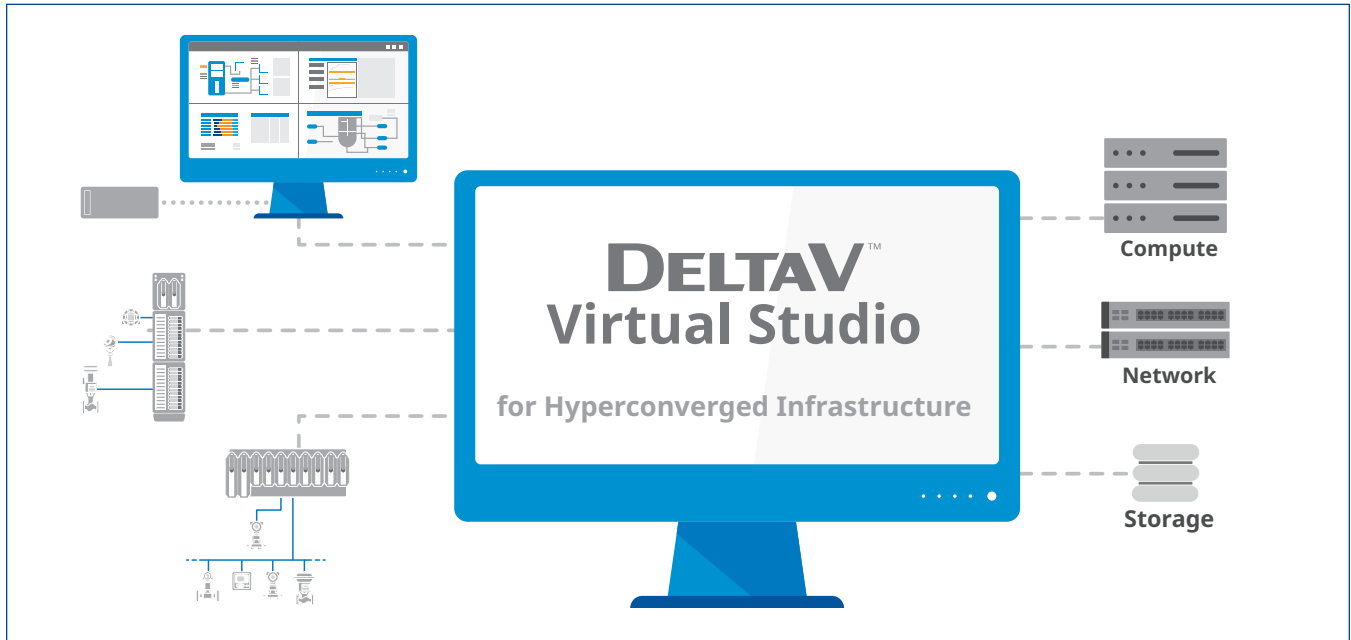


DeltaV™ Virtual Studio

for Hyperconverged Infrastructure



DeltaV™ Virtual Studio for Hyperconverged Infrastructure makes virtualization easier.

- DeltaV™ Virtualization made easy
 - Reduced costs and increased scalability
 - Automated configuration and setup
 - Fewer computers and control hardware
 - Extended system life with easy upgrades
 - High availability and automatic disaster recovery

Introduction

DeltaV™ Virtual Studio, now supporting Hyperconverged Infrastructure (HCI) makes it even easier to create and maintain virtual DeltaV systems for development, testing, training, and on-line production.

Setup and maintenance of multiple control systems can be expensive and time consuming. DeltaV Virtual Studio for HCI offers many compelling benefits including less hardware to buy and maintain, scalability to dynamically grow your system, increased configuration flexibility and engineering productivity, with a simplified architecture for a highly available system.

DeltaV Virtual Studio for HCI makes it easier than ever to capture the value of virtualization without being an IT virtualization expert. With an automation centered, fit-for-purpose HCI solution, deploying a virtualization infrastructure is greatly simplified with the automated setup and configuration tools built within DeltaV Virtual Studio to enhance user experience and achieve improved performance.

DeltaV Virtual Studio is easy because it is an integrated virtualization environment which includes prebuilt DeltaV virtual machine templates and virtual networks which simplify system set-up and reduce the risk of configuration errors.

Virtual operator workstations and application servers are easily created from templates without software installation and added to the control network without complicated virtual network mapping. For off-line development and test systems, you can easily create virtual hardware controllers, safety logic solvers, and I/O subsystems for simulation and testing.

Now you can confidently capture the value of the latest IT technologies with a fully tested and supported DeltaV virtualization with an HCI solution. DeltaV Virtual Studio will support virtualization of DeltaV software releases, v14.LTS and higher releases (including Feature Packs).

Benefits

DeltaV Virtualization Made Easy: Virtualization using Hyperconverged Infrastructure offers additional benefits above and beyond a traditional virtualization infrastructure. HCI creates a unified virtualized system incorporating compute power, network configuration and storage into a single tightly integrated software system to reduce overhead and improve performance. Users can manage the entire platform through a single interface, making it far easier to manage and scale virtual systems.

Automated Configuration and Setup: DeltaV Virtual Studio is designed to be an automation-centered, built for purpose HCI solution to simplify virtualization of control system hardware. DeltaV Virtual Studio now automates the setup and configuration of your HCI clusters, Cluster domain controllers and HCI switches which streamlines the deployment experience and ensures a secure and consistent installation of your virtualization platform.

Increased Flexibility and Productivity: Easily setup and maintain multiple systems for control development, testing and training. Support multiple systems, on multiple software releases, with the same virtualization infrastructure. Easily save and restore virtual control systems for more cost-effective troubleshooting, making modifications to existing applications, or operator training.

Fewer Computers and Control Hardware: Consolidate workstations on host servers to reduce computer hardware, installation, and maintenance costs. For off-line systems, utilize virtual controller, safety logic solver, and CHARMS IO card simulation to reduce the control hardware required for development and testing. HCI technology reduces the footprint and energy use of virtualized systems while increasing availability and performance.

Extended System Life With Easy Online Upgrades and System Expansions: Extend the life of your existing legacy DeltaV system with easy replacement of obsolete workstations with new HCI hardware or grow your system by adding HCI hardware to you existing virtualization deployment. DeltaV software upgrades are also made easier with automated upgrade wizards using virtual machine templates. In a DeltaV virtual environment you can update hardware and software independently, providing flexibility in scheduling upgrades.

Increased Scalability: HCI solutions designed specifically for control systems help future proof your control automation investment. Engineers simply choose the appropriate host size for the facility, and when the equipment arrives, intuitive wizards with interfaces recognizable from the associated control system guides the engineers through the configuration process to have new systems up and running quickly. When it is time to scale up, simply add more of the same smaller footprint, energy efficient DeltaV HCI hosts to the existing infrastructure.

High Availability and Automatic Disaster Recovery: Virtualization can improve availability by reducing the Mean Time To Recovery (MTTR) for workstations with automatic failover enabled. HCI uses Microsoft's software-defined storage (S2D) technology where data is written locally and replicated automatically to other hosts for high availability and for disaster recovery that makes it easier to perform planned repairs and hardware upgrades.

Product Description

DeltaV Virtual Studio is an integrated DeltaV application environment designed for easy implementation and management of virtual DeltaV control systems for both off-line and on-line production systems.

Typical DeltaV Virtualization Applications

Operator Training Systems

Virtualization is ideal for operator training systems (OTS). These systems typically do not include controller or IO hardware and use workstation PC's for operator consoles, application stations, and process control simulators. Figure

1 shows a typical operator training configuration using DeltaV Simulate Multi- node with a ProfessionalPLUS (PPN), 4 Operator Stations (OSN), 3 Application Stations (ASN), and a process simulator (Mimic™).

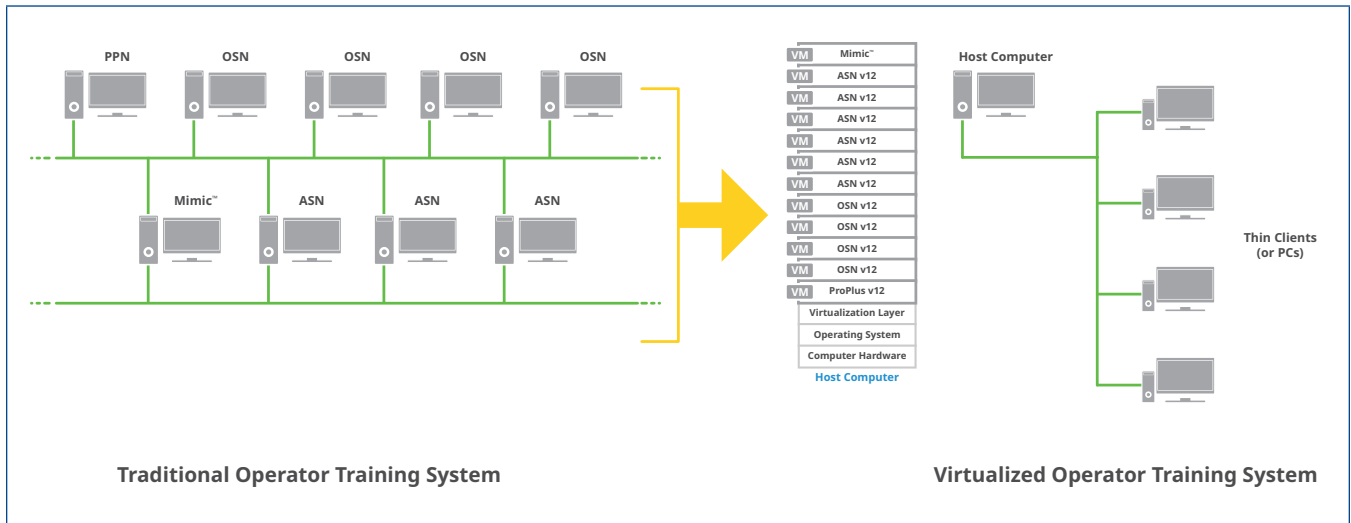


Figure 1 – Example Operator Training System.

With virtualization, all of the OTS computers run as virtual machines in one or more host computers. This capability is particularly useful because training systems often are needed to support multiple process units and different versions of DeltaV. Unique virtual machines (VMs) can be

created for these different units and control systems. The VMs can then be activated in the host computer when needed, allowing the same computer hardware to be used for multiple OTS applications.

Development and Test Systems

As with OTS systems, a development and test system can have all the DeltaV workstations virtualized on one or more host computers. With development and test systems however, it is important to checkout the IO assignments, a task traditionally performed with actual controllers and IO cards, or simulated IO via a Virtual IO Module (VIM) card. The virtualized DeltaV workstations can communicate on

the DeltaV network to actual controllers and I/O hardware or alternatively to virtual hardware controllers and IO subsystems. The virtual controllers and IO subsystems enable development and testing systems without physical control hardware. *For more information, see the product data sheets for Virtual CHARMS IO Card Simulation, Virtual Ethernet IO Card, and Virtual Machine Controller Simulation.*

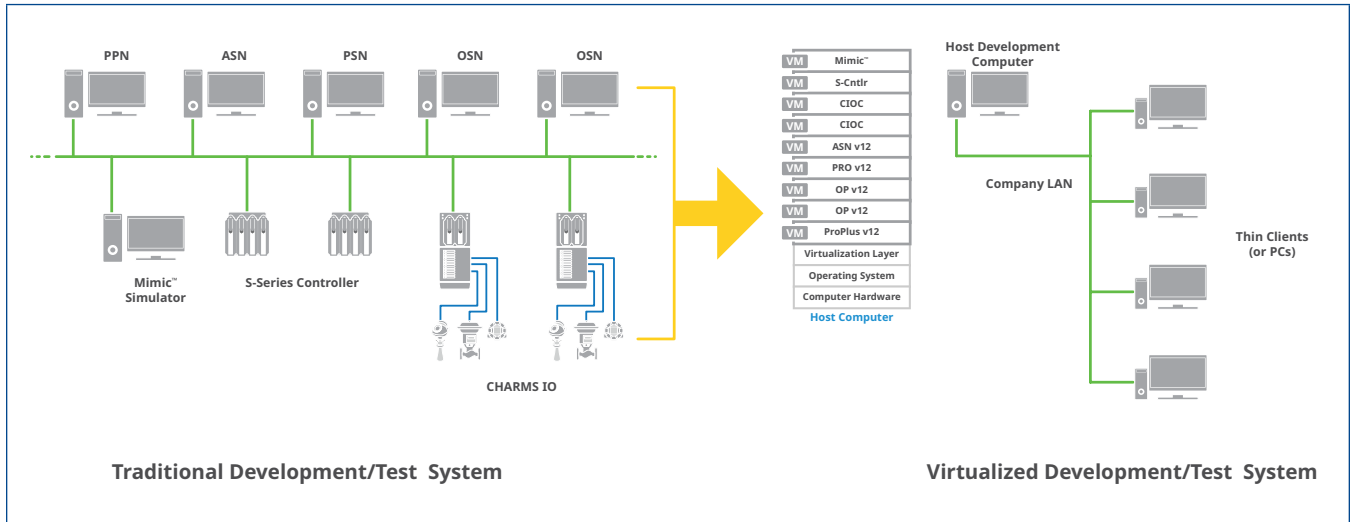


Figure 2 – Example DeltaV Development/Test System.

DeltaV Virtual Studio makes it possible to support multiple DeltaV development / test systems using common computer hardware. This can be a significant savings and flexibility advantage for central engineering departments and project teams.

Figure 2 shows a typical development / test system configuration using DeltaV Simulate Multi-node with a ProfessionalPLUS (PPN), 1 Application Station (ASN), 1 Professional Station (PSN), 2 Operator Stations (OSN), 2 virtual CHARMS IO Cards, 2 virtual S-series controllers, and a process simulator (Mimic).

You can also create virtual machines for development and testing of DeltaV SIS with Electronic Marshalling, and DeltaV Virtual Ethernet I/O Cards. For DeltaV SIS, virtual machine templates are available for the SZ controller, Charms Smart Logic Solver (CSLS) and Local Safety Network Bridge (LSN). *For more information, see the product data sheets for DeltaV SIS with Electronic Marshalling – Virtual Simulation, and DeltaV Virtual Ethernet I/O Card for Real-Time Smart Device Control/Data Integration and Simulation.*

Online Production Systems

DeltaV Virtual Studio for HCI also supports virtualization of DeltaV workstations in on-line production systems such as shown in Figure 3. In this example, virtualization using HCI allows you to consolidate 17 servers and workstations into two host servers. HCI uses software defined storage that

automatically enables high availability and DeltaV Virtual Studio can automatically move and reboot virtual DeltaV workstations to an alternate host in the event of primary host failure. Redundant thin client networks further improve overall system availability, Redundant applications (e.g., for Batch Executive or OPC Server) are also supported on Application Stations assigned to separate host computers.

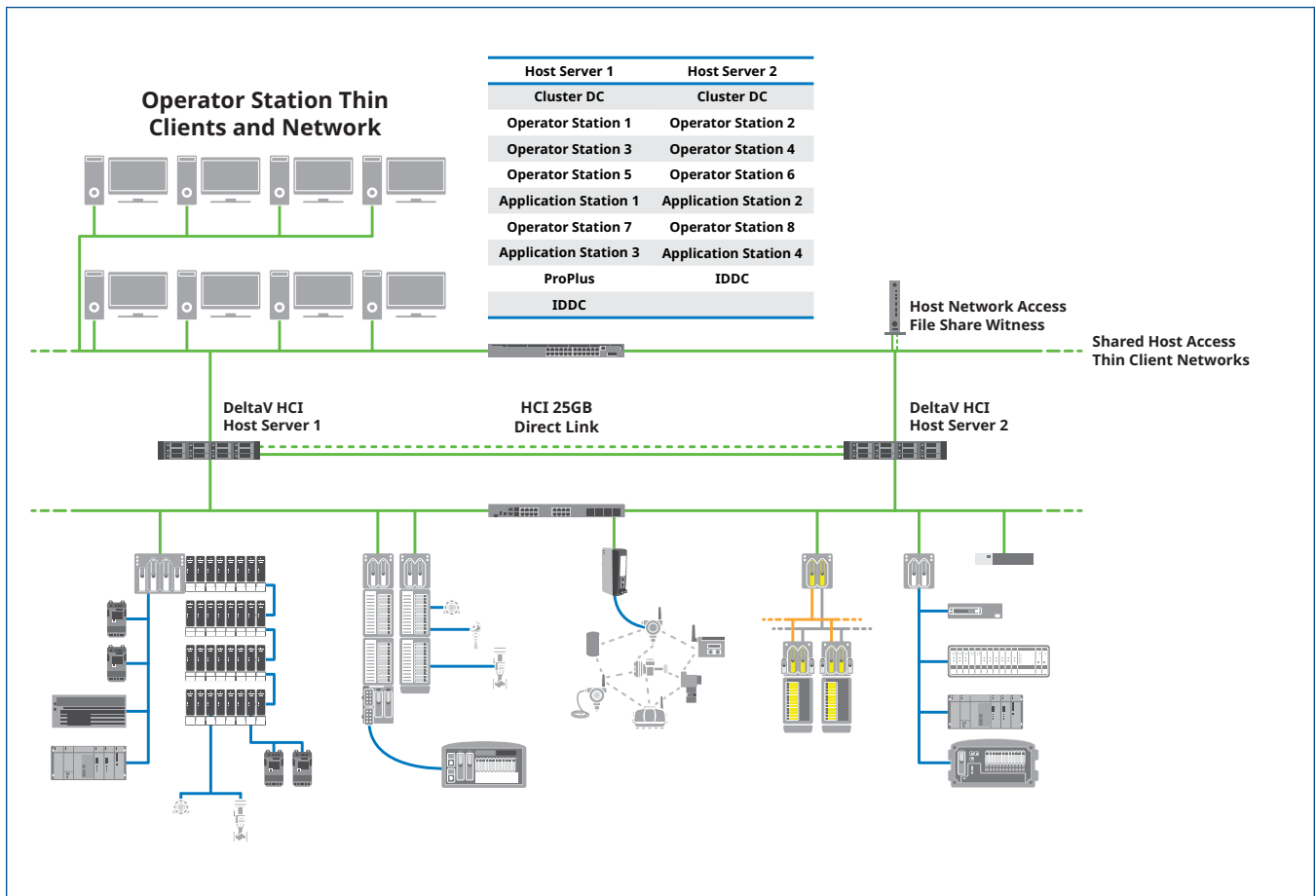


Figure 3 – Example DeltaV Online Virtualization for Hyperconverged Infrastructure (HCI) HA and DR– 2 Nodes.

DeltaV Virtual Studio Product Features

DeltaV Virtual Studio is designed to make it easy to create and manage virtual DeltaV systems. Most virtualization management software is complicated because the tools are generalized to support many different applications and markets. DeltaV Virtual Studio for HCI is a fit-for-purpose automation centered solution designed specifically for optimizing the virtualization infrastructure of process control systems and has a workflow and feature set which are easy to use and understand by a process control engineer.

DeltaV Virtual Studio puts all the virtualization functionality you need into a simple DeltaV application. You can:

- Setup your HCI environment using an automated setup wizard.
- Create virtual networks and add DeltaV HCI host computers.
- Create, start, stop, and move DeltaV VMs.
- Allocate resources and define failover scenarios.

Automated DeltaV HCI Cluster Setup

DeltaV Virtual Studio simplifies the setup and configuration of your HCI environment with an automated setup wizard that configures the DeltaV HCI hosts, Cluster Domain Controller, File Share Witness and Management Cluster for shared storage. DeltaV Virtual Studio for HCI is implemented using software- defined storage technology with Microsoft Storage Spaces Direct (S2D).

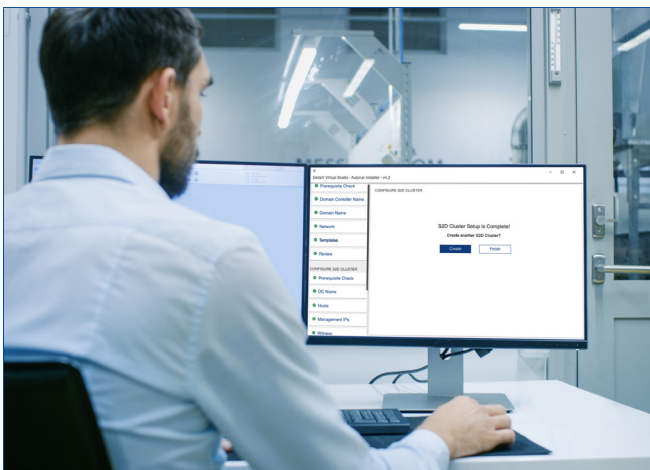


Figure 4 – Automated S2D Cluster Setup.

For clusters with more than 2 hosts, DeltaV Virtual Studio now includes a HCI Switch configuration tool that automates the switch setup allowing for easy scale-ups or expansions as your system grows.

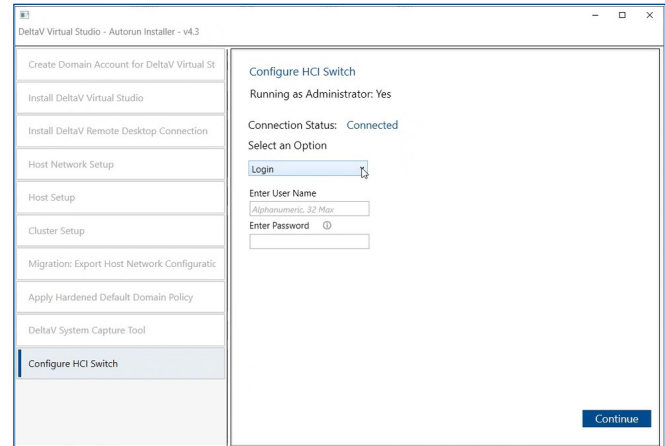


Figure 5 – HCI Switch Configuration Tool.

File Share Witness

A file share witness in a Failover Cluster is used as a vote in a cluster quorum. The recommended File Share witness PC will reside on the Host Access Network. The redundant Host Access Network will coexist securely on the Thin Client Network switches using secure Virtual Local Access Network (VLANs). The Host Access Network may be used to access the DeltaV HCI hosts, and the file share witness may run an instance of the DeltaV Virtual Studio in addition to other instances on the Domain Controller and DeltaV HCI Hosts.

Logical and Physical VM Assignments

DeltaV control systems have both a physical and logical orientation, allowing control modules to be assigned to both logical plant areas and physical control hardware. DeltaV Virtual Studio also supports a logical and physical paradigm which allows you to assign your DeltaV virtual machines to both physical host computers and logical groups or plant areas. Physical assignments make it easy to allocate your VMs across multiple hosts and move VMs between hosts for resource load allocation and high availability. Logical group assignments allow you to easily manage and distribute physical resources used for specific process units or plant areas. Figure 6 illustrates the logical orientation within DeltaV Virtual Studio.

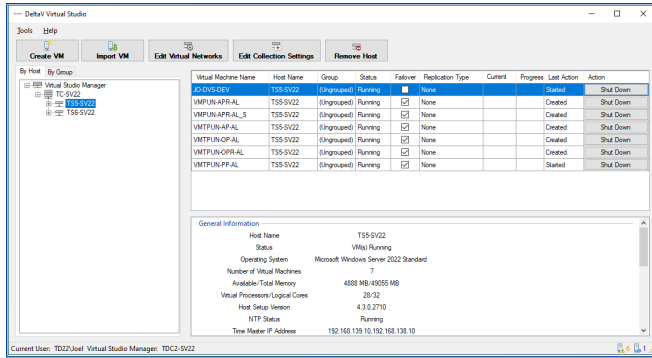


Figure 6 – DeltaV Virtual Studio Logical Grouping.

DeltaV Virtual Machine Templates

DeltaV Virtual Studio also makes virtualization easy by using DeltaV virtual machine templates. These templates allow you to add virtual workstations and controller hardware (for off-line use) from a single configuration dialog (see Figure 7). With a few clicks you can easily create a new DeltaV workstation without additional software installation.

A DeltaV template is a virtual machine with the operating system and DeltaV software fully installed. The virtual machine is then generalized to remove specific DeltaV and network configuration information. To create a new DeltaV VM, DeltaV Virtual Studio completes the DeltaV workstation configuration, creates network connections and adds the VM to the selected DeltaV network.

DeltaV VM templates are available for DeltaV versions v14.LTS & higher (including Feature Packs). VM templates for Operator, Professional, Maintenance, Application Station, Zone, and Terminal Servers are pre-built with DeltaV software preinstalled and network connections pre-defined. DeltaV ProfessionalPlus virtual machines use VM templates with automatic software installation and domain creation as specified. DeltaV Virtual Studio also supports automatic creation of DeltaV Independent Domain Controller VMs starting in DeltaV v14.LTS. AMS server workstations may be created from VM templates but require some manual software installation. AMS client software may be automatically installed on any DeltaV workstation during VM creation.

DeltaV Remote Clients using Microsoft Terminal Services are also supported using DeltaV server VM templates. DeltaV Remote Client sessions provide the same functionality as DeltaV Operator and Professional Stations but enables multiple sessions using a single server operating system VM.

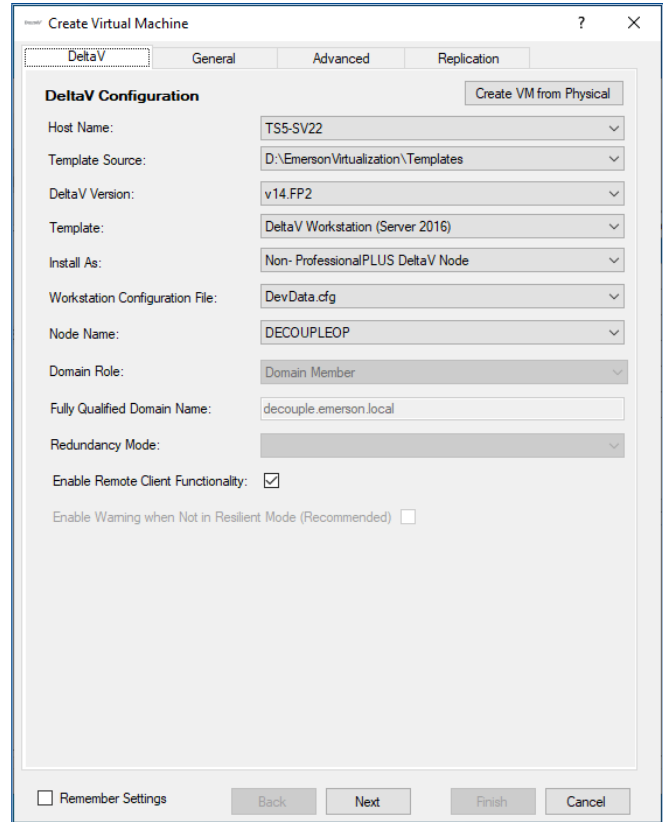


Figure 7 – Example VM Template Dialog.

All DeltaV templates include standard DeltaV release software. Additional hotfixes and OS updates can be applied to the DeltaV VMs after instantiation as required.

Customized VM Templates

DeltaV Virtual Studio enables you to create customized VM templates for Windows based virtual machines. After creating a VM with the standard VM templates, you may apply all DeltaV hotfixes and OS updates and create a new customized VM template which can be used for new VM creation. This saves time because you do not have to reapply the same hotfixes and OS updates to each new VM.

Control and SIS Hardware VM Templates

VM templates for control hardware are also available for DeltaV S-series controllers, M-series controllers, PK Controllers, CHARMS IO cards, and Ethernet IO cards. These templates are for off-line simulation use only. For more information, see the product data sheets for DeltaV Virtual Machine Controller Simulation, Virtual CHARMS IO Card Simulation, and Virtual Ethernet IO Card.

Starting with DeltaV v13, VM templates are also available for DeltaV SIS with Electronic Marshalling, including SZ controller, Charms Smart Logic Solver (CSLS) and Local Safety Network Bridge (LSNB). *For more information, see the product data sheets for DeltaV SIS with Electronic Marshalling – Virtual Simulation.*

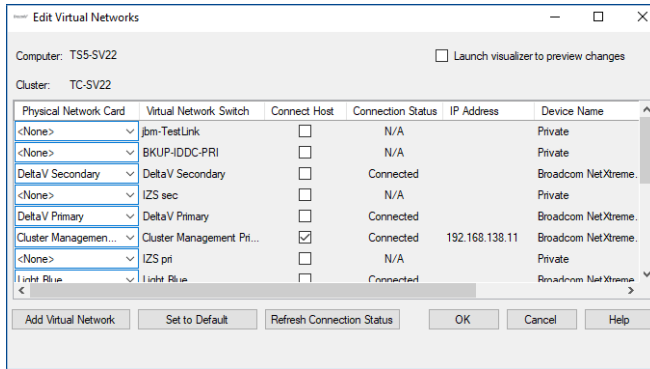


Figure 8 – Easy Network Configuration.

Easy Network Connections

DeltaV Virtual Studio makes it easy to create and manage DeltaV virtual networks. With DeltaV Virtual Studio you can simply add a virtual network to a host server, associate it with a DeltaV system and network device (if externally connected) and you are ready to add DeltaV virtual machines. Multiple DeltaV networks are supported for virtualization environments that encompass multiple systems.

DeltaV virtual machines are easily added to a DeltaV network because their templates come with predefined DeltaV network connections. A simple drop-down menu allows you to connect a virtual DeltaV machine to its respective DeltaV network. Figure 8 illustrates DeltaV VM network connections.

Easy DeltaV Upgrades

DeltaV Virtual Studio makes it easy to upgrade workstations and servers to the latest release of DeltaV. Upgrades can be performed from both existing virtual environments and traditional physical environments. DeltaV Virtual Studio has integrated DeltaV's Upgrade Wizard to automatically capture network and configuration data from existing machines and inject this information into new VMs created from templates. This saves you time normally required for manual data transfer and software installation. Upgrades are supported for the prior two major DeltaV releases (e.g., you may upgrade to v16.LTS from v14.LTS).

High Availability and Automatic Disaster Recovery

For on-line production control systems, fast recovery from system failures is important to insure maximum uptime. DeltaV Virtual Studio supports both High Availability (HA) and Automatic Disaster Recovery (DR) features to maximize reliability and minimize the Mean Time To Recovery (MTTR) after a failure.

High Availability includes automatic failover of virtual machines from one DeltaV HCI host to another host in the event of host failure. DeltaV Virtual Studio utilizes Microsoft's Storage Spaces Direct (S2D) to support High Availability and Disaster Recovery where data is written locally and replicated on other hosts for automatic failover for efficient disaster recovery. With HCI, HA and DR are achieved using a single tool to maximize reliability providing fast recovery from a host failure. Emerson recommends locating the DeltaV HCI hosts in separate locations to avoid common cause failure.

When a host failure occurs, DeltaV Virtual Studio automatically moves and reboots the virtual machines that were running on the failed host, to another specified DeltaV HCI host. DeltaV Virtual Studio also supports Live Migration of the VMs from one host to another, while the VM is running.

Starting with v4.3.3, DVS will implement Nested Storage Resiliency support for 2-host HCI clusters. Nested storage resiliency is a capability of Storage Spaces Direct in Azure Stack HCI and Windows Server that enables a two-server cluster to withstand multiple hardware failures at the same time without loss of storage availability, so users, apps, and virtual machines continue to run without disruption. This is not applicable to larger sized clusters (3 and 4 host clusters) as they are protected against multiple hardware failures with 3-way storage mirroring, and deploying one cluster shared volume (CSV) per host in a cluster.

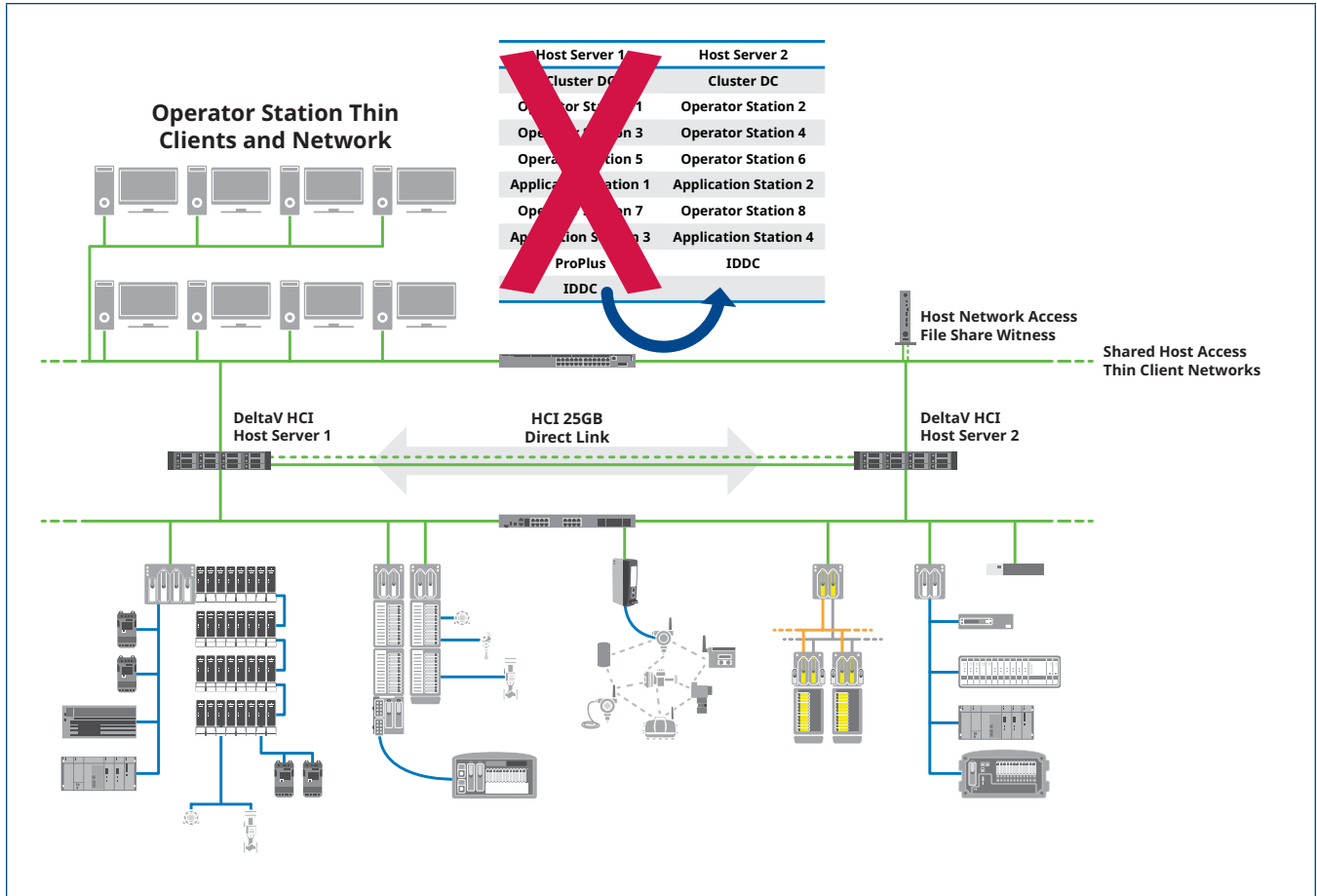


Figure 9 – Example System with High Availability and Automatic Disaster Recovery.

Another advantage of an HCI deployment is easier hardware upgrades and planned equipment repair. For example, in the system shown in Figure 9, you can failover your VMs to the secondary host to perform a Host upgrade or repair. DeltaV Virtual Studio also supports Live Storage Migration to your secondary host in the cluster for zero downtime of your VMs.

You can move your VMs from one DeltaV HCI host to another online to manage hardware repairs or upgrades.

For more information, see the product data sheet for DeltaV Virtualization Hardware for Hyperconverged Infrastructure.

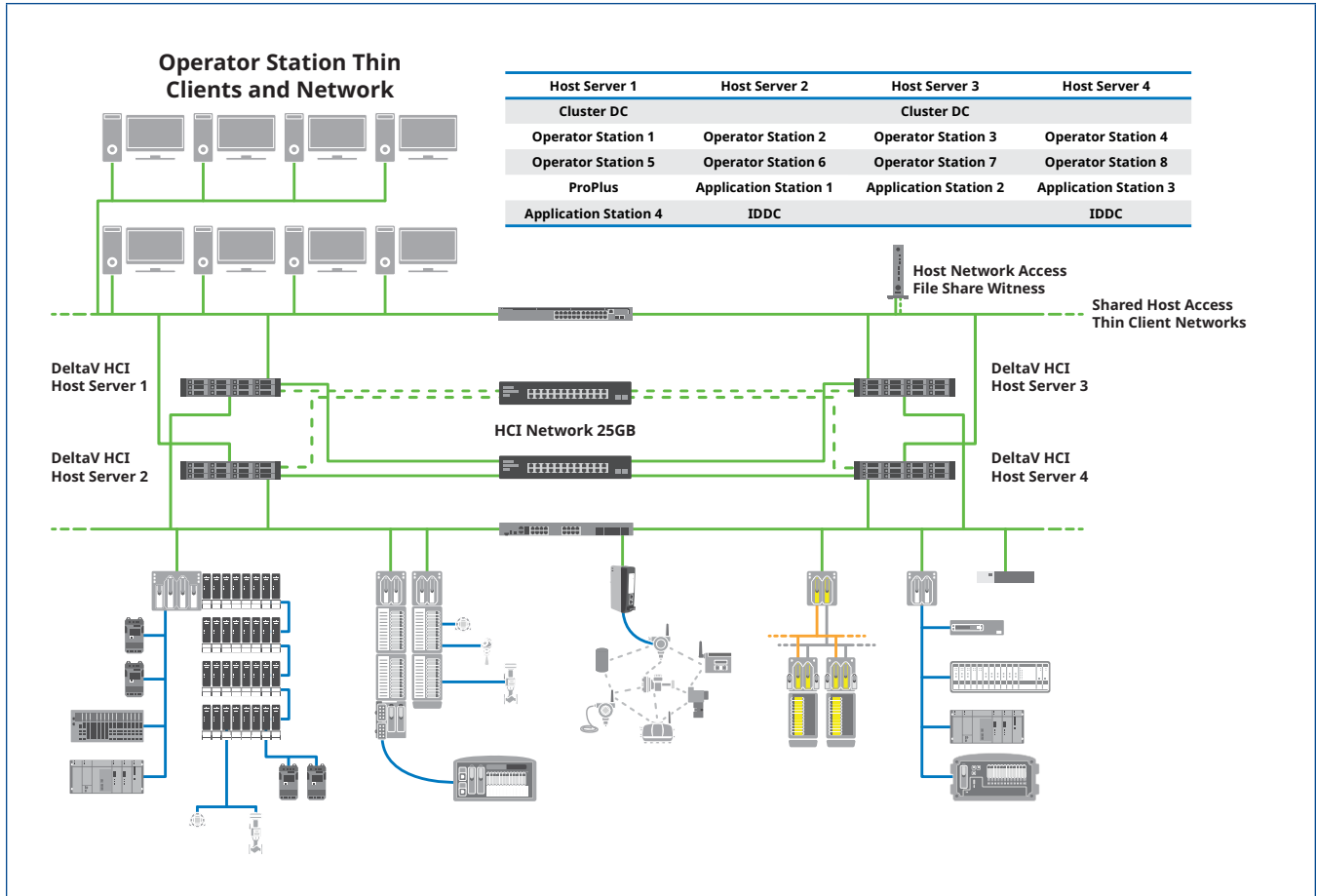


Figure 10 – DeltaV Online Virtualization with HCI HA And DR – 4 Nodes.

Figure 10 provides additional architectural details for a typical on-line virtualization configuration for a larger DeltaV system. The recommended architecture includes a pair of HCI switches, that is configured using the automated HCI Switch Configuration tool available with DeltaV Virtual Studio and domain controllers which may be implemented on physical or virtual machine. A Windows Server VM template is available for the virtual host domain controller.

DeltaV Virtualization System Health Alerts

DeltaV Virtual Studio supports virtualization system health alerts within DeltaV. Standard DeltaV alarms can be configured to notify operations and maintenance personnel when there is an abnormal condition in the virtualization hardware or software. Components monitored include DeltaV HCI host computers, HCI network switches, host domain controllers, and virtual network communications, file share witness, etc.

Advanced Virtualization Diagnostics

DeltaV Virtual Studio is implemented using standard Microsoft Windows Hyper-V virtualization technology. Advanced users who want additional virtualization diagnostic features available with Hyper-V, but not exposed with DeltaV Virtual Studio, may use the Hyper-V manager application available with Windows Server OS.

Licensing Considerations

DeltaV Virtual Studio is a licensed application that requires a system access key (dongle) and associated license file. The license and dongle are included in the base DeltaV Virtual Studio license bundle. This license and dongle enable DeltaV Virtual Studio across multiple hosts and DeltaV systems within the same virtualization environment, for up to 20 virtual machines on a small DeltaV HCI system and up to 50 virtual machines on a large DeltaV HCI host. Scale-up VM license packs are available for additional virtual machines needed as your system grows.

DeltaV Licenses

A DeltaV system implemented with virtualization requires the same DeltaV licenses that are required for a traditional physical system. For example, you still need licenses assigned to each DeltaV workstation whether they are virtual machines or physical workstations. The DeltaV licenses for DeltaV workstations are tied to a system ID as defined by the system USB access key (dongle). The system access key (dongle) is accessed on a physical DeltaV workstation, or through a USB IP Converter device that is available in the DeltaV Virtualization Hardware product data sheet.

Microsoft Windows OS Licensing

The DeltaV workstations also require Microsoft Windows licenses. Microsoft OS licensing for virtual machines is different for virtual server OS and virtual client OS machines. Example DeltaV server OS workstations include the: Professional Plus, Application Stations, and Remote Client Terminal Services. The DeltaV HCI hosts run Microsoft Windows Datacenter OS which provides the ability to host an unlimited number of Windows Server OS virtual machines. This simplifies the server OS licensing eliminating the need to account for server OS licenses for failover and replication across all the hosts in an S2D cluster.

Virtual Windows client OS machines e.g., Windows 10 require a Windows Virtual Desktop Access (VDA) license subscription or Microsoft Software Assurance for each device which is accessing the virtual client machines. A DeltaV Operator workstation is an example of a client OS machine. VDA subscriptions must be purchased separately from Microsoft or a Microsoft Partner. Proof of a VDA subscription or other valid client access license is required prior to shipment of DeltaV client OS VM templates from Emerson.

Microsoft server Client Access Licenses (CALs) are required for device connections to the host server. For multiple connections to a host server using Remote Desktop Connections, additional Microsoft Remote Desktop Services CALs (RDS CALs) are also required. All thin clients accessing DeltaV virtual machines on a host server will require both CAL and RDS CAL licenses. Microsoft CALs and RDS CALs are available from Emerson or through a direct Microsoft customer license agreement.

Resource Planning Guidelines

Virtual machines require host computer resources and are typically limited by available host CPU or RAM. Table 1 provides guidelines on how many virtual machines to assign to host computers based on the VM loading and RAM requirements.

VM Units (VMUs) are used to estimate relative CPU loading and host limits. These guidelines are for supported host hardware as specified in the DeltaV Virtualization Hardware product data sheet.

Example 1 – Operator Training System

An operator training system with

- 1 server class ProPlus (2 VMUs)
- 2 server class App Stations (4 VMUs)
- 6 Operator Stations (6 VMUs)

would require 12 VMUs and could all be run in one off-line host computer.

Example 2 – Development Test System

A development / test system with

- 1 server class ProPlus (2 VMUs)
- 2 server class App Stations (4 VMUs)
- 4 Professional Stations (4 VMUs)
- 2 Operator Stations (2 VMUs)
- 10 S-series Virtual Controllers (4 VMUs)
- 30 Virtual CHARMS IO Cards (6 VMUs)

would require 22 VMUs and would need at least two off-line host computers.

Example 3 – On-line Production System

An on-line production system with virtual machines for

- 1 server class ProPlus (2 VMUs)
- 5 server class App Stations (10 VMUs)
- 10 Operator Stations (10 VMUs)

would require 22 VMUs and would need at least two online whost computers.

Table 1 – Host VM Resource Planning

Host VM Resource Planning		
VM Class	VMUs	RAM (MB)
Workstation OS (e.g., Windows 10) ■ DeltaV v15.LTS and later	1	8,192
Server OS (e.g., Windows Server 2022) ■ DeltaV v15.LTS and later	2	16,384
Windows Server OS acting as a Terminal Server and supporting DeltaV Live Remote Sessions	4	16,384
Virtual Controllers (S, M, SZ)	0.4	256
Virtual PK Controller	0.8	1,024
Virtual Ethernet IO Card	0.8	256
Virtual CHARMS IO Card	0.2	64
Virtual CSLS and LSNB ¹	0.5	64
Supported Maximum VMU Limits for Host Servers ¹		
	Normal Operation	Temporary Failover Operation
On-line HCI Host Server (R760 XL or R740xd XL)	24	48
Standalone Host Server (R660)	22	N/A

Note 1 – Total number of VMs should not exceed available CPU threads = ((CPU cores x 2) - 1).

Ordering Information

A typical DeltaV Virtual Studio order will consist of the following products:

- DeltaV Virtual Studio Base License (i.e., VF1026S020, VF1026050).
- DeltaV Virtual Studio Software Media (e.g., VF1052DVS43L39).
- DeltaV Virtual Machine templates for a specific DeltaV release (e.g., VF1052BR16LTSL39, VF1052BR16LTSL39-T).
- VM Client Access Licenses (e.g., CALs - VF1052MS5CALs, and RDS CALs - VF1052MS5RDSCALs).

Description	Model Number
<p>DeltaV Virtual Studio (DVS) for Small to Medium Systems – Base License¹ for up to 20 VMs</p> <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Base license for Small HCI System (up to 20 VMs) ■ DVS Access Key <ul style="list-style-type: none"> ● For physical dongle, order must include VF1026LDK ● For softkey license, order must include VF1026SOFT 	VF1026S020
<p>DeltaV Virtual Studio (DVS) for Small to Medium Offline Systems – Base License¹ for up to 20 VMs (Offline)</p> <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Base license for Small to Medium Offline Training and Development Systems (up to 20 VMs) ■ DVS Access Key (Dongle) <ul style="list-style-type: none"> ● For physical dongle, order must include VX1026LDK ● For softkey license, order must include VX1026SOFT 	VX1026S020
<p>DeltaV Virtual Studio (DVS) for Large Systems – Base License for up to 50 VMs</p> <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Base License + Qty. 1 10 VM Scale-up + Qty. 1 20 VM Scale-up ■ DVS Access Key (Dongle) <ul style="list-style-type: none"> ● For physical dongle, order must include VF1026LDK ● For softkey license, order must include VF1026SOFT 	VF1026S050
<p>DeltaV Virtual Studio (DVS) for Large Offline Systems – Base License for up to 50 VMs (Offline)</p> <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Base License + Qty. 1 10 VM Scale-up + Qty. 1 20 VM Scale-up ■ DVS Access Key (Dongle) <ul style="list-style-type: none"> ● For physical dongle, order must include VX1026LDK ● For softkey license, order must include VX1026SOFT 	VX1026S050

Description	Model Number
DeltaV Virtual Studio 10 VM Scale-up Pack <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Additional VM Scale-up License Pack 	VF1026UPS010
DeltaV Virtual Studio 10 VM Scale-up Pack (Offline Systems) <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Additional VM Scale-up License Pack 	VX1026UPS010
DeltaV Virtual Studio 20 VM Scale-up Pack <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Additional VM Scale-up License Pack 	VF1026UPS020
DeltaV Virtual Studio 20 VM Scale-up Pack (Offline Systems) <ul style="list-style-type: none"> ■ For DVS v4.3 & up ■ DVS Licenses: Additional VM Scale-up License Pack 	VX1026UPS020
DeltaV Virtual Studio (DVS) v4.3.3 Software Media <ul style="list-style-type: none"> ■ Includes support for High Availability and Disaster Recovery ■ Supports Dell PowerEdge Windows Server HCI Platform ■ Electronic media available for download via Guardian <p>Note: For physical media on USB, use VF1052DVS433L39-PD</p>	VF1052DVS433L39
DeltaV Virtual Studio VM Server Templates (Server 2022) – v16.LTS Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v16.LTS VM Server (Server 2022) templates 	VF1052BR16FLTSL39
DeltaV Virtual Studio VM Client Templates (WIN10) – v16.LTS Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v16.LTS VM Client (WIN10 2021 LTSC) Templates 	VF1052BR16LTSL39-T
DeltaV Virtual Studio VM Server Templates (Server 2025) – v16.LTS Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v16.LTS VM Server (Server 2025) templates 	VF1052CR16FLTSL39
DeltaV Virtual Studio VM Client Templates (WIN11) – v16.LTS Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v16.LTS VM Client (WIN11 IoT 2024 LTSC) Templates 	VF1052CR16LTSL39-T
DeltaV Virtual Studio VM Templates – v15.FP3 Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.FP3 VM Server (Server 2022) templates ■ v15.FP3 VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (Hyper-V only) 	VF1052BR15FP3L39
DeltaV Virtual Studio VM Client Templates – v15.FP3 Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.FP3 VM Client (WIN10) Templates 	VF1052BR15FP3L39-T

Description	Model Number
DeltaV Virtual Studio VM Templates – v15.FP2 Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.FP2 VM Server (Server 2022) templates ■ v15.FP2 VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (Hyper-V only) 	VF1052BR15FP2L39
DeltaV Virtual Studio VM Client Templates – v15.FP2 Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.FP2 VM Client (WIN10) Templates 	VF1052BR15FP2L39-T
DeltaV Virtual Studio VM Templates – v15.FP1 Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.FP1 VM Server (Server 2022) templates ■ v15.FP1 VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (DVS and VMware) 	VF1052BR15FP1L39
DeltaV Virtual Studio VM Client Templates – v15.FP1 Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.FP1 VM Client (WIN10) Templates 	VF1052BR15FP1L39-T
DeltaV Virtual Studio VM Templates – v15.LTS Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.LTS VM Server (Server 2022) templates ■ v15.LTS VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (DVS and VMware) 	VF1052BR15LTSL39
DeltaV Virtual Studio VM Client Templates – v15.LTS Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up ■ v15.LTS VM Client (WIN10) Templates 	VF1052BR15LTSL39-T
DeltaV Virtual Studio Templates for Control Hardware Only (Media)⁴ <ul style="list-style-type: none"> ■ For use with DVS v4.3 & up ■ v15.FP3, v15.FP2, v15.FP1, v15.LTS, v16.LTS Virtual CIOC templates ■ v15.FP3, v15.FP2, v15.FP1, v15.LTS, v16.LTS S-series/M-series VM Controller templates ■ v15.FP3, v15.FP2, v15.FP1, v15.LTS, v16.LTS SZ Controller, CSLS, LSNB, and EIOC VM templates ■ v15.FP3, v15.FP2, v15.FP1, v15.LTS, v16.LTS PK VM Controller template ■ All VM templates are provided for DVS and VMware <p>Note: Starting with v15.FP2 all control hardware templates are available for electronic download via Guardian.</p>	VF1052S006
DeltaV Virtual Studio VM Templates – v15.LTS Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ v15.LTS VM server templates (for Server 2022) ■ MS Windows Server 2022 OS Embedded License (includes single license which covers 2 VMs) ■ v15.LTS VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (DVS and VMware) 	VF1049BR15LTSL39

Description	Model Number
DeltaV Virtual Studio VM Client Templates – v15.LTS Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ v15.LTS VM Client (WIN10 2021 LTSC) Templates 	VF1049BR15LTSL39-T
DeltaV Virtual Studio VM Client Templates – v15.FP1 Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ V15.FP1 VM Client (WIN10 2021 LTSC) Templates 	VF1049BR15FP1L39-T
DeltaV Virtual Studio VM Templates – v15.FP1 Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ v15.FP1 VM server templates (for Server 2022) ■ MS Windows Server 2022 OS Embedded License (includes single license which covers 2 VMs) 	VF1049BR15FP1L39
DeltaV Virtual Studio VM Templates – v15.FP2 Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ v15.FP2 VM server templates (for Server 2022) ■ MS Windows Server 2022 OS Embedded License (includes single license which covers 2 VMs) ■ v15.FP2 VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (Hyper-V only) 	VF1049BR15FP2L39
DeltaV Virtual Studio VM Client Templates – v15.FP2 Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ V15.FP2 VM Client (WIN10 2021 LTSC) Templates 	VF1049BR15FP2L39-T
DeltaV Virtual Studio VM Templates – v15.FP3 Media, English² <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ v15.FP3 VM server templates (for Server 2022) ■ MS Windows Server 2022 OS Embedded License (includes single license which covers 2 VMs) ■ v15.FP3 VM Controllers (S, M, and PK), CIOC, CSLS, LSNB, EIOC templates (Hyper-V only) 	VF1049BR15FP3L39
DeltaV Virtual Studio VM Client Templates – v15.FP3 Media, English³ <ul style="list-style-type: none"> ■ For use with DVS v4.3.1 & up on VRTX or SAN hardware with Server 2022 Std. ■ V15.FP3 VM Client (WIN10 2021 LTSC) Templates 	VF1049BR15FP3L39-T

Microsoft Licenses	Model Number
Microsoft Windows Server 2022 20 Core Standard License ⁶ for DeltaV Server 2022 VMs running on VRTX and SAN platforms	VF1052MS2022
Microsoft Client Access License for Server 2022 (CAL) – 5 CALs ⁵	VF1052MS5SCALS
Microsoft Remote Desktop Service Client Access License for Server 2022 – 5 RDS CALs ⁵	VF1052MS5RDSCALS
Microsoft Windows Server 2022 24 Core Standard License ⁶ (For use with DeltaV v16.LTS and v15.LTS, v16.LTS VMs when running on offline simulation or standalone host)	VF1052MS2022B
Win 10 IoT Ent 2021 LTSC COA MultiLang ESD OEI (1pk for Virtualization Only)	VF1052MSWIN10
Microsoft Windows Server 2025 – 24 Core Standard License; for DeltaV Server 2025 VMs running on Virtualization Host Server delivered with Server 2022 OS; Covers 2 VMs	VF1055MS2025A
Microsoft Windows Server 2025 – 24 Core Datacenter License ⁷ ; For use with DeltaV v16.LTS & up Server 2025 VMs when running on hosts that were delivered with Server 2022 OS	VF1055MS2025B
Microsoft Client Access License for Server 2025 (CAL)–5 CALs	VF1055MS5SCALS
Microsoft Remote Desktop Service Client Access License for Server 2025 5 RDS CALs	VF1055MS5RDSCALS
Win 11 IoTEnt 2024 LTSC COA MultiLang ESD OEI (1pk for Virtualization Only)	VF1055MSWIN11

Ordering Information Notes

- Note 1** – The DeltaV Virtual Studio base license provides the virtualization licenses only; DeltaV node licenses (e.g., ProPlus, Operator, Application, Virtual CIOC, etc.) are not included. A USB IP converter device must also be purchased to access the DeltaV system access key (dongle). For more information on the USB IP converter, see the product data sheet for DeltaV Virtualization Hardware.
- Note 2** – The DeltaV Virtual Studio templates are ordered for each specific DeltaV release (e.g., v14.LTS). You must also order a DeltaV Virtual Studio Base License and DeltaV Virtual Studio media to run your DVS software.
- Note 3** – DeltaV VM client templates for Windows 10 workstations (for Operator and Professional Stations) are ordered with DeltaV Virtual Studio software. Proof of a valid Microsoft license (e.g., Virtual Desktop Access “VDA” subscription) for these templates is required prior to delivery.
- Note 4** – The Control Hardware VM Templates do not include the Control Hardware VM node licenses which must be ordered separately. If you plan to use these templates with DeltaV Virtual Studio, you must also order a DeltaV Virtual Studio Base License and DeltaV Virtual Studio media to run your DVS software.
- Note 5** – Microsoft Windows Server 2022 CALs and RDS CALs may be downgraded for Server 2016 client access.
- Note 6** – These are Windows Server 2022 licenses for Embedded Systems Standard.
- Note 7** – These are Windows Server 2025 Datacenter licenses for use on virtualization host servers that were delivered with Server 2022 datacenter. Qty. 2 required per HCI host to cover dual 24 core CPUs.

Related Products

- **DeltaV Virtualization Hardware for Hyperconverged Infrastructure.** Rigorously tested and supported computer and peripheral devices for use with DeltaV Virtual Studio. An integrated hardware platform is available using Dell PowerEdge R740xd blade server with software-defined storage (S2D). Individual hardware components available include DeltaV HCI host servers, thin clients, network switches, and related hardware required for DeltaV Virtualization. For more information, see product data sheet for DeltaV Virtualization Hardware.
- **DeltaV Virtual Ethernet IO Card.** For off-line use, the virtual EIOC provides access to data from smart field devices that use Modbus TCP, EtherNet/IP, and EIC61850. For more information, see product data sheet for DeltaV Virtual Ethernet I/O Card.
- **DeltaV Virtual CHARMS IO Card Simulation.** Support simulation of process IO using virtual CHARMS IO cards running in a workstation PC. Virtual CHARMS IO cards provide the same simulation capability as real CHARMS IO cards and can be used for rigorous checkout of IO assignments, operator displays, and control functionality. Available for both DeltaV Virtual Studio and VMware environments. For more information, see product data sheet for DeltaV Virtual CHARMS IO Card Simulation.
- **DeltaV Virtual Machine Controller Simulation.** For off-line use, virtual hardware controllers provide an effective way to checkout control configuration and IO assignments prior to commissioning. The virtual controllers can be named and configured the same as real controllers so that no configuration changes or module reassignments are required. S-series, M-series, and PK Controllers are supported and available for both DeltaV Virtual Studio and VMware environments. For more information see product data sheet for DeltaV Virtual Machine Controller Simulation.
- **DeltaV SIS with Electronic Marshalling – Virtual Simulation.** For off-line use, virtual SIS control hardware provides an effective way to checkout safety logic configuration prior to commissioning. Virtual machines are provided for SZ controller, CSLS, and LSNB for DeltaV v13.3 and later. For more information see product data sheet for DeltaV SIS with Electronic Marshalling – Virtual Simulation.

Recommended Training

- **DeltaV – Virtualization Administration - 7028**
This 3 day DeltaV Virtualization course focuses on the various software that is used in the management of a DeltaV Virtualization environment. Students will engage in workshops that will reinforce the material discussed to successfully run and maintain a Virtualized DeltaV system.
- **DeltaV – I.T. for Automation Personnel - 7023**
This 3-day course will provide students with a set of essential information technology (I.T.) skills required to successfully setup, maintain, and troubleshoot a DeltaV distributed control system using a combination of lecture and hands-on workshops. For many, the increase in adoption of technologies such as virtualization, cybersecurity, business system integration, and complex networking demand a new set of skills. This course will distill the core learnings and techniques required from the I.T. toolkit, providing a targeted launch point for process control engineers, instrumentation/electrical technicians, I.T. staff, and others whose responsibilities require them to adopt and successfully use these technologies. After attending, students will be prepared to dive deeply into these technologies by attending other higher-level courses.

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