Properly designing a CommCell® environment can be a difficult process. In some environments a simple design may suffice, but in more complex environments careful planning must be done to ensure data is properly protected and the CommCell environment can properly scale to meet future requirements. Section III of this book will take multiple approaches using real world scenarios to assist in the proper design and implementation of storage policy and client configurations.

**Phases of Design and Implementation**

There are three phases to designing and implementing a proper solution:

1. Plan & Design
2. Build
3. Assess & Modify

*The primary phases in designing or redesigning storage policies are:*
The following highlight the key elements of each phase:

- **The Planning & Design Phase** focuses on gathering all information to properly determine the minimum number of storage policies required. Careful planning in this step will make it easier to build or modify policies and subclients. The objective is to determine the basic structure required to meet protection objectives. Modifications can later be made to meet additional requirements. Three separate chapters will be dedicated to the Planning and Design Phase:

  - **Basic Planning Methodology** which focuses on generic guidelines to building storage policies and subclients. This chapter will introduce protection matrix tables and how to use them to plan storage policy and subclient designs.

  - **Technical Planning Methodology** which focuses on technical requirements for providing a basic design strategy. This chapter will focus on library and data path configuration with an emphasis on Simpana deduplication.

  - **Content Based Planning Methodology** which takes a comprehensive end-to-end approach taking into consideration all aspects of business and IT requirements as well as integrating multiple technologies for a complete solution. This chapter will also introduce risk assessment which will be expanded on later in this section.

Although there will be some redundant information in each of these chapters it is recommended to go through each one before designing your design strategy. Each section will focus on different aspects of design and implementation of a CommCell environment.

- **The Build Phase** will focus on configuring storage policies, policy copies, and subclients. Proper implementation in this phase is based on proper planning and documentation from the design phase. There will be 2 chapters dedicated to the build phase:

  - **Creating & Configuring Storage Policies** which goes through the step by step process of creating and configuring storage policies. This chapter also has a series of tables listing all storage policy and policy copy options and detailed explanations and use cases for each option.

  - **Creating & Configuring Subclients** which takes a step-by-step approach to configuring subclients. This chapter also has a series of tables detailing subclient options with detailed explanations and use cases. **Note:** Since different agent subclients will have different options available, it would be impractical to explain every possible option so this chapter focuses on the most common settings for subclient configurations.

- **The Modification Phase** will focus on key points for meeting backup/recovery windows, media management requirements and environmental/procedural changes to modify, remove, or add any additional storage policy or subclient components. There will be two chapters dedicated to the modification phase:

  - **Modifications to Meet Protection & Retention Requirements** which focuses on specific options and features that can be used to modify the CommCell environment to meet specific...
Design & Implementation Methods

This section not only covers generic modifications but also details methods to improve specific systems such as virtual environment, databases, and file server backups.

- **Risk Assessment** which focuses on a multitude of technologies both CommVault based and 3rd party and provides Risk/Value/Cost analysis for each one. This is a very important aspect of data protection since changing technologies, features, or options may solve a problem but it could cause other problems.

It is important to note that The Design-Build-Modify approach is a cyclical process since an environment is always changing. Not only is this important for data growth and procedural changes, but it also will allow you to modify your CommCell environment and protection strategies based on emerging technologies. This will provide greater speed and flexibility for managing protected data as our industry continues to change at a rapid pace.

In each of these chapters extensive use is made of charts for documenting environments and storage requirements. These charts can be used as a basis for building your own charts specific to your needs. A shorthand notation system is used to represent various settings and options available in the Simpana product suite. The chapter *CommCell Notation* details all of the shorthand notation used in the following chapters.

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**A note on notation**

In my experience using CommVault I have come across a number of customers who have attempted to document their CommCell environments. Some documentation has been very well thought out. When we began to design the CommVault Storage Management training course, it was a high priority for us to design a methodology for implementation and a way to notate key configurations. I would like to thank everyone who shared their documentation methods with me which inspired me to work out the notation in this book.

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**Design Phase**

Proper design strategies can be based on the following key aspects of data protection:

- Meeting protection windows.
- Meeting media management requirements.
- Meeting retention needs.
- Meeting recovery objectives.
The two primary methods for designing storage policy solutions are technical based and content based.
Basic Planning Methodology Approach

This approach is generic in nature and is designed for CommVault engineers and administrators who are looking for basic guidance without getting too technical in design and implementation. It provides generic design charts which can be used as a basis for documenting a CommCell environment. The basic design methodology focuses on the following key areas:

- Requirements for custom content (subclients).
- Retention requirements for contents.
- Protection requirements for specific data types.
- Library and data path design.
- Simpana deduplication requirements.
- Build protection matrix charts.
- Build Simpana protection charts.

Technical Planning Methodology Approach

This approach is specifically for those who are primarily concerned with performance and other technical design aspects. There is emphasis on library design considerations and Simpana deduplication scaling and configuration. A basic case study is provided with a simple environment. Data from the protection matrix tables is used to assess deduplication scalability requirements, data path configuration, and the use of global deduplication policies. The technical planning methodology focuses on these key areas:

- Primary target data paths.
- Primary retention requirements.
- Data type requiring protection.
- Simpana deduplication requirements.
- Build protection matrix charts.
- Minimum number of policies required for implementation.
- Build Simpana protection charts.

Content Based Planning Methodology Approach

The content based approach is a comprehensive end-to-end approach that focuses on business data, its value, and best methods of protecting the data. This will require the most effort but will provide for the best design as well as the most flexibility to modify and scale the environment. By focusing so much attention on business requirements in the planning phase, protection / recovery windows and media management requirements will be more attainable, especially in large environments or environments with tight budgets.

Protection matrix charts will be expanded to include business and IT classifications, projected data growth, and priority level. Additional charts will be used for gap analysis to assess windows and media management requirements. It will also provide various technologies and Simpana features that can be used to shrink the gap.
The content based planning methodology will focus on these key areas:

- Survey the environment.
  - Identify business systems.
  - Identify and classify components of each business system as business or IT.
  - Determine SLA (protection windows, RTO and RPO), data retention and destruction policies.

- Gather technical statistics for data (location, dependencies, volume, projected growth…).

- Production & storage Infrastructure.
  - Data locations
  - Libraries
  - Data paths

- Simpana specific configurations to meet requirements.

- Assess current or proposed solutions.
  - Gap analysis

- Build protection matrix charts.

- Build Simpana protection charts.

**Build Phase**

The build phase focuses on storage policy and subclient designs. It will be divided into two chapters, *Creating and Configuring Storage Policies* and *Creating and Configuring Subclients*. These chapters contain steps for implementation and reference tables for settings and options for storage policies and subclients.

**Creating and Configuring Storage Policies & Subclients**

The flowcharts on the following pages illustrate the basic flow process to implementing storage policies
Basic procedures for determining storage policy settings based on library.

- Multiple Physical Libraries
  - Separate Physical Locations
    - Each Physical Location should have separate Storage Policies Defined
      - Disk Libraries
        - Using Simpana Deduplication
          - Client / Media Agents with LAN Free Paths
            - Option 1
              For Policy consolidation all Client / Media Agent data paths can be defined in a single policy if retention and other requirements are the same
            - Option 2
              Create Policies and group Client / Media Agent subclients based on retention and other requirements that are the same for the subclients
        - Tape Libraries
          - For Tape or Disk Library Storage Policy can be defined with multiple data paths using GridStor, Round Robin or Failover
  - NO
- Disks Libraries
  - GO to Disk Library using Simpana Deduplication
- Tape Libraries
  - GO to Disk Library using Simpana Deduplication
- Shared Library between multiple Media Agents LAN based Clients
  - Disk Library Using Simpana Deduplication
    - No

Tape library specific configuration options.
Simpana Deduplication specific settings.

- Protect object level or virtual machine using VSA Agent?
  - YES: Set dedupe block factor to 128k
  - NO: Recommend using dedicated policy with block size 256k or higher for best performance and scalability. If application performs compression disabled compression in the policy copy.

- Protect database data?
  - NO: Check with CommVault for current guidelines and best practices regarding DDB sizing and block sizes

- Large amounts of data with same protection requirements?
  - YES: Consider current and projected data sizes. Scale environment using multiple Media Agents and dedicated disk libraries. Each NAS/Lib should have separate policy for best performance and scalability.
  - NO: Continue with other configurations.

- Shared NAS Library with Multiple Media Agents?
  - YES: Use separate policy for each Media Agent path. Each dedupe database will be local to Media Agent. This will allow for more concurrent streams and higher scaling of dedupe database.
  - NO: Continue with other configurations.

- Shared SAN Library with Multiple Media Agents?
  - YES: Separate policies should be used for each Media Agent data path to shared library for best scalability and performance. Using a single library can have a major negative impact on auxiliary copy and restores.
  - NO: Separate policies should be used defining sufficient data that will be placed in SILO storage in one policy and data not required for SILO in a separate policy.

- Will SILO to Tape be Used?
  - YES: Design policy strategy to use single dedupe store (1 policy or multiple copies linked to global dedupe policy). Define all Media Agent paths and configure GridStor to Round Robin or Failover.
Process for determining secondary copy requirements.

- **Secondary Deduplicate Disk Target?**
  - YES: Use DASH Synchronous Copy to optimize bandwidth and disk usage.
  - NO:
    - **Secondary Tape Target or non-deduplicate disk?**
      - YES: Manage All Jobs (full, inc, ciff, log).
        - YES: Use Synchronous Copy.
        - NO: Use Selective Copy. Determine full backup interval (all, weekly, monthly, quarterly...).
      - NO: Manage Only Full Jobs.
    - NO: If required use extended retention for point in time copies with different retention needs.

- **Separate Retention for Subclient Data in Secondary?**
  - YES:
    - **Different Backup Retention Configuration?**
      - YES: Configure different secondary copies for each group of subclients requiring specific retention settings.
      - NO: Configure different secondary copies for each group of subclients requiring specific extended retention settings.
    - NO: Configure different secondary copies to manage backup and archive data to prevent mixed retention on tape media.
  - NO: Same secondary copy can be used to consolidate tape media required.
Isolate Subclient(s)
Streams to Specific Tape

Create secondary copy and associate subclient that will be placed on media. Use Combine to Streams option to determine number of tapes streams will be combined to.

Is Source Copy Disk with Multiple Mount Paths

Optionally set the Combine to Streams Multiplexing Factor to match the number of mount paths for faster auxiliary copy performance.

Isolate Subclient(s)
Streams within Data Set to Specific Tape for Faster Restores

Isolate streams within a dataset to a tape by creating separate secondary copies for each data set to be isolated and associate relevant subclients to each copy. Use the combine to streams option to copy all data set streams to specific media.

All streams within a dataset can be restored with single pass operation if streams have been sequentially copied or multiplexed to the same tape.
Process for determining subclient requirements.

1. Special Retention for Specific Content
   - YES
     - Content Defined by Drive / Folder / Database / VM
       - YES
         - Define custom subclient defining content requiring specific retention requirements
       - NO
         - Define custom subclient defining content requiring specific retention requirements
     - NO
       - Content Defined by File Type
         - YES
           - Define custom subclient using drive/folder path using wildcards to define file types requiring specific retention requirements
         - NO
           - Define custom subclient using drive/folder path using wildcards to define file types requiring specific retention requirements

2. Special Storage Requirements for Specific Content
   - YES
     - Content Defined by Drive / Folder / Database / VM
       - YES
         - Define custom subclient defining content requiring specific storage requirements
       - NO
         - Define custom subclient defining content requiring specific storage requirements
     - NO
       - Content Defined by File Type
         - YES
           - Define custom subclient using drive/folder path using wildcards to define file types requiring specific storage requirements
         - NO
           - Define custom subclient using drive/folder path using wildcards to define file types requiring specific storage requirements

3. Open File handling
   - YES
     - Windows 2003 or newer OS
       - YES
         - Define custom subclient for location requiring open file handling. Enable VSS in subclient properties.
       - NO
         - Define custom subclient for location requiring open file handling. Install and enable Simpana QSnap in subclient properties.
     - NO
       - Non-Windows OS
         - YES
           - Define custom subclient for location requiring open file handling. Install and enable Simpana QSnap in subclient properties.
         - NO
           - Define custom subclient for location requiring open file handling. Install and enable Simpana QSnap in subclient properties.

It is not recommended to use open file handling on volumes with databases or high I/O at time of data protection operation.
Create custom subclient. Use the Filters tab to include specific filters. If the filtering is required to override global filter settings use the Except For box to override defined filters.

Create custom subclient. Use Pre/Post Process scripts to insert scripts before or after the scan, backup or snap phases of data protection.

Create custom subclient defining content that will be content indexed.

Create custom subclient defining content as a UNC path. An impersonate user dialog box is used to enter user permissions with at a minimum Read Access to UNC path.
Additional Storage Policy Requirements based on Subclient Protection Needs.

Different subclients require different primary retention

- **YES**
  - Ease of Administration
  - Use separate policies for each retention requirement.
  - Policy Consolidation
  - If only a few subclients require different retention, use one policy. The policy can then be overridden using Advanced options when scheduling protection jobs for the subclient.

Backup & Archive Data Managed in Same Primary Copy

- **YES**
  - Primary Disk Target
  - Even if the Days retention is different, the same policy can be used.
- **NO**
  - Primary Tape Target
  - Unless the Days retention are the same for backup and archive, use separate policies.

Different subclients require different extended retention

- **YES**
  - Different policies must be created to meet extended retention requirements.
- **NO**

Different subclients require different Managed Disk Space Setting

- **YES**
  - Different policies must be created and Managed Disk Space enabled or disabled to meet retention requirements.
- **NO**

Different subclients require different setting for Retaining Intermediate Jobs

- Different policies must be created and Do not retain intermediate incremental or Differential jobs enabled or disabled to meet retention requirements.
Approaching Storage Policy Design

There is no one size fits all methodology for designing and configuring a CommVault environment. For many it is more of an art than a science where administrators and engineers use experience and intuition for proper implementation and configuration. The following chapters will approach policy design as more of a science providing specific methodology for proper design. The level of detail explained may or may not be the best solution for your environment. The balance of performance, media management, data retention, and ease of administration must be considered throughout the design and implementation process.
Consider these four basic rules for approaching storage policy design:

**Rule #1: Keep it Simple**
This section will describe several different methods for protecting data. It is designed to provide in-depth explanations and solutions for the most complex environments. But before overanalyzing and over-architecting the CommVault environment, use this one simple rule: **KEEP IT SIMPLE!** If rules 2 – 4 are being satisfied then there is really no reason to change anything. A complex environment leads to more complex problems.

**Rule #2: Meet Protection Requirements**
Data protection requirements MUST be met. Though it is true the only reason we protect data is to recover it, if you are not meeting your windows then you are not protecting data. You cannot recover something that never finished backing up so ensure protection windows are being met. In the following sections methods to improve performance will be discussed. Performance always starts with an adequately designed physical environment. Before tweaking CommVault software to improve performance, ensure that Clients, Media Agents, and networks are scaled appropriately.

**Rule #3: Meet Media Management Requirements**
In an ideal world data would simply be preserved forever. With the dropping cost of disk storage and deduplication, most data can be retained longer. As with anything this comes at a price. The best way to approach media management is to ensure the business end understands your capabilities and limitations for preserving data. Sometimes a ‘Pie in the Sky’ vision of protecting data can be brought right down to reality through a little education and a cost association of the business requirements. Although you understand the capabilities and limitations of your storage, the non-technical people may not. Provide basic guidance and education so they better understand what you and the Simpana product suite are capable of doing. You may not have the power to make the final decisions but you do have the power to influence the decision process.

**Rule #4: Meet Recovery Windows**
Recovery windows are made up based on Service Level Agreements (SLA).

For data protection and recovery an SLA is made up of three components:
- Protection Windows
- Recovery Time Objectives (RTO)
- Recovery Point Objectives (RPO)

When designing a CommCell environment focus should always be placed on how data will be recovered. Does an entire server need to be recovered or only certain critical data on the server require recovery? What other systems are required for the data to be accessible by users? What is the business function that the data relies on? What is the associated cost with that system being down for long periods of time? The following sections will address RTO and RPO and methods for improving recovery performance.