APPLICATION NOTE
August 2005

Implementing PAV on the V2Xf

ABSTRACT

This document highlights the benefits of parallel access volumes (PAV) working in conjunction with multiple allegiance and explains how to implement PAV on the V2Xf to help eliminate input/output supervisor queue (IOSQ) delays. Note that this information does not constitute complete instructions for a PAV implementation as supported by IBM z/OS.

1 Executive summary

The V2Xf Shared Virtual Array® (SVATM™) supports an optional feature known as parallel access volumes (PAV) in the mainframe environment. PAV can improve performance of storage devices by alleviating IOSQ delay, the queuing of I/O requests. PAV candidates are any devices that experience IOSQ delays due to multiple host tasks and jobs requiring simultaneous access to data located on the same device.

PAV works in conjunction with another feature integral to the V2Xf, multiple allegiance (MA). Whereas PAV is an optional feature, MA requires no additional installation or configuration.

The PAV and MA features combine to allow for the concurrent processing of multiple requests to the same device.

Properly configuring these features can greatly reduce data access rates when multiple requests for information are made to the same device at the same time — thus decreasing response time and enhancing performance management. This capability can be critical when meeting service level agreements requires concurrent data transfers.

2 PAV and multiple allegiance

PAV and multiple allegiance complement one another because while PAV enables a *single* host system to process multiple I/O requests concurrently against the same device, MA allows requests from *multiple* hosts to process concurrently against the same device. This allows MA to alleviate device-busy conditions and enhance PEND performance time.

MA is provided by internal V2Xf functionality and does not require specific enabling or installation. IBM z/OS supports MA on device type 2105 control units with this function.

Between them, PAV and MA allow for the concurrent processing of multiple requests to the same device. A condition known as *extent conflict* determines which I/O requests can process in parallel. Reads with like or unlike extent ranges can occur simultaneously. Extent ranges must be unique for reads and writes to occur at the same time. If one of the I/O requests is a write with an overlapping or conflicting extent range, then the request arrival sequences must be serialized. If no extent conflict is detected, then multiple requests can process at the same time with data integrity intact.

3 PAV description

IBM z/OS permits PAV on device type 2105 control units that support multiple allegiances. PAV allows a host system to process multiple I/Os concurrently against the same functional device located on the V2Xf (see Figure 1). This storage key feature is a hardware option that must be generated from a sales order and enabled by StorageTek on each V2Xf.

Conventionally, one I/O is serialized at a time to a single device to preserve data integrity. The host system queues I/O requests on the unit control block (UCB) that corresponds to the functional device. PAV considers this device to be the base.

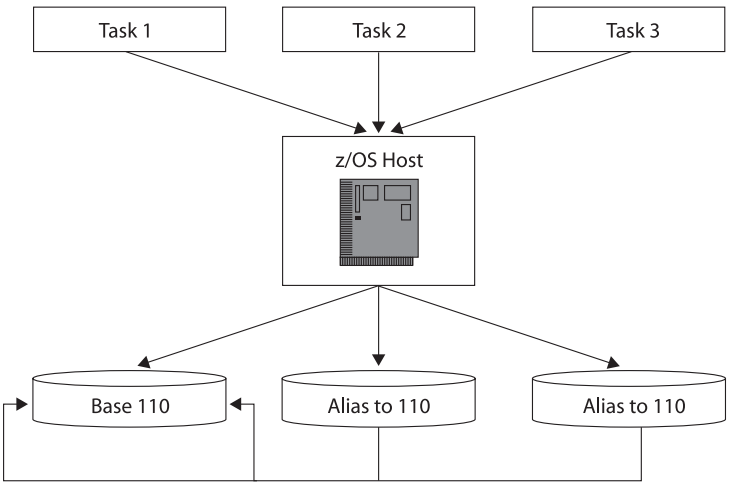

Figure 1. The host processes multiple I/Os against the same device on the V2Xf.

PAV assigns "aliases" to the base device, in effect creating multiple concurrent I/O ports for data requests.

PAV allows I/O requests from the host system to access the same device by means of one or more alias UCBs related to the base UCB. Each alias associated with a base will permit an additional concurrent I/O. Because no physical storage is assigned to an alias, I/O is actually executed against the data allocated on the base. In other words, it's the base device — not its aliases — that is known to the host tasks and jobs.

PAV handles read and write commands differently depending on whether the extent ranges being used are unique or overlapping:

- If extent ranges overlap, then only I/Os with read commands are allowed to process simultaneously.
- If the extent ranges are unique and do not conflict, then writes can occur simultaneously. (PAV permits write commands serialized at the extent level rather than the device level.)

PAV can significantly minimize contention on functional devices with multiple active data sets. Benefits are particularly obvious when accesses are directed to numerous data sets allocated on the same 3390-9 device. PAV permits one host system to transmit various I/Os to a device concurrently.

Several conditions can affect the ability of PAV to eliminate IOSQ.

Although PAV alleviates IOSQ delay, all such delay may not be eliminated due to the following reasons:

- PAV aliases in the logical control unit for the base in need are unavailable.

- Writes will be serialized and will not occur in parallel if the extent ranges conflict. The size of the extent may range from one track to all the tracks on the volume, depending on the application software.
- Workload Manager (WLM) PAV algorithms are used to monitor and determine the alias movement and whether aliases will assist with the IOSQ. A time lapse may be detected before the alias actually moves.
- PAV will not override RESERVE/RELEASE command processing on volumes.

3.1 RESERVE/RELEASE serialization

PAV or MA will *not* override the RESERVE/RELEASE channel commands used to serialize device accesses by applications. If the host has reserved the device, then a device-busy condition will occur. Dedicated devices may be used for applications requiring RESERVE/RELEASE functionality. Take into account that functional devices only consume back-end storage on the V2Xf as needed.

Note that you may be able to use IBM Global Resource Serialization (GRS) or similar software to convert RESERVE processing into system enqueues. Take the IBM recommendations into consideration before doing so.

4 PAV functional devices

PAV uses a base device with associated aliases within the same virtual control unit (VCU). A maximum of 256 base and alias devices can be defined in each VCU. Both the IBM hardware configuration definition (HCD) and the V2Xf functional devices must be modified to identify the bases and aliases. The device type of a base and its aliases must be the same.

The base represents the actual unit address of a specific device, and the aliases denote its alternates. Whereas multiple aliases can be assigned to each base, a specific alias can only be associated with one base at a time.

You can create up to 256 base and alias devices in each virtual control unit (VCU).

In HCD, the device type specifications distinguish the bases and aliases. The device feature known as WLMPAV determines whether the alias association with its base will remain static or will be converted to dynamic. In spite of this stipulation, no alias association with its base is specified in the HCD.

On the V2Xf, aliases are associated with a base when the functional devices are defined within Shared Virtual Array Administrator (SVAA). The PAVBASE parameter of the SVAA DEFINE DEVICE subcommand associates the alias with its base device. An alias *cannot* be defined without this assignment to a base device. If this SVAA parameter is left blank, the device definition will be a base device. The base and alias associations are mapped when system commands are issued to vary the base devices online.

SVAA definitions of base and alias devices must be synchronized with HCD. For further information regarding device mapping, refer to Appendix A of the StorageTek manual titled *V2Xf Shared Virtual Array (SVA) Planning* (part number MO9218), available at the Customer Resource Center.

4.1 Static PAV and dynamic PAV

Static PAV and dynamic PAV are controlled at the device level with the WLMPAV settings in the HCD for the host systems. The difference between the two approaches lies in the flexibility of the association between a base and one or more aliases. Alias resources can be managed in these ways:

- manual with static PAV
- automatic with dynamic PAV

You can choose to implement PAV dynamically or statically — each method has specific advantages

Static PAV allows an alias device to retain its base association as assigned in the functional device definition. Although alias reassignment necessitates manual intervention with the use of SVAA, static PAV permits complete control.

Dynamic PAV is the WLM function known as dynamic alias management, which automatically reassigns aliases from one base device to another as needed. WLM dynamic alias management takes precedence over manual alias assignments made using SVAA. One benefit of automated reassignment is the need for fewer alias devices in each virtual control unit. Another advantage is the elimination of the intensive and repetitive task of reassigning aliases.

Using SVAA to define functional devices, you specify the PAVBASE parameter to associate an alias to its base for either dynamic or static PAV. Note that both static and dynamic PAV require you to plan the base and alias device configuration. Also, performance analysis of the devices in each VCU prior to defining the aliases is advised.

Workload Manager (WLM), a component of z/OS, utilizes Dynamic Alias Management to reassign eligible aliases. In Goal Mode, WLM supports Dynamic Alias Management while observing performance, particularly IOSQ delays. Enable or disable Dynamic Alias Management on the WLM Interactive System Productivity Facility (ISPF) panel. When you enable Dynamic Alias Management in WLM and activate the HCD with the WLMPAV device specifications set for dynamic PAV, WLM will reassign aliases based on performance monitoring algorithms. The WLM viewpoint is from a single sysplex perspective.

The online or offline status of the base device determines the bound or unbound condition of its aliases. An offline base device does not make use of its aliases, and therefore aliases associated with an offline base device are unbound. Aliases associated with an online base device, however, are considered bound. On assigning dynamic aliases, WLM selects unbound aliases as preferred candidates. After an unbound alias is assigned to an online base device, the alias changes its state to bound.

Consistency verification for dynamic alias management does *not* automatically occur on the systems in a sysplex. Unpredictable results can occur for shared devices if specifications for WLMPAV are inconsistent across the various systems.

WLMPAV is set for each base and alias device in HCD.

- For dynamic PAV, set WLMPAV=YES on both the base device and its aliases. (WLMPAV=YES is the default setting.)
- For static PAV, set WLMPAV=NO on both the base device and its aliases.

For further information regarding WLMPAV settings, refer to the IBM manual *z/OS V1R5.0 MVS Planning: Workload Management*.

Individual base or alias devices can be included or excluded from Dynamic Alias Management by means of their WLMPAV specifications in HCD. With Dynamic Alias Management, WLM reassigns aliases to bases to manage service levels and minimize IOSQ delays.

5 Configuration planning considerations

Planning is key to any PAV implementation.

Several provisions can make your implementation of PAV on the V2Xf smoother. Consider the following in your configuration planning:

- Plan the device layout so administrative tasks are simplified to the level possible.
- Define device types of 3380 or 3390, the largest being 3390-9 with G01.04 or lower microcode level on the V2Xf.
- Do not exceed any of the following mutually exclusive V2Xf limits:
  - Total of **256** base and alias functional devices per VCU.
  - Total of **4,096** base and alias functional devices.
  - Total of **1,365** base functional devices, all defined as 3390-9 device type.
  - Total of **13,676,544** cylinders for all base functional devices.
- Plan the configuration of 16 VCUs and 256 functional devices per VCU to include base, alias and non-PAV and functional devices. Each base and its respective aliases must reside in the same VCU. Although it is not a requirement that all 16 VCUs and all devices be defined, be advised to allow for future expansion in each VCU .
- WLM manages dynamic PAV from a sysplex viewpoint. Hence, allot the volumes within the same VCU to a single sysplex.
- Multiple aliases can be associated with a single base. Only one base can be associated to an alias.
- Define the identical device type and model to a base and its aliases. To use the aliases most efficiently, define all the base and alias volumes in a single VCU as the same device type.
- IBM recommends defining the base volumes at the low end of the address range and the alias volumes at the high end of the address range in each logical control unit.
- Larger volumes ease the compliance to the limit of 256 devices per VCU. Although larger devices can require more aliases, extra functional devices will be available to be defined as aliases.
- The number of aliases assigned to a base determines the degree of concurrent I/O activity that PAV can support. Alias availability depends on the layout of base and alias devices configured in each VCU.
- A configuration scenario of 1,024 3390-9 functional devices, including 64 bases and 192 alias devices in each of the 16 VCUs, will maximize usage of all 4,096 functional devices on the V2Xf.

- A configuration scenario of 1,365 3390-9 functional devices, including 85/86 bases and 170 alias devices in each of the 16 VCUs, will maximize the virtual capacity on the V2Xf.
- Implementing dynamic alias management, IBM recommends the range from 0.25 to 0.50 aliases per 3 gigabytes (GB) capacity equivalent on the associated base. Using 3390-9 device types, this scales from 0.75 to 1.50 aliases per base. This ratio is equivalent to three aliases per 3 GB capacity on the associated base using an implementation of static aliases.
- Distribute the alias assignment to the bases for dynamic PAV effectiveness when defining aliases with SVAA. This distribution allows PAV to be used until WLM determines the suitable assignment of aliases to each base. Reassigning an alias using SVAA will not take priority over the WLM management of dynamic aliases.
- Distribute the alias assignment to the bases for static PAV efficiency based on performance analysis for IOSQ.

6 PAV prerequisites and planning tasks

The requirements for the StorageTek implementation of PAV are as follows:

- V2Xf Shared Virtual Array (SVA) hardware
- V2Xf PAV Storage Key hardware option
- V2Xf G01.02 microcode or higher recommended microcode level
- IBM z/OS host operating system and current maintenance
- SVAA 3.1 software and current maintenance

To facilitate the success of the PAV implementation on the V2Xf, perform the following as applicable to your site's environment:

1. Order, install and/or upgrade the V2Xf.
2. Order and enable the PAV feature by means of a Storage Key on the V2Xf.
3. Verify with StorageTek to install V2Xf G01.02 or higher recommended microcode level.
4. Verify and install IBM z/OS host maintenance.
   - Review IBMLINK 2105DEVICE Preventive Service Planning (PSP).
   - Verify all host software.
5. Order and install SVAA 3.1. Apply SVAA maintenance after obtaining from the StorageTek Customer Resource Center.
   - Install all available maintenance including:
     - Multiple Virtual Storage (MVS) — L2P00AJ, L2P00B5 L2P00AW
     - Virtual machine (VM) — L2P00AK
     - SVAA – L2P00C2 (server), L2P00B7 (low-level application programming interface)
   - Refresh respective host data sets and restart SVAA per instructions in the *Shared Virtual Array Administrator for OS/390* configuration and administration manual.

6. Review StorageTek and IBM documentation related to PAV, SVAA and V2Xf.
7. Enable Goal Mode for WLM on the z/OS systems to implement dynamic PAV.
8. Activate WLM Dynamic Alias Management globally on the z/OS systems to implement dynamic PAV.
9. Plan the configuration and the functional device layout of the base and alias associations. Take into account that the base device and its assigned aliases will always be in the same VCU. (Refer to the section Configuration Planning Considerations.)
10. In HCD, define the logical control units for the V2Xf with the parameter UNIT=2105. Up to 16 VCUs can be defined with CUADD=00-0F.
11. In HCD, use the following DEVICE parameters:

- **UNIT**=device type
  - Specify 3380 or 3390 if the device is not a PAV base or alias.
  - Specify one of the parameters in the following PAV eligibility list in the HCD during the device definition:

Device type	Description
3390B	3390 PAV base
3390A	3390 PAV alias
3380B	3380 PAV base
3380A	3380 PAV alias

- In the HCD, the device feature known as **WLMPAV** is used by Workload Manager in Goal Mode to support Dynamic Alias Management.
  - Specify WLMPAV=NO to prevent individual base or alias devices from participating in Dynamic Alias Management. The base and its alias associations will remain static.
  - Specify WLMPAV=YES to allow individual base or alias devices to participate in Dynamic Alias Management.

12. Assign a unique subsystem identifier (SSID) to each VCU. Up to 16 SSIDs can be defined on the V2Xf. Each SSID must be unique in the host environment of the customer sites.
13. Define functional devices on the V2Xf *prior* to usage. Define all devices for known storage requirements during one time frame prior to production workload activities or during low workload activity on the V2Xf.
14. Synchronize SVAA device definitions on the V2Xf with the HCD as follows:

- Validate HCD and the V2Xf device definitions manually. Match the base and alias devices with the unit addresses in the HCD versus the functional devices in the V2Xf.
- Define the *base* device *prior* to defining its alias. Do not attempt to define both the base and alias devices with a single SVAA subcommand. Do not specify the PAVBASE parameter on the DEFINE DEVICE subcommand — this results in an implied alias device.

- Define the alias devices with SVAA. An alias device is *not* required for each base device. Specify the PAVBASE parameter of the DEFINE DEVICE subcommand to associate the alias with its base device, which *must* be located in the same VCU. Define the alias with the same device type and model as its base.

7 PAV implementation tasks

To use the functional devices and implement PAV on the V2Xf, perform the following steps:

Once you have completed all planning steps, PAV implementation is a straightforward process.

1. Verify that the prerequisite and planning tasks are complete.
2. Dynamically activate the HCD or initial program load (IPL) the operating systems to activate the new HCD with the V2Xf definitions.
3. Assign up to 16 SSIDs on the V2XF.
4. Define at least one extended control and monitoring (ECAM) device on the V2Xf prior to defining devices with SVAA.
5. Issue the z/OS system command to vary the channel path online to the ECAM device. A host path *must* be made available to access the ECAM device prior to continuing with the following steps.
6. Initialize the ECAM device with IBM ICKDSF.
7. Utilizing SVAA, define the base functional devices on the V2Xf.
8. Using SVAA to define the alias functional devices, specify the PAVBASE parameter to associate an alias to its base for either dynamic or static PAV.
9. Issue z/OS system commands to vary the channel paths online to the devices.
10. Perform minimal initialization with IBM ICKDSF on base devices only. This task will provide the volume label, the volume table of contents (VTOC) and the VTOC index (VTOCIX) for a base functional device.
11. Issue z/OS system commands to vary the base devices online.
12. The devices on the V2Xf are now ready for use.
13. Monitor status with the use of z/OS operator commands, SVAA subcommands and reports, and IBM resource measurement facility (RMF) device reports. Enable SMF records required for SVAA and the RMF reports. Use the SVAA LISTCFG DEVICE subcommand to report on devices. Use z/OS system commands to determine the aliases associated with the base device.
14. Note the PAV STATUS column in the output from the SVAA LISTCFG subcommand.
    - B indicates a base with no aliases.
    - B(nnn) means a base with nnn aliases.
    - A-ffff means this is an alias that is related to a base with a Functional Device IDentifier (FDID) of ffff.

- Use the z/OS DEVSERV QPAVS system command to display the host unit address.
  - DS QP,xxxx,VOLUME
- Issue the z/OS D M=DEV(devnum-devnum) system command to display the total exposures, which includes the base device and its aliases.

7.1 PAV implementation on an existing V2Xf

If PAV is implemented on a previously installed V2Xf, then functional devices with production data may currently exist. Previously defined production volumes on the V2Xf will be base devices. Devices containing critical data must not be initialized or deleted. Any new functional devices must be defined with SVAA. Remember to define aliases in the same VCU as the corresponding bases. Since the combined number of bases and aliases cannot exceed 256 in each VCU, migration of existing production volumes may be required to other VCUs or to another V2Xf.

When implanting PAV on a previously installed V2Xf, be careful not to initialize or delete devices containing critical data.

In HCD, the unit parameter for each base device in HCD will require a change from 3390 to 3390B or 3380 to 3380B. To be eligible for PAV, the appropriate unit parameter in HCD must be specified for the base or alias device.

To implement PAV on an existing V2Xf and avoid device definition conflicts, perform these steps in this sequence:

1. Verify that all devices to be assigned as aliases are empty. If not, migrate data to another device and then verify that device is empty.
2. Issue z/OS system commands to vary devices and paths offline on all operating systems to devices that will be deleted and redefined. Devices cannot be deleted until host paths allowing access to the devices are terminated.
3. Using SVAA, delete empty functional devices that will be reassigned as aliases.
4. Modify HCD definition from 3390 to 3390A for alias volumes and to 3390B for base volumes. Devices defined as 3390-only in the HCD will not be eligible for PAV.
5. Initialize SVAA to refresh its map for the status of all devices.
6. Using SVAA, define functional devices for new bases.
   - Existing functional devices to be used as bases with PAV require no change with SVAA.
7. Using SVAA, define functional devices with the PAVBASE parameter for those to be assigned as aliases.

The devices are now ready for PAV use. If you are planning a future implementation of PAV, then set aside functional devices in each VCU to be defined as aliases.

7.2 Aspects of base and alias devices

The following tables display various aspects of the base and alias devices.

Attributes	Base devices	Alias devices
PAV support requirement	Yes	Yes
UCB	Yes	Yes
FDID	Yes	Yes
Esoteric unit	Yes	No
CKD device	Yes	Yes
3390 or 3380 device type	Yes	Yes
Optional association with one or more aliases (PAV support)	Yes	No
Assignment to a base device	No	Yes
Consumes V2Xf back-end storage	Yes	No
z/OS System COMMANDS		
Vary device online or offline	Yes	No
Issue SETIOS to specify MIH	Yes	No
Applications		
SVAA functional device definition	Yes	Yes
SVAA ECAM definition	Yes	No
Mapped by SVAA	Yes	No
SVAA INITIALIZE DEVICE subcommand (Note: This subcommand is invalid for CKD devices.)	No	No
IBM ICKDSF minimal initialization	Yes	No
IBM RMF device statistics	Yes	No
SnapShot capable	Yes	No
PPRC capable	Yes	No

8 StorageTek reference manuals and documents

V2Xf Shared Virtual Array (SVA) Planning
Part number: M09218
Contains an overview of PAV on the V2Xf in Chapter 2 and an example of HCD configuration in Appendix C

Shared Virtual Array Administrator for OS/390
Version 3.1
Configuration and Administration
Part number: 311290506
Identifies the SVAA subcommands to define functional devices and explanations pertaining to base and alias devices on the V2Xf

9 IBM reference manuals

IBM TotalStorage Enterprise Storage Server: Implementing the ESS in Your Environment
Document Number: SG24-5420-01
http://www.redbooks.ibm.com/redbooks/pdfs/sg245420.pdf
Contains the configuration of PAV devices and host operating system support in Chapters 7 and 8

z/OS V1R5.0 MVS Planning: Workload Management
Document number: SA22-7602-07
http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/IEA2W140/CC

ONTENTS?DT=20040113123052
Contains the planning and considerations of PAV in Workload Management in Chapters 11, 16 and 19

z/OS V1R5 HCD Planning
Document number: GA22-7525-06
http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/IEA2G840/CCONTENTS?DT=20031217135532
Contains the planning and description of HCD definitions

z/OS V1R5.0 MVS System Commands
Document number: SA22-7627-09
http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/BOOKS/IEA2G141/CCONTENTS?DT=20040325141238
Contains the description of systems commands — DEVSERV

IBM Redbooks | IBM Enterprise Storage Server (PDF/native HTML only)
Document number: SG24-5465-01
http://www.redbooks.ibm.com/redbooks/pdfs/sg245465.pdf
Explains how PAV and MA operate and extent conflict in Chapters 3 and 5

IBM TotalStorage Enterprise Storage Server Model 800
Document number: SG24-6424-01
http://www.redbooks.ibm.com/redbooks/pdfs/sg246424.pdf
Contains a summary of PAV in Chapter 3 with a more in-depth discussion in Chapter 6

IBM TotalStorage Enterprise Storage Server Model 800 Performance Monitoring and Tuning Guide
Document number: SG24-6422-00
http://www.redbooks.ibm.com/redbooks/pdfs/sg246422.pdf
Discusses PAV as it relates to performance in Chapters 9, 11 and 12

Techdocs — The Technical Sales Library
http://www-1.ibm.com/support/techdocs/atsmastr.nsf/Web/
TechDocsTD100805 — Valid IODF/IOCP Unit Specifications for 2105 (ESS)

- FLASH10246 — System Hangs When Dynamically Removing a PAV from a Page Volume
- W99051 — Missing Interrupt Handler Considerations for the Enterprise Storage Server
- TD100311 — Use of WLMPAV Specification for 2105 Base and Alias Devices

10 Glossary

Channel: A connection between the processor and its peripheral hardware, providing a pathway for data transmission.

Count key data (CKD): The format used to store data on a disk storage device. The count field includes the address of the record, CCHHR, and the length of the data. (CCHHR numbers indicate the cylinder, head [track] and record.) The record key (search field) is followed by the actual data.

Extended control and monitoring (ECAM) device: A functional device used for

SVAA-based communication between the Shared Virtual Array (SVA) and the host. Privileged ECAM devices are the only devices that SVA Administrator can use to send messages requesting a configuration change to the SVA subsystem.

Enqueue: An operating system mechanism used to provide serialization, enhance data integrity and sequence requests for a system or data resource in a queue.

Extent: An allocated contiguous space on a device dedicated for a particular data set, database, data space or file. Beginning and ending extents are specified in an I/O operation as CCHH, a valid cylinder and track address for the device.

Fibre Channel Connection (FICON): A Fibre Channel communication protocol designed for the mainframe processor and its peripherals.

FICON channel: A channel using fiber connections to transmit data between the mainframe processor and its peripherals.

Functional device: The volume image that the host operating system receives when the "Read Device Characteristics" channel command word (CCW) is issued. The attributes of the functional devices on the SVA must be defined with SVAA commands prior to use by the host operating system.

Functional Device IDentifier (FDID): The identifier for a functional device as it is known to the SVA. FDIDs range from 0 to FFF (hexadecimal) or from 0 to 4095 (decimal) on the V2Xf.

Hardware configuration definition (HCD): An interactive system interface allowing definition of the I/O hardware configuration for both the channel subsystem (CSS) and the operating system. HCD stores the entire configuration data in a central repository, the input/output definition file (IODF).

ICKDSF: ICKDSF, Device Support Facilities, is IBM software to perform functions needed for the installation, use and maintenance of disk devices.

Input/output (I/O): Pertaining to an operation or process involved in data input or data output.

I/O supervisor queue (IOSQ): I/O supervisor queue time, measured by the operating system, is an indicator of device contention time from the same operating system. The IOSQ time is the average number of milliseconds an I/O request must wait for access to the data on the device.

Multiple allegiance (MA): Allegiance is a relationship formed between a device and channel paths during the processing of I/O operations. The multiple allegiance facility enables the acceptance of concurrent I/O requests for a device from multiple system images. MA reduces device-busy conditions and PEND time.

Multiple Virtual Storage (MVS): The primary operating system used on mainframe processors, currently known as z/OS.

Parallel access volume (PAV): A combination of a base device and one or more alias devices supporting concurrent I/O processing to enhance performance. PAV reduces IOSQ time and device-busy conditions.

PEND: Pending time, measured by the channel subsystem (CSS), accumulates when contention occurs for the channel, switch port, control unit adapter or device from multiple hosts. The pending time is the average number of milliseconds an I/O request must wait for access to the data on the device.

Peer-to-Peer Remote Copy (PPRC): A hardware solution — activated by software commands — that enables synchronous data copying. PPRC transfers data directly from the primary disk subsystem to the secondary disk subsystem.

Resource measurement facility (RMF): An IBM software program that collects system data describing the processor activity (WAIT time), I/O activity (channel and device utilization), main storage activity (demand and swap paging statistics), and system resources manager activity (workload).

Shared Virtual Array Administrator (SVAA): StorageTek's host software product that enables implementation of the extended storage management facilities of the SVA and offers additional functions including SnapShot, DDSR and reporting capabilities.

Shared Virtual Array® (SVATM): StorageTek's disk storage subsystem based on virtual architecture.

System complex (sysplex): A set of systems coupled together and communicating via hardware components and software services to process customer workloads.

Unit control block (UCB): A control block in operating system storage that describes the attributes of a specific I/O device.

Virtual control unit (VCU): A virtual control unit is equivalent to a logical control unit (LCU), which is a specific set of devices (up to 256) attached to the same channels and physical control unit. The logical control unit is identified by the control unit address (CUADD) parameter in the HCD from the information specified in the control unit and device definitions. A maximum of 16 VCUs are supported on the V2Xf.

Vary offline: A system command used to change the status of a device from online to offline. While a device is offline, no data can be accessed by normal application processing.

Vary online: A system command used to change the status of a device from offline to online. While a device is online, the data is available for access.

Volume serial (VOLSER): An identification number in a volume label that is assigned during device initialization for use on the system.

Workload Manager (WLM): A component of z/OS used to manage resources and workloads.

z/VM: The IBM VM (Virtual Machine) operating system, based on the z/Architecture, supported for the mainframe processor.

z/Architecture: An IBM architecture based on the 64-bit real storage for mainframe computers, spanning the family of the zSeries servers.

z/OS: The prime IBM operating system, based on the z/Architecture, supported for the mainframe processor.

ABOUT STORAGETEK®

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