IBM General Parallel File System Multiplatform V3.3 delivers excellent scalability and performance

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At a glance

IBM® General Parallel File System^{tm} (GPFS^{tm}) Multiplatform (IBM X-Architecture®), V3.3 offers:

- New pricing, licensing, and entitlement structure
- In GPFS for Windows® Multiplatform, support for the Windows Server 2008 operating system running on 64-bit architectures (AMD x64, Intel® 64)
- Administration, performance, policy, and scaling improvements
- Enhancements to the Inode Scan Interface
- Additional scalable filesystem backup facilities
- In GPFS for Linux® Multiplatform, support for the Linux AIO APIs and improvements in the GPFS trace subsystem

Overview

GPFS Multiplatform is ideal for high-performance parallel file transfer and parallel I/O to single or multiple files. GPFS delivers multicluster support, scalability and performance, support for extremely large files, failure recovery, and ease of administration.

Version 3.3 enhancements:

- Introduction of a new pricing, licensing, and entitlement structure for GPFS V3.3 and V3.2.
- GPFS for Windows Multiplatform now supports the Windows Server 2008 operating system running on 64-bit architectures (AMD x64, Intel 64).
- Administration improvements include:
  - The scope of password-less remote shell command execution is now reduced.
  - Users are now allowed to define custom commands to be executed after certain GPFS events.
  - The build process for the GPFS portability layer on Linux is improved.
- Performance and scaling improvements include raising the limit on the number of snapshots per file system from 32 to 256, and the mmrestripefs, mmfsck, and mmcheckquota commands are enhanced.
- Policy improvements for GPFS V3.3 include several enhancements to the GPFS mmapplypolicy command and the associated GPFS SQL-based policy language.

- Existing calls for the Inode Scan Interface are enhanced and new calls are available.
- Additional scalable filesystem backup facilities are available through the enhanced mmbackup command.
- GPFS for Linux adds support for the Linux AIO APIs io_submit and io_getevents for workloads that open files using the O_DIRECT flag when the file system is created on local disks.
- GPFS for Linux introduces improvements in the GPFS trace subsystem.

Key prerequisites

Refer to the Hardware requirements and Software requirements sections.

Planned availability date

September 25, 2009

Description

GPFS Multiplatform delivers file system services to parallel and serial applications. It gives parallel applications simultaneous access to the same or different files from any node that has the GPFS file system mounted, while managing a high level of control over all file system operations. GPFS is particularly appropriate in an environment where the aggregate peak need for data bandwidth exceeds the capability of a distributed file system server.

GPFS V3.3 enhancements:

GPFS introduces a new pricing, licensing, and entitlement structure for Version 3.3 and Version 3.2.

- GPFS has two types of licenses, a server license and a client license. For each node in a GPFS cluster (see Permitted use of GPFS Server and GPFS Client below), the customer obtains the appropriate number of server or client licenses that correspond to the way GPFS is used on that node.
- Licenses continue to be priced per 10 Processor Value Units (PVU).
- During GPFS cluster configuration, the customer will be prompted to identify whether a particular node is a GPFS Server or a GPFS Client. If a GPFS Client is chosen, function that requires a GPFS Server license will be disabled on this node. Because the node that acts as the GPFS cluster configuration server requires a GPFS Server designation, at least one node in the GPFS cluster will require one or more GPFS Server licenses.
- GPFS V3.2 will remain available to order; however, the pricing will now be the same as GPFS V3.3 for GPFS Server and GPFS Client licenses. GPFS V3.2 customers will not be prompted during cluster configuration to identify a node as a GPFS Server or GPFS Client. During the ordering process, the number of GPFS Server and GPFS Client licenses will need to be identified.
- Permitted use of GPFS Server and GPFS Client:
- A node is defined as an individual operating system image that may appear on a single computer within a cluster, on a system within a cluster, or on a partition.
  - You may use the GPFS Server in order to perform the following GPFS functions:
    -- Mounting GPFS file systems and accessing data from operating system block devices and NSD servers
    -- Performing GPFS management functions such as cluster configuration manager, quorum node, manager node, and Network Shared Disk (NSD) server

- - Sharing data through any application, service protocol, or method, such as Network File System (NFS), Common Internet File System (CIFS), File Transfer Protocol (FTP), or Hypertext Transfer Protocol (HTTP)
  - You may use GPFS Client in order to perform the following functions:
    - - Mounting GPFS file systems and accessing data from operating system block devices and NSD servers
    - - Exchanging data between nodes that locally mount the same GPFS file system
  - The GPFS Client may not be used for nodes to share GPFS data through any application, service, protocol, or method, such as NFS, CIFS, FTP, or HTTP. For this use, entitlement to GPFS Server would be required.
- See the Ordering information section for an ordering example.

Note: Refer to the GPFS FAQs available from the following Web site for more information, including example configurations and license definitions regarding the new GPFS Server and GPFS Client model.

http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/index.jsp?topic=/com

GPFS for Windows Multiplatform now supports the Windows Server 2008 operating system running on 64-bit architectures (AMD x64, Intel 64). GPFS on Windows participates in a new or existing GPFS cluster (Version 3.2.1.5, or later) in conjunction with AIX® and Linux (32- or 64-bit) operating systems. GPFS does not support homogeneous Windows clusters. GPFS V3.3 support is limited to Windows Server 2008.

Administration improvements include:

- The scope of password-less remote shell command execution is now reduced. GPFS can now be configured so that password-less remote shell execution is not required between all nodes. Prior to GPFS V3.3, GPFS had to be configured so that all nodes can run commands on other nodes via a remote shell without being prompted for a password. GPFS V3.3 can be configured so that only the terminal session where a GPFS administrative command is being executed has to be able to execute remote shell commands on other nodes without being prompted for a password. All other nodes in the cluster do not have to have the ability to run password-less commands everywhere else.
- GPFS for Linux improves the build process for the GPFS portability layer by:
  - Eliminating the dependency on the imake utility through the use of the kernel Kbuild infrastructure
  - Optionally generating an RPM package containing the GPFS portability layer binaries to facilitate the installation process
- Users are now allowed to define custom commands to be executed after certain GPFS events. The administrator can use the mmaddcallback command to register a user exit script, the mmdelcallback command to delete a user exit script, and the mmlscallback command to list all the callback scripts currently registered in the GPFS configuration.

Performance and scaling improvements include:

- The limit on the number of snapshots per file system has been raised from 32 to 256.
- Performance enhancements have been made to the mmrestripefs, mmfsck, and mmcheckquota commands, and directory locking for concurrent file creates and deletes from multiple nodes.
- GPFS V3.3 adds support for the Linux AIO APIs io_submit and io_getevents (pread and pwrite only) for workloads that open files using the O_DIRECT flag when the file system is created on local disks.

Policy improvements include several enhancements to the GPFS mmapplypolicy command and the associated GPFS SQL-based policy language:

- A new command option (-g) is provided to enable a fully parallelized (multi-node and multi-threaded) directory traversal and faster metadata scan with policy rule set evaluation.
- When invoked with the new -g option, mmapplypolicy can tolerate and recover from faults in individual nodes.
- New command options and policy language extensions allow finer control and customization of the generation of the file lists and the execution of the user scripts associated with the EXTERNAL POOL and EXTERNAL LIST features of the policy language. File lists can be generated by the mmapplypolicy command, generated or manipulated by user programs, and input to the mmapplypolicy command for execution.
- The policy language now provides for access to Posix and Windows file attributes and to extended attributes.
- The THRESHOLD file selection criteria can be interpreted with respect to GPFS quotas for EXTERNAL POOLs or EXTERNAL LISTs.

Existing calls for the Inode Scan Interface are enhanced and new calls are available.

GPFS V3.3 provides additional scalable filesystem backup facilities through the enhanced mmbackup command. Enhancements include:

- Improved performance by use of the policy engine
- The processing of unlinked filesets
- Parallel backup to TSM servers
- Backup of snapshots as filesystem data versus being under the .snapshots/ directory
- Backup of a live system

Improvements have been made in the GPFS trace subsystem on Linux. The trace subsystem can be configured to run in an overwrite mode for reduced trace overhead and to perform raw trace data compression for extended trace coverage.

Improvements have been made in detecting and diagnosing network problems. GPFS can now automatically detect lost GPFS network messages.

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product positioning

GPFS is ideal for several different roles in clustered computing and shared storage:

- A multicluster file system for parallel processing on compute clusters, featuring extreme scalability and throughput optimized for streaming workloads such as those common in Web 2.0, digital media, scientific, and engineering applications. Users are allowed shared access to files in either the cluster where the file system was created or other GPFS clusters. Each site in the network is managed as a separate cluster, while allowing shared file system access.
- An information lifecycle management file system enabling multiple tiers of storage, including tape, with powerful policy-driven file placement, migration, archival, and deletion. The unique GPFS policy engine enables file migration scalable to billions of files and multiple petabytes of data.
- A scalable, shared storage file system for storage consolidation and virtualization. This includes Clustered NFS support, providing a scalable shared namespace, enabling horizontally scalable file serving. Additionally, GPFS includes many data/ SAN management features, including storage hardware-agnostic snapshots/ mirroring.

- A high availability file system for any business application or database that may benefit from very rapid failover of a consistent application data environment.
- A distributed file system, providing a global, cross-platform coherent namespace across an enterprise for around-the-world, around-the-clock operations.

Reference information

Refer to Software Announcement 209-105, dated July 14, 2009.

Program number

```
Program                   Program
number        VRM         name

5724-N94      3.3.0       General Parallel File System Multiplatform
```

Offering Information

Product information is available via the Offering Information Web site

http://www.ibm.com/common/ssi

Also, visit the Passport Advantage® Web site

http://www.ibm.com/software/passportadvantage

Publications

No publications are shipped with this program; however, the following publications are available from the Web:

IBM General Parallel File System:

- Concepts, Planning and Installation Guide (GA76-0413)
- Administration and Programming Reference (SA23-2221)
- Problem Determination Guide (GA76-0415)
- Data Management API Guide (GA76-0414)
- Advanced Administration Guide (SC23-5182)

You can view the manuals by selecting the GPFS Library link from the IBM Cluster Information Center at

http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/index.jsp

The IBM Publications Center

http://www.elink.ibmlink.ibm.com/publications/servlet/pbi.wss

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. Payment options for orders are via credit card (in the U.S.) or customer number for 50 countries. A large number of publications are available online in various file formats, and they can all be downloaded by all countries, free of charge.

Technical information

Specified operating environment

Hardware requirements

For GPFS for Linux Multiplatform

- Any of the following IBM X-Architecture servers:
  - IBM System x® enterprise servers
  - Cluster 1350^{tm}
  - BladeCenter® blade servers
  - System x modular servers

For supported connectivity, formally qualified disk subsystems, and use of GPFS on compatible non-IBM hardware, refer to the GPFS FAQs available at

http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/index.jsp?topic=/com.i

For GPFS for Windows Multiplatform

- Up to 64 Windows 64-bit clients of either AMD x64 or Intel 64 architectures
- An existing GPFS cluster that includes AIX or Linux nodes

Software requirements

For GPFS for Linux Multiplatform

- GPFS Service update 3.3.0-1 (APAR IZ45231)
- One of the following Linux distributions:
  - Red Hat Enterprise Linux (RHEL) 4 or RHEL 5
  - SUSE Linux Enterprise Server (SLES) 9 Service Pack 3, SLES 10, or SLES 11
- For service information, visit

  http://www14.software.ibm.com/webapp/set2/sas/f/cluster/home.html
- For updated supported kernel levels, consult the FAQs available from the GPFS Library Link from the IBM Cluster Information Center at

  http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/ index.jsp?topic=/com.i

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For GPFS for Windows Multiplatform

- Required software from Microsoft® includes:
  - Windows Server 2008 (with Service Pack 2)
  - Utilities and Software Development Kit (SDK) for SUA

  Access this software at

  http://www.msdn.microsoft.com
- Required software from InteropSystems includes:
  - SUA Community version of OpenSSH to support administrative functions

  Access this software at

  http://www.interopsystems.com/community/

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a

readme file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

Companion products

Related products to GPFS are:

- IBM DS and DCS disk arrays
- IBM GPFS for POWER®
- Tivoli® Storage Manager
- Tivoli Provisioning Manager
- HPSS (High Performance Storage System)
- IBM System Storage^{tm} SAN Volume Controller

Compatibility

Nodes running GPFS V3.3 can coexist and interoperate with nodes running GPFS V3.2.1.

Limitations

For complete and up-to-date information regarding GPFS specifications and capacities, refer to the GPFS Multiplatform (5724-N94) Sales Manual, and to the GPFS FAQs available from

   http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/index.jsp?topic=/com.i

For additional information, refer to usage restrictions in the Terms and conditions section of this announcement, or to the License Information document that is available on the IBM Software License Agreement Web site at

   http://www.ibm.com/software/sla/sladb.nsf

Planning information

Ordering and customer responsibilities

GPFS introduces a new pricing, licensing, and entitlement structure for Version 3.3 and Version 3.2.

- GPFS has two types of licenses, a server license and a client license. For each node in a GPFS cluster (see *Permitted use of GPFS Server and GPFS Client* below), the customer obtains the appropriate number of server or client licenses that correspond to the way GPFS is used on that node.
- Licenses continue to be priced per core.
- During GPFS cluster configuration, the customer will be prompted to identify whether a particular node is a GPFS Server or a GPFS Client. If a GPFS Client is chosen, function that requires a GPFS Server license will be disabled on this node. Because the node that acts as the GPFS cluster configuration server requires a GPFS Server designation, at least one node in the GPFS cluster will require one or more GPFS Server licenses.
- GPFS V3.2 will remain available to order; however, the pricing will now be the same as GPFS V3.3 for GPFS Server and GPFS Client licenses. GPFS V3.2 customers will not be prompted during cluster configuration to identify a node as a GPFS Server or GPFS Client. During the ordering process, the number of GPFS Server and GPFS Client licenses will need to be identified.
- Permitted use of GPFS Server and GPFS Client:
- A node is defined as an individual operating system image that may appear on a single computer within a cluster, on a system within a cluster, or on a partition.
  - You may use the GPFS Server in order to perform the following GPFS functions:

- -- Mounting GPFS file systems and accessing data from operating system block devices and NSD servers
- -- Performing GPFS management functions such as cluster configuration manager, quorum node, manager node, and Network Shared Disk (NSD) server
- -- Sharing data through any application, service protocol, or method, such as Network File System (NFS), Common Internet File System (CIFS), File Transfer Protocol (FTP), or Hypertext Transfer Protocol (HTTP)
  - – You may use GPFS Client in order to perform the following functions:
    - -- Mounting GPFS file systems and accessing data from operating system block devices and NSD servers
    - -- Exchanging data between nodes that locally mount the same GPFS file system
  - – The GPFS Client may not be used for nodes to share GPFS data through any application, service, protocol, or method, such as NFS, CIFS, FTP, or HTTP. For this use, entitlement to GPFS Server would be required.
- At GPFS V3.3 announcement, the customer's entitlements will be migrated to the new GPFS Server and GPFS Client model. At the customer's renewal date, the customer must identify the number of GPFS Client and GPFS Server licences required for their configuration.
- See the Ordering information section for an ordering example.

Note: Refer to the GPFS FAQs available from the following Web site for more information, including example configurations and license definitions regarding the new GPFS Server and GPFS Client model.

> http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/index.jsp?topic=/com.i

GPFS V3.3 is the last release that will support

- Data shipping mode
- 32-bit AIX kernels

Installability

For installation information, refer to the GPFS Installation Guide.

Packaging

IBM GPFS Multiplatform is distributed via electronic software distribution (ESD) or CD-ROM. There is a separate CD for each platform (one for GPFS for Linux Multiplatform, and one for GPFS for Windows Multiplatform). The GPFS Client installation code and GPFS Server installation code are shipped in the same package.

A product readme file and license information is shipped with the product. Publications are available online.

Security, auditability, and control

GPFS for Linux Multiplatform V3.3 uses the security and auditability features of the Linux operating system. The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Software Services

IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities.

Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

The ITS Specific Service offering supports the GPFS Multiplatform product.

To learn more about IBM Software Services or to contact a Software Services sales specialist, visit

http://www.ibm.com/software/sw-services/

Ordering information

This product is only available via Passport Advantage. It is not available as shrinkwrap.

```
Product group: Other Software
  Product Identifier Description (PID)
  General Parallel File System Multiplatform  (5724-N94)

Product category: System Software
```

Charge metric

```
                        Part number or
Program name            PID number            Charge metric

GPFS Multiplatform      5724-N94              10 Processor Value Units
```

Processor Value Unit (PVU)

PVU is the unit of measure by which this program is licensed. PVU entitlements are based on processor families (vendors and brands). A Proof of Entitlement (PoE) must be obtained for the appropriate number of PVUs based on the level or tier of all processor cores activated and available for use by the program on the server. Some programs allow licensing to less than the full capacity of the server's activated processor cores, sometimes referred to as *sub-capacity licensing*. For programs which offer sub-capacity licensing, if a server is partitioned utilizing eligible partitioning technologies, then a PoE must be obtained for the appropriate number of PVUs based on all activated processor cores available for use in each partition where the program runs or is managed by the program. Refer to the International Passport Advantage Agreement Attachment for Sub-Capacity Terms or the program's License Information to determine applicable sub-capacity terms. The PVU entitlements are specific to the program and may not be exchanged, interchanged, or aggregated with PVU entitlements of another program.

For general overview of PVUs for processor families (vendors and brands), go to

http://www-306.ibm.com/software/lotus/passportadvantage/pvu_licensing _for_customers.html

To calculate the exact PVU entitlements required for the program, go to

https://www-112.ibm.com/software/howtobuy/passportadvantage/valueunit calculator/vucalc.wss

Passport Advantage

Ordering example:

- GPFS license = 10 Processor Value Units (PVUs)

- Common System x HPC setup, no virtualization

  – Four x3655 machines (eight cores each), 32 x3455 machines (four cores each). Each physical machine is a GPFS node (no virtualization).

- Four x3655 nodes are configured as NSD servers and quorum nodes: four nodes with eight cores each = 32 Xeon® cores*50 PVUs = 160 server licenses.
- 32 x3455 nodes are configured as NSD clients: 32 nodes with four cores each = 128 Xeon cores*50 PVUs = 640 client licenses.

Note: Refer to the GPFS FAQs available from the following Web site for more information, including example configurations and the licenses required, about the new GPFS Server and GPFS Client model.

http://publib.boulder.ibm.com/infocenter/clresctr/vxrx/index.jsp?topic=/com

```
                                                 Part
Program name/Description                         number

IBM General Parallel File System V3.3 Linux      BH03REN
Media Pack
IBM General Parallel File System V3.3 Windows    BH03QEN
Media Pack


GPFS Server 10 Processor Value Unit Lic + SW S&S    D091MLL
  12 Mo
GPFS Server 10 Processor Value Unit Annual SW S&S   E06VULL
  Rnwl
GPFS Server 10 Processor Value Unit SW S&S Reinstate D091NLL
  12 Mo

GPFS Client 10 Processor Value Unit Lic + SW S&S    D091RLL
  12 Mo
GPFS Client 10 Processor Value Unit Annual SW S&S   E06VWLL
  Rnwl
GPFS Client 10 Processor Value Unit SW S&S Reinstate D091SLL
  12 Mo
```

Passport Advantage customer: Media pack entitlement details

Customers with active maintenance or subscription for the products listed are entitled to receive the corresponding media pack.

```
Entitled maintenance offerings
description                           Part number

Genl Para File Sys Linux Ins          CLGPFSLXSB01


Media packs
description                                         Part number

IBM General Parallel File System V3.2 Linux Media Pack    BH031EN
IBM General Parallel File System V3.2.1 Windows           BH03KEN
   Media Pack
IBM General Parallel File System V3.3 Linux Media Pack    BH03REN
IBM General Parallel File System V3.3 Windows             BH03QEN
   Media Pack
```

On/Off Capacity on Demand (CoD)

```
Part
number      Description

D091ULL     IBM General Parallel File System Server
            Proc Day OOCoD Temp Use Chrg
D091TLL     IBM General Parallel File System Client
            Proc Day OOCoD Temp Use Chrg
```

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License Information form number

L-KFIS-6YZPME

The program's License Information will be available for review on the IBM Software License Agreement Web site

   http://www.ibm.com/software/sla/sladb.nsf

Limited warranty applies

Yes

Limited warranty

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This technical support allows you to obtain assistance (via telephone or electronic means) from IBM for product-specific, task-oriented questions regarding the installation and operation of the program product. Software Subscription and Support (Software Maintenance) also provides you with access to updates, releases, and versions of the program. You will be notified, via announcement letter, of discontinuance of support with 12 months' notice. If you require additional technical

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If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

For clarification, note that (1) for programs acquired under the IBM International Passport Advantage offering, this term applies only to your first acquisition of the program and (2) for programs acquired under any of IBM's On/Off Capacity on Demand (On/Off CoD) software offerings, this term does not apply since these offerings apply to programs already acquired and in use by you.

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Volume orders (IVO)

No

Passport Advantage applies

Yes, and through the Passport Advantage Web site at

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Software Subscription and Support applies

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IBM Operational Support Services - SoftwareXcel

No

System i Software Maintenance applies

No

Variable charges apply

No

Educational allowance available

Not applicable.

On/Off CoD

To be eligible for On/Off CoD pricing, you must be enabled for temporary capacity on the corresponding hardware, and the required contract, Amendment for iSeries® and pSeries® Temporary Capacity On Demand - Software (Z125-6907), must be signed prior to use.

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To learn how Electronic Services can work for you, visit

Prices

Passport Advantage

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http://www.ibm.com/software/passportadvantage

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