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**CMD** 

Links

## Windows CMD Shell Command Line Syntax

```
Command Line Arguments %1 %~f1
    Parameters
    RUN commands
                         Start
                                  | Run commands.
                         Admin commands.
    MMC Snap-ins
    Shell: folder
                        Shortcuts to key folders.
    ProfileFolders Location of User profile folders (XP / W7 / W10).
    Env. Variables Create/read environment variables.
    Redirection Spooling output to a file, piping input. AND/OR Logic Conditional Execution (If-Then-Else)
                        Loops and Subroutines.
    functions
                        How to package blocks of code.
    Macros
                        Embed blocks of code in a variable.
  Services
                         List of Windows 7 (SP1) Services.
Evaluating expressions
    Using brackets to Group and expand expressions. Delayed Expansion Variables within loops.
    Escape chars, delimiters and quotes
SET /A Environment variable arithmetic.
VarSubstring
VarSearch Search & replace part of a variable.
                        Random Numbers.
    RANDOM
    Wildcards
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Batch Files
                       How to run a script.
Run with elevated permissions (As Admin).
    Run a script
    Elevate
                       Add or subtract days from any date. Remove quotes from a string. Delete files more than n days old. Generate an ASCII/Unicode character
    DateMath
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    GenChr.cmd
    GetDate.cmd
                        Get todays date (any region, any OS.)
    GetTime.cmd
                        Get the time now.
    GetGMT.cmd
                        Time adjusted to Greenwich Mean Time.
    StampMe.cmd
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                        Rename a file with the date/time.
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    Which.cmd
                        Display full path to any command.
    xlong.cmd
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Reference/How to
    Autoexec
                         Run commands at startup.
    Slow Browsing
                         Speed up network browsing.
    Desktop Heap Memory configuration.
Long Filenames NTFS filename issues.
                         Monitor size settings.
Working in the Windows CMD shell.
    Display DPI
CMD Shell
    CMD Internal
File Shares
                         CMD Keyboard shortcuts.
Hide mapped drives from Windows Explorer.
    Keyboard
    NoDrives
   Printing Printer connections and print drivers.

Recovery The Recovery Console.

Reg Tweaks Registry tweaks and settings.

BuiltIn Groups Built-In Users and Security Groups.

Groups Local Domain groups, Global and Universal groups.

64Bit Detect 64 bit vs 32 bit Windows.
    Windows Key
                         Shortcut keys
```

#### Related:

Microsoft.com - Command-line Reference Recommended books and Websites

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Command line reference – Database and OS scripting.

owerShell
QL Server
asswords

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Links

**Syntax** 

## An A-Z Index of the Windows CMD command line

```
ADDUSERS Add or list users to/from a CSV file ADmodcmd Active Directory Bulk Modify
              Address Resolution Protocol
ASSOC
              Change file extension associations.
ASSOCIAT One step file association
              Schedule a command to run at a specific time
ATTRIB
              Change file attributes
              Create or repair a system partition
BCDEDIT Manage Boot Configuration Data
BITSADMIN Background Intelligent Transfer Service
BROWSTAT Get domain, browser and PDC info
CACLS
              Change file permissions
              Call one batch program from another.
CERTREQ Request certificate from a certification authority
CERTUTIL Utility for certification authority (CA) files and services
CD Change Directory - move to a specific Folder

CHANGE Change Terminal Server Session properties
CHKOSK Check Disk - check and repair disk problems
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              Accept keyboard input to a batch file
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CSCcmd Client-side caching (Offline Files)
CSCcmd
              Import or Export Active Directory data
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DIRUSE Display disk usage
DISKPART Disk Administration
DISKPART Disk Administration
DISKSHADOW Volume Shadow Copy Service
DISKUSE Show the space used in folders
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DriverQuery Display installed device drivers
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              View items in active directory (user group computer)
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              Modify items in active directory (user group computer)
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EXPLORER Open Windows Explorer
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Search for strings in files
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Loop command: against the results of another command.
Loop command: all options files, Directory, List.
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FOR /F
FOR
FORFILES Batch process multiple files
FORMAT Format a disk
FREEDISK Check free disk space
             File and Volume utilities
FSUTIL
              File Transfer Protocol
FTYPE
              File extension file type associations.
```

```
Display the Media Access Control (MAC) address
GOTO Direct a batch program to jump to a labelled line•
GPRESULT Display Resultant Set of Policy information
GPUPDATE Update Group Policy settings
HELP
              Online Help
HOSTNAME Display the host name of the computer
iCACLS Change file and folder permissions
IEXPRESS Create a self extracting ZIP file archive
IF Conditionally perform a command•
IFMEMBER Is the current user a member of a group
IPCONFIG Configure IP
             Replace files that are in use by the OS
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              Edit a disk label
             Load PerfMon performance counters
LODCTR
LOGMAN
             Manage Performance Monitor logs
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              Log a user off
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MAPISEND Send email from the command line
MBSAcli
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MEM
              Display memory usage
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              Create a symbolic link (linkd)
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MOVEUSER Move a user from one domain to another
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              Send a message
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              Terminal Server Connection (Remote Desktop Protocol)
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             Manage network resources
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NETDOM
             Configure Network Interfaces, Windows Firewall & Remote access Display networking statistics (NetBIOS over TCP/IP) Display networking statistics (TCP/IP) Display locale information (reskit).

Network Location Test (AD)
NETSH
NBTSTAT
NETSTAT
NLSINFO
NLTEST
NOW Display the current Date and Time
NSLOOKUP Name server lookup
NTBACKUP Backup folders to tape
NTDSUtil Active Directory Domain Services management NTRIGHTS Edit user account rights
NVSPBIND Modify network bindings
OPENFILES Query or display open files
              Display or set a search path for executable files.
             Trace route plus network latency and packet loss Suspend processing of a batch file and display a message.
PAUSE
PERMS
              Show permissions for a user
             Performance Monitor
PERFMON
PING
              Test a network connection
             Return to a previous directory saved by PUSHD• Display the status of ports and services
POPD
PORTQRY
POWERCFG Configure power settings
PRINT Print a text file
PRINTBRM Print queue Backup/Recovery
PRNCNFG Configure or rename a print
PRNCNFG Configure or rename a printer
PRNMNGR Add, delete, list printers and printer connections
ProcDump Monitor an application for CPU spikes
             Change the command prompt.

Execute process remotely
PROMPT
PsExec
                 Show files opened remotely
Display the SID of a computer or a user
PsFile
PsInfo
                 List information about a system
                 Kill processes by name or process ID
PsKill
PsList List detailed information about processes
PsLoggedOn Who's logged on (locally or via resource sharing)
PsLogList Event log records
                 Change account password
               Measure network performance
View and control services
PsPing
PsService
PsShutdown Shutdown or reboot a computer
PsSuspend Suspend processes
PUSHD
              Save and then change the current directory.
QGREP Search file(s) for lines that match a given pattern
Query Process / QPROCESS Display processes
Query Session / QWinsta Display all sessions (TS/Remote Desktop)
Query TermServer / QAppSrv List all servers (TS/Remote Desktop)
Query User / QUSER Display user sessions (TS/Remote Desktop)
                                        Display user sessions (TS/Remote Desktop)
             Manage RAS connections
RASPHONE Manage RAS connections
RECOVER Recover a damaged file from a defective disk
              Registry: Read, Set, Export, Delete keys and values
```

```
REGEDIT Import or export registry settings REGSVR32 Register or unregister a DLL
REGINI
             Change Registry Permissions
REM
             Record comments (remarks) in a batch file.
REN
             Rename a file or files.
REPLACE Replace or update one file with another
Reset Session Delete a Remote Desktop Session
             Delete folder(s) •
RMTSHARE Share a folder or a printer ROBOCOPY Robust File and Folder Copy
                                           printer
             Manipulate network routing tables

Start | RUN commands

Execute a program under a different user account
ROUTE
RUN
RUNAS
RUNDLL32 Run a DLL command (add/remove print connections)
             Service Control
SCHTASKS Schedule a command to run at a specific time
SET Display, set, or remove session environment variables•
SETLOCAL Control the visibility of environment variables•
SetSPN Edit Service Principal Names
SETX
             Set environment variables
SFC
             System File Checker
SHARE
             List or edit a file share or print share
ShellRunAs Run a command under a different user account SHIFT Shift the position of batch file parameters.
SHORTCUT Create a windows shortcut (.LNK file)
SHUTDOWN Shutdown the computer SIGCHECK Display file version no. VirusTotal status & timestamp
SLEEP
             Wait for x seconds
SLMGR
             Software Licensing Management (Vista/2008)
SORT
             Sort input
START Start a program, command or batch file.

STRINGS Search for ANSI and UNICODE strings in binary files

SUBINACL Edit file and folder Permissions, Ownership and Domain

SUBST Associate a path with a drive letter

SYSMON Monitor and log system activity to the Windows event log
SYSTEMINFO List system configuration
            Take ownership of a file
TASKLIST List running applications and services
TASKKILL End a running process

TELNET Communicate with another host using the TELNET protocol

Display or set the system time.
             Delay processing of a batch file
Set the window title for a CMD.EXE session•
TIMEOUT
TITLE
             Task list with full path
Change file timestamps
TLIST
TOUCH
TRACERT
             Trace route
                               to a remote host
             Graphical display of folder structure
TSDISCON Disconnect a Remote Desktop Session
TSKILL End a running process
TSSHUTDN Remotely shut down or reboot a terminal server
TYPE
             Display the contents of a text file.
TypePerf Write performance data to a log file
             Time Zone Utility
TZUTIL
VER Display version information•
VERIFY Verify that files have been saved•
VMConnect Connect to a Hyper-V Virtual Machine
             Display a disk label.
VOL
W32TM
             Time Service
Wait for or send a signal
WAITFOR
WHADMIN WINDOWS Backup Admin
WECUTIL Windows Event Collector Utility
WEVTUTIL Clear event logs, enable/disable/query logs
WHERE Locate and display files in a directory tree
WHOAMI Output the current UserName and domain
WINDIFF
             Compare the contents of two files or sets of files
WINRM
             Windows Remote Management
WINRS
             Windows Remote Shell
             WMI Commands
WPEUTIL
             Run WinPE commands
             Windows Performance Recorder
WUAUCLT
             Windows Update
XCACLS
             Change file and folder permissions
XCOPY
             Copy files and folders
             Comment / Remark•
```

Commands marked • are *Internal* commands only available within the CMD shell.

All other commands (not marked with •) are *external* commands.

External commands may be used under the CMD shell, PowerShell, or directly from START-RUN.

See also: a categorized list of Windows CMD commands
Microsoft Help pages: 2003 Server, 2008 Server, Windows 7/Server 2012 / Technology
Discussion forum
Links to other sites, books etc...

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**CMD** 

## Websites, Resource Kits, Books and Utilities

Windows 7/2008 Command Reference - Microsoft

Windows 2008/R2 Commands Help file - Microsoft

Old New Thing - Raymond Chen, Microsoft

Microsoft Security Response Center (MSRC) - Microsoft)

Security Bulletins 2017 - Microsoft Security TechCenter

Microsoft Update Catalog - Search for specific updates by KB#

Rob van der Woude.com - Batch files, VBS

CommandLine - Batch File examples and Utilities.

Timo Salmi - Useful script tricks and tips.

## Resource Kits + updates

Many resource kit tools and utilities will run successfully on multiple versions of Windows. However Active Directory and NTFS have changed significantly over the years so I recommend you only use the tools supported for your platform.



Resource Kit Windows 7 Resource Kit

By Mitch Tulloch, Tony Northrup & Jerry Honeycutt

1,700 pages, Deploy, Manage, Maintain and Troubleshoot. Example VBS and PowerShell scripts, sample chapter (PDF.)

Windows 10 Remote Server Administration Tools (RSAT) KBase

Windows 2008/2012 Remote Server Administration Tools (RSAT) Built-in feature

WIndows 8.1 Remote Server Administration Tools (RSAT) KBase

Windows 8 Remote Server Administration Tools (RSAT) KBase

Windows 7 Remote Server Administration Tools (RSAT) KBase

RSAT includes Active Directory Domain Services Tools, elements of the RSAT package can be enabled under Control Panel | Programs and Features | Windows features.



Windows Server 2008 Resource Kit - April 2008

By Microsoft Corp

4,000 pages + DVD with more than 200 essential tools and scripts.

# Deployment tools

Windows 10 - ISO download

N edition = No Media Player or IE DRM or Camera.

KN edition = Korean

Windows Assessment and Deployment Kit (Windows ADK) - Customize Windows 10 images for large-scale deployment.

Microsoft Deployment Toolkit (MDT) 2013 Update 2 [news] - Automate desktop and server OS deployments.

### Other Windows Toolkits:

**Sysinternals Suite** - Download the Sysinternals utilities.

ADModify - A GUI tool to facilitate making bulk user attribute modifications.

Windows 7 /8 / 2008 / 2012 Assessment and Deployment Kit (ADK) Windows 7 /8.1/ 2008 R2 /2012 Assessment and Deployment Kit (ADK update)

Microsoft Application Compatibility Toolkit - Evaluate and mitigate application compatibility issues for Vista and Windows 7. Includes the Compatibility Administrator which can be used to set UAC exceptions (Application fix.)

Account Lockout Status (LockoutStatus.exe) - Display lockout information for a particular user account (Aug 2012).

Account Lockout and Management Tools - Includes LockoutStatus, plus tools to troubleshoot account lockouts, and display password ages(Aug 2012).

Microsoft Baseline Security Analyzer - Scan local and remote systems for missing security updates.

SMB1 How to disable it - Windows 7 up to Windows Server 2016

Elevation PowerToys for Windows Vista + Elevation blog

File Checksum Integrity Verifier (FCIV) - Compute and verify cryptographic hash values for files.

Policy Analyzer from Aaron Margosis - Compare sets of Group Policy Objects (GPOs). Highlight redundant settings or internal inconsistencies.

Group Policy Management Console SP1 & Group Policy Object Settings spreadsheet 2003/2008/2008R2/Win7

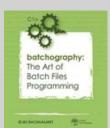
Local Administrator Password Solution (LAPS) - Manage local account passwords of domain joined computers (howto)

Remote Desktop Connection Manager - RDP to multiple machines.

Windows Help - Install Windows 7/8 Help, fix for 'Help not supported' errors.

WMI Diagnosis Utility - Diagnose and repair problems with the WMI service.

## Recommended Books.



Batchography: The Art of Batch Files Programming

by Elias Bachaalany

Discover the lost art of Batch file programming, start with the basics of manipulating numbers, strings and variables and move on to looping operations, recursion, debugging and troubleshooting of your scripts. The final chapter has a number of batch file recipes: parsing .ini files, creating interactive menus and more. Highly recommended.

Windows Sysinternals Administrator's Reference

SysInternals Administrator's Reference

by Mark E. Russinovich

Guidance and inside insights for the Windows Sysinternals tools. Guided by Sysinternals creator Mark Russinovich and Windows expert Aaron Margosis



Windows 7 and Vista Guide to Scripting, Automation, and Command Line Tools

By Brian Knittel

A complete guide covering VBScript, traditional batch files, and PowerShell.



Windows Internals, Part 1 and Part2

by Mark E. Russinovich, David A. Solomon and Alex Ionescu Insider perspectives and hands-on experiments to demonstrate how Windows operates.



Windows 10: The Missing Manual

by David Poque

An enjoyable but still very detailed read with lot's of good tips and keyboard shortcuts.



Mark Minasi's Mastering Windows Server 2012 R2

by Mark Minasi.

Comprehensive and understandable guide. Improve the performance and manageability of your network. minasi.com

### Windows NT Shell Scripting

by Tim Hill.

First published in 1998 so no mention of VBS or Powershell, despite this it's still a solid introduction to writing batch files under Windows. Sample chapter.

Also see - Recommended VBScript Books

### **Utilities - Command line**

SysInternals - Microsoft System utilities.

Joeware.net - Admin, AD and Exchange tools.

Nirsoft Utilities and NirCMD freeware Command-Line Tool.

Console 2 - Windows console emulator for CMD and/or PowerShell (review)

ConEmu-Maximus5 - Windows console emulator for CMD and/or PowerShell (review)

CommandLine.co.uk - Useful tools (free Win32 utilities - mostly console)

CryptoPrevent - A Group Policy to block executables from specific paths.

Cygwin - Linux-like environment for Windows, tutorial: 1, 2, 3

FastCopy - An alternative to RoboCopy.

Frank P. Westlake Batch Scripts + mirror of older console utilities.

Gow - Lightweight UNIX utilities compiled as native win32 binaries.

HoboCopy - open-source backup tool (can copy open files)

Jason Hood - Utilities including Search & Replace, Date/Time, ANSI escape recognition for CMD.

Npocmaka - Batch scripts, zipjs.bat + others

PDFtk - Command-line tool for processing PDFs

Petter Nordahl-Hagen - Offline Windows Password & Registry Editor

pretentiousname - Utilities by Leo Davidson

Repl.bat - Find and Replace text, JScript/Batch script

FindRepl.bat - FInd and Replace text, JScript/Batch script

SetRes - Set screen resolution (Ian Sharpe)

Bill Stewart - Batch script and Windows admin tools (TrueLast LogonTime)

SetACL - Utility to manage permissions, auditing and ownership (free)

System Tools - Dump Event Log, Registry or Security info

unxutils - Port of unix utilities to run under the CMD shell

## Package Managers

**Chocolatey** - Package manager for Windows

Ninite - Automate software installations and updates.

### Utilities - GUI

Agent Ransack - File Search (search all file types)

AIMP3 - Fully featured free music player.

Autohotkey - Automate keystrokes, mouse clicks.

**AutoIT** - GUI scripting

CamStudio - Record screen and audio activity on your computer.

Clonezilla - Partition and disk imaging/cloning program

CPU-Z - gather information on system devices

Dban - Darik's Boot and Nuke, a boot CD that securely wipes hard disks.

**Event Sentry - Event log monitoring** 

FTP - Cyberduck - FTP client

FTP - FileZilla - FTP client (safe download only via Ninite)

FTP - WinSCP - Free SFTP, SCP and FTP client for Windows

Find And Replace Text - Grep-like utility by Lionello Lunesu (Sourceforge link removed)

Flash uninstall - To allow a full 'clean' reinstall

FlashBlock - Content-filtering extension for Firefox

FileZilla - A cross-platform FTP, FTPS and SFTP client

foobar2000 - freeware audio player

Ghost Solution Suite - Disk / Partition Imaging

Inkscape - Vector Graphics (Illustrator)

imgburn.com - Free CD/DVD/Blu-ray burner

isoRecorder - Burn iso image to bootable CD

Krita - Open Source photo/graphics editor.

Lansweeper - Network Monitoring

Lost NT password

MakeMSI - Build Windows Installer files.

MalwareBytes - Anti Malware, detect and remove worms, Trojans, rootkits, etc.

Metapad - Simple notepad replacement

Notepad++ - Notepad replacement (n.b. the syntax highlighting for parentheses in CMD/BAT files is faulty.)

nLite - pre-installation Windows configuration

Photoshop Elements - Basic photo editing and organisation.

Trinity Rescue Kit - Recovery and repair of Windows machines

Netikus - Password, Ping, FTP, event log alerts.

Panda AntiVirus Free

PhotoRec - Data recovery software - hard disk, CD-ROM & Memory Cards

PuTTY - Free Telnet/SSH Client

Rapid Environment Editor - Edit environment variables

Servers Alive - Network monitoring

SoftPerfect - Search, Scan for open file shares and other utils.

Speccy - System information, hardware and software (serial numbers etc).

Sumatra - PDF viewer

SyncBack - GUI Backup and synchronize files

SyncToy - Synchronize files and folders

TeamViewer - Screen sharing/Remote control (Mac/PC/Linux)

Textadept - cross-platform text editor.

TightVNC - Remote control

TribbleSoft - Easy Robocopy (GUI)

UnDelete - Condusiv/Diskeeper

USB install for Windows 7 - Copy iso images to a bootable USB stick

WinMerge - open source WinDiff

VirtualBox - Open Source virtualisation for Windows, Linux, Macintosh, and Solaris.

VirtualDub - Process/Edit .AVI files

Virtual PC - Virtualisation for Windows

VLC Media Player - Free versatile media player

VMWare - Free

VueScan - Scanner Software

WiNToBootic - Make bootable USB Flash or Hard Disk

WSUS Offline Update - Microsoft Windows/Office updates from a USB stick.

Wink - Capture screenshots/video, add help text

WsusOffline - Apply Windows Update patches without an internet connection.

Zero Assumption Recovery - data recovery

Find more utilities, or add you own over in the forum

#### Related

Usenet - news: alt.msdos.batch.nt

DosTips forum

The Scripting Guys Forum - a mix of VBScript, Batch and PowerShell.

SS64 - Windows CMD discussion Forum

MS Support Q no's

Search Microsoft Knowledge base

"We have prided ourselves on always being the cheapest guy on the block. We have always told our people we're the high volume, low price guy in the software business" - Steve Ballmer (Partnering for Success)

Copyright © SS64.com 1999-2017 Some rights reserved ( SS64 ) CMD Syntax

## Command Line arguments (Parameters)

A command line argument (or parameter) is any value passed into a batch script:

```
C:> MyScript.cmd January 1234 "Some value"
```

Arguments can also be passed to a subroutine with CALL:

```
CALL :my_sub 2468
```

You can get the value of any argument using a % followed by it's numerical position on the command line. The first item passed is always %1 the second item is always %2 and so on

\*\* in a batch script refers to all the arguments (e.g. %1 %2 %3 %4 %5 ...%255) only arguments %1 to %9 can be referenced by number.

### Parameter Extensions

When an argument is used to supply a filename then the following extended syntax can be applied:

we are using the variable %1 (but this works for any parameter)

- %~f1 Expand %1 to a Fully qualified path name C:\utils\MyFile.txt
- %~d1 Expand %1 to a Drive letter only C:
- %~p1 Expand %1 to a Path only e.g. \utils\ this includes a trailing \ which will be interpreted as an escape character by some commands.
- %~n1 Expand %1 to a file Name without file extension C:\utils\MyFile or if only a path is present (with no trailing backslash\) the last folder in that path.
- $\mbox{\ensuremath{\$}{\sim}}\mbox{\ensuremath{\mathtt{x1}}}$  Expand %1 to a file eXtension only .txt
- %~s1 Change the meaning of f, n, s and x to reference the Short 8.3 name (if it exists.)
- %~1 Expand %1 removing any surrounding quotes (")
- %~a1 Display the file attributes of %1
- %~t1 Display the date/time of %1
- %~z1 Display the file size of %1
- %~\$PATH:1 Search the PATH environment variable and expand %1 to the fully qualified name of the first match found.

The modifiers above can be combined:

- %~dp1 Expand %1 to a drive letter and path only
- %~sp1 Expand %1 to a path shortened to 8.3 characters
- %~nx2 Expand %2 to a file name and extension only

These parameter/ argument variables are always denoted with a single leading &

This is unlike regular variables which have both leading and trailing %'s such as %variable%, or FOR command variables which use a single leading % on the command line or a double leading % when used in a batch file.

Parameter expansion will treat a Full Stop within a directory name as a file extension, so for a name like "Sample 2.6.4" the output of %~n1 will be truncated to "Sample 2.6" to return the whole folder name use %1 or %~nx1

If the output of DIR, or a filename with no drive letter/path is expanded to display a Full pathname %~f1 the command shell will assume; often incorrectly; that the file resides in the current directory. The CMD shell does not read file descriptors, or work with filesystem objects the way that PowerShell does, it is processing a simple list of text strings.

When writing batch scripts it's a good idea to store the values in a named variable SET \_LogFile=%~dp1, the rest of the script can then refer to the easy-to-read variable name %\_LogFile% This will also make life easier if you later need to change around the order of the parameters.

### **Tokenization**

Tokenization of the command line arguments is not always done by the cmd.exe shell. Most often the tokenization is done by the newly formed processes' runtime, at the OS level, Windows passes a command line untokenized as a single string to the new process. You can read more about the low-level details of the batch language/cmd escaping from the excellent answers by jeb and dbenham on this StackOverflow question.

## Passing by Reference

In addition to passing numeric or string values on the command line, it is also possible to pass a variable name and then use the variable to transfer data between scripts or subroutines. Passing by reference is a slightly more advanced technique but can be particularly useful when the string contains characters that are CMD delimiters or quotes.

## Links relative to the Batch Script

You can get the pathname of the batch script itself with %0, parameter extensions can be applied to this so %~dp0 will return the Drive and Path to the batch script e.g. W:\scripts\ and %~f0 will return the full pathname W:\scripts\mybatch.cmd

You can refer to other files in the same folder as the batch script by using this syntax:

```
CALL %0\..\SecondBatch.cmd
```

This can even be used in a subroutine, Echo %0 will give the call label but, echo "%~nx0" will give you the filename of the batch script.

When the %0 variable is expanded, the result is enclosed in quotation marks.

## Use %~a1 to display the Extended Attributes of a file.

FOR's <code>%%-aI</code> recognizes 9 NTFS file attributes. The expansion of a file attribute produces a series of 9 dashes, with each recognized attribute replacing a dash with a letter. A file with no recognized attributes or with none set will expand to 9 dashes like this: -------

Other NTFS attributes not recognised by %%~aI can be read using FSUTIL usn command:

```
FILE_ATTRIBUTE_ENCRYPTED
FILE_ATTRIBUTE_NOT_CONTENT_INDEXED
FILE_ATTRIBUTE_SPARSE_FILE
```

Example: Expansion of a file with the Hidden and System attributes:

```
---hs----
```

## Maximum line length

The maximum length of any command line (or variable) within CMD is 8191 characters.

## Terminology: Command-line Argument or Parameter?

In mathematical terms a **parameter** is "a numerical or other measurable factor" so typically a number.

In programming terminology:

A parameter represents a value that the procedure expects you to pass when you call it.

An argument represents the actual value that you pass to a procedure.

In practice the phrases argument and parameter tend to be used interchangeably, CMD batch files do not perform any type checking.

## FOR parameters

The FOR command creates parameter variables which are identified with a letter rather than a number (e.g. %%G).

The Parameter Expansions described above can also be applied to these.

To avoid confusion between the two sets of letters, avoid using the letters (a, d, f, n, p, s, t, x, z) as FOR parameters or just choose a FOR parameter letter that is UPPER case.

So for example in a reference like %%~fg the %%g is the FOR parameter, and the ~f is the Parameter Expansion.

### **Examples:**

Pass parameters from one batch to another:

```
MyBatch.cmd SMITH 100
```

### Or as part of a CALL:

```
CALL MyBatch.cmd SMITH 100
```

Get the file size of c:\demo\sample.xlsx using the %~z parameter extension:

```
@Echo off
For %%G in ("C:\demo\sample.xlsx") do set _var=%%~zG
Echo File size is %_var%
```

Passing values from one part of a script to another:

```
:: Using CALL to jump to a subroutine
CALL :s_staff SMITH 100

:: Calling a subroutine from a FOR command
FOR /F %%G IN ('DIR /b *.*') DO call :s_subroutine %%G
```

"A gift is pure when it is given from the heart to the right person at the right time and at the right place, and when we expect nothing in return" ~ The Bhagavad Gita

#### Related:

```
CALL - Call one batch program from another.
```

CMD - Start a new DOS shell (cmd.exe)

IF - Test that required inputs are in place (not NULL)

FOR - Conditionally perform a command several times.

SETLOCAL - Control the visibility of environment variables

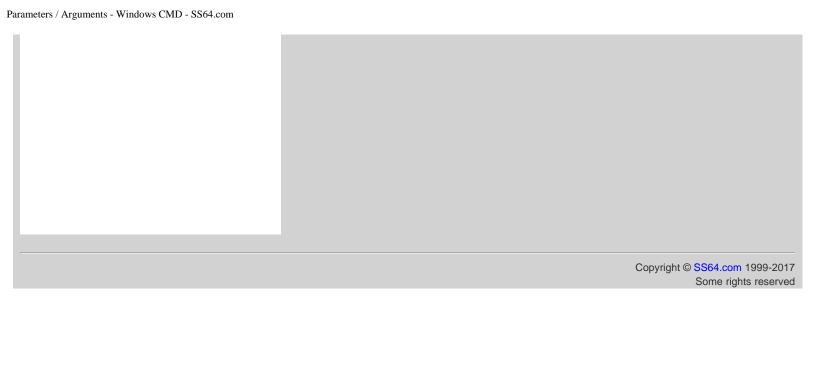
SHIFT - Shift the position of replaceable parameters in a batch file.

How Command Line Parameters are Parsed by David Deley

Bug when using ~s to display short file/folder names

StackOverflow - How does the Windows Command Interpreter (CMD.EXE) parse scripts?

Equivalent bash command (Linux): dirname - Convert a full pathname to just a path.



( SS64 ) CMD Syntax

# Windows Start | Run commands

Description +	Run Command +
Accessibility Options	utilman or control access.cpl
Add Hardware Wizard	hdwwiz
Add/Remove Programs (Add New Programs) (Add Remove Windows Components) (Set Program Access & Defaults)	appwiz.cpl control appwiz.cpl,,1 control appwiz.cpl,,2 control appwiz.cpl,,3
Administrative Tools	control admintools
Advanced User Accounts Control Panel	netplwiz
Authorization Manager	azman.msc
Automatic Update	control wuaucpl.cpl
Backup and Restore Utility	sdclt
Bluetooth Transfer Wizard	fsquirt
Calculator	calc
Certificate Manager	certmgr.msc
Character Map	charmap
Check Disk Utility	chkdsk
Clear Type (tune or turn off)	cttune
Color Management	colorcpl.exe
Command Prompt	cmd
Component Services	dcomcnfg or comexp.msc
Computer Management	CompMgmtLauncher.exe or compmgmt.msc
Control Panel	control
Credential (passwords) Backup and Restore Wizard	credwiz
Data Execution Prevention	SystemPropertiesDataExecutionPrevention
Date and Time Properties	timedate.cpl
Device Manager	hdwwiz or devmgmt.msc
Device Pairing Wizard	DevicePairingWizard

Digitizer Calibration Tool (Tablets/Touch screens)	tabcal	
Direct X Control Panel (if installed)	directx.cpl	
Direct X Troubleshooter	dxdiag	
Disk Cleanup Utility	cleanmgr	
Disk Defragmenter	dfrgui defrag	
Disk Management	diskmgmt.msc	
Disk Partition Manager	diskpart	
Display Color Calibration	dccw	
Display DPI / Text size	dpiscaling	
Display Properties (Themes, Desktop, Screensaver)	control desktop	
Display Properties (Resolution, Orientation)	desk.cpl	
Display Properties (Color & Appearance)	control color	
Documents (open 'My Documents' folder)	documents	
Downloads (open 'Downloads' folder)	downloads	
Driver Verifier Utility	verifier	
DVD Player	dvdplay	
Edit Environment Variables	rundll32.exe sysdm.cpl,EditEnvironmentVariables	
Encrypting File System Wizard (EFS)	rekeywiz	
Event Viewer	eventvwr.msc	
File Signature Verification Tool (Device drivers)	sigverif	
Files and Settings Transfer Tool	%systemroot%\system32\migwiz\migwiz.exe	
Firewall Control Panel	firewall.cpl	
Folders Properties	control folders	
Fonts list	control fonts	
Font preview	fontview arial.ttf	
Game Controllers	joy.cpl	
Local Group Policy Editor	gpedit.msc	
Internet Properties	inetcpl.cpl	
IP Configuration	ipconfig	
iSCSI Initiator configuration	iscsicpl	
Keyboard Properties	control keyboard	
Language Pack Installer	lpksetup	
Local Security Policy	secpol.msc	
Local Users and Groups	lusrmgr.msc	
Log out	logoff	

Microsoft Malicious Software Removal Tool	mrt
Microsoft Management Console	mmc
Access (Microsoft Office)	msaccess
Excel (Microsoft Office)	Excel
Powerpoint (Microsoft Office)	powerpnt
Word (Microsoft Office)	winword
Microsoft Paint	mspaint
Microsoft Support Diagnostic Tool	msdt
Mouse Properties	control mouse or main.cpl
Network Connections	control netconnections or ncpa.cpl
Projector: Connect to Network Projector Switch projector display	netproj displayswitch
Notepad	notepad
ODBC Data Source Admin Default ODBC driver: 32-bit ODBC driver under 64-bit platform:	<pre>C:\windows\system32\odbcad32.exe C:\windows\sysWOW64\odbcad32.exe</pre>
ODBC configuration - Install/configure MDAC drivers	odbeconf
On Screen Keyboard	osk
OOB Getting Started	gettingstarted
Password - Create a Windows Password Reset Disk (USB)	<pre>"C:\Windows\system32\rundl132.exe" keymgr.dll,PRShowSaveWizardExW</pre>
Pen and Touch (Tablet/Pen input configuration)	tabletpc.cpl
Performance Monitor	perfmon.msc
Phone and Modem Options	telephon.cpl
Phone Dialer	dialer
Power Configuration	powercfg.cpl and powercfg.exe
Presentation Settings	PresentationSettings
Problem Steps Recorder	psr
Program Access and Computer Defaults - browser / email / media	computerdefaults
Printers and Faxes	control printers
Print Management (.msc)	PrintManagement
Printer Migration (backup/restore)	printbrmui and printbrm.exe
Printer user interface (List all printui.dll options)	printui

Private Character Editor	eudcedit
Regional Settings - Language, Date/Time format, keyboard locale.	intl.cpl
Registry Editor	regedit
Remote Assistance	msra
Remote Desktop	mstsc
Resource Monitor	resmon
Resultant Set of Policy	rsop.msc
Scheduled Tasks	control schedtasks
Screenshot Snipping Tool	snippingtool
Security Center	wscui.cpl
Services	services.msc
Shared Folder Wizard	shrpubw
Shared Folders	fsmgmt.msc
Shut Down Windows	shutdown
Software Licensing/Activation	slui
Sounds and Audio	mmsys.cpl
Sound Recorder	soundrecorder
Sound Volume	sndvol
Syncronization Tool (Offline files)	mobsync
System Configuration Utility	msconfig
System File Checker Utility (Scan/Purge)	sfc
System Information	msinfo32
System Properties	sysdm.cpl SystemProperties or sysdm.cpl DisplaySYSDMCPL
System Properties - Performance	SystemPropertiesPerformance
System Properties - Hardware	SystemPropertiesHardware
System Properties - Advanced	SystemPropertiesAdvanced
System Repair - Create a System Repair Disc	recdisc
System Restore	rstrui
Task Manager	taskmgr
Task Scheduler	taskschd.msc
Telnet Client	telnet
Trusted Platform Module Initialization Wizard	tpmInit
User Accounts (Autologon)	control userpasswords2

User Account Control (UAC) Settings	UserAccountControlSettings
User Profiles - Edit/Change type	C:\Windows\System32\rundll32.exe sysdm.cpl,EditUserProfiles
Windows Disc Image Burning Tool	isoburn C:\movies\madmax.iso
Windows Explorer	explorer
Windows Features	optionalfeatures
Windows Firewall Windows Firewall with Advanced Security	firewall.cpl wf.msc
Windows Image Acquisition (scanner)	wiaacmgr
Windows Magnifier	magnify
Windows Management Infrastructure	wmimgmt.msc
Windows Memory Diagnostic Scheduler	mdsched
Windows Mobility Center (Mobile PCs only)	mblctr
Windows PowerShell	powershell
Windows PowerShell ISE	powershell_ise
Windows Security Action Center	wscui.cpl
Windows Script Host(VBScript)	wscript NAME_OF_SCRIPT.VBS
Windows System Security Tool. Encrypt the SAM database. (boot password.)	syskey
Windows Update	wuapp
Windows Update Standalone Installer	wusa
Windows Version (About Windows)	winver
WordPad	write

Unless indicated otherwise, all the commands above work in all versions of Windows from Vista upwards. Most of these utilities can be found in systemroot

"The Macintosh uses an experimental pointing device called a 'mouse.' There is no evidence that people want to use these things" ~ John Dvorak

### Related

MMC Snap-ins - Admin commands
Shell: folder - Shortcuts to key folders.
ProfileFolders - Location of user profile folders.
EXPLORER - Open Windows Explorer
Windows Key - Shortcuts



( SS64 ) CMD Syntax

# MMC Snap-ins

System Administrator command line shortcuts to popular Microsoft Management Consoles (MMCs).

Admin Snap-in +	Command +	Category \$
Quality of Service Control Management	ACSsnap.msc	Network
ADSI Edit	ADSIedit.msc	AD Configuration
Authorization manager	AZman.msc	Security
Certificates Management - Local machine	Certlm.msc	Security
Certificates Management - Current user	Certmgr.msc	Security
Certification Authority Management	Certsrv.msc	Security
Certificate Templates	Certtmpl.msc	Security
Failover cluster Manager	Cluadmin.exe	Disc, File
Component Services	Comexp.msc	
Computer Management	Compmgmt.msc	
Device Manager	Devmgmt.msc	Hardware
Notifications/Start menu/policy	DevModeRunAsUserConfig.msc	
Disk Defragmenter	Defrag.exe (formerly Dfrg.msc)	Disc, File
Distributed File Service Mgmt	DFSmgmt.msc	Disc, File
Disk Manager	DiskMgmt.msc	Disc, File
DNS Manager	DNSmgmt.msc	Network
AD Domains and Trusts	Domain.msc	AD Configuration
AD Users and Computers	DSA.msc	Security
AD Sites and Services	DSsite.msc	AD Configuration
Embedded Lockdown Manager	EmbeddedLockdown.msc	Security
Event Viewer	Eventvwr.msc	
Shared Folders open files	FSmgmt.msc	Disc, File
File Server Resource manager	FSRM.msc	Disc, File
Local Group Policy Editor	GPedit.msc	Policy
Group Policy Management	GPmc.msc	Policy
Group Policy Management Editor	GPme.msc	Policy
Group Policy Starter GPO Editor	GPTedit.msc	Policy
Local Users and Groups Manager	LUsrMgr.msc	Security
Teminal Services RDP	MSTSC	Remote Access
Teminal Services RDP to Console	MSTSC /v:[server] /console	Remote Access

NAP client configuration	NapCLCfg	Network
Performance Monitor	PerfMon.msc	
Print Management	PrintManagement.msc	Print
Resultant Set of Policy	RSOP.msc	Policy
Local Security Settings Manager	SecPol.msc	Policy
Server Roles, Features	ServerManager.msc	
Services Management	Services.msc	
SQL Server configuration Manager	SQLServerManager11.msc	
Storage Mgmt	StorageMgmt.msc	Disc, File
Telephony Management	TAPImgmt.msc	Phone/Modem
Task Scheduler	TaskSchd.msc	
Trusted Platform Module	TPM.msc	Security
Terminal Server Manager	TSadmin.exe	Remote Access
Remote Desktop	TSmmc.msc	Remote Access
Windows Mangement Instrumentation	WmiMgmt.msc	
Windows Server Backup (Local+Remote)	WBadmin.msc	Disc, File
Windows Local Backup	WLBadmin.msc	Disc, File
Windows Firewall	WF.msc	Remote Access

The commands above can be entered from START > Run, or from the command line. Availability will vary by OS and by the features installed.

### Related:



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<sup>&</sup>quot;I don't do anything in order to cause trouble. It just so happens that what I do naturally causes trouble. I'm proud to be a troublemaker"  $\sim$  Sinead O'Connor

( SS64 ) CMD Syntax

# Shell: folder shortcuts

Description +	Shell: folder shortcut +	Type ¢	Roaming?
Display installed Windows Updates	shell:AppUpdatesFolder	System folder	
Display links provided by your PC manufacturer (if any)	shell:OEM Links	System folder	
Open the Computer folder	shell:MyComputerFolder	System folder	
Open the folder holding all user profiles	shell:UserProfiles	System folder	
Open the Fonts folder	shell:Fonts	System folder	
Open the Games folder	shell:Games	System folder	
Open the HomeGroup folder	shell:HomeGroupFolder	System folder	
Open the HomeGroup folder for the currently logged- on user (if any)	shell:HomeGroupCurrentUserFolder	System folder	
Open the Network Places folder	shell:NetworkPlacesFolder	System folder	
Open the Printers folder	shell:PrintersFolder	System folder	
Open the Public Application Data folder	shell:Common AppData	System folder	
Open the Public Desktop	shell:Common Desktop	System folder	
Open the Public Documents folder	shell:Common Documents	System folder	
Open the Public Downloads folder	shell:CommonDownloads	System folder	
Open the Public Game Explorer folder	shell:PublicGameTasks	System folder	
Open the Public ringtones folder.	shell:CommonRingtones	System folder	
Open the Public Start Menu folder	shell:Common Start Menu	System folder	
Open the Public Start Menu Programs folder	shell:Common Programs	System folder	
Open the Public Startup folder	shell:Common Startup	System folder	
Open the Public Templates folder	shell:Common Templates	System folder	
Open the Recycle Bin	shell:RecycleBinFolder	System folder	
Open the Users\Public folder (Shared files)	shell:Public	System folder	
Open the Windows installation folder (usually \Windows)	shell:Windows	System folder	
Open the Windows Resources folder (themes are stored here)	shell:ResourceDir	System folder	
Open the Windows System folder	shell:System	System folder	
Open the Windows System folder for 32-bit files on 64-bit Windows, Or \Windows\System32 on 32-bit Windows	shell:Systemx86	System folder	
Access shortcuts pinned to the Start menu or Taskbar	shell:User Pinned	User folder	Υ

Display the user's Ringtones folder	shell:Ringtones	User folder	
Display further user tiles	shell:Roaming Tiles	User folder	Y
Display your user tiles (the images you can use for your account)	shell:UserTiles	User folder	
Open the Client Side Cache Offline Files folder, if supported	shell:CSCFolder	User folder	
Open the folder where files are stored before being burned to disc	shell:CD Burning	User folder	
Open the Public user tiles folder	shell:PublicUserTiles	User folder	
Open the Quick Launch folder (disabled by default)	shell:Quick Launch	User folder	Υ
Open the Saved Games folder	shell:SavedGames	User folder	Y
Open the saved searches folder	shell:Searches	User folder	Y
Open the user's \Music\Playlists folder	shell:Playlists	User folder	Y
Open the user's Application Data folder	shell:AppData	User folder	Υ
Open the user's Application Data folder (same as %LOCALAPPDATA%)	shell:Local AppData	User folder	
Open the user's certificates folder	shell:SystemCertificates	User folder	Υ
Open the user's Credentials folder	shell:CredentialManager	User folder	Υ
Open the user's desktop folder	shell:Desktop	User folder	Υ
Open the user's Documents folder	shell:Personal	User folder	Υ
Open the user's downloads folder	shell:Downloads	User folder	Υ
Open the user's encryption keys folder	shell:Cryptokeys	User folder	Υ
Open the user's Game Explorer folder	shell:GameTasks	User folder	
Open the user's History folder	shell:History	User folder	
Open the user's Links folder	shell:Links	User folder	Υ
Open the user's Network Places folder	shell:NetHood	User folder	Υ
Open the user's printer shortcuts folder	shell:PrintHood	User folder	Υ
Open the user's profile folder (same as %userprofile%)	shell:Profile	User folder	Y
Open the user's Send To folder	shell:SendTo	User folder	Υ
Open the user's Start Menu folder	shell:Start Menu	User folder	Υ
Open the user's Start Menu Programs folder	shell:Programs	User folder	Υ
Open the user's Startup folder	shell:Startup	User folder	Υ
Open the user's Templates folder	shell:Templates	User folder	Υ
Open the user's Windows Contacts folder	shell:Contacts	User folder	Υ
Open the user's Recent Documents folder	shell:Recent	User folder	Υ
Opens the user's AppData\Roaming\Microsoft\Protect folder	shell:DpAPIKeys	User folder	Υ
Display 32-bit programs stored on 64-bit Windows,		Internet	

or the \Program Files folder on 32-bit Windows	shell:ProgramFilesX86	Explorer	
Display the Control Panel	shell:ControlPanelFolder	Internet Explorer	
Open the user's Start Menu\Administrative Tools folder (if any)	shell:Administrative Tools	Internet Explorer	Y
Display Metro App shortcuts (Windows 8)	shell:Immersive Application Shortcuts	Internet Explorer	
Open All Users Start Menu\Administrative Tools folder	shell:Common Administrative Tools	Internet Explorer	
Launches Internet Explorer Applets and applications	shell:InternetFolder	Internet Explorer	
Open the Common Files for 32-bit programs stored on 64-bit Windows, Or the Program Files\Common Files folder on 32-bit Windows	shell:ProgramFilesCommonX86	Internet Explorer	
Open the Control Panel "Install a program from the network" applet	shell:AddNewProgramsFolder	Internet Explorer	
Open the Control Panel "Uninstall or change a program" applet	shell:ChangeRemoveProgramsFolder	Internet Explorer	
Open the default Sidebar Gadgets folder	shell:Default Gadgets	Internet Explorer	
Open the hidden ImplicitAppShortcuts folder	shell:ImplicitAppShortcuts	Internet Explorer	Y
Open the Internet Explorer Cookies folder	shell:Cookies	Internet Explorer	Y
Open the Internet Explorer Favorites folder	shell:Favorites	Internet Explorer	Υ
Open the list of Network Connections	shell:ConnectionsFolder	Internet Explorer	
Open the Program Files folder (same as %programfiles%)	shell:ProgramFiles	Internet Explorer	
Open the Program Files\Common Files folder	shell:ProgramFilesCommon	Internet Explorer	
Open the Temporary Internet Files folder	shell:Cache	Internet Explorer	
Open the user folder of downloaded Sidebar Gadgets	shell:Gadgets	Internet Explorer	
Open the Windows Search tool	shell:SearchHomeFolder	Internet Explorer	
Display public libraries, if any	shell:PublicLibraries	Library	
Display your Music library	shell:MusicLibrary	Library	
Display your Pictures library	shell:PicturesLibrary	Library	
Display your Videos library	shell:VideosLibrary	Library	
Open the Documents library	shell:DocumentsLibrary	Library	

Open the Libraries folder	shell:Libraries	Library	
Open the Windows Photo Gallery Original Images folder, if installed	shell:Original Images	Multimedia	
Open the Public Music folder	shell:CommonMusic	Multimedia	
Open the Public Pictures folder	shell:CommonPictures	Multimedia	
Open the Public Video folder	shell:CommonVideo	Multimedia	
Open the Sample Music folder	shell:SampleMusic	Multimedia	
Open the Sample Pictures folder	shell:SamplePictures	Multimedia	
Open the Sample Videos folder	shell:SampleVideos	Multimedia	
Open the user's Music folder	shell:My Music	Multimedia	Υ
Open the user's Pictures folder	shell:My Pictures	Multimedia	Υ
Open the user's Pictures\Slide Shows folder (if present)	shell:PhotoAlbums	Multimedia	Υ
Open the user's Videos folder	shell:My Video	Multimedia	Υ
Display Sync Centre	shell:SyncCenterFolder	Windows Sync Centre	
Display Sync Centre Conflicts	shell:ConflictFolder	Windows Sync Centre	
Display Sync Centre Results	shell:SyncResultsFolder	Windows Sync Centre	
Open the Sync Centre Setup options	shell:SyncSetupFolder	Windows Sync Centre	

Unless indicated otherwise, all the shortcuts above work in all versions of Windows from Vista upwards.

Shell folder shortcuts can be used directly in the Windows Explorer Address bar: shell:Desktop

Or in the Start Menu Start | Run | shell:Desktop

### Or from the command line:

C:\> explorer shell:desktop
C:\> start shell:desktop

The START command does also accept Shell shortcuts with spaces but they have to be quoted like so:

C:\> start "" "shell:my music"

"You go away for a long time and return a different person - you never come all the way back" ~ Paul Theroux

### Related

EXPLORER - Open Windows Explorer
ProfileFolders - Location of user profile folders.
Env. Variables - List of environment variables.
RUN commands Start | Run commands.

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Windows XP/2003

( SS64 ) CMD Syntax

## User Shell Folders - Profile, Start Menu folder...

Windows 7/2008

In Windows 7/2008 the main User Profile folder (%USERPROFILE%) has moved from C:\Documents and Settings\ to C:\Users\ and many profile folders have also changed name or location:

```
%USERPROFILE%\Application Data %USERPROFILE%\AppData\Roaming
                                                     %USERPROFILE%\AppData\Roaming\Microsoft\Windows\Cookies
%USERPROFILE%\AppData\Local\Microsoft\Windows\History
%USERPROFILE%\Cookies
%USERPROFILE%\History
%USERPROFILE%\Local Settings
%USERPROFILE%\My Documents
                                                     %USERPROFILE%\AppData\Local
%USERPROFILE%\Documents
                                                    *USERPROFILE%\AppData\Roaming\Microsoft\Windows\Network Shortcuts
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Printer Shortcuts
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Recent
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\SendTo
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Start Menu
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Start Menu
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Templates
%USERPROFILE%\NetHood
%USERPROFILE%\PrintHood
%USERPROFILE%\Recent
%USERPROFILE%\SendTo
%USERPROFILE%\Start Menu
%USERPROFILE%\Templates
%USERPROFILE%\Temporary Internet Files %USERPROFILE%\AppData\Local\Microsoft\Windows\Temporary Internet Files
  Windows XP/2003
                                                       Windows 10/2012 R2
%USERPROFILE%\Application Data %USERPROFILE%\AppData\Roaming
%USERPROFILE%\Cookies %USERPROFILE%\AppData\Local\Microsoft\Windows\INetCookies
                                                     %USERPROFILE%\AppData\Local\Microsoft\Windows\History
%USERPROFILE%\History
                                                     %USERPROFILE%\AppData\Local
%USERPROFILE%\Documents
%USERPROFILE%\Local Settings
%USERPROFILE%\My Documents
%USERPROFILE%\NetHood
%USERPROFILE%\PrintHood
                                                     *USERPROFILE%\AppData\Roaming\Microsoft\Windows\Network Shortcuts
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Printer Shortcuts
*USERPROFILE%\AppData\Roaming\Microsoft\Windows\Recent Items
%USERPROFILE%\Recent
```

### The values above can be found in the registry (as REG\_EXPAND\_SZ values)

HKEY\_CURRENT\_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\User Shell Folders

### The following HKCU registry subkeys are common to Windows XP/2003/7/2008:

AppData, Cache, Cookies, Desktop, Favorites, History, LocalAppData, My Pictures, NetHood, Personal, PrintHood, Programs, Recent, SendTo, Start Menu, Startup, Templates.

By default these all resolve to subfolders below %USERPROFILE% but they can be redirected to other locations. The registry locations are always the same, but the files and folders may be in different places.

To provide backwards compatibility, in Windows 7 and above the old locations under C:\Documents and Settings contain junction points (hidden, protected operating system files) which point to the new user-accessible folders.

## 'All Users' Shell Folders

### The folders for All Users settings have also moved:

```
Windows XP/2003
                                                  Windows 7/2008
%ALLUSERSPROFILE%\Application Data
                                                 %ProgramData%
%ALLUSERSPROFILE%\Desktop
%ALLUSERSPROFILE%\Documents
                                                 %PUBLIC%\Desktop
%PUBLIC%\Documents
%ALLUSERSPROFILE%\Start Menu\Programs %ProgramData%\Microsoft\Windows\Start Menu\Programs
                                                  %ProgramData%\Microsoft\Windows\Start Menu
Startup %ProgramData%\Microsoft\Windows\Start
%ALLUSERSPROFILE%\Start menu
%ALLUSERSPROFILE%\Start Menu\Programs\Startup
Menu\Programs\Startup
%ALLUSERSPROFILE%\Templates
                                                 %ProgramData%\Microsoft\Windows\Templates
                                                  Windows 10/2012 R2
 Windows XP/2003
%ALLUSERSPROFILE%\Application Data
%ALLUSERSPROFILE%\Desktop
                                                 %ProgramData%
                                                 %PUBLIC%\Public Desktop
%ALLUSERSPROFILE%\Documents
                                                 %PUBLIC%\Public Documents
                                                 %ProgramData%\Microsoft\Windows\Start Menu\Programs
%ProgramData%\Microsoft\Windows\Start Menu *
Startup %ProgramData%\Microsoft\Windows\Start
%ALLUSERSPROFILE%\Start Menu\Programs
%ALLUSERSPROFILE%\Start menu
%ALLUSERSPROFILE%\Start Menu\Programs\Startup
Menu\Programs\Startup
                                                 %ProgramData%\Microsoft\Windows\Templates
%ALLUSERSPROFILE%\Templates
```

\* In Windows 10 the Start Menu items are held in a database that is stored under C:\Users\accountname\AppData\Local\TileDataLayer this is proprietary, non user editable and limited to 500 shortcuts. It is also used for Cortana Search. The entire database can be copied between accounts - all or nothing.

The values above can be found in the registry (as REG\_EXPAND\_SZ values)

HKEY\_LOCAL\_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\User Shell Folders

The entries in this subkey can appear in both the <code>Shell Folders</code> subkey and the <code>User Shell Folders</code> and in both HKLM and HKCU. The entries that appear in <code>User Shell Folders</code> take precedence over those in <code>Shell Folders</code>. The entries that appear in HKCU take precedence over those in HKLM

The following HKLM registry subkeys are common to Windows XP/2003/7/2008:

Common AppData, Common Desktop, Common Documents, Common Programs, Common Start Menu, Common Startup, Common templates

### Folder Redirection

Although it is possible to redirect any of these folders with Group Policy, not all options are fully supported, for example redirecting IE favorites/cookies will result in very slow performance.

### **Examples**

Find the location of the Start Menu folder:

```
For /f "tokens=3*" %%G in ('REG QUERY "HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\User Shell Folders" /v "Start Menu" ^|Find "REG_"') do Call Set _startmenu=%%H

Echo %_startmenu%
```

### PowerShell function to open the Start menu:

```
function Open-StartMenu {
    $drive = dir env:SystemDrive
    $w7path = $drive.value + "\ProgramData\Microsoft\Windows\Start Menu"
    $xppath = $drive.value + "\Documents and Settings\All Users\Start Menu"
    if (test-path $w7path)
        {explorer $w7path}
    elseif (test-path $xppath) {explorer $xppath}
}
```

"There are no shortcuts to any place worth going" - Beverly Sills

### Related:

Shell: folder - Shortcuts to key folders.
Windows Environment Variables
RoamingProfile.vbs - Cleardown files to improve logon and logoff times.
Managing Roaming User Data Deployment Guide - TechNet (html and .doc)
Q886549 - User Shell Folders

( SS64 )	CMD	Syntax
----------	-----	--------

## Windows Environment Variables

Environment variables are mainly used within batch files, they can be created, modified and deleted for a session using the SET command. To make permanent changes, use SETX

Variables can be displayed using either SET or ECHO.

Variables have a percent sign on both sides: <code>%ThisIsAVariable%</code>
The variable name can include spaces, punctuation and mixed case: <code>%\_Another Ex.ample%</code>
(This is unlike Parameter variables which only have one % sign and are always one character long: <code>%A</code>)

A variable name may include any of the following characters:

```
A-Z, a-z, 0-9, # $ ' ( ) * + , - . ? @ [ ] _ ` { } ~
```

## Array variables

Unlike PowerShell, which fully supports arrays, there is no built in support for array variables within the CMD shell. However with some effort you can replicate this functionality using a series of separate variables, named to represent the array:

```
Set elem[1]=First element
Set elem[2]=Second one
Set elem[3]=The third one
```

To perform array indexing operations with these, use EnableDelayedExpansion and a reference like <code>!elem[%var%]!</code>

this is explained fully in this StackOverflow Q/A.

## Standard (built-in) Environment Variables

Variable	Volatile (Read- Only)	Default value in Windows 7/10/2008 (assuming the system drive is C:
ALLUSERSPROFILE		C:\ProgramData
APPDATA		C:\Users\{username}\AppData\Roaming
CD	Υ	The current directory (string).
ClientName	Υ	Terminal servers only - the ComputerName of a remote host.
CMDEXTVERSION	Υ	The current Command Processor Extensions version number. (NT = "1", Win2000+ = "2".)
CMDCMDLINE	Υ	The original command line that invoked the Command Processor.
CommonProgramFiles		C:\Program Files\Common Files
COMMONPROGRAMFILES(x86)		C:\Program Files (x86)\Common Files
COMPUTERNAME		{computername}
COMSPEC		C:\Windows\System32\cmd.exe or if running a 32 bit WOW - C:\Windows\SysWOW64\cmd.exe
DATE	Υ	The current date using same region specific format as DATE.
ERRORLEVEL	Υ	The current ERRORLEVEL value, automatically set when a program exits.
FPS_BROWSER_APP_PROFILE_STRING		Internet Explorer

FPS_BROWSER_USER_PROFILE_STRING		Default These are undocumented variables for the Edge browser in Windows 10.
HighestNumaNodeNumber	Y (hidden)	The highest NUMA node number on this computer.
HOMEDRIVE	Υ	C:
НОМЕРАТН	Υ	\Users\{username}
LOCALAPPDATA		C:\Users\{username}\AppData\Local
LOGONSERVER		\\{domain_logon_server}
NUMBER_OF_PROCESSORS	Υ	The Number of processors running on the machine.
OS	Υ	Operating system on the user's workstation.
PATH	User and System	C:\Windows\System32\;C:\Windows\;C:\Windows\System32\Wbem;{plus program paths}
PATHEXT		.COM; .EXE; .BAT; .CMD; .VBS; .VBE; .JS; .WSF; .WSH; .MSC The syntax is like the PATH variable - semicolon separators.
PROCESSOR_ARCHITECTURE	Υ	AMD64/IA64/x86 This doesn't tell you the architecture of the processor but only of the current process, so it returns "x86" for a 32 bit WOW process running on 64 bit Windows. See detecting OS 32/64 bit
PROCESSOR_ARCHITEW6432		=%ProgramFiles% (only available on 64 bit systems)
PROCESSOR_IDENTIFIER	Υ	Processor ID of the user's workstation.
PROCESSOR_LEVEL	Υ	Processor level of the user's workstation.
PROCESSOR_REVISION	Υ	Processor version of the user's workstation.
ProgramW6432		=%processor_architecture% (only available on 64 bit systems)
ProgramData		C:\ProgramData
ProgramFiles		C:\Program Files or C:\Program Files (x86)
ProgramFiles(x86) 1		C:\Program Files (x86)
PROMPT		Code for current command prompt format, usually \$P\$G
PSModulePath		%SystemRoot%\system32\WindowsPowerShell\v1.0\Modules\
Public		C:\Users\Public
RANDOM	Υ	A random integer number, anything from 0 to 32,767 (inclusive).
%SessionName%		Terminal servers only - for a terminal server session, SessionName is a combination of the connection name, followed by #SessionNumber. For a console session, SessionName returns "Console".
SYSTEMDRIVE		C:
SYSTEMROOT		By default, Windows is installed to <code>C:\Windows</code> but there's no guarantee of that, Windows can be installed to a different folder, or a different drive letter.  systempoot is a read-only system variable that will resolve to the correct location.  NT 4.0, Windows 2000 and Windows NT 3.1 default to <code>C:\WINDT</code>

TEMP and TMP	User Variable	C:\Users\{Username}\AppData\Local\Temp Under XP this was \{username}\Local Settings\Temp
TIME	Υ	The current time using same format as TIME.
UserDnsDomain	Y User Variable	Set if a user is a logged on to a domain and returns the fully qualified DNS domain that the currently logged on user's account belongs to.
USERDOMAIN		{userdomain}
USERDOMAIN_roamingprofile		The user domain for RDS or standard roaming profile paths. Windows 8/10/2012 (or Windows 7/2008 with Q2664408)
USERNAME		{username}
USERPROFILE		%SystemDrive%\Users\{username} This is equivalent to the \$HOME environment variable in Unix/Linux
WINDIR		%WinDir% pre-dates Windows NT and seems to be superseded by %SystemRoot% Set by default as windir=%SystemRoot% %windir% is a regular variable and can be changed, which makes it less robust than %systemroot%

<sup>&</sup>lt;sup>1</sup> Only on 64 bit systems, is used to store 32 bit programs.

Unless stated otherwise, all the variables above are System variables

Environment variables are stored in the registry:

User Variables: HKEY\_CURRENT\_USER\Environment

System Variables: hkey\_local\_machine\system\currentControlSet\control\session Manager\Environment

By default, files stored under **Local Settings** do not roam with a roaming profile.

Dynamic environment variables are read-only and are computed each time the variable is expanded. When all variables are listed with SET, these will not appear in the list. Do not attempt to directly SET a dynamic variable.

# Undocumented Dynamic variables (read only)

\*\_APPDIR\_\_ \* The directory path to the current application .exe, terminated with a trailing backslash. (Global) - discuss

\*\_\_CD\_\_\* The current directory, terminated with a trailing backslash. (Global)

%=C:% The current directory of the C: drive.

%=D:% The current directory of the D: drive if drive D: has been accessed in the current CMD session.

**\*DPATH\*** Related to the (deprecated) DPATH command.

\*=ExitCode\* The most recent exit code returned by an external command, such as CMD /C EXIT *n*, converted to **hex**.

\*=ExitCodeAscii\* The most recent exit code returned by an external command, as ASCII. (Values 0-32 do not display because those map to ASCII control codes.)

**\*KEYS\*** Related to the (deprecated) KEYS command.

More detail on these undocumented variables can be found in this stackoverflow answer from Dave Benham.

# Undocumented Dynamic variables (read/write)

<code>%\_\_COMPAT\_LAYER%</code> Set the ExecutionLevel to either <code>RunAsInvoker</code> (asInvoker), <code>RunAsHighest</code> (highestAvailable) or <code>RunAsAdmin</code> (requireAdministrator) for more see elevation and Q286705 / Application Compatibility Toolkit for other Compatibility Layers (colours,themes etc).

### Pass variables between batch scripts

There are several ways to pass values between batch files, or between a batch file and the command line, see the CALL and SETLOCAL pages for full details.

A child process by default inherits a copy of all environment variables from its parent, this makes environment variables unsuitable for storing *secret* information such as API keys or user passwords, especially in rare occasions like crashes where a crash log will often include the full OS environment at the time of the crash. PowerShell/Get-Credential is a more secure approach.

"Men may be convinced, but they cannot be pleased against their will. But though taste is obstinate, it is very variable, and time often prevails when arguments have failed" ~ Samuel Johnson

### Related:

PowerShell - Working with Environment variables
User Shell Folders - Standard folder locations.
Detecting 32 vs 64 bit Windows
CALL - Evaluate environment variables
SET - View environment variables, set local variables
SETX - Set environment variables
Q100843 - The four types of environment variable
Q286705 - Set compatibility variables
Q242557 - Registry Settings for Folder Redirection
StackOverflow - Storing a Newline in a variable
StackOverflow - Storing a Newline in a variable Managing Roaming User Data Deployment Guide - Microsoft.com (Word Doc)

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( SS64 ) CMD Syntax

## Redirection

```
command > filename
                          Redirect command output to a file
command >> filename
                          APPEND into a file
command < filename
                          Type a text file and pass the text to command
commandA | commandB
                          Pipe the output from commandA into commandB
commandA & commandB
                          Run commandA and then run commandB
                          Run commandA, if it succeeds then run commandB
commandA && commandB
commandA | | commandB
                          Run commandA, if it fails then run commandB
commandA && commandB || commandC
                          If commandA succeeds run commandB, if it fails commandC
```

Success and failure are based on the Exit Code of the *command*. In most cases the Exit Code is the same as the ErrorLevel

```
Numeric handles:
STDIN
      = 0 Keyboard input
STDOUT = 1 Text output
STDERR = 2 Error text output
UNDEFINED = 3-9
   command 2> filename
                            Redirect any error message into a file
   command 2>> filename
                            Append any error message into a file
  (command) 2> filename
                            Redirect any CMD.exe error into a file
   command > file 2>&1
                            Redirect errors and output to one file
   command > fileA 2> fileB Redirect output and errors to separate files
   command 2>&1 >filename
                            This will fail!
Redirect to NUL (hide errors)
   command 2> nul
                            Redirect error messages to NUL
   command >nul 2>&1
                            Redirect error and output to NUL
   command >filename 2> nul Redirect output to file but suppress error
  (command)>filename 2> nul Redirect output to file but suppress CMD.exe errors
```

Any long filenames must be surrounded in "double quotes".

A CMD error is an error raised by the command processor itself rather than the program/command.

Redirection with > or 2> will overwrite any existing file.

You can also redirect to a printer with > PRN or >LPT1

# Multiple commands on one line

In a batch file the default behaviour is to read and expand variables **one line** at a time, if you use & to run multiple commands on a single line, then any variable changes will not be visible until execution moves to the next line. For example:

```
SET /P _cost="Enter the price: " & ECHO %_cost%
```

This behaviour can be changed using SETLOCAL EnableDelayedExpansion

# Creating a new file

Create empty files using the NUL device:

```
Type NUL >EmptyFile.txt
Of
Copy NUL EmptyFile.txt
```

To prevent the > and < characters from causing redirection, escape with a caret: ^> or ^<

Redirect multiple lines by bracketing a set of commands:

```
Echo sample text1
Echo sample text2
) > c:\logfile.txt
```

#### **Exit Codes**

If the *filename* or *command* is not found then redirection will set an Exit Code of 1

#### Unicode

The CMD Shell can redirect ASCII/ANSI (the default) or Unicode (UCS-2 le) but not UTF-8. This can be selected by launching CMD /A or CMD /U

With the default settings a UCS-2 file can be converted by redirecting it (note it's the redirection not the TYPE/MORE command that makes the encoding change)

```
TYPE unicode.txt > asciifile.txt
```

European characters like ABCàéÿ will usually convert correctly, but others like £¥f€ will become random extended ASCII characters: @¾Ÿ?

# Pipes and CMD.exe

When a command is piped with | batch\_command | this will instantiate a new CMD.exe instance, in effect running:

```
C:\Windows\system32\cmd.exe /C /S /D "batch_command"
```

This has several side effects:

Any newline (CR/LF) characters in the *batch\_command* will be turned into & operators. (see StackOverflow) If the *batch\_command* includes any caret escape characters ^ they will need to be doubled up so that the escape survives into the new CMD shell.

Starting a new CMD shell also has a small (likely unnoticable) effect on performance.

For example, this syntax works, but would fail if the second or subsequent (piped) lines were indented with a space:

```
@Echo Off
echo abc def |^
find "abc" |^
find "def"> outfile.txt
```

Multi-line single commands with lots of parameters, can be indented as in this example:

```
Echo abc def ^
ghi jkl ^
mno pqr
```

When redirecting the output of DIR to a file, you may notice that the output file (if in the same folder) will be listed with a size of 0 bytes. The command interpreter first creates the empty destination file, then runs the DIR command and finally saves the redirected text into the file.

The maximum number of consecutive pipes is 2042

#### **Examples:**

```
DIR >MyFileListing.txt
DIR /o:n >"Another list of Files.txt"
DIR C:\ >List_of_C.txt 2>errorlog.txt
DIR C:\ >List_of_C.txt & DIR D:\ >List_of_D.txt
```

```
Command Redirection, Pipes - Windows CMD - SS64.com
     ECHO y DEL *.txt
     ECHO Some text ^<html tag^> more text
     COPY nul empty.txt
     MEM /C >>MemLog.txt
     Date /T >>MemLog.txt
     SORT < MyTextFile.txt
     SET _output=%_missing% 2>nul
     FIND /i "Jones" < names.txt >logfile.txt
     (TYPE logfile.txt >> newfile.txt) 2>nul
  "Stupidity, outrage, vanity, cruelty, iniquity, bad faith, falsehood,
  we fail to see the whole array when it is facing in the same direction as we" ~ Jean Rostand (French Historian)
  Related:
  conins and conouts behave like stdin and stdout, or 0 and 1 streams but only with internal commands.
  TYPE - Display the contents of one or more text files
  Q245031 - Error when using the | pipe symbol
  Successive redirections explained (1>&3) - Stack Overflow
  Equivalent bash command (Linux): Redirection - Spooling output to a file, piping input.
```

Conditional Execution AND OR IF - Windows CMD - SS64.com (SS64) **Syntax CMD Conditional Execution** Syntax if command1 succeeds then execute command2 (IF) command1 && command2 Execute command1 and then execute command2 (AND) command1 & command2 Execute command2 only if command1 fails (OR) command1 || command2 Success is defined as returning an %ERRORLEVEL% = 0 Care must be taken in using this syntax to read and SET variables as by default variables are expanded one line at a time.

### **Examples**

Show a message if a file copy succeeds:

```
COPY H:\share\TNSnames.ora C:\Oracle\ && ECHO The Copy succeeded
```

Use parenthesis to test the success of several commands:

```
(Dir C:\Test1 & Dir C:\Test2) || Echo One or more of the commands failed.
```

"Conditional cooperation is like adulterated cement which does not bind" ~ Mohandas K. Gandhi

### Related:

IF - Conditionally perform a command.

Command redirection

# Loops and subroutines

There are 2 ways to conditionally process commands in a batch file

IF xxx ELSE yyy - will conditionally perform a command (or a set of commands)

FOR aaa DO xxx - will conditionally perform a command several times (for a set of data, or a set of files)

Either of these can be combined with the CALL command to run a subroutine like this:

```
@echo off
IF EXIST C:\pagefile.sys CALL :s_page_on_c
IF EXIST D:\pagefile.sys CALL :s_page_on_d
GOTO :eof

:s_page_on_c
echo pagefile found on C: drive
GOTO :eof

:s_page_on_d
echo pagefile found on D: drive
```

Without the: a second batch file will be called ...

```
@ECHO off
IF EXIST C:\pagefile.sys CALL Second_Batch.cmd
```

If the code does not need to return then use the GOTO statement like this:

```
@ECHO off
IF EXIST C:\pagefile.sys GOTO s_page_on_c
ECHO pagefile not found
GOTO :eof
:s_page_on_c
ECHO pagefile found
```

To call a second batch file in a separate shell use CMD An important difference between CALL and CMD is the exit behaviour if an error occurs.

```
@ECHO off
IF EXIST C:\pagefile.sys CMD /C Second_Batch.cmd
```

"I knew of one little DO loop that ran for 48 hours, cost \$14,000 and did nothing" ~ Richard Keeler

### Related:

Syntax: Parameters - Command Line Parameters %1 %~f1 Syntax: Functions - How to package blocks of code

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### Batch file Functions

Packaging up code into a discrete functions, each with a clear purpose is a very common programming technique. Re-using known, tested code, means you can solve problems very quickly by just bolting together a few functions.

The CMD shell does not have any documented support for functions, but you can fake it by passing arguments/parameters to a subroutine and you can use SETLOCAL to control the visibility of variables.

A common first attempt at building a function:

```
:myfunct
SETLOCAL
SET _var1=%1
SET _var2="%_var1%--%_var1%--%_var1%"
SET _result=%_var2%
ENDLOCAL
```

but there is a problem, the ENDLOCAL command will throw away the \_result variable and so the function returns nothing.

```
:myfunct2
SETLOCAL
SET _var1=%1
SET _var2="%_var1%--%_var1%--%_var1%"
ENDLOCAL
SET _result=%_var2%
```

This version is getting close, but it still fails to return a value, this time because ENDLOCAL will throw away the \_var2 variable

The solution to this is to take advantage of the fact that the CMD shell evaluates variables on a line-by-line basis - so placing ENDLOCAL **on the same line** as the SET statement(s) gives the result we want. This technique is known as 'tunneling' and works for both functions and entire batch scripts:

```
:myfunct3
SETLOCAL
SET _var1=%1
SET _var2="%_var1%--%_var1%--%_var1%"
ENDLOCAL & SET _result=%_var2%
```

In examples above there are just 2 local variables (\_var1 and \_var2) but in practice there could be far more, by turning the script into a function with SETLOCAL and ENDLOCAL we don't have to worry if any variable names will clash.

In other words you can do this:

```
@ECHO OFF
SET _var1=64
SET _var2=123
CALL :myfunct3 Testing
echo _var1 is %_var1%
echo Final result %_result%
goto :eof
:myfunct3
SETLOCAL
SET _var1=%1
SET _var2="%_var1%--%_var1%--%_var1%"
ENDLOCAL & SET _result=%_var2%
```

When working with functions it can be useful to use Filename Parameter Extensions against the function name, \$0 will contain the call label, \$~nx0 the file name, see Rob Hubbards blog for an example. Note that if you have two scripts one calling another, this will not reveal the location of the 'calling' script.

Cats are intended to teach us that not everything in nature has a function" ~ Garrison Keillor
elated:
ALL - Call one batch program from another lacros - Embed blocks of code in a variable.  ETLOCAL - Control the visibility of environment variables  HIFT - Shift the position of replaceable parameters in a batch file osTips - A collection of CMD functions
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## Batch file macros

A macro allows you to embed blocks of code in a variable. Like calling a <u>subroutine</u> or <u>function</u> this allows reusing the same block of code multiple times, the difference is that by placing the code in a variable the performance will be much faster.

This is an advanced technique but can be very useful in scripts that include large blocks of code or looping commands where the performance of other methods is too slow.

A macro which runs exit /b

```
set _ex=exit /b
```

You can then exit a subroutine with:

%\_ex%

A macro which lists all the .XLS files in a folder:

```
Set _macro=Dir c:\demo\*.xls
```

We can now run the Macro like this:

```
%_macro%
```

So far so like the DOSKEY command, but to make this more powerfull you will want to pass arguments to the macro, in the example above you might want to pass the name of the folder to be listed.

Passing arguments to a macro is not particularly easy, the best method (discovered by Jeb) is to place a For /L command within the macro, set to run 2 steps each time the macro is run:

In the first step the arguments are stored in a variable (argv)

set \_macrodemo=for /L %%n in (1 1 2) do if %%n==2 (%\n%

) ELSE setlocal enableDelayedExpansion ^& set argv=,

echo \_argument1=%%G %\n% set "\_argument1=!%%~G!"%\n% dir !\_argument1!\\*.xls%\n%

for /F "tokens=1 delims=, " %%G in ("!argv!") do ( $\n$ 

In the second step the main body of the macro runs and can (optionally) read the variable

The basic structure of the macro definition:

```
Set _macro=For /1 %%n in (1 1 2) do if %%n==2 (Echo Main MACRO goes here.) else setlocal enableDelayedExpansion % Set argv=,
%_macro% arg1 arg2
:: The macro will expand to:
:: for /1 %%n in (1 1 2) do if %%n==2 (Echo Main MACRO goes here.) else setlocal enableDelayedExpansion & Set argv=, arg1 arg2
:: which is equivalent to:
:: setlocal enableDelayedExpansion
:: Set argv= arg1 arg2
:: Echo Main MACRO goes here.

Example:

@echo off
cls
setlocal DisableDelayedExpansion
set LF=^

::Above 2 blank lines are required - do not remove set ^"\n=^^^$LF%*LF%*LF%*LF%**IF
```

) %\n%

set "\_testfolder=c:\demo"
%\_macrodemo% \_testfolder

In a macro where more than one argument need to be passed, these will become tokens 2,3,4... in the FOR / F command.

A library of macros can be defined by running a single MACROS.CMD batch file, allowing the library macros to be used in multiple batch files.

Credits: Ed Dyreen, Jeb and Dave Benham, the original dostips forum threads are here and here.

"Macro dictionary definition: 1. Large 2. Long 3. Inclusive" ~ from the Greek 'makros'

#### Related:

functions - How to package blocks of code.  CALL - Call one batch program/subroutine from another  How the %LF% newline variable hack works - StackOverflow  DOSKEY - Edit command line, recall commands, and create macros							

( SS64 )

CMD

**Syntax** 



# Windows 7 Services

A list of the default services in Windows 7.

Service Display Name	Service (Registry Key) ÷	Process ÷	Description +	Default Status & notes +
ActiveX Installer (AxInstSV)	AxInstSV	svchost.exe / audiosrv.dll	Provides UACI validation for the installation of ActiveX controls from the Internet.	Manual
Adaptive Brightness	SensrSvc	svchost.exe / sensrsvc.dll	Monitors ambient light sensors to detect changes in ambient light and adjust the display brightness.	Manual, can be disabled if no light sensors available)
Application Experience	AeLookupSvc	svchost.exe / aelupsvc.dll	Processes application compatibility cache requests for applications as they are launched	Manual
Application Host Helper Service	AppHostSvc			Not Installed. Optional feature (Control Panel add features)
Application Identity	AppIDSvc	svchost.exe / appidsvc.dll	Determines and verifies the identity of an application.	Manual. Disabling this service will prevent AppLocker from being enforced.
Application Information	Appinfo	svchost.exe /appinfo.dll	Facilitates the running of interactive applications with additional administrative privileges.	Manual (Started)
Application Layer Gateway Service	ALG	alg.exe	Provides support for 3rd party protocol plug-ins for Internet Connection Sharing	Manual
Application Management	AppMgmt	svchost.exe / appmgmts.dll	Processes installation, removal, and enumeration requests for software deployed through Group Policy.	Manual
ASP.NET State Service	aspnet_state	aspnet_state.exe		Optional feature (Control Panel add features)

Background Intelligent Transfer Service	BITS	svchost.exe / qmgr.dll	Transfer files using idle network bandwidth, maintain file transfers through network disconnections and computer restarts.	Manual. If disabled, then applications that depend on BITS, such as Windows Update, will be unable to automatically download files.
Base Filtering Engine	BFE	svchost.exe / bfe.dll	Manages firewall and IPsec policies and user mode filtering.	Automatic (Started)
BitLocker Drive Encryption Service	BDESVC	svchost.exe / bdesvc.dll	Provides secure startup for theOS, as well as full volume encryption.	Manual
Block Level Backup Engine Service	wbengine	wbengine.exe	The WBENGINE service is used by Windows Backup to perform backup and recovery operations.	Manual
Bluetooth Support Service	bthserv	svchost.exe / bthserv.dll	Discovery and association of remote Bluetooth devices.	Manual. If stopped Bluetooth devices will fail to operate properly.
BranchCache	PeerDistSvc	peerdistsvc.dll	Caches network content from peers on the local subnet.	Manual
Certificate Propagation	CertPropSvc	svchost.exe / certprop.dll	Copies user certificates and root certificates from smart cards into the current user's certificate store, detects when a smart card is inserted into a smart card reader, and, if needed, installs the smart card Plug and Play minidriver.	Manual
Client for NFS	NfsCInt			Not Installed. Optional feature in Ultimate/Enterprise edition (Control Panel add features)
CNG Key Isolation	Keylso	LSASS.exe (Local Security Authority Subsystem) / keyiso.dll	Provides key process isolation to private keys and associated cryptographic operations as required by the Common Criteria.	Manual
			Provides automatic	

COM+ Event System	EventSystem	svchost.exe / comres.dll	distribution of events to subscribing COM components.	Automatic (Started)
COM+ System Application	COMSysApp	dllhost.exe		Manual
Computer Browser	Browser	svchost.exe / browser.dll	Collects the names of NetBIOS resources on the network, creating a list so that it can participate as a master browser or basic browser (one that takes part in browser elections).  This maintained list of resources (computers) is displayed in Network Neighborhood.	Manual. If disabled you can still map drives, but can't browse the whole network. This has no effect on TCP/IP or internet browsing
Credential Manager	VaultSvc	LSASS.exe (Local Security Authority Subsystem) / vaultsvc.dll	Provides secure storage and retrieval of credentials to users, applications and security service packages.	Manual
Cryptographic Services	CryptSvc	svchost.exe / cryptsvc.dll	Confirm the signatures of Windows files, add and remove Trusted Root Certification Authority certificates, retrieve root certificates from Windows Update.	Automatic (Started)
DCOM Server Process Launcher	DcomLaunch	svchost.exe / oleres.dll	Launches COM and DCOM servers in response to object activation requests.	Automatic (Started) If this service is stopped, programs using COM or DCOM will not function properly.
Desktop Window Manager Session Manager	UxSms	svchost.exe / dwm.exe	Provides Desktop Window Manager startup and maintenance services	Automatic (Started)
DHCP Client	Dhcp	svchost.exe / dhcpcore.dll	Registers and updates IP addresses and DNS records for this computer.	Automatic (Started) If this service is stopped, this computer will not receive dynamic IP addresses and DNS updates.
			Enables problem	

Diagnostic Policy Service	DPS	svchost.exe / dps.dll	detection, troubleshooting and resolution for Windows components.	Automatic (Started)
Diagnostic Service Host	WdiServiceHost	svchost.exe / wdi.dll	Diagnostic Policy Service - diagnostics that need to run in a Local Service context.	Manual (Started)
Diagnostic System Host	WdiSystemHost	svchost.exe / wdi.dll	Diagnostic Policy Service - diagnostics that need to run in a Local System context.	Manual
Disk Defragmenter	defragsvc	svchost.exe / defragsvc.dll	Provides Disk Defragmentation Capabilities.	Manual
Distributed Link Tracking Client	TrkWks	svchost.exe / trkwks.dll	Maintains links between NTFS files within a computer or across computers in a network.	Automatic (Started)
Distributed Transaction Coordinator	MSDTC	MSDTC.exe	Coordinates transactions that span multiple resource managers, such as databases, message queues, and file systems.	Manual
DNS Client	Dnscache	discache.sys / dnsapi.dll	Resolves and caches Domain Name System (DNS) names, and registers the full computer name for this computer.	Automatic (Started)
Encrypting File System (EFS)	EFS	LSASS.exe (Local Security Authority Subsystem) / efssvc.dll	The core file encryption technology used to store encrypted files on NTFS volumes.	Manual
Extensible Authentication Protocol	EapHost	svchost.exe / eapsvc.dll	Provides network authentication in such scenarios as 802.1x wired and wireless, VPN, and Network Access Protection (NAP).	Manual
Fax	Fax	fxssvc.exe	Send or receive faxes, using a local or network fax machine/server.	Manual Optional feature (Control Panel add features)
Function Discovery	fdPHost	svchost.exe / fdPHost.dll	Function Discovery (FD) network	Manual (Started)

Provider Host			discovery providers.	
Function Discovery Resource Publication	FDResPub	svchost.exe / fdrespub.dll	Publish this computer and resources attached to this computer so they can be discovered over the network.	Automatic (Started)
Group Policy Client	gpsvc	svchost.exe / gpapi.dll	Applies Group Policy settings.	Automatic (Started)
Health Key and Certificate Management	hkmsvc	svchost.exe / kmsvc.dll	Provides X.509 certificate and key management services for the Network Access Protection Agent (NAPAgent).	Manual. Enforcement technologies that use X.509 certificates will not function properly without this service
HomeGroup Listener	HomeGroupListener	svchost.exe / ListSvc.dll	Makes local computer changes associated with configuration and maintenance of the homegroup-joined computer.	Automatic (Started)
HomeGroup Provider	HomeGroupProvider	svchost.exe / provsvc.dll	Performs networking tasks associated with configuration and maintenance of homegroups.	Manual (Started)
Human Interface Device Access	hidserv	svchost.exe / hidserv.dll	Enables generic input access to Human Interface Devices (HID), predefined hot buttons on keyboards, remote controls,etc.	Manual
IIS Admin Service	IISADMIN			Optional feature (Control Panel add features)
IKE and AuthIP IPsec Keying Modules	IKEEXT	svchost.exe / ikeext.dll	Hosts the Internet Key Exchange and Authenticated Internet Protocol (AuthIP) modules. These keying modules are used for authentication and key exchange in Internet Protocol security (IPsec).	Manual
Indexing Service	CISVC	Cisvc.exe	Index the contents and properties of files on local and remote computers. This can become a resource hog if set to scan the entire volume or multiple	Optional feature (Control Panel add features)

			volumes.	
Interactive Services Detection	UI0Detect	UIODetect.exe	Enables user notification of user input for interactive services, which enables access to dialogs created by interactive services when they appear.	Manual
Internet Connection Sharing (ICS)	SharedAccess	svchost.exe / ipnathlp.dll	Provides network address translation, addressing, name resolution and/or intrusion prevention services for a home or small office network.	Disabled
IP Helper	iphlpsvc	svchost.exe / iphlpsvc.dll	Provides tunnel connectivity using IPv6 transition technologies (6to4, ISATAP, Port Proxy, and Teredo), and IP-HTTPS.	Automatic (Started)
IPsec Policy Agent	PolicyAgent	svchost.exe / polstore.dll	IPsec supports network-level peer authentication, data origin authentication, data integrity, data confidentiality (encryption), and replay protection.	Manual
KtmRm for Distributed Transaction Coordinator	KtmRm	svchost.exe / comres.dll	Coordinates transactions between the Distributed Transaction Coordinator (MSDTC) and the Kernel Transaction Manager (KTM).	Manual
Link-Layer Topology Discovery Mapper	Iltdsvc	svchost.exe / lltdres.dll	Creates a Network Map, consisting of PC and device topology - connectivity and metadata.	Manual
LPD Service	LPDSVC			Optional feature (Control Panel add features)
Media Center Extender Service	Mcx2Svc	svchost.exe / ehres.dll	Allows Media Center Extenders to locate and connect to the computer.	Disabled
Message Queuing	MSMQ	mqsvc.exe	Message Queuing Q2566230	Optional feature (Control Panel add features)
Message				Optional feature

Queuing Triggers	MSMQTriggers	mqtgsvc.exe	Message Queuing Q2294419	(Control Panel add features)
Microsoft .NET Framework NGEN v2.0.50727	clr_optimization_v2.0.50727	mscorsvw.exe	Microsoft .NET Framework NGEN	Automatic (Delayed Start, Started
Microsoft FTP Service	ftpsvc			Optional feature (Control Panel add features)
Microsoft iSCSI Initiator Service	MSiSCSI	svchost.exe / iscsidsc.dll	Manages Internet SCSI (iSCSI) sessions from this computer to remote iSCSI target devices.	Manual
Microsoft Software Shadow Copy Provider	swprv	svchost.exe / swprv.dll	Manages software- based volume shadow copies taken by the Volume Shadow Copy service.	Manual
Multimedia Class Scheduler	MMCSS	svchost.exe / mmcss.dll	Enables relative prioritization of work based on systemwide task priorities. This is intended mainly for multimedia applications.	Automatic (Started)
Net.Msmq Listener Adapter	NetMsmqActivator	SMSSvcHost.exe	Receives activation requests and passes them to the Windows Process Activation Service. net.msmq and msmq.formatname protocols	Optional feature (Control Panel adfeatures)
Net.Pipe Listener Adapter	NetPipeActivator	SMSSvcHost.exe	Receives activation requests and passes them to the Windows Process Activation Service. net.pipe protocol	Optional feature (Control Panel ad features)
Net.Tcp Listener Adapter	NetTcpActivator	SMSSvcHost.exe	Receives activation requests over the net.tcp protocol and passes them to the Windows Process Activation Service.	Optional feature (Control Panel ad features)
Net.Tcp Port Sharing Service	NetTcpPortSharing	SMSSvcHost.exe	Provides ability to share TCP ports over the net.tcp protocol.	Optional feature (Control Panel ad features)
Netlogon	Netlogon	LSASS.exe (Local Security Authority Subsystem)	Network Authentication: Maintains a secure channel between this	Manual

		/ netlogon.dll	computer and the domain controller for authenticating users and services.	
Network Access Protection Agent	napagent	svchost.exe / qagentrt.dll	Collects and manages health information for client computers on a network. Health policy ensures that the client computer has the required software and settings.	Manual
Network Connections	Netman	svchost.exe / netman.dll	Manages objects in the Network and Dial- Up Connections folder, in which you can view both local area network and remote connections.	Manual (Started)
Network List Service	netprofm	svchost.exe / netprofm.dll	Identifies the networks to which the computer has connected, collects and stores properties for these networks, and notifies applications when these properties change.	Manual (Started)
Network Location Awareness	NlaSvc	svchost.exe / nlasvc.dll	Collects and stores configuration information for the network and notifies programs when this information is modified.	Automatic (Started)
Network Store Interface Service	nsi	svchost.exe / nsisvc.dll	delivers network notifications (e.g. interface addition/deleting etc) to user mode clients.	Automatic (Started)
Offline Files	CscService	svchost.exe / cscsvc.dll	Maintains the Offline Files cache, responds to user logon/logoff events	Automatic (Started)
Parental Controls	WPCSvc	svchost.exe	For backward compatibility only.	Manual
Peer Name Resolution Protocol	PNRPsvc	svchost.exe / pnrpsvc.dll	Enables serverless peer name resolution over the Internet using the Peer Name Resolution Protocol (PNRP).	Manual
Peer			Enables multi-party communication using	

Networking Grouping	p2psvc	svchost.exe / p2psvc.dll	Peer-to-Peer Grouping.	Manual
Peer Networking Identity Manager	p2pimsvc	svchost.exe / pnrpsvc.dll	Provides identity services for the Peer Name Resolution Protocol (PNRP) and Peer-to-Peer Grouping services.	Manual
Performance Counter DLL Host	PerfHost	perfhost.exe	Enables remote users and 64-bit processes to query performance counters provided by 32-bit DLLs.	
Performance Logs & Alerts	pla	svchost.exe / pla.dll	Collects performance data from local or remote computers based on preconfigured schedule parameters, then writes the data to a log or triggers an alert.	Manual
Plug and Play	PlugPlay	svchost.exe / umpnpmgr.dll	Enables a computer to recognize and adapt to hardware changes with little or no user input.	Automatic (Started)
PnP-X IP Bus Enumerator	IPBusEnum	svchost.exe / IPBusEnum.dll	Manages the virtual network bus, discovers network connected devices and gives them presence in PnP.	Manual
PNRP Machine Name Publication Service	PNRPAutoReg	svchost.exe / pnrpauto.dll	Publishes a machine name using the Peer Name Resolution Protocol.	Manual
Portable Device Enumerator Service	WPDBusEnum	svchost.exe / wpdbusenum.dll	Enforces group policy for removable mass-storage devices.	Manual
Power	Power	svchost.exe / umpo.dll	Manages power policy and power policy notification delivery.	Automatic (Started)
Print Spooler	Spooler	SPOOLSVC.exe	Loads files to memory for later printing	Automatic (Started)
Problem Reports and Solutions Control Panel Support	wercplsupport	svchost.exe / wercplsupport.dll	Provides support for viewing, sending and deletion of system-level problem reports for the Problem Reports and Solutions control panel.	Manual

Program Compatibility Assistant Service	PcaSvc	svchost.exe / pcasvc.dll	Provides support for the Program Compatibility Assistant (PCA). PCA monitors programs installed and run by the user and detects known compatibility problems.	Manual
Protected Storage	ProtectedStorage	LSASS.exe (Local Security Authority Subsystem) / psbase.dll	Provides protected storage for sensitive data, such as passwords, to prevent access by unauthorized services, processes, or users.	Manual
Quality Windows Audio Video Experience	QWAVE	svchost.exe / qwave.dll	Quality Windows Audio Video Experience (qWave) is a networking platform for Audio Video (AV) streaming applications on IP home networks.	Manual
Remote Access Auto Connection Manager	RasAuto	svchost.exe / rasauto.dll	Creates a connection to a remote network whenever a program references a remote DNS or NetBIOS name or address.	Manual
Remote Access Connection Manager	RasMan	svchost.exe / rasmans.dll	Manages dial-up and virtual private network (VPN) connections from this computer to the Internet or other remote networks.	Manual
Remote Desktop Configuration	SessionEnv	svchost.exe / SessEnv.dll	Responsible for all Remote Desktop Services and Remote Desktop related configuration and session maintenance activities that require SYSTEM context.	Manual
Remote Desktop Services	TermService	svchost.exe / termsrv.dll	Allows users to connect interactively to a remote computer.	Manual
Remote Desktop Services UserMode Port Redirector	UmRdpService	svchost.exe/ /umrdp.dll	Allows the redirection of Printers/Drives/Ports for RDP connections	Manual
Remote Procedure Call	RpcSs	svchost.exe / oleres.dll	The Service Control Manager for COM and DCOM servers.	Automatic

(RPC)			Aactivation requests, garbage collection.	(Started)
Remote Procedure Call (RPC) Locator	RpcLocator	Locator.exe	In Windows 2003 and earlier versions of Windows, the Remote Procedure Call (RPC) Locator service manages the RPC name service database. In Windows Vista and later versions of Windows, this service does not provide any functionality and is present for application compatibility.	Manual
Remote Registry	RemoteRegistry	svchost.exe / regsvc.dll	Enables remote users to modify registry settings on this computer.	Manual
RIP Listener	iprip	isapnp.sys		Optional feature (Control Panel add features)
Routing and Remote Access	RemoteAccess	svchost.exe / mprdim.dll	Offers routing services to businesses in local area and wide area network environments.	Disabled
RPC Endpoint Mapper	RpcEptMapper	svchost.exe / RpcEpMap.dll	Resolves RPC interfaces identifiers to transport endpoints.	Automatic (Started)
Secondary Logon	seclogon	svchost.exe / seclogon.dll	Enables starting processes under alternate credentials.	Manual If this service is stopped, this type of logon access will be unavailable.
Secure Socket Tunneling Protocol Service	SstpSvc	svchost.exe / sstpsvc.dll	Provides support for the Secure Socket Tunneling Protocol (SSTP) to connect to remote computers using VPN.	Manual
Security Accounts Manager	SamSs	LSASS.exe (Local Security Authority Subsystem) / samsrv.dll	The startup of this service signals other services that the Security Accounts Manager (SAM) is ready to accept requests.	Automatic (Started)
			Monitors and reports security health settings: Firewall,	Automatic

Security Center	wscsvc	svchost.exe / wscsvc.dll	antivirus, antispyware, Windows Update, UAC, and Internet settings	(Delayed Start, Started)
Server	LanmanServer	svchost.exe / srvsvc.dll	Supports file, print, and named-pipe sharing over the network for this computer.	Automatic (Started)
Shell Hardware Detection	ShellHWDetection	svchost.exe / shsvcs.dll	Provides notifications for AutoPlay hardware events.	Automatic (Started)
Simple TCP/IP Services	simptcp			Optional feature (Control Panel add features)
Smart Card	SCardSvr	svchost.exe / SCardSvr.dll	Manages access to smart cards read by this computer.	Manual
Smart Card Removal Policy	SCPolicySvc	svchost.exe / certprop.dll	Allows the system to be configured to lock the user desktop upon smart card removal.	Manual
SNMP Service	SNMP			Optional feature (Control Panel add features)
SNMP Trap	SNMPTRAP	SNMPTRAP.exe	Receives trap messages generated by local or remote Simple Network Management Protocol (SNMP) agents and forwards the messages to SNMP management programs running on this computer.	Manual
Software Protection	sppsvc	SPPSVC.exe	Enables the download, installation and enforcement of digital licenses for Windows and Windows applications.	Automatic (Delayed Start, Started)
SPP Notification Service	sppuinotify	svchost.exe / sppuinotify.dll	Provides Software Licensing activation and notification	Manual
SSDP Discovery	SSDPSRV	svchost.exe / ssdpsrv.dll	Discovers networked devices and services that use the SSDP discovery protocol, such as UPnP devices.	Manual (Started)
Storage Service	StorSvc	svchost.exe / StorSvc.dll	Enforces group policy for storage devices	Manual

Superfetch	SysMain	svchost.exe / sysmain.dll	Maintains and improves system performance over time.	Automatic (Started)
System Event Notification Service	SENS	svchost.exe / Sens.dll	Monitors system events and notifies subscribers to COM+ Event System of these events.	Automatic (Started)
Tablet PC Input Service	TabletInputService	svchost.exe / TabSvc.dll	Enables Tablet PC pen and ink functionality	Manual
Task Scheduler	Schedule	svchost.exe / schedsvc.dll	Configure and schedule automated tasks.	Automatic (Started)
TCP/IP NetBIOS Helper	Imhosts	svchost.exe / lmhsvc.dll	Provides support for NetBIOS over TCP/IP (NetBT) and NetBIOS name resolution for clients on the network.	Automatic (Started) If not required can be set to manual or disabled.
Telephony	TapiSrv	svchost.exe / tapisrv.dll	Provides Telephony API (TAPI) support for programs that control telephony devices on the local computer and, through the LAN, on servers that are also running the service.	Manual
Telnet	TIntSvr			Optional feature (Control Panel add features)
Themes	Themes	svchost.exe / themeservice.dll	Provides user experience theme management.	Automatic (Started)
Thread Ordering Server	THREADORDER	svchost.exe / mmcss.dll	Provides ordered execution for a group of threads within a specific period of time.	Manual
TPM Base Services	TBS	svchost.exe / tbssvc.dll	Enables access to the Trusted Platform Module (TPM), which provides hardware-based cryptographic services to system components and applications.	Manual
UPnP Device Host	upnphost	svchost.exe / upnphost.dll	Allows UPnP devices to be hosted on this computer.	Manual
User Profile			Loading and	Automatic

Service	ProfSvc	svchost.exe / profsvc.dll	unloading user profiles.	(Started)
Virtual Disk	vds	VDS.exe	Provides management services for disks, volumes, file systems, and storage arrays.	Manual
Volume Shadow Copy	VSS	VSSVC.exe	Manages and implements Volume Shadow Copies used for backup and other purposes.	Manual
Web Management Service	WMSVC			Optional feature (Control Panel add features)
WebClient	WebClient	svchost.exe / webclnt.dll	Enables Windows- based programs to create, access, and modify Internet-based files.	Manual
Windows Audio	AudioSrv	svchost.exe / audiosrv.dll	Manages audio for Windows-based programs.	Automatic (Started) If this service is stopped, audio devices and effects will not function properly.
Windows Audio Endpoint Builder	AudioEndpointBuilder	svchost.exe	Manages audio devices for the Windows Audio service.	Automatic (Started) If this service is stopped, audio devices and effects will not function properly.
Windows Backup	SDRSVC	svchost.exe / sdrsvc.dll	Windows Backup and Restore capabilities.	Manual
Windows Biometric Service	WbioSrvc	svchost.exe / wbiosrvc.dll	The Windows biometric service gives client applications the ability to capture, compare, manipulate, and store biometric data without gaining direct access to any biometric hardware or samples.	Manual
Windows CardSpace	idsvc	infocard.exe	Securely enables the creation, management, and disclosure of digital identities.	Manual
			Third-party Windows Color System color device model and gamut map model	

Windows Color System	WcsPlugInService	svchost.exe / WcsPlugInService.dll	plug-in modules. These plug-in modules are vendor- specific extensions to the Windows Color System baseline.	Manual
Windows Connect Now – Config Registrar	wcncsvc	svchost.exe / wcncsvc.dll	Microsoft's Implementation of Wi- Fi Protected Setup (WPS) protocol. This is used to configure Wireless LAN settings for an Access Point (AP) or a Wi-Fi Device.	Manual
Windows Defender	WinDefend	svchost.exe / MsMpRes.dll	Protection against spyware and potentially unwanted software.	Automatic (Delayed Start, Started)
Windows Driver Foundation – User-mode Driver Framework	wudfsvc	svchost.exe / wudfsvc.dll	Creates and manages user-mode driver processes. This service cannot be stopped.	Manual
Windows Error Reporting Service	WerSvc	svchost.exe / wersvc.dll	Allows errors to be reported when programs stop working or responding and allows existing solutions to be delivered. Also allows logs to be generated for diagnostic and repair services.	Manual
Windows Event Collector	Wecsvc	svchost.exe / wecsvc.dll	Manages persistent subscriptions to events from remote sources that support WS-Management protocol. This includes Windows Vista event logs, hardware and IPMI-enabled event sources.	Manual
Windows Event Log	EventLog	svchost.exe / wevtsvc.dll	Manages events and event logs.	Automatic (Started)
Windows Firewall	MpsSvc	svchost.exe / FirewallAPI.dll	Windows Firewall	Automatic (Started)
Windows Font Cache Service	FontCache	svchost.exe / FntCache.dll	Cache commonly used font data.	Automatic (Delayed Start, Started)
Windows Image	StiSvc	svchost.exe / wiaservc.dll	Provides image acquisition services	Manual

Acquisition (WIA)			for scanners and cameras	
Windows Installer	msiserver	MSIEXEC.exe	Adds, modifies, and removes applications provided as a Windows Installer (*.msi) package.	Manual
Windows Management Instrumentation	Winmgmt	svchost.exe / wmisvc.dll	Provides a common interface and object model to access management information about operating system, devices, applications and services.	Automatic (Started)
Windows Media Center Receiver Service	ehRecvr	ehRecvr.exe	Windows Media Center Service for TV and FM broadcast reception	Optional feature (Control Panel add features)
Windows Media Center Scheduler Service	ehSched	ehSched.exe	Starts and stops recording of TV programs within Windows Media Center	Optional feature (Control Panel add features)
Windows Media Player Network Sharing Service	WMPNetworkSvc	wmpnetwk.exe	Shares Windows Media Player libraries to other networked players and media devices using Universal Plug and Play - provided for backward compatibility only.	Manual (Started)
Windows Modules Installer	TrustedInstaller	TrustedInstaller.exe	Enables installation, modification, and removal of Windows updates and optional components.	Manual
Windows Presentation Foundation Font Cache 3.0.0.0	FontCache3.0.0.0	PresentationFontCache.exe	Cache commonly used font data for Windows Presentation Foundation (WPF) applications.	Manual
Windows Process Activation Service	WAS	WatUX.exe	Performs Windows 7 Validation.	Optional feature (Control Panel add features)
Windows Remote Management (WS-	WinRM	svchost.exe / wsmsvc.dll	Implements the WS-Management protocol for remote management. WS-Management is a standard web services protocol used for remote software	Manual

Management)			and hardware management. The WinRM service reserves the /wsman URL prefix.	
Windows Search	WSearch	SearchIndexer.exe	Provides content indexing, property caching, and search results for files, email, and other content.	Optional feature (Control Panel add features)
Windows Time	W32Time	svchost.exe / w32time.dll	Maintains date and time synchronization on all clients and servers in the network.	Manual
Windows Update	wuauserv	svchost.exe / wuaueng.dll	Enables the detection, download, and installation of updates for Windows and other programs.	Automatic (Delayed Start, Started)
WinHTTP Web Proxy Auto- Discovery Service	WinHttpAutoProxySvc	svchost.exe / winhttp.dll	Implements the client HTTP stack and provides developers with a Win32 API and COM Automation component for sending HTTP requests and receiving responses.	Manual
Wired AutoConfig	dot3svc	svchost.exe / dot3svc.dll	IEEE 802.1X authentication on Ethernet interfaces.	Manual
WLAN AutoConfig	Wlansvc	svchost.exe / wlansvc.dll	Provides the logic required to configure, discover, connect to, and disconnect from a wireless local area network (WLAN) as defined by IEEE 802.11 standards.	Manual
WMI Performance Adapter	wmiApSrv	WmiApSrv.exe / wmiapsrv.exe	Provides performance library information from Windows Management Instrumentation (WMI) providers to clients on the network.	Manual
Workstation	LanmanWorkstation	svchost.exe / wkssvc.dll	Creates and maintains client network connections to remote servers using the SMB protocol.	Automatic (Started)
World Wide				Optional feature

Web Publishing Service	W3SVC			(Control Panel add features)
WWAN AutoConfig	WwanSvc	svchost.exe / wwansvc.dll	Manages mobile broadband (GSM & CDMA) data card/embedded module adapters and connections by autoconfiguring the networks.	Manual

The defaults above are based on Windows 7 *Professional SP1*, defaults for other versions, Home/Ultimate etc can be found over on the Black Viper Service Tweaking guide.

Before changing any of the defaults - use the links above to find what exactly the service does.

It is inadvisable to *disable* a service without being aware of the consequences, always start by setting the service to *manual*, reboot and test for any problems.

A service set to *manual* will be automatically restarted if another service is dependent on it. A service set to *disabled* will not restart even if it's required to boot the machine!

If a service crashes the machine at startup, you can DISABLE it using the recovery console.

Stopping or disabling a service will generally save a small amount of memory and will reduce the number of software interrupts (cpu message queue.) The main reason for tinkering with services is to harden the system against security vulnerabilities. Disable everything that you don't need or use - then any future problems with those services cannot affect the machine.

The security group All Services (NT SERVICES\ALL SERVICES) includes all service processes that are configured on the system. Membership of this group is controlled by the OS.

To document all the services currently installed:

```
SC QUERY state= all |findstr "DISPLAY_NAME STATE" >my_services.csv
```

Some services communicate and send data directly to Microsoft, this is not generally something to lose sleep over. Managing the running of these services might be a consideration if confidentiality or anonymity is highly important to you.

# Remove a service completely

To delete a service use the SC delete command:

SC delete NameofServiceTodelete

### **Built-in Service Accounts**

In addition to other Default User & Group accounts there are 3 built-in accounts, designed for running background services.

Local Service Account (NT AUTHORITY\LOCAL SERVICE) - has the same level of access to resources and objects as members of the Users group. This limited access helps safeguard the system if individual services or processes are compromised. Services that run as the Local Service account access network resources as a null session without credentials. (This account is not supported for running SQL Server services.)

Network Service Account (NT AUTHORITY\NETWORK SERVICE) - has more access to resources and objects than members of the Users group. Services that run as the Network Service account access network resources by using the credentials of the computer account.

Local System Account (NT AUTHORITY\SYSTEM) - a very high-privileged built-in account. It has extensive privileges on the local system and acts as the computer on the network.

Windows 2008 introduced a new feature: *Managed Service Accounts* these provide automatic password management and simplified service principal name (SPN) management. Service accounts are created in PowerShell with New-

#### **ADServiceAccount**

"The service we render to others is really the rent we pay for our room on this earth. It is obvious that man is himself a traveler; that the purpose of this world is not 'to have and to hold' but 'to give and serve.' There can be no other meaning" - Sir Wilfred T. Grenfell

Related:

SC - Service Control
TASKLIST - List running tasks and services
PORTQRY - Enumerate SQL Server instances, Local ports, local services and the DLL modules loaded.
WinMSD - List running services
ServiceStatus.ps1 - List all services (Powershell)
Safe Mode - Press F8 during bootup to start with mimimal services running.
Recovery - The Recovery Console
WMIC SERVICE - WMI access to services
DComCnfg - Disable/configure Component Services
windows\system32\drivers\etc\services - Ports and Services
The Elder Geek - Services Guide
Q137890 - SRVANY - create a User-Defined Service
Q288129 - Grant users the right to manage services (Windows 2000 KB but still works in Windows 7)

# Using parenthesis/brackets to group expressions

Parenthesis can be used to split commands across multiple lines. This can make code more readable. Variables will be evaluated for the code block just as if the command was a single line.

```
(command)
(command command)
```

#### Example

```
IF EXIST C:\pagefile.sys (
          ECHO pagefile found on C: drive)
```

If the command will fit on a single line, then the parenthesis can be omitted e.g.

# Using variables within parenthesis

The CMD shell will expand [read into memory] all the variables at the beginning of a code block and use those values even if the variable's value is changed within the code block. Turning on DelayedExpansion will force the shell to read variables at the start of every line.

Code blocks can be used to expand variables in places where they would not otherwise be accepted such as the "tokens" parameter of the FOR command:

```
@echo off
set tknz="tokens=1-2"
(
   for /f %tknz% %%A in ('echo') do (
      echo %%B
      echo %%A
   )
)
```

# Things that break inside parenthesis

The CMD shell does not use any great intelligence when evaluating parenthesis, so for example the command below will fail:

```
IF EXIST MyFile.txt (ECHO Some(more)Potatoes)
This version will work:
IF EXIST MyFile.txt (ECHO Some[more]Potatoes)
You could also escape the extra parenthesis like (ECHO Some^(more^)Potatoes)
Or use quotes; though they will appear in the output (ECHO "Some(more)Potatoes")
```

Although parenthesis are legal in NTFS pathnames, they are often misinterpreted.

Chaining to a second batch file (without using CALL) will normally exit the first batch file completely, but if you do this from a code block within parentheses then execution will return to the first batch file and continue where it left off.

This action appears to be very similar to just using CALL, but in some cases; particularly using parenthesis within the DO section of a FOR loop; the behaviour becomes buggy. A recommended coding style is to always explicitly use CALL when running a second batch file.

The CMD shell will read the entire content of a code block in parenthesis into memory at once. That code will always be executed unless you break out of the block by executing a goto :label or goto :eof

A GOTO command inside a bracketed code block will break the parenthesis context and may cause errors. For example within a For-Do Loop, a GOTO command will exit the entire loop not just the current iteration.

The interpretation of comments/Labels within a code block is problematic, so put all comments outside the parenthesis.

### **Testing Numeric values**

Do not use parenthesis or quotes if you are comparing numeric values with an IF command. For example

```
IF (2) GEQ (15) echo "bigger"
Of
IF "2" GEQ "15" echo "bigger"
```

Will perform a character comparison and will echo "bigger"

#### however the commands:

```
IF 2 GEQ 15 echo "bigger"
Of
IF (2 GEQ 15) echo "bigger"
```

Will perform a **numeric** comparison and return the correct result.

This behaviour is opposite to the SET /a command where quotes are required.

The maximum number of nested expressions in parenthesis is 256 (more will cause a buffer overrun).

"Yes, we are the richest major nation. But because so much of our national income is concentrated in relatively few hands, large numbers of Americans are worse off economically than their counterparts in other advanced countries" - Paul Krugman

#### Related

DelayedExpansion - Force the shell to read variables at the start of every line.

IF - conditional command

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# EnableDelayedExpansion

Delayed Expansion will cause variables within a batch file to be expanded at execution time rather than at parse time, this option is turned on with the SETLOCAL EnableDelayedExpansion command.

Without this, by default, when a batch file is executed, the command processor (CMD.exe) will parse complete lines and complete compound commands. Variables are replaced by their values just once, BEFORE the commands of the line are executed.

Generally this only makes a difference when working within a loop, e.g. FOR... DO... If you want to perform operations on a variable within the loop then you will need to enable Delayed Expansion.

When delayed expansion is in effect, variables can be immediately read using <code>!variable\_name!</code> you can also still read and use <code>%variable\_name%</code> that will show the initial value (expanded at the beginning of the line).

### **Example:**

```
@echo off
SETLOCAL
Set "_var=first"
Set "_var=second" & Echo %_var%
```

This will output: first

The value of %\_var% was read into memory BEFORE the Set command which changes it.

Now repeating this with Delayed Expansion:

```
@echo off
SETLOCAL EnableDelayedExpansion
Set "_var=first"
Set "_var=second" & Echo %_var% !_var!
```

This will output: first second

The value of the !\_var! variable is evaluated as late as possible while the %\_var% variable works just as before.

There are some advantages - we can swap the value of two variables in one line:

```
Set "var1=%var2%" & set "var2=%var1%"
```

# Why this behaviour?

The SET command was first introduced with MS-DOS 2.0 in March 1983, at that time memory and CPU were very limited and the expansion of variables once per line was enough.

Delayed Expansion was introduced some 16 years later in 1999 by which time millions of batch files had been written using the earlier syntax. Retaining immediate expansion as the default preserved backwards compatibility with existing batch files.

This is not how anyone would design a language if starting from scratch, indeed PowerShell behaves like this:

```
PS C:\> $demo = "First"
PS C:\> $demo = "Second" ; echo $demo
Second
```

### Other effects - Punctuation

Because DelayedExpansion expands variables later, that means that any escape characters (^) and redirection characters in your expressions will be evaluated before the variable expansion and this can be very useful:

```
@echo off
```

```
Setlocal
Set _html=Hello^>World
Echo %_html%
```

In the above, the Echo command will create a text file called 'world' - not quite what we wanted! This is because the variable is expanded at parse time, so the last line is executing Echo Hello > World and the > character is interpreted as a redirection operator.

If we now try the same thing with EnableDelayedExpansion:

```
Setlocal EnableDelayedExpansion
Set _html=Hello^>World
Echo !_html!
```

With delayed expansion, the variable (including the > ) is only expanded at execution time so the > character is never interpreted as a redirection operator.

This makes it possible to work with HTML and XML formatted strings in a variable.

When delayed expansion is enabled AND at least one exclamation mark in a line is present, then any carets will be interpreted as an escape and so will disappear from the output:

```
Setlocal EnableDelayedExpansion
Echo "Hello^World"
Echo "Hello^World!"
```

#### The above will output:

```
"Hello^World"
"HelloWorld"
```

Even if you double the carets ^^, which normally would act as an escape, or add an escape just before the exclamation mark, the presence of an exclamation mark anywhere in the line will still have this effect.

# FOR Loops

Delayed variable expansion is often useful when working with FOR Loops, normally an entire FOR loop is evaluated as a single command even if it spans multiple lines of a batch script. This is the default behaviour of a FOR loop:

```
@echo off
setlocal
:: count to 5 storing the results in a variable
set _tst=0
FOR /1 %%G in (1,1,5) Do (echo [%_tst%] & set /a _tst+=1)
echo Total = %_tst%

C:\> demo_batch.cmd
[0]
[0]
[0]
[0]
[0]
Total = 5
```

Notice that when the FOR loop finishes we get the correct total, so the variable correctly increments, but during each iteration of the loop the variable is stuck at it's initial value of 0

The same script with **EnableDelayedExpansion**, gives the same final result but also displays the intermediate values:

```
@echo off
setlocal EnableDelayedExpansion
:: count to 5 storing the results in a variable
set _tst=0
FOR /1 %%G in (1,1,5) Do (echo [!_tst!] & set /a _tst+=1)
echo Total = %_tst%

C:\> demo_batch.cmd
[0]
[1]
[2]
[3]
```

```
[4] Total = 5
```

Notice that within the for loop we use !variable! instead of %variable%.

An alternative way to write this is by calling a subroutine, because this breaks out of the loop it does not need Delayed Expansion

```
@echo off
setlocal
:: count to 5 storing the results in a variable
set _tst=0
FOR /1 %%G in (1,1,5) Do (call :sub %%G)
echo Total = %_tst%
goto :oef

:sub
echo [%1] & set /a _tst+=1
goto :eof

C:\> demo_batch.cmd
[1]
[2]
[3]
[4]
[5]
Total = 5
```

### More Examples

Set and then Echo the same variable within a FOR command:

```
Setlocal EnableDelayedExpansion for /f %%G in ("abc") do ( set _demo=%%G & echo !_demo!)
```

Replace a variable name using values from another variable:

```
@echo off
setlocal EnableDelayedExpansion
Set var1=Hello ABC how are you
Set var2=ABC
Set result=!var1:%var2%=Beautiful!
Echo [!result!]
```

Another method for replacing a variable named with the content of another is CALL SET

# Some unexpected behaviours when using delayed variable expansion

If *DelayedExpansion* is used in conjunction with a FOR command looping through a set of files, if any file in the set has an exclamation mark '!' in the filename, that will be interpreted like a !variable!.

Although this is not a common character used in filenames, it can cause scripts to fail. This happens because the parameter expansion (%%P) happens just before the delayed expansion phase tries to interpret my!filen!ame.txt

When *DelayedExpansion* is used inside a *code block* (one or several commands grouped between parentheses) whose output is *Piped*, the variable expansion will be skipped.

When you use a pipe, both parts of the pipe will be executed in a new cmd.exe instance and these instances are started by default with disabled delayed expansion.

EnableDelayedExpansion is Disabled by default.

EnableDelayedExpansion can also be enabled by starting CMD with the /v switch.

EnableDelayedExpansion can also be set in the registry under HKLM or HKCU:

```
[HKEY_CURRENT_USER\Software\Microsoft\Command Processor]
"DelayedExpansion"= (REG_DWORD)
1=enabled 0=disabled (default)
```

"At times it is folly to hasten at other times, to delay. The wise do everything in its proper time" - Ovid

#### Related:

Forum discussion - EnableDelayedExpans OldNewThing - Longer explanation of Enable SETLOCAL - Start localisation of environment	
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# Syntax: Escape Characters, Delimiters and Quotes

# Using "Double Quotes"

If a single parameter contains spaces, you can still pass it as one item by surrounding in "quotes" - this works well for long filenames.

If a parameter is used to supply a filename like this:

```
MyBatch.cmd "C:\Program Files\My Data File.txt"
```

This parameters will be:

```
%0 =MyBatch
%1 ="C:\Program Files\My Data File.txt"
```

To launch a batch script with spaces in the Program Path requiring "quotes"

```
CMD /k ""c:\batch files\test.cmd" "Parameter 1 with space" "Parameter2 with space""
```

In the FIND comand, the " quote can be escaped by doubling it to " "

### Removing Quotes

Several methods for removing quotes are listed on the dequote page.

### Working without Quotes

Without surrounding quotes, a long filename will be passed as %1 %2 %3...

```
MyBatch C:\Program Files\My Data File.txt
```

To refer to the pathname above use %\* rather than %1 %2 %3 - the %\* will cover all parameters - even if there are more than %9

You can apply Extended Filename syntax to %\* with the following workaround:

```
@ECHO OFF
SET _params=%*
:: pass params to a subroutine
CALL :sub "%_params%"
GOTO :eof
:sub
:: Now display just the filename (not path)
ECHO %~n1
```

### **Delimiters**

Delimiters separate one parameter from the next - they split the command line up into words.

Parameters are most often separated by spaces, but any of the following are also valid delimiters:

Comma (,) Semicolon (;) Equals (=) Space ( ) Tab ( )

Notice that although / and - are commonly used to separate command options, they are absent from the list above. This is because batch file parameters are passed to CMD.exe which can accept it's own parameters

(which are invoked using / and - )

One exception to this standard list of delimiters is the FOR command where the default is just [space] and [tab] and you can use the delims= option to specify something different.

When using the TAB character as a delimiter be aware that many text editors will insert a TAB as a series of SPACEs.

When you use %\* to refer to all parameters, the value returned will include the delimiters, under NT 4.0 this will include the leading space, under Windows 2000 and above it won't.

### Escape Character

```
^ Escape character.
```

Adding the escape character before a command symbol allows it to be treated as ordinary text. When piping or redirecting any of these characters you should prefix with the escape character:  $\& \ \ < \ > \ ^ \ |$ 

```
e.g. ^\ ^& ^| ^> ^< ^^
```

### Escaping CR/LF line endings.

The ^ escape character can be used to make long commands more readable by splitting them into multiple lines and escaping the Carriage Return + Line Feed (CR/LF) at the end of a line:

```
ROBOCOPY \\FileServ1\e$\users ^
\\FileServ2\e$\BackupUsers ^
/COPYALL /B /SEC /MIR ^
/R:0 /W:0 /LOG:MyLogfile.txt /NFL /NDL
```

One thing to be careful of with this technique is that a stray space at the end of a line (after the ^) will break the command, this can be hard to spot unless you have a text editor that displays spaces and tab characters.

Some commands (e.g. REG and FINDSTR) use the standard escape character of \ (as used by C, Python, SQL, bash and many other languages.)

The  $\setminus$  escape can cause problems with quoted directory paths that contain a trailing backslash because the closing quote " at the end of the line will be escaped  $\setminus$  ".

To save a directory path with a trailing backslash (\) requires adding a second backslash to 'escape the escape' so for example instead of "C:\My Docs\" use "C:\My Docs\\"

To be sure that a path includes a trailing backslash, you can test for it:

```
Set _prog=C:\Program Files\SS64 App
IF %_prog:~-1% NEQ \ (Set _prog=%_prog%\)
Echo "%_prog%"
```

# Escaping the pipeline

When a pipe is used, the expressions are parsed twice. First when the expression before the pipe is executed and a second time when the expression after the pipe is executed. So to escape any characters in the second expression double escaping is needed:

The line below will echo a single `&` character:

```
break | echo ^^^&
```

# **Escaping Percents**

The % character has a special meaning for command line parameters and FOR parameters. To treat a percent as a regular character, double it:

응응

Many characters such as  $\ = \ (\ )$  do not need to be escaped when they are used within a "quoted string" typically these are characters you might find in a filename/path. The percent character is one exception to this rule, even though under NTFS  $\ *$  is a valid filename character.

# **Escaping Exclamation marks**

When the shell is running in EnableDelayedExpansion mode the ! character is used to denote a variable and so must be escaped (twice) if you wish to treat it as a regular character:

^^ !

# Escape the Escape character

The escape character can be used to escape itself ^^ (meaning don't treat the first ^ as an escape character), so you are escaping the escape character:

# Special Cases

A small number of commands follow slightly different rules, FINDSTR, REG and RUNAS all use \ as an escape character instead of ^

"All the best stories in the world are but one story in reality - the story of escape. It is the only thing which interests us all and at all times, how to escape" ~ A. C. Benson

### Related:

SETLOCAL EnableDelayedExpansion - More examples, particularly for HTML.

Long Filenames and NTFS - Valid characters in filenames

FINDSTR Escapes and Length limits

How does the Windows Command Interpreter (CMD.EXE) parse scripts? - StackOverflow

cmd Syntax

Powershell Escape Character

In bash use \ to escape a line ending.

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### SET

Display, set, or remove CMD environment variables. Changes made with SET will remain only for the duration of the current CMD session.

```
Syntax

SET variable
SET variable=string
SET /A "variable=expression"
SET "variable="
SET /P variable=[promptString]
SET "

Key

variable
String
Stri
```

### Arithmetic expressions (SET /a)

The expression to be evaluated can include the following operators:

```
Add set /a "_num=_num+5"
Add variable set /a "_num+5"
Subtract (or unary)set /a "_num=_num-5"
Subtract variable set /a "_num=_num+5"
Multiply set /a "_num=_num*5"
    +=
    -=
          Multiply variable set /a "_num*=5"
Divide set /a "_num=_num/5"
                                     set /a "_num=_ni
set /a "_num/=5"
set /a "_num=5%?
     /=
         Divide variable
                                                    _num=5%%2"
          Modulus
          Modulus set /a "_num%%=5"
Logical negation 0 (FALSE) 1 (TRUE) and any non-zero value (TRUE)
    %%= Modulus
                                                                                                                      0 (FALSE)
          One's complement (bitwise negation)
                                       set /a "_num=5&3"
                                                                       0101 \text{ AND } 0011 = 0001 \text{ (decimal 1)}
          AND
                                       set /a "_num&=3
          AND variable
                                       set /a "_num=5|3"
                                                                       0101 OR 0011 = 0111 (decimal 7)
          OR
                                      set /a "_num|=3"
set /a "_num=5^3"
     OR variable
                                                                       0101 \text{ XOR} 0011 = 0110 \text{ (decimal 6)}
          XOR
                                             /a "_num=^3"
it 0)
          XOR variable
                                       set
          Left Shift.
                                 (sign bit
                                 (Fills in the sign bit such that a negative number always remains negative.)
          Right Shift.
                                  Neither ShiftRight nor ShiftLeft will detect overflow.
    <== Left Shift variable >>= Right Shift variable
                                             set /a "_num<<=2"
set /a "_num>>=2"
          Parenthesis group expressions set /a "_num=(2+3)*5" Commas separate expressions set /a "_num=2,_result=_num*5"
If a variable name is specified as part of the expression, but is not defined in the current environment, then SET /a will use a value of 0.
See SET /a examples below and this forum thread for more. also see SetX, VarSearch and VarSubstring for more on variable manipulation.
```

Variable names are not case sensitive but the contents can be.

It is good practice to avoid using any delimiter characters (spaces, commas etc) in the variable *name*, for example IF DEFINED \_variable will often fail if the variable name contains a delimiter character.

It is a common practice to prefix variable names with either an undescore or a dollar sign \_variable or \$variable, these prefixes are not required but help to prevent any confusion with the standard built-in Windows Environment variables or any other other command strings.

Any extra spaces around either the variable name or the *string*, will **not** be ignored, SET is not forgiving of extra spaces like many other scripting languages.

# Display a variable:

In most contexts, surround the variable *name* with %'s and the variable's *value* will be used e.g. To display the value of the  $\_department$  variable with the ECHO command:

```
ECHO %_department%
```

If the variable name is not found in the current environment then SET will set %ERRORLEVEL% to 1.

This can be detected using IF ERRORLEVEL ...

Including extra characters can be useful to show any white space:

```
ECHO [%_department%]
ECHO "%_department%"
```

Type SET without parameters to display all the current environment variables.

Type SET with a variable name to display that variable

```
SET _department
```

The SET command invoked with a string (and no equal sign) will display a wildcard list of all matching variables

Display variables that begin with 'P':

```
SET p
```

Display variables that begin with an underscore

SET

#### Set a variable:

Example of storing a text string:

```
C:\> SET _dept=Sales and Marketing
C:\> set _
_dept=Sales and Marketing
```

Set a variable that contains a redirection character, note the position of the quotes which are not saved:

```
SET "_dept=Sales & Marketing"
```

One variable can be based on another, but this is not dynamic E.g.

```
C:\> set xx=fish
C:\> set msg=%xx% chips
C:\> set msg
msg=fish chips

C:\> set xx=sausage
C:\> set msg
msg=fish chips

C:\> set msg=%xx% chips
C:\> set msg
msg=sausage chips
```

Avoid starting variable names with a number, this will avoid the variable being mis-interpreted as a parameter \$123\_myvar\* < > \$1 23\_myvar

To display undocumented system variables:

```
SET "
```

# Values with Spaces - using Double Quotes

There is no need to add quotation marks when assigning a value that includes spaces

```
SET _variable=one two three
```

For special characters like & you can surround the entire expression with quotation marks. The variable contents will **not** include the surrounding quotes:

```
SET "_variable=one & two"
```

If you place quotation marks around the value, then those quotes will be stored:

```
SET _variable="one & two"
```

# Variable names with spaces

A variable can contain spaces and also the variable name itself can contain spaces, therefore the following assignment:

```
SET _var =MyText
will create a variable called "_var " - note the trailing space
```

# Prompt for user input

The /P switch allows you to set a variable equal to a line of input entered by the user. The Prompt string is displayed before the user input is read.

```
@echo off
Set /P _dept=Please enter Department || Set _dept=NothingChosen
If "%_dept%"=="NothingChosen" goto :sub_error
If /i "%_dept%"=="finance" goto sub_finance
If /i "%_dept%"=="hr" goto sub_hr
goto:eof

:sub_finance
echo You chose the finance dept
goto:eof

:sub_hr
echo You chose the hr dept

:sub_error
echo Nothing was chosen
```

The Prompt string can be empty. If the user does not enter anything (just presses return) then the variable will be unchanged and an errorlevel will be set.

To place the first line of a file into a variable:

```
Set /P _MyVar=<MyFilename.txt
```

The CHOICE command is an alternative to SET /P (but accepts only one character/keypress.)

### Delete a variable

Type SET with just the variable name and an equals sign:

```
SET _department=
```

Better still, to be sure there is no trailing space after the = place the expression in parentheses or quotes:

```
(SET _department=)
  or
SET "_department="
```

# Arithmetic expressions (SET /a)

Placing expressions in "quotes" is optional for simple arithmetic but required for any expression using logical operators.

Any SET /A calculation that returns a fractional result will be rounded down to the nearest whole integer.

#### **Examples:**

```
SET /A "_result=2+4"
(=6)

SET /A "_result=5"
(=5)
SET /A "_result+=5"
(=10)

SET /A "_result=2<<3"
(=16) { 2 Lsh 3 = binary 10 Lsh 3 = binary 10000 = decimal 16 }</pre>
```

```
SET /A "_result=5%%2"
(=1) { 5/2 = 2 + 2 remainder 1 = 1 }

SET /A "_var1=_var2=_var3=10"
(sets 3 variables to the same value - undocumented syntax.)
```

In a batch script, the Modulus operator (%) must be doubled up to (%%).

SET /A will treat any character string in the expression as an environment variable name. This allows you to do arithmetic with environment variables without having to type any % signs to get the values. SET /A \_result=5 + \_MyVar

Multiple calculations can be performed in one line, by separating each calculation with commas, for example:

```
_year=1999
Set /a _century=_year/100, _next=_century+1
```

The numbers must all be within the range of 32 bit signed integer numbers (-2,147,483,648 through 2,147,483,647) to handle larger numbers use PowerShell or VBScript.

# Leading Zero will specify Octal

Numeric values are decimal numbers, unless prefixed by ox for hexadecimal numbers, or for octal numbers.

```
So 0x10 = 020 = 16 decimal
```

The octal notation can be confusing - all numeric values that start with zeros are treated as octal but 08 and 09 are not valid octal digits.

For example SET /a \_month=07 will return the value 7, but SET /a \_month=09 will return an error.

# Permanent changes

Changes made using the SET command are NOT permanent, they apply to the current CMD prompt only and remain only until the CMD window is closed.

To permanently change a variable at the command line use SetX or with the GUI - Control Panel | System | Environment | System/User Variables

Changing a variable permanently with SetX will not affect any CMD prompt that is already open. Only new CMD prompts will get the new setting.

You can of course use SetX in conjunction with SET to change both at the same time:

```
Set _Library=T:\Library\
SetX _Library T:\Library\ /m
```

# Change the environment for other sessions

Neither SET nor SetX will affect other CMD sessions that are already running on the machine. This as a good thing, particularly on multi-user machines, your scripts won't have to contend with a dynamically changing environment while they are running.

It is possible to add permanent environment variables to the registry (HKCU\Environment), but this is an undocumented (and likely unsupported) technique and still it will not take effect until the users next login.

System environment variables can be found in the registry here:

HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\Environment

## CALL SET

The CALL SET syntax allows a variable substring to be evaluated, the CALL page has more detail on this technique,

Setlocal EnableDelayedExpansion

in most cases a better approach is to use

### Autoexec.bat

Any SET statement in c:\autoexec.bat will be parsed at boot time

Variables set in this way are not available to 32 bit gui programs - they won't appear in the control panel.

They will appear at the CMD prompt.

If autoexec.bat CALLS any secondary batch files, the additional batch files will NOT be parsed at boot.

This behaviour can be useful on a dual boot PC.

## Errorlevels

When CMD Command Extensions are enabled (the default)

If the variable was successfully changed %ERRORLEVEL% = 0

No variable found/invalid name = 1

SET /A Unbalanced parentheses = 1073750988

SET /A Missing operand = 1073750989

SET /A Syntax error = 1073750990

SET /A Invalid number = 1073750991

SET /A Number larger than 32-bits = 1073750992

SET /A Division by zero = 1073750993

SET is an internal command. If Command Extensions are disabled all SET commands are disabled other than simple assignments like: \_variable=MyText

The CMD shell will fail to read an environment variable if it contains more than 8,191 characters.

# I got my mind set on you

# I got my mind set on you... - Rudy Clark (James Ray/George Harrison)

## Related:

Syntax - VarSubstring Extract part of a variable (substring)

Syntax - VarSearch Search & replace part of a variable.

Syntax - Environment Variables - List of default variables

**CALL** - Evaluate environment variables

**SETX** - Set an environment variable permanently.

SETLOCAL - Begin localisation of environment variable changes

ENDLOCAL - End localisation of environment changes, use to return values

EXIT - Set a specific ERRORLEVEL

Parameters - get a full or partial pathname from a command line variable.

PATH - Change the %PATH% environment variable.

PATHMAN - Resource Kit utility for modification of both the system and user paths. Pathman can resolve many problems and can improve performance by removing duplicate paths. For details see Pathman.wri

**REG** - Read or Set Registry values

**REGEDIT** - Import or export registry settings

WMIC ENVIRONMENT - Set environment vars through WMI

StackOverflow - Storing a Newline in a variable

Powershell: Set-Variable - Set a variable and a value (set/sv)

Powershell: Read-Host - Prompt for user input

Equivalent bash command (Linux): env - Display, set, or remove environment variables

Set - Environment Variable - Windows CMD - SS64.com	
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# Variables: extract part of a variable (substring)

It is possible to retrieve specific characters from a string variable.

A negative number will count backwards from the end of the string.

### **Examples**

The variable **\_test** is used for all the following examples:

```
SET _test=123456789abcdef0
:: Extract only the first 5 characters
SET _result=%_test:~0,5%
ECHO %_result%
                           =12345
:: Skip 7 characters and then extract the next 5
     result=%_test:~7,5%
ECHO %_result%
                           =89abc
:: Skip 7 characters and then extract everything else
      result=%_test:~7%
ECHO %_result%
                           =89abcdef0
:: Extract only the last 7 characters
     _result=%_test:~-7%
                           =abcdef0
ECHO %_result%
:: Extract everything BUT the last 7 characters
SET _result=%_test:~0,-7%
ECHO %_result% =
                           =123456789
:: Extract between 7 from the front and 5 from the end
SET _result=%_test:~7,-5%
ECHO %_result% =
                           =89ab
:: Go back 7 from the end then extract 5 towards the end
SET _result=%_test:~-7,5%
ECHO %_result% =
                           =abcde
:: Extract between 7 from the end and 5 from the end
   SET _result=%_test:~-7,-5%
   ECHO %_result%
```

This variable substring syntax only works for CMD environment variables, like <code>%MYVAR%</code>, it will not work with FOR parameter variables, like <code>%%G</code>, however a simple workaround is to set a variable first: <code>Set %MYVAR%=%%G</code> and then find the substring of the new variable.

To discover if a given variable contains a given string: use the syntax above to remove the \_SearchString and compare the result with the original variable before removal. If both strings are the same, then\_SearchString was not found:

```
IF /i "%_variable:_SearchString=%"=="%_variable%" (Echo String not found.) ELSE (Echo String found.)
```

To match an exact word, pad the search string with spaces: "John" instead of "John" will avoid a match with "Johnstone"

### Advanced Usage of :~

You can use the :~ syntax and provide each of the parameters from other variables, for example if you have

```
%_donor%=2539850
%_digit%=4
```

To extract digit # 4 from \_donor you might try

```
SET _substring=%_donor:~%_digit%,1%
```

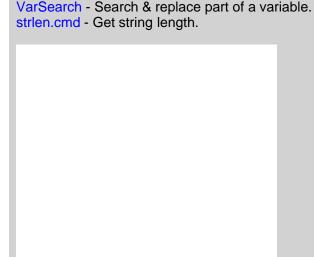
Unfortunately this will not work because the :~ syntax expects a value not a variable. To get around this use the CALL command like this:

```
SET _startchar=2
SET _length=1
SET _donor=884777
CALL SET _substring=%*_donor:~%_startchar%,%_length%%%
ECHO (%_substring%)
```

- :: Credits:
- :: Clay Calvert alt.msdos.batch.nt
- :: Ritchie Lawrence alt.msdos.batch.nt

#Substitute Me for him, Substitute My Coke for gin, Substitute You for my mum, At least I'll get my washing done# ~ The Who (Substitute)

### Related:



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# Variable Edit/Replace

Use the syntax below to edit and replace the characters assigned to a string variable.

```
Syntax
%variable:StrToFind=NewStr%
%~[param_ext]$variable:Param

Key
StrToFind : The characters we are looking for NewStr : The chars to replace with (if any) variable : The environment variable param_ext : Any filename Parameter Extension Param : A command line parameter (e.g. 1)
```

This Edit/Replace syntax can be used anywhere that you would use the <code>%variable%</code> such as ECHOing the variable to screen or setting one variable = another

param\_ext cannot be <code>%\*</code> which typically represents a whole set of parameters, but this is easily worked around by setting a variable=<code>%\*</code>

"StrToFind" can **begin** with an asterisk, in which case it will replace all characters to the left of "StrToFind". By leaving NewStr blank, you can delete characters.

Using both an asterisk and NewStr=null effectively provides a left\$() or right\$() function.

#### **Examples:**

The variable \_test containing 12345abcabc is used for all the following examples:

```
::Replace '12345' with 'Hello '
SET _test=12345abcabc
SET _result=%_test:12345=Hel
   SET _result=%_test:12345=Hello %
ECHO %_result% =Hello &
                                     =Hello abcabc
:: Replace the character string 'ab' with 'xy'
   SET _test=12345abcabc
SET _result=%_test:ab=xy%
    ECHO %_result%
                                     =12345xycxyc
:: Delete the character string 'ab'
   SET _test=12345abcabc
SET _result=%_test:ab=%
ECHO %_result%
                                     =12345cc
::Delete the character string 'ab' and everything before it
   SET _test=12345abcabc
SET _result=%_test:*ab=%
ECHO %_result%
                                     =cabc
::Replace the character string 'ab' and everything before it with 'XY'
SET _test=12345abcabc
SET _result=% toot.tab.vvv
          result=%_test:*ab=XY%
    ECHO %_result%
                                      =XYcabc
:: To remove characters from the right hand side of a string is
:: a two step process and requires the use of a CALL statement
:: e.g.
    SET _test=The quick brown fox jumps over the lazy dog
       To delete everything after the string 'brown' first delete 'brown' and everything before it
    SET _endbit=%_test: *brown=%
    Echo We dont want: [%_endbit%]
   ::Now remove this from the original string CALL SET _result=%%_test:%_endbit%=%%
    echo %_result%
```

All the examples on this page assume the default Expansion of variables, if you are using DelayedExpansion then you may want to change the variable references to !\_variable! instead of %\_variable%

## Remove spaces from a text string

To delete space characters use the same syntax as above:

```
SET _no_spaces=%_some_var: =%
```

## Boolean Test "does string exist?"

To test for the existence of a value we can use a temporary variable, delete the string we are looking for (if it exists) and then compare the two variables with EQU

Example: test for the existence of the string "London" in a variable containing text (that could be in any order) "Aberdeen, London, Edinburgh"

```
Set _cities="Aberdeen, London, Edinburgh"
:: Remove London if found
Set _dummy=%_cities:London=%
IF NOT %_dummy% == %_cities% (ECHO London was found.) ELSE (ECHO London was not found.)
```

## Finding items within the PATH environment variable

The %PATH% variable contains a list of folder names.

If you have a parameter containing a valid 'folder' this can be compared with the PATH variable.

This is done using the syntax: \$variable:parameter

### Example

```
%PATH% = C:\Windows\system32;C:\Windows;C:\utils\jdk\bin
batch parameter %1 = C:\utils\jdk\bin
```

### To get the drive and Path

```
ECHO %~dp$PATH:1
```

This will either return "C:\utils\jdk\bin" or a NULL if the item is not found in the %PATH%

If the batch parameter was supplied as %2 then this would be: ECHO %~dp\$PATH: 2

This syntax can be applied where:

- The parameter is any valid parameter (%1 %2 %G) but it must contain a Full Path (not a pathname)
- The variable is %PATH% or any other variable that contains one or more Paths or pathnames separated by semicolons;
- If nothing is found by the search, then this will return an empty string (NULL)

Be wary of using the syntax on this page to **modify** the PATH - the User path can be edited, but the System path remains read-only for most users.

"A phony smile will never replace honest integrity" ~ Bob Martinelli

#### Related:

```
SUBSTRING of a variable :~
```

PARAMETERS - Filename Parameter Extensions.

strlen.cmd - Get string length.

PATHMAN - This Resource Kit utility allows quick modification of both the system and user paths. Pathman can resolve many problems such as duplicate characters, and can improve performance by removing duplicate paths. For details see Pathman.wri in the resource kit.



## Random Numbers

The Windows CMD shell contains a dynamic variable called %RANDOM% that can be used to generate random numbers.

%RANDOM% generates a random integer from 0 to 32,767 (inclusive)

```
0 ≤ %RANDOM% ≤ 32767
```

The range of numbers can be made smaller than 32767 with a little arithmetic, for example to generate a range between 1 and 500:

```
@ECHO OFF
SET /a _rand=(%RANDOM%*500/32768)+1
ECHO Random number %_rand%
```

(The Set /a will always round down)

If you try, it may look as though a larger range than 32767 will work, but doing this will produce gaps, for example changing 500 in the above to 65536 will result in a sequence of "random" numbers which only consists of odd numbers.

The distribution of numbers returned will be a determined by both the range and the quantity of numbers drawn.

For example if you are drawing random integer numbers where each number is between 0 and 100 then on average:

- If you draw 10 numbers then you should expect around 6% to be duplicates.
- If you draw 100 numbers then just over 63% will be duplicates i.e. matching one or more of the other 99 numbers.
- If you draw 1,000 numbers then almost all will be duplicates as there are only 100 possible values.

#### Random vs Pseudorandom numbers

A pseudorandom sequence is not truly random but is determined by a small set of initial values (state), the initial seed is often based on the clock time. In the case of the CMD %RANDOM% the seed is based on the clock time when the CMD session started. This can be problematic when running a batch file, if the script always takes about the same time to run before calling %RANDOM% then the number returned will always lie within a small predictable range.

As an example create a file numbers.cmd:

```
@Echo off
Echo %RANDOM%
```

Then call the above with

```
CMD /c numbers.cmd
CMD /c numbers.cmd
CMD /c numbers.cmd
```

Johannes Baagøe has published a comparison of better random numbers for javascript. The fastest of these is Alea(), which you can find a copy of below. This has a number of advantages, you can create much larger numbers, it will create a lot of numbers quickly and if you call it passing a seed number then the results become repeatable - you can create exactly the same sequence of random numbers again at a later date.

```
// random.js

// call this from the command line with:
// C:\> cscript /nologo random.js

// or from PowerShell
// PS C:\> $myrandom = & cscript /nologo "c:\batch\random.js"
// will create an array of 10 random numbers which you can then treat like any array variable:
// PS C:\> $myrandom[4]

// Calling without a seed, the current time will be used as a seed
var srandom=Alea();
// Calling with a seed will return the same value for the same seed
```

```
//var seed=1234
//var srandom=Alea(seed);
var i=0
// Return 10 random numbers while ( i < 10 ) \{
  // Return a number between 1 and 500 million
WScript.echo(Math.floor((srandom()*500000000)+1) );
  i++;
function Mash()
  var n = 0xefc8249d;
  var mash = function(data) {
     data = data.toString();
for (var i = 0; i < data.length; i++) {
       n += data.charCodeAt(i);
       var h = 0.02519603282416938 * n;
       n = h >>> 0;
       h -= n;
h *= n;
       n = h >>> 0;
       h -= n;
       n += h * 0x10000000; // 2^32
     return (n >>> 0) * 2.3283064365386963e-10; // 2^-32
  mash.version = 'Mash 0.9';
  return mash;
function Alea()
  return (function(args) {
     // Johannes Baagoe <baagoe@baagoe.com>, 2010
var s0 = 0;
var s1 = 0;
     var s2 = 0;
     var c = 1;
     if (args.length == 0) {
  args = [+new Date];
     var mash = Mash();
s0 = mash(' ');
s1 = mash(' ');
     s2 = mash(' ');
     for (var i = 0; i < args.length; i++) {
       s0 -= mash(args[i]);
if (s0 < 0) {
  s0 += 1;
       $1 -= mash(args[i]);
if (s1 < 0) {
   s1 += 1;</pre>
        s2 -= mash(args[i]);
       if (s2 < 0) {
s2 += 1;
     mash = null;
     var random = function() {
  var t = 2091639 * s0 + c * 2.3283064365386963e-10; // 2^-32
       s0 = s1;
       s1 = s2;
       return s2 = t - (c = t | 0);
     random.uint32 = function()
       return random() * 0x100000000; // 2^32
     random.fract53 = function() {
       return random() + (random() * 0x200000 | 0) * 1.1102230246251565e-16; // 2^-53
     random.version = 'Alea 0.9';
     random.args = args;
     return random;
  } (Array.prototype.slice.call(arguments)));
/* licensed according to the MIT - Expat license:
Copyright (C) 2010 by Johannes Baagoe <bagoe@baagoe.org>
Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal
in the Software without restriction, including without limitation the rights
```

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"Anyone who attempts to generate random numbers by deterministic means is, of course, living in a state of sin" ~ John von Neumann

#### Related:

THE SOFTWARE.

VBScript: Rnd - Return a pseudorandom number. Random.org - Generate true random numbers online	

PowerShell Equivalent: Get-Random

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## Wildcards

```
The * wildcard will match any sequence of characters (0 or more, including NULL characters)

The ? wildcard will match a single character (or a NULL at the end of a filename)
```

A few quirks affect the operation of wildcards which are best illustrated by example:

To match the filename BAR.TXT any of the following patterns will match ?AR.TXT BAR.\*
??R.TXT B?R.???
BA?.TXT BA?.TXT

However the following will fail to match with BAR.TXT ??AR.TXT ?BAR.TXT B??AR.TXT

## Wildcard matching rules

- \* Generally matches any 0 or more characters, with one exception (see next rule). The non-greedy wildcard is free to match as many or as few characters as are necessary for the remainder of the mask to match.
- \*. At end of mask matches any 0 or more characters except for {dot}. In actuality, the rule applies with any number of {dot} and {space} characters between the \* and terminal {dot}. The regular expression for this term is "[\*][.]\*[.]\*[.]\*"
- ? Match 0 or one character, except for {dot}.

The only time it matches 0 characters is when it matches the end of the name, or the position before a {dot}. The question mark can also be used more than once to match more than one character.

# Wildcards match both the Short and Long filename

The command DIR /X will reveal short filenames if they exist, where many similar names exist in the same folder the short file name (SFN) will not always be an obvious contraction of the long name. e.g.

```
DIR /X

2012-05-12 01:12 96 DIABLO~1 diablo1640
2012-05-12 01:12 96 DIABLO~2 diablo1641
2012-05-12 01:12 96 DIABLO~3 diablo1642
2012-05-12 01:12 96 DIABLO~4 diablo1643
2012-05-12 01:12 96 DIE359~1 diablo1644
2012-05-12 01:12 96 DIC49C~1 diablo1648
2012-05-12 01:12 96 DIF2E9~1 diablo1740
2012-05-12 01:12 96 DIE2EF~1 diablo1649
```

As you can see, the first four short filenames follow the usual numeric tails (~1, ~2, ~3, ~4).

Then, from fifth and more files with similar beginning, the short names have four hex digits in the middle. This is actually a hex checksum of the long filename. (If you need a true file checksum look at certutil -hashfile)

Wildcards are supported by the following commands:

ATTRIB, CACLS, CIPER, COMPACT, COPY, DEL, DIR, EXPAND, EXTRACT, FIND, FINDSTR, FOR, FORFILES, FTP, ICACLS, IF EXIST, MORE, MOVE, MV, NET (\*=Any Drive), PERMS, PRINT, QGREP, REN, REPLACE, ROBOCOPY, ROUTE, TAKEOWN, TYPE, WHERE, XCACLS, XCOPY

The commands COPY and REN accept two sets of wildcards, there are some subtle differences between how these are

treated, see the REN page for details.

### Undocumented Wildcards

The two undocumented wildcards, < and > can be used with commands like DIR and COPY, or to supply a command name but only if quoted: DIR / D / Comp < T

- < Matches any 0 or more characters in either the base name or the extension, but never both.</p>
  Unlike the \* wildcard, a single < cannot match characters in both the base name and the extension.</p>
  The {dot} is considered to be part of the base name, not the extension. There is one exception If the name consists solely of an extension, without a base name, then the {dot} is considered to be part of the extension. This non-greedy wild card is free to match as many or as few characters as are necessary for the remainder of the mask to match.
- > Is identical to ?. The only difference is that it can be placed after a {dot} to prevent the {dot} from matching the end of the name.

#### Examples at **Dostips**

The < and > wildcards work with the following commands: CACLS, CIPHER, COPY, DEL, DIR, FINDSTR, IF EXIST, MOVE, TYPE

## Numeric Comparisons

There are several contexts where CMD.EXE will parse a string as a numeric expression:

```
IF comparisons - EQU, NEQ, LSS, LEQ, GEQ, GTR SET /A
variable substring expansion - %var:~n,m%
FOR /F "TOKENS=n"
FOR /L %%A in (n1 n2 n3)
```

For many purposes a 4 byte signed integer value ranging from -2,147,483,648 to 2,147,483,647 will suffice, but in the above contexts it is also possible to express the numbers in hexadecimal or octal notation.

e.g. Octal: 00, 07 Hex: 0x00, 0xFF

There are a number of subtle differences (Negative numbers, command, version of Windows) which affect how these numbers are parsed and these are described in the DosTips forum thread Rules for how CMD.EXE parses numbers.

"We usually see only the things we are looking for, so much that we sometimes see them where they are not" ~ Eric Hoffer

#### Related:

FINDSTR REN - Rename files Long and short filename issues

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# Run a CMD batch file

To run a batch script from the CMD shell, save the file as plain ASCII text with the file extension .CMD, then from the command line, enter the name of the script and press return.

```
C:\Batch> Demo.cmd
```

To run a batch file from within another batch file, use the CALL command, otherwise the first script will exit without performing any further commands.

It is also possible to run batch scripts with the old (Windows 95 style) .BAT extension, but be aware that these will set ERRORLEVEL differently.

# Run a Powershell script

To run a PowerShell script from the CMD shell:

C:\> powershell -file "c:\batch\demo.ps1"

# Run a VBScript file

Pun a ceript from PowerShell

To run a VBScript from the CMD shell:

C:\> cscript c:\batch\demo.vbs

"The method of the enterprising is to plan with audacity and execute with vigor" ~ John Christian Bovee

### Related

Run a script from VBScript		

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# Run with elevated permissions

The CMD shell, START and RUNAS commands have no built-in options to elevate or run commands 'As Admin'

It is possible to right click CMD.exe (or it's Start menu shortcut) and run it As Admin. Shortcuts can be edited to always run as Admin - Properties | Shortcut | Advanced then tick "Run as administrator".

To elevate from the command line will require running either VBScript or PowerShell, this does not have to involve completely rewriting existing scripts, you can use a couple of lines of either VBScript or PowerShell to launch an elevated CMD.exe and that will run a batch file elevated.

Another approach is to use a third party utility that will elevate permissions.

# Testing for Elevation

Testing if the current session is elevated can be done with the FSUTIL command (via StackOverflow) or SFC. Note that you don't even have to pass a drive letter to FSUTIL, it will set an errorlevel without reading any drive information.

```
fsutil dirty query >nul
If %errorLevel% NEQ 0 (
    Echo Failure, please rerun this script from an elevated command prompt. Exiting...
    Ping 127.0.0.1 3>&1 > nul
    Exit /B 1
)
Echo Success: this script is running elevated.
```

When a script is run with elevated permissions several aspects of the user environment will change: The current directory, the current TEMP folder and any mapped drives will be disconnected.

## Run without Elevation

In some cases you may wish to run an application without elevation, this will restrict what the application can do.

The undocumented environment variable \_\_COMPAT\_LAYER can be used to lower the ExecutionLevel to RunAsInvoker

```
@Echo Off
SETLOCAL
Set __COMPAT_LAYER=RunAsInvoker
regedit.exe
```

The example above will run REGEDIT using the user's native permissions, attempting to modify any protected area of the registry (such as HKLM) within this session will produce an error.

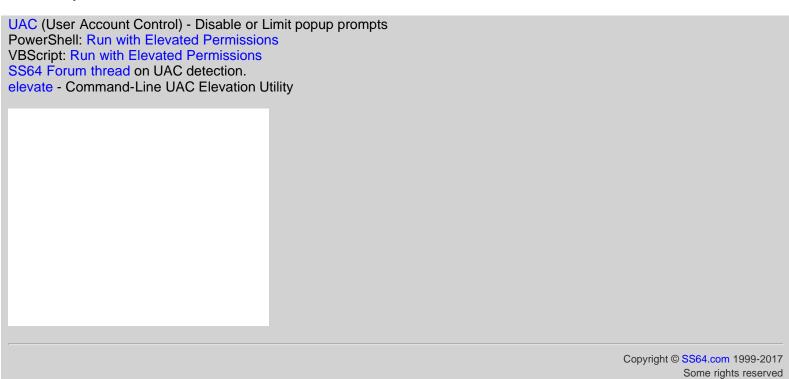
### Scheduled Tasks

If a scheduled task invokes a UAC prompt, then the task will fail to run unattended, to prevent this make sure to select the 'Run With Highest Privileges' check box:

```
    Run only when user is logged on
    Run whether user is logged on or not
    Do not store password. The task will only
    Run with highest privileges
```

"A man in public life expects to be sneered at – it is the fault of his elevated situation, and not of himself" ~ Charles Dickens

### Related



## DateMath.cmd

Add or subtract days from any date, copy the script below or download here and save as DateMath.cmd

```
SETLOCAL
:: DateMath, a general purpose date math routine
:: If DateMath detects an error, variable _dd_int is set to 999999.
SET v_mm_int=0
SET v_yy_int=0
SET v_ymd_str=
SET v_mm_str=
SET v_dd_str=
IF "%3"=="" goto s_syntax
IF "%4"=="+" goto s_validate_year
IF "%4"=="-" goto s_validate_year
IF "%4"=="" goto s_validate_year
:s_syntax
echo:
echo DATEMATH SYNTAX:
echo
echo:
echo DateMath will set the variables as listed below
            variables include leading zeros e.g. "01"
echo 'str'
echo 'int' variables leading zeros are stripped e.g. "1"
echo:
echo CALL DateMath YY MM DD - YY2 MM2 DD2
echo:
echo Will set variable _dd_int to the signed difference
echo between the 2 dates (measured in days)
echo:
echo:
echo CALL DateMath YY MM DD +/- Days
echo:
echo Will set the following variables to the result of
echo adding or substracting days from the initial date:
echo
         _ymd_str, _yy_int
         _mm_str, _mm_int, _dd_str, _dd_int
echo
echo
echo:
echo:
echo
pause
echo:
echo:
echo CALL DateMath YY MM DD
echo:
echo Will set the following variables:
         _ymd_str, _yy_int
_mm_str, _mm_int,
echo
echo
          _dd_str, _dd_int
echo
echo:
echo
echo:
echo _ymd_str is in YYYYMMDD format.
echo _yy_int is in YYYY format, even if YY format was originally supplied. echo This conversion is useful for FAT/NTFS file dates which are in YY format.
ENDLOCAL & SET /a _dd_int=999999
goto :eof
:s_validate_year
::strip leading zeros
 SET v_yy=%1
 if %v_yy:~0,1% EQU 0 set v_yy=%v_yy:~1%
 :: Check for Y2K IF v_y LSS 100 IF v_y GEQ 80 SET /A v_yy += 1900 IF v_y LSS 80 SET /A v_yy += 2000
 :: at this point v_yy contains a 4 digit year
::validate month and day
 if %2 GTR 12 goto s_syntax if %3 GTR 31 goto s_syntax
 SET v_mm=%2
 SET v_dd=%3
```

```
::strip leading zeros if v_m: 0,1 EQU 0 set v_m: 0,1 EQU 0 set v_d: 0 set v_d: 0
:: Set the int variables

SET /a v_dd_int=%v_dd%

SET /a v_yy_int=%v_yy%

SET /a v_mm_int=%v_mm%
:: Determine which function to perform - ADD, SUBTRACT or CONVERT
 If not "%6"=="" goto s_validate_2nd_date
 if "%4"=="" goto s_convert_only
 :: Add or subtract days to a date
SET /a v_number_of_days=%5
 goto s_add_or_subtract_days
:s_convert_only
 SET /a v_dd_int=%v_dd%
IF %v_dd% LEQ 9 (SET v_dd_str=0%v_dd%) ELSE (SET v_dd_str=%v_dd%)
IF %v_mm% LEQ 9 (SET v_mm_str=0%v_mm%) ELSE (SET v_mm_str=%v_mm%)
SET v_ymd_str=%v_yy%%v_mm_str%%v_dd_str%
ECHO DATEMATH - Convert date only (no maths)
goto s_end
:s_validate_2nd_date
  If "%4"=="+" goto s_syntax
 :: Subtracting one date from another :::::
 :: strip leading zero
 SET v_yy2=%5
 if %v_yy2:~0,1% EQU 0 set v_yy2=%v_yy2:~1%
 if %v_yy2% GTR 99 goto s_validate2nd_month if %v_yy2% GTR 49 goto s_prefix_2_1950_1999 if %v_yy2% LSS 10 goto s_prefix_2_2000_2009 SET v_yy2=20%v_yy2%
 goto s_validate2nd_month
:s_prefix_2_2000_2009
SET v_yy2=200%v_yy2%
goto s_validate2nd_month
:s_prefix_2_1950_1999
 SET v_yy2=19%v_yy2%
:s_validate2nd_month
 ::strip leading zeros
 ::SET /a v_yy2=%v_yy2% if %v_yy2:~0,1% EQU 0 set v_yy2=%v_yy2:~1%
 ::v_yy2 now contains a 4 digit year
 if %6 GTR 12 goto s_syntax
 SET v_mm2=%6
 if %7 GTR 31 goto s_syntax
 SET v_dd2=%7
 ::strip leading zeros
::SET /a v_mm2=%v_mm2%
if %v_mm2:~0,1% EQU 0 set v_mm2=%v_mm2:~1%
::SET /a v_dd2=%v_dd2%
if %v_dd2:~0,1% EQU 0 set v_dd2=%v_dd2:~1%
call :s_julian_day %v_yy_int% %v_mm_int% %v_dd_int%
SET v_sumdays1=%v_JulianDay%
call :s_julian_day %v_yy2% %v_mm2% %v_dd2%
SET v_sumdays2=%v_JulianDay%
SET /a v_dd_int=%v_sumdays1% - %v_sumdays2%
ECHO DATEMATH - Subtracting one date from another = days difference
ECHO
ECHO %v_dd_int%
ECHO ~
goto s_end_days
:s_add_or_subtract_days
if /i "%4"=="+" goto s_add_up_days
:: Subtract all days :::::
SET /a v_dd=%v_dd% - %v_number_of_days%
:s_adjust_month_year
if %v_dd% GEQ 1 goto s_add_subtract_days_DONE
SET /a v_mm=%v_mm% - 1
if %v_mm% GEQ 1 goto s_add_days_%v_mm%
```

```
SET /a v_yy=%v_yy% - 1
SET /a v_mm=%v_mm% + 12
goto s_add_days_%v_mm%
:s_add_days_2
SET /a v_dd=%v_dd% + 28
SET /a v_leapyear=%v_yy% / 4
SET /a v_leapyear=%v_leapyear% * 4
if %v_leapyear% NEQ %v_yy% goto s_adjust_month_year
SET /a v_dd=%v_dd% + 1
goto s_adjust_month_year
:s_add_days_4
:s_add_days_6
:s add days 9
 :s_add_days_11
SET /a v_dd=%v_dd% + 30
goto s_adjust_month_year
:s_add_days_1
:s_add_days_3
:s_add_days_5
:s_add_days_7
:s_add_days_8
:s_add_days_10
:s_add_days_
SET /a v_dd=%v_dd% + 31
goto s_adjust_month_year
:s_add_up_days
:: add all days ::::::
SET /a v_dd=%v_dd% + %v_number_of_days%
:s_subtract_days_
goto s_subtract_days_%v_mm%
:s_adjust_mth_yr
SET /a v_mm=%v_mm% + 1
if %v_mm% LEQ 12 goto s_subtract_days_%v_mm%
SET /a v_yy=%v_yy% + 1
SET /a v_mm=%v_mm% - 12
goto s_subtract_days_%v_mm%
:s_subtract_days_2
SET /a v_leapyear=%v_yy% / 4
SET /a v_leapyear=%v_leapyear% * 4
If %v_leapyear% EQU %v_yy% goto s_subtract_leapyear
if v_dd\ LEQ 28 goto s_add_subtract_days_DONE SET /a v_dd=v_dd\ - 28
goto s_adjust_mth_yr
:s_subtract_leapyear
if %v_dd% LEQ 29 goto s_add_subtract_days_DONE
SET /a v_dd=%v_dd% - 29
goto s_adjust_mth_yr
:s_subtract_days_4
:s_subtract_days_6
:s_subtract_days_9
:s_subtract_days_11
if %v_dd% LEQ 30 goto s_add_subtract_days_DONE
SET /a v_dd=%v_dd% - 30
goto s_adjust_mth_yr
:s_subtract_days_1
:s_subtract_days_3
:s_subtract_days_5
:s_subtract_days_7
:s_subtract_days_8
:s_subtract_days_10
:s_subtract_days_12
if %v_dd% LEQ 31 goto s_add_subtract_days_DONE
SET /a v_dd=%v_dd% - 31
goto s_adjust_mth_yr
:s_add_subtract_days_DONE
SET /a v_dd_int=%v_dd%
SET /a v_mm_int=%v_mm%
SET /a v_yy_int=%v_yy%
IF %v_dd% GTR 9 (SET v_dd_str=%v_dd%) ELSE (SET v_dd_str=0%v_dd%)
IF %v_mm% GTR 9 (SET v_mm_str=%v_mm%) ELSE (SET v_mm_str=0%v_mm%)
SET v_ymd_str=2v_yvx%v_mm_str2kv_dd_str%
SET v_ymd_str=%v_yy%%v_mm_str%%v_dd_str%
ECHO DATEMATH - add or subtract days from a date = new date
goto s_end
:s_julian_day
SET v_year=%1
SET v_month=%2
SET v_day=%3
```

```
SET /a v_month=v_month
   SET /a v_day=v_day
   SET /A a = 14 - v_month SET /A a /= 12
   SET /A y = v_year + 4800 - a

SET /A m = v_month + 12 * a - 3

SET /A m = 153 * m + 2

SET /A m /= 5

SET /A v_JulianDay = v_day + m + 365 * y + y / 4 - y / 100 + y / 400 - 32045
   ECHO The Julian Day is [%v_JulianDay%]
   goto :eof
   ECHO [%v_ymd_str%] YY=[%v_yy_int%] MM=[%v_mm_str%] DD=[%v_dd_str%]
   :s_end_days
   ENDLOCAL&SET /a
                    _yy_int=%v_yy_int%&SET /a _mm_int=%v_mm_int%&SET /a _dd_int=%v_dd_int%&SET
_ymd_str=%v_ymd_str%&SET _mm_str=%v_mm_str%&SET _dd_str=%v_dd_str%
Examples
D:\> datemath 02 05 08
DATEMATH - Convert date only (no maths)
[20020508] YY=[2002] MM=[05] DD=[08]
D:\> datemath 2007 12 30
DATEMATH - Convert date only (no maths)
[20071230] YY=[2007] MM=[12] DD=[30]
D:\> datemath 27 12 01 - 02 11 02
The Julian Day is [2461741]
The Julian Day is [2452581]
DATEMATH - Subtracting one date from another = days difference
9160
D:\> datemath 02 11 02 + 9160
DATEMATH - add or subtract days from a date = new date
[20271201] YY=[2027] MM=[12] DD=[01]
D:\> datemath 2012 09 08 - 2011 09 08
The Julian Day is [2456179]
The Julian Day is [2455813]
DATEMATH - Subtracting one date from another = days difference
366
~~~~~
D:\> datemath 13 09 08 - 12 09 08
The Julian Day is [2456544]
The Julian Day is [2456179]
DATEMATH - Subtracting one date from another = days difference
365
```

"We were having one of those great first dates you can only have when it's not an actual date" ~ Sarah Jessica Parker

Related:
SetLocal - Control the visibility of environment variables in a batch file.  Powershell variables - these support Math operations out of the box (.addDays)  Rules for how CMD.EXE parses numbers - DosTips forum (Dave Benham)
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# Remove Quotes from a string

Several routines that can be used to remove quotes from the contents of a variable.

In the majority of cases running any current version of Windows, the simplest method is to use \*~1 Parameter Extensions to remove the quotes automatically

```
@ECHO OFF
Set _string=%~1
Echo the string passed to this script is %_string%
```

(you may also want to test IF the variable is empty/NULL)

This is equivalent to the following, which can be used to remove *outer* quotes from **any** string, not just a parameter string:

```
:: Remove quotes
SET _string=###%_string%###
SET _string=%_string:"###=%
SET _string=%_string:###"=%
SET _string=%_string:###=%
```

If you just want to remove ALL quotes from a string, this can be done in one line with variable replace syntax:

```
Set _somevariable=%_somevariable:"=%
```

File and folder names cannot (legally) contain quotes so the above is often all that's needed.

A one line function, using a FOR command to run parameter expansion and remove quotes (the %~A removes the quotes), this is a good approach when you need to dequote multiple strings, just call the function with each string:

```
:::::::: one line Dequote example ::::::::
@Echo Off
Setlocal
Set _mypath="C:\Program Files\ss64\"
CALL :dequote _mypath
Echo %_mypath%
Goto :eof

:DeQuote
for /f "delims=" %%A in ('echo %%%1%%') do set %1=%%~A
Goto :eof
```

The above will turn "C:\Program Files\ss64\" into C:\Program Files\ss64\

If the line in bold is saved as a single line batch file DeQuote.cmd, then it can be called from other batch scripts:

```
CALL DeQuote.cmd VariableName
```

There may be cases when you only want to affect the string if it both starts and ends with a quote and raise an error or some other action if mismatched quotes are found. Some more complex scripts to handle this can be found here in the forum.

"One look is worth a thousand words" ~ Fred R. Barnard

#### Related:

SetLocal - EnableDelayedExpansion
Long Filenames and NTFS - Valid characters in filenames



# Delete files older than N days

There are several ways to do this

1) Using ForFiles to delete files over 7 days old:

```
C:\> forfiles /p "C:\source_folder" /s /m *.* /c "cmd /c Del @path" /d -7
```

2) Using Robocopy /Move to delete files over 7 days old:

```
C:\> set _robodel=%TEMP%\~robodel
C:\> MD %_robodel%
C:\> ROBOCOPY "C:\source_folder" %_robodel% /move /minage:7
C:\> del %_robodel% /q
```

- 3) Using DateMath.cmd and Getdate.cmd, download DelOlder.cmd
- 4) With PowerShell delete files over 7 days old:

```
PS C:\> $now = get-date
PS C:\> dir "C:\source_folder\" | where {$_.LastWriteTime -le $now.AddDays(-7)} | del -whatif
```

Powershell also has .AddHours if you want to delete more recent files.

"We were having one of those great first dates you can only have when it's not an actual date" - Sarah Jessica Parker

#### Related:

SetLocal - Control the visibility of environment variables in a batch file. Powershell methods - Math operations (.addDays)

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## GenChr.cmd

Generate the ASCII/Unicode character for any byte value. The output is a file bytevalue.chr

```
@echo off
set "USAGE=echo:Usage: Supply an integer 0-255& goto :EOF"
if "%-1" equ "" %USAGE%
set /a "val=%-1" 2>nul
if "%-1" neq "%val%" %USAGE%
if %-1 lss 0 %USAGE%
if %-1 gtr 255 %USAGE%

set tempfile=%-1.tmp
set "options=/d compress=off /d reserveperdatablocksize=26"
if %-1 neq 26 (type nul >"%tempfile%"
makecab %options% /d reserveperfoldersize=%-1 "%tempfile%" %-1.chr >nul
type %-1.chr | (
(for /l %%N in (1 1 38) do pause)>nul&findstr "^">"%tempfile%")
>nul copy /y "%tempfile%" /a %-1.chr /b
del "%tempfile%"
) else (copy /y nul + nul /a 26.chr /a >nul)
```

Written via the teamwork of carlos, penpen, aGerman, dbenham & bluesxman - see forum thread

## **Examples**

Create the 0 or NUL character (file 0.chr)

genchr.cmd 0

Create the 9 or tab character. (file 9.chr)

genchr.cmd 9

Create all 256 characters/files:

```
for /1 %a in (0,1,255) do start "" cmd /c genchr %a
```

"When the character of a man is not clear to you, look at his friends" ~ Japanese Proverb

#### Related

Ascii table
MAKECAB Create .CAB files

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## GetDate.cmd

Display the date and time independent of OS Locale, Language or the users chosen date format (Control Panel/Regional).

If all you need is the current date and time in **local** format, you can just use the built in variables <code>%date%</code> and <code>%time%</code> the more difficult problem is making this work for *any* locale so that it can be used across international networks.

Method 1 - Calling a VBScript getdate.vbs for Windows XP or greater

```
@Echo off
For /f %%G in ('cscript /nologo getdate.vbs') do set _dtm=%%G
Set _yyyy=%_dtm:~0,4%
Set _mm=%_dtm:~4,2%
Set _dd=%_dtm:~6,2%
Set _hh=%_dtm:~8,2%
Set _nn=%_dtm:~10,2%
Echo %_yyyy%-%_mm%-%_dd%T%_hh%:%_nn%
```

### Method 2 - Calling WMIC for Windows XP Professional or Vista/Windows 7

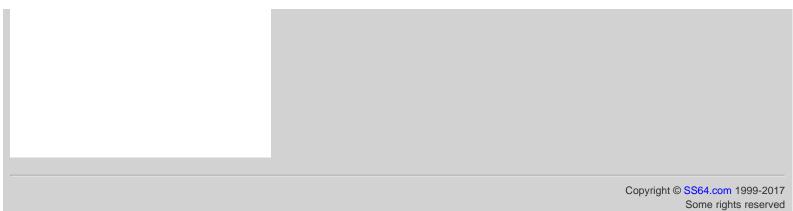
```
@Echo off
:: Check WMIC is available
WMIC.EXE Alias /? >NUL 2>&1 || GOTO s_error
:: Use WMIC to retrieve date and time
FOR /F "skip=1 tokens=1-6" %%G IN ('WMIC Path Win32_LocalTime Get Day^,Hour^,Minute^,Month^,Second^,Year
/Format:table') DO (
IF "%%~L"=="" goto s_done
Set _yyyy=%%L
Set _mm=00%%J
      Set _dd=00%%G
Set _hour=00%%H
SET _minute=00%%I
:s_done
:: Pad digits with leading zeros
      Set _mm=%_mm:~-2%
      Set _dd=%_dd:~-2%
Set _hour=%_hour:~-2%
      Set _minute=%_minute:~-2%
:: Display the date/time in ISO 8601 format:
GOTO: EOF
:s error
Echo GetDate.cmd
Echo Displays date and time independent of OS Locale, Language or date format.
Echo Requires Windows XP Professional, Vista or Windows 7
Echo Returns 6 environment variables containing isodate, Year, Month, Day, hour and minute.
Based on the sorted date code by Rob van der Woude.
```

Previous versions of this script (for Windows XP) used the DATE command, under Windows 7 this now gives different output strings dependent on the short date format and OS Language.

"I've been on the calendar, but never on time" ~ Marilyn Monroe

#### Related

datetime.vbs - Get Date, Time and daylight savings (VB Script)
Get UNIX format date - Dave Benham / StackOverflow (WMIC)
Standard date and time notation - YYYY-MM-DD
Date/Time scripts - Rob van der Woude
Date/Time scripts - Ritchie Lawrence



## GetTime.cmd

Returns the current time into the variable %\_time%

```
@echo off
SETLOCAL
For /f "tokens=1-3 delims=1234567890 " %%a in ("%time%") Do set "delims=%%a%%b%%c"
For /f "tokens=1-4 delims=%delims%" %%G in ("%time%") Do (
    Set _hh=%%G
    Set _min=%%H
    Set _ss=%%I
    Set _ms=%%J
)
:: Strip any leading spaces
Set _hh=%_hh: =%

:: Ensure the hours have a leading zero
if 1%_hh% LSS 20 Set _hh=0%_hh%

Echo The time is: %_hh%:%_min%:%_ss%
ENDLOCAL&Set _time=%_hh%:%_min%
```

Although the default time delimiter, in Windows XP and above is either . or : users can change the delimiter to just about any character they like. And you know theres always that one guy, the one who writes everything in green ink, who will do this!

Based on the discussion thread here, this script always returns HH:MM no matter which time delimiter has been set in the control panel. Thanks to avery\_larry and bluesxman for their improvements. To include Milliseconds just tack on the <code>%\_ms%</code> variable.

"What may be done at any time will be done at no time" ~ Scottish Proverb

#### Related

datetime.vbs - Get Date, Time and daylight savings (VB Script)
%TIME% - variable containing current time
TIME - Set the time (list of default time formats for different countries)
GetDate.cmd - Get todays date (any region, any OS)
tdiff.cmd - Time difference in Hours/Minutes
Commandline.co.uk - date/time scripts
Rob Vanderwoude - date/time scripts

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## GMT.cmd

Returns the current time into the variable <code>%\_gmt%</code> adjusted to Greenwich Mean Time, this can be useful when comparing events across multiple time zones or whenever you don't want daylight savings to affect the result.

```
::gmt.cmd Display the current time in GMT (World Time)
@echo off
Setlocal
Set _key=HKLM\System\CurrentControlSet\Control\TimeZoneInformation
:: find offset from GMT in minutes
For /f "Tokens=3" %%G in ('Reg query %_key% /V ActiveTimeBias^|FIND "REG_DWORD"') do (
  Set /a _offset=%%G
:: Convert to hours
Set /a _offset_hours=%_offset% / 60
:: Get current local time
For /f "tokens=1-3 delims=1234567890 " %%a in ("%time%") Do set "delims=%%a%%b%%c"
For /f "tokens=1-4 delims=%delims%" %%G in ("%time%") Do (
  Set _hh=%%G
  Set _min=%%H
:: Strip any leading spaces
Set _hh=%_hh: =%
:: Ensure the hours have a leading zero if 1%_hh% LSS 20 set _hh=0%_hh%
        Local time: %_hh%:%_min%
:: add offset to the current time
Set /a _hh=%_hh% + %_offset_hours%
:: display result
Echo GMT time:
                            %_hh%:%_min%
ENDLOCAL&Set _gmt=%_hh%:%_min%
```

"Time is like money, the less we have of it to spare, the further we make it go" ~ Josh Billings

#### Related

datetime.vbs - Get Date, Time and daylight savings (VB Script)
GetTime.cmd - Get the time now
TIME - Set the time (list of default time formats for different countries)
Rob Vanderwoude - date/time scripts

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# StampMe.cmd

Rename a file (or folder) by appending the current date and time to the existing filename:

```
SETLOCAL
IF [%1] NEQ [] goto s_start
:: Author - Simon Sheppard, Nov 2014
:: Tested for Windows XP Pro or greater
Echo StampMe.cmd
Echo Rename a file with the DATE/Time
Echo:
Echo Syntax
       STAMPME TestFile.txt
Echo
Echo:
Echo
       STAMPME "Test File.txt"
Echo:
       STAMPME "c:\docs\Test File.txt"
Echo
Echo:
       Will rename the file in the format "Test File-2014-12-30@16-55-01.txt"
Echo
Echo:
Echo
        In a batch file use CALL STAMPME ...
GOTO :eof
:s_start
Set _file=%~n1%
Set _pathname=%~f1%
Set _ext=%~x1%
Year-MM-Day@HR-Min-Sec
Echo
      %_datetime%
:: Rename the file
REN "%_pathname%" "%_file%-%_datetime%%_ext%"
```

The last line of the batch file does the REName.

### **Examples**

```
c:\> StampMe "sample file.txt"
c:\> StampMe "C:\logs\data\errorlog.txt"
c:\> StampMe "C:\docs\example folder"
```

An alternative 'quick and dirty' way to do the same thing in one line is shown below, this does work but is less robust as the results will vary according to regional/control panel settings.

```
c:\> REN "sample file.txt" "* %Date:/= % %Time::=.%.*"

"The time you enjoy wasting is not wasted time" ~ Bertrand Russell
```

#### Related

DelOlder.cmd - Delete files more than n days old GetDate and GetTime scripts Standard date and time notation - YYYY-MM-DD Stampme.ps1 - Powershell version

StampMe.cmd - rename a file with todays date and time - Window	vs CMD - SS64.com
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### tdiff.cmd

Calculate the time difference between two time values in hours, minutes and seconds.

```
@Echo off
Setlocal
if "%~1" EQU "" goto s_syntax
:: Convert start and end times to hundredths of a second
Call :s_calc_timecode %1
Set _start_timecode=%errorlevel%
Call :s_calc_timecode %2
Set _stop_timecode=%errorlevel%
:: Calculate the difference in hundredths
Set /a _diff_timecode=_stop_timecode - _start_timecode
:: Midnight rollover if %_diff_timecode+=(24 * 60 * 60 * 100)
Echo %_diff_timecode% hundredths of a second
:: Split out Hours, Mins etc and return the result set /a hs=_diff_timecode \%\% 100
set /a _diff_timecode/=100 set /a ss=_diff_timecode %% 60
set /a _diff_timecode/=60
set /a mm=_diff_timecode %% 60
set /a _diff_timecode/=60
set /a hh=_diff_timecode
set hh=0%hh%
set mm=0%mm%
set ss=0%ss%
set hs=0%hs%
set _tdiff=%hh:~-2%:%mm:~-2%:%ss:~-2%.%hs:~-2%
Echo HH:MM:ss.hs
Echo %_tdiff%
endlocal & set _tdiff=%_tdiff%
goto :EOF
:s_calc_timecode
   :: Remove delimiters and convert to hundredths of a second.
  setlocal
  For /f "usebackq tokens=1,2,3,4 delims=:." %%a in ('%1') Do (
       set hh=00%%a
       set mm=00%%b
       set ss=00%c
       set hs=00%%d
   set hh=%hh:~-2%
   set mm=%mm:~-2%
   set ss=%ss:~-2%
   set hs=%hs:~-2%
   set /a hh=((%hh:~0,1% * 10) + %hh:~1,1%) * 60 * 60 * 100 set /a mm=((%mm:~0,1% * 10) + %mm:~1,1%) * 60 * 100 set /a ss=((%ss:~0,1% * 10) + %ss:~1,1%) * 100
   set /a hs=((%hs:~0,1% * 10) + %hs:~1,1%)
   set /a _timecode=hh + mm + ss + hs
Endlocal & Exit /b %_timecode%
:s_syntax
   Echo:
   Echo Syntax: tdiff.cmd StartTime StopTime
   Echo:
             The times can be given in the format:
   Echo
             HH or HH:MM or HH:MM:ss or HH:MM:ss.hs
   Echo
   Echo:
             so for example: tdiff %%time%% 23 will give the time difference between now and 23:00:00.00
   Echo
   Echo
   Echo:
   Echo The result is returned in variable %%_tdiff%%
Exit /b 1
```

### Examples

c:\> tdiff 14:30 23:15



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### Which.cmd

Show the full path to an executable file.

```
:: WHICH.CMD CommandName [ReturnVar]
    Determines the full path of the file that would execute if
::
    CommandName were executed.
    The result is stored in variable ReturnVar, or else it is echoed to stdout if ReturnVar is not specified.
::
::
::
::
    If no file is found, then an error message is echoed to stderr.
::
::
    The ERRORLEVEL is set to one of the following values
       0 - Success: A matching file was found
       1 - No file was found and CommandName is an internal command
2 - No file was found and CommandName is not an internal command
::
::
       3 - Improper syntax - no CommandName specified
::
@echo off
setlocal disableDelayedExpansion
set "file=%~1"
if not defined file (
  >&2 echo Syntax error: No CommandName specified exit /b 3
set "noExt="
setlocal disableDelayedExpansion
  if not "%%~\mbox{modpath:}\bar{F}"=="" if not exist "%%~\mbox{modpath:}F\" (
    endlocal & endlocal & endlocal if "%~2"=="" (echo %%~$modpath:F) else set "%~2=%%~$modpath:F"
    exit /b 0
  endlocal
endlocal
>nul help %~1 && (
    >&2 echo "%~1" is not a valid command
    exit /b 2
>&2 echo "%~1" is an internal command
:: Credits:
:: Dave Benham
:: forum thread
```

#### Related

WHERE - Locate and display files in a directory tree. whereis utility - Flounder.com

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### xlong.cmd

It is possible to create very long filenames/pathnames on NTFS that exceed the Windows API limit. This typically happens when a folder which is part of a deep hierarchy gets renamed. Very long filenames will often create errors in applications that attempt to open them (even Windows Explorer.)

The script below will list any files that exceed this limit.

```
@Echo off
Setlocal EnableDelayedExpansion
:: Report all file / folder paths that exceed the 256 character limit
If {%1}=={} Echo Syntax: XLong DriveLetter&goto :EOF
Set wrk=%1
Set wrk=%wrk:"=%
For /F "Tokens=*" %%a in ('dir %wrk% /b /s /a') do (
   set name=%%a
   if not "!name:~255,1!"=="" echo Extra long name: "%%a"
)
Endlocal
```

#### **Examples**

Check the whole of the D: drive

```
c:\> xlong D:\
```

Check the current directory on the C: drive:

```
c:\> xlong C:
```

Check the S:\workgroups\ folder:

```
c:\> xlong S:\workgroups\
```

The maximum Windows API MAX\_Path is 260 characters, subtract 3 characters for the drive and colon: and 1 character for a terminating NULL and you have a maximum 256 characters that can be used for the pathname.

All .Net applications enforce the Windows API pathname limit including Windows Explorer and PowerShell.

To access very long paths use Robocopy, SUBST or the \\?\UNCPATH\ syntax.

"This report, by its very length, defends itself against the risk of being read" ~ Winston Churchill

#### Related

Which.cmd - Display full path to any command

```
Bash equivalent:
```

```
find . | awk '{print length($0) " " $0}' | sort -n | tail -n 15
```

### Autoexec commands

To run a command as soon as the **command prompt** is opened -

HKLM\Software\Microsoft\Command Processor\AutoRun HKCU\Software\Microsoft\Command Processor\AutoRun

To run a command as soon as a user logs in -

The STARTUP folder (Start Menu)

HKLM\Software\Microsoft\Windows\CurrentVersion\Run

HKCU\Software\Microsoft\Windows\CurrentVersion\Run

HKCU\Software\Microsoft\Windows\Run

To run a command **as soon as the machine powers up**, (like AUTOEXEC.BAT in MS-DOS), use the Windows Task Scheduler - choosing the option:

Run a task:

When my computer starts (before a user logs on)

#### Autoexec.bat file

The autoexec.bat file was an MS-DOS feature. Under Windows there is a still a degree of backwards compatibility - if the file (C:\autoexec.bat) exists, any SET statements within it will be parsed at boot time.

Variables set in this way are not available to gui programs - they will be visible from the CMD prompt but don't appear in the control panel. All other commands in autoexec.bat will be ignored. This behaviour is to allow old DOS applications to install correctly.

# Scripts running at Windows startup

To see exactly what is running (or running slowly) at windows startup/login, set the following registry key:

[HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\policies\system] "verbosestatus"=dword:0000001

#### AutoRun

In Windows 7/2008 R2, autorun events are (mostly) restricted to drives of type DRIVE\_CDROM. The default behaviour is to invoke AutoPlay. The NoAutoRun registry entry can be used to disables the AutoPlay and/or AutoRun feature on individual drives. This can be set in the registry under HKCU and/or HKLM. (If both are set then HKLM will take priority.)

The NoDriveTypeAutoRun registry entry disables or enables the AutoRun feature on all drives of the *type* specified. It can be set in the registry under HKCU and/or HKLM. (If both are set then HKLM will take priority.) Values: 0xFF=Disable AutoRun on all types of drive, 0x91=Disable AutoRun on network drives, 0x95=Disable AutoRun on removable + network drives.

The NoDriveAutoRun registry entry disables or enables the AutoRun feature on individual *drives*. It can be set in the registry under HKCU and/or HKLM. (If both are set then HKLM will take priority.)

In all cases the registry keys are set under:

\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer

The registry key HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\MountPoints2 contains cached information about every removable device seen so far. This cache can bypass the registry settings above which can leave a machine vulnerable. See Q967715 for patches that address this issue. Alternatively the iniFileMapping method described below will disable AutoRun completely.

To effectively disable AutoRun in all versions of Microsoft Windows, import the following registry value (source: US-Cert Alert TA09-020A) this applies to any autorun.inf in any location and on any drive:

REGEDIT4 [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\IniFileMapping\Autorun.inf] @="@SYS:DoesNotExist"
"The real danger is not that machines will begin to think like men, but that men will begin to think like machines" ~ Sydney J. Harris
Related:
SC - Service Control SET - Display, set, or remove Windows environment variables Q967715 - How to disable the Autorun functionality in Windows Q137890 - SRVANY - create a User-Defined Service Q243486 - AutoExNT Run a Batch File before Logging on (Windows 2000)
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# Slow network browsing issues in Windows

### 1) Listing the contents of a shared folder is slow - Desktop.ini

The file permissions set on <code>desktop.ini</code> files can slow down browsing the folder structure. This issue affects Windows clients using mapped drives or UNC connections, this issue was fixed in XP sp2 (Q840309), but from Q326549 has re-emerged in Windows 7.

When listing a directory, Windows will search for and parse Desktop.ini files. This will noticably affect performance when a large number of subfolders are involved, it does this for the current folder and one level down the directory tree.

Desktop.ini can be used to provide a custom icon, thumbnail view, and can make normal file folders into 'Special Folders' (eg Fonts, History, Temporary Internet Files, "My Music", "My Pictures", and "My Documents").

Desktop.ini files are only visible in Windows Explorer if you first un-check "Hide protected operating system files" (under Tools, Options, View)

To see the file locks created by this process run the following command on the file server, while a client is (slowly) listing a large directory:

NET FILE | Find "desktop.ini"

A quick solution to this performance problem is to remove the READ\_ONLY attribute from the folder and/or delete the non-essential desktop.ini files.

### 2) Explorer randomly locks files

There are reports that Windows Explorer can run very slowly or stop responding if some of the profile permissions get corrupted.

To fix this logout and login with a different (Administrator level) account and rename this folder:

C:\Users\cal\Microsoft\Windows

When you login again the folder will be re-created with the correct permissions.

# 3) Shortcuts in the Windows XP 'My Network Places' make network browsing very slow.

If the 'My Network Places' folder contains a shortcut to a network share, then each refresh of the explorer window will attempt to read icon information from every file in the remote location, causing the system to slow to a crawl.

Removing all shortcuts from 'My Network Places' will return the system response to normal. In Windows 7, network places have been moved under 'Computer' and this issue seems to have been fixed.

Every time you open a file via a UNC name, Windows XP will automatically add another shortcut to the 'My Network Places' folder - so the issue tends to get worse over time.

You can prevent the automatic addition of shortcuts with the registry setting below:

Windows Registry Editor Version 5.00
[HKEY\_CURRENT\_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]
"NoRecentDocsNethood"=dword:0000001

# 4) Network Shortcuts on the Start menu and Desktop

Placing a shortcut to a network resource in either the Start menu or Desktop (including the recycle bin) can drastically slow down system response, particularly when the network resource is unavailable. Shortcuts to *Domains* or *Machines* don't suffer from these problems as they always have the same icon.

A sensible routine for managing desktop shortcuts can be found here.

An alternative worksround is to create a shortcut to Explorer.exe and pass the UNC name of the resource.

explorer /e, \\Server\FileShare

"Total world oil reserves amount to one thousand billion barrels, yearly consumption is 27 billion barrels" ~ BP Amoco

#### Related:

CleanRoamingProfile.vbs - VBScript to delete selected files from a roaming profile.

Q841978 - Explorer.exe stops responding when you use network shortcuts (XP)

SysInternals - Mark Russinovich - Desktop.ini files fill up the audit event log.

Windows 7 Slow Logon – Waiting for the User Profile Service

Q904160 - File sharing on the network is slower than expected (WinServer 2003 SP1)

Q885189 - Slow performance from a mapped drive - Windows Server 2003

Q841978 - Explorer.exe stops responding when you use network shortcuts (XP)

Q834350 - Access to network resources is slower

Q822219 - Slow File Server Performance

Q819017 - Long delay before files appear in My Computer (XP)

Q816375 - XP Explorer pane flickers

Q814112 - Network shares open slowly SMB/AntiVirus scanning

Q326549 - Read-only & System attributes for folders

Q321281 - Desktop.ini does not work correctly when you customise the Default Profile

Q320138 - Disable automatic search for network printers and folders (XP)

Q320829 - Increase the Request Size Buffer on the file server - (try between 32 and 64 Kb)

Q319470 - Office2000: Screen response is slow in Save As dialog box in Word

Q315237 - 100-Megabit network packets

Q312403 - Distributed Link Tracking

Q265396 - Slow network performance on a share that uses NTFS

Q245800 - Delay viewing shares (Windows 98/2000)

CleanMgr - Automated cleanup of Temp files, recycle bin

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# Increasing the Desktop Application Heap

When you run a large number of Windows-based programs, "Out Of Memory" error messages appear when you attempt to start new programs or try to use programs that are already running.

In the case of WinNT services the process simply dies for no obvious reason.

This error can occur if the desktop heap in the WIN32 subsystem is depleted; even though you still have plenty of physical and pagefile memory available.

Desktop Heap memory is defined in the registry under the (long string) key 'SharedSection'::

#### Default settings Windows XP:

 ${\tt HKLM} \\ {\tt System} \\ {\tt CurrentControlSet} \\ {\tt Control} \\ {\tt Session} \\ {\tt Manager} \\ {\tt SubSystems} \\ {\tt System} \\$ 

%SystemRoot%\system32\csrss.exe
ObjectDirectory=\Windows
SharedSection=1024,3072
Windows=On
SubSystemType=Windows
ServerDll=basesrv,1
ServerDll=winsrv:UserServerDllInitialization,3
ServerDll=winsrv:ConServerDllInitialization,2
ProfileControl=Off MaxRequestThreads=16

In this case 1024 defines the system heap size, 3072 controls the size of the interactive desktop heap (used for Windows objects).

If a third value is present e.g. "1024,3072,512", this covers the non-interactive desktop heap. All values are KBytes. If the 3rd value is not present non-interactive desktops will default to the same value as interactive desktops (typically 3072 K).

In Vista SP1 or Windows Server 2008 this increases to 12 MB:

 $\label{local_manager} $$HKLM\System\CurrentControlSet\Control\Session Manager\SubSystems\Windows SharedSection=1024, \end{2288}, 512$ 

64-bit Windows has a default interactive desktop heap size of 20MB

Microsoft do not recommend that you set a value that is over 20,480 KB for the second SharedSection value.

Lower values increase performance at the risk of crashing any process which can run out of resources.

For many applications (in Win XP) 3072K is too high, although MS recommend 512 K (in Q142676) for many applications this is too low.

512 K will support approximately 2,500 windows, menus, pens, icons, etc. 1024 K will support approximately 5,000 windows, menus, pens, icons, etc. 3072 K will support approximately 15,000 windows, menus, pens, icons, etc.

Because the non-interactive desktop heap is mapped into the address space of each and every process', this value should not be set to an arbitrarily high value, but should only be increased sufficiently to allow all the desired applications to run. Note that many server side applications such as Oracle Forms will spawn multiple processes for each user request.

Because NT only supports one interactive session at a time; tuning the interactive desktop heap has less impact on total memory use.

Windows NT has a system wide memory limit of 48 Mb for all the above desktop heaps, if this limit is exceeded there might not be enough memory to create an error message dialog box. As a result, the requested operation fails without any indication.

#### Related

Desktop heap monitor - Examine desktop heap usage for WinXFQ126962 - Desktop Heap - NT 4, Windows 2000 Q184802 - Desktop Heap - NT 4, Windows 2000, Windows XP, 2 Q947246 - Desktop Heap - Vista Desktop Heap Overview - Blog from the Microsoft Critical Proble	2003
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# Long filenames, NTFS and legal filename characters

**Long file names** - If a filename contains spaces you must surround it "with double quotes" Filenames that include quotes or parenthesis (') - these are legal filenames but they can cause problems.

Short file names - The order in which you create files will affect short 8.3 names

e.g.

echo abc > "a long file 1.txt"

echo abc > "a long file 3.txt"

echo abc > "a long file 2.txt"

DIR /x

:: will produce this:

ALONGF~1.TXT a long file 1.txt

ALONGF~3.TXT a long file 2.txt

ALONGF~2.TXT a long file 3.txt

If these files are now copied to another folder the 8.3 filenames will change, this is most likely to happen when upgrading server storage or restoring data from a backup.

Similarly for folders

md "a long folder 1"

md "a long folder 3"

md "a long folder 2"

DIR /x

:: will produce this:

ALONGF~1 a long folder 1

ALONGF~3 a long folder 2

ALONGF~2 a long folder 3

Again copying these to somewhere else will change the 8.3 names to:

ALONGF~1 a long folder 1

ALONGF~2 a long folder 2

ALONGF~3 a long folder 3

See the Wildcards page for more long/short filename issues.

### Enable or Disable 8.3 filenames in NTFS

If 8.3 filenames are disabled, ancient 16 bit software (like WordPerfect 3) will still be able to read/write short filenames (C:\WORK\JAN.WPD), but won't see a short equivalent for long filenames (C:\My Documents\new stuff.wpd).

An 8.3 filename can also be useful when dealing with corruption such as an 'undeletable' file.

#### Disable the creation of 8.3 filenames

[HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem]
NtfsDisable8dot3NameCreation=1

#### Enable the creation of 8.3 filenames (default)

[HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem]
NtfsDisable8dot3NameCreation=0

#### Batch files .BAT or .CMD?

Batch files can be saved with the extension .BAT or .CMD

The .BAT extension will run under Windows 95/MSDOS but the .CMD extension will only run under NT, XP or later

One key difference between .CMD and .BAT scripts (running under CMD.EXE) is that with extensions enabled,

commands like PATH/APPEND/PROMPT/SET/ASSOC will reset ERRORLEVEL to 0 if they succeed. In the old style .BAT file, the ERRORLEVEL will not be changed unless there is a new error (source).

### NTFS file system

Legal characters in NTFS include the following:

```
! [ ] . ; = ( )
```

Illegal Characters: The following characters are not permitted in Windows file or directory names:

```
/ \ : * ? " < > |
```

The control characters (0x00-0x1F, 0x7F) are also invalid in Windows' FAT and NTFS.

Windows Explorer will not create files with a period (.) as the first or only character in the filename, although NTFS (and many command-line tools) do support this.

A long file name (LFN) can be up to 255 characters long.

NTFS supports paths up to 32768 characters in length, but only when using the Unicode APIs.

When using very long path names, prefix the path with the characters \\?\ and use the Unicode versions of the C Runtime functions.

### 8.3 format filenames

These can have between 1 and 8 characters in the file name. Short file names have the 8.3 format and are compatible with MS-DOS and other legacy operating systems.

The name must start with a letter or a number and can contain any characters except the following:

```
/ \ : * ? " [ ] | = , . ; (space)
```

An 8.3 file name typically has a file name extension between one and three characters long with the same character restrictions. A period separates the file name from the file name extension.

It should be noted that some characters are invalid in 8.3 format filenames but are valid in NTFS filenames and are also valid Delimiters Typically the Windows GUI will silently rename such files where necessary.

You can use long file names in both NTFS and FAT volumes.

Special file names reserved by the system (cannot be used for files or folders):

CON, AUX, COM1, COM2, COM3, COM4, LPT1, LPT2, LPT3, PRN, NUL, conIN\$, conOUT\$

"Tongues, like governments, have a natural tendency to degeneration; we have long preserved our constitution, let us make some struggles for our language" - Samuel Johnson: Preface to the Dictionary

#### Related:

Escape Characters, Delimiters and Quotes

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# DPI display settings

The DPI setting of a display monitor is a measure of the number of dots that are visible in a single inch (Dots-per-Inch or Pixels-per-inch).

DPI is not the same as resolution. (Resolution is the number of horizontal and vertical pixels. For example, 1024 x 768 pixels.) An image with 100 x 100 pixel resolution would be 1 x 1 inch when printed at 100 DPI.

When a display DPI is chosen in Microsoft Windows, you are telling the system how the attached monitor will display images, Windows will then rescale to take this into account.

For example changing from 96 DPI to 120 DPI, Windows will assume that you now have a display with closely packed (dense) pixels that make everything 20% smaller, so to compensate will scale everything to be 25% larger.

The changes made by adjusting DPI are more subtle than changing screen resolution, but setting DPI correctly can be important for preventing eye strain when using high pixel density displays.

The ideal\* DPI for a display can be calculated using pythagoras as follows:

#### Given:

W = Width in Pixels

H = Height in Pixels

S = Diagonal Size in Inches (display size)

Then the DPI =  $\sqrt{(W^2 + H^2)} / S$  examples

An iPad with a 9.7" screen √(10242 + 7682) / 9.7= 132 DPI

An IBM Thinkpad with a 15" screen √(19202 + 12002) / 15.4= 147 DPI

It is not advisable to set a DPI lower than 96 as the majority of Windows fonts are not hinted to display correctly at very small sizes.

# Windows 7/2008 DPI settings:

#### 96 to 500 DPI

```
Control Panel | Display | Set Custom Text Size (DPI) or Control Panel | Personalisation | Adjust Font Size (DPI)
```

For custom sizes, tick: "Use Windows XP style DPI Scaling" un-ticking this option will turn on full scaling of all non-DPI aware applications, which can cause fonts to become blurry.

When Windows SETUP is run to install Windows, the DPI will be set according to the capabilities of the attached monitor.

This will automatically set most high resolution monitors to 120 DPI.

#### Citrix and Terminal servers

Setting the DPI for individual users connected to a terminal server (or Citrix) can only be done in the registry, if the DPI is changed in the Control Panel as above, then the change will apply to all users.

Registry settings for Per-User DPI setting (Windows 2003/2008):

Small 96 DPI Medium 120 DPI Large 144 DPI

<sup>\*</sup> In practice you should select DPI based on individuals eyesight/preference.

rt dispiay settings - windows CMD - \$504.com
Default 96 DPI (includes AppliedDPI value)
"There are three classes of people: those who see. Those who see when they are shown. Those who do not see" ~ Leonardo da Vinci
Related
Q2726399 - Cannot change the DPI setting through an RDP session.  REGEDIT - Import or export registry settings.  DPI ruler  DPI Calculator & list of common display sizes.  Detect your monitor DPI
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( SS64 )	CMD	Syntax
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### CMD Shell

Notes on working with the Windows CMD shell.

# Pausing or stopping a batch script

Execution of any batch script can be paused by pressing CTRL-S this also works for pausing a single command such as a DIR listing. Pressing any key will resume the operation.

Execution of any batch script can be canceled by pressing CTRL-C

If one batch file CALLs another batch file CTRL-C will exit both batch scripts.

If CMD /c is used to call one batch file from another then CTRL-C will cause only one of the batch scripts to terminate. (see also EXIT)

### Copy and Paste / QuickEdit

In Windows 10 the standard Ctrl-X & Ctrl-C shortcuts are supported.

For earlier versions of Windows you can enable QuickEdit cut and paste at the Command Prompt as follows:

Activate the control menu at the top left of the current cmd window, go to Properties, Options tab and then tick against QuickEdit Mode. Now you can select text with the mouse and hit Enter (or right click) to copy it to the clipboard. Paste anywhere using Control+V (or Right Click) or via the menu.

ESC will cancel any selection and return to editing mode.

When copying between windows, you need one click to select the window and a second click to paste.

# History of Previous Commands

Pressing the UP arrow will list previous commands entered at the command prompt.

Other DOSKEY function keys are loaded by default (F7, F8, F9)

# Quote Characters in a command

If /c or /k is specified, then the remainder of the command line is interpreted as a command and the following logic is used to process quote (") characters:

- 1. If all of the following conditions are met, then quote characters on the command line are preserved:
  - No /S switch (Strip quotes)
  - Exactly two quote characters
  - No special characters between the two quote characters, where special is one of: & < >( ) @ ^ |
  - There are one or more whitespace characters between the two quote characters
  - The string between the two quote characters is the name of an executable file.
- 2. Otherwise, old behavior is to see if the first character is a quote character and if so, strip the leading character and remove the last quote character on the command line, preserving any text after the last quote character. To negate this behaviour use a double set of quotes "" at the start and end of the command line.

```
CMD /c ""c:\work\my reports\profit ^& Loss.doc""
```

### Command.com vs CMD.exe

All the commands on these pages assume you are running the 32 bit or 64 bit command line (cmd.exe)

The old 16 bit command processor command.com is supplied to provide backward compatibility for 16 bit DOS applications. Command.com has very limited functionality compared to cmd.exe e.g. it will fail to set an %errorlevel% after many commands.

If you name your batch scripts with the extension .CMD rather than .BAT then they will not run under command.com even if copied to a Windows 95 machine.

The \*COMSPEC\* environment variable will show if you are running CMD.EXE or command.com

One key difference between .CMD and .BAT scripts (running under CMD.EXE) is that with extensions enabled, commands like PATH/APPEND/PROMPT/SET/ASSOC will reset ERRORLEVEL to 0 if they succeed. In the old style .BAT file, the ERRORLEVEL will not be changed unless there is a new error (source).

On 64 bit versions of Windows, the 32 bit CMD.exe can be found at <code>%windir%\SysWoW64\cmd.exe</code> To reduce compatibility issues, the WOW64 subsystem isolates 32-bit binaries from 64-bit binaries by redirecting registry calls and some file system calls.

## Opening CMD from Windows Explorer

You can open a new CMD prompt by choosing START, Search box, cmd, OK

# Registry Keys:

#### Allow UNC paths at command prompt

[HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Command Processor] "DisableUNCCheck"=dword:0000001

#### Run a command when CMD.exe starts

[HKEY\_LOCAL\_MACHINE\Software\Microsoft\Command Processor]
"AutoRun"=-

#### **Activate Automatic Completion**

[HKEY\_LOCAL\_MACHINE\Software\Microsoft\Command Processor] "CompletionChar"=0x9

# For Windows 7: Add an elevated 'Open CMD prompt here (Admin)' option to the context menu for file system folders:

[HKEY\_CLASSES\_ROOT\Directory\shell\runas]
@="Open CMD prompt here (Admin)"
[HKEY\_CLASSES\_ROOT\Directory\shell\runas\command]
@="cmd.exe /k pushd %L"

# For Windows 7: Add an elevated 'Open CMD prompt here (Admin)' option to the

My Computer context menu:

[HKEY\_CLASSES\_ROOT\CLSID\{20D04FE0-3AEA-1069-A2D8-08002B30309D}\shell\runas]
@="Open CMD prompt here (Admin)"
[HKEY\_CLASSES\_ROOT\CLSID\{20D04FE0-3AEA-1069-A2D8-08002B30309D}\shell\runas\command]
@="cmd.exe"

#### For Windows 10

See this article on TenForums

# Run multiple instances of CMD.exe

At the command line or in a batch script CMD will start a new instance of CMD.exe which will appear in the same window. The EXIT command will close the second CMD instance and return to the previous shell.

A method of calling one Batch script from another is to run a command like CMD /c C:\docs\myscript.cmd

The output of CMD can be redirected into a text file. When CMD /c is used, the EXIT command is not required.

The environment Variable %CMDCMDLINE% will expand into the original command line passed to CMD.EXE

The native version of CMD.exe is always in <code>%windir%\system32</code>, on 64 bit operating systems there is also a 32 bit CMD.exe in <code>%windir%\SysWOW64</code>

ID synt	ax - Windows CMD - SS64.com
Lon	g Commands and long filenames
	The maximum length of any command line (or variable) within CMD is 8191 characters. For all versions of Windows, NTFS and FAT allows pathnames of up to 260 characters.
	A workaround for the limited pathname length is to prefix \\?\ for example: \\?\C:\TEMP\Long_Directory\Long_Filename.txt
"The	method of the enterprising is to plan with audacity and execute with vigor" ~ John Christian Bovee
Rela	ted
CMD	- Start a new CMD shell.  Internal - Commands that are Internal to the CMD shell.  Emu-Maximus5 - a Windows console emulator with tabs

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### Internal commands

The Windows CMD shell CMD.exe contains a number of 'internal' commands, additional 'external' commands are also supplied as separate executable files. External commands are generally stored in the C:\WINDOWS\System32 folder, this folder is part of the system PATH.

This arrangement means that both internal and external commands are always available no matter what your current directory happens to be.

ASSOC, BREAK, CALL ,CD/CHDIR, CLS, COLOR, COPY, DATE, DEL, DIR, DPATH, ECHO, ENDLOCAL, ERASE, EXIT, FOR, FTYPE, GOTO, IF, KEYS, MD/MKDIR, MKLINK (vista and above), MOVE, PATH, PAUSE, POPD, PROMPT, PUSHD, REM, REN/RENAME, RD/RMDIR, SET, SETLOCAL, SHIFT, START, TIME, TITLE, TYPE, VER, VERIFY, VOL

In the main A-Z list of CMD commands the internal commands are indicated with a •

When you are working from any other shell, such as PowerShell then none of the internal commands are available unless you first open a CMD shell.

### Passing arguments

Arguments can be passed to an internal command, just like an external command, e.g. copy /y In some cases (when the command is being parsed by CMD.exe) the space before each argument can be omitted e.g. copy/y this can save time when working at the command line, but for scripts and scheduled tasks it is better to include the space.

for example from PowerShell:

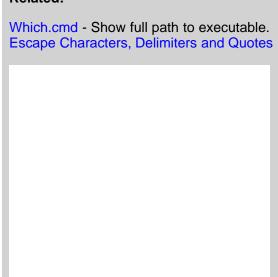
```
PS C: > cmd /c date /t
```

will launch a CMD shell, run the DATE /T command and then exit back to PowerShell. Of course in many cases this is not neccessary, (PowerShell has its own Date command) but can be useful if you need to run something 'the old way'.

It is possible for a system to have an internal command and an external command with the same name. If you have a command called DATE.exe and want to run that in preference to the internal DATE command, use the full pathname to the file e.g. C:\utils\date.exe even if your current directory is C:\utils\

"Tongues, like governments, have a natural tendency to degeneration; we have long preserved our constitution, let us make some struggles for our language" - Samuel Johnson: Preface to the Dictionary

#### Related:



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# Organising File Shares

Some thoughts on how to arrange shared files. Here we discuss the *what* rather than the *how* - there is a separate page covering the technical aspects of folder sharing.

#### **Awareness**

A key consideration in organising shared files is making sure that all the people in a team are aware exactly which data of theirs is being shared with other teams.

Particularly in larger teams, the people asking for data to be shared may not be aware that the area includes sensitive data.

Such problems can occur long after the sharing is initially setup, but it is not practical to do a review of access permissions every time a new data file is saved.

Take an example of an HR Team and a Finance team, it might seem reasonable to share the HR folder with Finance staff so they can get figures on annual workforce costs, but if one of the many HR subfolders has information about redundancies that may eventually affect the Finance team then they certainly don't want that to be shared.

# Listing what is available

When a list of folders is shared, you have a choice of hiding all folders for which the user does not have permission. This was once a Novell Netware feature, but all recent versions of Windows now have Access-based Enumeration turned ON by default. This has the advantage of simplifying day-to-day working, but has the disadvantage that by hiding the folders of other teams, no one has any information on what might be available.

This can cause some ridiculous situations - a new hire needs to collate information about X, a shared folder full of data about X already exists, but not knowing anything about that they start generating all the same documents again from scratch.

If the list of fileserver shares is hidden from Windows Explorer, then something equivalent should be made available elsewhere, perhaps on the company intranet.

# Shared with everyone drives

One approach to sharing files is to have a file server area that is open and read/write to everyone. This is a common approach in small organisations with little need for security.

With no clear ownership, file shares like this tend to become disorganised fairly quickly. Tidying this up typically involves some kind of cleardown or reorg but this is never a popular approach and is likely to result in data loss at some point.

# Team only shares

This is very common in larger organisations, shared areas where the access is limited to only members of one team or another. This access control means that when any need arises to share documents with people *not* in that team they have to use email or some other means of sharing.

# Split Folder Sharing

One approach to address these issues is to setup TWO sets of shared folders, and corresponding mapped drives. For each Team there is one shared folder that's only available within the team and a second that is shared with other teams.

s: Shared – users will typically have access to multiple folders, here, including their own teams shared folder.

All folders are visible.

T: Team only – each user will have access to one and only one folder in this share corresponding to their own Team. Other folders are **hidden** from view.



With this arrangement, users can save the files they want to share with other teams into their shared folder.

Because the Team Only and Shared areas are delivered to the end users via two separate drive mappings, any movement of files between them (whether Moved or Copied) will retain the desired permissions inherited from the parent folder.

You may be tempted to Map drive T: directly to each users Team folder, allowing work to be saved in T:\file.doc rather than T:\teamName\file.doc but there are good reasons for keeping the name of the team folder visible:

• If they try to email a link to a T: file or folder, to someone in a different team, they will quickly see that the other team doesnt have access to that folder, so they will realise and use the S: shared folder instead.

In contrast, they are quite likely to be completely baffled as to whya link to T:\file.doc doesn't appear for the other person, it's not intuitive.

- It acts as a reminder of their teams Folder Name.
- Login scripts are easy to setup, everyone gets exactly the same two drive mappings.
- In Windows explorer and many other places, they can switch between their Team and Shared folders, by just changing T: to S:

Some teams may store their work almost exclusively in the shared area, other teams may mostly work using their Team-only folder. It places decisions about document sharing with individual users and means that shared access is both visible and can be done on a per-file basis without having to involve the IT department at all.

For ease of use, the team folder names should be kept short - think 16 characters or less, that leaves ~ 240 characters for all the filenames within the group folder.

#### Access Permissions on the shared folders

Granting read-only access to everyone across all shared folders makes it simple and clear that shared items are visible to everyone, but the ownership is still held by one team.

Alternatively you may want to allow multiple teams to work collaboratively with read/write access to the same shared folder. The same logic would apply - shared items are read/write to selected other teams, but the ownership is still held by one team.

It is likely to be worth setting up two AD groups for each team, one for the team members  $\mathtt{T}$ : drive and one that grants permissions to the  $\mathtt{S}$ : drive for other people/teams. That gives complete flexibility about who can access the Shared folder.

### Large projects

One flaw in this arrangement is that while it works well for people in two teams sharing data, the structure may not work so well for large project folders shared by many teams or sharing between a mish mash of people dotted around the organisation.

For those cases - create a new shared folder for the project, just like an actual team using the T: and S: structure.

If you setup every file share the same consistent way, it simplifies management, some T: drives might never be seen or used, but having them ensures you are covered for that case where a new hire is allocated to work on the mega project and nothing else.

#### Home Folders

In addition to the above, every user typically has a home folder.

If a large proportion of users need to work with files that are kept private, set the Home directory to H: so it appears at the top of the list. Conversely, mapping the Home directory to U: will put it at the bottom of the list.

For software packages like Microsoft Office, consider where the default save folder should be set to. In some organisations the home folder may get very little use and so not require a drive mapping at all.

### Every organisation is different

The arrangement described above may not work for every organisation, but hopefully it will give you ideas to improve and simplify the management of your shared files. It will not eliminate the need for custom share permissions but may help to reduce the number and complexity of changes that need to be managed.

In secure environments there is a tendency to say – "we can't share document X with any other teams, therefore we can't share any files. The fallback option then becomes email, which is actually far more difficult to monitor and control.

Even in the most complex environments, with many permissions to consider there is often an advantage to be found in providing a file storage area that everyone understands will never be accidentally shared with any other teams.

"The sky is filled with stars, invisible by day" ~ Henry Wadsworth Longfellow

#### See also

E	Groups - Full description of AD Local Doma Built-in Groups - Built-In Users and Securit NoDrives - Hide mapped drives from Windo MapDrive - Map a Drive letter to a network	y Groups. ows Explorer

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(SS64) CMD **Syntax** 

# Windows Keyboard shortcuts

Keyboard shortcuts for the Windows CMD shell and PowerShell.

```
ALT+ENTER Switch to/from full screen mode.
[Tab] Autocomplete folder/file name.
                 Scroll through history of typed commands.
    / ↑
F1 F1
 Γĺ
                Print characters of the previous command one by one.
                Repeat part of the previous command; up to character {\it Z} Repeat the previous command.
  F2 Z
   F3
                Beginning from the current cursor position, delete up to character Z.
  F4 Z
  F5
F7
                Scroll through history of typed commands (\uparrow).
                Show history of previous commands. Clear command history.
 ALT+F7
                Move backwards through the command history, but only display
  F8
                commands matching the current text at the command prompt. Run a specific command from the command history. Clear command line.
  F9
   ESC
 INSERT Toggle Insert/Overwrite. Ctrl Home Erase line to the left.
               Erase line to the right.

Move one word to the left (backward).

Move one word to the right (forward).

Erase character to the left.
 Ctrl End
 Ctrl ←
 Ctrl →
                Move to beginning of line.
Move to end of line.
Scroll window up.
Scroll window Down.
 [Home]
 [End]
      PgUp
 PgDn
Ctrl-C
                Abort current command/typing.
                Left + PrtScn
Toggle High Visibility screen mode.
Left Alt + Left
 Ctrl-Z
                Signal end-of-file.
Group Policy GPO
```

```
Mark all settings on the page as "green" (apply all).

Mark current settings on the page as "green" (apply this setting).

Mark current settings as "red" (don't apply this setting).

Mark all settings on the page as "red" (don't apply).

Display a list of available variables.
F6
    is the Shift key
   is the Backspace key
```

"If NumLock is on, pressing a key on the numeric keypad while holding SHIFT overrides NumLock and instead generates an arrow key" ~ OldNewThing

#### Related:

Doskey /history - Show history of previous commands Equivalent PowerShell cmdlet - Get-History (history) Equivalent bash Keyboard shortcuts

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( SS64 )	CMD	Syntax
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#### **NoDrives**

Hide drive mappings in 'My Computer', Windows Explorer and the standard Open dialog box.

A:	B:	C:	D:	E:	F:	G:	H:	l:	J:	K:	L:	M:	None
1	2	4	8	16	32	64	128	256	512	1024	2048	4096	0
N:	0:	P:	Q:	R:	S:	T:	U:	V:	W:	X:	Y:	Z:	ALL
8192	16384	32768	65536	131072	262144	524288	1048576	2097152	4194304	8388608	16777216	33554432	67108863

Result: Decimal

Copy the result into the registry to hide the drive letter(s)

User Key

[HKEY\_CURRENT\_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]

System Key:

 $[\verb|HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]|$ 

Value Name: NoDrives
Data Type: DWORD

After changing the registry, logoff or reboot so that it takes effect.

Drive mappings hidden with a nodrives registry setting are still available, just type the drive letter into the explorer address bar.

"The dream is the small hidden door in the deepest and most intimate sanctum of the soul, which opens to that primeval cosmic night that was soul long before there was conscious ego and will be soul far beyond what a conscious ego could ever reach" ~ Carl Jung

#### Related:

REG - Registry: Read REGEDIT - Import or	

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# An overview of Windows Network Printing

### Print Drivers and the Print\$ share

Every Print Server has a hidden file share (called Print\$) that is used to deliver print Drivers to Windows clients.

When a PC connects to a Print Share the drivers on the server and client are compared, if the client is missing the driver; or has an older version; then it will be automatically downloaded.

The achilles heel of this system is version control: consider that you have two similar printers on two different print servers. One server has a driver version 26.232 the other has version 26.234, in theory the client will download the latest driver and use it for both printers, in practice the results are less predictable - the worst case being a driver download every time the user prints.

Whenever a new driver is installed on a **print server**, you can force all users who have a connection to that print queue, to download the updated driver. This is done by changing the Print *Share* name on the server [Press Apply] Then change back to the original *Share* Name [Press Apply again]. E.a.

Change the printer MyPrintShare to MyPrintShareX [Apply] then change back to MyPrintShare.

If you can arrange that each user connects to only one print server, management becomes much easier. If you have multiple print servers, consider duplicating queues so that no user has to access more than one print server.

# Printer Migration - bulk changes

The Microsoft Print Migrator has now been superseded by PRINTBRM which can backup and restore Print Queues.

# Client Printer connections (Print Map)

To update client printer connections, use qchange this will not only change the clients connection to a different Print Queue but will also also preserve the user's **default** printer.

List all the print queues currently shared on a server with

net view \\MyServer >file\_print\_shares.txt

#### Printer Name vs Print Share Name

Every shared printer has both a Printer name and a Share name - these appear in different places:

Browsing Network Neighborhood (NetBios UNC Name) = ShareName Add Printer Wizard (DNS) = PrinterName Find Printer Wizard (DNS) = PrinterName

Active Directory and the Control Panel will display the *PrinterName* in most places.

A key difference between these two names is what happens when you rename them:

Changing the ShareName on the server, clients stay connected.

Changing the *PrinterName* on the server, clients will lose their connection. The control panel status will display "Printer not found on server, unable to connect"

For example:

Create Printer called **HP1** and share it as *Share1* 

Connect a client to the printer

Now turn off the print Share on the server (set to Not Shared)

Create Printer called **KYO2** and share it as *Share1*, you might expect the client to now connect to this new queue, but it will still point to the old one (and will fail).

Now Rename HP1 to HPold and rename KYO2 (still shared as *Share1*) to HP1 The client will now connect to *Share1* successfully.

## Naming conventions

As you have probably figured by now; it pays to keep things simple and make the printer's SHARE Name and PRINTER Name identical.

I recommend short printer names (8 characters or less) with no spaces, for example a simple naming convention with 2 characters and a number (AA1, ZZ9...) will support 6,760 print queues. This is likely more than you will want to host on a single Print Server.

\\London\RS7

Short Printer Names without spaces are portable and easy to script. If you choose to use long names with spaces, expect that some third party software can have problems.

Over time Teams tend to move around different offices and buildings. Over time Printers tend to also move around, either due to maintenance or to satisfy demand. This means that 'meaningful' printer names such as *HPLJ14* or *FirstFloor21* or *FinanceTeam* tend to get out-of-date and become unhelpful.

Details such as the printer model and features (colour/duplex etc) should be placed in the Print Queue DESCRIPTION field.

Filling in the LOCATION field will allow the *Find Printer Wizard* to display all the relevant printers for a team or site.

Attach a large physical label to the printer with it's share name, this will save on paper, user frustration and helpdesk calls.

# Deploying Printer Location with Active Directory

This feature helps users to find a printer by storing PC and Printer locations in Active Directory. For example with 500 printers you might define 10 locations with 50 printers in each. Groups of computers are then allocated to appropriate Locations, and Windows will pre-populate the Find Printer Wizard with the 50 nearest printers.

This is a good feature for large organisations following the trend to consolidate multiple print/file servers.

### **Default Printer**

The default Printer connection is *per user*, and will travel with roaming profiles. it can be changed with Defptr, WMIC or WSH.

If the default printer is a local printer, then roaming to a different PC without an identical local printer, will change the default to the next available printer.

### Print to File

In the Printers folder, click Add Printer.
Click My Computer, and then Next.
Click "Local printer attached to this computer"
(don't tick automatically detect) >Next
Click Create a new Port. >Next
When prompted for a local port name, type a path and file name for the file.
Choose the Generic/Text print driver.

#### **Local Printers**

Any PC with a *shared* local printer will also setup a Print\$ share - acting as a source of driver DLL's for other machines. This presents a possible security risk that needs to be understood and managed. If the printer is never accessed by other machines don't share the printer.

Printer connections are normally *per user*, and roam with roaming profiles. Local shared printers and roaming profiles are generally not a good mix. (They don't cause problems but do confuse users who roam.)

It is possible to create printer connections per machine with rundll32 - these will not follow a roaming profile.

Windows XP Professional will support a maximum of 10 users per Share (This applies to both file and print shares) for more than this you will need a server licence.

#### New features in Windows 7/Vista

Location-aware printing - mobile computers can automatically switch default printer according to the connected network.

Avalon graphics provide improved color printing.

The NextGen print spool file uses human-readable XAML, an XML-based declarative programming language. This opens up possibilities such as including multiple documents in a single print job.

#### LPR - Line Printers

The Line Printer protocol LPR is a useful method of printing to a character printer, typically used with monospaced fonts for printing over pre-printed stationary such as cheques.

LPR print jobs are sent direct to the printer, this allows the application to manage/send printer control codes, (page feed etc).

LPR can also be used to send print jobs to a UNIX Print Server.

The "Microsoft TCP/IP Printing service (UNIX)" provides a TCP/IP-based printing service using the Line Printer protocol. This is not installed by default.

To create an LPR printer, Select Control Panel - Add Printer - My Computer - Add Port - LPR port. At the prompt type the host name or IP Address of the printer (or remote Unix host).

Once installed, the LPR protocol will use the Service: LPDSVC

# **Printer Options**

*Priority*: The priority sliding bar sets the default priority for documents printed.

A common approach is to create one printer for the majority of users with a default priority of 1 then create a separate 'high priority' printer that sends output to the same printing device but with a higher priority setting.

Spool print documents so program finishes printing faster (& Start printing immediately) - preferred option for most applications.

*Print directly to the printer* - this sends documents directly to the printer. This gives the fastest time-to-output but you lose the ability to use the PC while the print job is in progress.

*Print spooled documents first* - if you disable this option, high priority jobs will interrupt lower priority jobs that are already printing. (so the pages get mixed up)

#### Print Processor

The default Print Processor is WINPRINT.DLL, (this can be replaced for advanced DTP work) This Print Processor supports several data formats:

Raw: [default] This datatype indicates that the job is in a ready-to-print format in the printing device's native language. (Good for PostScript printing).

Raw [FF Appended]: As RAW but appends a form-feed character to the end of the print job.

*Text*: This indicates a print job that consists of ANSI text.

PSCRIPT (PostScript support for Macintosh clients using non-PostScript printer)

*EMF*: A Windows application will partially rendered the job and the print driver then completes the rendering process. EMF takes advantage of print server CPU resources, EMF files sizes are smaller than RAW which reduces network congestion.

(Good formost PCL-based laser printers)

#### Printer Pools

A printer pool allows multiple physical printing devices to appear as a single'virtual' printer. When print jobs are sent to a printer pool, Windows routes the job to the first availabledevice.

In a busy printing environment pooling will allow more efficent and faster printing but does not provide any failure resilience e.g. Windows cannot redirect a job from a failed port, so when a printer is offline the printer pool will continue to send jobs to that port.

To enable Printer pooling, go to Printer properties - Ports, check the 'Enable printer pooling' tickbox Note: it's quite possible to have individual print queues in addition to the printer pool queue.

Printing requires the Spooler service to be running

#### Related:

NET PRINT - View and Delete print jobs NET SHARE - Create file share qchange.vbs - Connect to a different Printer Queue.

PRNCNFG - Configure or rename a printer.
PRNMNGR - Add, delete, list printers and printer connections.

RMTSHARE - List or edit a file share or print share

RUNDLL32 - Add/remove print connections

SHARE - List or edit a file share or print share

WMIC PRINTER - Set printing options through WMI

Print Management Snap-in - TechNet

Q234270 - Group Policies to Control Printers

Q888744 - Printer driver not updated on the client

Print Notification - this is set under Control Panel, Printers, File, Server Properties, Advanced

Equivalent bash command (Linux): printf - Format and print data

Recovery Console commands:

ATTRIB



# Windows Recovery Console

Change file attributes

When dealing with a Blue Screen of Death at boot - the first option should be to boot into Safe Mode (press F8 during bootup). From safe mode you can run a system restore with <code>%systemroot%\system32\restore\rstrui.exe</code>

Some hardware failures are so severe they prevent booting into Safe Mode.

The recovery console allows an alternative boot option giving a limited command prompt - this can be used to disable services or replace system files until you are able to boot into safe mode.

```
BATCH
            Execute a batch file
           Change directory
CHKDSK
           Check Disk
CLS
           Clear screen
COPY
            Copy files*
           Delete Files*
DEL
DIR
           Directory listing
DISABLE
           Disable Service
DISKPART Create or delete disk Partitions (like running setup)
           Enable Service
ENABLE
           Quit the recovery console and reboot
EXIT
EXPAND
           Write a new boot sector to the system partition Repair the Master boot Record FORMAT drive\ /\text{FS:NTFS}
FIXBOOT
FIXMBR
FORMAT
HELP
LISTSVC
          List all services and drivers
           Logon as administrator (local)
List local physical drive mappings
List local physical drive mappings(ARC path)
LOGON
MAP
MAP arc
           Make Directory*
MORE
           Remove Directory*
           Rename file*
SYSTEMROOT Set the current directory to be %Systemroot%
* File operations are only possible on:
  system directories, floppy drive(removable media), Root directories, local install sources. You can copy FROM but not TO a floppy disk.
```

#### Installation:

The recovery console is not installed by default, from the install CD use the command: D:\i386\winnt32 /cmdcons Then restart the machine.

"When a deep injury is done us, we never recover until we forgive" ~ Alan Paton

#### Related:

SC - Service Control

```
WinMSD - List running services
Q326215 - Recovery console Windows 2003
Q308402 - Recovery Console and Sysprep
Q812450 - Program Files Are Missing or Damaged
Q330184 - Invalid Boot.ini / Hal.dll error message
Q816579 - Perform an In-Place Upgrade of Windows Server 2003
List of Windows Services
```



# Windows 10 registry - user interface settings

Registry settings for user interface settings and options under Windows 10. The older Windows 7 version of this page is here

```
Windows Registry Editor Version 5.00
; Win10.REG
; Usual disclaimers apply - don't edit the registry unless you know what you are doing and ; BACKUP THE REGISTRY FIRST
; Comment lines are prefixed with ;
                                                        (REGEDIT will ignore them)
; so uncomment the parts you want to run.
  ======== Start menu ========
;Start menu speed - the default is 400
    [HKEY_CURRENT_USER\Control Panel\Desktop]
    "MenuShowDelay"="50"
; ========= Taskbar ========
;No Glomming (keep every icon on the taskbar separate)
; [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
; "TaskbarGlomming"=dword:00000000
;Glomming enabled
; [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
; "TaskbarGlomming"=dword:00000001
;Always combine Taskbar icons + hide labels
; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
; "TaskbarGlomLevel"=dword:00000000
;Combine icons when taskbar is full (default)
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
"TaskbarGlomLevel"=dword:00000001
; Never combine Taskbar icons
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced] "TaskbarGlomLevel"=dword:00000002
;TaskBar left/right grouping by age (oldest first) (default).
; [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
"TaskbarGroupSize"=dword:00000000
;or group by size largest first
; "TaskbarGroupSize"=dword:000000001
;or group all with 2 or more, or 3 or more:
; "TaskbarGroupSize"=dword:00000002
    "TaskbarGroupSize"=dword:00000003
;or prevent grouping altogether
; "NoTaskGrouping"=dword:00000001
;Don't hide the log-off option from the Start Menu ;(setting to 0 does not prevent users from using other methods to log off.); [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]; "StartMenuLogOff"=dword:00000001
;Don't hide the Themes tab in Control Panel Personalisation ; [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
    "NoThemesTab"=dword:00000000
; Remember my Explorer views
; [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
    "NoSaveSettings"=dword:00000000
  ======= System Tray =======
  System Tray - Show all icons (The default for this can be set under HKLM) [HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer]
   "EnableAutoTray"=dword:00000000
   or hide inactive icons
   [HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer]
   "EnableAutoTray"=dword:0000001
; ======== Explorer / General ========
;Don't tie new shortcuts to a specific PC ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]; "LinkResolveIgnoreLinkInfo"=dword:00000001
```

```
;Don't use Windows NTFS link tracking to resolve existing shortcuts.
; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer]
   "NoResolveTrack"=dword:0000001
;Don't hide any local Drives
    "NoDrives"=dword:00000000
;Don't add "-Shortcut" text to the name of newly created shortcuts.
; [HKEY_CURRENT_USER\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer]
; "link"=hex:00,00,00,00
;or Restore the default adding "-Shortcut" text to the name of newly created shortcuts.
    "link"=hex:1e,00,00,00
;Show all folders in Explorer including Recycle Bin, Desktop, Control Panel; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]; "NavPaneShowAllFolders"=dword:00000001
;or only show current folder path in Explorer
; "NavPaneShowAllFolders"=dword:00000000
Remove the OneDrive icon
    [HKEY_CLASSES_ROOT\CLSID\{018D5C66-4533-4307-9B53-224DE2ED1FE6}]
    "System.IsPinnedToNameSpaceTree"=dword:00000000 [HKEY_CLASSES_ROOT\Wow6432Node\CLSID\{018D5C66-4533-4307-9B53-224DE2ED1FE6}]
    "System.IsPinnedToNameSpaceTree"=dword:00000000
;Add Right Click "Open PowerShell window here" Context Menu
; see this article on TenForums
; ======= Explorer\Advanced ========
;Show hidden files and folders ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
    "Hidden"=dword:00000001
or Don't show hidden files and folders:
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced] "Hidden"=dword:00000002
;Don't Hide file extensions
   [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced] "HideFileExt"=dword:00000000
;Don't hide recently opened Programs from the Start menu /Start Run ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
    "Start_TrackProgs"=dword:00000001
;Don't hide recently opened Documents from the Start menu /Start Run ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]; "Start_TrackDocs"=dword:00000001
;Don't add a Games shortcut to the start menu
   [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
"Start_ShowMyGames"=dword:0000000
;Don't slow down search by including all public folders; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
   "Start_SearchFiles"=dword:00000001
;Don't change the upper/lower case of filenames ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]; "DontPrettyPath"=dword:00000000
;Don't show notifications/adverts (OneDrive & new feature alerts) in Windows Explorer; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\Advanced]
    "ShowSyncProviderNotifications"=dword:00000001
; ======== Personalization ========
; Allow changing Windows Color
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System] "NoDispAppearancePage"=dword:00000000
; Allow Color scheme changes
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
   "NoColorChoice"=dword:00000000
; Allow changing the font size
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
   "NoSizeChoice"=dword:00000000
;Change desktop background (any wallpaper will override this)
    [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
    "NoDispBackgroundPage"=dword:00000000
;Allow changing the Screen Saver
   [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System] "NoDispScrSavPage"=dword:00000000
;Allow changing the Display ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
    "NoDispCPL"=dword:00000000
```

```
;Allow changing the Display Settings; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
  "NoDispSettingsPage"=dword:0000000
;Allow changing the Screen Saver ; [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
   "NoDispScrSavPage"=dword:00000000
;Allow changing the wallpaper ;If a wallpaper value is set here (or via policy) it will override the users choice ;in the control panel (HKCU\Control Panel\Desktop) so delete the key to allow changes:
   [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\System]
   "Wallpaper"=-
 ====== Control Panel / Add-Remove Programs =======
;Don't hide any Control Panel applets see Q207750; [HKEY_CURRENT_USER\Control Panel\don't load]
   "appwiz.cpl"=
;These keys make sure you can install or uninstall programs:
  [HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Programs]
   "NoProgramsAndFeatures"=
   "NoProgramsCPL"=-
; or disallow access:
   "NoProgramsAndFeatures"=dword:0000001
 ======= Windows Update [HKLM] =======
; These affect all users [HKLM] and would typically be set via Group Policy
   [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\WindowsUpdate\Auto Update]
; Download and install ; "AUOptions"=dword:00000004
;Download but don't install ; "AUOptions"=dword:00000003
;Check but don't download
  "AUOptions"=dword:00000002
;Don't check
   "AUOptions"=dword:00000001
;Disable P2P uploads/downloads (Windows Update>Advanced>Choose how updates are delivered); [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\DeliveryOptimization\Config]; "DODownloadMode"=dword:00000000
; ======== Misc [HKLM] All users ========
;Set the Screen Saver grace period (this only works if a valid screensaver is set); an alternative is adjusting the power / hibernate settings for the display.
; [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon]
   "ScreenSaverGracePeriod"="5"
;When opening files with an unknown extension, dont prompt to 'Look for an app in the Store'
  [HKEY_CURRENT_USER\Software\Policies\Microsoft\Windows\Explorer]
"NoUseStoreOpenWith"=dword:0000001
;this can also be set for all users
; [HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows\Explorer]ß
  "NoUseStoreOpenWith"=dword:00000001
;Display verbose messages during login (Group policy, profile loading etc)
   [HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\System
  "verbosestatus"=dword:00000001
;Disable Cortana (Windows 10 Anniversary+)
   HKEY_LOCAL_MACHINE\SOFTWARE\Policies\Microsoft\Windows\Windows Search
 "AllowCortana"=dword:00000000
```

Many of the On/Off registry values above can be toggled between TRUE (00000001) and FALSE (00000000)

If any of the above settings could have been modified by Group Policy, use RSOP.msc (GUI utility) to see the policy settings that have been applied to the current user, or run GPRESULT /z to see the full details of registry keys set.

If you are running DISM then equivalent settings for All Users can be found under

[HKEY\_LOCAL\_MACHINE\WIM\_Default\Software\Microsoft\Windows\CurrentVersion\Explorer\

#### Windows 10 Themes can be found under:

%userprofile%\AppData\Local\Microsoft\Windows\Themes

"It's not like I let people do things for me, so I guess you can call me a control freak, or you can call me passionate" ~ Courteney Cox
Related:
TenForums - Tutorials on Windows 10 personalization AskVG - Windows 10 Hidden Secret Registry Tweaks
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( SS64 ) CMD Syntax

# Windows Built-in Users and Default Groups

Items in italics are *implicit placeholders*, these items don't appear in "Active Directory Users and Computers" but are available when applying permissions – membership is automatically calculated by the OS.

Group	User/ Session	Description
Account Operators		A built-in group that exists only on domain controllers. By default, the group has no members. By default, Account Operators have permission to create, modify, and delete accounts for users, groups, and computers in all containers and organizational units (OUs) of Active Directory except the Builtin container and the Domain Controllers OU. Account Operators do not have permission to modify the Administrators and Domain Admins groups, nor do they have permission to modify the accounts for members of those groups.
	Administrator	A user account for the system administrator. This account is the first account created during operating system installation. The account cannot be deleted or locked out. It is a member of the Administrators group and cannot be removed from that group.
Administrators		A built-in group . After the initial installation of the operating system, the only member of the group is the Administrator account. When a computer joins a domain, the Domain Admins group is added to the Administrators group. When a server becomes a domain controller, the Enterprise Admins group also is added to the Administrators group. The Administrators group has built-in capabilities that give its members full control over the system. The group is the default owner of any object that is created by a member of the group.
	Anonymous	A user who has logged on anonymously.
Authenticated Users		A group that includes all users whose identities were authenticated when they logged on. Membership is controlled by the operating system.
Backup Operators		A built-in group. By default, the group has no members. Backup Operators can back up and restore all files on a computer, regardless of the permissions that protect those files. Backup Operators also can log on to the computer and shut it down.
Batch		A group that implicitly includes all users who have logged on through a batch queue facility such as task scheduler jobs. Membership is controlled by the operating system.
Cert Publishers		A global group that includes all computers that are running an enterprise certificate authority. Cert Publishers are authorized to publish certificates for User objects in Active Directory.
Cert Server Admins		Certificate Authority Administrators - authorized to administer certificates for User objects in Active Directory. (Domain Local)
Cert Requesters		Members can request certificates (Domain Local)
Creator Group		A placeholder in an inheritable ACE. When the ACE is inherited, the system replaces this SID with the SID for the primary group of the object's current owner. The primary group is used only by the POSIX subsystem.
	Creator Owner	A placeholder in an inheritable access control entry (ACE). When the ACE is inherited, the system replaces this SID with the SID for the object's current owner.
Dialup		A group that implicitly includes all users who are logged on to the system through a dial-up connection. Membership is controlled by the operating system.
DnsAdmins		Members of this group have administrative access to the DNS Server service. This

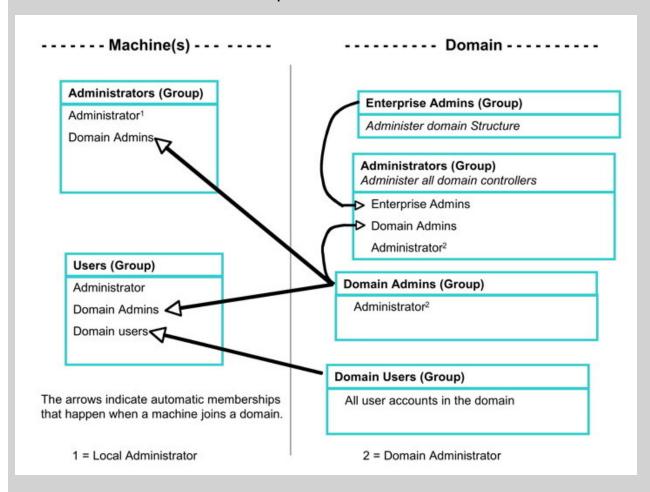
(installed with		
DNS)		group has no default members.
DnsUpdateProxy (installed with DNS)		Members of this group are DNS clients that can perform dynamic updates on behalf of other clients, such as DHCP servers. This group has no default members.
Domain Admins		A global group whose members are authorized to administer the domain. By default, the Domain Admins group is a member of the Administrators group on all computers that have joined a domain, including the domain controllers. Domain Admins is the default owner of any object that is created in the domain's Active Directory by any member of the group. If members of the group create other objects, such as files, the default owner is the Administrators group.
Domain Computers		A global group that includes all computers that have joined the domain, excluding domain controllers.
Domain Controllers		A global group that includes all domain controllers in the domain. New domain controllers are added to this group automatically.
Domain Guests		A global group that, by default, has only one member, the domain's built-in Guest account.
Domain Users		A global group that, by default, includes all user accounts in a domain. When you create a user account in a domain, it is added to this group automatically.
Enterprise Admins		A group that exists only in the root domain of an Active Directory forest of domains. It is a universal group if the domain is in native mode, a global group if the domain is in mixed mode. The group is authorized to make forest-wide changes in Active Directory, such as adding child domains. By default, the only member of the group is the Administrator account for the forest root domain.
Enterprise Controllers		A group that includes all domain controllers an Active Directory directory service forest of domains. Membership is controlled by the operating system.
Everyone		A group that includes all users, even guests. Membership is controlled by the operating system.  In Windows XP and later, the Anonymous Logon security group has been removed from the <i>Everyone</i> security group: see Q278259 and the group policy Let Everyone permissions apply to anonymous users
Group Policy Creators Owners		A global group that is authorized to create new Group Policy objects in Active Directory. By default, the only member of the group is Administrator. The default owner of a new Group Policy object is usually the user who created it. If the user is a member of Administrators or Domain Admins, all objects that are created by the user are owned by the group. Owners have full control of the objects they own.
	Guest	A user account for people who do not have individual accounts. This user account does not require a password. By default, the Guest account is disabled.
Guests		A built-in group. By default, the only member is the Guest account. The Guests group allows occasional or one-time users to log on with limited privileges to a computer's built-in Guest account.
HelpServicesGroup		XP - Group for the Help and Support Center
Interactive		A group that includes all users who have logged on interactively. Membership is controlled by the operating system.
	KRBTGT	A service account that is used by the Key Distribution Center (KDC) service.
	Local System	A service account that is used by the operating system.
Network		A group that implicitly includes all users who are logged on through a network connection. Membership is controlled by the operating system.

Network		Members of this group can make changes to TCP/IP settings and renew and release
Configuration Operators		TCP/IP addresses on domain controllers in the domain. This group has no default members.
	Nobody	No security principal.
Performance Monitor Users		Members of this group can monitor performance counters on domain controllers in the domain, locally and from remote clients without being a member of the Administrators or Performance Log Users groups.
Performance Log Users		Members of this group can manage performance counters, logs and alerts on domain controllers in the domain, locally and from remote clients without being a member of the Administrators group.
Power Users		A built-in group. By default, the group has no members. This group does not exist on domain controllers. Power Users can create local users and groups; modify and delete accounts that they have created; and remove users from the Power Users, Users, and Guests groups. Power Users also can install most applications; create, manage, and delete local printers; and create and delete file shares.
Pre-Windows 2000 Compatible Access		A backward compatibility group which allows read access on all users and groups in the domain. By default, the special identity Everyone is a member of this group. Add users to this group only if they are running Windows NT 4.0 or earlier.
Principal Self or Self	Principal Self or Self	A placeholder in an ACE on a user, group, or computer object in Active Directory. When you grant permissions to Principal Self, you grant them to the security principal represented by the object. During an access check, the operating system replaces the SID for Principal Self with the SID for the security principal represented by the object.
Print Operators		A built-in group that exists only on domain controllers. By default, the only member is the Domain Users group. Print Operators can manage printers and document queues.
RAS and IAS Servers		Servers in this group are permitted access to the remote access properties of users. A domain local group. By default, this group has no members. Computers that are running the Routing and Remote Access service are added to the group automatically. Members of this group have access to certain properties of User objects, such as Read Account Restrictions, Read Logon Information, and Read Remote Access Information.
Remote Desktop Users		XP - Members in this group are granted the right to logon remotely
Replicator		In NT 4 domains, this group was called Replicators and is used by the directory replication service. In 2K/XP the group is present but is not used. Do not add users to this group.
Schema Admins		A group that exists only in the root domain of an Active Directory forest of domains. It is a universal group if the domain is in native mode, a global group if the domain is in mixed mode. The group is authorized to make schema changes in Active Directory. By default, the only member of the group is the Administrator account for the forest root domain. Because this group has significant power in the forest, add users with caution.
Server Operators		A built-in group that exists only on domain controllers. By default, the group has no members. Server Operators can log on to a server interactively; create and delete network shares; start and stop services; back up and restore files; format the hard disk of the computer; and shut down the computer.
Service		A group that includes all security principals that have logged on as a service. Membership is controlled by the operating system.
Terminal Server Users		A group that includes all users who have logged on to a Terminal Services server. Membership is controlled by the operating system.
		A built-in group. After the initial installation of the operating system, the only member is the Authenticated Users group. When a computer joins a domain, the Domain

Users

Users group is added to the Users group on the computer. Users can perform tasks such as running applications, using local and network printers, shutting down the computer, and locking the computer. Users can install applications that only they are allowed to use if the installation program of the application supports per-user installation.

# Default Admin Users and Groups:



### Related:

Groups - Local Domain groups, Global and Universal groups.

Q271876 - Large Numbers of ACEs in ACLs Impair Directory Service Performance.

Q243330 - Well-known security identifiers (sids) in Windows operating systems.

Q277752 - Security Identifiers for built-in groups are unresolved when modifying group policy.

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( SS64 ) CMD Syntax

# AD Local Domain groups, Global groups and Universal groups.

This page describes the different types of Active Directory group, group scope and nesting permissions within and across WANS and domains.

### Types of Groups

Security groups are used to control access to resources. Security groups can also be used as email distribution lists.

*Distribution* groups can be used only for email distribution lists, or simple administrative groupings. Distribution groups cannot be used for access control because they are not "security enabled."

### Group Scope

Assuming a Native-mode enterprise.

### Universal groups

Provide a simple 'does everything' group suitable mainly for small networks. Typically, organizations using WANs should use Universal groups only for relatively static groups in which memberships change rarely. Changes in membership will impose global catalog replication throughout an entire enterprise.

#### Global groups

Provide domain-centric membership, place all user accounts into Global groups. Global groups can be nested within other Global groups, this can be particularly useful when delegating OU administrative functionality.

It can be useful to give each Global group a name that is meaningful to the staff involved, i.e. matching the name of a Team or a Project, particularly if the group is also to be used as an email distribution list.

### Domain Local groups

Used for the direct assignment of access permissions on files, printer queues, and other such resources.

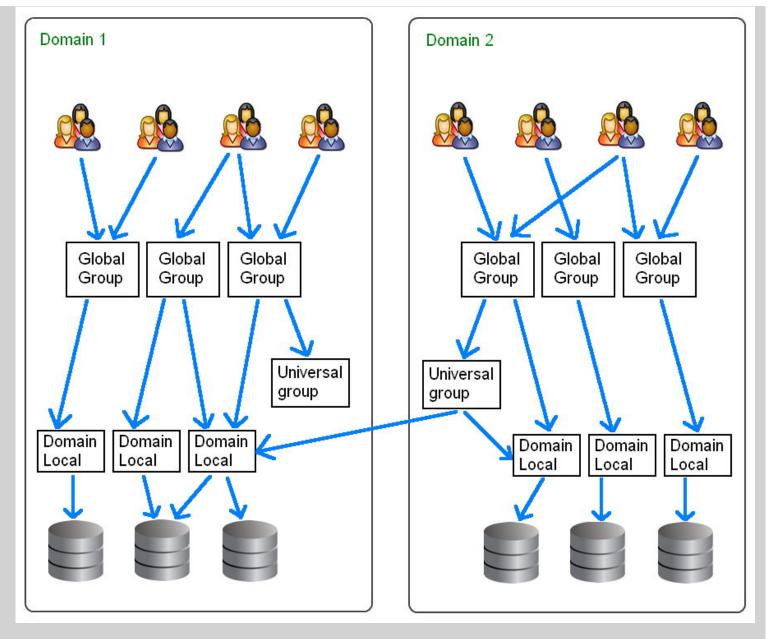
It can be useful to give each Domain Local group a name that is meaningful to the IT Operations team e.g. if a group assigns rights to a shared folder on a specific server then the group name might include a prefix or suffix indicating the server name.

#### Local groups

Stored on the local SAM (Local Computer) use for security settings that apply just to this one machine. Local groups will work even if the network becomes unavailable, e.g. during a disaster recovery exercise.

### **Best Practice**

Place users in Global groups, nest those inside Domain Local groups which in turn are used to apply permissions, as shown below. This will also maximise performance in a multi-domain forest.



Group membership is evaluated when a user logs on to a domain. To be sure that any membership changes have taken effect, ask the users to log-off. In contrast ACL changes or permissions applied directly to User accounts will take place immediately. Granting permissions using a group from a different domain is only possible where a *trust relationship* exists between the domains.

### Single Domains

In a single domain the *scope* of groups will have no effect on performance. Global groups can be used for everything but you can nest groups and use Domain Local Groups to simplify management.

The fact that you cannot add a **Domain Local** group to a **Global** group is very useful to enforce the correct inheritance of rights. A common mistake is adding group permissions the wrong way around. e.g. a resource group (such as one for color printers) is added to an organisational group (such as the personnel dept) if at a later date you add someone else to the colour printers group then they will also be able to read all the personnel files.

If all organisational groups are Global and resource groups are Domain Local then it is simply not possible to add group permissions the wrong way around. Within a single domain individual User accounts can join either type of group, so in the above example if one extra user needed access to the printers they could still be added directly to the Domain Local colour printer group.

### Separating People and Resources

It is tempting to use the same groups to hold users and also apply resource permissions but this seemingly simple setup

will involve more effort to maintain.

For example, you have a finance department with 25 accountants and clerks, they need access to the Crest system, they also need editor permissions on the intranet and they need access to all the shared Account Balances spreadsheets.

A common way to deal with this is to create 3 groups and add the 25 people to each:

```
25 25 25 [CREST] [INTRANET] [ACCOUNT_BALANCES]
```

The extra work starts when someone changes job or a new hire arrives, now someone has to remember and sort out which groups each of these people needs to be added to or removed from.

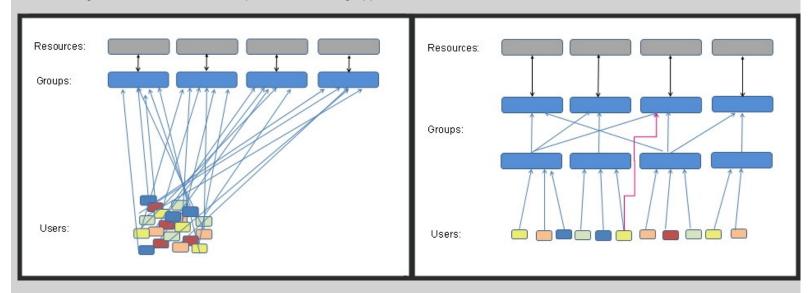
The better way of managing this, is to still create the 3 groups as before but also create a group called Accounting, put the 25 people into the Accounting group, and make all the resources available to the *group* rather than to individuals.

```
25
[ACCOUNTING Group]
[res_CREST] [res_INTRANET] [res_ACCOUNT_BALANCES]
```

Now when a new hire arrives we add them to the accounting group and they will automatically get everything they need. Similarly when someone changes job we remove them from the accounting group and add them to a different group appropriate to their new role. Also note that this arrangement only requires 28 permissions to be set instead of 75.

Separating people and resources also makes it easy to temporarily remove access e.g. during maintenance downtime. In the above example you could just remove the Accounting group from the res\_Crest group. This is much easier than having to either remove (and then later accurately replace) a bunch of individual user accounts, or having to edit the actual permissions applied to files/printers/databases.

The two diagrams below both show 22 permissions being applied:



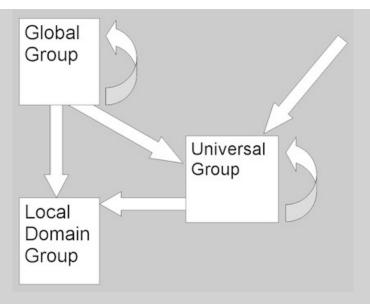
With a flat permission structure there are fewer **groups** to maintain.

With separate groups for users and resources, there are fewer **permissions** to manage (the arrows in the diagram above).

### Nesting one Group within another with a different scope

Rules that govern when a group can be added to another group (same domain):

- Global groups can be nested within Domain Local groups, Universal groups and within other Global groups in the same domain.
- Universal groups can be nested within Domain Local groups and within other Universal groups in any domain.
- A Domain Local group cannot be nested within a Global or a Universal group.



Rules that govern when a group can be added to another group (different domain):

- Domain Local groups can *grant access* to resources on the same domain. For example a Domain Local group named Sales on the SS64.local domain can only grant access to resources on that domain, and not on SS64.com
- Domain Local groups can *accept* anything, except for Domain Local groups from another domain. Domain Local groups accept user accounts from any domain.
- Global groups can grant access to anything, including files/folders in any domain.
- Global groups cannot be nested across domains. You cannot take a Global group from SS64.local, and nest it within another Global group in SS64.com.
- A user or computer account from one domain cannot be nested within a Global group in another domain.
- Universal groups accept user/computer accounts from any domain. A Global group can also be nested within a Universal group (from any domain).

A Universal group can be nested within another Universal group or Domain Local group in any domain.

# Members - who can join a group:

Group Scope	Location	Local Users can join?	Domain Users can join?	User accounts from another domain?	Local Computer accounts	Domain Computer accounts	Computer accounts from another domain	Machine Local groups	Domain Local groups	Global groups	Universal groups
Machine Local	Stored in local sam database	Yes	Yes		No	No		No	Yes	Yes	Yes
Domain Local	Stored in AD	No	Yes	Yes	No	Yes	Yes	No	Yes (same domain)	Yes	Yes
Global	Stored in AD	No	Yes	No	No	Yes	No	No	No	Yes (same domain)	No
Universal	Stored in AD	No	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes

# Resources that a group can grant access to:

Group Scope	Location	Can act as distribution list?	File Permissions (local machine)	File Permissions Domain File Server	File/Printer SHARE permissions	Can be Mail enabled	Can use to assign Mailbox permissions	Permissions on Active Directory objects
Machine Local	Stored in local sam database	No	Yes	No	Yes (same machine only)	No	No	No
Domain Local	Stored in AD	Yes	Yes	Yes	Yes	Yes	Yes	Yes*
Global	Stored in AD	Yes	Yes	Yes*	Yes*	Yes	Yes	Yes
Universal	Stored in AD	Yes	Yes	Yes*	Yes*	Yes	Yes	Yes

<sup>\*</sup> Possible but not recommended by Microsoft.

### **Admin rights**

To modify groups in AD, you must be a member of the *Account Operators* group, the *Domain Admins* group, or the *Enterprise Admins* group, or you must have been delegated the appropriate authority.

"In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed" ~ Charles Darwin

#### Related

Built-in Groups - Built-In Users and Security Groups

NET localgroup / NET localgroup /domain / NET group /domain - Create new groups.

circular.ps1 - Script to find circular nested AD groups.

The Golden Rules of Permissions Administration (pt2) - NetworkAdminkb.com

ServerFault - Performance impact of AD Universal groups assignment

PowerShell script to remediate pre 2003 AD members that don't support LVR

Q231273 - Group Type and Scope Usage.

Q328889 - Users who are members of more than 1,015 groups may fail logon authentication

Q271876 - Large Numbers of ACEs in ACLs Impair Directory Service Performance (slow logon times.)

Q909264 - Naming conventions in Active Directory for computers, domains, sites, and OUs.

Q811965 - Domain Local Groups do not appear when you edit a group policy object.

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# Detecting 64 bit vs 32 bit

Before starting to look at this, its important to be clear about what you mean by "64 bit". You can have a 64 bit CPU, a 64 bit operating system and a 64 bit process running. It is equally possible to have 64 bit CPU, a 32 bit operating system installed and a 16 bit process running.

The table below shows a few of the combinations you need to account for:

	CPU Hardware	Operating System	Process
Windows 3.1	16	16	16
Windows 95/NT	32	32	32
Windows XP (16 bit compatibility)	32	32	16
Windows XP	32	32	32
Windows XP on new hardware	64	32	32
Windows 7+ on old hardware	32	32	32
Windows 7+ (32 bit compatibility)	64	64	32 (WOW)
Windows 7+	64	64	64

## Detect 64 bit processor hardware

In Vista and greater, you can use wmic os get osarchitecture, or in WMI Win32\_ComputerSystem/OSArchitecture sadly this is not supported in XP or 2003

There are a number of promising looking options in WMI and Systeminfo, but they all pertain to the OS not the CPU.

# Detect a 64 bit Operating System

```
:: Installed OS
Set _os_bitness=64
IF %PROCESSOR_ARCHITECTURE% == x86 (
   IF NOT DEFINED PROCESSOR_ARCHITEW6432 Set _os_bitness=32
   )
Echo Operating System is %_os_bitness% bit
```

Via David Wang's blog post: Detect OS Bitness

### Detect a 64 bit Process

On Windows 7, running C:\windows\SysWoW64\cmd.exe will launch a 32 bit instance of CMD.exe even if the OS is 64 bit. Applications that are compiled for a 32 bit processor will run in a similar way.

We can detect this by testing either the %programFiles% or the %processor\_architecture% environment variables:

#### 32bit CMD process:

```
C:\Windows\SysWOW64> set ProgramFiles
ProgramFiles=C:\Program Files (x86)
C:\Windows\SysWOW64> echo %PROCESSOR_ARCHITECTURE%
x86
```

### 64 bit CMD process:

```
C:\Windows\System32> set ProgramFiles
ProgramFiles=C:\Program Files
C:\Windows\System32> echo %PROCESSOR_ARCHITECTURE%
AMD64
```

Using this with a conditional IF to detect process bitness in a script:

```
If %PROCESSOR_ARCHITECTURE% == x86 (
    Set _ps_bitness=32
    ) ELSE ( Set _ps_bitness=64)
Echo Process is %_ps_bitness% Bit
```

### **System Folders**

64 bit versions of Windows have dynamic system folders C:\Windows\sys\* to support both 64 and 32 bit programs. PowerShell.exe, CMD.exe and many other programs are available as both 32 bit or 64 bit.

The dynamic sys folders will appear differently to a 32 bit session and a 64 bit session:

	32 bit folder	64 bit folder
32 bit session	C:\Windows\system32\	C:\Windows\sysNative\
64 bit session	C:\Windows\sysWOW64\	C:\Windows\system32\

By default a 32 bit session will launch 32bit executables from C:\Windows\System32\ but you can still choose to launch 64 bit executables by specifying SysNative

By default a 64 bit session will launch 64bit executables also from C:\Windows\System32\ but you can still choose to launch 32 bit executables by specifying sysWOW64.

The sysNative folder is not visible to 64 bit processes or programs and cannot been seen in Windows Explorer.

#### File location environment variables

```
%ProgramFiles% = 32 bit programs on 32 bit systems "C:\Program Files"
%ProgramFiles% = 64 bit programs on 64 bit systems "C:\Program Files"
%ProgramFiles(x86)% = 32 bit programs on 64 bit systems "C:\Program Files (x86)"
```

## Run a 32 bit program

To run a 32 bit program or utility on a 64 bit OS, the 32 bit executable file must be called from C:\Windows\SysWOW64\

if you run a 32 bit shell (such as C:\windows\syswow64\cmd.exe) and then try to launch a command, it will **always** look for a 32 bit version of the command, even if you explicitly use a full path to system32, the 32 bit shell will redirect to the 32 bit equivalent in syswow64 (if no 32 bit version of the command is found, then the new process will fail to launch.)

# Run a 64 bit program from a 32 bit process

To run a 64 bit program from a 32 bit process use the virtual folder C:\Windows\sysnative

In many cases this is not needed as most utilities (e.g. ping.exe) have both a 32 bit and 64 bit version, however a few utilities (nbtstat, bcdedit) are only available as a 64-bit executable.

By default, running CMD from the start menu will launch a 64 bit process (C:\Windows\System32\cmd.exe)

"It's not so much that we're afraid of change or so in love with the old ways, but it's that place in between that we fear... it's like being between trapezes" ~ Marilyn Ferguson

Related:		
Q556009 - How to check if a computer is re	unning a 32 bit or 64 bit Operating System.	
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CMD

Syntax

# Windows Key Shortcuts #

For Windows 10

Description +	Windows Key combination +
Open/Close the Start Menu	Windows key
Open the Action center.	Windows key + A
Open Cortana in listening mode	Windows key + C
Fast-switch to/from the desktop - minimise all	Windows key + D
Open File Explorer	Windows key + E
Open Game bar (when a game is open)	Windows key + G
Open Share	Windows key + H
Open Settings	Windows key + I
Open Connect	Windows key + K
Switch accounts or lock the PC	Windows key + L
Minimize all windows	Windows key + M
Open the Run dialog box	Windows key + R
Open Search	Windows key + S
Open the Ease of Access center	Windows key + U
Open the Quick Link menu	Windows key + X
Snap app windows to the left	Windows key + left arrow key
Snap app windows to the right	Windows key + right arrow key
Maximize the app	Windows key + up arrow key
Minimize the app	Windows key + down arrow key
Open the app that is pinned to the taskbar in that number's position	Windows key + a number
Open a quick look at the desktop	Windows key + comma
Open Narrator	Windows key + Enter
Minimize all but the active desktop window	Windows key + Home
Capture a screenshot and save it to the Screenshots folder	Windows key + PrtScn
Add a virtual desktop	Windows key + Ctrl + D
Switch between virtual desktops	Windows key + Ctrl + left or right arrow
Close the current virtual desktop	Windows key + Ctrl + F4
Stretch the desktop window to the top and bottom of the screen	Windows key + Shift + Up arrow
Open Task view	Windows key + Tab
Zoom in	Windows key + +

Zoom out		Windows key + -
"Madness is to think of too many things in su	ccession too fast, or of one thin	ag too exclusively" ~ Voltaire
Related		
Windows key - Wikipedia, this includes old Windows Start   Run commands EXPLORER - Open Windows Explorer	er versions back to windows	s 95
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