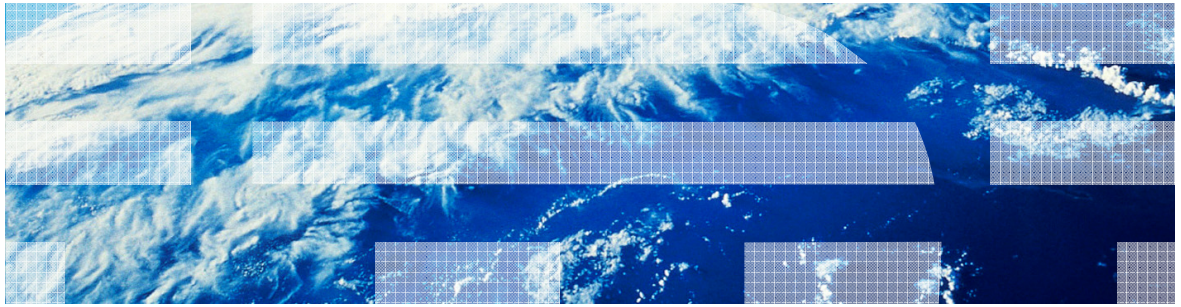
# Content Storage



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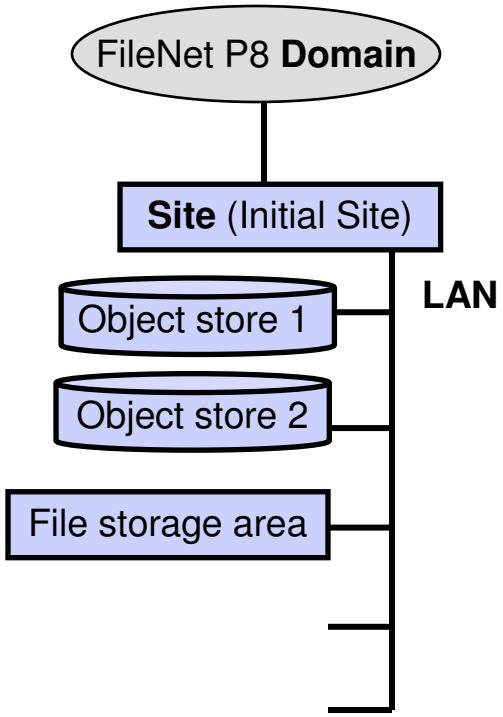
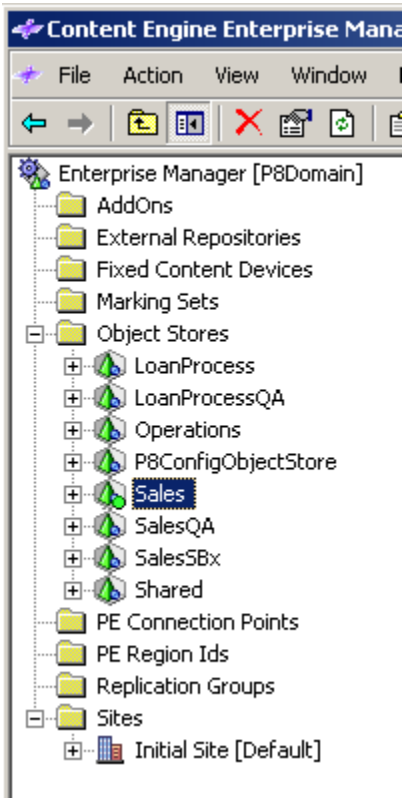
# Content Engine storage components

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# What is a FileNet P8 domain?

- A logical grouping of physical resources.
  - Content Engine servers
  - Sites
  - Object stores
  - Index areas
  - Storage areas
  - Content cache areas
  - Other elements
- Global Configuration Database (GCD)
  - Holds the information defining the FileNet P8 domain.

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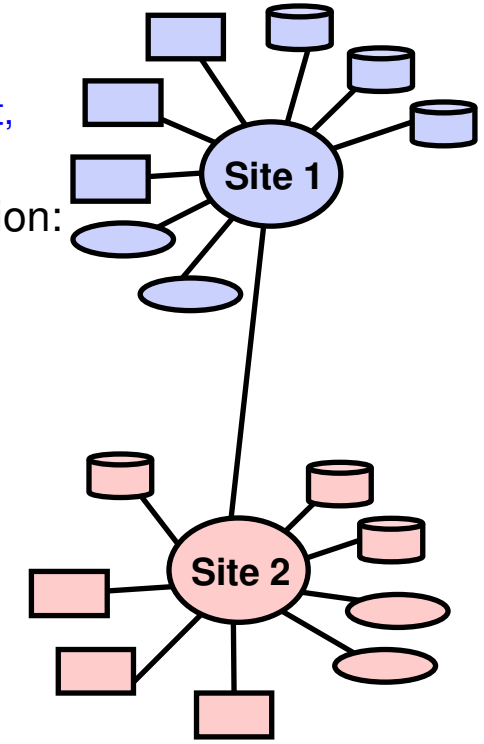
# What is a site?

- A node in the FileNet P8 domain
- Represents a geographical location
  - Where resources are connected by a fast, reliable LAN
- Each site can have its own configuration:
  - Object stores
  - Storage areas
  - Content cache areas
  - Virtual servers
- Used to optimize network traffic

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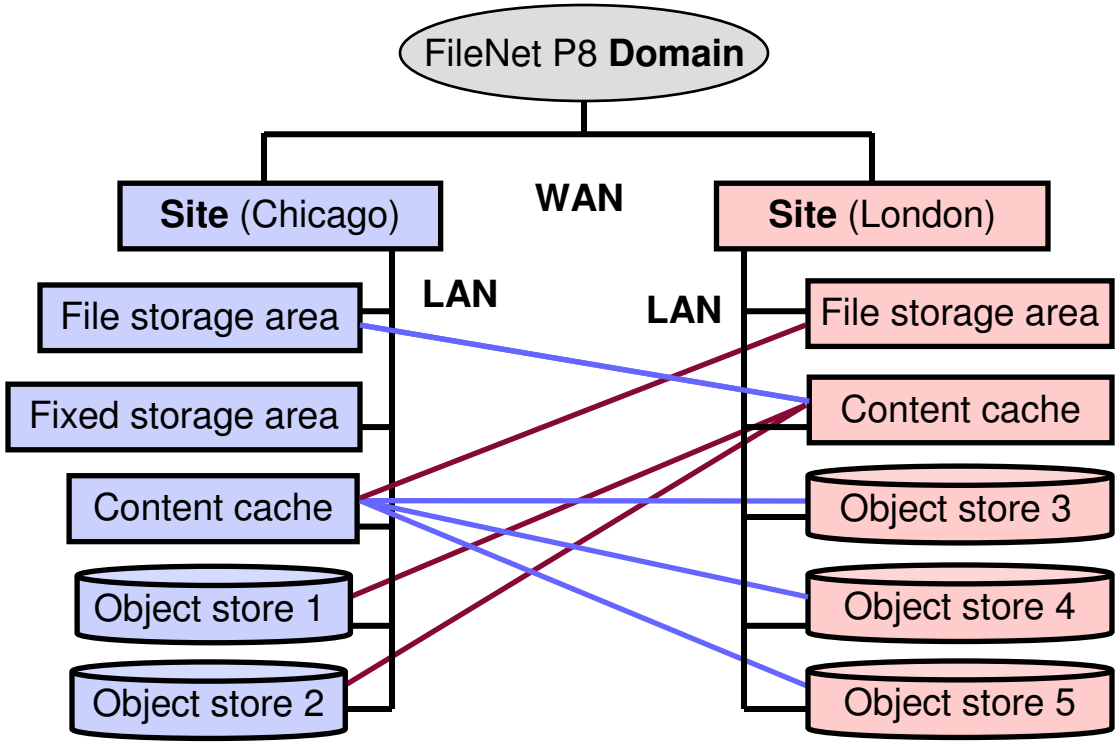
# Sample FileNet P8 domain

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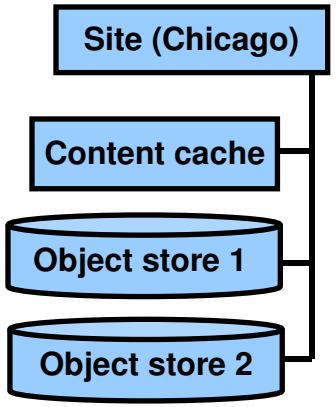
# What is an object store?

- A repository for storing objects
  - Object metadata is in a database.
  - Content can be stored in the database. Or, it can be stored in one of the following:
    - File storage area
    - Fixed storage area
- An object store consists of the following:
  - One instance of a database (or tablespace) to manage objects
  - One or more content stores to hold document content
  - An entry in the FileNet P8 GCD

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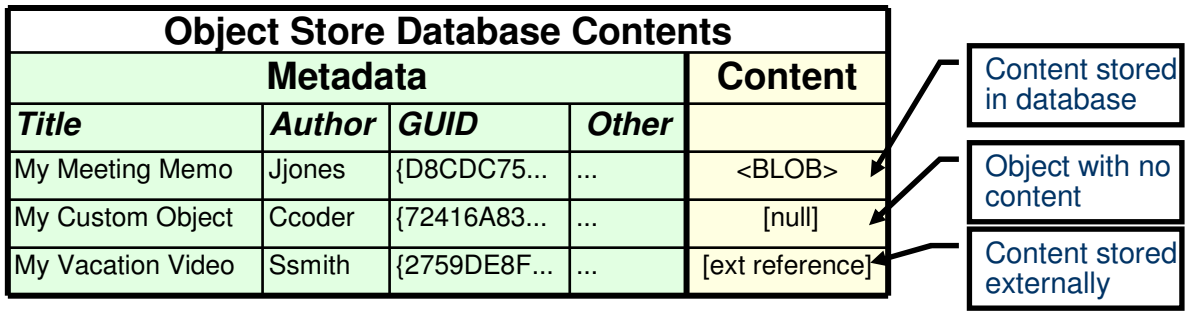
# What is the object store database?

- A container for the object store contents and properties
  - Object store properties are metadata that identify the object store and define its behavior.
  - Object store content includes metadata and (optional) object content.
- Each object store uses one database.
- Each database is exclusive to one object store.
- Content can be stored directly within the database as BLOBs.
  - Recommendation: Restrict size to 10 KB or smaller.

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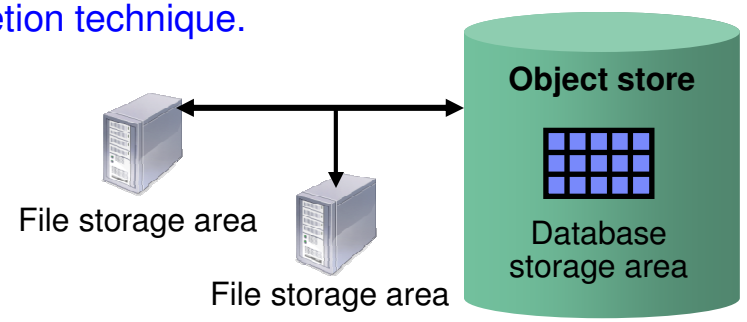
# What is a file storage area?

- An area in the file system to store document content
  - Located in a folder on a local or distributed file system.
  - Associated metadata is stored in the database store.
- Dependent on at least one object store
- Use a file storage area in these circumstances:
  - Document size is greater than 10 KB, to improve retrieval performance.
  - Documents are grouped by different maintenance procedures.
  - You must control file deletion technique.
- Storage Policy
  - To specify which document classes use the file storage area
  - Covered later

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# What is a content cache area?

- Content cache
  - A storage area in a file system used to temporarily hold files and database content for faster retrieval
    - By providing local storage of frequently accessed documents without having to repeatedly request them over the network
  - Caches document content upon retrieval
    - From databases
    - From file storage areas
  - Can be configured to cache content at the time it is added to the object store

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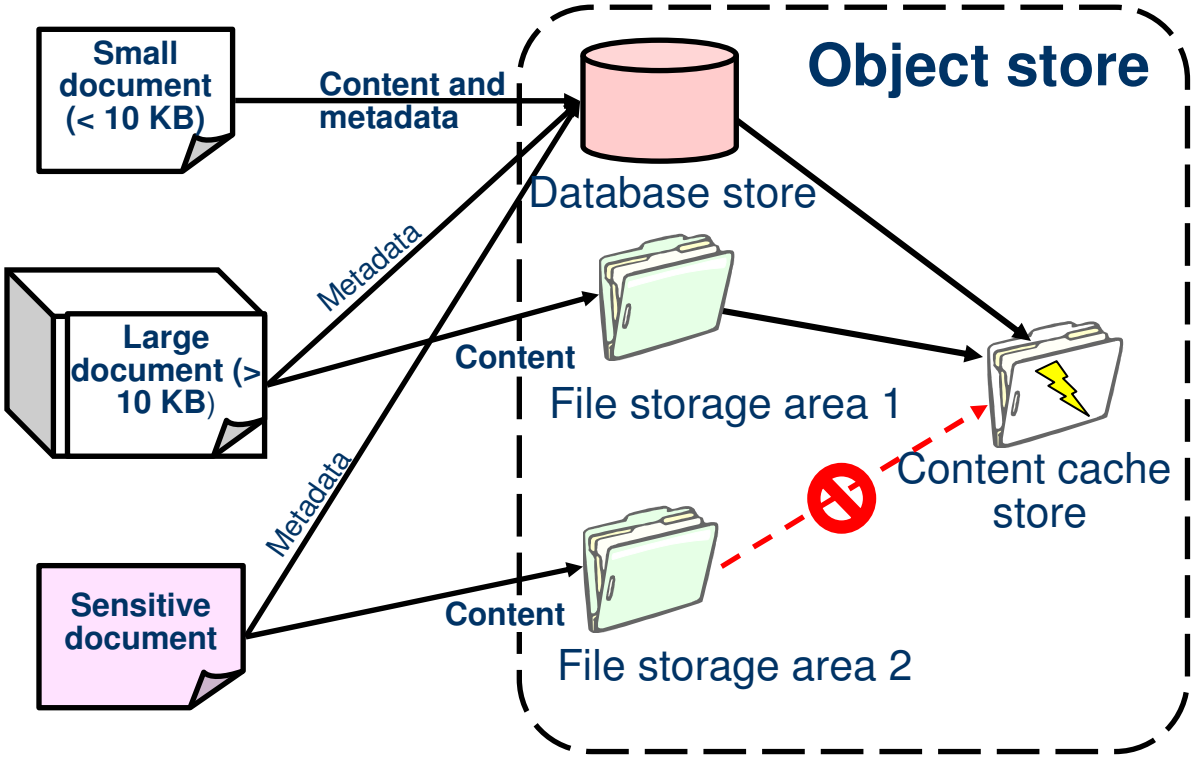
# Using object store components

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# Object store planning guidelines

- Plan the number of object stores needed to do the following:
  - Support enterprise IT organizational structure
  - Simplify security for many document types
  - Simplify deep folder structures
  - Improve search performance
  - Support applications such as Records Manager
- Plan one or more file storage areas in order to do the following:
  - Improve retrieval performance for large documents
- Plan a content cache area in order to do the following:
  - Improve system performance using content caches

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# Prerequisites for creating an object store

- A database
  - Each object store must have its own database created prior to creating an object store.
- Two Java Database Connectivity (JDBC) data sources
  - Each object store must have two JDBC data sources to connect to its database.
    - One for nondistributed (non-XA) transactions, which are one-phase-commit transactions involving a single resource.
    - One for distributed (XA) transactions, used to support two-phase-commit transactions across multiple databases or different types of resources.
  - You create these data sources using the IBM FileNet Configuration Manager.

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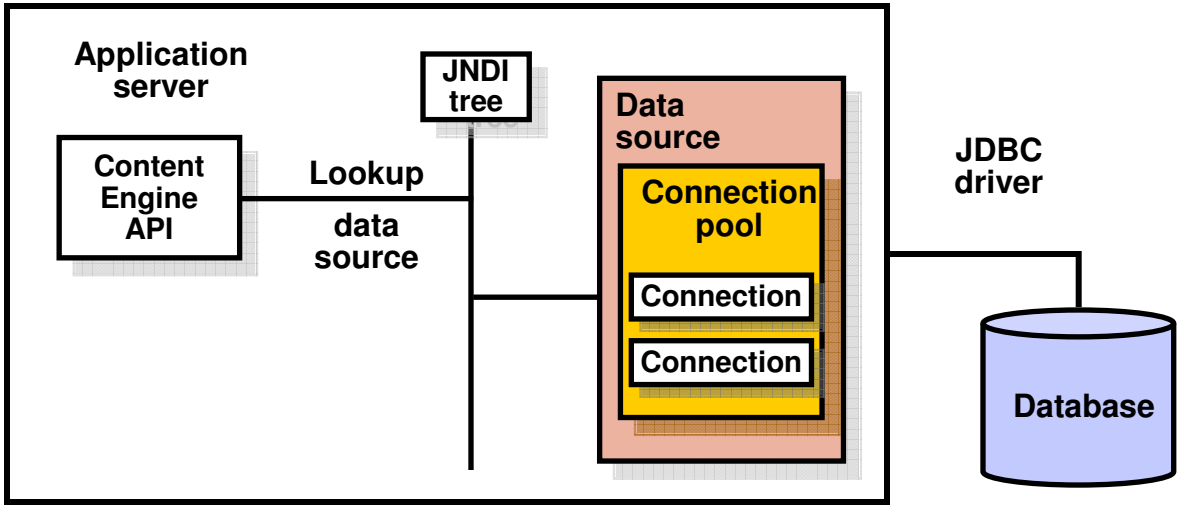
# How are data sources used?

- Each data source contains a pool of database connections
  - Applications get a database connection by looking up the data source on the JNDI tree and then requesting a connection.
  - The data source provides the connection to the application from its pool of database connections, using a JDBC driver.

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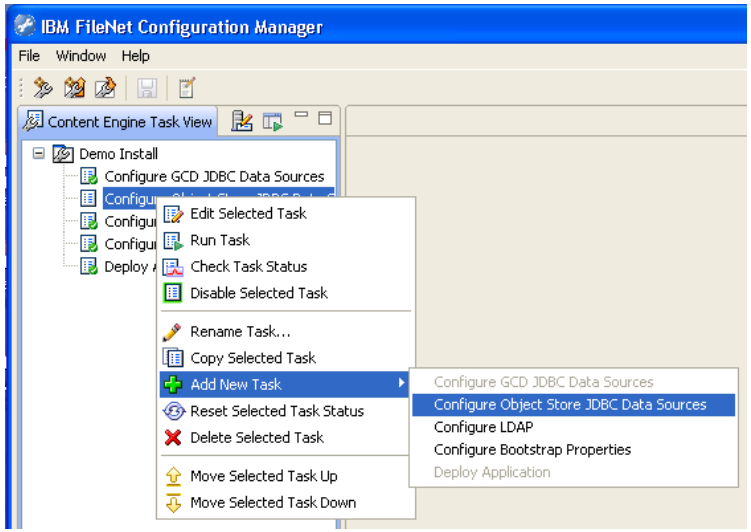
# What is Configuration Manager?

- A multipurpose tool
  - Used to create or modify profiles that are used for building Content Engine instances
  - Used for configuring data sources required for object stores
    - JDBC connections
    - LDAP connections
  - Configuration Manager manages these tasks as a collection referred to as a *configuration profile*

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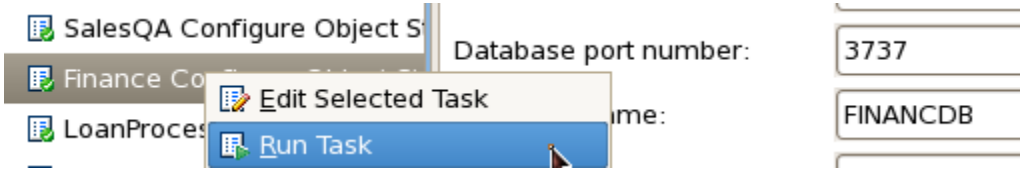
# CreateDataSources.cfgp profile

- Example data source configuration task

| *Finance Configure Object Store JDBC Data Sources* | |
|---|---|
| **JDBC driver name** | **DB2 Universal JDBC Driver** |
| **JDBC data source name** | `FinanceDS` |
| **JDBC XA data source name** | `FinanceDSXA` |
| **Database server name** | `localhost` |
| **Database name** | `FINANCDB` |
| **Database user name** | `osdbuser` |
| **Database password** | `IBMFileNetP8` |
| **Database port number** | `3737` |

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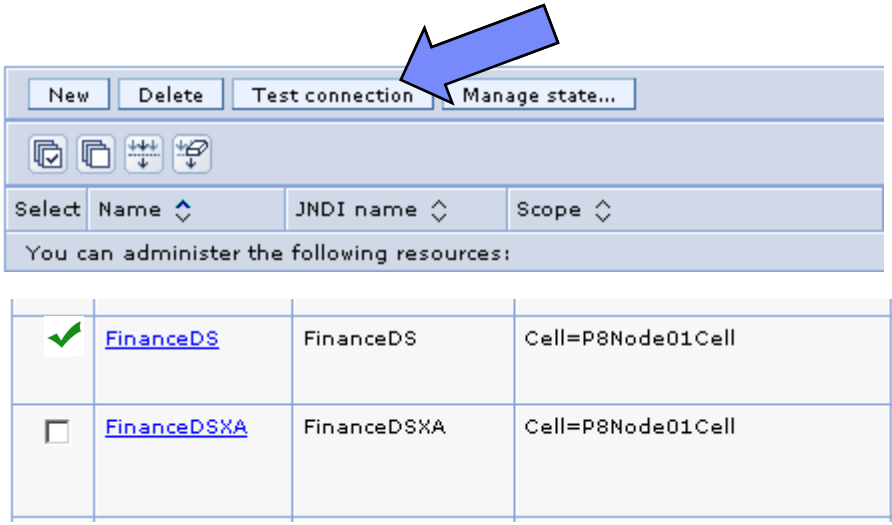
# Testing JDBC data sources

- For example:
  - Using the WebSphere Administrative Console

    **`http://<ServerName>:9043/ibm/console/logon.jsp`**
  - Resources > JDBC > Data sources

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# Using the Object Store wizard

- The Object Store wizard prompts for the following:
  - Display name
  - Data sources (created using the Configuration Manager)
  - Default content storage location
    - Database, file storage area, fixed storage area
    - Advanced button: Use of separate storage locations for data tables, index data, and LOB (next slide)
  - List of administrative users for the object store
  - List of initial users for the object store
  - Selected AddOns

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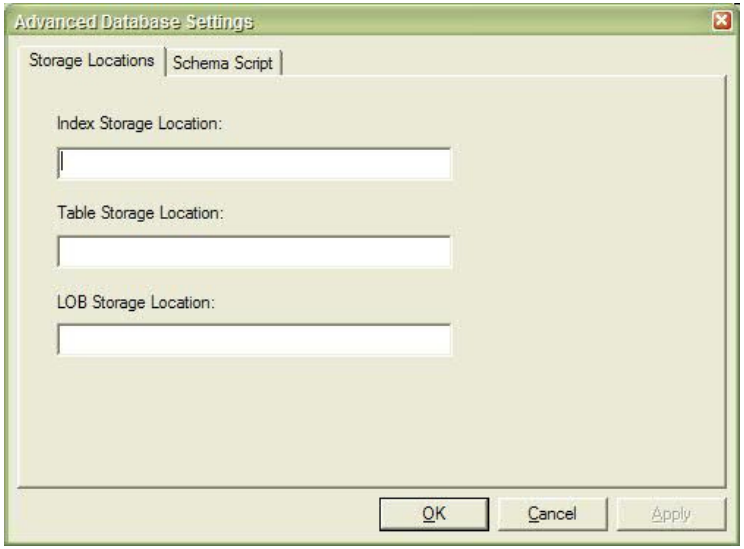
# Distribute data tables, indexes, and BLOBs

- Storage location options
  - Object store data tables, indexes, and storage for document content BLOBs can be created in separate tablespaces or file groups.
- Benefit:
  - More flexible database provisioning as directed by your database administrator.

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# Modifiable scripts for object store creation

- Scripts for object store creation can be edited by database administrator.
- Benefits:
  - Fine-grained control of data (individual tables) available when provisioning to tablespaces.
  - Allows for partitioning tables.

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# De-select unneeded AddOns

- AddOns
  - Select only needed AddOns during Object Store creation.
  - Can add or remove later using Enterprise Manager
- Benefit:
  - Saves row space in object store data tables.
- Workplace AddOns still selected by default.
  - The Workplace AddOns are needed for testing during FileNet P8 installation.
- CFS-IS AddOn
  - Need to explicitly select the CFS-IS AddOn if you are deploying CFS-IS federation.

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# Ramifications of changing an object store

- Specify initial users correctly the first time
  - A change in security on an object store after content is added requires using the Security Script Wizard and the Query Builder tool.
- Consequences of changing display or symbolic names:
  - A change in the object store symbolic name or the display name of an object store in a production environment can cause problems.
  - A change in the name of the object store does not change the name of the associated database or any other properties or objects.
- Deleting an object store.
  - Delete the object store in FileNet Enterprise Manager.
  - Delete associated content stores manually.
  - Delete the associated database or tablespace.
  - Optionally, retain the database for reuse.

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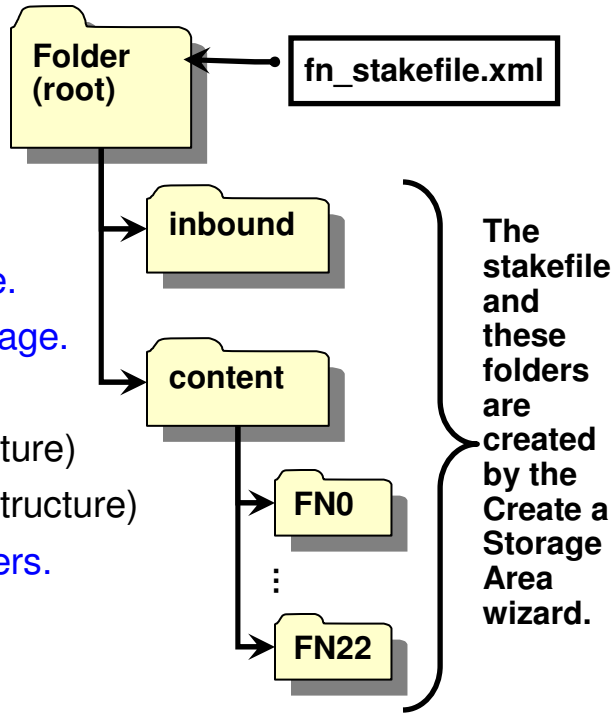
# What is a file storage area?

- File storage area
  - Container for document content
  - Exists on a local or network drive accessible by the Content Engine server.
- Structure
  - Root folder contains fn_stakefile.
  - Inbound folder = temporary storage.
  - Content folder contains
    - 23x23 subfolders (Small structure)
    - 23x23x23 subfolders (Large structure)
  - Content is stored in the subfolders.

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# File storage area folder security

- Root folder
  - Each file storage area must have its own accessible root folder.
  - Contains the file storage area contents in a series of subfolders.
  - Must exist before the file storage area can be created.
- Root folder security
  - Content Engine server must have full access to the folder.
  - Network security controls physical access to the folder and its contents.
  - FileNet P8 object security permissions control access by FileNet P8 users and applications.

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# File storage area properties

- Name
- Location
  - Local or remote folder
  - Assigned object store
- Configuration
  - Online (status)
  - Allow new content
  - Allow delete
  - Content caching settings
  - Indexed (status)
  - Delete method
    - Nonrecoverable
    - Destructive
    - Purge
- Statistics
  - For monitoring
- Storage policies
- File storage size parameters
  - Directory structure
    - Small
    - Large
  - These settings can be changed after creation:
    - Maximum size (in MB)
    - Maximum number of elements

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# Guidelines for managing file storage areas

- How many file storage areas do you need?
  - A storage area can serve only one object store.
  - Create separate file storage areas to ensure efficient document management.
- Disable content caching
  - For file storage areas that contain confidential documents.
  - Caching is disabled by default for file storage areas.
- What security level do you need for content deletion?
  - Nonrecoverable: lowest security, quickest performance
  - Destructive: medium security
  - Purge: highest security, slowest performance
- Enable and disable storage areas
  - Use FileNet Enterprise Manager.

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# Set default storage location

- Where is document content stored?
  - In the database
  - In a storage area
  - Document class properties control the default storage location.
- Modify the document class definition
  - You can set both a default storage area and a default storage policy.
    - The Default Storage Area setting takes precedence.
    - Storage policies are described in the next lesson.
- The default content location can be overridden
  - When a document is added using FileNet Enterprise Manager.
  - Content location cannot be overridden using FileNet Workplace XT.

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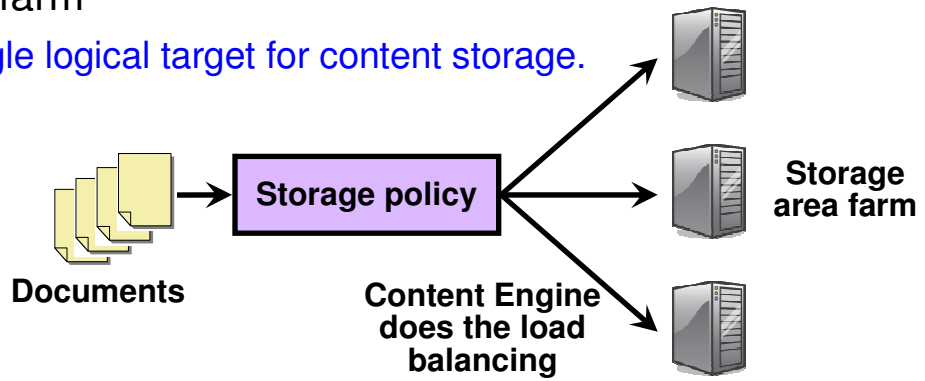
# What is a storage policy?

- Storage policy
  - Determines where document content is stored.
  - Is used for storage area farming.
  - Maps to one or more storage areas.
  - Can be assigned to classes or documents.
  - Can be modified or deleted as needed.
- Storage area farm
  - Acts as a single logical target for content storage.

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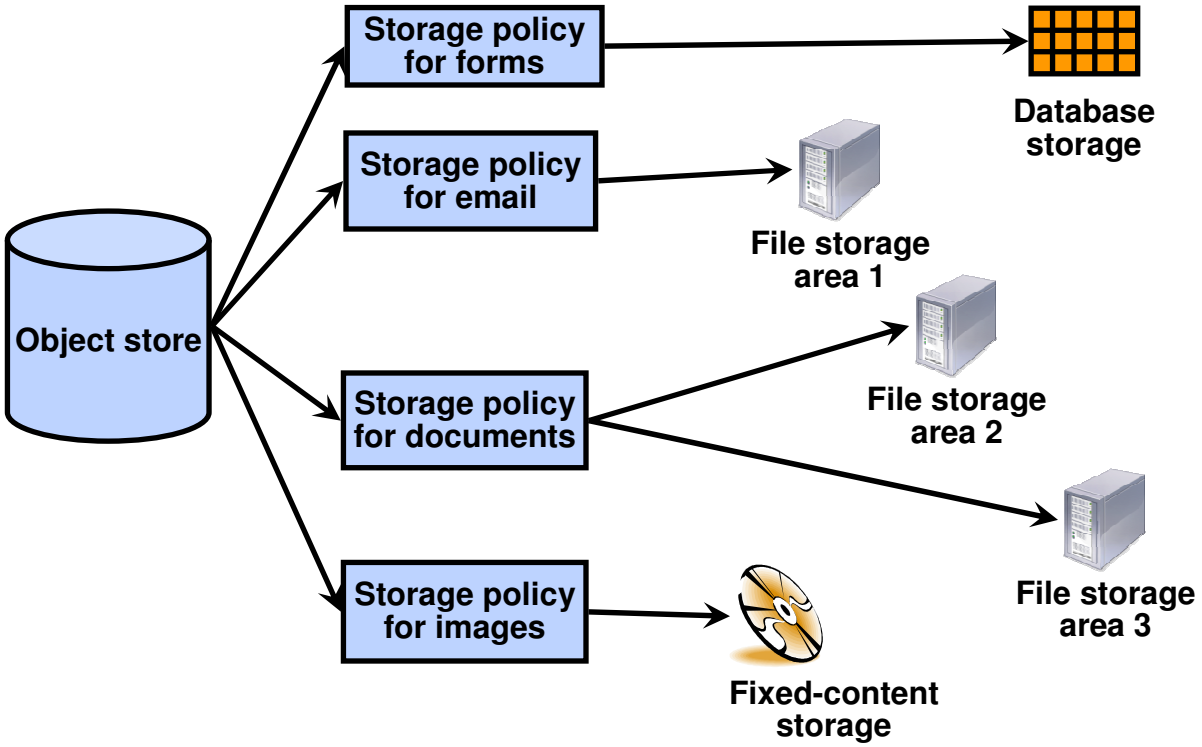
# Using storage policies (1)

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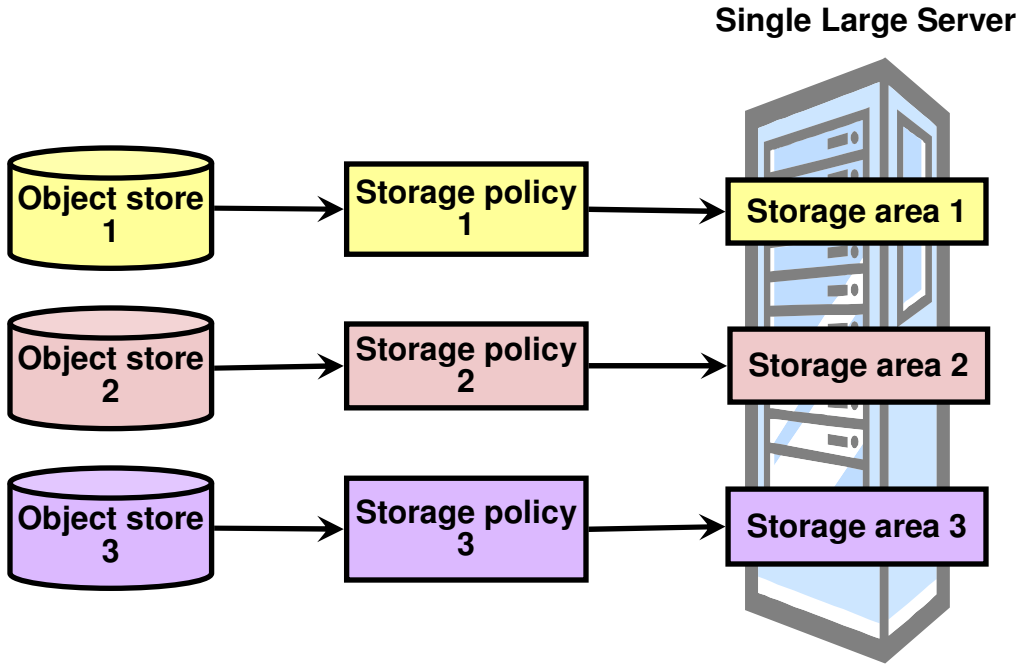
# Using storage policies (2)

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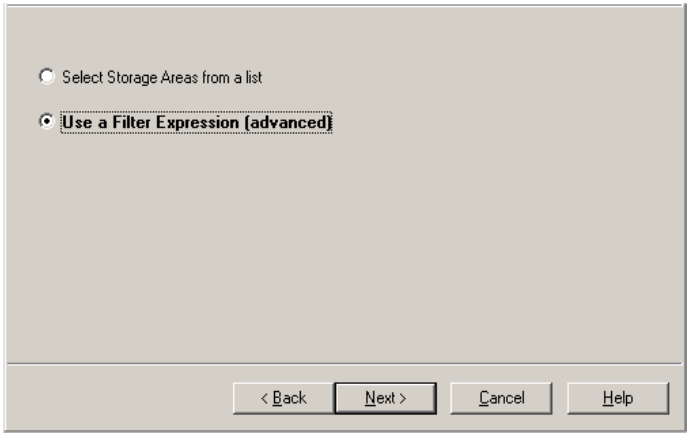
# Create a file storage policy

- Create storage policies in FileNet Enterprise Manager.
  - Use Storage Policies node of the object store.
- Supply the name and the description.
- Assign storage areas:
  - Select from list.
  - Or, use a filter expression.

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# Assigning storage areas to a policy

- Direct selection
  - Select one or more storage areas from a list of available storage areas.
- Storage policy filter expression
  - Edit the filter expression to select storage areas that meet specific requirements.
- Example filter expressions
  - `(1>0)` Returns all storage areas that are online.
  - `IsClass(Source,FixedStorageArea)` Returns all fixed storage areas.
  - `IsClass(Source,FileStorageArea)` Returns all file storage areas.

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# Content cache overview

- The content cache handles content only.
  - Both API layer and Workplace XT have their own property caching.
  - The cache works for both file and database content stores.
- Content cache performance
  - Customers can add as many caches as required to improve response times for retrievals.
  - Supports write-through caching
  - Is a function of the Content Platform Engine, not of the Web server
- Any client can use a cache
  - Workplace XT, Custom Java application, Enterprise Manager, Administrative Console for Content Engine, IBM Content Navigator
- Resides on
  - The Content Platform Engine server, or on a network share

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# Declaring a content cache

- You can declare a cache in one of the following:
  - Site definition
  - Virtual Server definition
  - Server definition
- You can override the default cache assignment
  - At each definition level
- Configuration
  - Unless you assign specific servers to the cache, all member servers of a site or virtual server use the same configured cache.
  - Default setting for any given storage area is that caching is enabled cross-site only.

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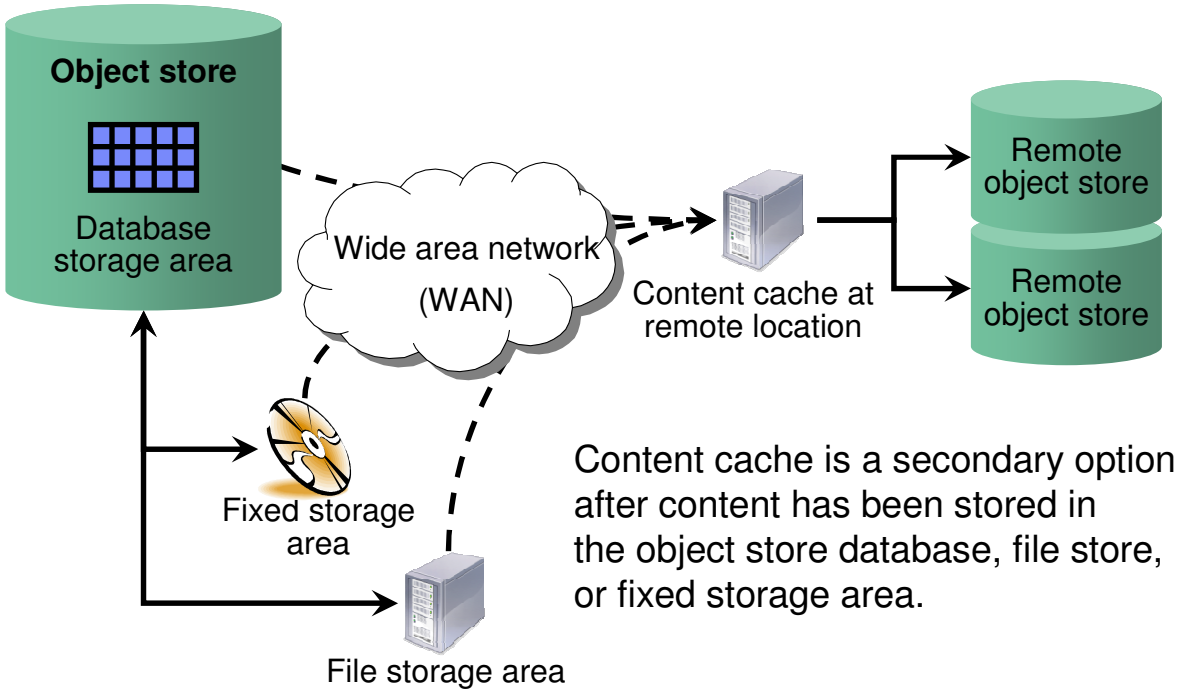
# Content cache at a remote location




Content cache is a secondary option after content has been stored in the object store database, file store, or fixed storage area.

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# Other content cache attributes

- Content preloading
  - A cache can automatically load content upon document checkin.
- Cache size
  - A cache can automatically prune (delete) content that has not been accessed recently.
- Periodic pruning
  - Triggered by the Content Lifespan property
  - Occurs automatically halfway through the period specified by the Content Lifespan property.
- Mandatory pruning
  - Removes content files in a least-recently-accessed order to achieve a calculated target total.

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# Content cache performance guidelines

- Optimize pruning thresholds
  - Using the Threshold Size property
  - Using the Threshold Elements property
- Preload accessed content only
- Adjust Content Lifespan property
  - Shorter lifespan increases re-fetching of content
  - Longer lifespan requires a larger cache area
- Make the cache accessible to all servers in the domain
  - Accessible from every Content Platform Engine server in the FileNet P8 domain.

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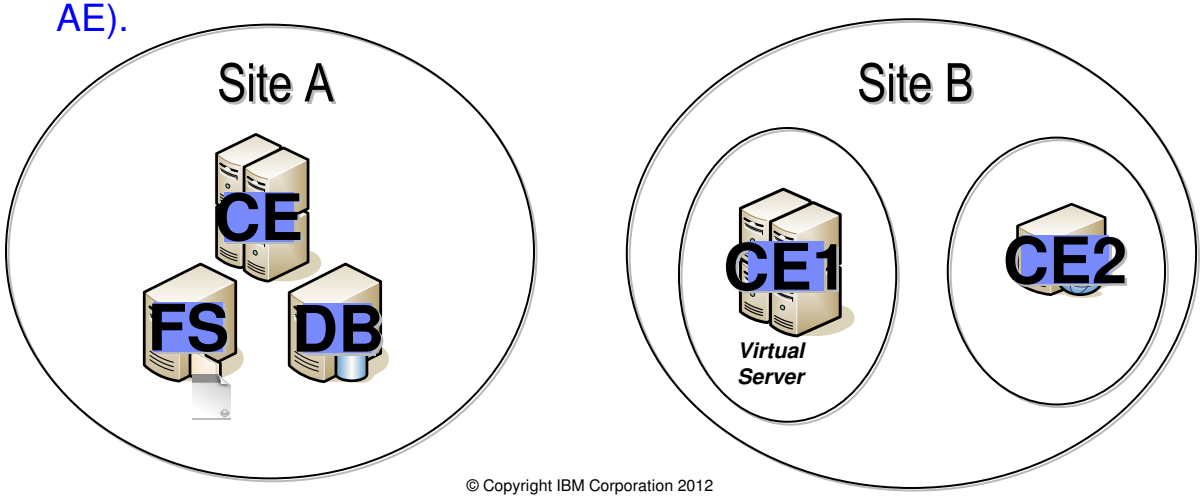
# Content cache example

- Original system configuration
  - Site B has a WAN connection to the database and file store.
  - Two applications run on Site B.
  - A farm of CE servers is configured as a virtual server on Site B, and is being used for one application through a AE server.
  - The second application is used by a department (uses one CE and AE).

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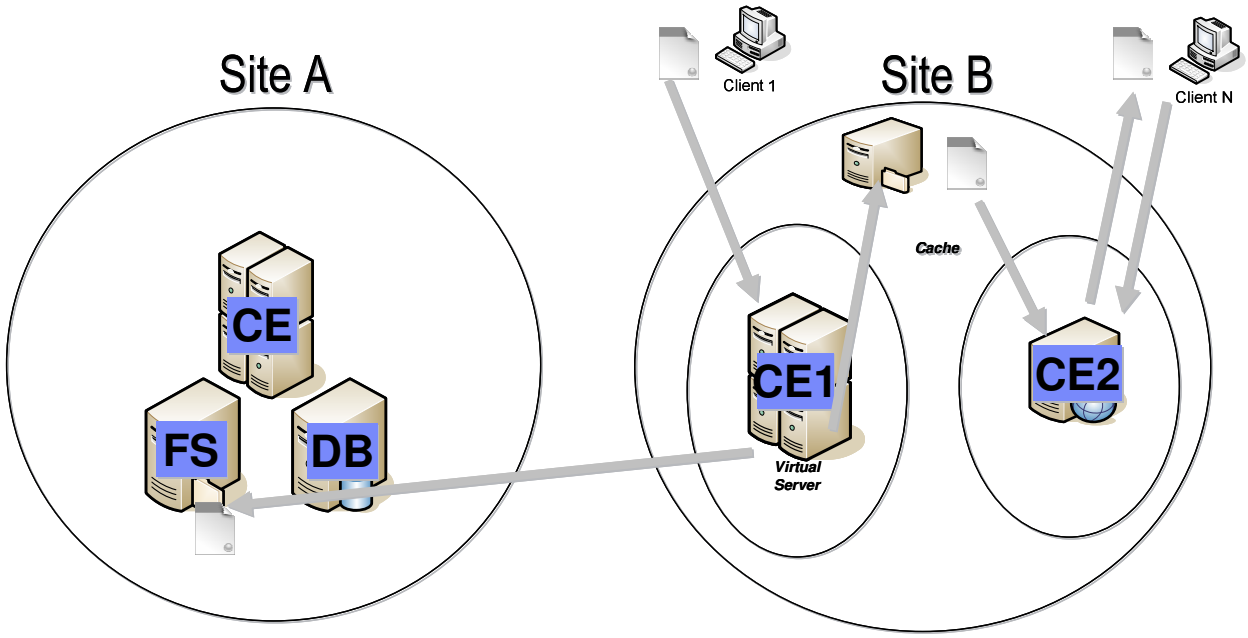
# Add a cache server

- To reduce response time
  - Implement cache at the site level or the virtual server level.

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