Diploma in Infocomm & Security

IT2654: Systems Administration & Security

TOPIC 7:
FILE SYSTEM MANAGEMENT

Objectives

- Understand and configure file and folder attributes
- Understand and configure advanced file and folder attributes
- Implement and manage disk quotas

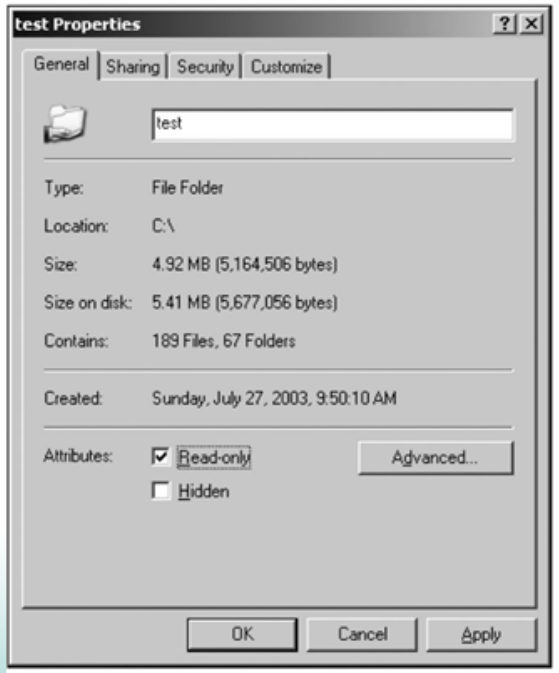
File and Folder Attributes

- Used since MS-DOS operating system
- Attributes describe files, folders, and their characteristics
- Can use graphical tools and the ATTRIB command to access them
- Four common file and folder attributes
  - Read-only, Archive, System, Hidden

```
D  Directories                R  Read-only files
H  Hidden files               A  Files ready for archiving
S  System files               I  Not content indexed files
L  Reparse Points             -  Prefix meaning not
```

Read-only

- Designates that the contents of a file cannot be changed and file cannot be deleted
- Available in all file systems (FAT, FAT32, NTFS partitions and volumes)
  - ✓ FAT, FAT32 attributes can be changed by any user
  - ✓ NTFS attribute can only be changed by a user with appropriate permissions
- Can be configured for a file or folder
  - ✓ For folders, attribute pertains to the files it contains, not the folder itself



Archive

- Marks which files and folders have been recently changed or created
- Archive bit – 1 or 0 (0 = backup, 1 = not backup)
- Important for backup methods:
  - Full backup – reset it
  - Incremental backup – reset it
  - Differential backup – does not reset.
- Viewing the attribute is done using Windows Explorer or command-line utilities (e.g., DIR, ATTRIB)

Hidden

- Make files and folders less visible to users from File Explorer and command-line
- Default configuration in Windows Server displays hidden files as semi-transparent icons unless in conjunction with system attribute
- Hidden attribute can be configured from General tab of Properties

System

- Designed to identify OS files in MS-DOS
- In Windows Server
  - When system and hidden both true, file or folder is “super hidden” (not displayed in File Explorer interface)
  - Treated as “protected operating system files” with specific alternate display options
  - Can only be manipulated using **ATTRIB** command
  - Do not mess with them as may affect OS behavior.

Visibility Configuration

- Visibility can be configured from **File Explorer → View → Options → Change folder and search options**
  - Show hidden file and folders
    - Hidden files and folders appear in Windows Explorer as semi-transparent icons
  - Do not show hidden files and folders
    - Files with set hidden attributes do not appear in Windows Explorer
  - Hide protected operating system files
    - All files with both hidden and system attributes set are hidden in Windows Explorer when set

Visibility Configuration (cont..)

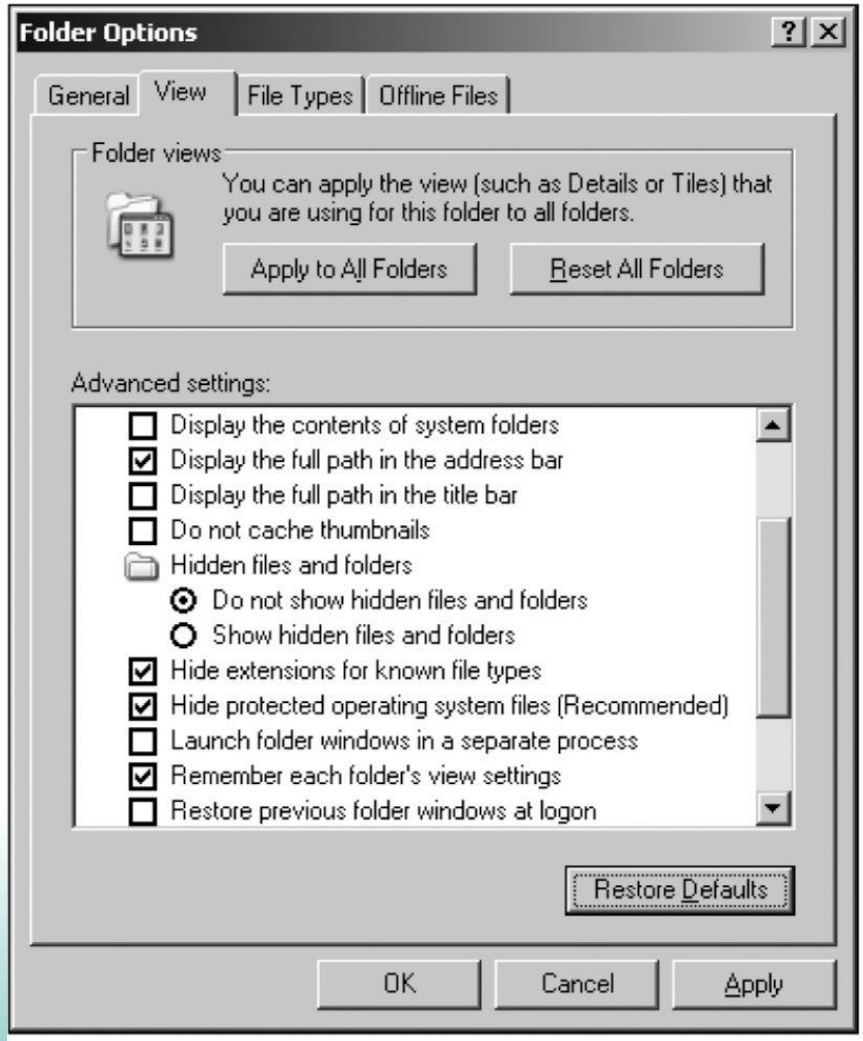


Figure 7-5 Configuring display settings for hidden files and folders

The ATTRIB Command

- A command-line utility used to view, add or remove the four attributes of files and folders
- Only way to configure system attribute
- Supports wildcards (*) allowing multiple files or folders to be changed simultaneously
- Syntax
  - View: attrib *filename*
  - Set: attrib +*attribute filename*
  - Remove: attrib –*attribute filename*

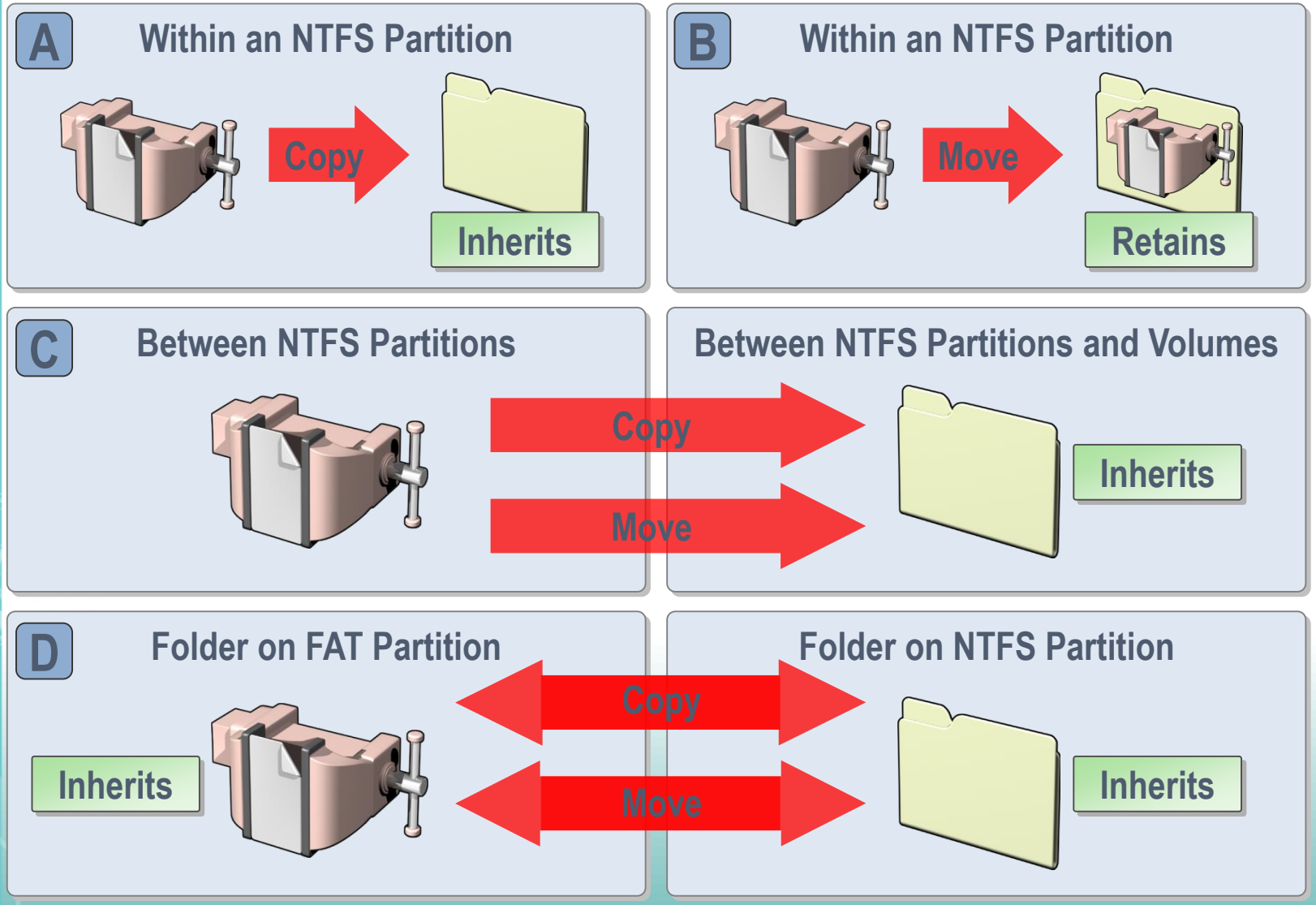
Advanced Attributes

- Advanced attributes found on NTFS volumes
- Archive and Index attributes
  - File is ready for archiving
  - Indexing service
- Compress or Encrypt
  - Compress contents to save disk space
  - Encrypt contents to secure data

File Compression

- Use compression when you need more space on your hard drive
- Reduces amount of disk space needed for files and folders
- Do not use compression for system files and folders
- Automatically uncompressed when the resource is accessed
- Compressed resources displayed in different color in Windows Explorer (blue by default)
- Moving and copying resources can affect compression

What Are the Effects of Moving and Copying Compressed Files and Folders?

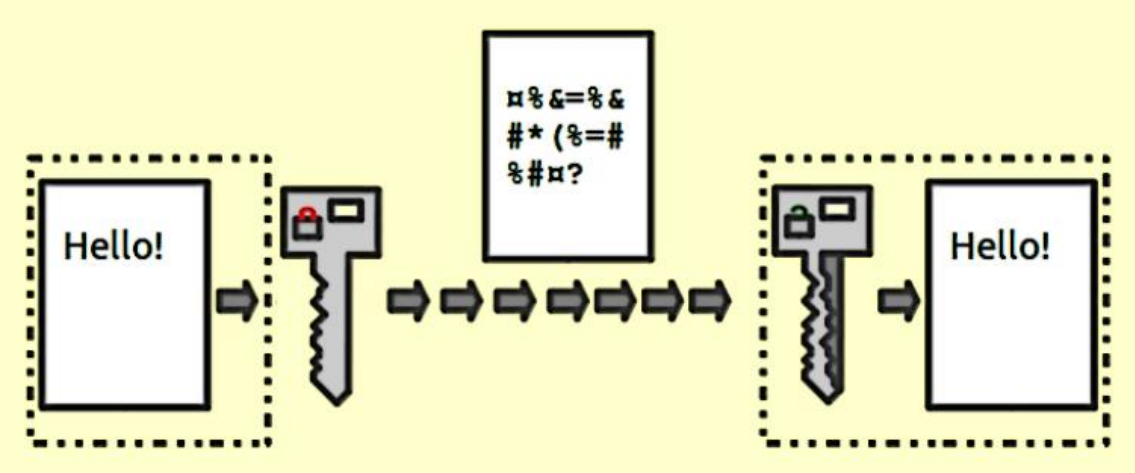


COMPACT

- Used with NTFS file system only
- Command-line utility for configuring the compression attribute
- Syntax
  - COMPACT (to view)
  - COMPACT *switches resourcename* (to set attributes)
- Switches
  - /c (to compress resources)
  - /u (to uncompress resources)

File Encryption

- **Encrypting File System (EFS)** uses public key cryptography to encrypt files and folders
- Available on NTFS & FAT32 file systems
- Transparent to user
- EFS use user password to encrypt data.



File Encryption (continued)

- Main challenge for public key cryptography is when users leave organization (user account deleted)
- Data Recovery Agent
  - Additional object that can recover encrypted data
- Encrypted files cannot be compressed, vice versa
- Encrypted data can be shared.

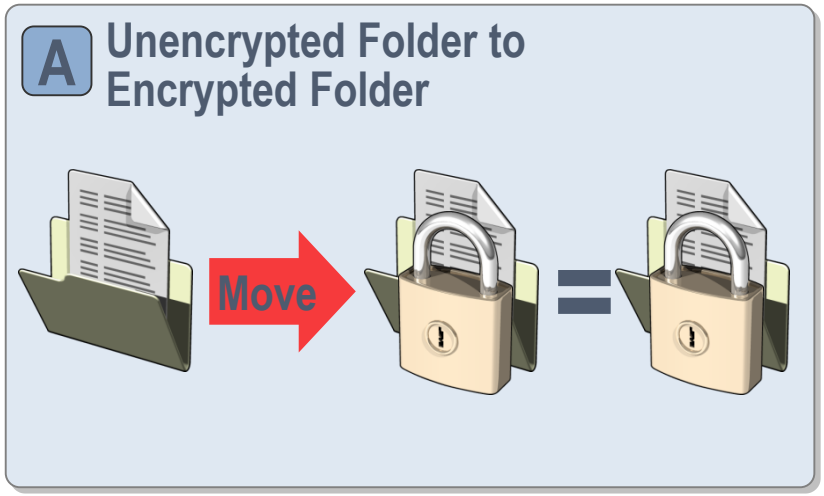
The CIPHER Command

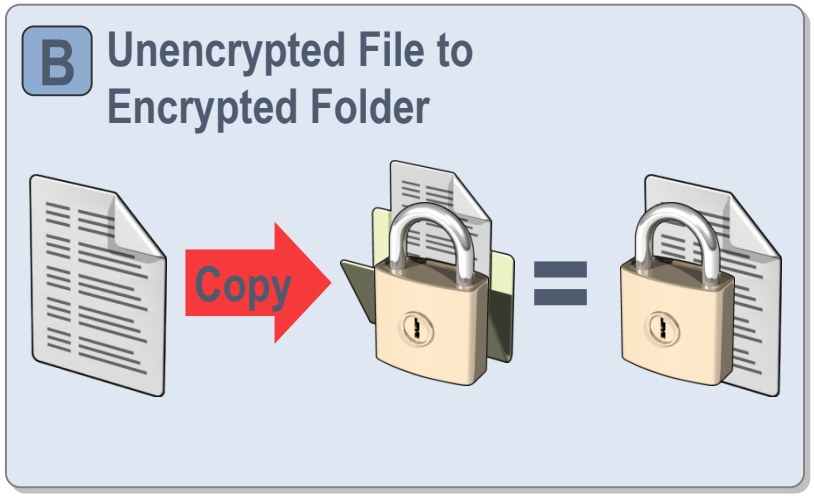
- Command-line utility for file and folder encryption
- Syntax
  - CIPHER (to view)
  - CIPHER *switches resourcename* (to set attributes)

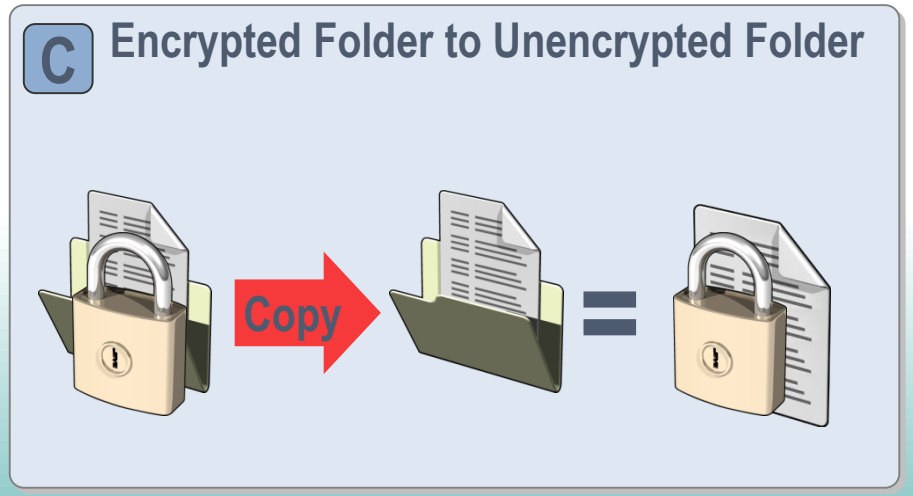
The CIPHER Command (continued)

- Switches
  - /e (to encrypt a folder)
  - /d (to decrypt a folder)
  - /a (to apply other switches to a file rather than a folder)
- Cannot encrypt files which have their read-only attribute set
- Can use the wildcard character (*)

Effects of Moving and Copying Encrypted Files or Folders







Disk Quotas

- Disk quotas used to monitor and control user disk space
- Advantages
  - Prevents users from consuming all disk space
  - Encourages users to delete old files
  - Allows monitoring for planning purposes
  - Allows monitoring of individual users
- Disabled by default
- Implemented only on NTFS volumes
- Configured from Properties of a volume

Disk Quotas (demo)

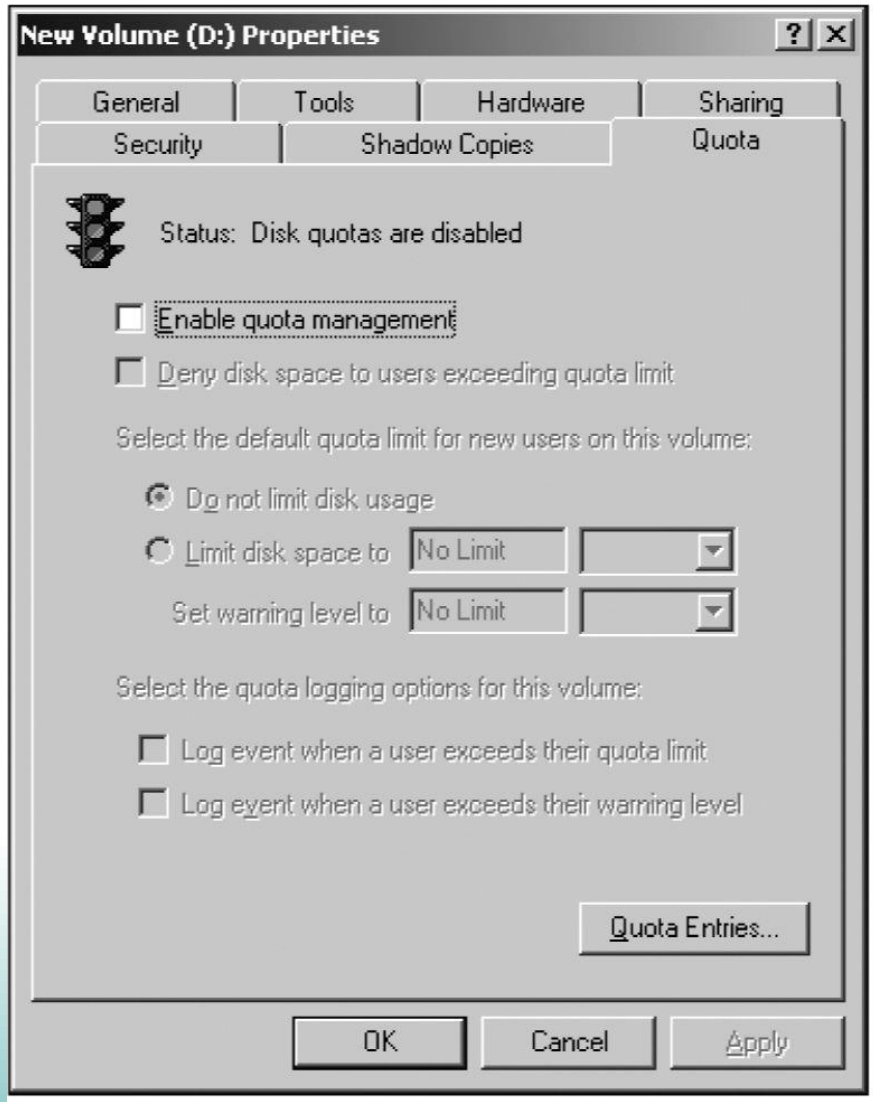


Figure 7-18 The Quota tab in the properties of a volume or partition

Managing Disk Quotas from the Command Line

- FSUTIL QUOTA command-line utility can be used to manage disk quotas
  - Can enable/disable, modify, display, track, report
  - Example (to enable disk quotas on drive E)
    - **fsutil quota enforce E:**
  - Events written to System log (displayed in Event Viewer) every hour by default
    - fsutil behavior command can change the interval
- Help available for fsutil quota and fsutil behavior commands in Help and Support Center

Summary

- File and folder attributes are:
  - Read-only (can a resource be modified or deleted)
  - Archive (has a resource recently been changed)
  - System (does resource have specific display requirements, especially in conjunction with Hidden)
  - Hidden (should the resource appear normally in Windows Explorer)
- File and folder attributes can be set through graphical tools or the ATTRIB command-line utility

Summary (continued)

- Advanced attributes on NTFS partitions or volumes include:
  - Archiving (specifies whether to back up file)
  - Indexing (makes resource searchable)
  - Compression (saves disk space)
  - Encryption (makes resources accessible only to those holding keys)
- Command-line utilities for advanced attributes include:
  - COMPACT
  - CIPHER

Summary (continued)

- Disk quotas allow management of disk space usage by individual users
  - Managed from the Properties of a volume or using the FSUTIL command-line utility