

Caching SMB Data for Offline Access and an Improved Online Experience

- ❑ What is Offline Files
- ❑ How does Offline Files interact with SMB
- ❑ Offline Files enhancements for Windows 7
- ❑ Questions

What is Offline Files?

Motivations for Offline Files

- ❑ Customers want to consolidate user data on file servers for easier management
 - ❑ Folder Redirection allows user's data on Windows client to be redirected to a file server
- ❑ Offline Files allows this data to be cached locally for improved performance and access to the data when disconnected from file server
- ❑ Supports synchronization of data between the client cache and the file server to keep data up-to-date

How is Offline Files Deployed?

- ❑ Most commonly through Folder Redirection deployments
 - ❑ In enterprises, through Group Policy
 - ❑ In small/medium size businesses, through scripts or manual configuration
- ❑ For user selected SMB share, through Explorer UI
 - ❑ “Always Available Offline” context menu option

Offline Files Connectivity States

Online Access

File access is achieved through the server.
“Regular” file share access experience.

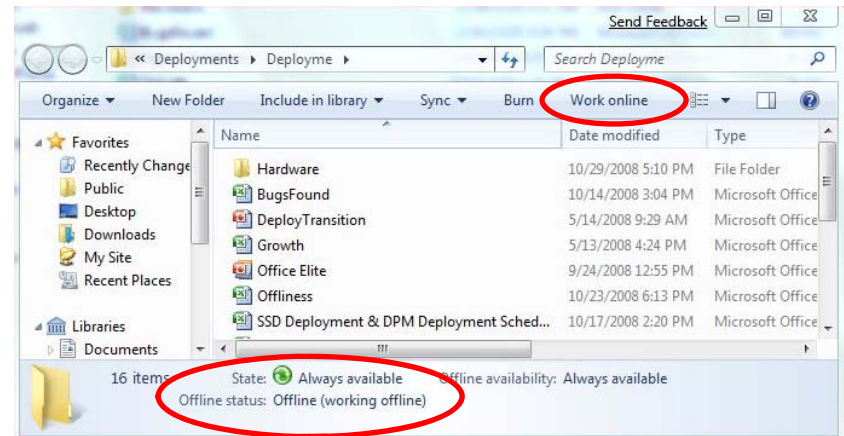
Offline Access

File access is achieved through the client cache only.

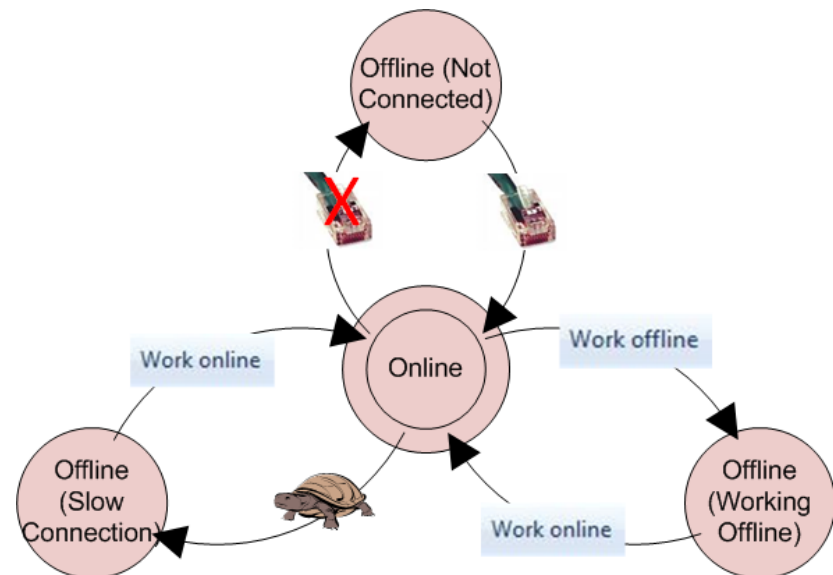
Offline modes possible:

- ❑ Offline (Not Connected)
 - ❑ Server is not reachable
- ❑ Offline (Working Offline)
 - ❑ User intent to work from the cache
- ❑ Offline (Slow Connection)
 - ❑ Slow connection detected
 - ❑ Designed for better experience in Remote Access scenario

Explorer Experience



State Transitions



- ❑ Sync Center is the dashboard for synchronization management
- ❑ Shows last synchronization time, conflicts and errors
- ❑ Users can take action to resolve synchronization issues

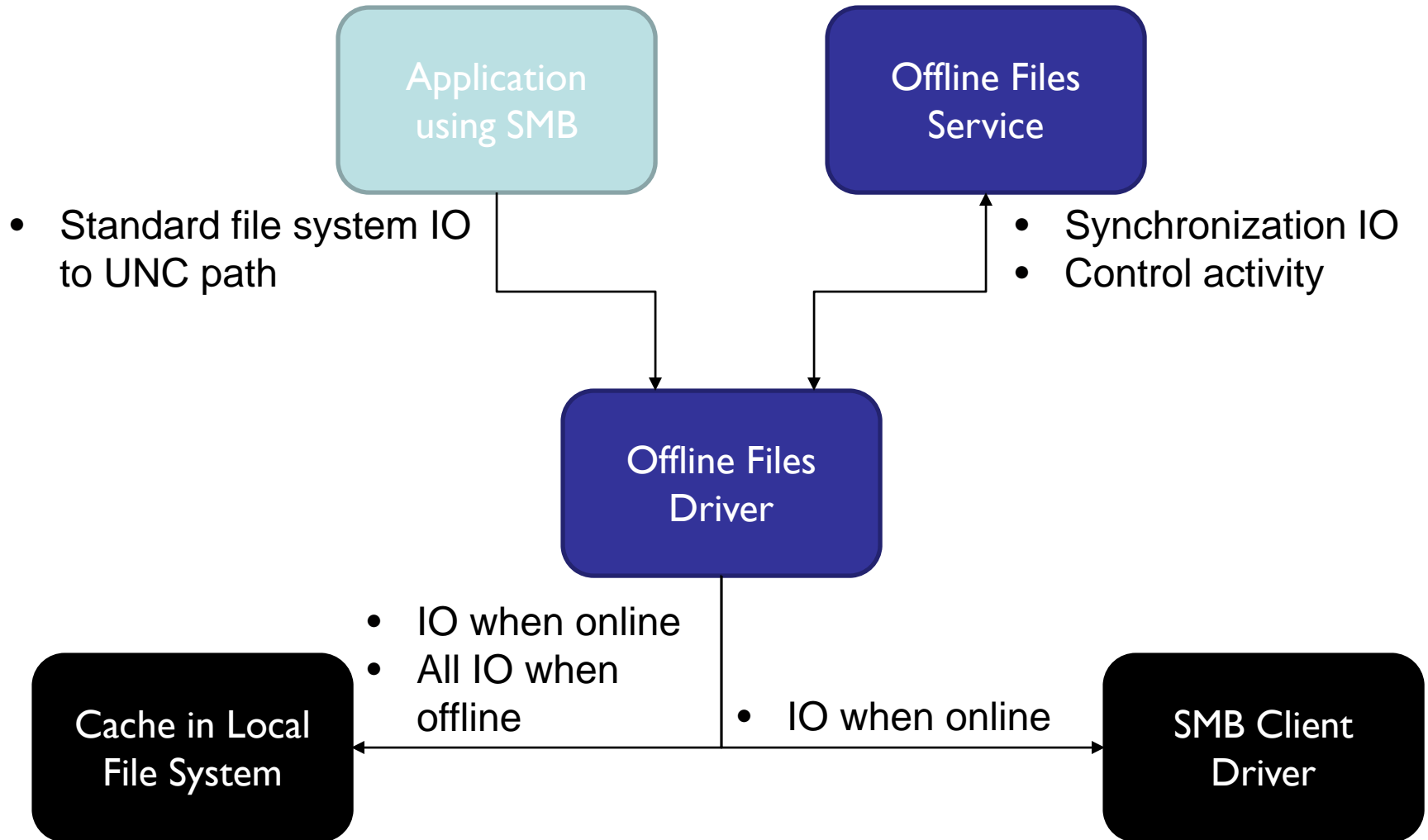
- ❑ COM interfaces expose rich set of APIs for controlling and enumerating the Offline Files cache
 - ❑ IOfflineFilesCache is primary interface
- ❑ WMI interfaces for scripting of management tasks
 - ❑ Win32_OfflineFilesCache is primary interface
- ❑ All documented on MSDN

How does Offline Files interact with SMB?

- ❑ Share caching mode returned from server during connection negotiation
 - ❑ Manual cache – data will be cached when explicitly requested
 - ❑ Auto cache – data will be cached as it is accessed
 - ❑ No cache – no data will be cached
- ❑ Flags for these modes as exposed through NetShareGetInfo(), SHARE_INFO_1005 level
 - ❑ CSC_CACHE_MANUAL_REINIT
 - ❑ CSC_CACHE_AUTO_REINIT
 - ❑ CSC_CACHE_NONE

- ❑ Server support for opportunistic lock
 - ❑ To ensure proper cross-client cache coherency when online, Offline Files will only cache or use data from the cache when protocol allows the client to cache data reads and writes
- ❑ Get improved caching if server supports enhanced opportunistic lock of SMB v2.1 (requires Windows 7 client)

Architectural Overview



Offline Files Driver Behavior

- ❑ Caches data using logical names
 - ❑ If DFS namespace is deployed, these names are cached
- ❑ When online, filtering traffic to SMB
 - ❑ Keeps cache up-to-date as application touches files
 - ❑ Prepared to transition offline if needed and maintain file handles
 - ❑ Fulfills read operations from cache
- ❑ When offline, acts to complete IO requests made by applications based on cache in local file system

Offline Files Service Behavior

- ❑ Drives all synchronization work
 - ❑ Enumerates client and server to determine changes
 - ❑ Initiates appropriate data transfer
- ❑ Background tasks to:
 - ❑ Fill cached files
 - ❑ Manage automatic online-to-offline or offline-to-online transitions
- ❑ Provides cache state to UI elements

Offline Files enhancements for Windows 7

Focus Areas for Windows 7

- Improve WAN file access
 - End user responsiveness over slow network links
 - Reduced bandwidth utilization
- Improved network file experience for remote users

“Usually Offline” Support

- ❑ Automatic transition from slow-link to online mode
- ❑ Full 2-way background synchronization at fixed intervals
- ❑ Synchronization transparent to the end user
- ❑ IT administrator can configure synchronization intervals and more

- ❑ Seamless experience for end-users
- ❑ Optimizes the network usage for remote and branch office workers

- ❑ Files accessed on shares are automatically cached to disk when server connection is slow
 - ❑ Subsequent reads to the file are satisfied from the local cache
 - ❑ Best effort only – data not in cache will be retrieved from server
- ❑ Transparent to the end user
 - ❑ User doesn't need to establish formal synchronization partnership with server
 - ❑ Data integrity and access permissions are maintained

BranchCache Integration

- ❑ Built on Transparent Caching to use the BranchCache infrastructure to populate the Offline Files cache
- ❑ File identifier downloaded from server and used for branch retrieval
- ❑ Cached files are ‘published’ to BranchCache
- ❑ Subsequent accesses to the cached files are satisfied from the branch
- ❑ Operates in two modes:
 - ❑ Distributed cache
 - ❑ Hosted cache

- ❑ Two changes in SMB v2.1 protocol to support this
 - ❑ New share flag:
`SH11005_FLAGS_ENABLE_HASH`
 - ❑ Indicates that server supports returning file identifiers
 - ❑ New control code: `FSCTL_SRV_READ_HASH`
 - ❑ Client issues this to retrieve file identifiers
 - ❑ Server response with file identifier content or an appropriate error

Questions