Tintri

SQL-Integrated Storage Getting Started Guide

v1.0 – July 2020

About This Guide

- A quick-start guide to implementing SQL-Integrated Storage for enhanced visibility, performance and management of Microsoft SQL Server databases, hosted on Virtual Machines or Physical Servers.

- Audience:
  - SQL Server Database Administrators
  - Storage Administrators
  - System Administrators

Table of Contents

Prerequisites

- Tintri Global Center (TGC) version: 5.x
  - TGC 5.x Virtual Machine specs: minimum 4 vCPUs and 8GB RAM
    - NOTE: Pre-existing TGC "small" instances may be configured with 2vCPU & 4GB RAM
  - Advanced License required for each VMstore that will use SQL Integrated Storage feature set
- VMstore version: TXOS 4.6.x or newer
- Microsoft SQL Server 2016 and newer, installed on:
  - Windows Server 2016 and newer
  - VM and/or Bare-metal
- VMstore(s) and TGC operational
  - For new customers – refer to support.tintri.com/download for initial deployment documentation
- Active Directory administrative permissions
- Networking Familiarity

QuickStart Overview

- Here's a high-level overview of steps needed to get up and running:

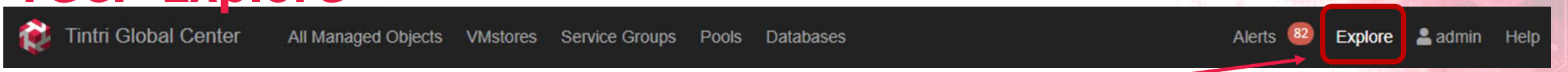
1. Upgrade TGC & VMstores to meet minimum version & licensing requirements
2. Join TGC & VMstores to Active Directory, if not already members
3. Configure network connectivity from SQL Servers to Data IPs of VMstores (10Gb or higher recommended). Separate storage connectivity from client connectivity where possible. Up to 64 different IPs and VLANs can be applied per interface, giving you lots of flexibility in design
4. Permissions: Create AD accounts and groups as needed, such as "SQL_Servers"
5. Create SMB shares on VMstores. Configure permissions so that SQL Server service accounts and DBAs have read/write access
6. Register SQL Servers in TGC using SQL Accounts that have sysadmin rights
7. Migrate Databases into the SMB shares.
8. Observe & Protect: Each database will show up in TGC and is ready for interaction
9. Change default locations in SQL servers to ensure all new databases benefit.
10. Create some Service Group policies to ensure all new databases are protected by default
11. Repeat #6 through #10 as needed

Tintri Global Center (TGC) Settings

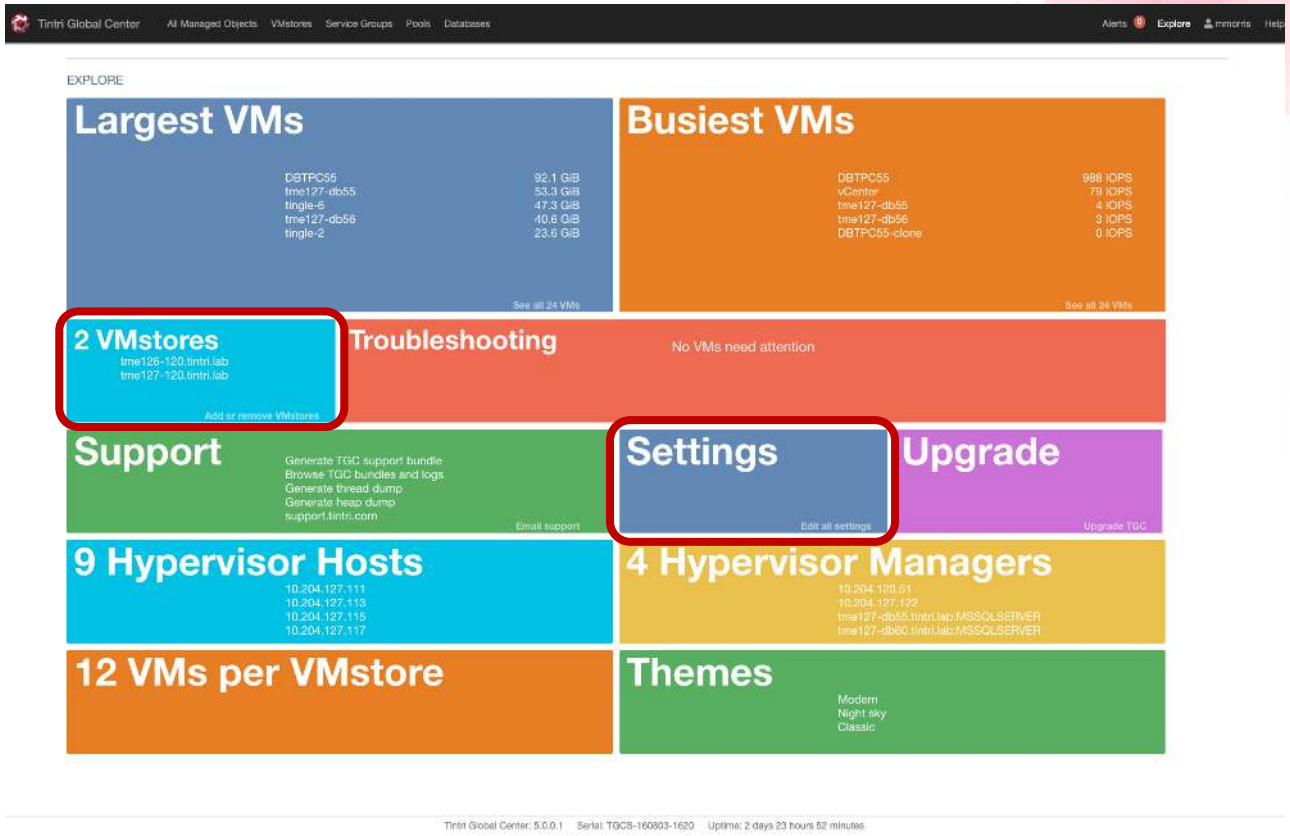
Tintri Global Center (TGC)

- Verify Version
- VMstore Registrations – Add/Remove
- Time & Date
- Active Directory Membership

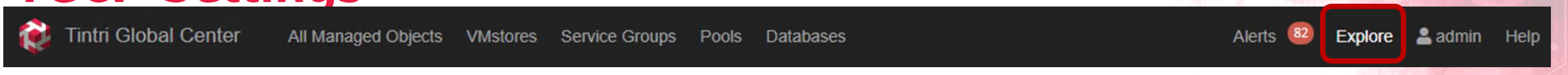
TGC: Explore



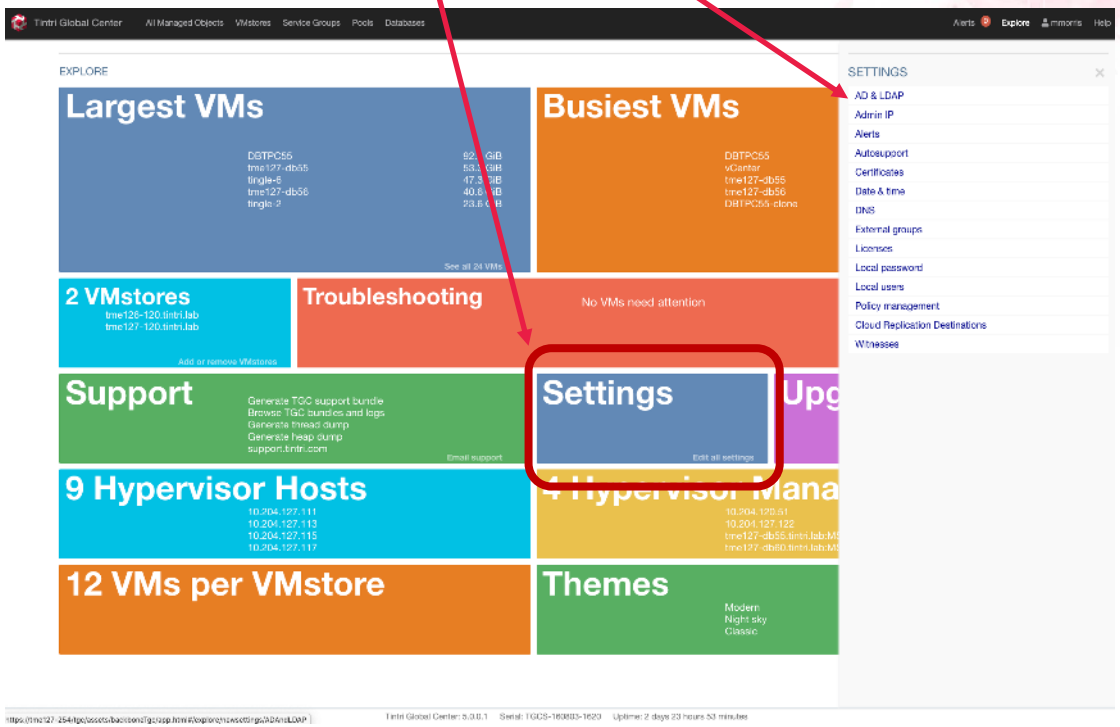
- Explore
  - Provides access to a variety of high-level insight about your environment.
  - Add/Remove VMstores
  - Settings: SQL-Integrated Storage setup is dependent on a few elements:
    - Active Directory Membership
    - Time & Date Settings



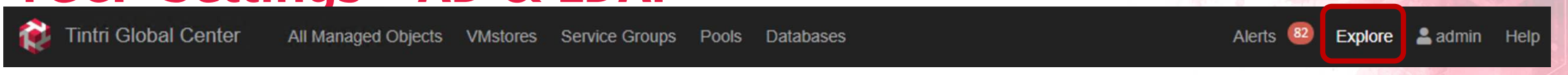
TGC: Settings



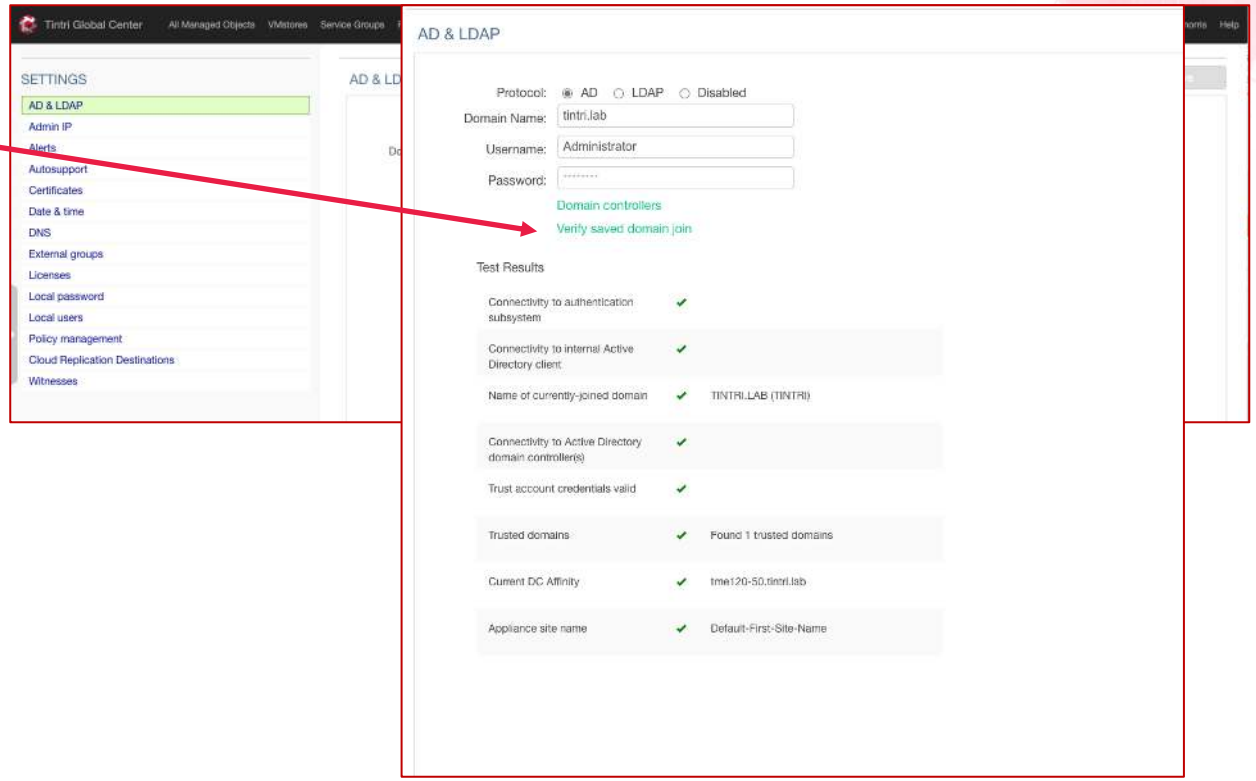
- Active Directory
  - Make sure both TGC and VMstores are members of the same Domain.
- Click on Settings
  - Then AD & LDAP



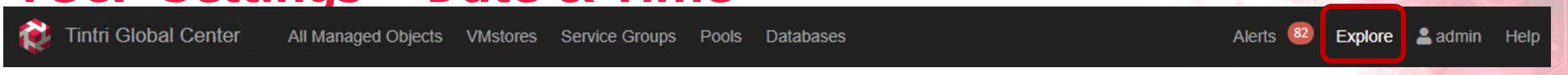
TGC: Settings - AD & LDAP



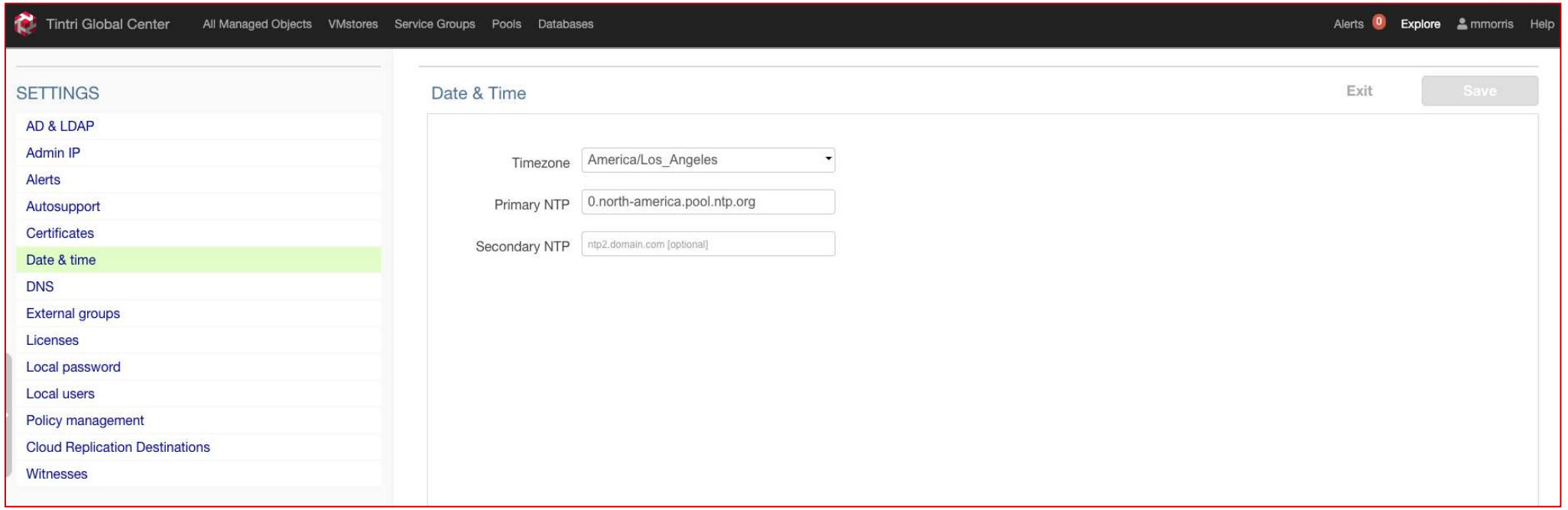
- Check Domain Membership
  - Username / Password
  - Click the hyper-link to validate domain membership.
    - Verify saved domain join
  - After Joining the domain, you will find a computer account for TGC within your AD



TGC: Settings – Date & Time

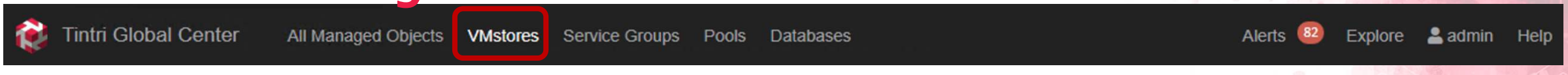


- Select Date & Time
  - Enable Network Time Protocol (NTP) to ensure all Servers, VMstores, and TGC are within a time-tolerances across the environment (required for Kerberos)

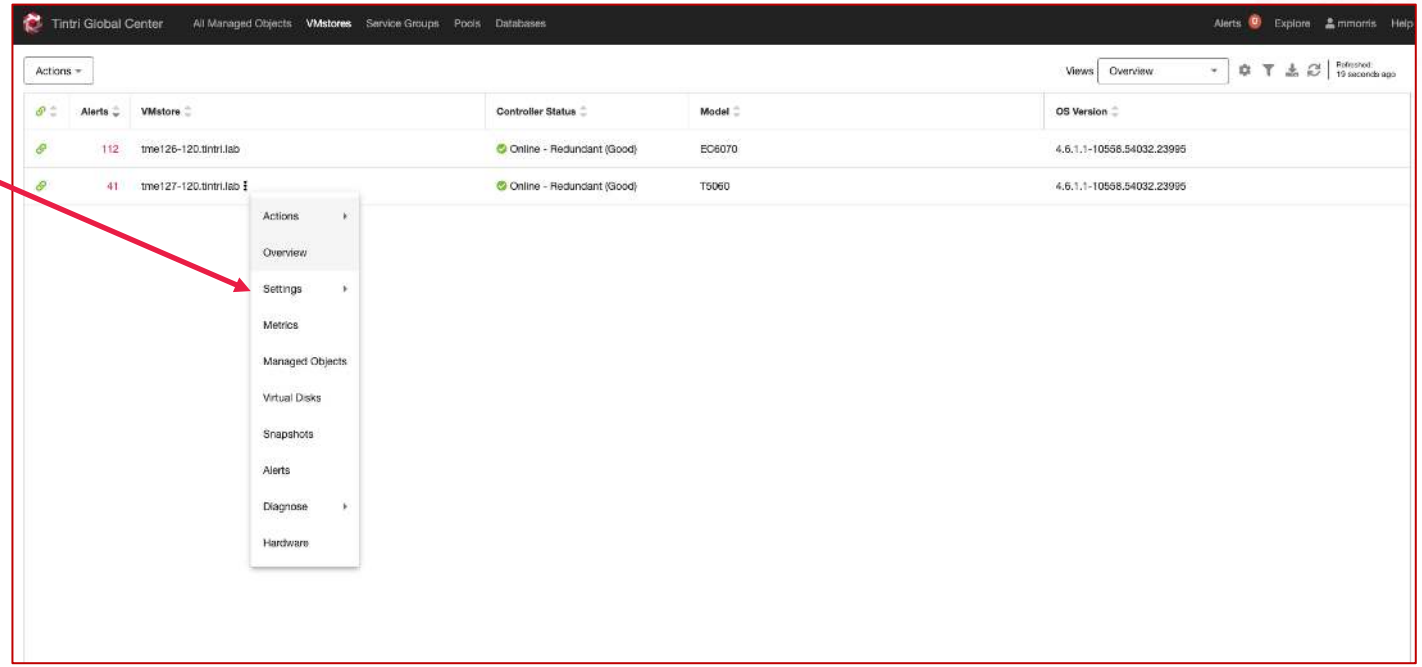


VMstore Settings

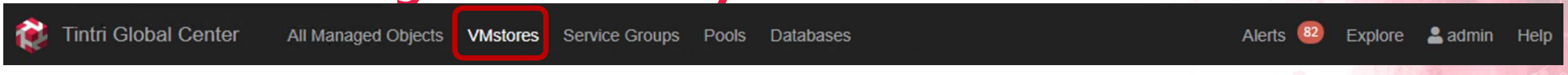
VMstore: Settings



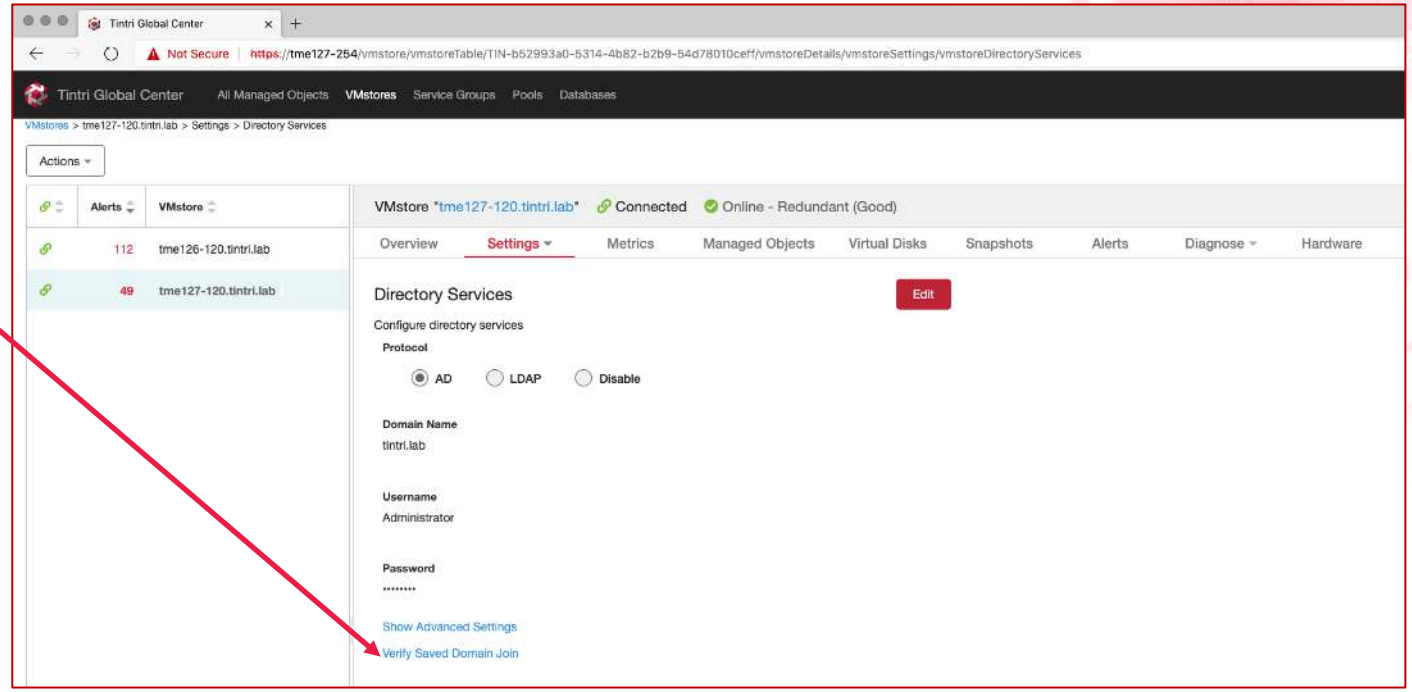
- VMstore configuration
  - This section will provide access to the VMstore(s) elements
    - Overview Performance & Activity Data
    - Settings
    - Managed objects
    - Virtual Disks
    - Alerts
    - Diagnostics
    - Hardware



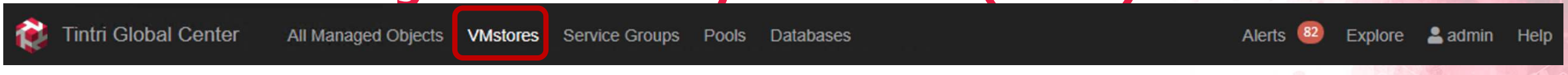
VMstore: Settings – Directory Services



- VMstore Settings
  - Directory Services
  - SMB
  - Directory Services
    - Verify Membership
    - Select Edit if needed to add or make changes

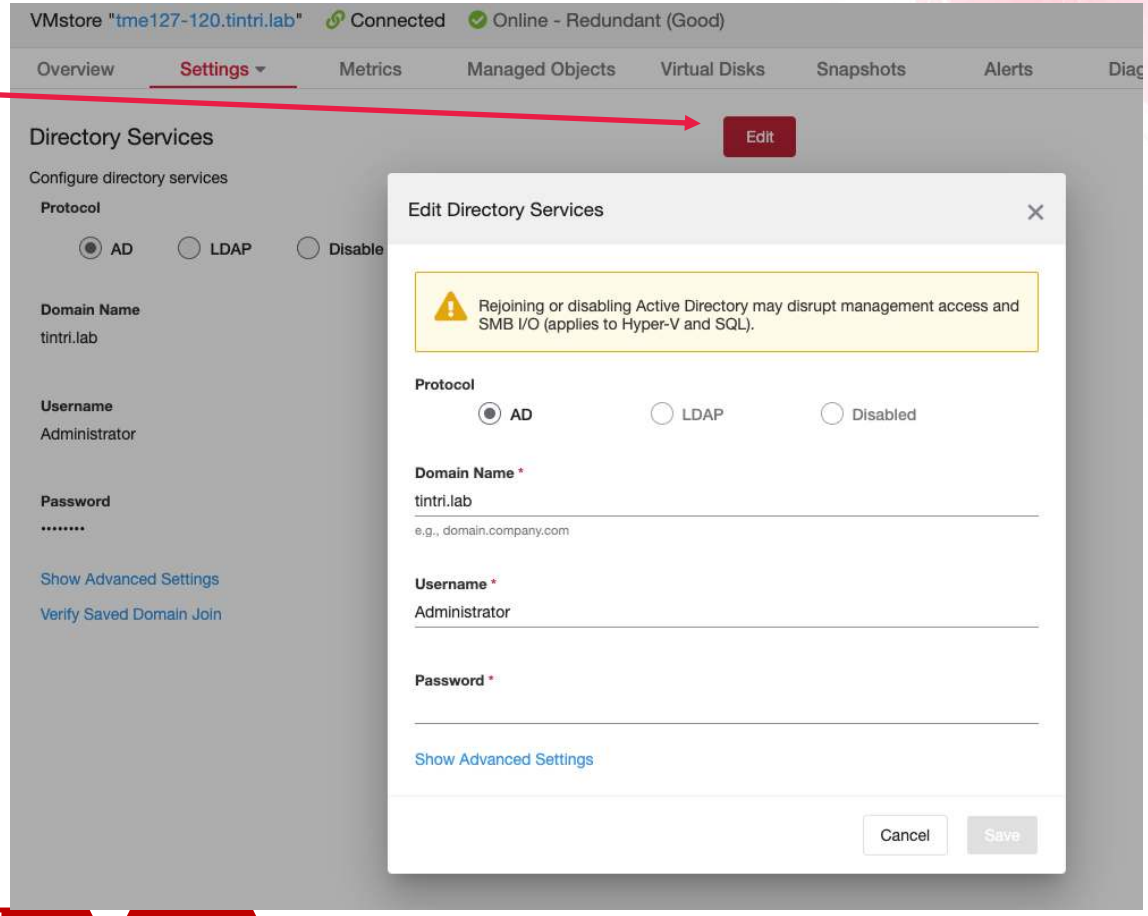


VMstore: Settings – Directory Services (con't)

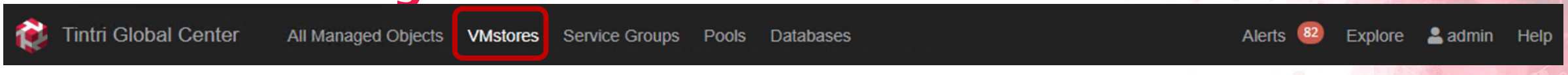


- VMstore configuration
  - Directory Services
    - Select Edit if needed to add or make changes
    - Make Changes as needed
      - Domain Name
      - Username
      - Password

- Settings Tab Starts at the Directory Services View

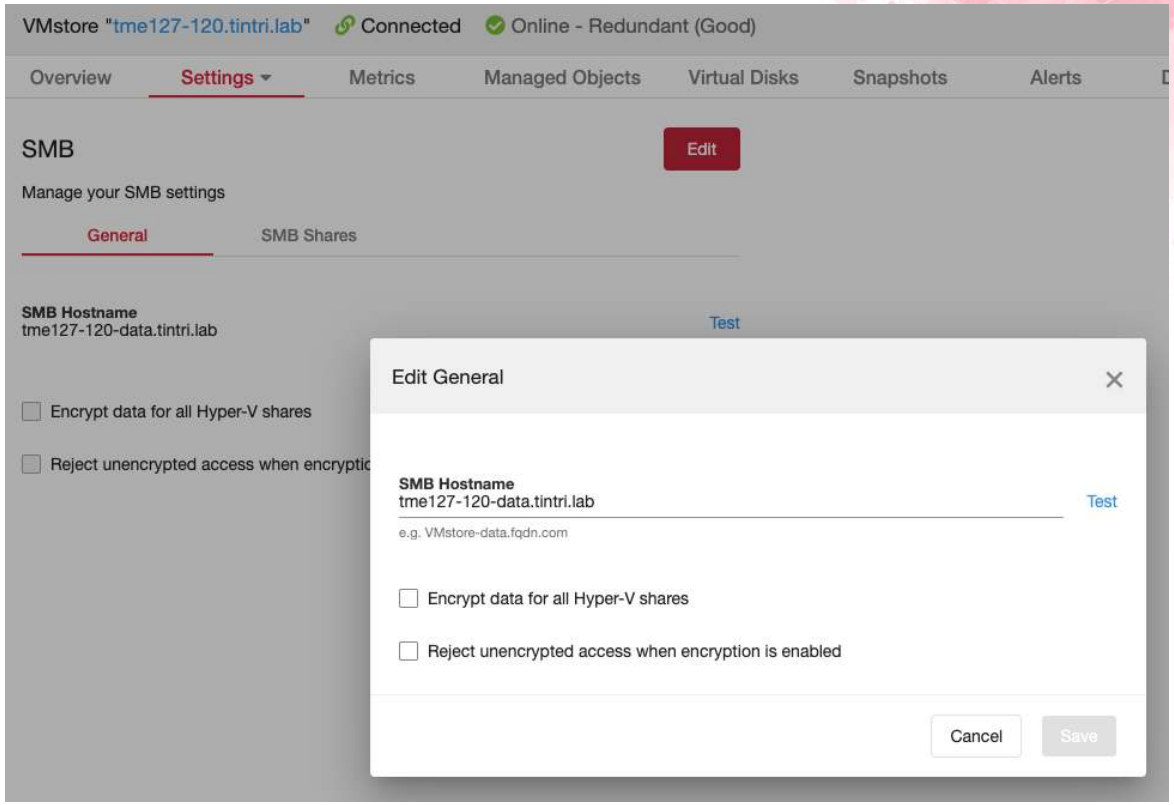


VMstore: Settings – SMB – General

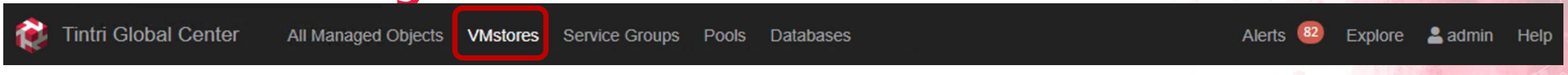


- VMstore Settings
  - Directory Services
  - SMB

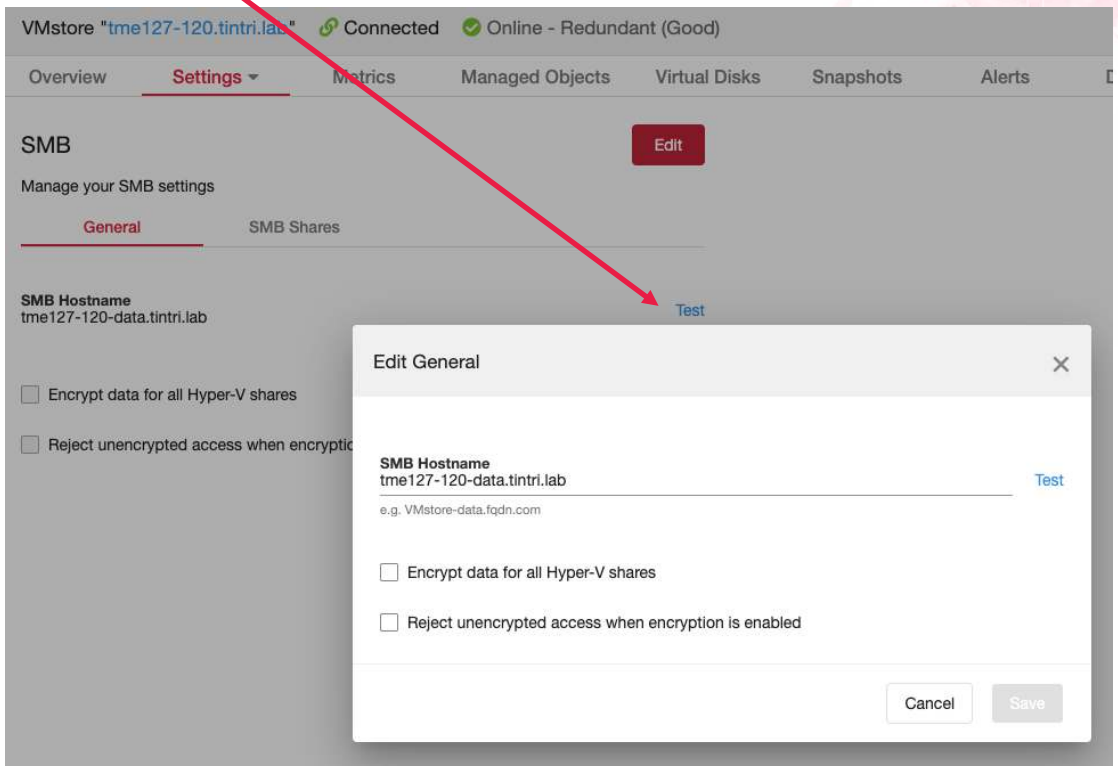
- SMB Hostname
  - Create a Hostname for the Data interface
    - Create a record in DNS for this hostname, pointing to the Data IP
  - Required: Fully Qualified Domain Name
  - We recommend hostname**-data**.domain.com



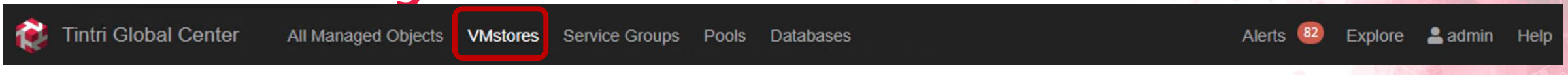
VMstore: Settings – SMB Hostname Validation



- Click Test to validate the SMB Hostname
  - This will validate Domain access, Service Principal Name, Group Membership.

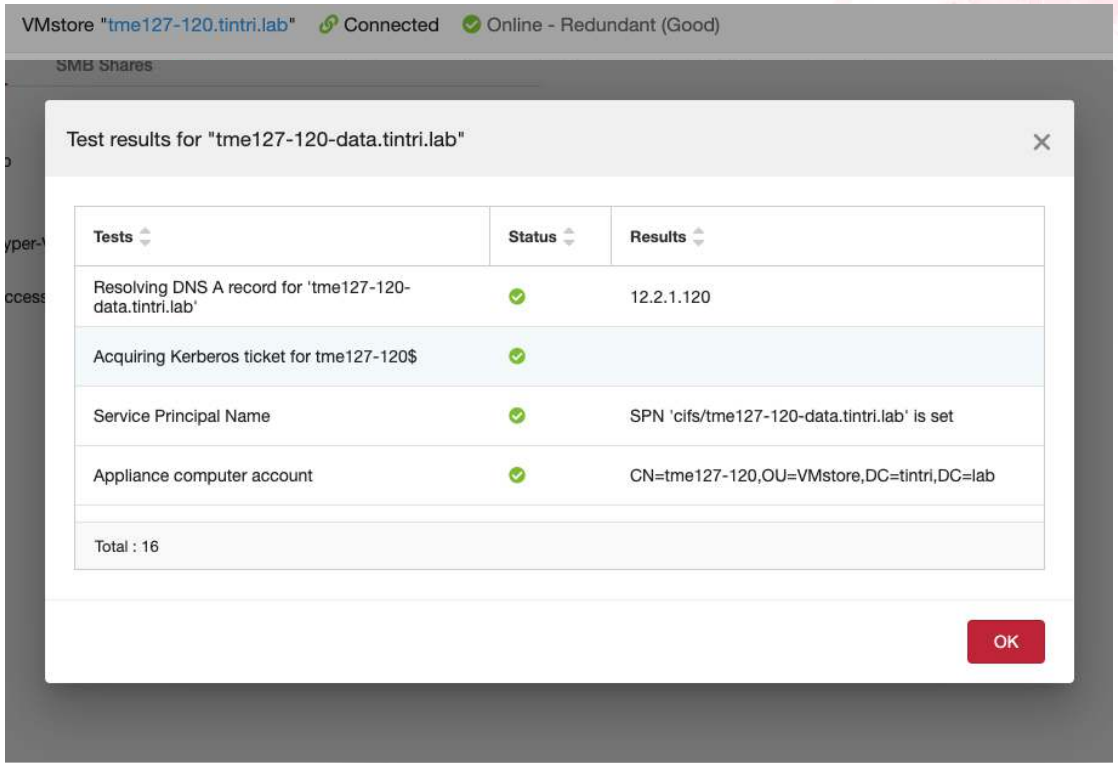


VMstore: Settings – SMB Hostname Validation

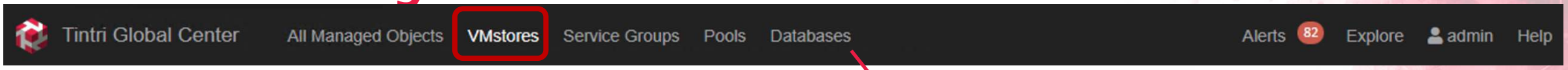


- VMstore configuration
  - SMB Hostname Test Results
    - AD Membership, Service Principal Name verified for the SMB Hostname
    - Expect Green Checkboxes in the status column
    - Scroll down and review all tests are successful. If there are any failed tests or warnings, adjust as needed in AD or DNS in order to get all tests to pass.

NOTE: The final test ("Delegation") is applicable to Hyper-V deployments, but not SQL Server. A status of "failed" for the delegation test is expected and can safely be ignored.

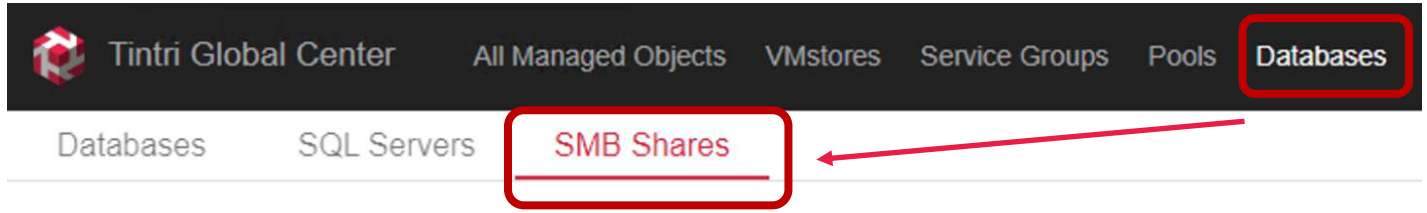


VMstore: Settings – SMB Shares

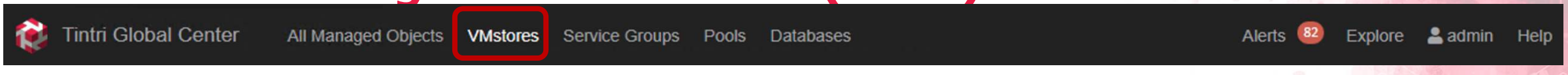


- Although SMB Shares can be managed from the VMstore tab, we recommend creating & managing shares for SQL Server database files from the Databases -> SMB Shares section (covered in the “SQL Integration” section)

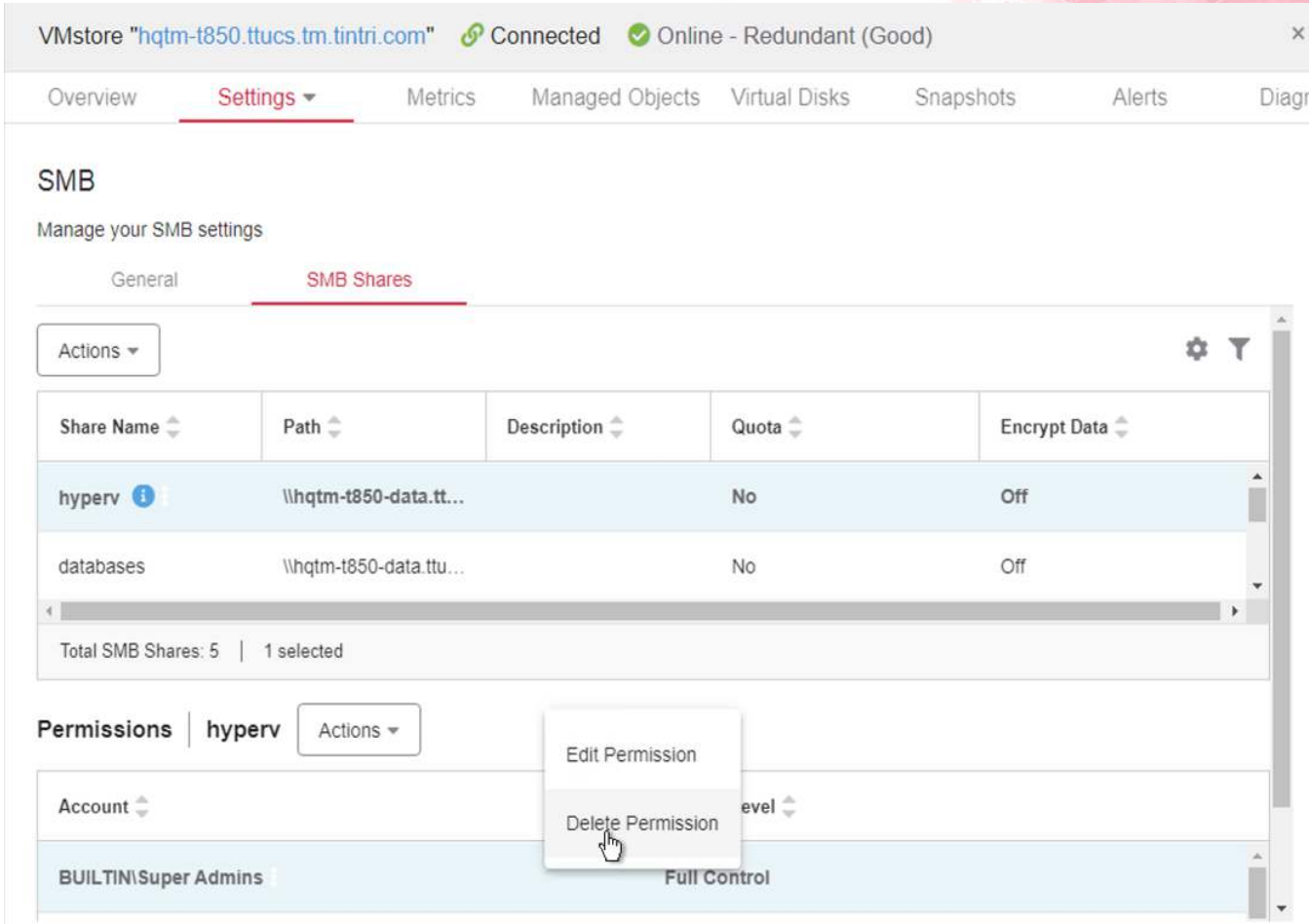
NOTE: Although similar, the UI for "Add Share" is slightly different. Shares created under the Databases tab mask the "System Center VMM Quota" option which is only applicable to HyperV deployments and is NOT APPLICABLE TO SHARES FOR DATABASES



VMstore: Settings – SMB Shares (con't)



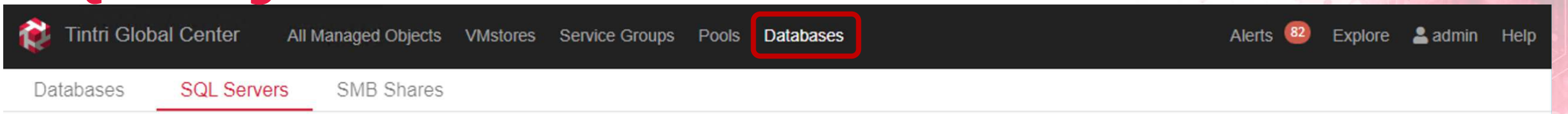
- VMstore configuration
  - Existing SMB shares on each VMstore and their permissions can be viewed under **Settings – SMB – SMB Shares [tab]**
  - The builtin '*hyperv*' share acts as a root to all SMB shares created. Access to this top-level share effectively gives access to all shares (as directories)
- STRONGLY RECOMMENDED:
  - Edit the permissions on the *'hyperv'* share and remove "BUILTIN\Super Admins" and other BUILTIN accounts
  - Use DOMAIN groups & individual accounts on each SMB Share to control permissions



SQL Integration

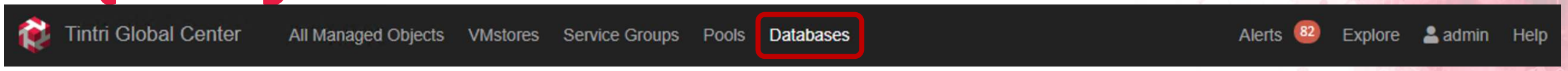
[TGC: Databases Tab]

SQL Integration: Overview



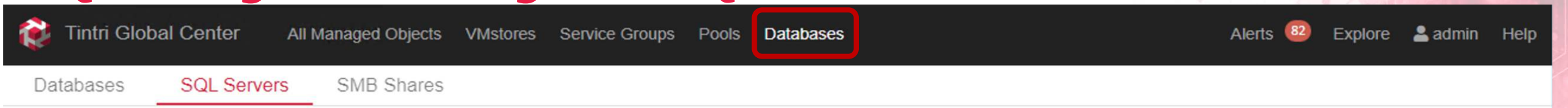
- The Databases Tab provides a consolidated view databases and and SQL Integration components. There are three sub-tabs:
  - Databases
    - Databases discovered from the within the registered SQL Servers.
  - SQL Servers
    - Add/Remove/Manage SQL Server connections
    - View Databases within each SQL Server Instance
  - SMB Shares
    - Add/Remove/Edit SMB Shares for the selected VMstore
      - Use the dropdown to change between VMstores
      - Click on a share to view permissions

SQL Integration: Permissions

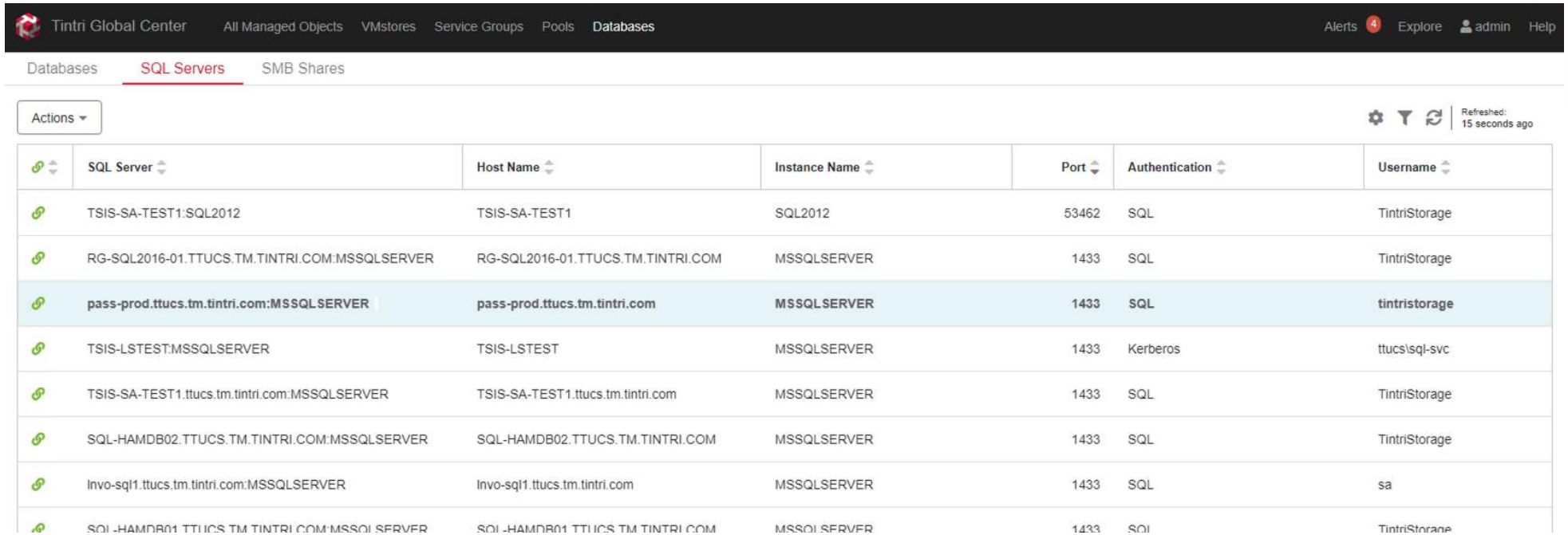


- SQL Servers -> VMstores
  - SQL Servers access database files in SMB shares on Tintri VMstores using Active Directory domain accounts
  - When adding permissions to SMB shares, use one or more AD group(s) to simplify adding new SQL servers later
  - Ensure the domain account that the SQL Server Service logs in with is in an AD group that has permissions, or add the individual account explicitly
  - If the SQL Server service runs as “Local system account” (default), apply permissions for the DOMAIN\SQL_Server$ computer account
- TGC -> SQL Servers
  - Use a SQL Authentication with sysadmin permissions
  - Account is used for:
    - Polling & Inventory
    - Attach new databases (cloning)
    - Extended Event session management
  - As of the initial release of SQL Integrated Storage (TGC v5.0.0.1), only accounts using SQL Authentication provide complete feature functionality – specifically cloning
  - The type of authentication used can be seen in the SQL Servers table, found under the Databases tab in TGC

SQL Integration: Register SQL Servers

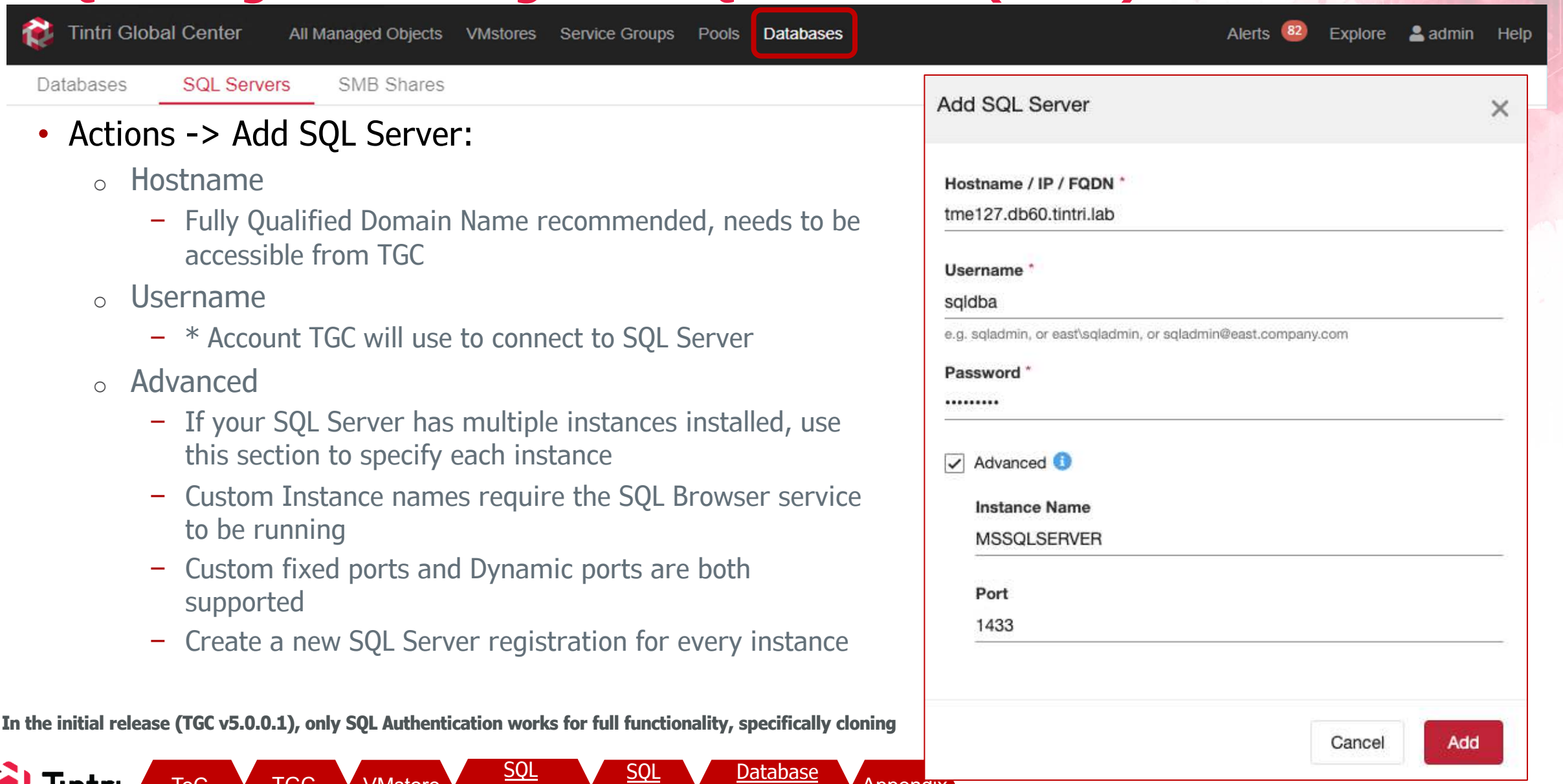


- Databases: SQL Servers
  - SQL Server instances must be registered for databases to be discovered as managed objects
  - Double-click a SQL Server instance to see all discovered databases within each. Only databases migrated to an SMB share on a VMstore registered in this TGC instance will show



SQL Server	Host Name	Instance Name	Port	Authentication	Username
TSIS-SA-TEST1:SQL2012	TSIS-SA-TEST1	SQL2012	53462	SQL	TintriStorage
RG-SQL2016-01.TTUCS.TM.TINTRI.COM:MSSQLSERVER	RG-SQL2016-01.TTUCS.TM.TINTRI.COM	MSSQLSERVER	1433	SQL	TintriStorage
pass-prod.ttucs.tm.tintri.com:MSSQLSERVER	**pass-prod.ttucs.tm.tintri.com**	**MSSQLSERVER**	**1433**	**SQL**	**tintristorage**
TSIS-LSTEST:MSSQLSERVER	TSIS-LSTEST	MSSQLSERVER	1433	Kerberos	ttucs\sql-svc
TSIS-SA-TEST1.ttucs.tm.tintri.com:MSSQLSERVER	TSIS-SA-TEST1.ttucs.tm.tintri.com	MSSQLSERVER	1433	SQL	TintriStorage
SQL-HAMDB02.TTUCS.TM.TINTRI.COM:MSSQLSERVER	SQL-HAMDB02.TTUCS.TM.TINTRI.COM	MSSQLSERVER	1433	SQL	TintriStorage
Invo-sql1.ttucs.tm.tintri.com:MSSQLSERVER	Invo-sql1.ttucs.tm.tintri.com	MSSQLSERVER	1433	SQL	sa
SQL-HAMDB01.TTUCS.TM.TINTRI.COM:MSSQLSERVER	SQL-HAMDB01.TTUCS.TM.TINTRI.COM	MSSQLSERVER	1433	SQL	TintriStorage

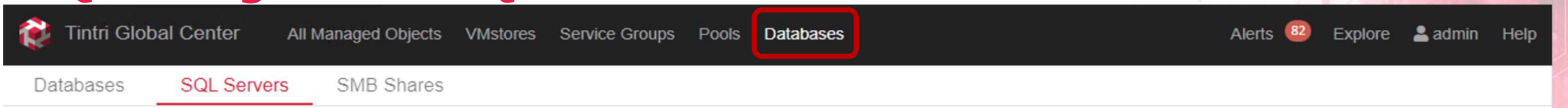
SQL Integration: Register SQL Servers (con't)



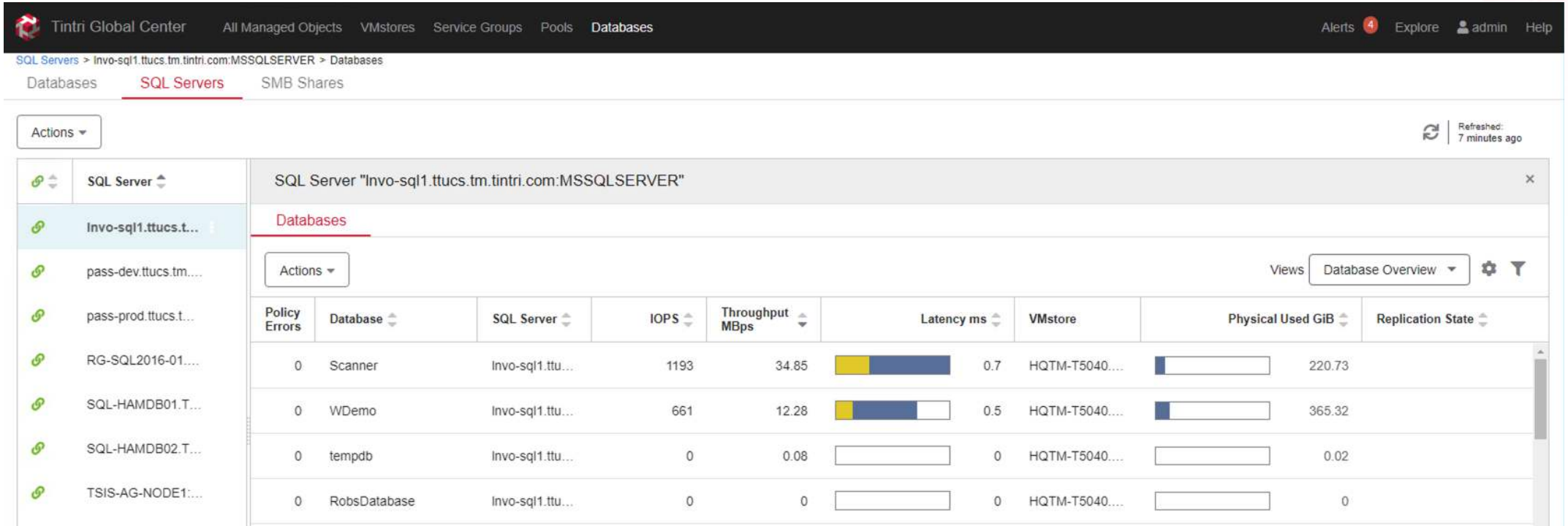
- Actions -> Add SQL Server:
  - Hostname
    - Fully Qualified Domain Name recommended, needs to be accessible from TGC
  - Username
    - * Account TGC will use to connect to SQL Server
  - Advanced
    - If your SQL Server has multiple instances installed, use this section to specify each instance
    - Custom Instance names require the SQL Browser service to be running
    - Custom fixed ports and Dynamic ports are both supported
    - Create a new SQL Server registration for every instance

*** In the initial release (TGC v5.0.0.1), only SQL Authentication works for full functionality, specifically cloning**

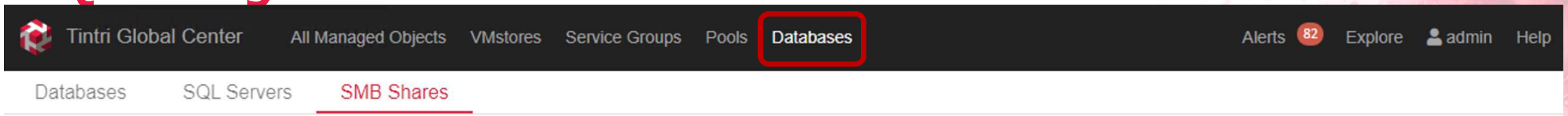
SQL Integration: SQL Servers – View Databases



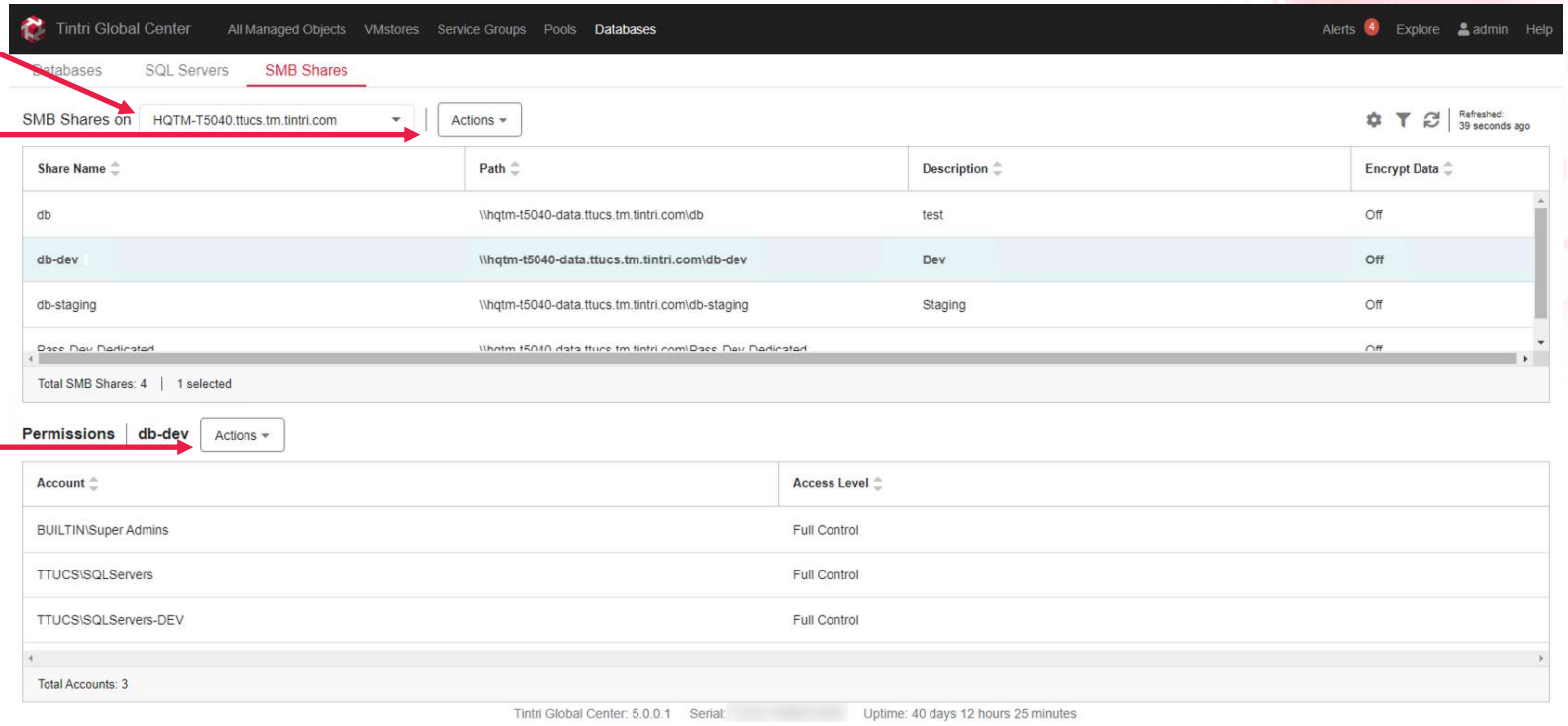
- Double-click on a SQL Server in the SQL Servers table to view databases that have been migrated to SMB shares on VMstores managed by this TGC instance
  - Sort and filter columns to quickly find databases of interest



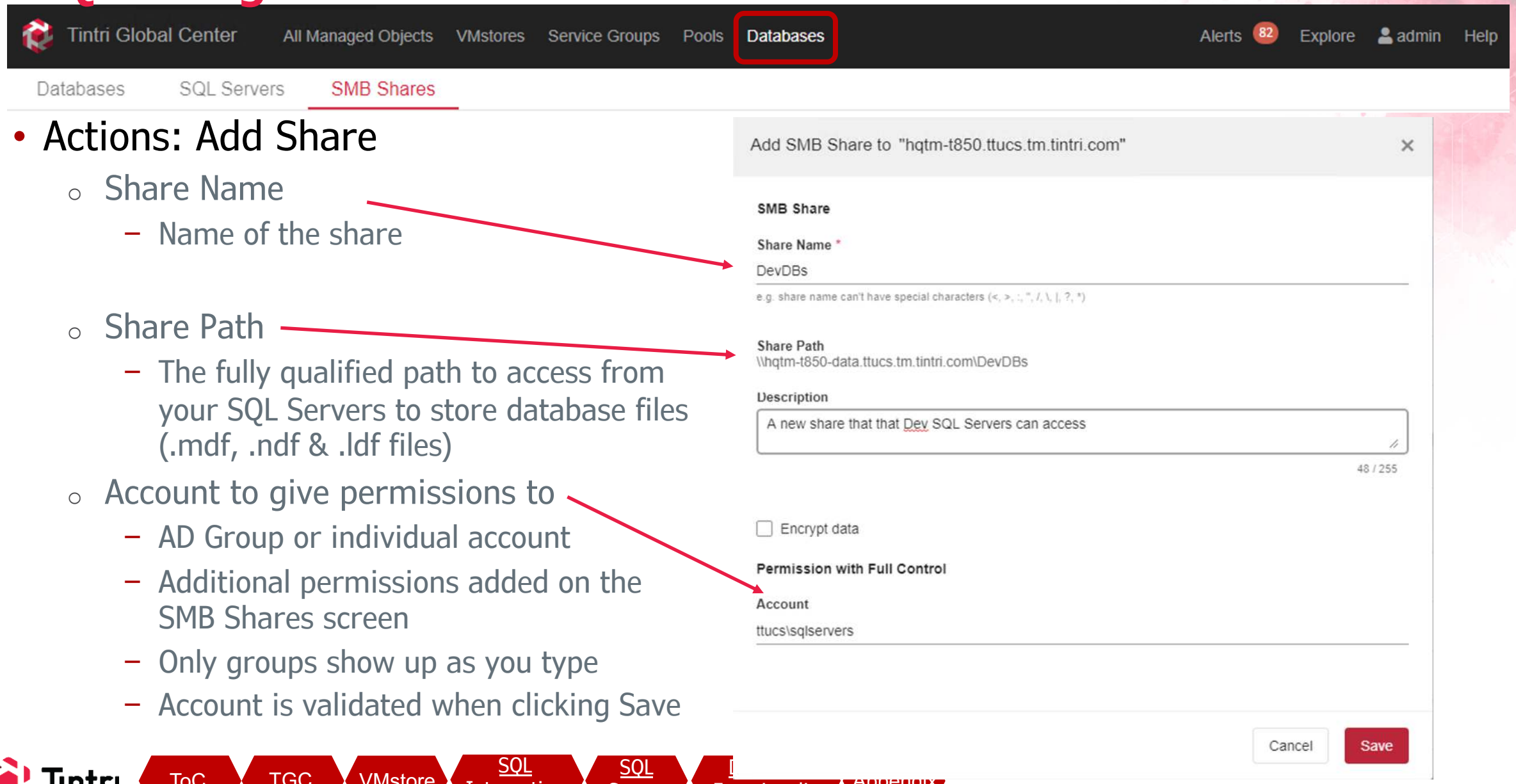
SQL Integration: SMB Shares



- Select VMstore
- Add/Edit/Delete Shares
  - Deleting a share does NOT remove data within it, but does make it inaccessible
  - Refer to the appendix for additional detail
- Add/Edit/Delete Permissions
  - This is where we control access to each share
    - Full Control or Read-Only



SQL Integration: SMB Shares – Add Share



- Actions: Add Share
  - Share Name
    - Name of the share
  - Share Path
    - The fully qualified path to access from your SQL Servers to store database files (.mdf, .ndf & .ldf files)
  - Account to give permissions to
    - AD Group or individual account
    - Additional permissions added on the SMB Shares screen
    - Only groups show up as you type
    - Account is validated when clicking Save

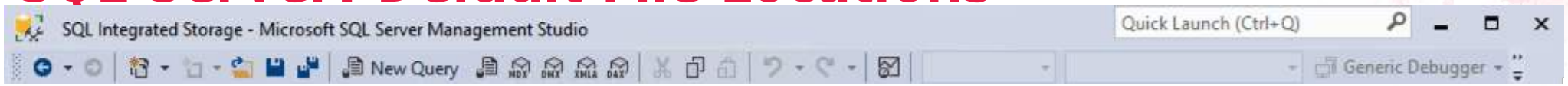
SQL Server Settings

SQL Server:

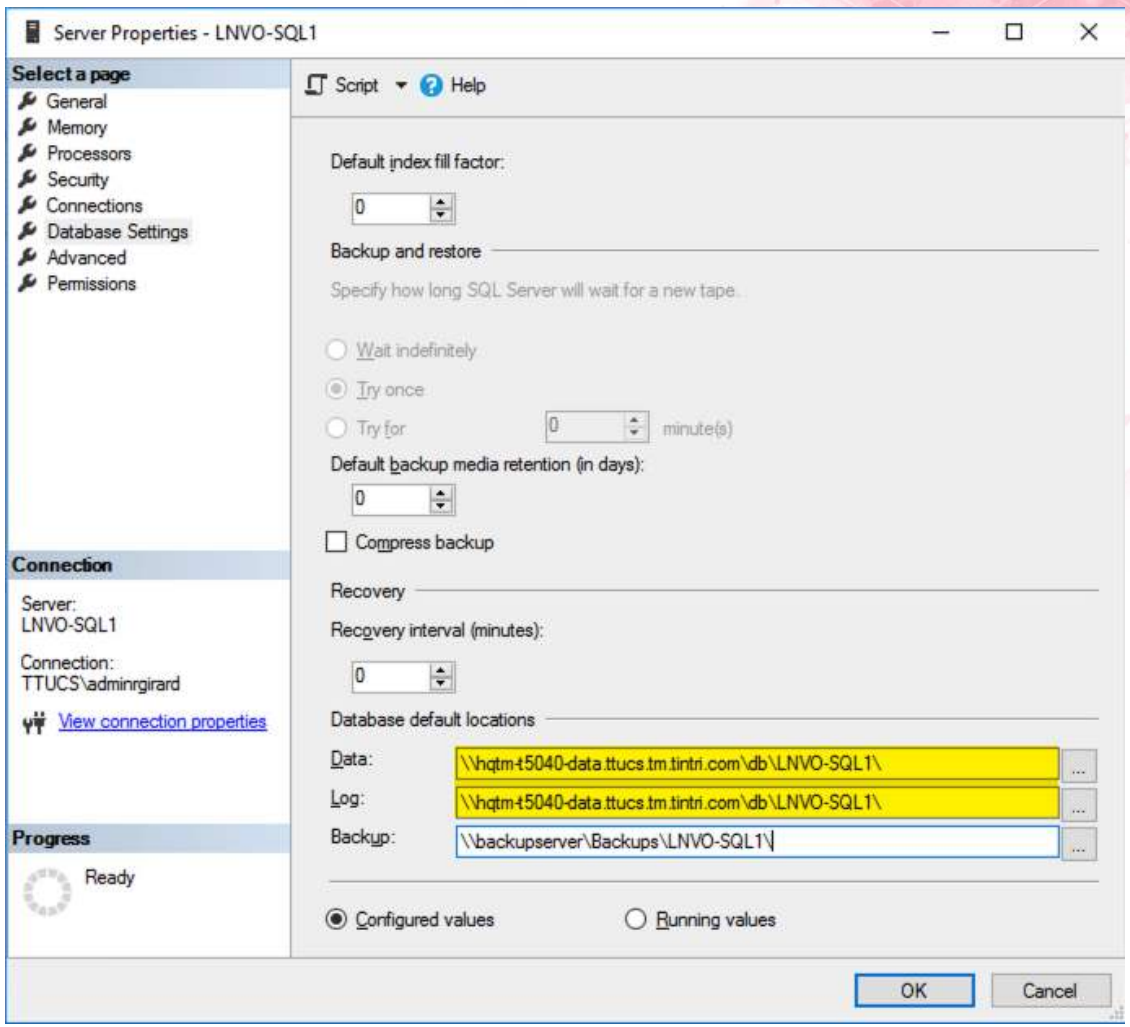
- SQL Server configuration
  - Generally speaking, there is nothing specific that needs to done on the SQL server other than use the SMB share you created to store the files for your databases.
  - This section contains a few tips that will help make it even easier to run SQL Integrated Storage for your existing databases, as well as any new ones that get created

** Remember: Always register any new SQL servers within TGC before running databases on SMB shares on Tintri VMstores. Failure to do so will lead to a lack of visibility, limited feature functionality, and performance degradation*

SQL Server: Default File Locations

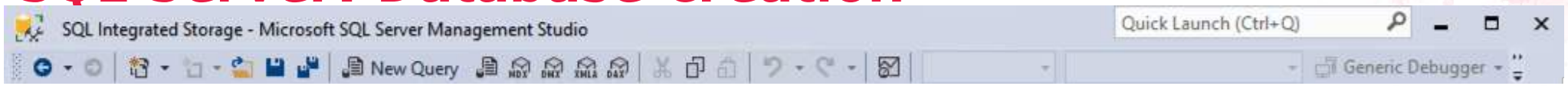


- SQL Server Management Studio:
  - Right-click Server Name and select Properties
  - Click on Database Settings

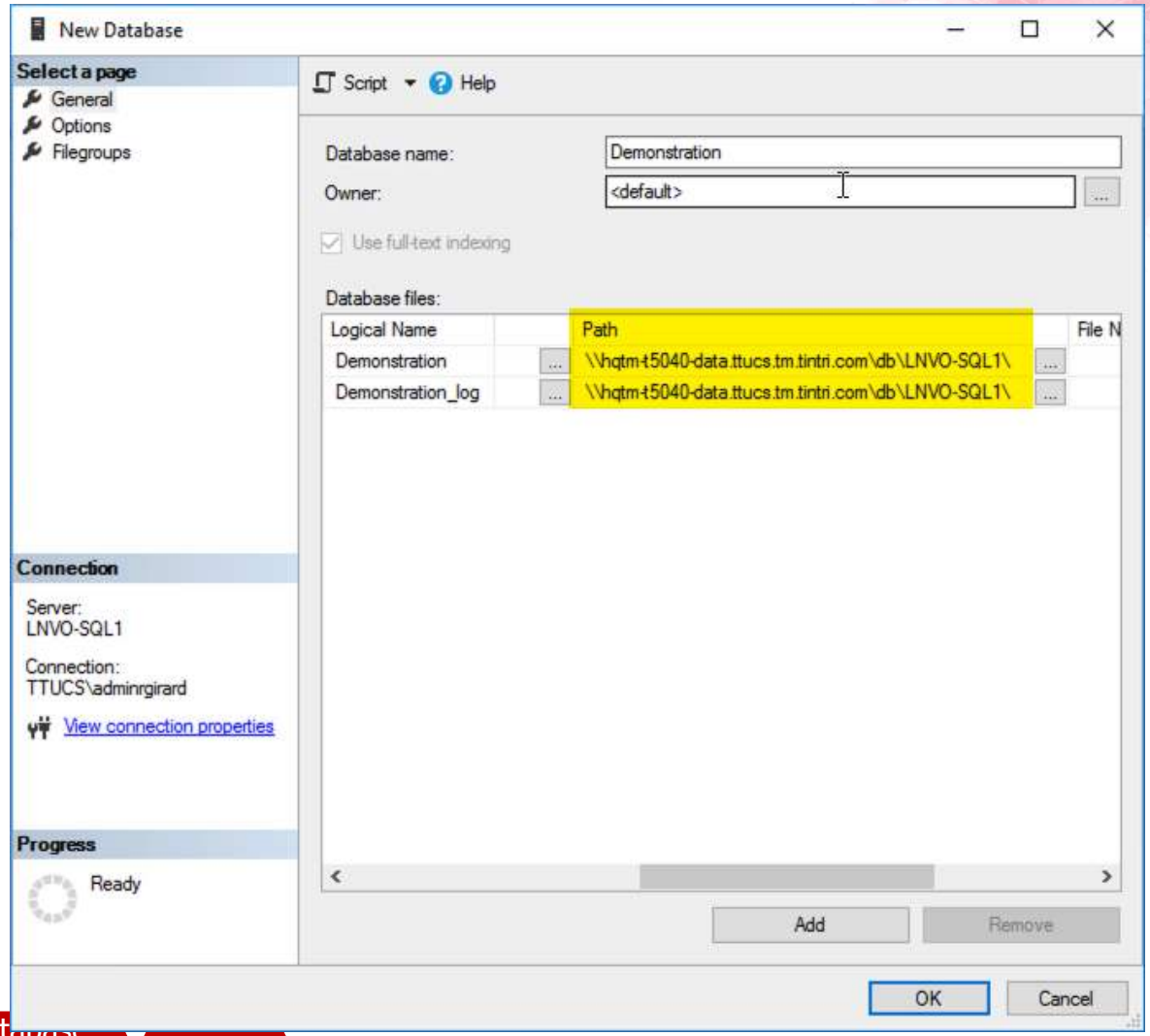


- Set default locations for Data and Log files
- To keep your shares neat and organized, consider creating a folder in the share for EACH SQL Server
- Configured values don't take effect until the SQL Server service is restarted

SQL Server: Database Creation



- SQL Server configuration
  - When creating a new database, ensure that all files reside within the same SMB share on the same VMstore
  - If you've changed your default file locations, confirm the path is the VMstore and share you expect
    - If not, manually adjust the path for new databases until you've had an opportunity to restart the SQL Server service

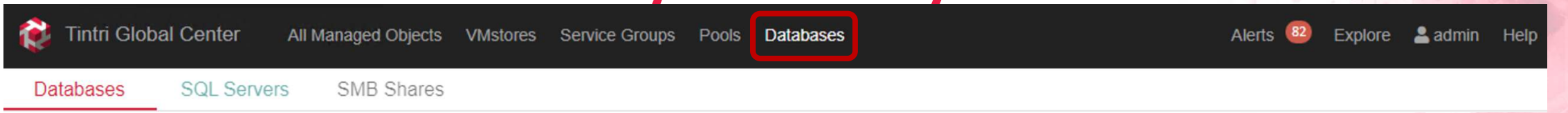


SQL Server: AlwaysOn Availability Groups

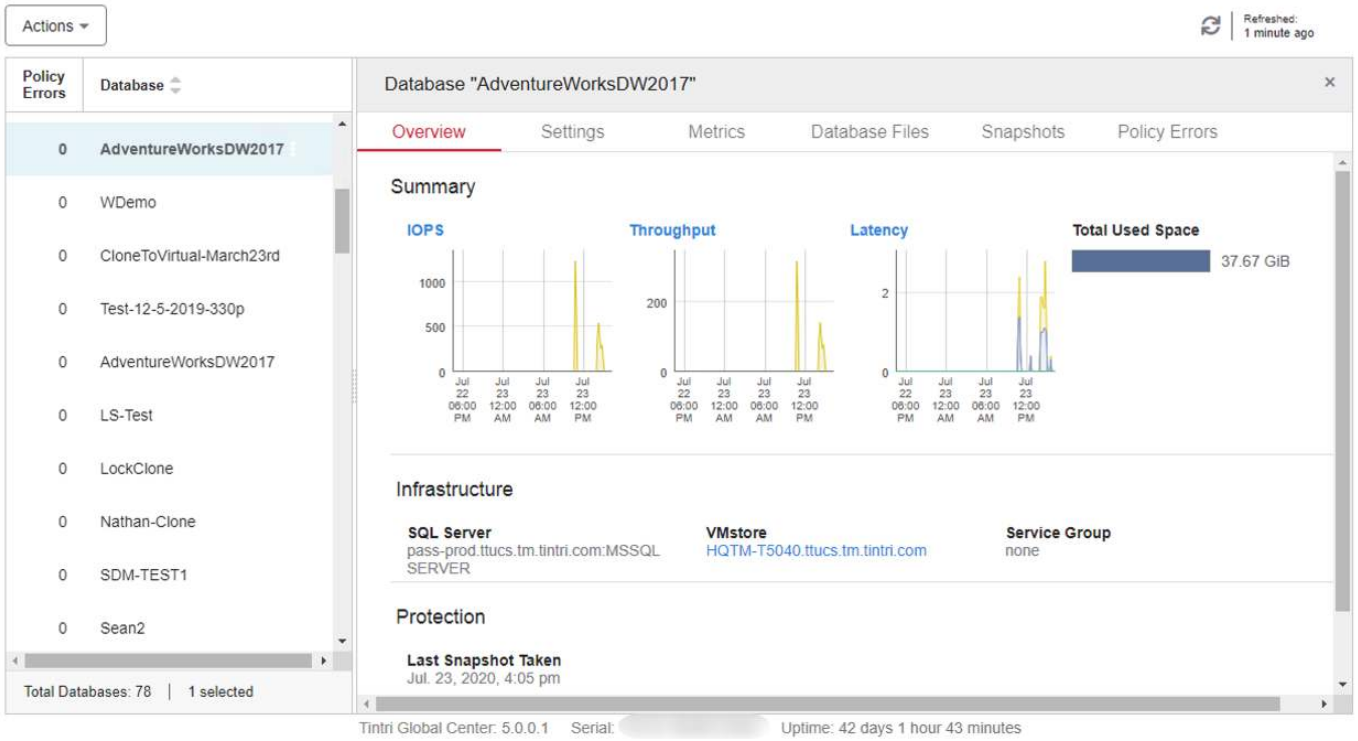
- When registering the Availability Group with TGC. Register each individual node as a separate SQL Server and do NOT register the Floating Name (VIP) of the availability Group
  - Configuring Always-On Availability Groups:
    - Use the Wizard to create the baseline environment with a local path
    - After the wizard, you will need to use a script to adjust the data paths to the SMB share
    - A full script example can be found on https://github.com/Tintri

Database Functionality

Databases – Functionality - Visibility

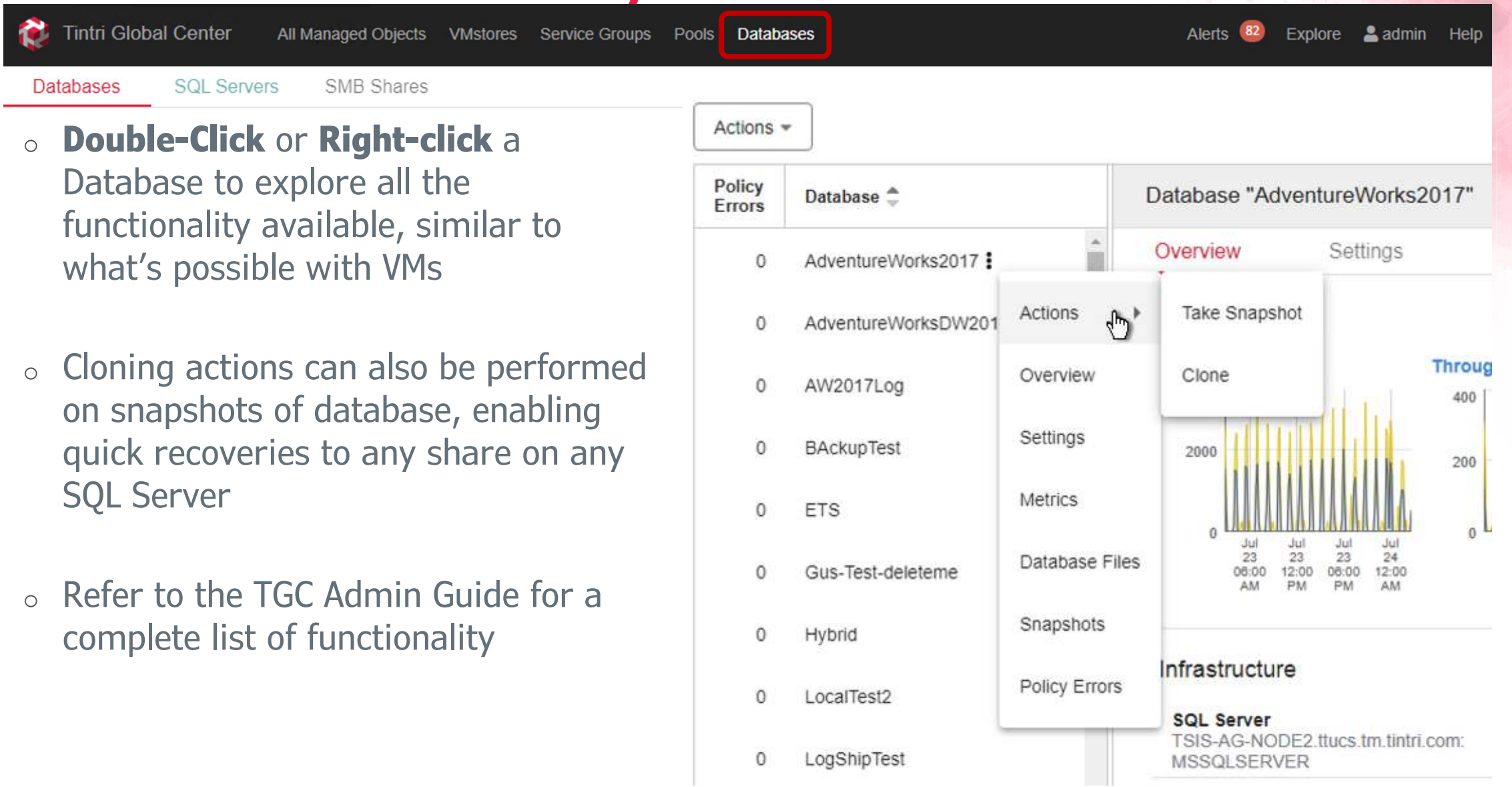


- At this point, new databases added to any of your registered SQL Servers are automatically discovered and show up in the Databases tab
  - Databases will also show in the global Managed Objects list (along with VMs), in the SQL Servers tab (double-click a SQL Server to see them), and listed as top contributors when clicking on global graphs and VMstore graphs



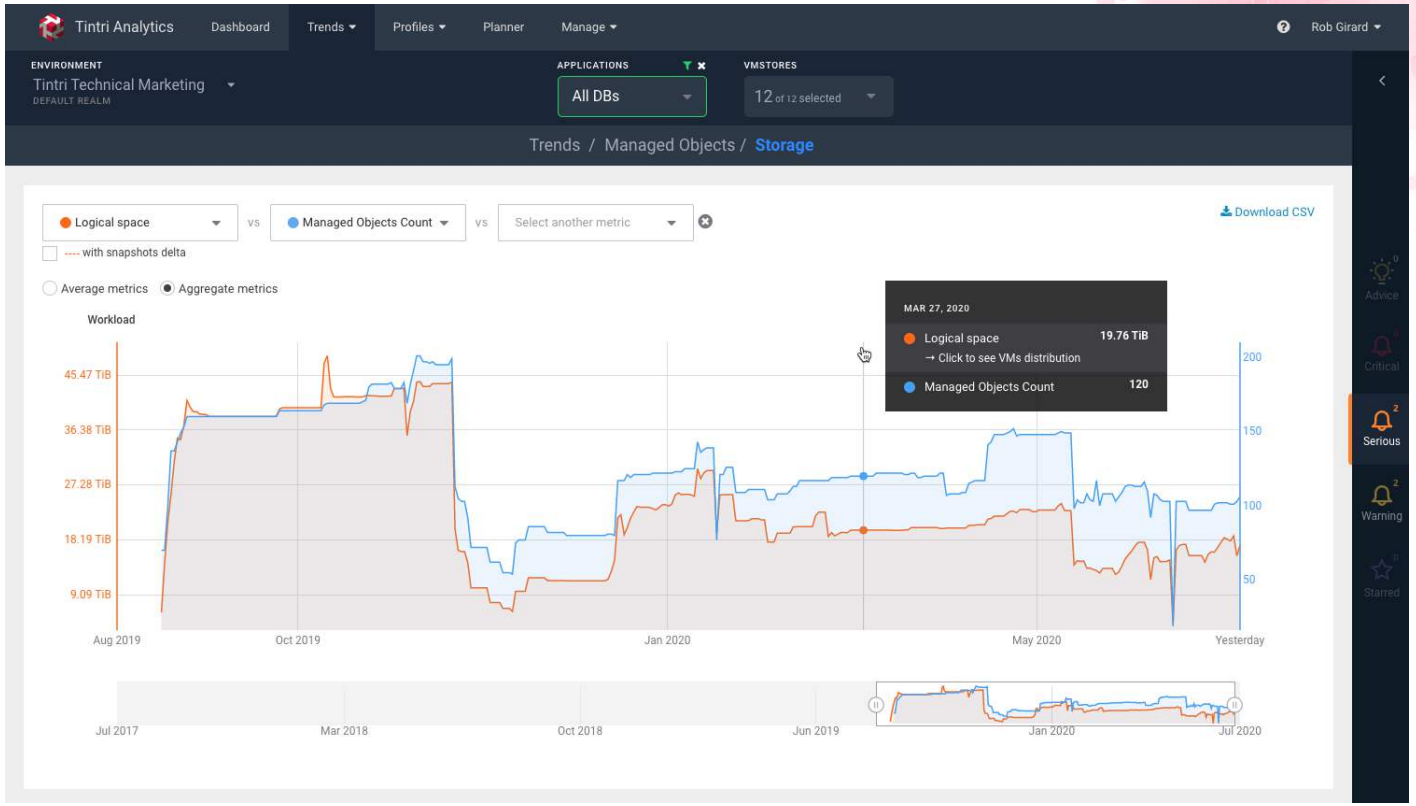
Databases – Functionality - Actions

- **Double-Click** or **Right-click** a Database to explore all the functionality available, similar to what's possible with VMs
- Cloning actions can also be performed on snapshots of database, enabling quick recoveries to any share on any SQL Server
- Refer to the TGC Admin Guide for a complete list of functionality

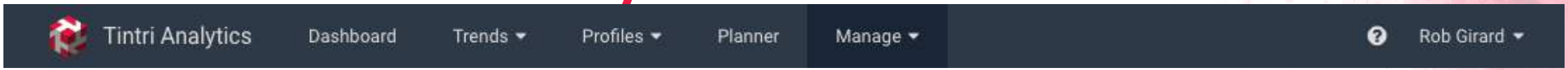


Databases – Tintri Analytics

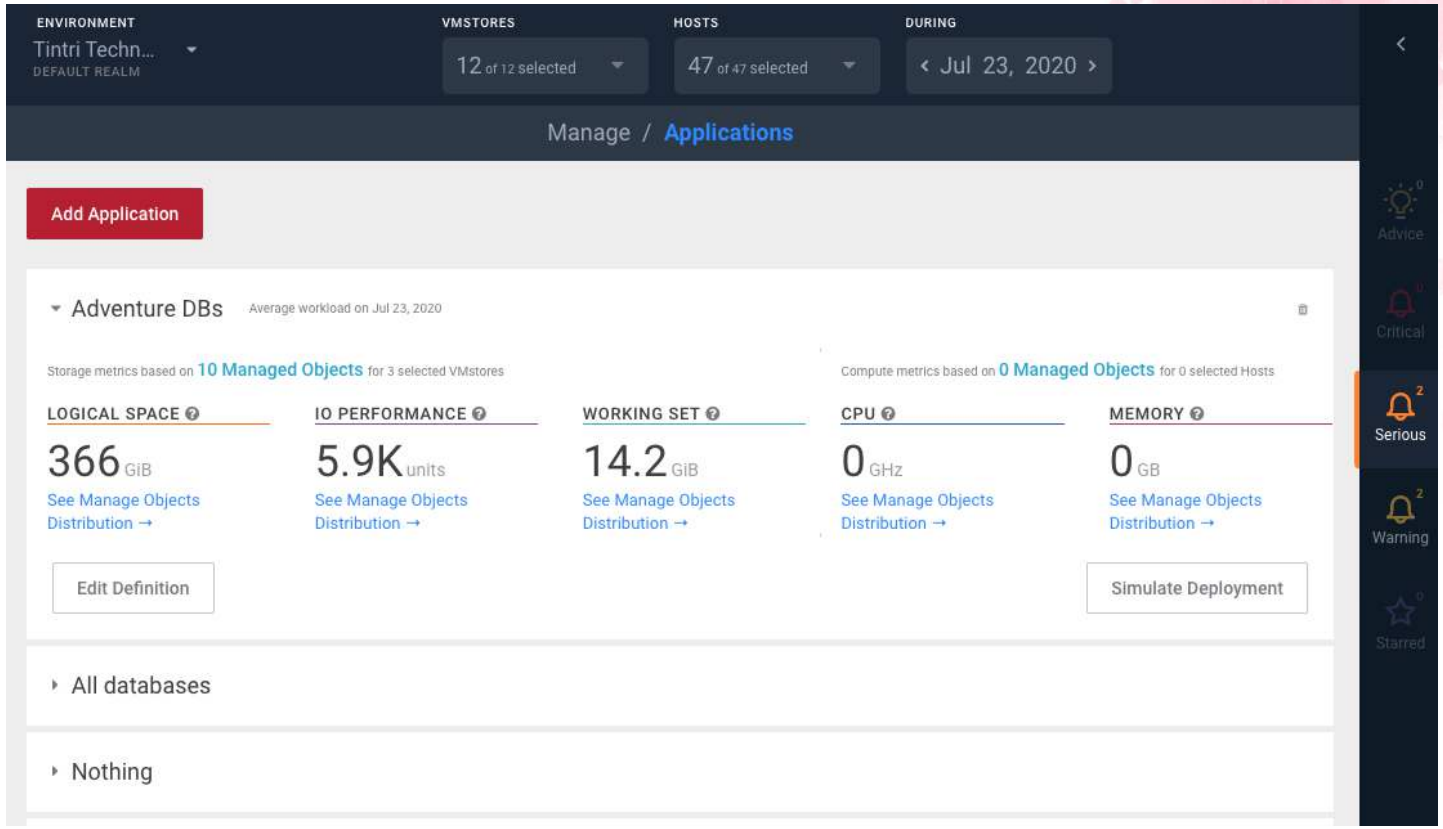
- Database trending and planning is available at https://analytics.tintri.com
- A built-in group “All DBs” has been created to view only database managed objects



Databases – Tintri Analytics

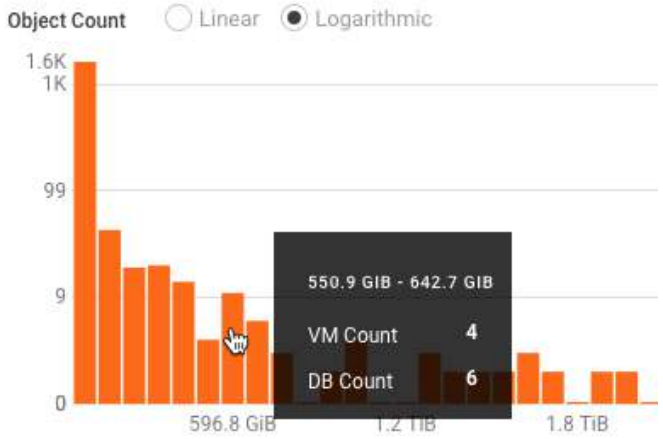


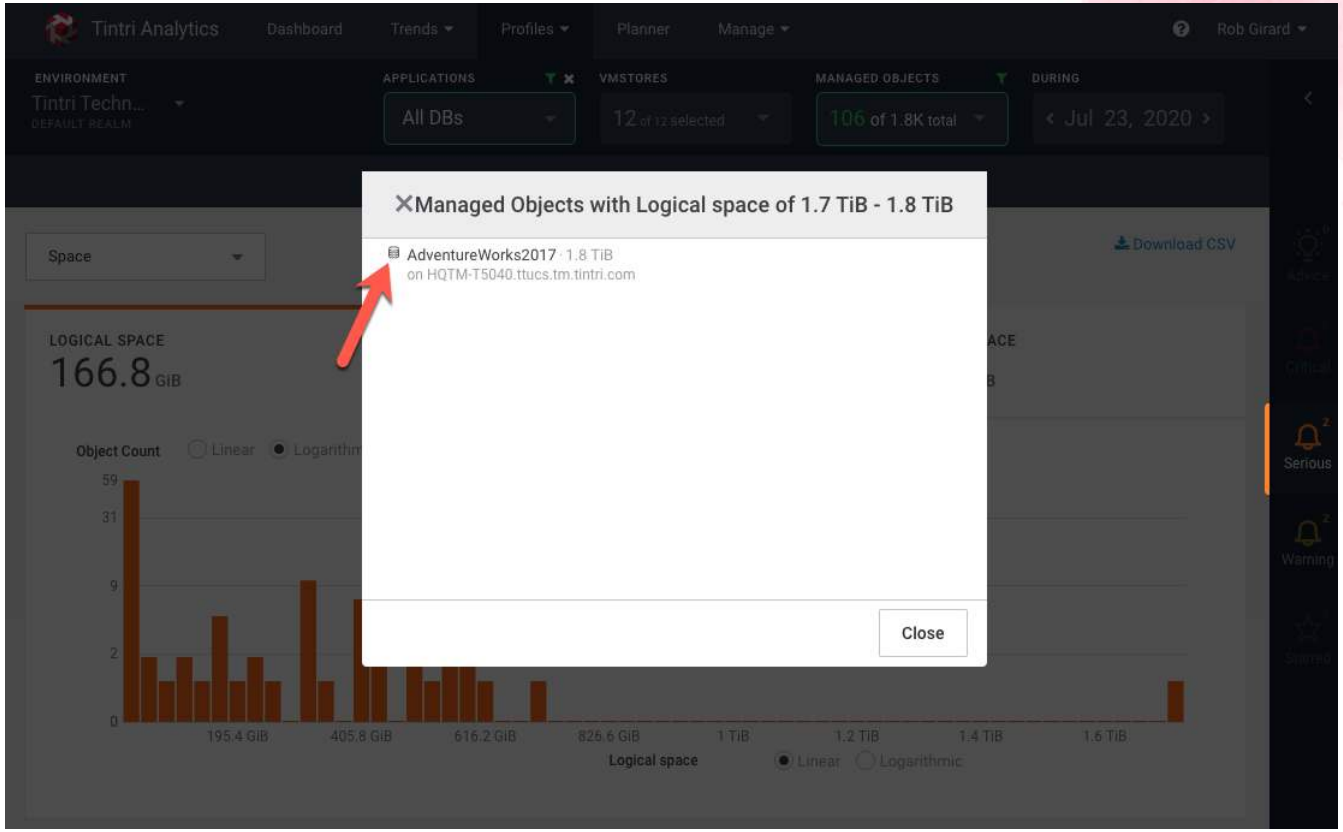
- Custom application groups can use *Object Type = Databases* as criteria to include only DBs and can be combined with other criteria, such as naming patterns to trend & model specific sets of databases



Databases – Tintri Analytics

- When viewing distribution graphs (profiles), SQL Server databases are denoted with an icon
- Mouse-over bars to see separate counts for VMs and DBs:





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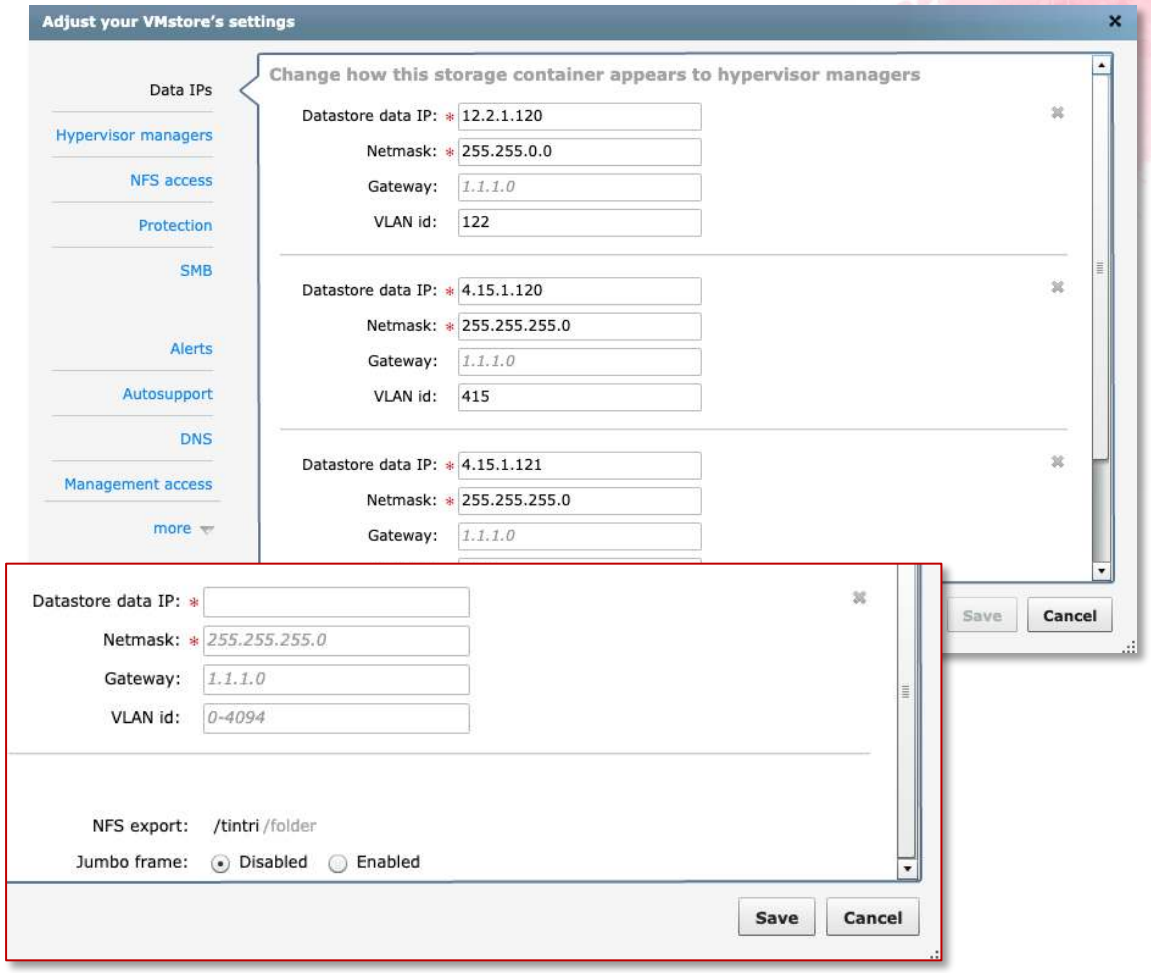
Appendix

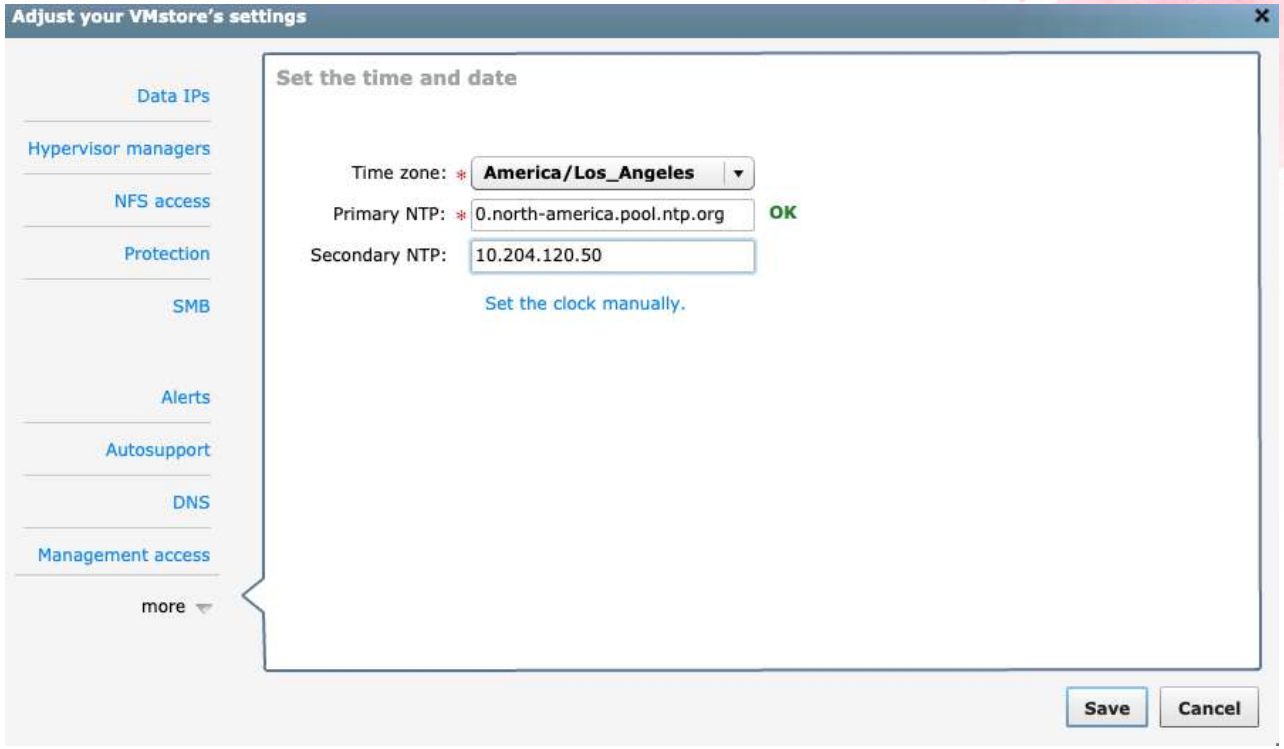
VMstore Configuration - Networking

- Data IP (VMstore local UI – Settings)
  - Press the ✚ and create up to 64 IPs and VLAN IDs
  - Separate SMB storage traffic from SQL client traffic by mutlihoming SQL Servers for best performance
  - Configure additional VMstore Data IP addresses in the same subnet as SQL Server IPs, on the same VLAN and don't use a gateway for better performance
  - If Network latency shows up on your databases, further isolation of traffic may be required. On SQL Server VMs, investigate VMNIC usage on the hosts. Additional port groups and physical NICs may help

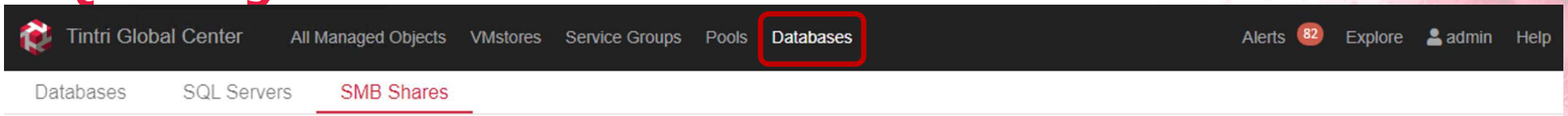


VMstore Configuration – Date & Time

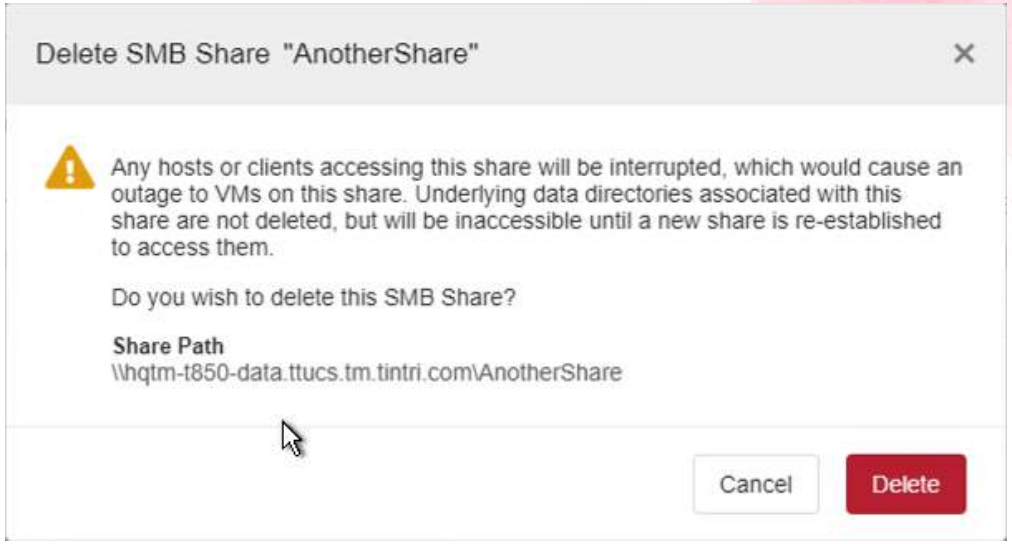
- Date & Time
  - Kerberos is time-sensitive and too much of a time delta between VMstores, TGC, SQL Servers, Hypervisors and AD Controllers may interfere with authentication
  - Configure NTP in order to keep time consistent throughout your infrastructure



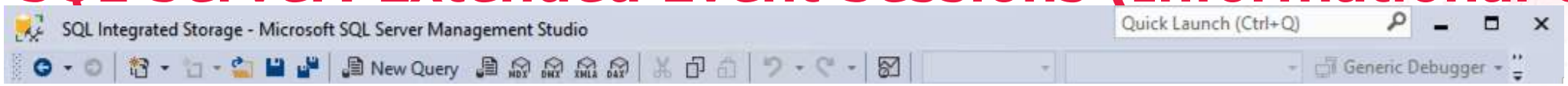
SQL Integration: Deleted SMB Shares



- Oops! You deleted the wrong SMB share!
  - You were warned, but proceeded anyway
  - SQL Servers with databases in the deleted SMB share lose connectivity and are denoted with ”In Recovery" in SSMS
  - If your databases are still trying to find the missing share, simply re-create the share using the same name and the same directory will be re-used.
  - If you no longer want the share, but it contained data, that data is no longer recognized as Managed Objects and becomes “other” data. Browse the ‘hyperv’ share (SMB root) and a directory will persist with the same name as the SMB share that was deleted. Delete or more the data to clean up

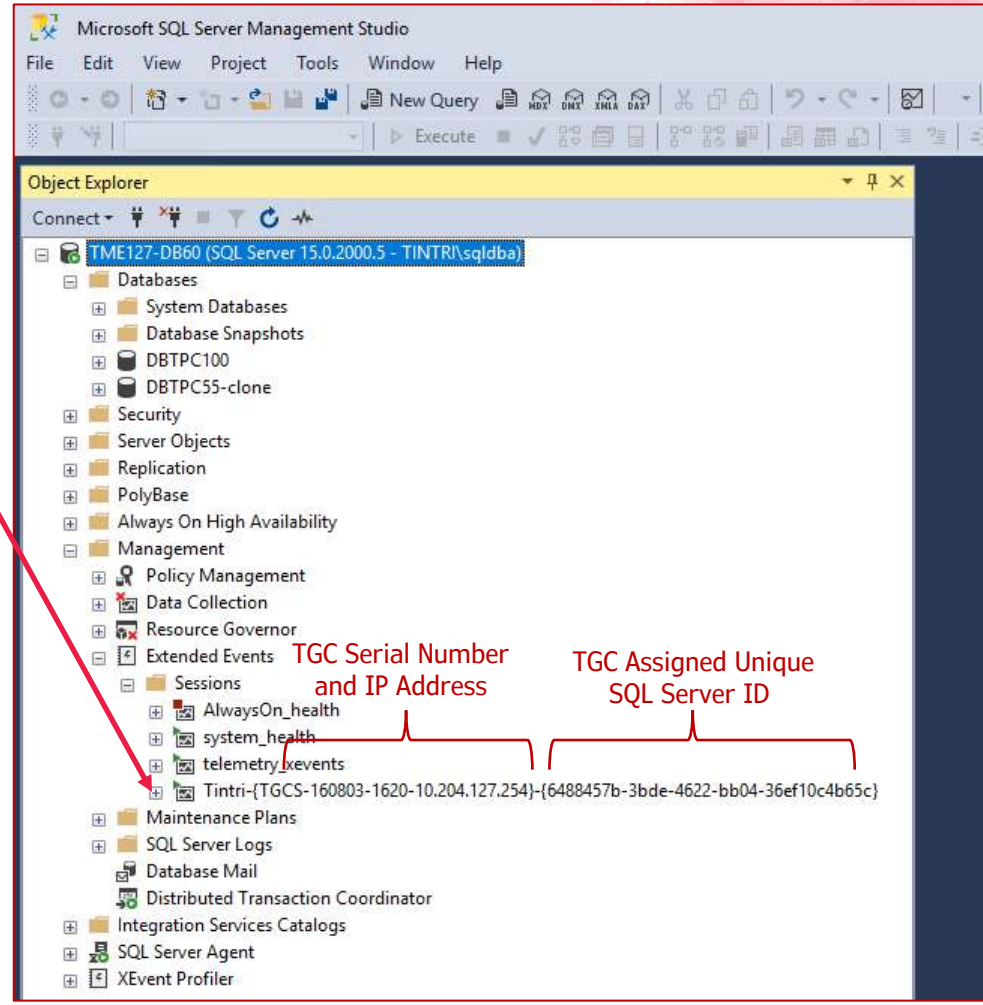


SQL Server: Extended Event Sessions (Informational Only)



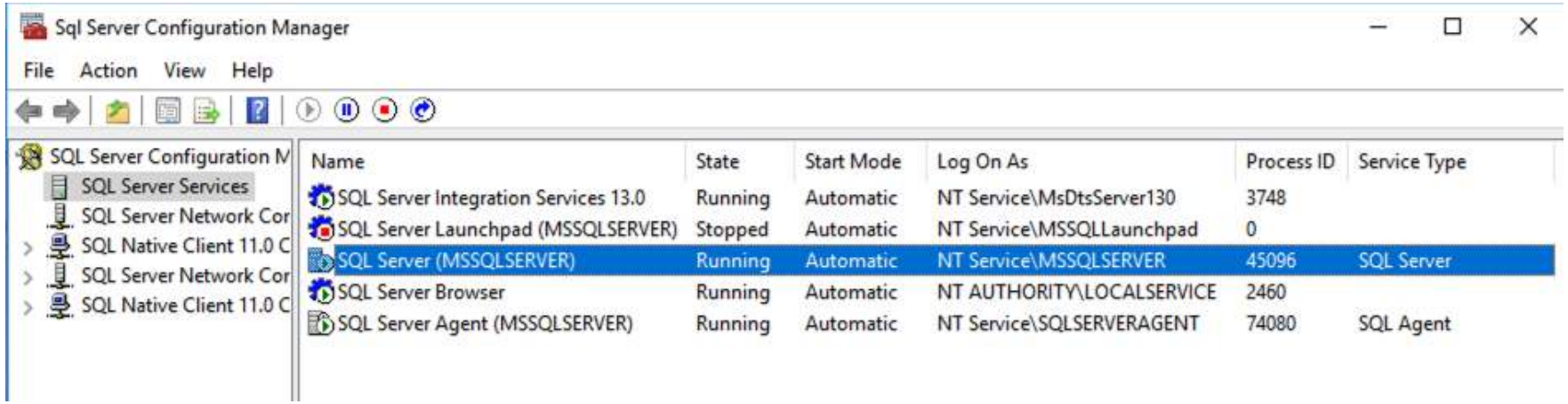
- When a SQL Server instance is registered in TGC, an Extended Event Session is created
  - Enables a lightweight polling process for TGC to detect changes in inventory
  - A watchdog service on TGC will restart the session if stopped and recreate it if missing
  - When a SQL Server registration is removed from TGC, the extended event session is stopped and left behind to re-use the unique SQL Server ID in case the instance is re-added. This prevents duplicate objects from being created

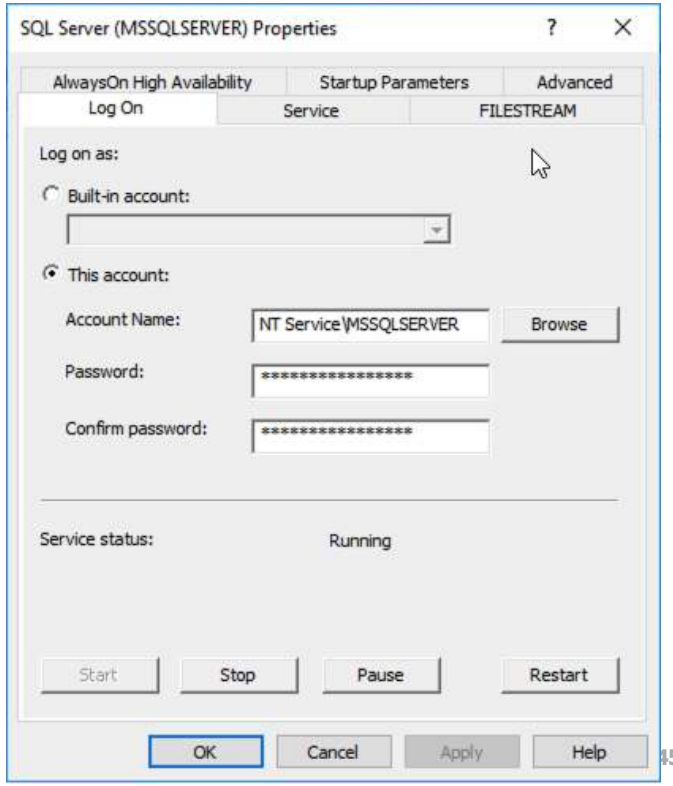
NOTE: If cloning a SQL Server VM, delete this session ID before attempting to register the new SQL Server in TGC. This will allow a new unique ID to be created for the cloned SQL server



SQL Server: Configuration Manager

- Confirm that the ”Log on As” account for the SQL Server service has permissions to the SMB share
  - If your server is using the default NT Server\MSSQLSRVER account, the domain account requiring permissions on the SMB share will be the **DOMAIN\SQL_SERVER$** computer account
  - Alternatively, if you’re using a domain service account, ensure that account has permissions to the SMB share
  - If you encounter access issues, check to ensure the Service Principal Name (SPN) is configured correctly on the AD account for Kerberos to function properly





Additional Resources

- Tintri Support: https://tintri.com/company/support/vmstore-support/

- Additional Information on Tintri SQL-Integrated Storage: https://tintri.com/sql

Revision History

Version	Date	Author	Notes
1.0	July 2020	Matt Morris & Rob Girard	Initial release