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(54) Title: RUNNING MICROSOFT WINDOWS 95/98 ON RAMDISK

(57) Abstract: A method, resulting in the production of a customized running image of files, is provided for running off, through a customized booting process Microsoft Windows 95/98 on ramdisk in protected WINDOWS mode without the requirement of accessing fixed non-volatile storage medium as required by it at present. The method and the booting process include the steps of producing a customized copy of configuration files used by Microsoft Windows 95/98; copying these configuration files, system files provided by Microsoft Windows 95/98 during installation process and other device drivers and programmes to storage medium/media to be used in computer systems or devices capable of running Microsoft Windows 95/98; and with the use of these files from the storage medium/media, booting up in plain DOS mode, preparing for and running off Microsoft Windows 95/98 on ramdisk in protected WINDOWS mode in these computer systems or devices.

Description

Title of Invention:

05 **RUNNING MICROSOFT WINDOWS 95/98 ON RAMDISK**

Technical Field

10 This invention relates to running Microsoft Windows 95/98 (the operating system) in devices, including computer systems, capable of supporting the operating system. In particular, this invention relates to utilizing ramdisk as a storage medium for the running image of the operating system on which the full operating system can be run off without the need for accessing any other non-volatile storage medium.

15

Background Art

For any computer system or device capable of running it, Microsoft Windows 95/98 is designed to be installed onto and run on a non-volatile
20 rewriteable storage medium with sufficient space and speed. Once the protected-mode portion of the operating system runs off on such storage medium, the medium cannot be removed from the computer system or device as the running system need gain access to it. In this sense, the storage medium need to be fixed with the computer system or device when
25 the operating system starts running in protected WINDOWS mode. This description applies to local installation and running of the operating system in standalone computer systems or devices as well as Server-based Setup and running of the operating system for networked computer systems or devices.

The requirement of a fixed non-volatile storage medium for running Microsoft Windows 95/98 in protected WINDOWS mode can be dispensed with by running off the operating system on a ramdisk. This is what is achieved by this invention. To be able to do this, firstly the operating system has to be booted up under plain DOS mode. Secondly, a ramdisk with sufficient size and compatible with Microsoft Windows 95/98 has to be set up. Thirdly, the running image with suitable configuration has to be transferred to the ramdisk. Lastly, Microsoft Windows 95/98 is run off in protected WINDOWS mode on the ramdisk by issuing the command, WIN,
10 at the DOS command prompt.

Before this invention, no successful attempts of running off Microsoft Windows 95/98 in protected WINDOWS mode wholly on ramdisk have been disclosed. The ramdisk driver bundled with the operating system supports only 32 megabytes of maximum size which is not sufficient or quite difficult for storing and running the whole running image of the protected-mode Microsoft Windows 95/98. The ramdisk (version: rhk.rd.1.0) released on 1st January, 2000 and copyrighted by Reliable (H.K.) Limited is found to be compatible with Microsoft 95/98 and can be
15 configured up to 2 gigabytes which is more than sufficient for the purpose of running the whole operating system on it.

However, the transfer of the running image of the operating system to ramdisk is made difficult by the problems associated with long filenames adopted by the operating system. The commands or programmes provided by Microsoft for copying files cannot cope with long filenames under plain DOS mode for this purpose. The documentation of Microsoft -- "Unable to Copy Long File Name Files to Large RAMDrive" -- makes it plainly that long file name files cannot be copied to ramdisk of over 10 megabytes. The
25

document is found at the following URL:
<http://support.microsoft.com/support/kb/articles/Q192/9/27.ASP> . This does not apply to the copying process after the protected-mode Microsoft Windows 95/98 is started. However, for the purpose of transferring the
05 running image of the operating system to ramdisk under plain DOS mode before starting it in protected WINDOWS mode, there must be a workaround solution.

In this respect, Odi's DOS tools for long file names copyrighted by Ortwin
10 Glueck and released on 7thDecember, 1999 at <http://odi.webjump.com/> appear to provide partly the solution of copying long file name files onto large ramdisk. However, this tool set contains known bugs as described in the Readme.txt accompanying the tool set.

15 There are two significant problems associated with the use of this tool set at present. Firstly, copying all the files comprising the whole running image of Microsoft Windows 95/98 using this utility file by file takes long time. Secondly, this tool set at present is only capable of dealing with Unicode characters from codepages 00h and 25h. Many versions of Microsoft
20 Windows 95/98 in languages other than English may contain long file names from other codepages that this tool set cannot cope with. Thus those versions of Microsoft Windows 95/98 cannot be run on ramdisk by using this tool set for transferring the running image.

25 Given that the above problem is solved, simply copying the running image prepared by the installation programme of Microsoft Windows 95/98 to ramdisk is guaranteed to fail on running if the operating system has not been properly configured for the purpose of running on ramdisk.

The present invention makes possible the running of Microsoft Windows 95/98 in protected WINDOWS mode on ramdisk after the operating system is booted up in plain DOS mode by bootable device. Traditionally, a computer system or device is booted up from a harddisk, floppy disk or boot ROM. Microsoft documents its support of booting from alternate devices by Microsoft Windows 98, for instance, at <http://www.microsoft.com/HWDEV/devdes/cdboot.htm>. The EL Torito-Bootable CD-ROM Format Boot Specification, Version 1.0, is for booting a computer system from CDROM. Compaq, Intel, Phoenix BIOS Boot Specification, Version 1.01 and ATAPI Removable Media Device BIOS Specification, Version 1.0 are other specifications for booting from various forms of alternate booting devices. At present, these specifications allow booting of Microsoft Windows 95/98 into plain DOS mode, the running of it in protected WINDOWS mode relies on the presence of a fixed non-volatile storage medium such as a fixed harddisk or a fixed removable disk. These specifications do not specify the setting up and use of ramdisk, the configuration of the running image of Microsoft Windows 95/98, the transfer of this running image from a storage medium onto a ramdisk and running the protected-mode Microsoft Windows 95/98 on the ramdisk. What is left out as outlined above in these specifications is specified by this invention.

Microsoft's web page on "Bootable CD Drives and Windows 98" at <http://www.microsoft.com/HWDEV/storage/cdboot98.htm> points out that "[A]s implemented under Windows 98, booting from the product CD is much like booting from an emergency floppy disk – it is enough to allow users to see their devices, start an installation, and so on, but users cannot actually run the full operating system from CD". Tobias Remberg and Hajo Schulz appeared to have come to a solution of creating a CD capable of

booting the full Microsoft Windows 95/98 at <http://www.ct.heise.de/ct/english/99/11/206/>. It involves the use of ramdisk for storing registry files and other temporary files. In this way, the CD still cannot be removed, and as the running of the operating system relies on this
05 non-rewriteable CD for reading other system files, the running speed is slow and the whole system may crash or may not function properly when the operating system or application programmes need direct write-access to the drive represented by the CD. This method also involves the question of modifying IO.SYS provided by Microsoft. A better and complete solution
10 to the problem is to completely move the whole operating system onto ramdisk so that it no longer relies on the use of any fixed non-volatile storage medium for system operation. This is made possible by this invention.

15 **Disclosure of Invention**

This invention basically makes possible the phenomenon of running Microsoft Windows 95/98 on a ramdisk. For this to happen, the operating system has to be installed and configured in a computer system or device as
20 usual using the setup programme provided with it. There should also be a compatible ramdisk capable of holding the running image of the operating system in a computer system or device with sufficient RAM for the protected-mode Microsoft Windows 95/98 to run. The ramdisk can be implemented as a hardware external to the main RAM or as a software
25 within the main RAM.

This invention reveals a method for customizing the configuration and preparing a running image of the operating system so that it can be run off in protected WINDOWS mode on ramdisk. This method therefore leads to

the creation of a product, i.e. a customized image of files consisting of customized configuration files, system files of the operating system, other device drivers and programmes; the use of which makes possible the phenomenon of running off Microsoft Windows 95/98 in protected
05 WINDOWS mode on ramdisk without the need for access to any other storage medium in computer systems or devices capable of running the operating system.

The method includes the steps of customizing the configuration of the
10 running image of Microsoft Windows 95/98; transferring or copying the properly configured running image, other device drivers and programmes onto storage medium/media; booting off the running image in plain DOS mode; loading the appropriate ramdisk; transferring or copying the running image so configured, other device drivers and programmes onto the
15 ramdisk and finally issuing the command, WIN, under plain DOS mode to start the operating system in protected WINDOWS mode.

These steps are detailed as follows:

20 1. Customizing the configuration of the running image of Microsoft Windows 95/98

Before customizing the existing configuration files, all existing configuration files, or better, all files have to be backed up first so that
25 the existing operation system and its configuration is preserved. A new copy of these configuration files for use with a new copy of the running image of the operating system is then to be produced.

To configure a running image of Microsoft Windows 95/98 suitable

for running off on a ramdisk involves the following substeps:

(a) Customizing configuration files read by the operating system under plain DOS mode

05

Microsoft Windows 95/98 boots up in two phases, the first phase is booting to plain DOS mode. The second phase is booting to protected WINDOWS mode by issuing the WIN command. In the first phase, it reads in IO.SYS, MSDOS.SYS, COMMAND.COM, CONFIG.SYS, AUTOEXEC.BAT and DBLSPACE.INI, if available and applicable, for user-configurable system information, commands and programmes to be executed. In the process, it prepares for loading into protected WINDOWS mode. It starts its protected-mode operation after the WIN command is issued.

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15

(1) Customizing MSDOS.SYS

After issuing the WIN command, the operating system tries to load Microsoft Windows 95/98 into protected WINDOWS mode. Before this is successful, the operating system checks the system information about where the Microsoft Windows 95/98 WINDOWS system files are located. This information is stored in RAM on booting and specified in MSDOS.SYS. Modifying MSDOS.SYS after booting does not change the system information stored in RAM. So for the operating system to locate these system files and run the protected-mode Microsoft Windows 95/98 successfully, MSDOS.SYS should contain proper settings before the operating system boots up under plain DOS mode. The relevant settings for the location of the WINDOWS system files of Microsoft Windows 95/98 are specified

20

25

under the section:

[Paths]

WinDir=

05 WinBootDir=

HostWinBootDrv=

WinDir specifies where the WINDOWS system files are located. If the
ramdisk is loaded as X: drive and the WINDOWS system files, i.e. the
10 files of the Windows directory, are put into a directory named
“NEWWINDOWS”, then WinDir should be set as
WinDir=X:\NEWWINDOWS.

WinBootDir specifies where the command, WIN.COM, is stored. If
15 WIN.COM is put in a directory other than WinDir, WinBootDir
should be set accordingly. Otherwise, WinBootDir should be equal to
WinDir.

HostWinBootDrv specifies which drive booting up the operating
20 system. If the ramdisk is loaded as X:, the setting can be set as
HostWinBootDrv=X. This setting is not absolutely required and can
be set as the actual boot-up drive.

If the running image is put into the compressed drive created by the
25 operating system in DRVSPACE.000 (or named otherwise), the
DRVSPACE.000 should be mounted up so that its contents are made
accessible under plain DOS mode. In order to do so, the
DBLSPACE.BIN/DRVSPACE.BIN driver should be loaded by the
operating system on booting. This driver is loaded by default if

DBLSPACE.BIN/DRVSPACE.BIN is stored under the root directory of the start-up or boot-up drive and no setting refers to it in MSDOS.SYS. Otherwise, the relevant setting(s) in MSDOS.SYS should be set so as to enable loading the compression drive driver as described below:

05 [Options]
DBLSpace=
DRVSpace=

10 To enable automatic loading of the driver, set DBLSpace=1 or DRVSpace=1. To ensure proper functioning, both settings should be set to 1 for loading the compression drive driver.

15 The setting:

[Options]
DisableLog=

20 controls whether Bootlog.txt is created during the booting process. It assumes the value 1 or 0. This setting should be included and set so as to disable the creation of Bootlog.txt on booting up if the booting storage medium is a read-only medium.

25 The setting:

[Options]
SystemReg=

controls whether the booting process scans the system registry or not. It assumes the value 1 or 0. In certain cases, the configuration of running Microsoft Windows 95/98 off on ramdisk may have changed the default location of the system registry, enabling this setting to 1 will lead to booting error. To ensure that the operating system boots up properly in all cases, this setting should be set to 0 to disable scanning system registry;

(2) Customizing DBLSPACE.INI

10

To be able to mount the compression drive -- DRVSPACE.000 on a ramdisk, the configuration file -- DBLSPACE.INI with appropriate settings should be created on the root directory of the boot-up drive. Two particular settings, i.e. FirstDrive and LastDrive, should be properly set according to which drive letter the ramdisk assumes. These two settings control how many compression drives can be mounted up. For instance, in some configuration, if the ramdisk is set up as X: drive, and 2 compression drives are to be mounted up, then the settings should be set to drive letters after X as follows:

20

```
FirstDrive=Y
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LastDrive=Z
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If these two settings are set otherwise, mounting of compression drive(s) from the ramdisk may not be feasible.

25

(3) Customizing CONFIG.SYS and AUTOEXEC.BAT

It is recommended that the LastDrive setting in CONFIG.SYS under

the root directory of the boot-up drive be set to Z so as to allow using all 26 drive letters.

05 As said before, on booting up to plain DOS mode, the operating system prepares for running in protected WINDOWS mode. It reads in MSDOS.SYS to find out where the system files are. By default, the WinDir and WinBootDir are assumed to be C:\WINDOWS if they are not set otherwise in MSDOS.SYS. Using such information, the operating system loads HIMEM.SYS, IFSHLP.SYS and
10 SETVER.EXE. Both HIMEM.SYS and IFSHLP.SYS should be loaded in memory before WIN.COM is started so that the operating system can be run in protected WINDOWS mode. SETVER.EXE is useful for compatibility of using programmes for older DOS versions and is not absolutely necessary for loading the operating system into
15 protected WINDOWS mode.

If HIMEM.SYS and IFSHLP.SYS are not found in the directory specified by WinDir in MSDOS.SYS, the two drivers cannot be loaded and the operating system cannot be started into protected
20 WINDOWS mode. If these two drivers are put elsewhere, they can however be loaded by specifying their location(s) in CONFIG.SYS with the use of the DEVICE= or DEVICEHIGH= statements. Another way of loading device driver can be done by writing a device loading programme to be executed under plain DOS, either to be specified in
25 AUTOEXEC.BAT or to be executed under DOS command prompt. Whatever is the way, HIMEM.SYS and IFSHLP.SYS should be loaded before WIN.COM is issued for protected-mode Microsoft Windows 95/98 to run.

Other device drivers such as ramdisk driver, CDROM driver, or virtual container drive driver (if the compression drive driver, DBLSPACE.BIN/DRVSPACE.BIN, provided by the operating system is not used; virtual container drive is defined here as a computer file, when opened or mounted by programmes or utilities capable of using it, appearing to be a drive with a compatible file system capable of holding other files that are accessible under plain DOS mode and protected WINDOWS mode) have to be loaded as appropriate, before WIN command is issued. This is done by specifying in CONFIG.SYS, or in AUTOEXEC.BAT or loaded under DOS command prompt as the case may be.

The compression drive, DRVSPACE.000, created by the utility provided by Microsoft Windows 95/98 can be regarded as a kind of virtual container drive for containing files put into it. For the present purpose, it is used for holding the running image of the operating system. Other compatible virtual container drive drivers can also be used such as compression drive drivers or encryption drive drivers or compression and encryption drive drivers provided by other vendors. These drivers however should satisfy the requirements of being both mountable and accessible under plain DOS mode and protected WINDOWS mode as the compression drive driver, DBLSPACE.BIN/DRVSPACE.BIN, provided by Microsoft Windows 95/98 does.

To mount up DRVSPACE.000 on ramdisk so that the running image of the operating system contained within it can be read under plain DOS mode, SCANDISK.EXE has to be used. If the ramdisk is setup as X: drive, a DRVSPACE.000 transferred and contained in this X:

drive can thus be mounted up and made accessible by issuing the following command:

[drive:][path] SCANDISK.EXE /MOUNT X:

05

where [drive:][path] is the location where SCANDISK.EXE is found and X: is the drive letter of the drive (in this case, the ramdisk X:) containing the DRVSPACE.000.

10

This command likewise can be put in AUTOEXEC.BAT or issued under DOS command prompt. If any other compatible virtual container drive driver is used instead of DBLSPACE.BIN/DRVSPACE.BIN, the corresponding mounting utility has to be used in similar manner.

15

Because the ramdisk so setup is not a booting device, depending on configuration, sometimes a SUBST.EXE command has to be issued before issuing the WIN command. For instance, if the ramdisk is set up as drive X:, and the boot-up device or drive is recognized as C:, then the command [drive:][path]SUBST.EXE C: X:\ can be used.

20

Implementing [drive:][path] SUBST.EXE [host drive:] [mounted drive:]\ will also improve re-usability of any running session; where [host drive:] is the drive hosting the virtual container drive and [mounted drive:] is the mounted virtual container drive. With the use of this command, the operating system can be fast re-booted by pressing the SHIFT key on rebooting without the need of warm booting or cold booting. In this way, any information stored on ramdisk is preserved after fast re-booting. SUBST.EXE commands can be put in AUTOEXEC.BAT or issued at DOS command prompt

25

before the WIN command.

05 Path= statement can be included in CONFIG.SYS or
AUTOEXEC.BAT to facilitate locating programmes or utilities to be
executed under DOS command prompt for loading drivers,
transferring running image of files to ramdisk, mounting virtual
container drive.

10 (b) Customizing configuration files read by the operating system after
issuing the WIN command

The configuration files read by the operating system during and after
the process of loading into protected WINDOWS mode are the
Registry files, Policy files, User Profile files, and INI files. These files
15 contained various entries of system and user configuration
information. To ensure that the operating system loads successfully
into protected-mode operation, the entries containing the location, i.e.
the precise drive and directory information of the running image of the
operating system should be altered accordingly. For instance, if the
20 running image of the operating system is to be found in
X:\NEWWINDOWS and at the moment the entries in these
configuration files point to C:\WINDOWS, then all these entries have
to be changed to pointing X:\NEWWINDOWS. This applies to other
directory or location information for other application programmes.

25 The Registry files, Policy files and User Profile files cannot be easily
altered under plain DOS mode. For convenience, these files have to be
altered after the protected WINDOWS mode is running. Because these
files contain many many entries about directory information, a

programme has to be developed for such alteration. Suppose if the operating system now starts from C:\WINDOWS, it will crash if all entries in the Registry files pointing to C:\WINDOWS are altered to X:\NEWWINDOWS if the process is not done properly and restored afterwards. Therefore, these configuration files have to be backed up first and used for recovery in case of crash during the alteration process later. The programme capable of doing such alteration has to, firstly change the relevant entries so that they point to their valid new location(s), secondly copy the new configuration files to another location for use later, and thirdly change back the relevant entries in the configuration files so that they point to their unaltered location(s). Otherwise, the operating system will crash.

INI files have also to be changed likewise.

The location(s) of programmes specified in Shortcut files should also be changed to their new location(s) so that they can be validly referred to and run successfully.

After the above steps of customization, the existing operating system is preserved and a new copy of MSDOS.SYS, DBLSPACE.INI, CONFIG.SYS, AUTOEXEC.BAT, Registry files, Policy files, User Profiles, INI files and Shortcut files is produced.

Another way of obtaining suitable configuration files of a running image is to partition and format a harddisk with sufficient number of drives, and then install the operating system onto the appropriate drive, the drive letter of which will later be taken up by the ramdisk on which the running image is to run. For instance, if drive X: is to be used as

the ramdisk for running off the operating system, the harddisk should first be partitioned and formatted up to drive X:, and a new installation of the operating system is set up on this drive X:. The running image and the associated Registry files, Policy files, User Profile files, INI files and Shortcut files will be suitable for ramdisk running. Other configuration files of MSDOS.SYS, CONFIG.SYS, AUTOEXEC.BAT, and DBLSPACE.INI (if compression drive driver, DBLSPACE.BIN/DRVSPACE.BIN, is to be used) should however be customized as appropriate.

10

After backing up the running image and the associated customized configuration files, the harddisk should be re-partitioned to have less number of drives so that a free drive letter X: can be taken up by the ramdisk.

15

For some CD recording software which is able to read in a whole harddisk drive and record all its contents onto a bootable CD, which boots up as C: drive, the process of customization is further simplified by: firstly, installing the operating system as usual onto C: drive of a harddisk; secondly, compressing C: drive into a DRVSPACE.000; thirdly changing the name of DRVSPACE.000 into another name, for instance, ABC.DSK; thirdly, copying the required HIMEM.SYS, IFSHLP.SYS, SCANDISK.EXE, ramdisk driver(s), storage device driver(s), and programmes for copying files and for utilizing these drivers onto the host drive containing IO.SYS, COMMAND.COM, DBLSPACE.BIN/DRVSPACE.BIN and ABC.DSK, and fifthly, customizing MSDOS.SYS, CONFIG.SYS, AUTOEXEC.BAT and DBLSPACE.INI as appropriate.

25

The whole drive C: now contains the whole customized running image -- including IO.SYS, COMMAND.COM, DBLSPACE.BIN/DRVSPACE.BIN, HIMEM.SYS, IFSHLP.SYS, SCANDISK.EXE, customized MSDOS.SYS, customized
05 CONFIG.SYS, customized AUTOEXEC.BAT, customized DBLSPACE.INI, ramdisk driver(s), storage device driver(s), programmes for copying files and for utilizing these drivers, and ABC.DSK (to be named back as DRVSPACE.000 for mounting during the booting process as implemented through
10 AUTOEXEC.BAT). It can then be recorded onto a bootable CD as drive C: by CD recording software.

On booting, the customized AUTOEXEC.BAT will execute commands of setting up a ramdisk, for instance as drive X:,
15 transferring ABC.DSK onto the ramdisk, renaming ABC.DSK back to DRVSPACE.000, mounting up DRVSPACE.000, executing SUBST.EXE C: X:\, and issuing WIN.COM. In this case, the harddisk can be removed from the computer. If it is not removed, the original drive C: on the harddisk will be turned into drive D: on booting up
20 from the bootable CD. After issuing the command SUBST.EXE C: X:\, the booting CD C: drive will be made referring to the contents of Drive X:. In this way, the original booting CD is hidden. The CD drive will now be recognized as a CD drive with another drive letter after booting and running into protected WINDOWS mode. The CD can
25 later be removed or replaced as usual.

The whole customized running image thus contains the customized configuration files, device drivers such as ramdisk driver(s), storage device driver(s), virtual container drive driver(s), programmes or

utilities for loading and utilizing these drivers and for copying files, and all other system files supplied by the operating system during the installation process as selected by the user.

05 2. Transferring the customized running image onto storage medium

To copy this customized running image of the operating system, one can start up the operating system in protected WINDOWS mode and make use of EXPLORER.EXE to copy all the files of the customized running image to a brand-new drive. If EXPLORER.EXE is used, the
10 WIN386.SWP system swap file cannot be copied. This file therefore has to be deselected for copying purpose. It will be created afresh on next running.

15 This customized running image however may contain hundreds of files. During the process of re-booting and setting it up to run on ramdisk, the time required for copying the customized running image file by file to ramdisk under plain DOS mode is very long. There is also a problem associated with long file name files as described
20 previously.

Therefore, as a viable solution, it is recommended that a virtual container drive be used for containing all the files associated with the customized running image. The compression drive, DRVSPACE.000,
25 created by Microsoft Windows 95/98 itself is a reliable one to use. By using DRVSPACE.000 and putting the customized running image into it, there is only one file to copy to the storage medium instead of hundreds of files associated with the customized running image. This speeds up the process of transferring the customized running image to

any storage medium. Because DRVSPACE.000 is a file with short file name, it can also be copied under plain DOS mode, for instance using XCOPY32.EXE. The use of compression drive, DRVSPACE.000, also saves space when it is copied to non-volatile storage medium or later to ramdisk as well.

In this connection, other compatible virtual container drive drivers can also be used instead.

Once a DRVSPACE.000 containing the customized running image is prepared, the DRVSPACE.000 can be put onto any storage medium for use later. The storage medium can be of any type. For it to be suitable for any use, the running speed of the storage medium should be acceptable to users. ROM, EEPROM, CDROM, DVDROM, DVDROM, PCMCIA disks, removable MO disks, or other kinds of fixed or removable SCSI, ATAPI or USB hard disks, etc. can all be used. The transfer of DRVSPACE.000 onto storage medium can be carried out by utilities most optimized for the particular storage devices used. The storage medium can be bootable or non-bootable, depending on configuration.

Whether the storage medium containing this customized running image is bootable or not, the booting device has to be enabled and configured so that the booting device can start up the process of booting up Microsoft Windows 95/98 into plain DOS mode, setting up a ramdisk, transferring the customized running image from the storage medium onto the ramdisk and starting off the customized running image on the ramdisk into protected WINDOWS mode as described below.

3. Booting off the customized running image in plain DOS mode

To boot off the customized running image in plain DOS mode and to access it later, the booting device has to gain access to the storage medium on which it is stored. The image of the following files, namely, IO.SYS, MSDOS.SYS, CONFIG.SYS, COMMAND.COM, AUTOEXEC.BAT, should be stored in the root directory of the boot-up drive or the contents of such files can be read for the purpose of booting. MSDOS.SYS, CONFIG.SYS, and AUTOEXEC.BAT have to be configured as described above.

HIMEM.SYS, IFSHLP.SYS, ramdisk driver, storage device driver and virtual container drive driver are also required to be available for loading before issuing the WIN command. SETVER.EXE is however optional.

If DRVSPACE.000 is used, DBLSPACE.BIN/DRVSPACE.BIN and a properly configured DBLSPACE.INI have also to be included into the root directory of the boot-up drive. In this case, SCANDISK.EXE should also be included for use. The corresponding utilities for using other compatible virtual container drive driver(s) can however be used instead for the same purpose.

4. Loading appropriate ramdisk

Either hardware or software ramdisk driver can be used. Ramdisk driver can either be loaded as specified in CONFIG.SYS or in AUTOEXEC.BAT or under DOS command prompt.

5. Transferring the customized running image onto ramdisk and issuing WIN command

05 After booting off into plain DOS mode, the customized running image contained in the storage medium has to be copied onto the ramdisk. XCOPY32.EXE or other file-copying utilities of good copying speed should be available on the boot-up drive and used for this purpose under plain DOS mode.

10 As described previously, it is preferable to use a virtual container drive to hold the customized running image for fast copying, as a solution for the problem arising from long file name files and as a means for saving space on ramdisk. If a virtual container drive is used, it has to be mounted after being copied onto the ramdisk so that
15 the customized running image contained within it can be accessed under plain DOS mode in order that the WIN command can be issued and the whole protected-mode Microsoft Windows 95/98 can be run off on the ramdisk.

20 For instance, if DRVSPACE.000 is used, after copying DRVSPACE.000 onto the ramdisk, the SCANDISK.EXE command has to be issued as described previously so that the contents of DRVSPACE.000 become accessible to plain DOS.

25 For some configuration, the SUBST.EXE command has to be issued before issuing the WIN command, also as described previously.

Best Mode for Carrying out the Invention

Because of the complexity of the process of customizing the configuration of the running image of the operating system, the best mode for carrying out the invention involves the use of a computer with CPU(s) of good running speed, large amount of RAM, for instance 512 megabytes or more
05 (however, 128 megabytes are found to be sufficient to run a bare operating system without other application programmes installed with it), a fast removable and bootable harddisk or MO disk, and preferably a high speed and bootable CD-RW drive; other peripherals are optional.

10 Microsoft Windows 95/98 is to be freshly installed onto the removable harddisk or MO disk at a drive letter which will be assumed by the ramdisk. In this way, the customization required for MSDOS.SYS, CONFIG.SYS, AUTOEXEC.BAT or DBLSPACE.INI will be minimal. The Registry files, Policy files, User Profile files, INI files and Shortcut files can be left
15 unaltered in this way. The whole drive containing the full running image of the operating system is to be compressed by using DRVSPACE.EXE into a DRVSPACE.000.

Other files, including IO.SYS, customized MSDOS.SYS,
20 COMMAND.COM, customized CONFIG.SYS, customized AUTOEXEC.BAT, customized DBLSPACE.INI, DBLSPACE.BIN/ DRVSPACE.BIN, HIMEM.SYS, IFSHLP.SYS, SETVER.EXE, other device drivers, such as CDROM driver, ramdisk driver and programmes or utilities for loading and utilizing these drivers and for copying files should
25 be added to the host drive which contains the DRVSPACE.000 (which also contains the above files together with other system files of the operating system). This collection of files forms the whole bootable running image of the operating system.

This bootable running image can then be copied or recorded onto a bootable CD by using the utilities provided with the CD-RW drive. The removable harddisk or MO disk can then be removed. The CD-RW is configured to be the booting device for booting up the CD so produced. The operating
05 system will boot into plain DOS mode from the CD; ramdisk is then set up; the whole running image is copied onto the ramdisk; the DRVSPACE.000 is mounted up and made accessible; and finally the protected-mode Microsoft Windows 95/98 runs off on the ramdisk as configured. The removable harddisk or MO disk drive can be recognized as a removable
10 device and the CD-RW drive can also be seen. Both these removable devices will function properly and accept replacement of disk or CD as usual. The ramdisk is simply regarded as another rewriteable fixed disk by the operating system except that it is running on a storage medium of ram speed.

15

Industrial Applicability

The requirement of a fixed non-volatile storage medium for running Microsoft Windows 95/98 means the running speed of the operating system
20 depends, amongst other limiting factors of course, very much on the speed of the fixed non-volatile storage medium used.

The use of a fixed non-volatile rewriteable storage medium for storing the running image of the operating system makes it susceptible to virus
25 infection. The maintenance of a clean running image suitable for running whenever it is needed without the need for re-installation becomes a daily challenge.

The running of the operating system on a ramdisk makes computer system

run faster, saving computing time. The ability of running the operating system without the requirement of a fixed non-volatile storage medium, for instance a harddisk, means that standalone desktop computers, notebook computers or hand-held computers capable of running the operating system
05 can be built and used with or without a harddisk. Notebook or hand-held computers running without a fixed harddisk can save much battery power and have a longer running time. They can rely on other removable storage systems such as PCMCIA storage media, MO disks, Zip disks or LS-120 disks or even free drivespace on the Internet. This mode of functioning
10 helps computing on transit.

Computer systems booting off from a running image of the operating system stored on CDROM or ROM and running the operating system on ramdisk in protected WINDOWS mode can guarantee that each such
15 booting and running is clean and unaffected by virus infection. This can save the maintenance cost of the computing world adopting the operating system on the efforts spent on anti-virus measures and on the process of system backup and recovery.

20 By using this invention, computer makers can mass produce computers of uniform configurations and provide the consumers simply with a bootable CD that can, so to speak, boot off the full Microsoft Windows 95/98 from the CD. The CD is not required after the operating system starts running off on ramdisk in protected WINDOWS mode, thus providing flexibility. The
25 CD is virus-free and guaranteed to boot off a clean full Microsoft Windows 95/98 every time. The invention also accommodates other configurations not using CD as the bootable device, such as PCMCIA disks, ROM, EEPROM, or removable MO disks, etc.

The prior art for the implementation of this invention includes the operating system of Microsoft Windows 95/98; the hardware of any devices, including computer systems, capable of running Microsoft Windows 95/98; the specifications of booting these devices, including computer systems,
05 under plain DOS mode; various kinds of ramdisk device drivers, storage device drivers, virtual container drive drivers; programmes or utilities for loading and utilizing these device drivers; and programmes or utilities for copying files from and to storage media for use with Microsoft Windows 95/98.

10

In combination with the use of the technical features contained in the prior art stated above, this invention makes possible the phenomenon of running off Microsoft Windows 95/98 in protected WINDOWS mode on ramdisk and, in this relation, is characterized by the following claims:

15

Claims

1. A method, capable of being implemented in computer-executable programme(s) and/or computer-executable instruction(s), comprising steps of preparing and producing a copy of customized image of files (the customized running image of files) to be used for running off Microsoft Windows 95/98 on ramdisk in protected WINDOWS mode in computer systems or devices capable of running the operating system, the steps comprising:

10

(a) customizing and producing a copy of configuration files, including MSDOS.SYS, CONFIG.SYS, AUTOEXEC.BAT and/or DBLSPACE.INI (if DBLSPACE.BIN/DRVSPACE.BIN is to be used), to be read under plain DOS mode on booting; this sub-step comprising the steps of:

15

(1) producing a copy of MSDOS.SYS with customized entries of WinDir=, WinBootDir=, HostWinBootDrv=, DisableLog=, SystemReg=, and/or DBLSpace= / DRVSpace= (if DBLSPACE.BIN/DRVSPACE.BIN is to be used);

20

(2) producing a copy of DBLSPACE.INI (if DBLSPACE.BIN/DRVSPACE.BIN is to be used) with customized entries of FirstDrive= and LastDrive=;

25

(3) producing a copy of CONFIG.SYS with customized entries of LastDrive=, Device=, DeviceHigh=, and Path= to accommodate the inclusion and loading of HIMEM.SYS, IFSHLP.SYS, ramdisk device drivers, storage device drivers, and virtual container drive drivers, and

to facilitate locating programmes for utilizing such devices and transferring the customized running image of files; and

05 (4) producing a copy of AUTOEXEC.BAT with customized entries for executing programmes for loading and utilizing HIMEM.SYS, IFSHLP.SYS, ramdisk device drivers, storage device drivers, virtual container drive driver(s); for executing programmes for transferring the customized running image of files onto ramdisk; for executing programmes mounting virtual container drive(s) or for executing
10 SCANDISK.EXE (if the compressed drive of DRVSPACE.000 or named otherwise is to be used), and/or for executing SUBST.EXE, and/or for executing WIN.COM;

15 (b) producing a copy of customized configuration files, including Registry files, Policy files, User Profile files, INI files and Shortcut files, to be read by Microsoft Windows when starting off on ramdisk and running afterwards in protected WINDOWS mode; wherein any entries in these configuration files relating to the locations of files used by Microsoft Windows 95/98 are customized to pointing to their valid
20 locations;

(c) copying or transferring:

25 (1) the files selected and provided during the installation process of setting up Microsoft Windows 95/98;

(2) the customized copy of configuration files specified in Claim 1(a) and Claim 1(b);

(3) ramdisk driver(s), storage device driver(s), virtual container drive driver(s); and

05 (4) programmes for reading, writing and utilizing ramdisks, storage media and virtual container drives and programmes for copying or transferring files

10 to a virtual container drive (a computer file that is readable, writeable, mountable and recognizable as a compatible drive by Microsoft Windows 95/98) in valid location(s) so that these files are accessible when the virtual container drive is opened or mounted, wherein IO.SYS, COMMAND.COM, customized MSDOS.SYS, customized CONFIG.SYS, customized AUTOEXEC.BAT, and customized DBLSPACE.INI and DBLSPACE.BIN/ DRVSPACE.BIN (if
15 DBLSPACE.BIN/DRVSPACE.BIN is to be used) are to be placed in the root directory of the virtual container drive and other files in valid locations for use;

20 (d) copying or transferring the virtual container drive as specified in Claim 1(c) to a storage medium that is recognized as logical drive, bootable or non-bootable, by the booting device of a computer system or device capable of running Microsoft Windows 95/98; and

25 (e) copying or transferring:

(1) IO.SYS, COMMAND.COM, HIMEM.SYS, IFSHLP.SYS, and/or DBLSPACE.BIN/DRVSPACE.BIN (if it is to be used);

(2) the customized copy of MSDOS.SYS, CONFIG.SYS,

AUTOEXEC.BAT and/or DBLSPACE.INI (if DBLSPACE.BIN /DRVSPACE.BIN is to be used) produced as specified in Claim 1(a);

05 (3) ramdisk driver(s), storage device driver(s), virtual container drive driver(s); and

(4) programmes for reading, writing and utilizing ramdisks, storage media and virtual container drives and programmes for copying or transferring files

10

to a storage medium that is recognized as a bootable logical drive in location(s) that can be used in the booting process by the booting device of a computer system or device capable of running Microsoft Windows 95/98;

15 2. A method of booting off the customized running image of files produced as specified in Claim 1 under plain DOS mode into protected WINDOWS mode; wherein the booting process, through executing computer-executable programme(s) or computer-executable instruction(s), including but not limited to using the customized
20 configuration files produced as specified in Claim 1(a) and Claim 1(b), executes the following steps:

(a) reading in IO.SYS, MSDOS.SYS, DBLSPACE.INI and DBLSPACE.BIN/DRVSPACE.BIN (if DBLSPACE.BIN/
25 DRVSPACE.BIN is to be used), CONFIG.SYS, AUTOEXEC.BAT, and COMMAND.COM from bootable logical drive of a storage medium as specified in Claim 1(e);

(b) loading HIMEM.SYS and IFSHLP.SYS;

- (c) loading and preparing ramdisk device driver(s), virtual container drive driver(s) and/or storage device driver(s) for use;
- 05 (d) copying the virtual container drive so prepared as specified in Claim 1(c) from the storage medium specified in Claim 1(d) to ramdisk;
- (e) mounting the virtual container drive so that its contents are
10 accessible under plain DOS mode;
- (f) issuing the command SUBST.EXE to substitute one drive for another, if necessary; and
- 15 (g) issuing WIN.COM for running off Microsoft Windows 95/98 on ramdisk into protected WINDOWS mode; and during the process, the customized contents of Registry files, Policy files, User Profile files, INI files and Shortcut files so produced as specified in Claim 1(b) are used;
- 20
3. The customized running image of files so produced and copied or transferred to storage medium as specified in Claim 1; and
4. The use of the customized running image of files so produced and
25 copied or transferred to storage medium as specified in Claim 1 in computer systems or devices capable of running Microsoft Windows 95/98.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB00/00010

A. CLASSIFICATION OF SUBJECT MATTER

G06F9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F9/00,13/00,9/06,9/44,9/445,13/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC,RS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP0358292A2 The whole document	1-4
A	US5764903 The whole document	1-4
A	US5606681 The whole document	1-4

Further documents are listed in the continuation of Box C. See patent family annex.

<p>* Special categories of cited documents:</p> <p>“A” document defining the general state of the art which is not considered to be of particular relevance</p> <p>“E” earlier application or patent but published on or after the international filing date</p> <p>“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>“O” document referring to an oral disclosure, use, exhibition or other means</p> <p>“P” document published prior to the international filing date but later than the priority date claimed</p>	<p>“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>“&” document member of the same patent family</p>
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/IB00/00010

US5606681	25.02.97	None	
US5764903	09.06.98	None	
EP0358292A2	14.03.90	AU3088789	15.03.90
		JP2081248	22.03.90
		AU609585	02.05.91
		US5146568	08.09.92
		CA1321654	24.08.93
		US5280627	18.01.94
		DE68928311D	16.10.97
		DE68928311T	02.04.98