - Turn off "Set time automatically"
    - Turn off "Set timezone automatically"
    - Set the time zone
    - Set the time
  - Privacy → Diagnostics & feedback
    - Set "Diagnostic Data" to Basic
    - Set "Windows should ask for my feedback" to Never

- Control Panel (view by small icons):
  - User Accounts
    - Change UAC to Never Notify
  - System → Advanced System Settings
    - Computer Name
      - Set the computer name and workgroup
    - Advanced→ Performance
      - Visual Effects
        - Choose "Adjust for best performance"
        - Choose "Show window contents while dragging"
      - Advanced
        - Choose "Background services"
        - Set custom size page file on C: = 8192-16384
      - Data Execution Prevention
        - Set DEP for essential Windows programs and services only
    - Advanced→Startup and Recovery
      - Don't automatically restart on a system failure
      - Automatic memory dump
    - Remote
      - Allow remote desktop connections, from any level client

- File Explorer Options→View→Advanced Settings
    - Always show menus
    - Do not hide any files and folders
- Administrative Tools
    - Local Security Policy
        - Account Policies → Password Policy
            - Set "Maximum password age" to zero
            - Set "Password must meet complexity requirements" to disabled
        - Press CTRL-ALT-DEL and change OS password to a simpler one. Use the same password that you used on the database server.
    - Event Viewer
        - Right click on each "Windows Logs" type →Properties
            - Set "Maximum log size" to 256,000

- Other settings:
    - Set desktop to use Small Icons
    - Pin frequently used programs to the taskbar

- Run gpedit.msc
    - Choose Computer Configuration→Administrative Templates→System
        - In the right pane, near the bottom, open "Display Shutdown Event Tracker"
        - Select "Disabled" [OK]

- Run "control userpasswords2"
    - Uncheck "Users must enter a user name and password to use this computer" [OK]
    - Enter your account password twice [OK]

- Reboot the computer to apply all those settings

<u>Install Device Drivers:</u>

There are Windows-compatible versions for most of these code updates. Download these versions from Lenovo.com, copy them over to the server, run the EXE there, and choose to do the update immediately, rather than extracting the files for later.

- Chipset:
    - Download the latest chipset INF files for this system
    - Install
    - Reboot when prompted
- RAID:
    - Download the latest RAID drivers and firmware for this system
    - Install drivers
    - Install firmware
    - Reboot
    - Download & install the latest LSA application, to manage the storage
- Networking:
    - Download the latest networking drivers and firmware for this system
    - Download the latest networking drivers and firmware for the 10Gb Ethernet adapters
    - Update the Ethernet firmware
    - Install the Ethernet device drivers
    - Reboot
- Video:
    - Download the latest video drivers for this system
    - Install
    - Reboot when prompted
- Drive firmware:

- Download the latest SAS/SATA hard drive firmware update program
- Run the program to update the firmware on any down-level drives

Configure IP Addresses & Network Connections

- One of the onboard Ethernet ports will be used for the lab network. Connect onboard port 1 to a Gb Ethernet switch that will create the lab network, linking the database server, client, driver, and any other needed systems. This network is used to copy files between the systems, synchronize system times, manage the systems, etc..
- The other onboard Ethernet port is unused.
- There are Broadcom NX-E dual-port 10Gb Ethernet adapters installed in slots 1 & 5. Both ports on each of these adapters will be used for connecting the client directly to the database server using Ethernet crossover connections.
- There is a dual-port 10Gb Ethernet adapter installed in slot 2. Both of these ports will be used to connect the client directly to the driver using Ethernet crossover connections. Their use during a benchmark run is for the client to report its status and results to the driver.

- IP addresses:
  - Onboard port 1: Set as needed for your lab network
  - Slot 1 left port: Static 10.10.1.100 / 255.255.255.0
  - Slot 1 right port: Static 10.20.1.100 / 255.255.255.0
  - Slot 5 left port: Static 10.30.1.100 / 255.255.255.0
  - Slot 5 right port: Static 10.40.1.100 / 255.255.255.0
  - Slot 2 left port: Static 10.100.1.100 / 255.255.255.0
  - Slot 2 right port: Static 10.100.2.100 / 255.255.255.0

Miscellaneous OS Setup:

- Copy the TPC-E kit files to the client. See the kit documentation for details.
  - The client will be used for kicking off checkpoints with the proper timing. See RunRegularCheckpoints.bat.
  - StartTpce.BAT will be used to start the MEE and CE processes on the client.
- Place a BAT file, synctime.bat, into the startup folder to synchronize the time with another server every time the system is rebooted. The driver, server, and client will have this same BAT file in their startup folders, and they all sync their times off of the same system. The systems are rebooted before a run of TPC-E insuring that all of the system clocks will be synchronized. Test the BAT file to be sure it works.

SQL Server Client Code

Installation:

- Run SQL Server's setup.exe
- SQL Server Installation Center
  - choose "Installation" on the left
  - choose "New SQL Server stand-alone installation…"
- Product Key. Evaluation [Next >]
- License Terms. Accept the terms [Next >]
- Microsoft Update [Next >]
- Product Updates [Next >]
- Feature Selection, check
  - Shared Features
    - Client Tools Connectivity
  - [Next >]
- Ready To Install [Install]
- Complete [Close]
- Close the SQL Server Installation Center

Configuration:

- Start the SQL Server Configuration Manager
    - On the left, expand "SQL Native Client Configuration"
        - Highlight "Client Protocols"
            - On the right, double click on "TCP/IP"
                - Set the default port to 1410 [OK]
        - Highlight "Aliases"
            - Move the mouse over the right side and right-click. Select "New Alias…"
            - Create the alias "cp" pointing to 10.30.1.1:1433
            - This will be the connection used for checkpoints.
    - On the left, expand "SQL Native Client Configuration (32bit)"
        - Highlight "Client Protocols"
            - On the right, double click on "TCP/IP"
                - Set the default port to 1410 [OK]
        - Highlight "Aliases"
            - Move the mouse over the right side and right-click. Select "New Alias…"
            - You will create several aliases, according to this table:

Client	Alias #	Alias Name	Port Number	Server
client20	1	port10	1410	10.10.1.1
	2	port11	1411	10.10.1.1
	3	port12	1412	10.10.1.1
	4	port13	1413	10.10.1.1
	5	port20	1420	10.20.1.1
	6	port21	1421	10.20.1.1
	7	port22	1422	10.20.1.1
	8	port23	1423	10.20.1.1
	9	port30	1430	10.30.1.1
	10	port31	1431	10.30.1.1
	11	port32	1432	10.30.1.1
	12	port33	1433	10.30.1.1
	13	port40	1440	10.40.1.1
	14	port41	1441	10.40.1.1
	15	port42	1442	10.40.1.1
	16	port43	1443	10.40.1.1

            - Select [OK] after creating each one.
    - Close the SQL Configuration Manager

- The TPC-E kit client programs, running on the client, will be pointed to those aliases to connect to SQL Server at the IP address and port number shown. See the TPC-E kit documentation for details.

SQL ODBC:

- Download the latest "ODBC Driver for SQL Server" package from Microsoft (x64 version)
- Install the package