Unit 1
Managing a multi-server Spectrum Protect 7.1.6 environment

Unit objectives

When you complete this unit, you can perform the following tasks:

- Describe Spectrum Protect and its function
- List the components of Spectrum Protect
- Describe Spectrum Protect 7.1 administrative functions and interfaces
- Identify the Spectrum Protect servers set up for this course

IBM Spectrum Protect was formerly known as IBM Tivoli Storage Manager (TSM).

Topics

- Lesson 1: Basic Spectrum Protect concepts
- Lesson 2: Spectrum Protect Operations Center
- Lesson 3: Benefits of a multi-server Spectrum Protect environment
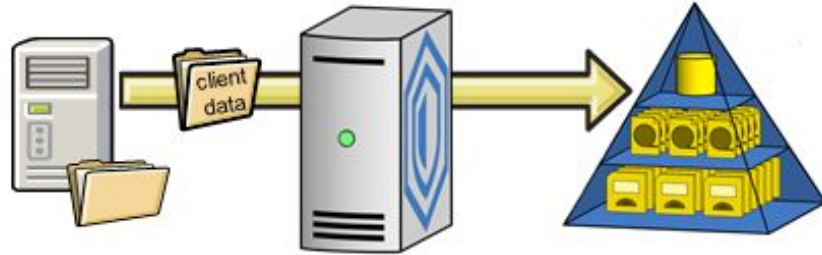- Lesson 4: The IBM Spectrum storage family

Lesson 1
Basic Spectrum Protect concepts

IBM Spectrum Protect basic functions

Backup:
The backup-archive clients send copies of files to a storage pool or container, and the database makes a record of the transaction.
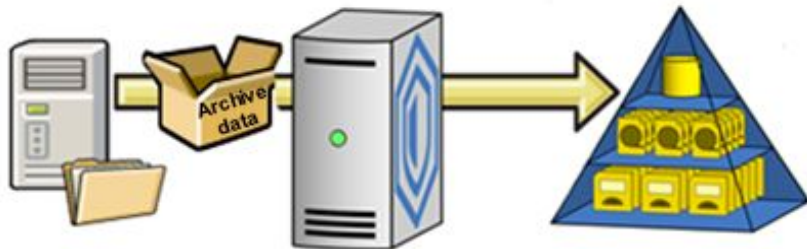
Restore:
Copies of files returns to the backup-archive client by using information in the database.

Archive:
The backup-archive clients send copies of files for retention to Spectrum Protect server.

Retrieve:
A copy of the files returns to the backup-archive client.

Spectrum Protect components

- Server
  - Database and recovery logs
  - Policy
  - Server storage
  - Administrative and client schedules
- Client
  - Administrative client command line
  - Backup-archive GUI
  - Backup-archive command line
  - Web client
  - Application client, for example Spectrum Protect for Mail
  - Application Program Interface (API) customized for applications
- Operations Center
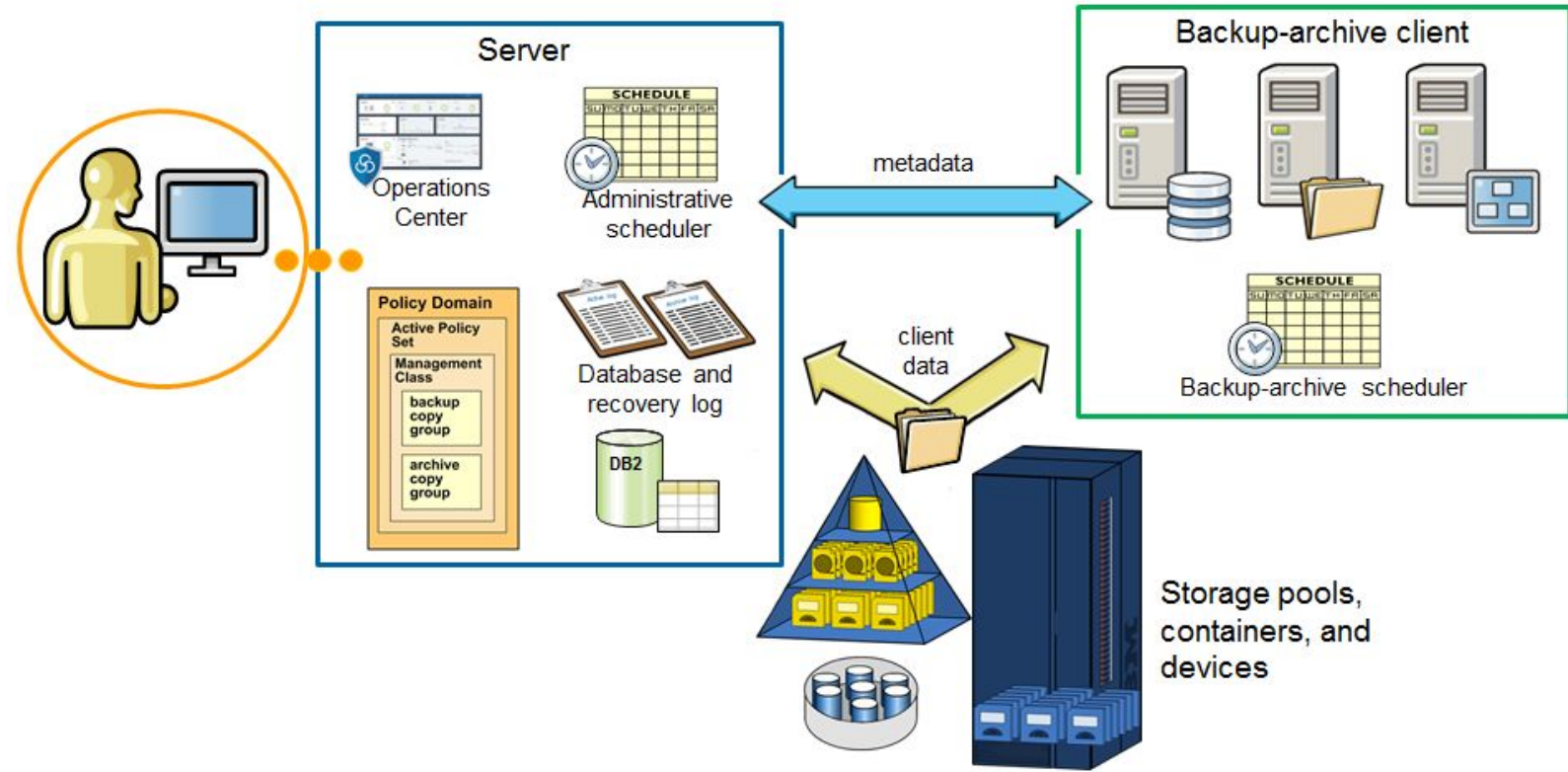
Spectrum Protect server

The Spectrum Protect server consists of the following components:
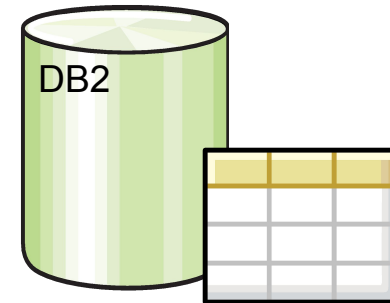
- Database

- Recovery logs

- Server options

- Default policy

  - Standard

- Default storage pool definitions

  - Backuppool

  - Archivepool

  - Spacemgpool
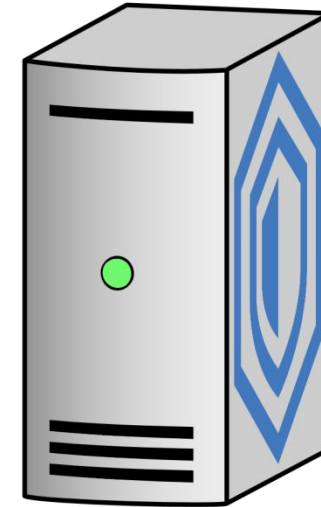
Spectrum Protect database

The Spectrum Protect server has a database that contains information about the following items:

- Policy and schedules

- Activity log and events records

- Data storage inventory

- Client nodes and administrators

  - Connection information

  - Authority

DB2

You do not need to be a DB2 database administrator to perform Spectrum Protect DB2 functions. Although the Spectrum Protect database is running on DB2, it has been designed especially for Spectrum Protect.
Daily management of the database is always performed using the Spectrum Protect utilities.

Spectrum Protect recovery log

The recovery log is composed of the following files:

- Active log
  - In-flight transactions not yet committed to the database
- Active log mirror
  - Mirror copy of active log
  - Maintains same size as active log
- Archive log
  - Transactions that are complete and committed to the database
- Archive failover log

Active log

Archive log

Server options file

Windows options:

- Communication

- Backup and archive processing

- Restore and retrieve processing

- Scheduling and language

- Format

- Command processing

- Authorization

- Error processing

- Transaction processing

UNIX options:

- Communication

- Backup and archive processing

- Restore and retrieve processing

- Scheduling and language

- Command processing

- Authorization

- Error processing

- Transaction processing

Volume history and device configuration files

Volume history

- This option specifies the names of the files to be automatically updated whenever server sequential volume history information is changed. There is no default for this option.

- You can include one or more volume history options in the **dsmserv.opt** file. When you use multiple volume history options, Spectrum Protect automatically updates and stores a backup copy of the volume history information in each file specified.

Device configuration

- Device configuration information is also stored in the Spectrum Protect database with a **define devclass** command. This information includes drive and library definitions created using the define drive and define library commands.

- Keep copies of **devconfig.out** (UNIX) or **devcnfg.out** (Windows) and **volhist.out** for database recovery purposes by updating the options file.

Communication options

- TCP/IP Version 4 or 6 (enabled by default)

- Named Pipes (enabled by default)

- Shared memory

- Simple network management protocol (SNMP) Distributed Program Interface (DPI)

- Secure Sockets Layer (SSL)

Shared memory can be enabled for database backups.

Policy management

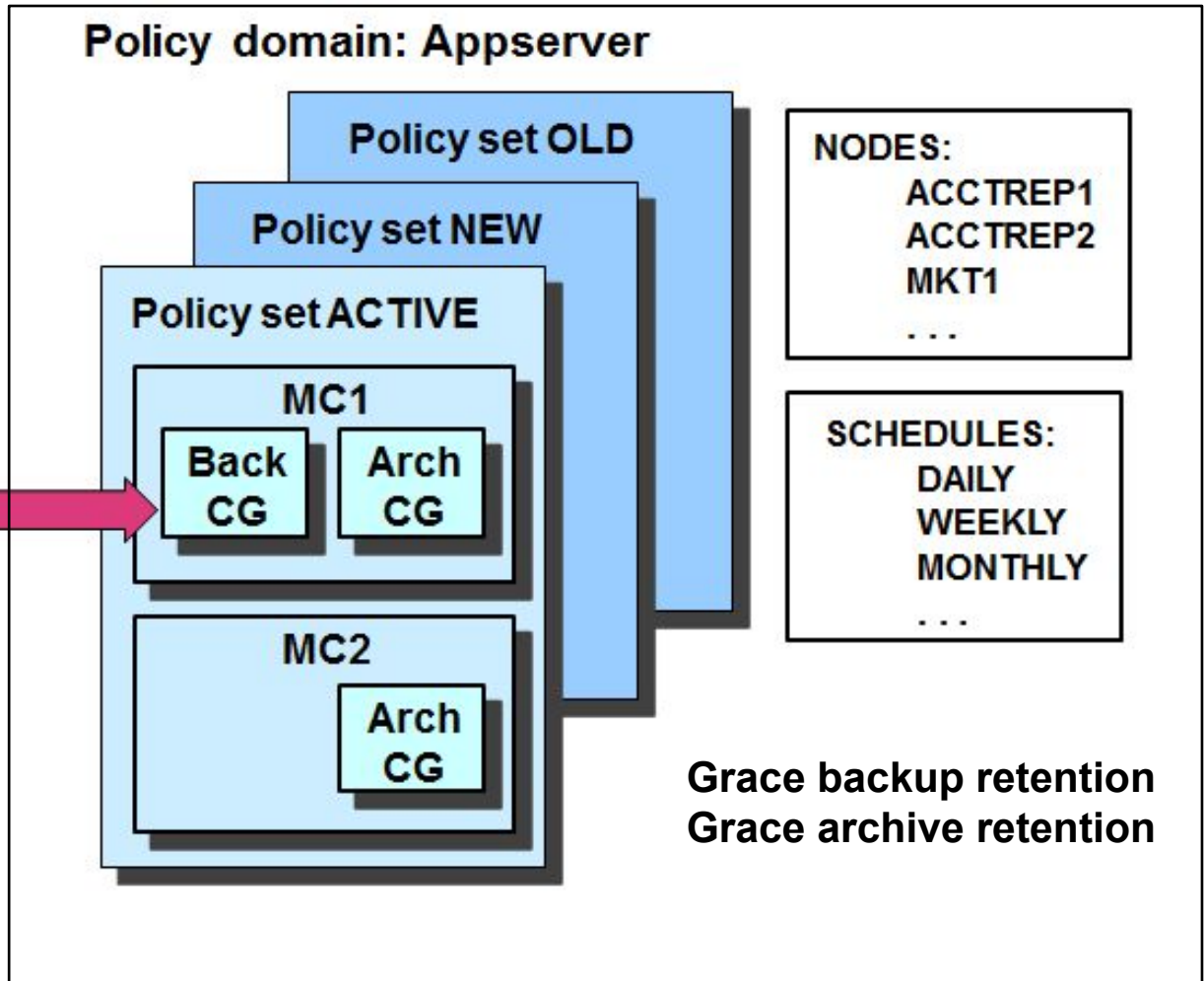Server

Client

Policy domain: Appserver

Policy set OLD

Policy set NEW

Policy set ACTIVE

MC1

| Back CG | Arch CG |

Data retention rules ➡

MC2

Arch CG

NODES:
ACCTREP1
ACCTREP2
MKT1
. . .

SCHEDULES:
DAILY
WEEKLY
MONTHLY
. . .

Grace backup retention
Grace archive retention

```
Include c:\taxes\*  MC1

DSMC ARCHIVE -ARCHMC=MC2
```
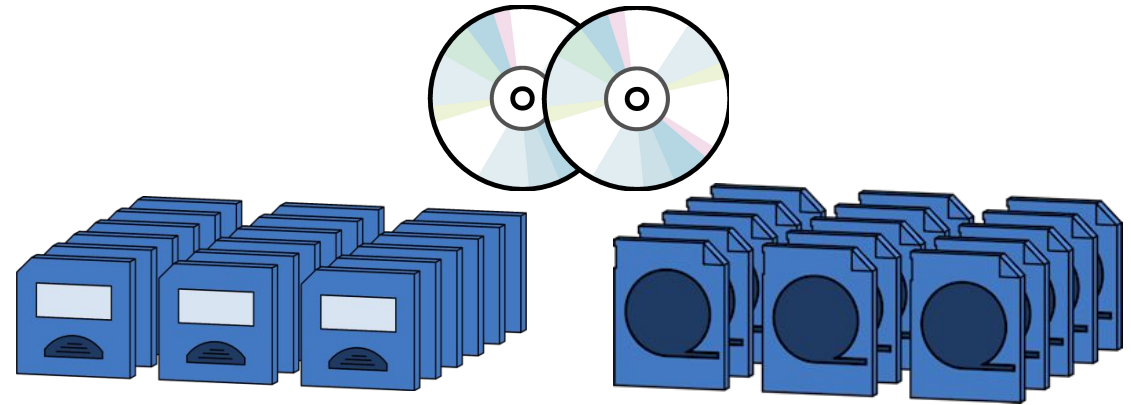
Disk-type storage devices

The DISK device class is predefined.

Random access (DISK)

Sequential access (removable media and FILE)

You can define additional device classes so that they reflect specific devices, media, and procedures. Use the following command:

```
DEFINE DEVCLASS DEVTYPE=TYPE of device
```

```
►►──DEFine DEVclass──device_class_name──DEVType──=──FILE──────────────────────────►
```

```
►►──DEFine DEVclass──device_class_name──LIBRary──=──library_name──────────────────►

                              ┌──MAXCAPacity──=──space_remaining──┐
►──DEVType──=──REMOVABLEfile──┤                                   ├──────────────────►
                              └──MAXCAPacity──=──size─────────────┘
```
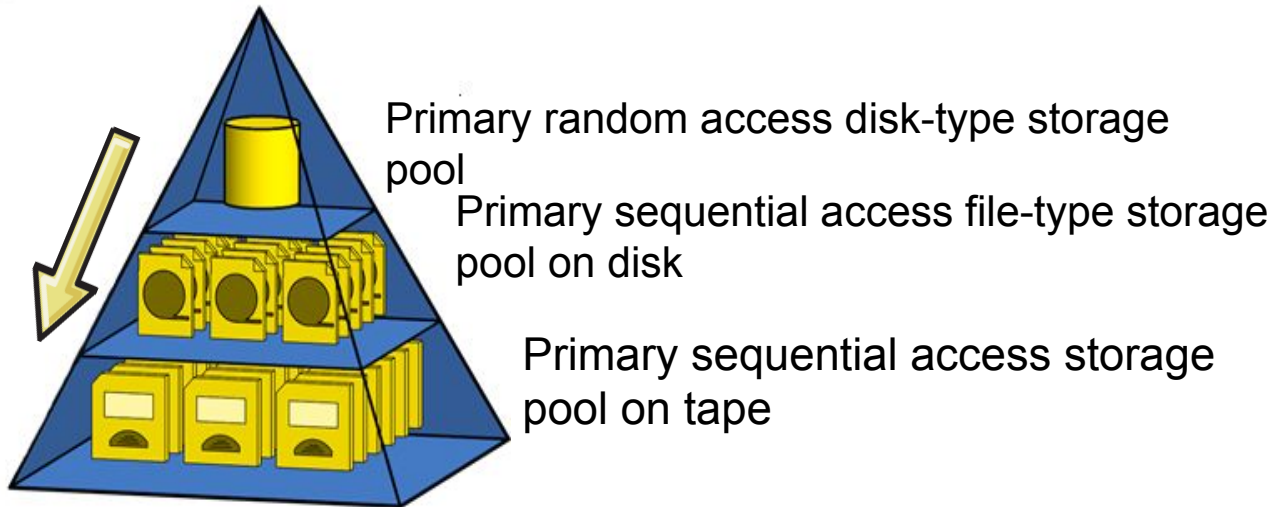
*IBM Tivoli Storage Manager Version 7.1.6 Administrator's Reference.*

Storage pools

Storage pools are collections of similar media that provide storage for backed up, archived, and migrated files. These pools can be chained to create a storage hierarchy.

Use any supported sequential media in all copy storage pools.

Migration: Data moves from the primary disk pool directly to tape pools.

Primary random access disk-type storage pool

Primary sequential access file-type storage pool on disk

Primary sequential access storage pool on tape

Copy data: Data moves from the primary storage pools to copy pools on removable media.

Copy storage pool on tape
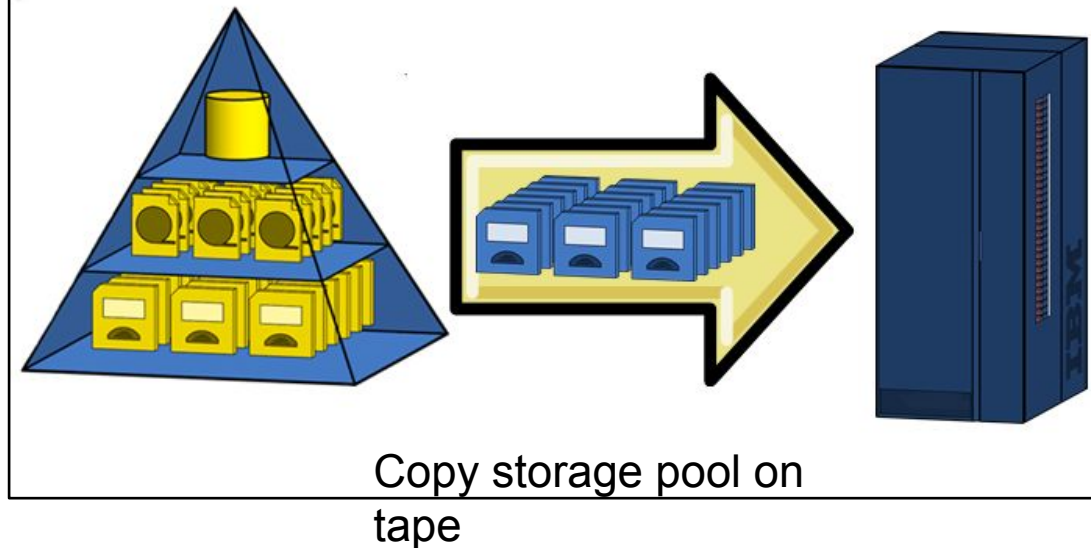
In this course, storage pools are represented by these graphics.

Container type storage pools

Container storage pools provide the following benefits:

- Provides simplified storage management, using directory or cloud containers, not volumes

- Supports public and private clouds

- Optimizes data-deduplication processing

  - Deduplication is enabled when container is created

  - Compression is enabled when container is created

- Reduces database growth and size

- Increases server performance and scalability

- Improves recoverability of damaged extents

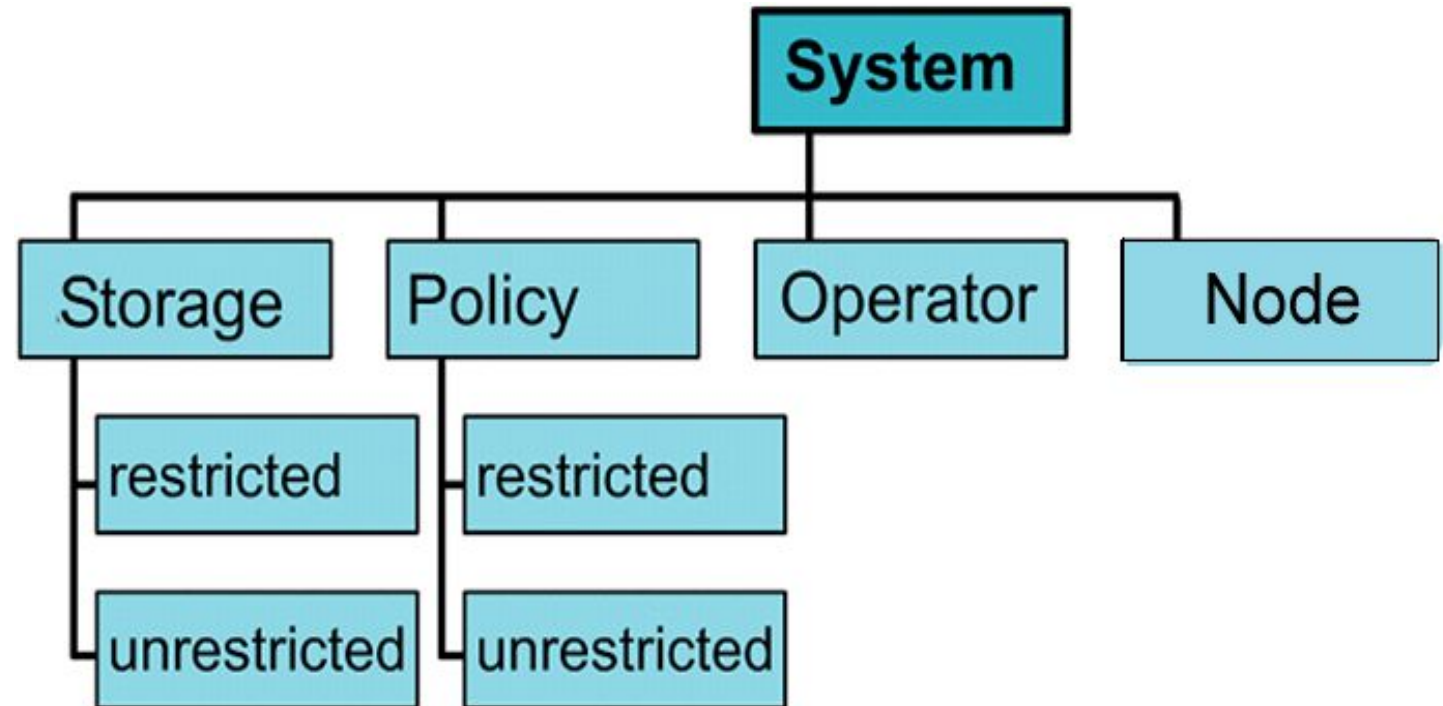- Provides excellent performance for most workloads
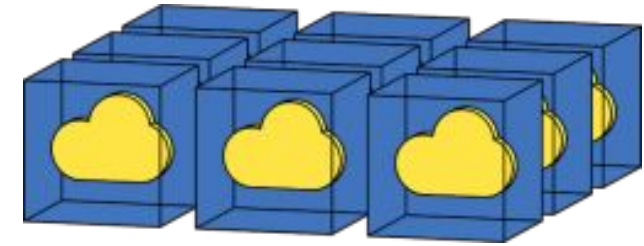
Cloud
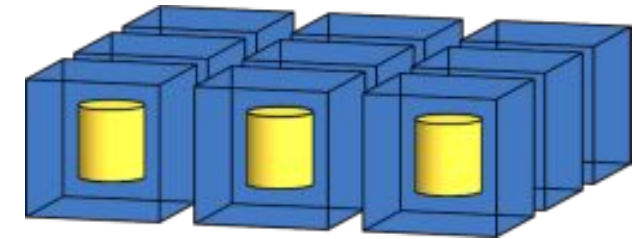
Directory

Administrators

The Spectrum Protect administrators manage the following areas:

- Daily operations
  - Client backups and schedules
  - Server maintenance and schedules
- Administrators and clients
  - Levels of administrative authority
  - Login requirements and server access
- The server performance
- Storage pools and volumes
- Other Spectrum Protect servers
- Disaster recovery
- Troubleshooting

```
                              ┌──────────┐
                              │  System  │
                              └────┬─────┘
        ┌──────────────┬───────────┼───────────────┐
   ┌─────────┐   ┌──────────┐ ┌──────────┐    ┌────────┐
   │ Storage │   │  Policy  │ │ Operator │    │  Node  │
   └────┬────┘   └────┬─────┘ └──────────┘    └────────┘
   ┌────┴──────┐ ┌────┴──────┐
   │restricted │ │restricted │
   └────┬──────┘ └────┬──────┘
 ┌──────┴──────┐┌─────┴───────┐
 │unrestricted ││unrestricted │
 └─────────────┘└─────────────┘
```
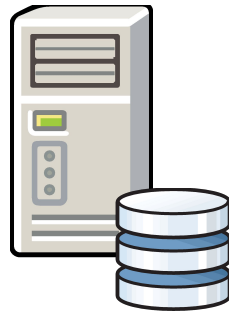
Administrative client options

dsmadmc

admin_command

-ID=*USERID*

-PASSWORD=*password*

-NOCONFIRM

-QUIET

-CONSOLEMODE

-MOUNTMODE

-ITEMCOMMIT

-OUTFILE=*filename*

-COMMADELIMITED

-TABDELIMITED

-DATAONLY=*value*

-DISPLAYMODE=*list* or *table*
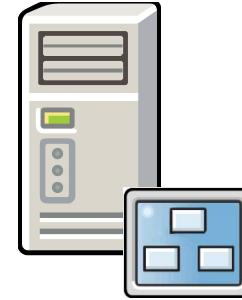
Backup-archive client

applications
such as database
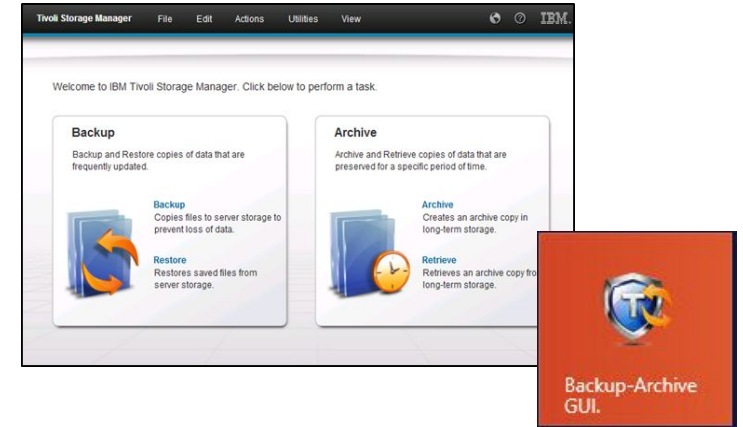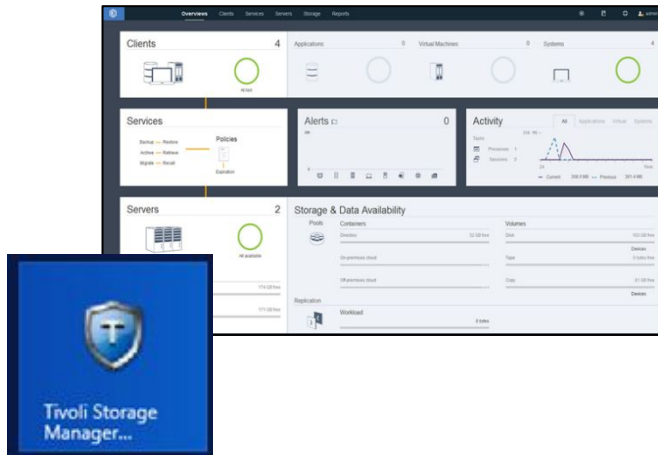or mail server

file server

VM or Hyper-V

A *client node* is equivalent to a computer, virtual machine, or application, such as a Spectrum Protect backup-archive client that is installed on a file server for data backups.

In this course, the client instance is represented by these graphics.

Interfaces

Interface	Interface access
Operations Center	Web browser and default secure port 11090
Backup-archive client GUI	**dsm** (Windows) **dsmj** (UNIX)
Web client GUI	Web browser and default port 1581
Backup-archive command line	**dsmc**
Spectrum Protect server command line	**dsmadmc**, Operations Center Command Builder, and server console

Lesson 2
Spectrum Protect Operations Center

Operations Center, Overview page

The banner

Return to Overview page

| ◉ | | Overviews | Clients | Services | Servers | Storage | Reports | | ⚙ | ▯ | ⊕ | 👤 admin1 ▾ |

White font = active selection

Hovering over the tabs in the banner displays the available functions for that tab.

Overviews
Overviews
Alerts

Clients
Clients
Schedules

Servers
Servers
Maintenance

Storage
Storage Pools
Disk Devices
Tape Devices
Replication

⊕
Reports

Documentation

What's New

About the
Operations Center

⚙
Command Builder
Licensing
Settings

Operations Center, new features for 7.1.4 and 7.1.5

The following enhancements were made to the Operations Center for Spectrum Protect 7.1.4:

- You can complete the following tasks with the Reports page:
  - Configure and manage a general operations report and a license compliance report. These predefined reports are available by default.
  - Configure and manage custom reports, which use SQL SELECT statements to query one or more managed servers.
  - Schedule reports to be sent automatically, or manually send a report.
- You can complete the following tasks for NAS file servers:
  - View capacity and status information for NAS file servers that are registered as Tivoli Storage Manager clients.
  - View the capacity of volumes that are defined on NAS file servers.
  - Track the status and performance of full and differential volume backups.

The following enhancements were made to the Operations Center for Spectrum Protect 7.1.5:

- You can use the Add Storage Pool wizard to create a cloud-container storage pool that backs up data to IBM Cloud Object Storage System, formerly known as Cleversafe, an IBM object storage system, using the Simple Storage Service (S3) protocol.
- You can use inline compression with a directory-container storage pool to maximize storage pool space. You can complete the following tasks:
  - Specify whether data that is stored to a directory-container storage pool is compressed.
  - View how much space was saved in a storage pool by deduplicating and compressing data. The savings from both client-side and server-side compression are shown.
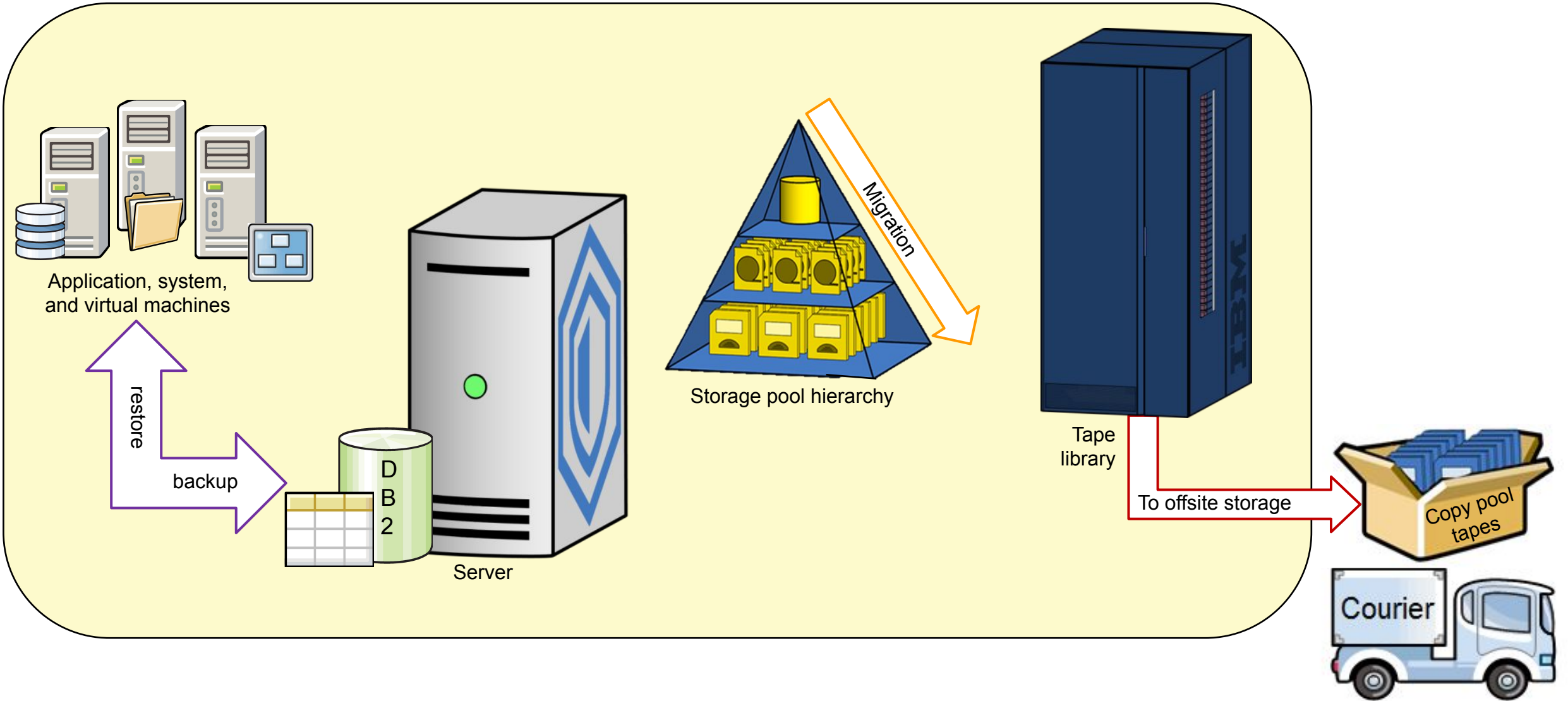
Operations Center, new features for 7.1.6

The following enhancements were made to the Operations Center for Spectrum Protect 7.1.6:

- You can use the new Convert Storage Pool wizard to move data from a primary storage pool that uses the FILE device class or a virtual tape library (VTL) to a directory-container storage pool. Directory-container storage pools provide inline data deduplication and compression, and are typically easier to manage than volume-based pools.

- You can view status, capacity, and configuration information for tape libraries. You can complete the following tasks:

  - View the status of library robotics, drives, and paths.

  - View the number of available scratch tape volumes and private tape volumes for each server.

  - View a library's overall tape capacity and tape usage over two weeks.

  - For shared libraries, identify which server is the library manager and which servers are library clients.

  - View the configuration and state of tape drives, including currently loaded tapes.

  - Specify which drives are available for server operations by taking them offline or bringing them online.

- You can use the Add Server Pair wizard to enable Aspera FASP technology for replication processes. Aspera FASP technology is available when you purchase the IBM Spectrum Protect High Speed Data Transfer product. An evaluation license is available by request.

Lesson 3
Benefits of a multi-server Spectrum Protect environment

Traditional disk to tape

Application, system, and virtual machines

restore

backup

D B 2

Server

Migration

Storage pool hierarchy

Tape library

To offsite storage

Copy pool tapes

Courier

Multi-site disk environment overview

Application, system, and virtual machines

failover restore

failover restore

Data replication

restore

backup

Server

DB2

Storage pool protection

Disk storage for deduplicated data and inventory backup

Site A

Application, system, and virtual machines

restore

backup

Server

DB2

Disk storage for deduplicated data and inventory backup

Site B
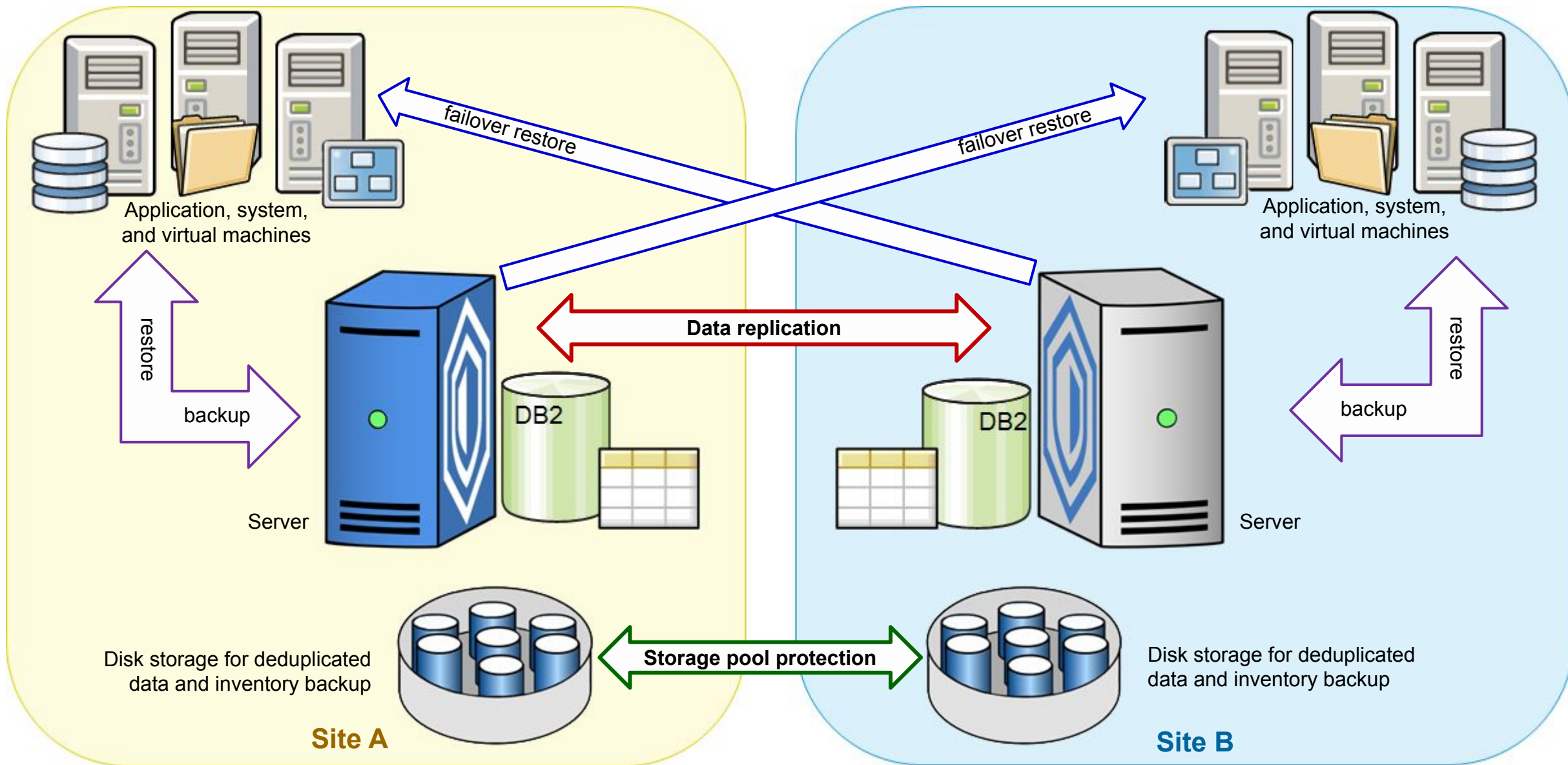
Lesson 4
The IBM Spectrum Protect storage family

IBM Spectrum Protect products

Spectrum Protect

- Spectrum Protect
  - Backup and Restore
  - Archive and Retrieve
  - Operations Center
  - Data Reduction (deduplication)
- Spectrum Protect Extended Edition (Basic plus..)
  - Advanced disaster recovery management
  - Backup via NDMP for NAS
  - Large libraries, additional tape support
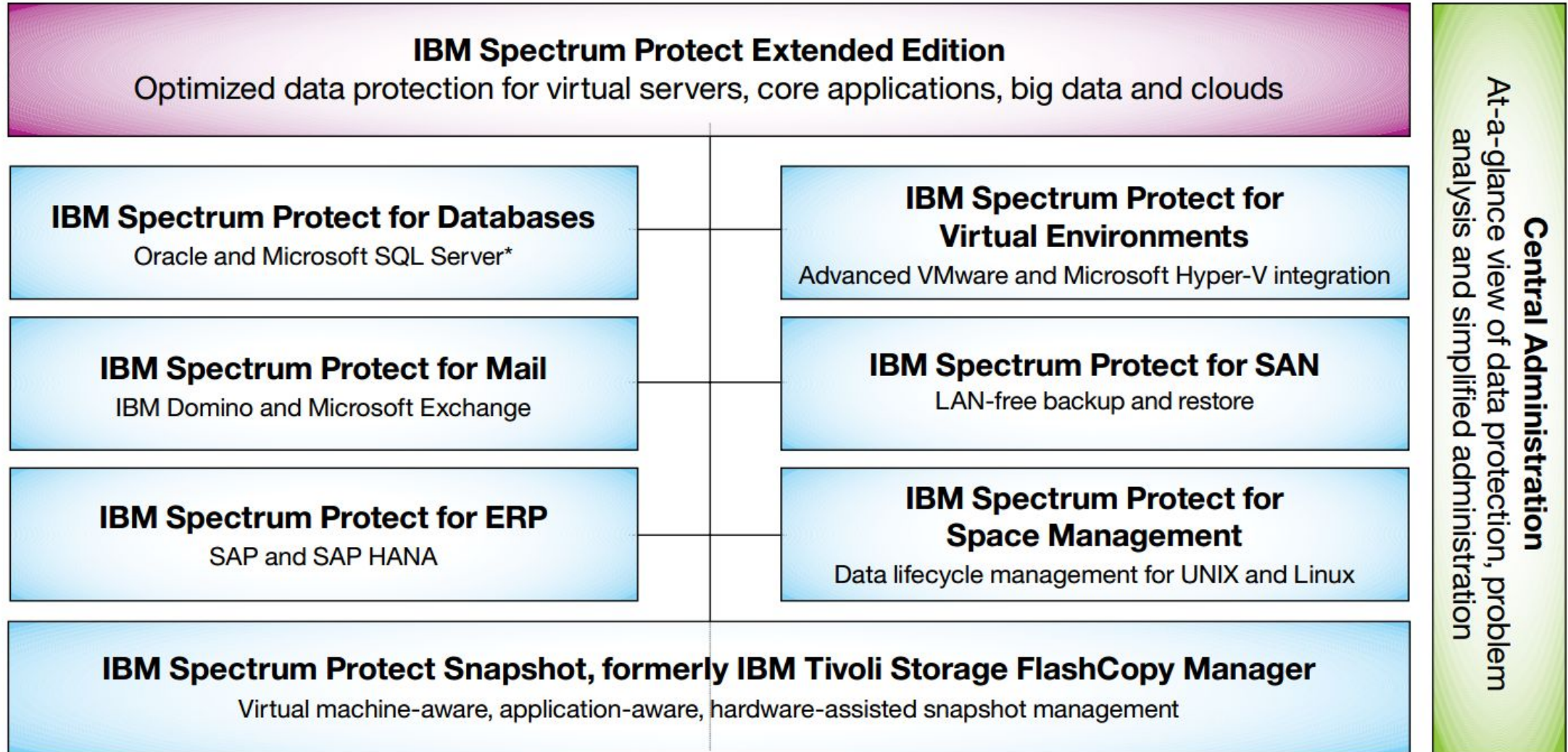 - Node replication
- IBM Spectrum Protect for SAN

Spectrum Scale

- Formerly known as GPFS
- Spectrum Scale file systems balances the workload and capacity for all Spectrum Protect instances on disk
- Provides standardized, scalable and easy to use storage infrastructure for the multiple instances

Application Protection

- Advanced Agents for Core Applications
  - Mail agents support Microsoft® Exchange and Lotus® Domino®.
  - Database agents support Oracle® and Microsoft® SQL.
  - Enterprise Resource Planning agent supports SAP® on Oracle, and SAP HANA environments.
- Advanced Agent for Virtual Environments
  - VMWare
  - Hyper-V
- Snapshot Management
  - Oracle
  - DB2
  - SAP Oracle/DB2
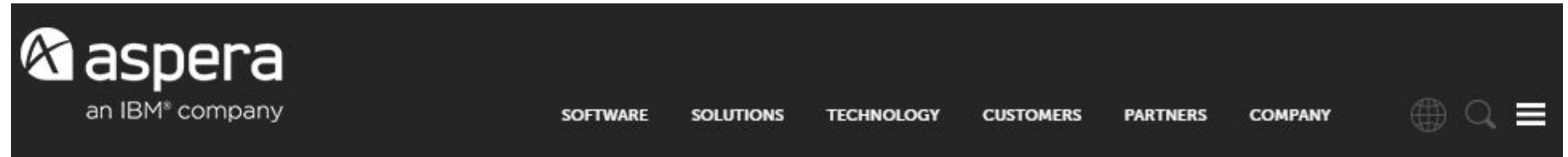 - VMWare
- Space Management

IBM Spectrum Protect Suite

IBM Spectrum Protect Extended Edition
Optimized data protection for virtual servers, core applications, big data and clouds

IBM Spectrum Protect for Databases
Oracle and Microsoft SQL Server*

IBM Spectrum Protect for Virtual Environments
Advanced VMware and Microsoft Hyper-V integration

IBM Spectrum Protect for Mail
IBM Domino and Microsoft Exchange

IBM Spectrum Protect for SAN
LAN-free backup and restore

IBM Spectrum Protect for ERP
SAP and SAP HANA

IBM Spectrum Protect for Space Management
Data lifecycle management for UNIX and Linux

IBM Spectrum Protect Snapshot, formerly IBM Tivoli Storage FlashCopy Manager
Virtual machine-aware, application-aware, hardware-assisted snapshot management

Central Administration
At-a-glance view of data protection, problem analysis and simplified administration

* IBM DB2 and IBM Informix include IBM Spectrum Protect backup agents.

Aspera

http://asperasoft.com/

"Aspera's unwavering mission is to create the next-generation software technologies that move the world's data at maximum speed, regardless of file size, transfer distance and network conditions. Our patented, highly efficient bulk data transport technology FASP™ is unique and core to all Aspera high-performance file transfer software. Organizations across a variety of industries on six continents rely on Aspera software for the business-critical transport of their digital assets."

Spectrum Protect high speed data transfer with Aspera

Requirements for each source and target server to run IBM Spectrum Protect High Speed Data Transfer

- Running IBM Spectrum Protect 7.1.6 (or later)
- Running on Linux for System x platform
- Using directory container pools
- Using PROTECT STGPOOL and/or REPLICATION to transfer data
- Have a valid license

When **adding a server pair** with the wizard in the Operations Center, Aspera FASP can be enabled with the **transfer protocol** step once the license is installed on the target and source servers.

TCP/IP is effective for networks with low latency and low packet loss. On a wide area network with data transfer delays or high packet loss, you might improve performance by using Aspera Fast Adaptive Secure Protocol (FASP) technology.

Aspera FASP   ☑ Enable

Cloud-based storage solution

IBM Cloud and Software Defined Storage software solutions can:

- Manage data growth
    - Better prepare for future storage demands with an optimized, integrated and virtualized storage environment designed to help reduce complexity, costs and underutilized assets
- Increase reliability
    - IBM storage specialists help reduce risks by using time-tested processes and drawing on years of experience implementing, migrating and managing storage environments
- Enable innovation
    - Create a more efficient storage infrastructure that can support new business growth opportunities

IBM provides a broad portfolio of storage services designed to help you keep up with explosive data growth and the latest technology advancements.

Unit glossary

Review the key words and concepts for this unit:

- Spectrum Protect Extended Edition

- Database

- Recovery logs

- Server options

- Default policy

- Archive log

- Active log

- Volume history

- Device configuration

For additional training on IBM Spectrum Protect concepts and basic functions, visit our YouTube channel.

Go to **youtube.com** and search for *Spectrum Protect Software Training*. Click *Playlists* to access the *TSM/Spectrum Protect 101* series.
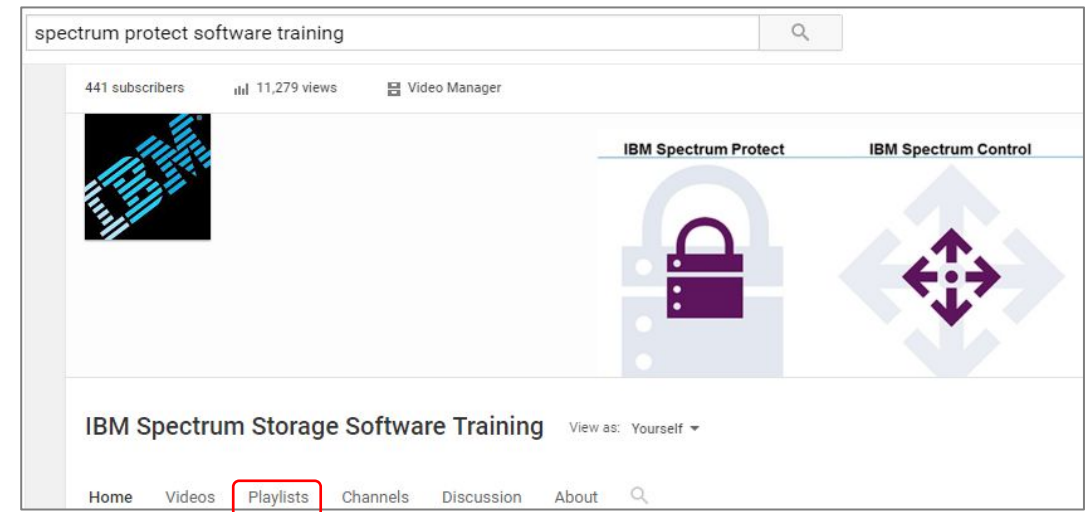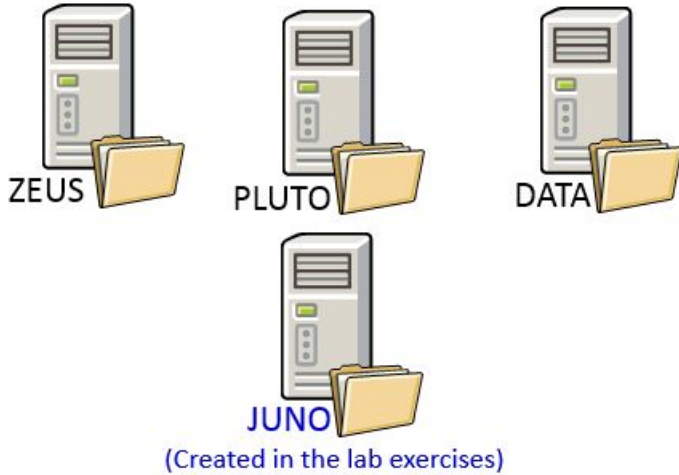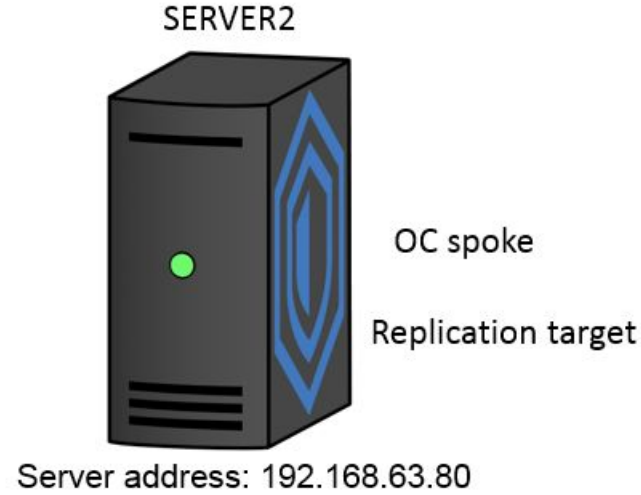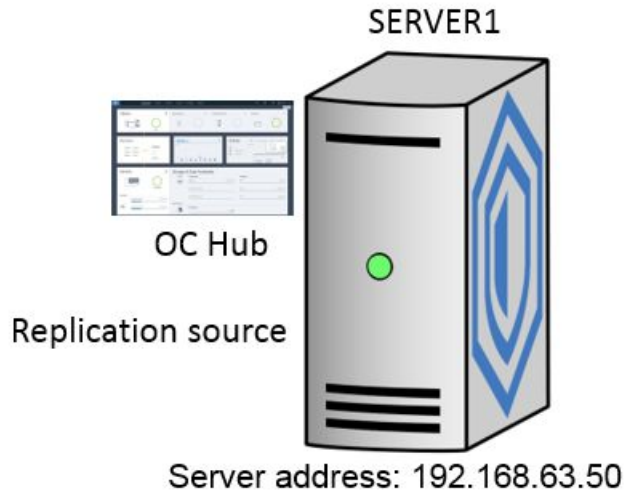
Review questions

1. True or false: The Spectrum Protect administrative command line, which is used for issuing commands for the server, is automatically installed with the Spectrum Protect server.

2. True or false: Shared memory can be enabled for database backups.

3. True or false: You need to be a DB2 database administrator to perform Spectrum Protect DB2 functions.

4. Which type of storage pools optimizes data-deduplication processing?

5. What is a benefit of using a multi-server disk environment?

Exercises for Unit 1

Lab environment

SERVER1
OC Hub
Replication source
Server address: 192.168.63.50

ZEUS PLUTO DATA

JUNO
(Created in the lab exercises)

SERVER2
OC spoke
Replication target
Server address: 192.168.63.80

MARS

system	login ID	password
SERVER1	admin1	admin1
SERVER2	admin1	admin1
ZEUS	ZEUS	zeus
DATA	DATA	data
PLUTO	PLUTO	pluto
JUNO	JUNO	juno
MARS	MARS	mars

Exercise introduction

You will perform the following exercises:

- Log on and verify the system

- Use the Spectrum Protect administrative command line interfaces

- Add a spoke in the Operations Center

- View status and use Command Builder in the Operations Center

Unit summary

Now that you have complete this unit, you can perform the following tasks:

- Describe Spectrum Protect and its function

- List the components of Spectrum Protect

- Describe Spectrum Protect 7.1 administrative functions and interfaces

- Identify the Spectrum Protect servers set up for this course