Stratesave 6.0

The comfortably organized backup solution for your PCs

User Manual

Stratesave Systems GmbH

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The manual is for Stratesave 6.0e for Windows 7/2008/Vista/2003/XP/2000.

1.Introduction

1.1. What is Stratesave?

The keywords **comfortable organized backup** best describe Stratesave. The backups are comfortable and organized. At execution time, it is neither necessary to specify what should be backed up, nor where it will be stored. It is sufficient to call the backup program once a day in the evening, and daily backup is executed automatically. It can be even more comfortable, using the scheduled backups-feature, which automatically executes backups at a desired time of day.

Stratesave is a **complete backup solution** for your Windows Network. It fully backs up local and networked computers, including System State, Active Directory, SQL- and Exchange Server databases. Stratesave allows full restoration of your systems. VSS (Volume Snapshot Service) Open File backup and Disaster recovery without reinstalling Windows are provided for local and network backup of Windows 7/2008/Vista/2003/XP. Disk Image backup is provided as well as precise file backup.

Stratesave is optimized for regular backups over a longer period of time. You define different backups for different **periods** (hour, day, week, month, quartal, semester, year). The storage medias are fixed disks, tapes and removable disks (including CD/DVD).

The **Restore** completely fits with Stratesave's concept of organized backups. Stratesave manages by itself to find the files to be restored on the corresponding backups. Backup lists containing the names of backed up files can be view or printed if required.

The **Remote Backup Control** feature allows to control the backups when they run as a Windows Service or under the Windows AT-command.

1.2. Why organized backup?

The organized backup is important especially in a professional field, if regularly backup is desired. Stratesave organizes the backups with help of a macro (user defined backup plan) and a log (list of executed backups). Stratesave is very flexible and leaves it to the user to specify, how many tapes or how much disk space should be used for backup. Specific backup credentials for security and availability of old backups are taken into account.

Stratesave distinguishes backups from their periods (hourly, daily, weekly, monthly backup etc.). Additionally, backups are separated with a rotation scheme of 2-12 backups on different storage locations. The usage of a precise plan allows to calculate the potential risks for extreme situations. For example, when a backup tape gets defective, older backups will be available for restore. Sometimes files are deleted by accident, and this is detected weeks later. A monthly, quartal, semester or yearly backup can help out here, if these periods are used in the actual backup plan.

The option **differential backup** helps saving backup time and storage space. Only the updated files since last bigger backup are stored. As an example, you can make a full backup every month with daily and weekly differential backups.

1.3. Macro

For each PC to be backed up with Stratesave, a **macro** must be created. It contains all the necessary information for regular backup. The macro is stored on PC. Designing a macro is an easy task. To simplify further, the network manager can create the macros for all PCs on the net and copy them to the executing PCs.

1.4. Log

Stratesave creates a **log** automatically. The log exactly describes executed backups, with backup date and time, backup location, and backed up directories. The log is an important sign post for the restore program. You can display or print the log as desired. If the Log is lost, it can also be restored directly from the latest backup.

1.5. Backups on removable disks or CD/DVD

Stratesave has builtin driver engine for backup on CD/DVD. Also supported are standard removable disks or 3rd party CD/DVD-packetwriting Software. A backup can be extended over several removable disks, and multiple drives can be used for backup (spanning support).

1.6. Backups on tapes

The tapes are formatted with **Labels**, following the **ANSI**[1]**-tape format**. This wide-spread format includes a protection, in case of a wrong tape being put into the drive. Stratesave also supports **tape sets**. A backup can be extended over two or more tapes. Also backups can be appended to backups already on tape. The commonly used **GFS (Grandfather Father Son) tape rotation scheme** allows optimal tape usage and flexibility.

Supported tape drives: SCSI DAT, DLT, LTO, 8mm (including Exabyte VXA, Mammoth). SCSI Travan drives are supported, but only one backup can be stored on every tape. In principle, all SCSI tape drives are supported.

Non-SCSI drives are also supported in principle, if a driver for the tape drive is installed, but currently this has not been severly tested.

Currently not supported: OnStream.

1.7. Backups on Sftp Server

Stratesave can store the backups on Sftp-online-Server. This is secure transfer over internet or local network. You need a storage account which supports sftp-protocol. Sftp-Servers with certificate are also supported.

With the integrated scheduler, backups are automatically done in background as soon as the computer is connected.

1.8. Protection against storage faults

The backups are protected with a 32 bits **CRC**[2]**-checksum**. The backups can be checked for data-errors, automatically after backup or later if required. During restore, files are also controlled with this checksum. You will be warned of any difference between backed up data and restored data.

If the file tables and file headers in backup contain errors, use the **special restore option for corrupted backups**. It allows to restore as many files as possible from even heavily corrupted backups, where the normal restore would fail. The entire backup is scanned in the search of backed up files, allowing also errors in file headers. This feature is not an error correction. Data-errors are recognized and listed (and bypassed to access the still correct backup-data), but not corrected in the current version of Stratesave. Also, the corrupted backup restore does not restore special

[1]American National Standard Institute.

[2]Cyclic Redundancy Check - modern method of checksum-generation

information like extened file attributes and NTFS security. It is merely a safety net in case the normal restore fails, to be used as a lsat resort.

1.9. Backup format

The backups are stored in extended **TAR[3]-format**, if compression and encryption are not used. Files can be restored with every TAR-program. This, of course, is only necessary in an extreme situation, if the restore program is not available.

The extension to the Unix-TAR-format is the addition of a checksum of backed up files. If data in backup changes, restore program will detect and list corrupted files.

1.10. Automatic backup start

The backup plan can be defined as automatic starting times of the backups for each period (hourly, daily, weekly, monthly, yearly backup) individually with a time window, where backup of each period can start. This allows for advanced backup plans like automated daily backups Monday to Thursday at 18:00, weekly backup Friday except first Friday every month, where a monthly backup should be run.

Backup program can be run as a Windows Service, for automatic scheduled backups when noone is logged on. The Remote Backup Control allows you to control the local or remotely running service. This runs in the user context with an icon in the taskbar, and interracts with the service, or with the Stratesave Backup running under the Windows AT-command.

1.11. Rotation scheme

The backups are stored sequentially on 2-12 different locations. For example, if three tapes are reserved for backups, the first three backups are stored on three tapes respectively. The fourth backup will be stored on first tape, overwriting the backup stored there. The fifth backup will be stored on second tape etc. The rotation scheme combined with period definitions (hourly, daily, weekly etc. backups) gives maximum flexibility for the design of an optimized backup plan.

1.12. Database backups

Stratesave backups databases SQL Server 2008, 2005, 2000, 7.0 and Exchange Server 2010 (with VSS), 2007, 2003, 2000. The backups are performed at the database level, and can be combined with file backups. Differential backups are

[3]Tape ARchive - standard archive program for Unix

supported, as well as purely incremental backups. Incremental backups base not on the last backup of longer period, but on the last incremental backup. For the restore, the whole chain of incremental backups since last full backup must be restored from. Incremental backups for databases can be repeated automatically at very short interval (1 minute minimum). For SQL Server, VSS full backups can be combined with standard differential and incremental backups.

1.13. Full restore approved

Stratesave backups extended system informations, including Registry and Eventlog files, long and short file- and directorynames, NTFS Security-information and other specialities, System State, Active Directory, databases. Restore can even be done on locked files, allowing a full restore of a running system. It is therefore not necessary to make the full restore to a separate partition or disk first.

The Restore Disk, which can be created with Periodical backup, allows you to restore, even if Restore program on hard disk is no longer available, without reinstalling Stratesave. After a disk crash of your system disk, only the operating system and network software need to be reinstalled before restoration.

1.14. Disaster Recovery

Stratesave supports Disaster Recovery on Windows 7/2008/Vista, 2003 and XP, local and networked. The system can be setup and fully restored without reinstalling Windows and Stratesave. Disaster Recovery bases on Automated System Recovery (ASR), which is builtin Windows. For Windows 2003/XP, the computer can be booted from Windows CD, then after pressing F2 and providing a Disaster Recovery Floopy Disk a minimized Windows version will automatically be installed and Stratesave Restore Program will start. A Wizard allows you to configure Network settings if required for the restore. Then System Files and System State can be restored in a single run.

For Windows 7/2008/Vista, a prepared Windows PE 2.0 DVD (VistaPE for remote Disaster Recovery) is required to boot from. Then Network can be configured, Stratesave started and System can be fully restored.

1.15. Open File Backup / VSS

Open File Backup is supported for local and Network backups of Windows XP or later. It uses Volume Snapshot Service (VSS), which is built in Windows.

At start of backup, a Snapshot is taken of all disks to be backed up. The Snapshot is then backed up. This has the advantage, that the state of all backed up files is taken

at the same time. Stratesave also backs up the System State "VSS-aware", following the VSS guidelines.

VSS Writers can be selected for backup under VSS-database tree. For example Exchange Server 2010,2007,2003, SQL Server (SqlServerWriter, MSDEWriter) have writers and are therefore selectable under VSS. Backups of VSS databases are currently always full backups, and incremental if supported by Writer. Stratesave also backups up and restores Writer's Meta-Data.

1.16. Backup limits

Current Version of Stratesave has following limits:

- Not all tape drives are supported. Fully supported are SCSI DAT, DLT, LTO, 8mm (including VXA, Mammoth). SCSI Travan drives are supported, but only one backup can be stored on every tape. In principle, all SCSI tape drives are supported. Unsupported are OnStream drives. Non-SCSI DAT, DLT, LTO, 8mm drives, for which a Windows tape driver is installed, should work in principle, but they have not been extensively tested.
- Appending backups on tapes (=storing several backups on the same tape one behind the other) works with most, but not with all tape devices. It does not work with Travan, HP Collorado.
- Max. size of backup on fixed disk and removable disks or CD/DVD: Unlimited
  Max. size of backup output file on tape: Unlimited
  Backups can also be extended over several tapes or removable disks.

2.System requirements

Stratesave Standard is offered for following PC-operating systems:

- PC with MS-Windows 7/2008/Vista/2003/XP/2000. To remotely backup other operating systems with Network Agent, the backup Server should be Windows 7, 2008, Vista, Windows XP Professional or Windows 2003. It does not matter if the backup server is Windows XP Professional. Even a Windows XP Professional can remotely backup Windows 2008 and 2003 Servers (and Windows 2000 Servers).
- Stratesave fully supports x64 systems, for local and network backup.

2.0.1. Requirements for tape drives

Supported and recommended: SCSI DAT, DLT, 8mm (including VXA, Mammoth).
Also supported, but cannot store several backups one behind the other on same tape: Travan.
Not supported: OnStream

2.0.2. Requirements for CD/DVD

Supported are DVD+RW, (DVD-RW), DVD+R, DVD-R, CD-RW, CD-R. DVD-RW is supported, but not recommended. Better use DVD+RW instead. Best use a modern drive which is data underrun-safe.

3. Installation

3.1. Installation of Stratesave program

The setup program will guide you with its interrogative user interface to a successfull installation. The install-program is 32-bit application. It will install the correct Stratesave version: 32-bit on x32 systems, 64-bit on x64 systems.

4.Create your Backup plan

4.1. Quick Intro

You can create the plan, after which your PC will be backed up. The plan will be stored as a Macro in file **Macroname.STM**. The prefered Macroname is the networkname of your PC. The networkname is the default macroname and will be loaded automatically by Stratesave. The networkname also clearly distinguishes the backups, if several PCs are backed up to the same server.

To create a macro, start with **Settings** from left-pane treeview. You can specify directory where backup Log will be stored, and device settings for backups to tape/removable disks, Email settings. Then define the desired backup periods by selecting the period**.** You can specify the backup media (tapes, fixed disks or removable disks) and backup location. The directories to be backed up can be selected. Within the subtree **Period options**, you can specify additional parameters for your backups.

4.2. Designing the backup plan

Before starting the Backups, take some minutes to define your backup parameters. Following points are important for a backup plan:

4.2.1. Which periods (hourly, daily, weekly, monthly, quartal, semester, yearly backup) should be defined?

The more periods you define, the more storage space (tapes, disks) you need for your backups. The advantage is that it is more probable to recover previously deleted files and old versions of files. At least one period must be defined. It is advisable to define **daily backup** for regular backups with one or a few days interval.

It is possible to start with one or two periods (e.g. daily and monthly backup), and add other periods later when needed.

Stratesave allows to define multiple periods with same interval. You can define multiple daily or weekly backups. For example, define Weekly backup 1 to be run Monday to fully backup one part of your network, and Weekly backup 2 Tuesday, to backup another part of your network etc. These weekly full backups can then be combined with a daily differential backup over the entire network. For better overview, the periods can be renamed. For example rename "Weekly backup 1" to "Weekly backup network part A".

The periods SQL Server incremental backup and Exchange Server incremental backup are special periods for purely incremental backup of databases. See also chp. 8.8. "Exchange Server- and SQL Server incremental backup".

4.2.2. Rotation scheme: Where are the backups stored?

Backups are stored on fixed disks, Sftp-server disks, tapes, removable disks or CD/DVDs. Every period can be stored on different media. For example, store daily backups on fixed disks, which are fast and need no media-handling; store monthly backups on tapes, which can be kept in a fire-proof safe for maximum security, and are also cheaper than fixed disks.

The new backups always overwrite the old ones. Otherwise, storage would quickly be filled, and regular backup impossible. On the other hand it is dangerous to overwrite the latest backup by the new one. If the PC crashes during backup, there is no more backup around: The actual backup was overwritten and the new one is not finished. Therefore there is a rotation of 2-12 backups, until the first backup is overwritten. For backups to fixed disks, minimum rotation can be set to 1. In this case, backups are not overwritten, but the previous backup is deleted, when new backup completes. If your PC crashes during backup, last backup will still be available, even if you set rotation to 1.

For backups on tapes and removable disks, Stratesave follows the GFS (Grandfather Father Son)-strategy. Multiple backups can be stored on a single tape or disk, but only for the same period. There will be a set of at least two tapes for every period, to avoid loss of data. The last backup in the rotation plan must be stored on a different tape than the first one. The reason for this restriction is that backups on tape always overwrite the backup already stored there, and all backups further behind on tape. For backups on fixed disks, the backups of a period can all be made on the same disk. Even backups of several periods or several PCs can go to same disk. For security-reason, it is advisable not to store all backups at the same location. If the critical disk gets defective, all the backups will be lost.

For example, it is decided to store weekly and monthly backups on tape. The rotation is 4 for weekly backups and 12 for monthly backups, as all weekly backups should be kept for one month and all monthly backups for one year. If the backup tape has enough space for 4 full backups, this backup plan requires 2 tapes for weekly backups (at least 2 tapes are required for every period) and 3 tapes for monthly

backups (12 backups / 4 backups per tape = 3 tapes). The total number of tapes required will be 2 + 3 = 5.

If there is a lot of backup data, one tape may be not enough for a full backup. Certainly this depends on the storage capacity of the tapes used. Stratesave allows one backup to extend over several tapes or removable disks. In the dialogs where a volume name is required, you can always enter a set with several tape- or disknames. If a tape or removable disk is filled during backup, backup will continue on the next in set.

The tapes and removable disks must be named and initialized before use. The name of a tape consists of maximum 6 capital letters or digits. This conforms to ANSI tape-standard. The name of a removable disk has up to 12 letters or digits.

4.2.3. Directories and databases to backup

Local directories or remote network directories (\\Server\...) can be selected for backup, as well as local and remote databases (System State, Exchange Server 2007/2003/2000 (ESE98), SQL Server, VSS).

The directories can be selected for every period seperately. A backup with a longer period automatically includes all directories in a shorter period. For example in a weekly backup, the directories defined for daily backup are also included.

All files in a directory are backed up, also hidden files (files, which are normaly not shown in Windows Explorer or with MSDOS DIR-command). System swap-files and other temporary files are automatically excluded. The files and directories defined in registry under 'FilesNotToBackup' are also automatically excluded.

4.2.4. Time plan

For automatic start of backups, a time plan is required. Basically, for each period, weekdays must be defined when backup should run, and time window. For higher periods (monthly or longer), also day of the month and months can be specified. This allows you for example to run a weekly backup every Friday at 18:00, except the 1. Friday of the month, when a monthly backup is done. Monday to Thursday daily differential backups are run.

The backup program figures out the period to be backed up next, according to the settings.

The time plan of Stratesave can be overruled, if necessary. For instance, when time plan signals that a weekly backup should be made, a daily backup can be executed anyway.

4.2.5. Differential backup?

For every backup there is the choice between differential and non-differential backup. Differential backups contain only the files, that have been created or been changed since last backup of higher period. For example, a differential daily backup does not include files that were already saved in a previous weekly backup.

Differential backups save backup time and storage space. The disadvantage is a reduced safety. The weekly backup, on which the daily backup bases, might become defective.

Databases which support differential backups (SQL Server, Exchange Server) are backed up differentially (only changes) in a differential backup. Optionally, differential backups can be configured to fully backup Exchange Server or SQL Server. Databases which support only full backups (e.g. System State, VSS databases) are backed up fully in a differential backup.

Purely incremental backups can be defined for SQL Server and Exchange Server.

4.2.6. Encrypted backup?

Stratesave can store backups encrypted, to improve security. Often backups contain secret data, and the backup tapes can easily be stolen. Encrypted backups make it very hard or impossible for someone to retrieve the data, after he/she got hand on the backups. Stratesave uses public/private-key encryption. The private key, which you define, is required for restore. The backups will be done with a corresponding public key, which can be stored in a file or in registry. If someone gains temporary access to your PC where Stratesave is making backups, he / she can possibly read the public key, which is not enough for the restore. See also chp. 8.12., "Encrypted backups".

4.2.7. Automatic checks after backup?

Optionally, an automatic check can be appended to the backup. This check rereads the backup. The check is part of the backup, because backup counts as executed only if check detects no errors. You can choose between checksum control or comparison between files in backup and on PC. The backup check with checksum detects errors in backup with almost 100 % security, because the modern 32-bit CRC-checksum is used

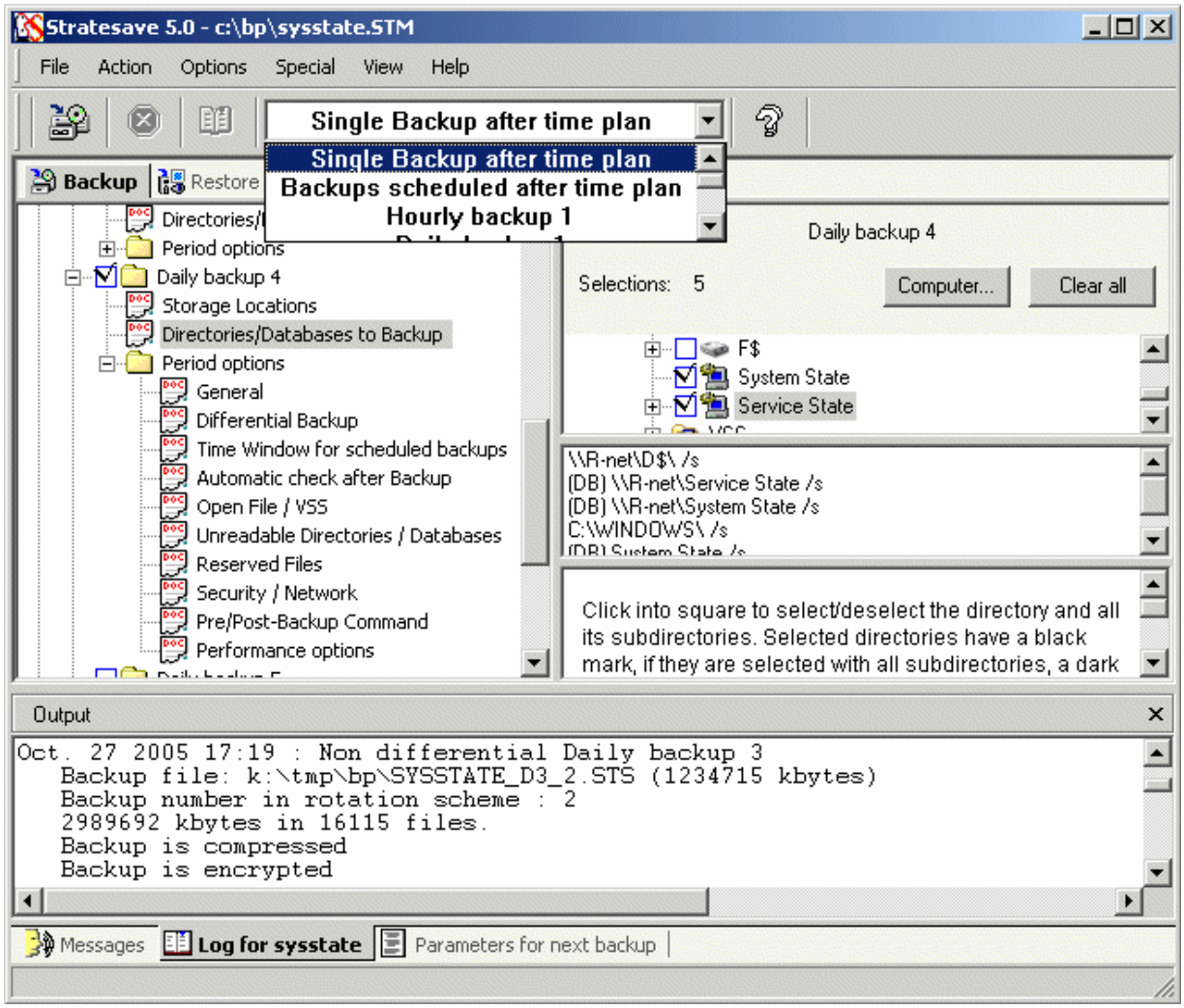
4.2.8. Other informations

- Directory where log is stored. The log is an important signpost for the restore program. If the log is lost, you can still restore the backed up files, by specifying directory, tape or removable disk where the backup is stored. You can also recover the Log from latest backup. The Log can also be stored remotely on Sftp-Server.

- Tape device for backups on tape, and removable disk device for backups on removable disks. You can specify a list of devices. For backup or restore, the first free device in list will be taken.
- Optionally, the mount of tapes can be made by automatic media changer. Stratesave supports tape mounts through RSM (Removable Storage Manager), or directly for SCSI tape autoloaders.
- Handling of locked files. A file is locked, when a program reserves it for exclusive use. This file can not be read by backup program and therefore cannot be backed up. Many files stay reserved only a short time. For example, a text file is reserved during save-operation of text. Stratesave optionally waits a certain time, until the file is unlocked. If the file remains locked, it will either be skipped, or backup will terminate with an error message. If VSS openfile backup is used, there will be no locked files.
- Optionally, the Catalog will be copied to logdirectory, in addition to the default storage on backup media. This option is only available for backups to tape/removable disk. It is comfortable during restore, because tape/removable disk is not needed to just view list of backed up files or select files for restore. The disadvantage is the required disk space in log directory.

4.3. Load and display macro

A macro is selected and read with command *Open...* in menu *Macro*. The macros are stored in files named **macroname.STM.**



4.4. Save macro

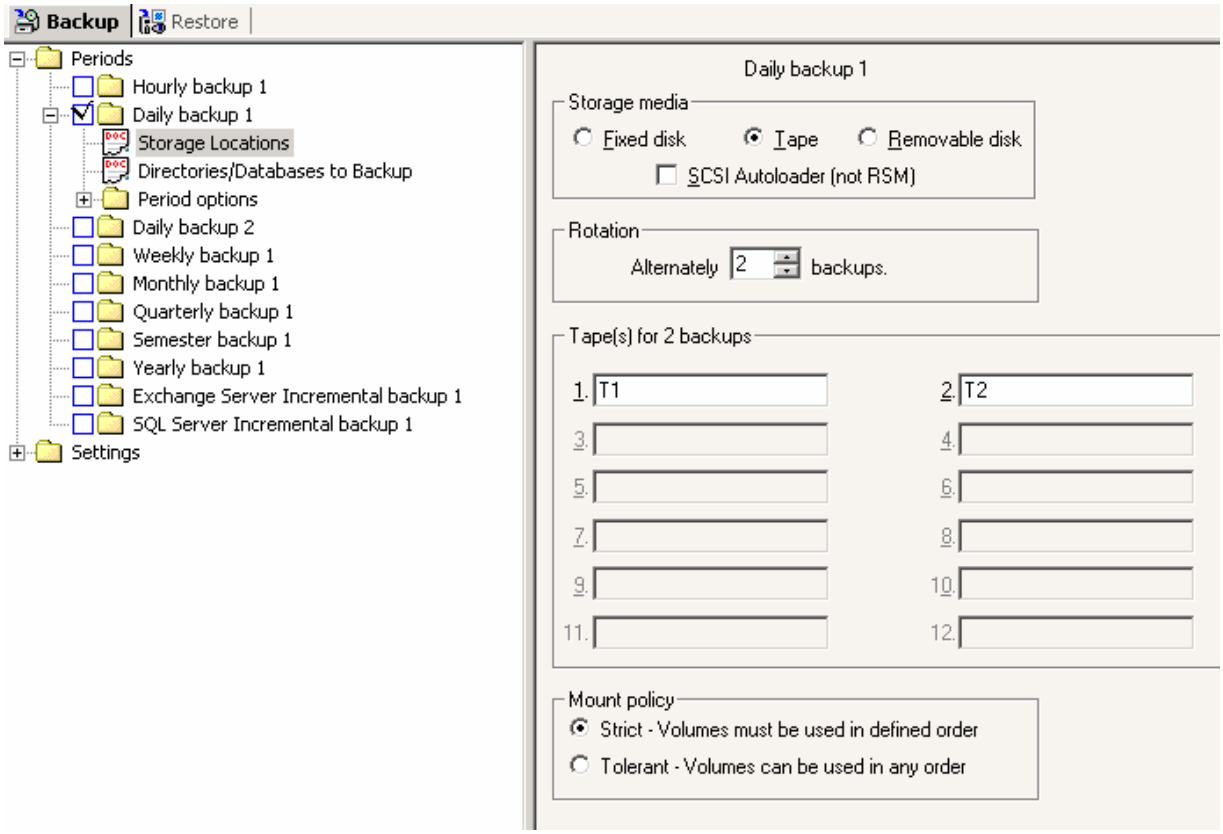
Command *Save* in menu *Macro* stores the macro to disk.

The macro is stored in file **macroname.STM**. The command *Save as...* stores macro under a new name.

Usually the macro is stored under the PC's network name. This is the default macro used by backup program.

4.5. Backup Storage

For each period, Storage location can be defined. The radio buttons named *Storage-media* select between *Tape*, *Fixed disk*, *Removable disk* and *Sftp Server disk.*



Alternately ... backups contains the desired rotation-number, that are kept for each period. If, for example, this number is set to 4, the 5th backup overwrites 1st backup etc. The rotation must be set to between 2 (1 for backups to fixed disks) and 12. Fields *1.* to *12.*, contain storage of backup in each rotation. Tape/disk-volume-names are required to type in. A tape or removable disk name is at most 12 character long and has only uppercase characters or digits. For backups to fixed disks, specify the directories, where backups will be stored on server. Sftp-Server directories can be specified as sftp:dirname (where server and user are defined under Settings), or sftp,user@server:dirname. For backups which extend over several tapes/removable disks, a tapeset (or diskset) should be entered. A tapeset is a list of tape names, separated by blank or comma. When the first tape or removable disk is filled, backup continues on next in list. If no continuous volume name is specified, Stratesave defines one itself, by appending #1 (or #2, #3 etc.) to the volume name. For all backups of rotation, the same number of tapes/removable disks must be entered. Before backup starts, initialize all tapes or removable disks in set (see chp. 5.9. " Initialization of tapes and removable disks "). Initialization is not necessary for backup to CD/DVD.

For backups on tape, each tape can only be used for one period and one macro. This restriction follows from the GFS (Grandfather Father Son) tape rotation scheme used in Stratesave. Also, the last backup in rotation must be stored to a different tape than the first one in rotation scheme. So at least 2 tapes are required per period. The reason is, that backups on tape always erase backups stored further behind on tape.

For backups on fixed-disks or removable disks, there is no such restriction, all backups can go to the same disk. But for maximum safety, it is better to distribute backups to several disks.

Backup rotation 1

You can set backup rotation to 1 for backups to fixed disks. Internally this is similar to rotation 2. A new backup will not overwrite its precedor, but the previous backup is deleted after new backup completes. With rotation=1 you have minimum security, because you can not restore from previous backups, only from the latest backup. But rotation=1 covers the case, where your PC disk crashes during backup. Previous backup is still available to restore from.

Backup over multiple volumes

Stratesave allows backups to extend over multiple volumes (tapes,CDs / DVDs). You can enter a list of volume names into each field for volumes, separated by blank or comma. When first volume gets filled, and a second volume has been specified in list, Stratesave will continue backup on the second volume. Dito for 3rd, 4th volume etc. For example, under 1. enter VOL1A,VOL1B, under 2. enter VOL2A,VOL2B. This will start the 1. backup in rotation scheme on VOL1A. When VOL1A gets filled, Stratesave will prompt for VOL1B and continue backup there. 2nd backup will start on VOL2A, and extend to VOL2B etc. If no continuous volume name is specified, Stratesave defines one itself, by appending #1 (or #2, #3 etc.) to the volume name. For example, if backup starts on VOL1, and it gets filled, backup continuous on VOL1#1, then VOL1#2, etc.

Option **SCSI Autoloader (not RSM)** specifies that autoloader will be used for tape backups, and accessed directly (not through Removable Storage Manager RSM). Enter the autoloader slot number(s) for the tapes into fields **Slot nr**. The numbering of autoloader slots is defined by autoloader itself, and should be visible from autoloader manual. If you don't define a slotnr of a tape, or - as space holder, that particular tape will be prompted for insertion into tape drive. See also chp. 8.16., "Backup with Tape Autoloader".

Link volume names with Weekdays

If set, backups will not be stored in defined order, but according to weekdays. If volume name contains string "MON", Monday backup will be stored there. Similar with "TUE", "WED" etc. If tape is for Saturday or Sunday backup, it can contain both strings, like "SATSUN".

Mount policy

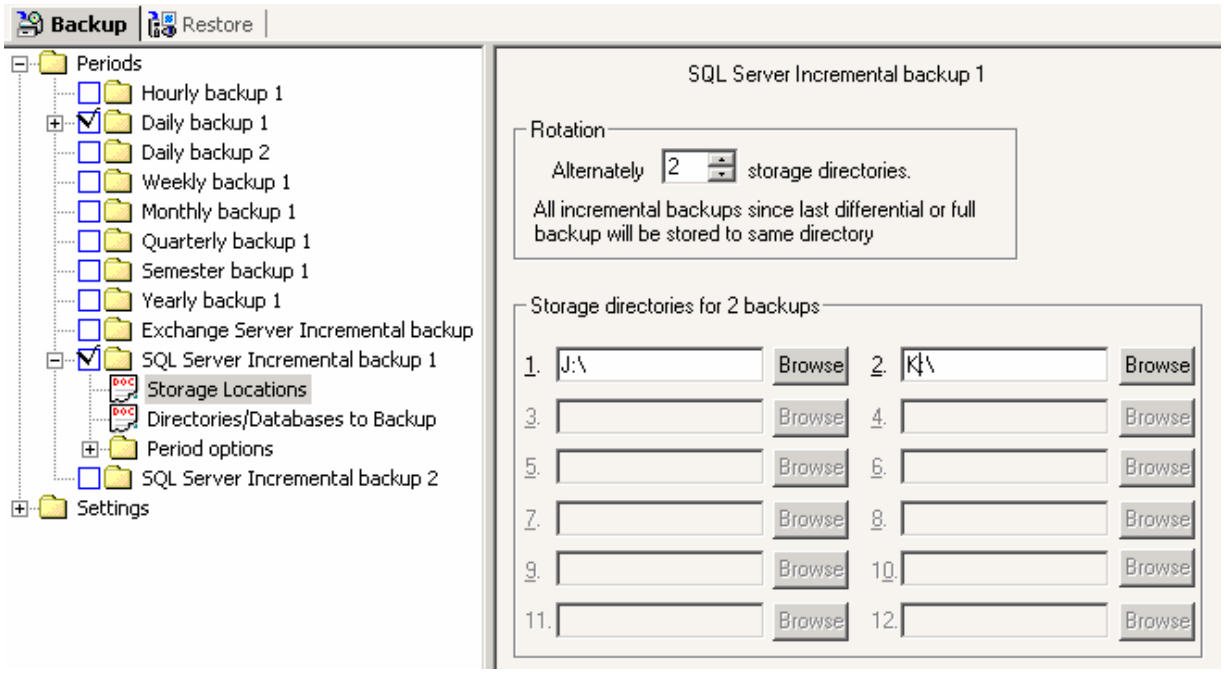
Defines if the rotation is strictly followed and each tape, removable disk or CD/DVD is mounted in correct order. If set to Strict, the volumes are used exactly as defined, the first backup being stored to volume specified under 1., 2nd backup to volume under 2. etc. If mount policy is Tolerant, which is the default, Stratesave allows any volume specified to be used for backup. This is only used for backups which don't

use tape autoloader. Tolerant mount policy permits to name your volumes for example MONDAY, TUESDAY etc., and check for yourself that correct volume is mounted.

Note on usage of tapes and removable disks:

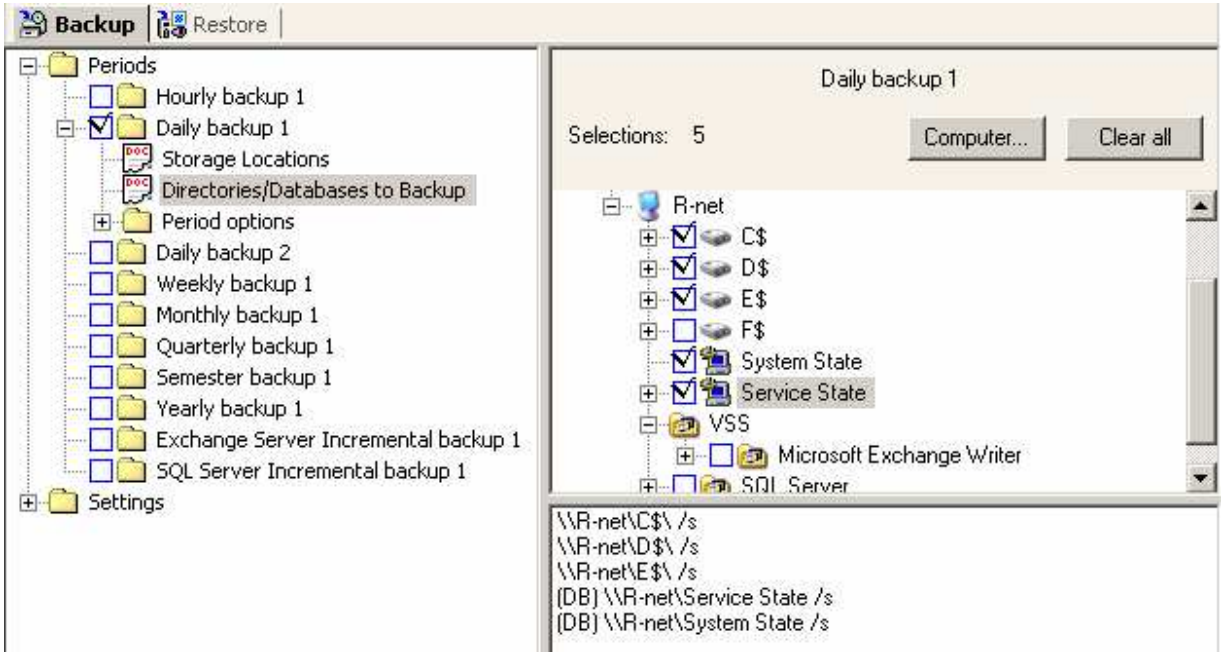
Tapes and removable disks have to be initialized before they can be used with Stratesave. This is not necessary for CD/DVDs. It should be done before start of backup. To avoid mistakes, also label the tapes and removable disks on their cover. See also chp. 5.9. "Initialization of tapes and removable disks".

4.5.1. *Backup storage* for Incremental Database backup



Storage directories are defined for incremental backup of SQL server, Exchange Server and VSS (if incremental backups are supported by VSS writer). Because the backups are purely incremental, a chain of backups is built, which all must be available for restore. There is no sense to rotate backup media in the chain, so the rotation is around the basing differential or full backup. Once such a base-backup, or backup of higher period, is done, a new chain of incremental database backups will start on next storage directory in rotation scheme. The storage directories should have enough space for all differential backups, until a base-backup is run again, usually for entire day or week. Rotation of 1 is supported. In this case, the old chain of incremental backups will be erased and rebuilt after every base-backup. See also chp. 8.8., "Exchange Server- and SQL Server incremental backup".

4.6. Define directories and databases



Click into square to select/deselect the directory and all its subdirectories. Selected directories have a black mark, if they are selected with all subdirectories, a dark gray mark, if they are selected, but one or more subdirectories are excluded, and a light gray mark, if they are not selected, but at least one subdirectory is selected.

Directories and databases to backup:

Local directories or remote network directories (\\Server\...) can be selected for backup, as well as local and remote databases (System State, VSS, Exchange Server 2007/2003/2000 (ESE98), SQL Server).

The directories and databases can be selected for every period separately.

Network directories on remote computers are preferably selected through their Administrative shares (\\Server\C$, \\Server\D$\.. etc.). Don't select other system defined shares for backup. Also don't select virtual drive defined by Exchange server 2000 (usually M:). This virtual drive is built by Exchange server automatically and does not need to be backed up.

Junction points are not shown for selection. In Windows Vista, for example C:\Documents And Settings is not shown because it is a Junction Point (Link) to C:\Users. Junction points will be backed up correctly as junction points. It is necessary to select the real directory C:\Users if the file tree is to be backed up.

Network databases Exchange Server, Active Directory, Certificate Server are not visible and cannot be selected if the backup server does not have some .DLL files as described in chp. 8.9., "Network Database Backup".

The System State consists of certain defined directories and databases (System Files, Registry, Active Directory ...), which should be backed up and restored together. Stratesave has single selection System State backup. "Service State" is also selectable for VSS backups. See also chp. 8.4., "How Stratesave backs up the System State".

A full backup of a computer typically includes all administrative shares if remote (\\Computer\C$, \\Computer\D$ etc.), all disk drives if local (C:, D:, etc. but not the virtual drive M: from Exchange Server 2000), System State, Service State (possibly without MSDEWriter, if SQL Server is backed up separately), SQL server database (if installed), Exchange Server 2007/2003/2000 (ESE98) database (if installed).

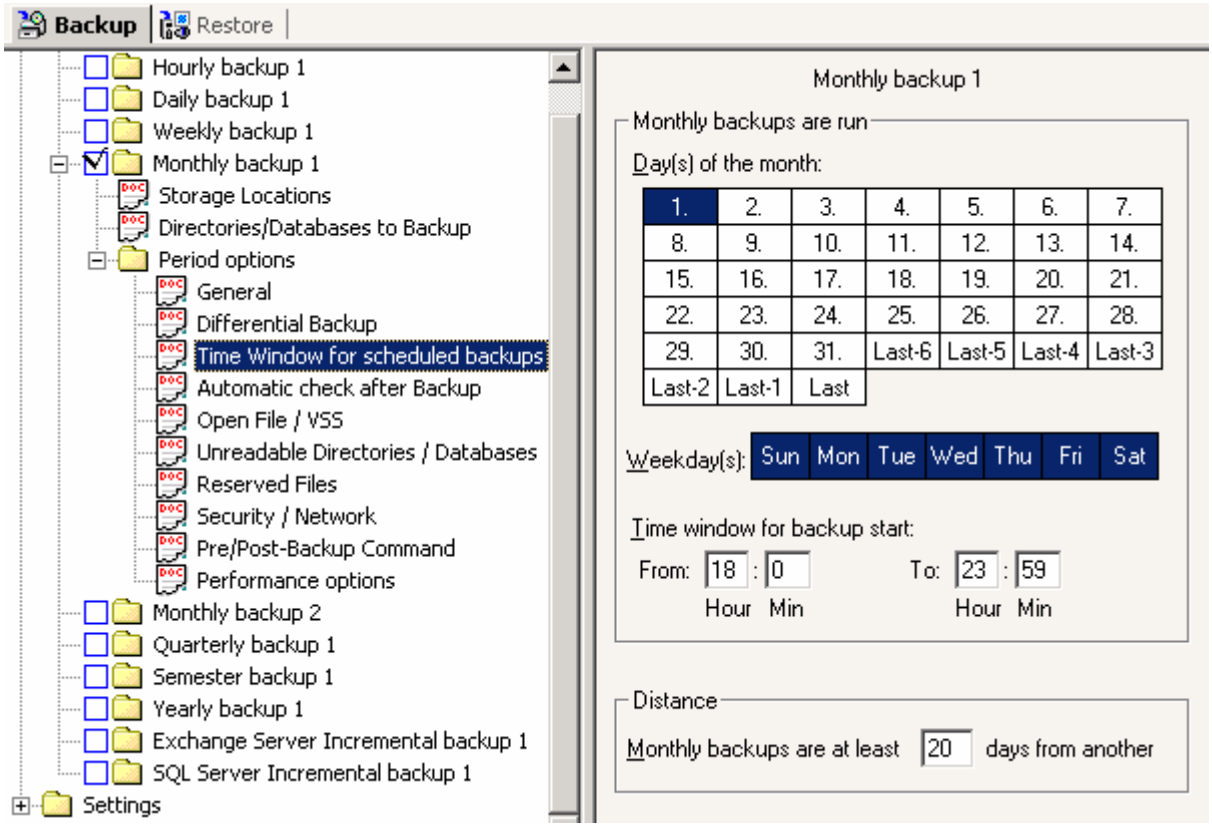
Exchange Server 2007/2003/2000 can be selected under ESE98 database tree. Best is to use an account which also has Administrator access on the remote computers (same username/password). This avoids Stratesave retrying with provided credentials, which does not always work. Remote ESE98 and sometimes SQL server and Remote System State are not visible if account names/passwords do not match.

It is not necessary to backup the Removable Storage Database if Removable Storage Manager (RSM) is not needed (e.g. no Autoloaders are installed). Backing up the RSM database activates the RSM service which is normally not started.

The *VSS*-tree shows volume snapshot writers. Writers are programs that cooperate in the generation of snapshot. Open Files/Databases of other programs can still be backed up with the snapshot, the difference is that selected writers actively participate to ensure integrity of backed up data. If you click on the VSS and subtree does not show up, it is because there are no writers beside System State and Service State. Databases under VSS are always fully backed up, even if backup is defined as differential backup.

While *VSS databases* are backed up as files it is not sufficient to select for backup only the directories where databases are stored. Only if the databases are selected under VSS tree there is the correct snapshot which is created in cooperation with the writers. If the VSS databases and the corresponding files/directories are both selected, there is no duplication in backup, each VSS database internally points to its database file(s). So it is possible to select entire drives and the VSS databases.

4.7. Define Time plan



You can specify time window and starting days of period, for automatic scheduled backups. Stratesave will calculate scheduled backups according to the settings defined here. To see how changements made in this dialog affect scheduling, save Macro and select "Scheduled backups after time plan" in toolbar, load Log and check Output window "Next scheduled backups". The settings from time plan can be overruled in backup program, by selecting a different period than scheduled explicitly. Time plan as defined here only affects scheduled backups if "Backups after time plan" is selected in backup program.

Under *Weekdays*, select weekday(s) when backup of this period can be run. They won't be scheduled to run on a weekday which is not selected. Under time window, select possible starting time for backup. Backups won't run outside the time window. Monthly backups also have settings for day of the month. You can for example define Monthly backup to run 1. Friday every month, or last Friday every month. Quartal, semester and yearly backups also have months for selection. Hourly backup has starting hours for selection. Backups for hourly backups will always start at full hour.

Time Window for backup start specifies time (from-to) when backup may start. Backup will always start as early as possible, but not outside the time window specified.

Under *Distance*, the minimum time distance between 2 backups of actual period, or from a backup of higher period and actual period can be set. The default settings for this should work for most cases. As soon as the minimum distance time has passed, a backup of that period can be scheduled, if the other conditions (weekdays, time window...) are met.

For SQL Server or Exchange Server Incremental backups, the time distance where incremental backups are repeated is specified under *Every ... minutes*.

Don't stop scheduler if ... backup fails: If set, the scheduler will keep on running even if the backup fails. This can be useful for laptops, which are not always connected to the network. As soon as the laptop is connected, a backup will be made automatically.

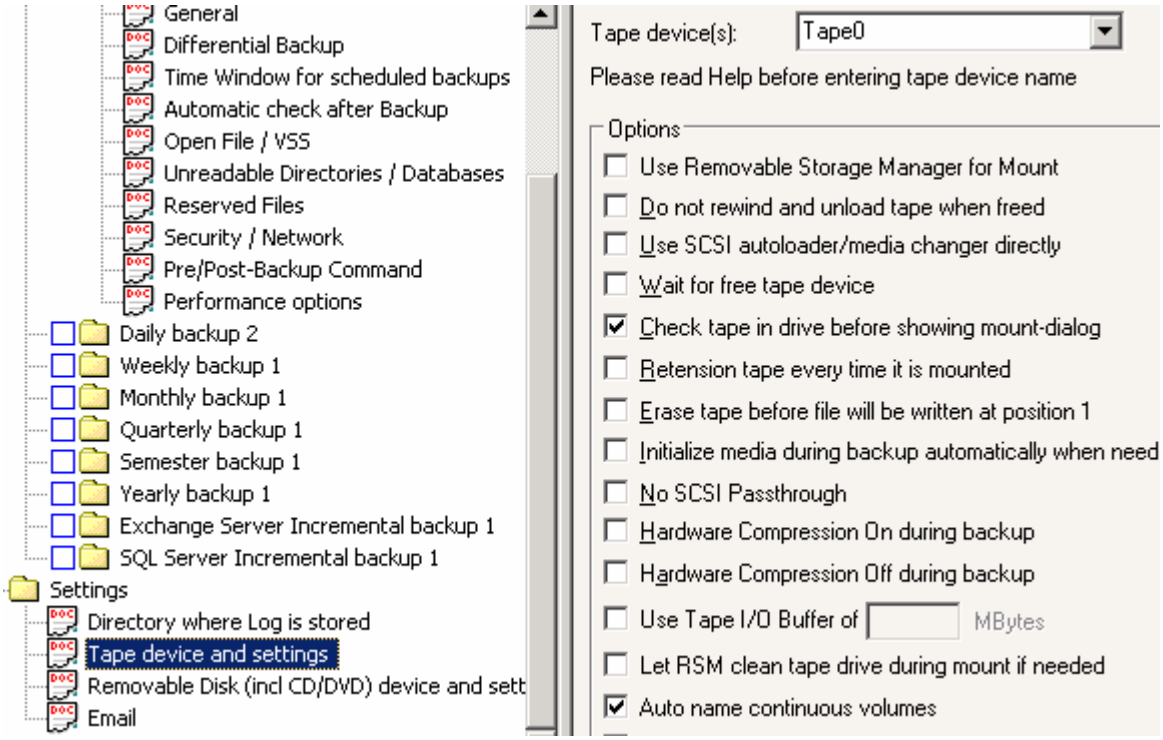
Failed ... backup will be retried after ... minutes: Minimum time to elapse after which a failed backup can be retried.

4.8. Common options for all periods, Tape- and removable disk-devices and Email settings

The common options for all periods are shown in treeview under *Settings*

Directory where Log is stored contains directory where log is stored. Log is stored under filename "macroname.STL".

4.8.1. Tape device and settings



In field *Tape device(s)*, enter name of tape drive. The 1. tape drive detected is Tape0, 2. is Tape1 etc. If you have only 1 tape drive connected to your system, specify Tape0. Alternatively, you can specify the SCSI address directly, in one of the forms Scsi*i*, Scsi*ai*, Scsi*ail*, Scsi*abil*, where *i* is the SCSI id, *a* is adapter address (0=1. SCSI adapter), *l* is SCSI lun address, *b* is bus address if one adapter has several SCSI buses. For example, if you have 1 SCSI bus, and tape drive is at SCSI id 4, device name would be Scsi4. If you have IDE and SCSI on the same computer, the system might assign a virtual SCSI address to the IDE bus, and the real SCSI bus with the tape drive attached receives busnr 1. The device name would be Scsi14 in this case.

Option *Use Removable Storage Manager for Mount* specifies, that reserving tape drive and mounting tape is handled by the Removable Storage Manager service. If this is set, field Tape device(s) becomes *Tape device type* where you can select device type of tape drive (e.g. 4mm DDS, 8mm etc). Listed first are the device types which are available on the computer. Then the other device types known by RSM.

Option *Do not rewind and unload tape when freed* specifies, if Stratesave rewinds and unloads tape after use.

The check box *Use SCSI autoloader/media changer directly* allows tape mounting by automatic media-changer (robot). This will control the media changer directly, while option *Use Removable Storage Manager for Mount* specifies that media changer is managed by RSM. It is normally prefered to have RSM handle autoloaders.

If checkbox *Wait for free tape device* is set, backup will wait until a device becomes available.

Checkbox *Check tape in drive before showing mount-dialog* is only valid when options Use Removable Storage Manager for Mount and Use SCSI autoloader/media changer directly are not set. It specifies, that tape in drive is checked first, and "please mount" dialog is only shown, if the tape is not already in the drive. If checkbox is not set, please-mount-dialog is shown without checking tape drive.

Option *Retension tape every time it is mounted* winds tape forward to the end and backward again at mount time, to increase tape readability and writability. This operation is not supported by all tape drives. If *Erase tape before file will be written at position 1* is set, entire tape will be erased, before writing starts from beginning of tape. This operation also increases tape read and write capabilities. It is very time consuming (several hours for some tapes).

No SCSI Passthrough specifies that the drive is always controlled by the commands from Windows tape driver, even if it's a SCSI drive. Stratesave can control SCSI drives directly with SCSI commands. If you encounter problems with backing up to your SCSI drive or to optimize backup speed, setting or clearing this option might be helpful. Normally it is better not to set this option.

Initialize media during backup automatically when needed allows to mount a blank tape during backup which will automatically be initialized. If Removable Storage Manager (RSM) is used, Stratesave automatically takes tapes from the free media pool when needed. It is not necessary to explicitely initialize the volumes before starting the backup.

Hardware Compression On/Off during backup specifies if tape's hardware compression should be turned off or on during the backup. If both are not set, Stratesave does not change hardware compression. When hardware compression is changed during backup, a notification line will be shown in Output window 'Messages'. A notification is also given if Stratesave fails to turn Hardware compression on or off, for example because the tape drive does not support hardware compression. Tape Hardware compression is usually very fast compression, and an alternative to Stratesave's compression. If Stratesave Backup compression is used or backup encryption, nothing will be gained with tape hardware compression, data might even expand. So it's better to turn tape hardware compression off in this case.

Auto name continuous volumes: If a tape gets filled and no additional volume names are defined, Stratesave will automatically define a name for the volume to continue backup. The original name is taken, appended by #1 (#2, #3 etc for more continuous volumes). For example, if backup goes to volume VOLA, and it gets filled, backup continues on VOLA#1. If *Start with #2 not #1* is set, the first continuation volume will end with #2.

Use Tape I/O Buffer of ... MBytes: If selected, Tape I/O will be buffered with a buffer of specified size. Buffer size can be between 10 and 102400 MBytes (100Gbytes) on 64-Bit Windows 1024 Mbytes (1Gbyte) on 32-bit Windows. This feature can help minimize mechanical tape slapping which occurs if the computer cannot deliver data as fast as required by the tape drive. Especially DLT drives are very sensitive and become very slow on data underrun. Currently Tape buffering is only implemented for Backup and not for Restore. Enough real or virtual memory must be available for the buffer.

Buffer to disk: If set, entire backup will be stored on disk first, then copied to tape. There must be enough space on disk to store the backup data. For best performance the specified disk directory is on a separate hard drive.

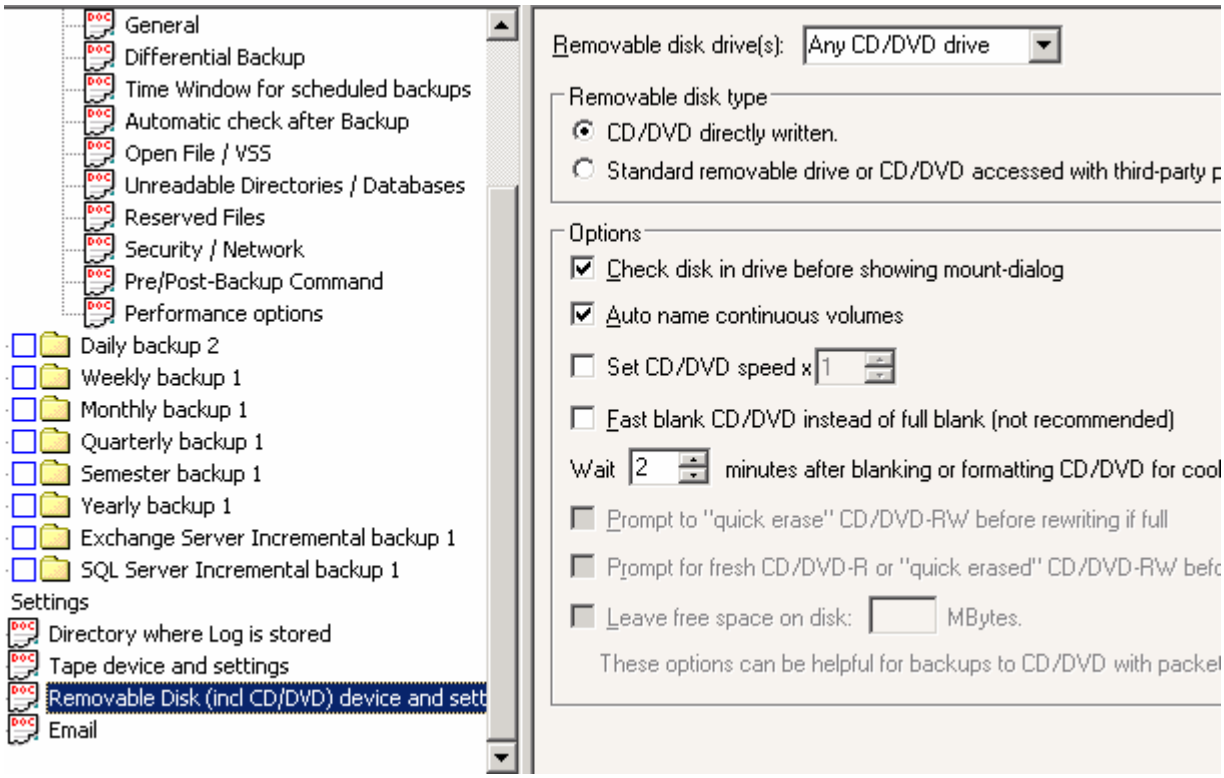
Mount Timeout of ... minutes: If selected, mount operation will timeout after ... minutes. This is only for backup, not for restore, and only for the first tape, not for the 2nd in multivolume backup. Currently it is only implemented if RSM is used. This feature can be useful if backup should only be done if a tape has been prepared in advance.

Create Tape log messages (for debugging) logs tape operations to "Messages" display. This can only be useful for debugging purposes, and is normally not turned on.

Section *SCSI Autoloader options* pops up, if *Use SCSI autoloader/media changer directly* is set. Under Autoloader device, specify the device name as Changer*n*. Changer0 stands for first media changer in the system. Alternatively, the SCSI address can be specified directly (in the form Scsi..., as described above). Stratesave currently supports only SCSI tape media changers and accesses them directly with SCSI commands. If autoloader is specified as Changer*n*, the corresponding driver must be installed on the system. If you don't have the driver installed, specify the SCSI address. Under Tape drive(s) served by autoloader, specify the tape drives connected to the media changer, in the order they are connected to the media changer. Specify the tape drive with lowest media changer slot number first in list. If Tape0 and Tape1 are connected to media changer, and Tape0 has lower media changer slot-nr, specify Tape0,Tape1. In most cases, enter into this field the same tape drive name as in Tape device(s). Autoloaders are now usually controlled by RSM (with option *Use Removable Storage Manager for Mount*, where these options are not used. See also chp. 8.16., "Backup with Tape Autoloader".

If tape drive or autoloader is shared with other applications, or multiple running Stratesave programs, it is preferable to have a driver installed and use Tape0/Changer0, instead of Scsi... for tape drive or autoloader name. The reason is device reservation between applications can only be done through the driver.

4.8.2. Removable disk-device and settings



Removable disk drive(s)

Specify the removable or CD/DVD drive (e.g. F:) in field *Removable disk drive(s)*. Multiple drives can be separated by blank or comma. Multiple drive means the CD/DVD can be mounted in any of the specified drives. The default is "Any CD/DVD drive", where Stratesave finds itself all CD/DVD drives in the system.

With *Removable disk type*, select if the CD/DVD engine builtin Stratesave is used to burn the CD/DVD (CD/DVD directly written), or if the removable disk is a normal disk where files can be copied to (e.g. Zip-drive), or you have third-party packet-driver Software installed, which lets the CD/DVD be used like a normal drive.

Checkbox *Check disk in drive before showing mount-dialog* specifies, that mount dialog is only shown, if the removable disk is not already in the drive. If checkbox is not set, please-mount-dialog is shown without checking disk in drive.

Auto name continuous volumes: If a disk gets filled and no additional volume names are defined, Stratesave will automatically define a name for the volume to continue backup. The original name is taken, appended by #1 (#2, #3 etc for more continuous volumes). For example, if backup goes to volume VOLA, and it gets filled, backup continues on VOLA#1.

Use I/O Buffer of ... Mbytes: If selected, Removable disk or CD/DVD I/O will be buffered with a buffer of specified size. Buffer size can be between 1 and 1024

MBytes. This feature can help minimize data underrun which occurs if the computer cannot deliver data as fast as required by the drive. Currently this kind of buffering is only implemented for Backup and not for Restore. Enough real or virtual memory must be available for the buffer.

Set CD/DVD speed: Here you can specified the recording speed. The maximum speeds are normally indicated on the cover of the CD/DVD. x1 speed is 1385 KBytes/sec for DVD, 176 KBytes/sec for CD. If CD/DVD speed is not set, it normally defaults to maximum speed.

Fast blank CD/DVD instead of full blank (not recommended): CD-RW and DVD-RW discs need to be blanked before being reused. Normally a full blank operation is done for maximum integrity of stored data, but this is lenghty operation. Optionally a fast blank can be specified, which erases the CD/DVD directory tables only but not all stored data. For DVD+RW blanking is not necessary and this media is therefore recommended

Following options can be useful when 3-rd party packet-writing Software is used to write on CD/DVD:

Checkbox *Prompt to "quick-erase" full CD-RW before rewriting* prompts you to use the quick-format or quick-erase utility to erase the CD-RW everytime it is full and about to be rewritten. This can help avoiding errors during rewriting the CD.

Checkbox *Prompt for fresh CD-R or to "quick-erase" CD-RW before rewriting* prompts you to enter a fresh CD-R disk or a quick-formated CD-RW everytime Stratesave attempts to reuse the disk from the beginning, when the next round in backup rotation is on. With this option, when you backup to CD-R, Stratesave will inform you when a fresh CD-R is needed for backup. Use this option when backing up to CD-R. With this option you are prompted to provide fresh or reformatted CD even if it is not full.

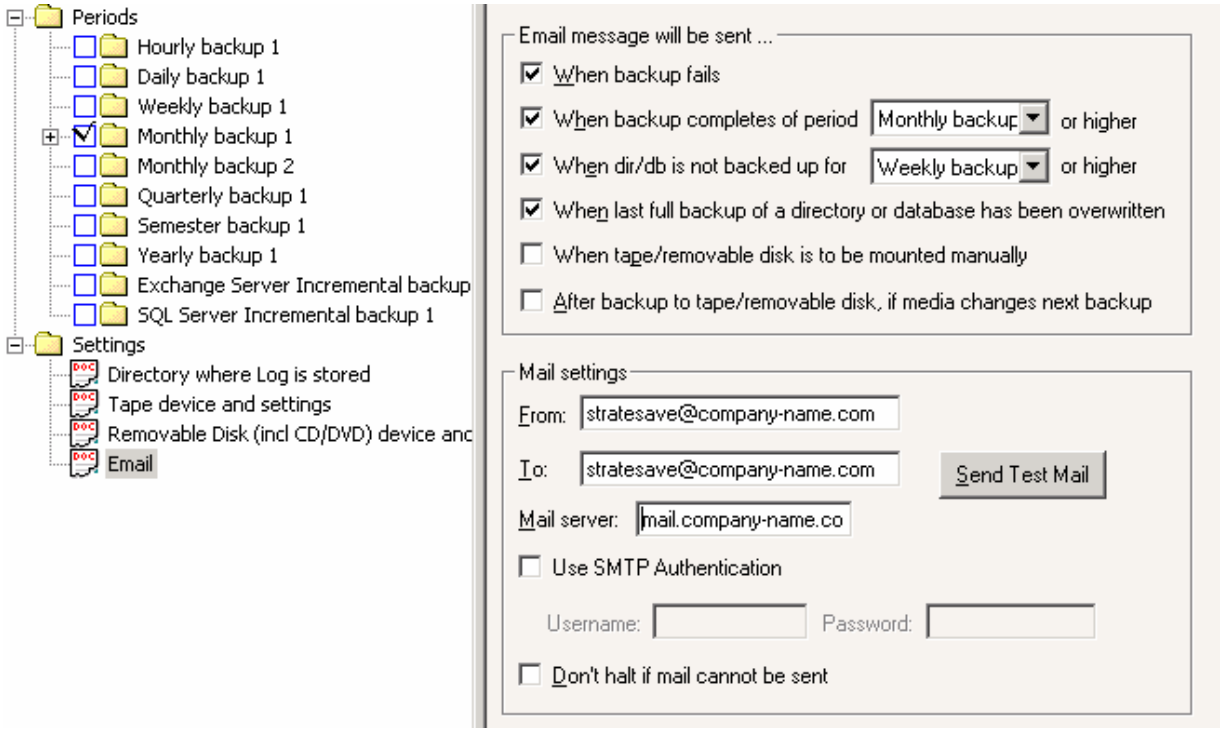
Checkbox *Leave free space on disk* specifies if and how much space should be kept free on the disk. Stratesave regards the removable disk as full, when it has just the amount specified of space available. This option is helpful for backups to CD-R and CD-RW, because completely filling the CD can render the disk invalid or lead to data storage problems. The default free space value of 20MBytes (if option is turned on) should be enough in most cases. For backups to DVD-RAM, more must be specified with some driver Software, to avoid backup exceeding 4GBytes. Specify 140-150MBytes if you encounter errors backing up to DVD-RAM.

See also chp. 8.15., "Backup to CD/DVD".

4.8.3. Email

You can specify, when to receive an automatic email from Stratesave backup program, and the receiver email address and mail server. This can be useful for

unattended automatic backups, for example if Stratesave is run as a Windows Service, to be notified by email when attention is needed.



Section *Email message will be sent...* defines the condition for email message. This can be if a backup fails for some reason (not if backup is cancelled), if one or more directories or databases could not be backed up, if a backup of a certain period completes successfully (for example you may want to receive an email when the monthly backup completes successfully), if a directory or database "drops out", is no longer contained in any full backup because the last backup having it has been overwritten, when a tape or removable disk must be mounted, or if a media change is expected for next backup.

In section *Mail settings*, define the From/To email addresses (mail will be sent to the address specified under *To:*). Multiple To-addresses can be specified, separated by comma. Under *Mail server:*, specify the address of TCP/IP SMTP server. Send Test Mail sends an email from within the dialog, to test if the mail settings are correct.

Port 587 specifies the port-number to be used, default is SMTP-port 25. If *STARTTLS* is set, mail will be sent over encrypted connection and the mail server must have a valid certificate. *Use SMTP authentication* enables authentication for access to SMTP mail server. Credentials Username/password can be specified. These are stored with the network access passwords in Registry, and not in macro. If username/password are not specified, already stored credentials will not be erased. Following SMTP authentication methods are supported: NTLM, CRAM-MD5, LOGIN (LOGIN only with STARTTLS). If mail server supports NTLM and no

username/password credentials are stored, authentication will be done for logged in user.

4.8.4. EventLog and Print Notification

Similar to Email, notification to EventLog or Printer is also supported. Notification can be done when backup succeeds or fails, when directory or database could not be backed up, when directory/database is no longer contained in any backup, when tape/disk needs to be mounted or tape/disk changes next backup.

4.8.5. SQL Server Backup Settings

Use Windows Authentication only

If this option is set, Windows Authentication will be used for SQL Server backup and SQL Server Authentication will not be used. Otherwise, Windows Authentication will be tried first. If it fails, user can provide a password and retry with SQL Server Authentication. This option is useful, because the prompt for password can be irritating if Windows Authentication is used.

Use Remote Process instead of Remote SQL functions

For Remote backups of SQL Server, a process will be started on the remote computer doing a local backup, and sending the backup data to the computer running Stratesave. Otherwise, the remote SQL functions will initiate a remote SQL Server backup.

A remote process sometimes works where remote SQL function does not, and does not need TCPIP protocol enabled on the SQL Server. On the downside it is more overhead to start the remote process. Using Remote Process might not work if SQL Server is running under the SYSTEM account. In this case, let SQL Server run under a different account, or use Remote SQL function for backup. The default is to never use remote process.

Don’t select VSS SQL Writer in Image Backup

Normally, all Writers (applications) are selected to cooperate in creation of image backup, for most precise image. If this option is set, SQL Server writer and MSDE writer will not participate. This is useful, if SQL Server is backed up with standard non-VSS SQL Server backup, to avoid interference.

4.8.6. Exchange Server Backup Settings

Use Remote Process instead of Remote SQL functions

For Remote backups of Exchange Server, a process will be started on the remote computer doing a local backup, and sending the backup data to the computer running

Stratesave. Otherwise, the remote Exchange functions will initiate a remote Exchange Server backup.

A remote process sometimes works where remote Exchange function does not, and does not need Remote Backup enabled on the Exchange Server, or ESEBCLI2.DLL copied to backup server. On the downside it is more overhead to start the remote process. The default is to use remote process for the full backups and differential backups, but remote Exchange Server functions for the frequent incremental backups. If the incremental backups are not working, try set this option to Always.

Don't select VSS SQL Writer in Image Backup

Normally, all Writers (applications) are selected to cooperate in creation of image backup, for most precise image. If this option is set, Exchange Server will not participate. This is useful, if Exchange Server is backed up with ESE98 backup, to avoid interference.

4.9. Period Options

4.9.1. Section General

- *Store backups in compressed format* specifies, whether the files will be compressed, before they are backed up. Compressed backups are usually faster and smaller than uncompressed backups. The compression factor depends on the backed up files, and normally values about 50%. As a disadvantage, compressed backups are not stored in portable TAR-format. You can choose between *Faster compression* and *Stronger compression*. Faster compression is the default, and normally delivers same or even better speed than uncompressed. With faster compression, backup speed is normally determined by computer's I/O performance. Stronger compression delivers backup speed and compression ratio similar to zip programs. With stronger compression, backup speed is normally determined by computer's CPU performance. If you are using a very fast tape drive, like DLT, faster compression (or tape drives hardware compression) is usually better than stronger compression, to keep the tape streaming, and achieve much better performanc. If you use stronger compression with a fast tape drive, specifying large tape I/O-buffer can help keep tape streaming.
- *Store backups encrypted* specifies, whether the files will be stored encrypted in the backup. This is useful, if an unauthorized person gains access to the backup media. They will not be able to retrieve the backed up data without knowing the encryption key. See also chp. 8.12., "Encrypted backups".
- If *Store Catalog in log directory* is set, Catalog will be stored in a separate file in log directory. This option is available for backups to tape and removable disk, so

you will not have to mount tape/removable disk to view list of backed up files or select files for restore.

- *System name*: Original name of the backup period, which cannot be modified.
- *Display name*: Choosable name of the backup period. It is important to choose a unique name which clearly defines the period. If different periods backup different parts of your network, this can be specified here. e.g. "Weekly backup 1 for 1. floor Monday"

4.9.2. Differential Backup

- *Differential backup:* Only the files changed since the last higher period (weekly backup counts higher than daily backup, monthly higher than weekly etc.) will be backed up. For the full restore, both the full backup and the differential backup will be needed. Stratesave will automatically restore the files from their corresponding backups.
- *If a directory has no base full backup:* Applies, if a directory to be backed up in differential backup is not contained in any full backup.
  Make full backup: The backup period will be switched so that a full backup will be made with the directory included, instead of the differential backup.
  Abort backup: The backup will halt so you can decide how to continue.
  Skip directory: The directory will simply be left out. Use this if you don't want to change the schedule and plan to backup the directory later, in the next full backup.
  Fully backup the directory: All files in the directory will be backed up. This is necessary, because there is no base backup to refer to, but can make very large backups.
- *Don't Load catalog of base backup (no precise differential backup):* For precise differential backup, normally catalog of base backup will be loaded during backup. For each file, it is checked if the correct file is contained in base backup, to decide if it needs to be included in the differential backup.
  If this option is set, catalog of base backup will not be loaded, and differential backup will base on file dates. Database files like System State files will always be fully backed up in this case.
- *Fully backup SQL Server also in differential backup:* forces the SQL server full backup even if the period is defined as differential backup. Normal file backups continue to be differential for this period. This counts only if the SQL Server is not selected under VSS\SqlServerWriter or Service State\MSDEWriter. Under VSS it will always be a full backup.
- *Fully backup Exchange Server also in differential backup:* forces the full backup for Exchange Server 2007/2003/2000 if selected under ESE98. If

Exchange Server 2003 is selected under VSS, it will always be full backup anyway.

4.9.3. Section Open File Backup / VSS

- This is for using the Volume Snapshot Feature on Windows XP or later. It allows to backup files which are in use. If *Revert to non-VSS backup if Snapshot fails* is specified, a normal backup will be done if Snapshot cannot be created. If this option is not enabled, backup will halt on error if the Snapshot creation fails. To create and maintain the volume snapshot enough free disk space must be available. A Snapshot will always be done if a VSS-database is selected for backup. See also chp. 8.10., "VSS / Open File Backup".
- *Retry on recoverable errors (VSS Timeout)* defines Stratesave's action if VSS reports a retryable error during snapshot creation. Snapshot must be created in short time-frame and sometimes it will time out, while next snapshot may work fine. The default settings are waiting 10 minutes between retries, and retry 5 times. If all 5 attemps to create the snapshot fail, backup will halt on error. *Retry even on errors reported nonretryable by writer* can be set for a writer which reports non-retryable (=fatal) error, when you find that still on some attemps snapshot works, so error is still "retryable". It can be difficult for a writer to find out if cause for failure is retryable or not, so this flag forces retries.

4.9.4. Exclude Files

The files listed here will be excluded from backup. Put every entry on a separate line.

For example: *.obj will exclude all files with extension .obj from backup
C:\Subdir*.obj excludes all .obj-files in C:\Subdir or further down.
\\Server\Share*.obj excludes .obj-files from the remote-share.

The files will not be excluded if they are included in a selected database. For example, if System State is selected and includes some files which are excluded here, they will be backed up anyway.

4.9.5. Unreadable directories / databases

- Section *At unreadable directories...* defines Stratesave's action when a directory from macro can not be read or is non-existent. Either directory will be left out or backup will be stopped with error-message.
- Section *At unreadable databases...* defines Stratesave's action when a SQL- or Exchange Server database from macro can not be read or is non-existent. Either database will be left out or backup will be stopped with error-message. System state databases (Active Directory, COM+, Certificate Authority) are not checked with this option, but with above option *At unreadable directories...*.

4.9.6. Reserved files

- Section *At reserved files...* describes what happens when a file to be backed up is locked and therefore unreadable. The file will be left out or backup will be stopped with error message. This option has no effect if VSS openfile backup is used, where locked files are backed up as normal. *Retry time* shows the time in seconds that Stratesave tries to read the files. Files are often locked only for a short time, e.g. during file storing. *Skip during file compare* is designed for locked files during backup check with file comparing (see below). If this option is not set, a locked file will be regarded as different from the same file in backup.

4.9.7. Automatic check after backup

- *Checksum control of all files:* If set, backup will be reread automatically and controlled with a 32 bit-CRC checksum, to verify that backup data is stored correctly. If the checksum control detects an error the backup will fail. This option is especially useful for tape backups. For backups which extend over multiple volumes, previous volume will be checked before backup continues on next volume.

4.9.8. Pre-/Post-Backup command

- *Command to run before backup:* defines a command to be run before the backup. This can be used to dump a running database to file, which will then be backed up. Optionally you can also specify that the executed command must return 0 or backup will halt on error.
  It is best to specify full path names for all files and directories within the command.
  If you use piping, specify cmd /c command, e.g.
  cmd /c c:\mysql\bin\mysqldump --opt datatbase > c:\mysqlbackupdir\filename.sql

  Alternatively, you can use a .bat command file, and run one or more commands from there.

- *Command to run after backup:* defines a command to be run after the backup. The command will run after the optional email has been sent. The environment-variable STSRC is set to 0 for successfull backup, 1 if at least 1 directory or database was skipped, 2 if backup failed or 3 if backup was cancelled. Optionally you can specify to wait until command completes and fail if command returns non-zero.

4.9.9. Security / Network

- In Section *Network backups*, option *Don't prompt for passwords of netshares* specifies that backup should halt on error if it needs a password for network access from user, instead of asking for the password. This can be useful for

unattended backups where you don't expect to be prompted for the network password.

- Section *Windows security*: *Use backup privilege if available* specifies, whether backup privilege will be used to access the files. With backup privilege, which is usually held by Administrator user, all files can be backed up. This includes those, whose access rights are missing. If *Skip files with permission error* is set, files will be skipped if the access right is not available, otherwise backup will terminate with error message. *Differential, backup securities of all files* applies to differential backups only. If this option is set, securities of all files will be backed up in differential backup, even for files unchanged since last full backup and therefore not backed up. This option may need significant backup time, but guarantees that security settings are always backed up in differential backups. This can be useful if only security settings of files are changed.

4.9.10. Performance options

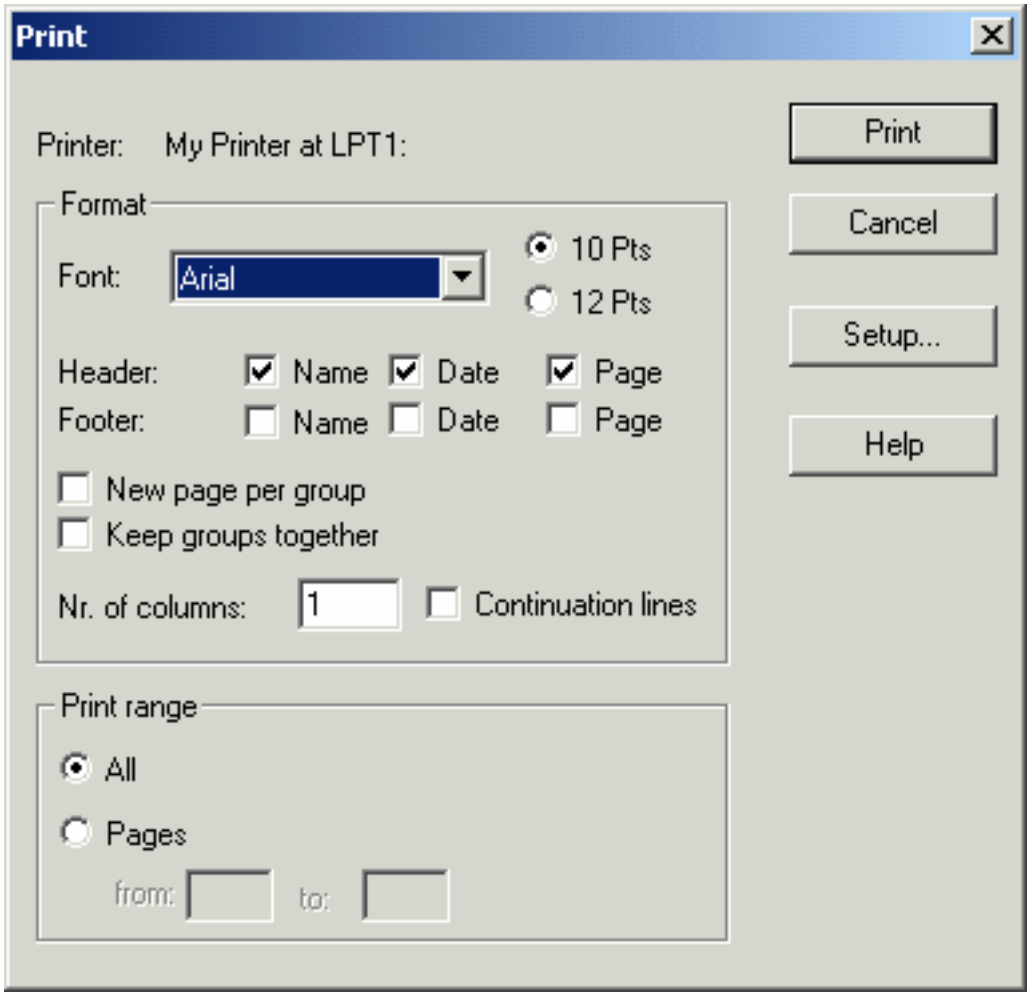
- *Don't concurrently scan computer while mounting volume*
  For backup to tape, 1. computer to backup normally is snapshotted and directory scanned while tape is being mounted. This might be unpractical, if mounting volume takes a long time, because operator intervention is needed. If this option is set, tape volume will be mounted first, before snapshot generation and directory scan starts.
- *Don't concurrently scan next computer and backup*
  Next computer is normally snapshotted and directory scanned while current computer is backed up, to increase performance. This option turns off the parallel processing.
- *Run backup with Low Priority*
  Minimizes performance impact for other programs during backup.

4.9.11. Delete backed up files

The backed up files specified will be deleted after the backup completes successfully. This can be useful for log files. The full path needs to be specified. Wildcards are supported in the filename only. Put every entry on a separate line.

4.10. Print macro

Print dialog is started with command *Print...* from menu *Macro*.



Section *Format* sets formattings on paper. The desired font can be selected. Font size is either *10* or *12 points*. The formats of *header*- and *footer* lines, containing macro *Name*, *Date* and *Page number*, are also adjustable. If check box *New page per group* is on, each period-listing starts from a new page. *Keep groups together* puts period onto a new page, if the whole period-listing would not fit on current page. Field *Nr. of columns* divides page in specified number of columns to save paper. If information can not fit in a column, "..." will appear at end of column. Checkbox *Continuation lines* lets information be printed in multiple columns or lines if necessary, to avoid cutting.

4.11. Later changes of macro

Stratesave allows changes in macro, while it is in service and backups are executed after it. You can, for example, modify storage-locations, insert additional directories and periods in backup plan etc.

Also differential backups, which are based on another backup with longer period, continue to work even if macro is modified. If database backups are defined,

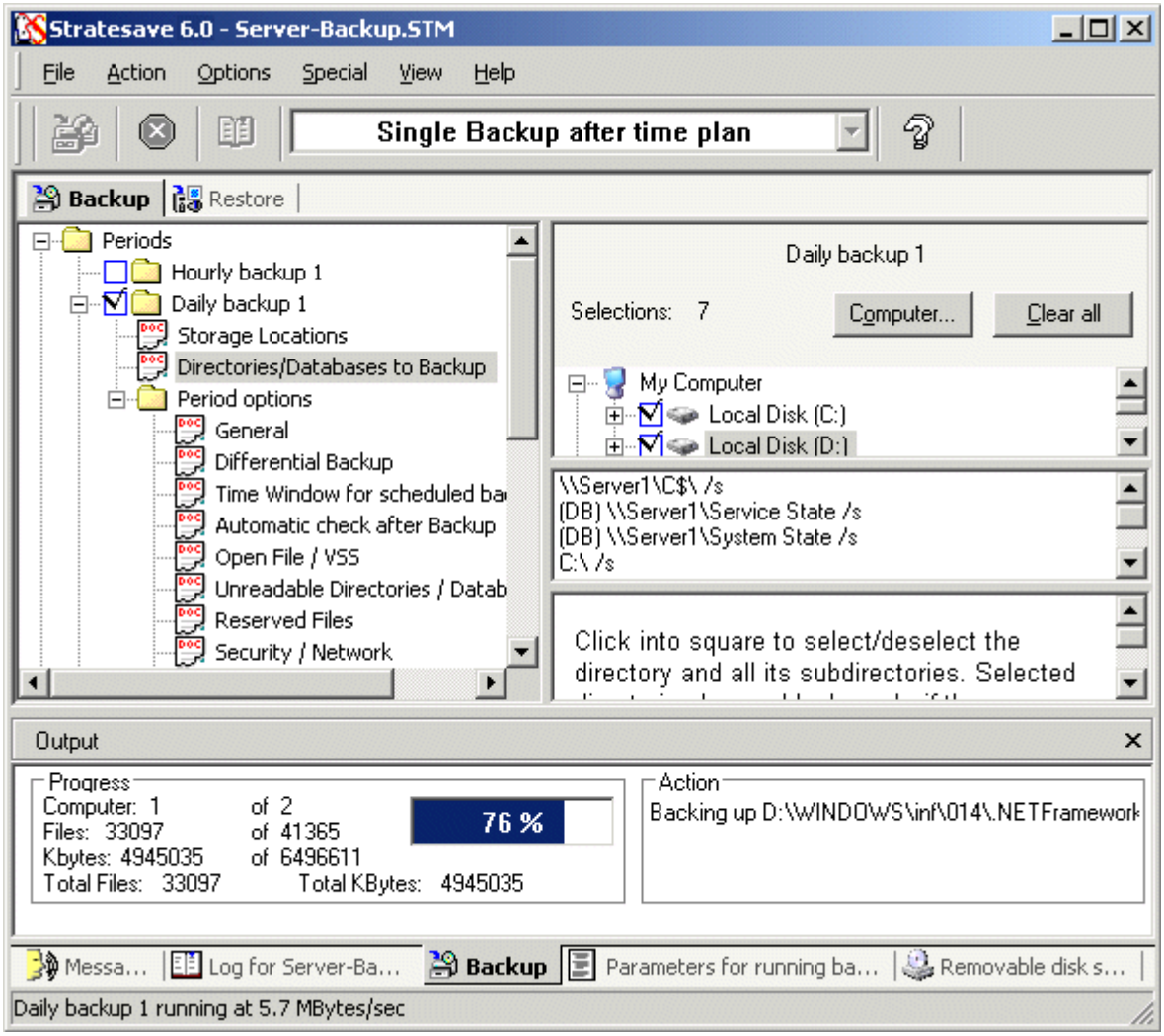
significant changes in macro with regards to databases require a full backup of highest period to be run next.

5.Periodical backup

Stratesave backup executes backup according to the definitions in macro. Macro and log determine the backup period automatically, following the defined time plan.

Backup is started with command *Start backup* from *Action*-menu, or with  -toolbar-key. Normally, backups run scheduled according to macro definition, but backups of explicitely defined period can be run anytime. For example, you can start daily backup immediately any time, even if it is currently not scheduled.

5.1. Displays while backup is running



5.1.1. Output windows

Information is grouped and displayed in several sub-windows. There are Output windows about backup progress, backup parameters, log, messages, scheduled backups etc. The Output windows are only visible if the necessary information is available. For example, if log is not loaded from server, log-window will not be shown.

5.1.2. Status bar

In status bar at lower end of program-window, currently running operation is described, e.g. "Daily backup is running". If a menu command is selected without being activated (while mouse button is not released), a short description of the command is shown in status bar.

5.1.3. Ask password or encryption key during backup

If during backup a network password, or encryption key is required to enter, following dialog pops up:

Enter encryption key or password required. Push button *Random* generates random encryption key (which can be seen by pressing *Show key* or *Key Info...*). You can optionally save the password/key temporarily in memory, where it will be stored until Stratesave program is quit, or store it permanently. See also chp. 8.14., "Where the passwords/encryption keys are stored".

5.2. Backup period

Backup period can be selected with selection box in toolbar. Period **Single Backup after time plan**, which is selected by default, executes one backup according to defined backup plan. This is for example to start the backup at the end of working day. The backup program then determines from the backup plan and the backups already made, which period is next, and runs a backup. **Scheduled backups after time plan** is for repeated automatic backups as defined in backup plan. In this case the next backups to follow are shown in Output window **Next scheduled backups**.

5.3. Start backup

Backup is started with menu command *Start backup* or with function key  . In case of server access with password, a dialog will be displayed where password can be entered.

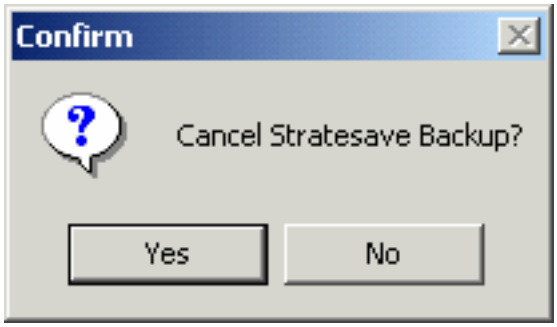
During backup, running actions are shown with a progress meter in a Output window:

Small errors, after which backup can still continue, are listed in Output window *Messages*. A message appears, for example, if a file on PC is deleted by user, before it can be backed up. The Messages-window is created, as soon as the first message appears to be shown.

5.4. Cancel backup

Backup is cancelled with toolbar-key  , with *Cancel*-button on progress-display or command *Cancel* in *Action*-menu.

For verification, following dialog appears:



When *Yes* is selected, backup will be cancelled. There is "soft"-cancel, which means reservation of tape or removable disk will continue to exist. For this reason cancelling backup can last a few seconds.

5.5. Free mounted tape or removable disk

Name of currently mounted tape or removable disk is shown in a Output window:

Commands *Free tape* and *Free removable disk* from *Action*-menu free the mounted tape or removable disk. The *Free*-command can only be executed when no backup is running. If command *Free tape/removable disk after backup or backup check* from menu *Options* is on, tape or removable disk will be freed automatically after backup or after check of backup. If backup is cancelled by user, tape/removable disk will not be freed automatically. Tape will be unloaded (and ranged if autoloader is used), unless tape option *Do not rewind and unload tape when freed* is set.

5.6. Print log and Catalog

Log, which contains list of executed backups, can be printed during or after backup. Print dialog starts with command *Print log...* from menu *File*. Dialog parameters are explained in chp. 4.10. "Print macro".

If log is printed during backup, backup running at present is not yet included in log and will therefore not be printed. The new log containing actual backup can only be printed when backup is complete.

Catalog, containing list of backed up files, can be printed after backup with command *Print Catalog...* from menu *File.*

5.7. Files contained in backup

Directories selected for current period are backed up. Directories defined for a shorter period are backed up also. For example, a weekly backup includes directories for daily backup.

In a **non-differential** backup, all files are backed up, independent of their dates. A **differential** backup, contains only changed or new files since last backup of longer period.

For example, weekly backup is executed on Monday. Differential daily backup on Tuesday will back up all files, that were created or changed since Monday. Daily backup on Wednesday also bases on Monday's weekly backup. It has all files, updated or created since Monday. If Thursday a monthly backup is done, daily backups from Friday to Sunday base on Thursday's monthly-backup etc.

5.7.1. Unreadable files

If a file can not be read, backup will be aborted with error-message. The only exception are for reserved files. Backup-action for reserved files can be set with macro editor, or in backup program with command *Special backup parameters...* in menu *Options*. Either file will be skipped or backup will be aborted with error-message. Additionally, a waiting time can be defined. Please see chp. 4.9. "Period Options" for details.

All files which have not been backed up are listed in log and in Output window *Messages,* together with a short explanation.

5.7.2. Not backed up system files

Windows has a defined registry entry *FilesNotToBackup* (and KeysNotToRestore). These keys define a concept for system recovery/full restore, which tolerates some

hardware changes. Stratesave follows these rules. See also chp. 8.4., "How Stratesave backs up the System State".

5.8. Stop scheduling, Exit backup program or shutdown after backup

Command *Exit program after backup* from menu *Options* automatically terminates program after backup. If backup is not successful, program will not terminate automatically, so that error-message can be read. Command *Stop scheduling after next backup* stops running scheduled backups after next backup completes. Command *Shutdown computer after backup* shuts down the computer and turns power off after the next successfull backup. Your computer must support power off by Software for this function to work. These commands can also be set with command line parameter, see chp. 5.10., "Parameters in command line".

5.9. Initialization of tapes and removable disks

Tapes and removable disks used for Stratesave must be initialized before their first use. Tapes and removable disks are formatted with their name. If by accident a wrong tape or disk is inserted in the drive, the mistake will be recognized by backup program.

5.9.1. Which tapes and removable disks have to be initialized?

- New tapes and removable disks, before their first use with Stratesave.
- Tapes and removable disks, whose names are changed.
- Tapes, which are used for a new macro. If macro name changes, tapes have to be reinitialized.

Important: Initializing tapes and removable disks destroys data already on the media.

5.9.2. Function Initialize Tape... from Menu Special

This function leads to dialog *Initialize Tape*, where you can initialize the mounted tape, and assign it the same volume name as specified in macro.

If tape mounts are handled by Window's removable Storage Manager (RSM), tape option *Initialize media during backup automatically when needed* allows tapes to be taken from free media pool and being initialized automatically during backup. It will not be necessary to initialize the tapes in this case. See also chp. 4.8.1., "Tape device and settings".

5.9.3. How to initialize removable disks (CD/DVD)?

The disk must be formatted with Windows Formatting utility, or with the formatting function from your CD/DVD packetdriver Software. The volume name must be the same as in macro. Initializing CD/DVD is not necessary if Stratesave's builtin driver engine is used. Stratesave will blank or format the CD/DVD automatically as needed.

5.10. Parameters in command line

Command line at start of backup program can be modified within your Windows-environment. Backup program expects following parameters

- **macro name or name of macro file**
  Macro, which is loaded at start of backup program. If this parameter is not specified, macro with PC's network name is loaded automatically.
- **/PERIOD="period name"** or **SCHEDULED**

  Specifies backup period. For example /PERIOD="Daily Backup 1". SCHEDULED=Scheduled backups after time plan. If this parameter is not specified, it defaults to "Single Backup after time plan".
- **/RESTORE**
  Switch to Restore display.
- **/STARTBACKUP**
  Starts backup automatically, without waiting for start command (see chp. 5.3. "Start backup").
- **/LOADLOG**
  At start of backup program, log is loaded automatically from server.
- **/EXITAFTERBACKUP**
  After successfull backup, backup program exits automatically. This parameter corresponds to command *Exit program after backup* from menu *Options*. See also chp. 5.8. "Stop scheduling, Exit backup program or shutdown after backup".
- **/STOPAFTERBACKUP**
  After successfull backup after time plan, backup program stops scheduling and running backups. This parameter corresponds to command *Stop scheduling after next backup* from menu *Options*. See also chp. 5.8. "Stop scheduling, Exit backup program or shutdown after backup".
- **/SHUTDOWNAFTERBACKUP**
  After successfull backup, computer will be shut down automatically. This parameter corresponds to command *Shutdown program after backup* from menu

Options. See also chp. 5.8. "Stop scheduling, Exit backup program or shutdown after backup".

- **/SERVICE**
  This parameter must be specified, if backup program is started as a service.
- **/DELAY=nseconds**
  Wait time, before /LOADLOG or /STARTBACKUP will be executed. This is useful if Stratesave is running as a service, and better waits some time with starting the backups until all other system services have been started and networking has been initialized.
- **/MESSAGESFILE=filename**

  If specified, all output which goes to display-window "messages", will also be written (appended) to the specified file. This can be helpful for unattended backups.
- **/ENCRYPTKEYFILE=filename**

  If specified, reads the encryption key from the specified file. The key stored in the file must be public key (not private key).
- **/HIDEMINIMIZED**

  If specified, The Stratesave program is not shown during backup if minimized. Only the task-bar icon is shown.
- **/NAME=name**

  Name assigned to this Stratesave session, so it can be remotely controlled. If Stratesave runs as a service, the service name should be specified.
- **/REMOTECTL**
  If specified, Stratesave will connect to another running Stratesave session, to control it.
- **/RCSERVER=computer**

  Computername of the computer where backup program runs. If this is not specified, or . (dot) is specified, it means local machine.
- **/RCNAME=name**

  Specifies the "name" of the backup program. The same name must be specified to the backup program. If the backup program runs as a service, the service name should be specified.

- **/RCRETRY**

  The remote backup control program will show an icon in task-bar. This will show even if the backup program is not run, and it will retry to connect to backup program.

- **/RCSERVICE**
  The backup programs runs as a Windows Service. The task-bar icon will have some entries in its menu, for start and stop of the service. When the macro (backup plan) was changed, the service should be restarted for the changes to take effect.

- **/SELECT1=filename, dirname or databasename /SELECT2=.... /SELECTn=**
  Selects the specified directories/files/databases for restore. Specify the lines exactly as shown in restore-file-database-selection. Start with /SELECT1=, and increment for every additional directory,database or file to be selected. If the name contains spaces, put it between double-quotes, e.g /SELECT1="C:\My Folder\Work to do\". If a file, directory or database must be selected with an alternate target directory, specify -> targetdir, e.g. /SELECT1="C:\My Folder\Work to do\ -> C:\My Folder\Work Done\".
  There should be exactly 1 space before and after the ->
  For databases, put (DB) in front of name. Please note that Database names are case sensitive here, for example: /SELECT1="(DB) SQL Server\DBname\ -> (DB) SQL Server\DBname2\"
  For Excluded entries, write Excluded: at beginning of line.

- **/STARTRESTORE**
  Start restoration at program startup. The directories/files to be restored must be selected with /SELECT1=-option.

- **/MAIL**
  Send a mail after restore. The email settings must be configured in macro.

- **/WARNMAIL**
  Send a mail after restore, if there is an error or files could not be restored. The email settings must be configured in macro.

- **/ERRMAIL**
  Send a mail after restore, if there is an error. The email settings must be configured in macro.

- **/FORCE**
  Exit restore program after the automatically started restore.

- **/CONFIGURENET**
  Automatically starts the *Network-configuration wizard*. This is used during ASR

disaster recovery over Network. This option also enables follow menu commands under menu Special, which can be useful for ASR disaster recovery: *Configure Network*, *Map Network Drive* and *Command prompt*.

Example command to make automatic full restore of C-drive and exit after restore, without any asking-dialogs, and write log-messages to a file on D-drive:
"C:\Stratesave 6.0\Stratesave" macro /RESTORE /LOADLOG /SELECT1=C:\ /STARTRESTORE /EXIT /FORCE /MESSAGESFILE=D:\RESTORE.LOG

5.11. How to start backup program as Windows Service

This is useful, if you want regular backup on computer where nobody logs in to start backup program. You can define backup program as a Service, which starts automatically when PC boots. Together with command line parameters, you can define regular daily backups, even when nobody logs in on PC, for example on a Windows Server computer.

To install Stratesave as a service, run command *Install Service...* from Menu *Special*. This will run the Service installation wizard.

To uninstall the service, use command *Uninstall Service...* from Menu *Special*.

Please note:

1. When backup program is run as a Windows Service, it is normally not visible. There is the *Remote Backup Control* feature to control the backup program.
2. It is best security policy to not make the service visible and not allow it to interact with the desktop.

6.Restore

The Restore part of Stratesave controls and restores backed up files and databases.

Listed files are sorted after their directory but not after the backup storage. For example, a file from weekly backup can be shown in Catalog next to a file from incremental daily backup. Restore program manages to restore both files from their backups automatically. It is also possible to restore earlier backups or from selected backups, ignoring the backup plan.

A finished or interrupted restore can be undone. Files and directories are set back to the state before restore started.

6.1. Load log

Usually the first action is to load log, after switching to Restore. Log contains informations, when the backups were made, and where they are stored. Log is the sign post for restore program, to load Catalogs and restore files. Log is stored under **macroname.STL. Macroname** is the name of macro, which contains backup plan.

Dialog for loading log is activated with *Load log...*-command from *Action*-menu. The Log file (.STL-file) can be selected.

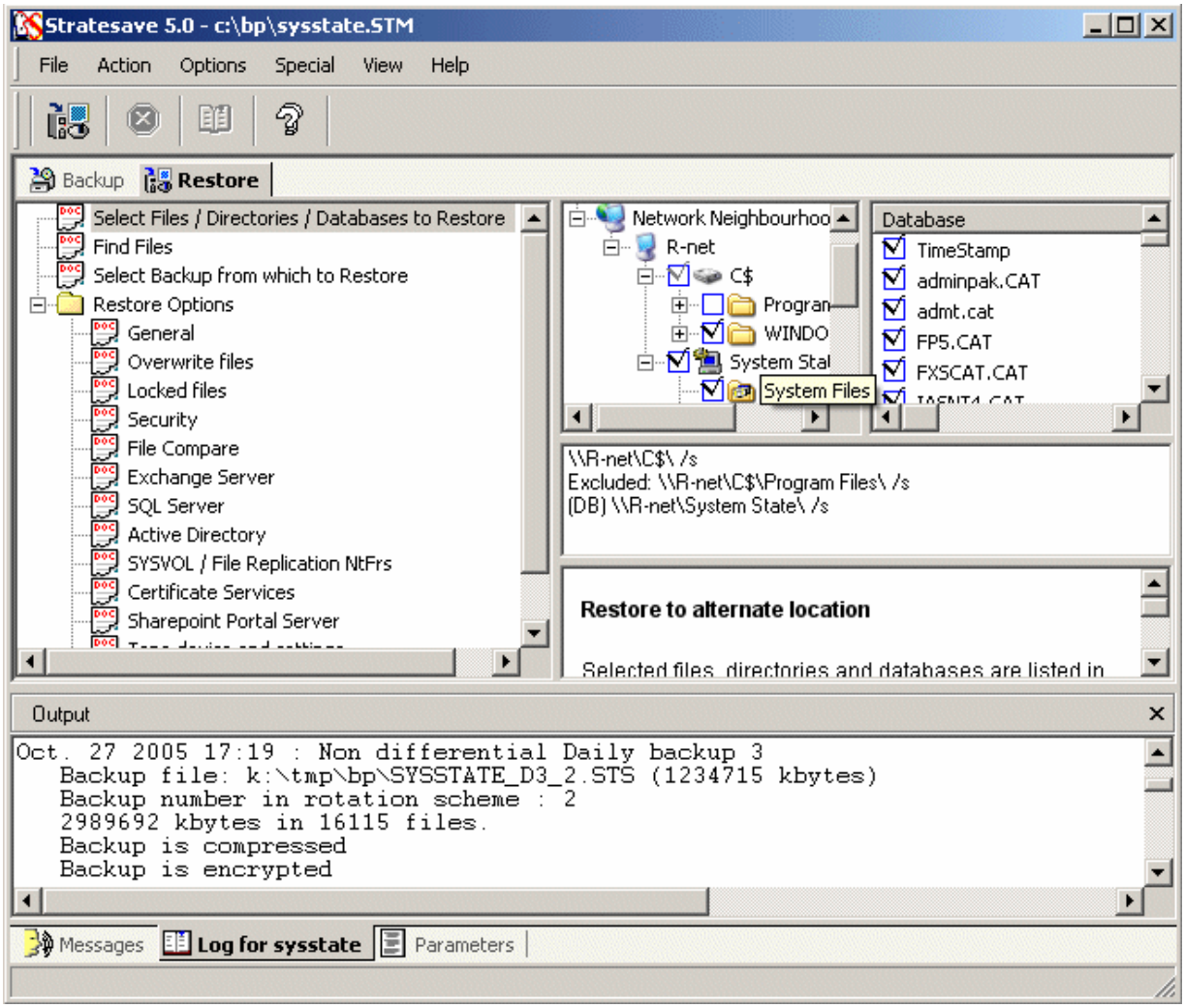
Toolbar function  loads log for current macro directly, bypassing the dialog.

6.2. Print log

Print dialog is activated with command *Print log...* from *File*-menu. A description of print dialog can be found in chp. 4.10. "Print macro".

6.3. Display Catalog and select files / databases

Click on *Select files / Directories / Databases to Restore* in Left-pane treeview. The log must be loaded in advance (see chp. 6.1. "Load log").



Select directories, files and databases to be restored or compared with directory-tree and file-selection windows.

Restore to alternate location:
Selected files, directories and databases are listed in window below the directory-tree. To set a new target-directory, click there with the right mouse-button and a popup-menu appears.

Restore to alternate location:
Selected files, directories and databases are listed in window below the directory-tree. To set a new target-directory, click there with the right mouse-button and a popup-menu appears.

Disaster recovery and Full restore:
Select System drive + System state + possibly other drives, or drive image(s) and restore in single run, then reboot. Restore SQL server and Exchange Server and VSS databases later, after system has been recovered. See also chp. 8.11., "Disaster Recovery".

6.4. Print Catalog

Printing is started with command *Print Catalog...* from *File*-menu. Print dialog is described in chp. 4.10. "Print macro". Before Catalog can be printed, log must be loaded from server (please see chp. 6.1. "Load log"). If not all Catalogs are loaded from their backups, you will be asked if all Catalogs should be loaded before printing. This is recommended, because files can only be listed if the corresponding Catalogs are loaded from backup. Like the log, Catalog contains access-informations, and list of backups. Additionally, backed up files are listed with their sizes, file dates and attributes.

6.5. Restore options

6.5.1. General

Save settings between sessions: If enabled, the changes made in this dialog will be saved between sessions with restore program.

6.5.2. Overwrite files

These options determine file overwriting during restoration. Options *Restore into existing directories* and *Overwrite older/newer files* can be set to *Ask*, *Overwrite/Restore* or *Skip. Overwrite* and *Restore* mean that corresponding files will be restored. The files will be skipped with *Skip*. *Ask* means that a dialog will appear to decide whether a file should be restored or skipped. *Ask* is the default.

6.5.2.1.Restore into existing directory

When a file is going to be restored in a directory which already existed before restoration, this will be utilized. File will be restored, skipped or Ask-dialog will be shown, depending on how option is set.

Protection against restoring into existing directory seems not very important, because no files are overwritten then. But it can produce a mess on the hard disk. For an example, a total failure of hard disk occurs. Before the full restore is done, maybe you want to install the latest versions of operating-system and network software, which are newer than the versions on hard disk before the crash. During full restore you will be warned, if files would be copied into directories with new operating-system-version (assuming option is set on *Ask)*.

6.5.2.2.Overwrite older files

Overwriting existing files during restore is delicate. Restore program has double protections against unwanted loss of data during restore. First, copies of overwritten files can be made. This protection is described in chp. 6.5.2.4. "Make temp. copies of overwritten files". Secondly restore of files existing on PC is controlled with options

Overwrite older files: It is used, when a file existing on PC has an older date and time. It can be set to *Overwrite* or *Skip* file or to *Ask*.

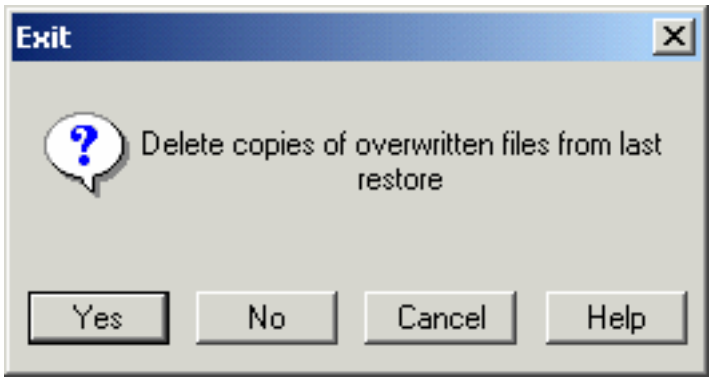
6.5.2.3.Overwrite newer files

This is a similar case as *Overwrite older files.* If file on PC has a newer, or the same date and time, option *Overwrite newer files* is used. Overwriting newer files is more dangerous than overwriting older files. For this reason, option *Overwrite newer files* may only be set equal or more restrictive than *Overwrite older files.* An invalid combination would be, for example, *Overwrite* for *Overwrite newer files* and *Skip* or *Ask* for *Overwrite older files.*

6.5.2.4.Make temp. copies of overwritten files

Restore of existing files on PC is managed with restore options *Overwrite older (newer) files.* As an additional protection, copies of the files on PC can be made before they are overwritten. Copies are in the same directory as their originals, and differ from their original by a slight modification of filename. **Extension** part of the file name, namely the part after "." sign is replaced by .$$1. If a file with the new name exists already, extension will be set to .$$2 etc.

These files are kept until restore program is quit or until a new restore-operation is started. At that time, a dialog will be shown and one can decide if the file copies should be kept or deleted.



If the answer is *No,* copies are not deleted automatically. Later they had to be deleted "by hand", for example with file manager / explorer.

Copies of overwritten files are also used to undo a restore-operation. See chp. 6.14., "Undo last restoration" for undoing a restore.

Please note that copies can neither be made for registry files nor for locked files which will be replaced at next reboot. Therefore Undo operation can not be done for these files.

6.5.3. Locked files

At locked files and files without access: This option applies to files, which can not be restored, because the file on PC with equal name is locked, and therefore can not be overwritten normally (see also chp. 6.5.3. "*Restore locked files and registry at reboot*"). It also applies to files whose necessary permissions or access rights are missing for restore. Files will either be skipped or restore will terminate with error message.

Restore locked files and registry at reboot: With this option, even locked files can be restored. The restoration will be done in two steps: First the files will be restored to temporary files in the same directory. Then, replace commands will be put in System registry. At next reboot, the system will automatically replace the locked files with the restored ones. This option must also be set if registry files are to be restored. The option requires restore privilege.

Full restores of running systems are possible with this method. It is not necessary to restore the system to a different disk-drive and change disks afterwards.

6.5.4. Security

These options are related to Windows and NTFS security. If *Use restore privilege* is set, restore privilege will be used (if user has it) to restore the files, which allows restoration of all files independent from their protection. The options *Restore files owners / groups / permissions / auditings*, specify the parts of each file's or directory's security description which will be restored. Restoration of files auditings requires Restore privilege.

6.5.5. SQL Server

Options for restoration of SQL Server databases: *Don't recover restored SQL databases*: If full backups, differential and or incremental parts of SQL database are restored together, all must be restored in unrecovered state, only the last one is restored recovered, for database to become usable again. If this option is turned on, SQL database is restored unrecovered, and further restore operations can be done on the database.

6.5.6. Exchange Server

Options for restoration of ESE98 (Exchange Server 2007/2003/2000) databases: *Don't recover restored Exchange databases*: Leaves database in unrecovered state, so further restore operations can be done on the database. In this case, Restore Log path will be shown in Output window 'Messages'. This Restore Log Path must be remembered for further Restore operations. *Reopen previous non-recovered Restore* must be set for the later restores. Specify *Log path* shown during first restore operation. *Don't recover restored Exchange databases* must be set for all but the last

restore operation. Usually these options need not be used. It is best to select entire database and restore it in a single run. These options do not apply if Exchange Server was backed up under VSS.

Option for restoration of Exchange 5.5 Server: *Don't delete database files before restore (Exchange 5.5)*. If specified, the Backup Logs already stored will not be deleted before the restore. Per default the Logs since latest backup should not be applied during restore, so they are deleted.

6.5.7. Active Directory and Certificate Services

Don't delete database files before restore. If specified, the Backup Logs already stored will not be deleted before the restore. Per default the Logs since latest backup should not be applied during restore, so they are deleted. This option is not used when restoring from a VSS System State backup.

6.5.8. SYSVOL / File Replication NtFrs

When restoring replicated data sets, mark the restored data as the primary data set: Performs a Primary Restore. Ensures that restored File Replication service (FRS) data is replicated to your other servers. Please see your Windows or online documentation for more information on Primary and Authoritative restore of Windows Domain controllers, and NTDSUTIL utility. This option is not used when restoring from a VSS System State backup.

6.5.9. SharePoint Portal Server

Restore full-text indexes to original location. If specified, the SharePoint Portal Server 2001 full-text indexes are restored to original location during backup. Otherwise they are restore to currently defined location. This corresponds to option /o of MSDMBACK-command.

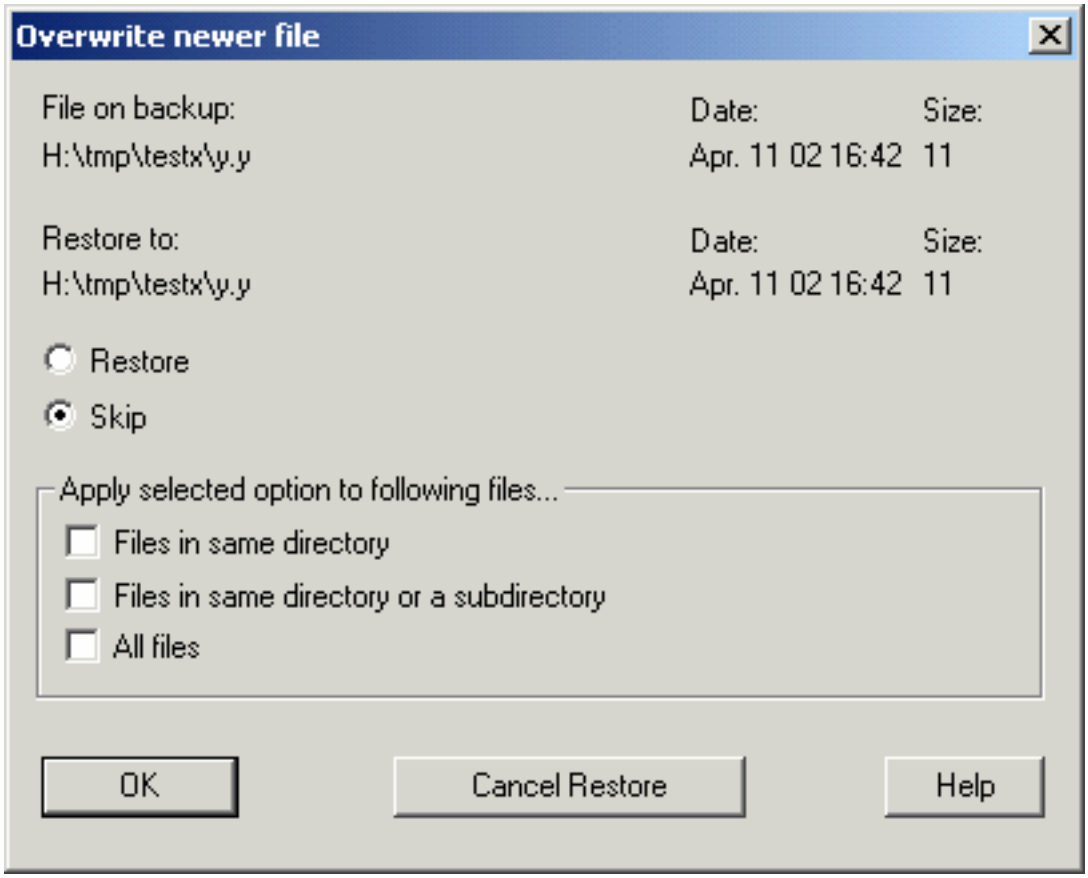
6.5.10. File Compare

Options for compare run:
Compare Registry keys: If set, when registry hive is to be compared, all registry keys will be compared, and all changes will be listed. This can be useful to detect changements in registry.
Compare only directory tree, not file data: This option allows to quickly detect changes made since last backup. New/deleted files and directories will be listed, also changed files, if either filesize or filedate are changed. The file data and file security settings are not compared.

6.6. Confirmation dialog for *Ask*-option

The previous section described the file overwrite options with their settings *Overwrite/Restore, Skip* and *Ask.* If *Ask* is set, a dialog appears when a file should be overwritten or restored into an existing directory.

For example, option *Overwrite newer file* is set to *Ask.* If during restore an existing file with a newer date+time would be overwritten, confirmation-dialog is shown. This dialog shows files in backup and on PC with names, dates and sizes.



With option fields, it can be decided whether file should be restored or skipped. Additionaly, the selection can be made for further files, without showing dialog. The selection counts further for *Files in same directory, Files in same directory or a subdirectory* or for *All files.*

Dialog is quit with *OK* or *Cancel restore.* Restore continues with *OK*, and terminates with *Cancel restore.*

6.7. Start restore - cancel restore

Restoration is started with toolbar-function  or with command *Start restore* from *Action*-menu. Files, directories and databases to be restored must be selected (see chp. 6.3. "Display Catalog and select files") before restauration. Selected files and directories can be shown in Output window *Selected files / directories / databases.*

During restore, current action is shown with a progressmeter indicating current position of restore.

Restore can be cancelled with toolbar-key  or with command *Cancel...* from *Action*-menu. For safety reasons, Cancel-operation must be confirmed.

6.8. Full restore techniques

Full restore of a running system, replacing the currently running operating system with the backed up. Windows must be installed first, compared with Disaster Recovery, where system is restored without installing Windows.

Full restore of running system means to restore all drives, or at least system drive and System State, while the system is running. This must be done in 1 single restore run, then reboot the system.

Run the Full Restore as Administrator, and the system to be restored in Directory Services Restore Mode. Directory Services Restore Mode (or Safe Mode) is best even for restoring Windows XP/2000 workstation, to avoid interference with Windows File Protection (WFP). After reboot, press F8 and Select Directory Services Restore Mode, before running the full restore.

Best is if servicepack of running system and restored system are same version.

Install the new system in the same directory and drive as the backed up system. If the backed up system was installed in directory C:\WINDOWS, the system installed before full restore should also be in C:\WINDOWS. It is best if drive number and partition number are also the same as in backup.

It is best to avoid access errors. This can be done if backup server and computer to be restored have same Administrator user account name and password. Before the restore, change the password on backup server with Ctrl-Alt-Del, set it to same value as computer to be restored.

During Restore, when Overwrite Newer file-dialog pops up, select Restore and All files, then press OK.

For full restore of a system with SQL Server or Exchange Server installed, reinstall Windows first and Restore all the drives, and System State first, then reboot. This will restore SQL server and Exchange server installations, but not the databases. Exchange Server volumes will not be mounted because they were not yet restored, and SQL server will not start, because there is no master database. Exchange Server can then be fully restored with Stratesave. After restoring Exchange Server, it's volumes can be mounted with Exchange System Manager or by reboot. Full restoration of SQL server is described here.

For Windows 2000 Server or Advanced Server with Active Directory installed (domain controller): Install Windows 2000 and configure the same Computer name as backed up. If you don't there can be problems during Active Directory restoration later. Also configure time zone correctly during installation. Then install Active Directory on the computer, and install the same service pack as was backed up. Hint: If you have a reserve PC to recover from a total PC crash, you might already setup the reserve PC with Windows 2000 and AD + Service pack installed. Reboot the system in Directory Service Restore mode (press F8 during reboot and select Directory Services restore mode). Now start Stratesave and run the full restore: select System State, and System drive, and root directory of boot drive for Restore. Do not select Exchange Server, SQL Server databases, and SharePoint Portal Server for restore at this time. Finally reboot the system in normal mode. If you setup the Windows 2000 server with a different computer name than backed up, Active Directory cannot start. In this case, reboot to directory services restore mode, and restore the Active Directory database again. For restoration of a computer with both Active directory and Certificate Server, first install Windows 2000 without Certificate Server. Then install Active directory and reboot. After that, install Certificate Services (through Optional Components). Then install the same Windows Service Pack as the system had when backed up. Then reboot in Directory services restore mode, and restore the entire system, including System State and System Drive (but not yet Exchange and SQL databases), in a single run, then reboot. Finally restore the certificate, which you (should) have backed up to file separately, with Certificate Authority tool, or certutil -restorekey. Only select Private key and CA certificate for restore, don't select Issued certificate log and pending certificate request queue, because the database was restored with Stratesave.

During Windows boot, do not press spacebar "to enter last known good menu". This applies to session before and after full restore.

After a full Restore, perform a full backup, before making incremental or differential backups again. Full backup made before the full restore cannot be used as a base for incremental or differential backups made after the full restore, so a full backup is required after the full restore.

Windows 2003/2000/XP provides registry entries 'FilesNotToBackup' and 'KeysNotToRestore'. These keys to some degree allow a full restore even with changed hardware. Stratesave follows these guidelines.

If the System is fully restored with System State, files and directories, it might not be necessary to also restore the VSS databases, because they were backed up as files under VSS, and therefore restored with full restore.

See also chp. 8.11., "Disaster Recovery".

6.9. Full restore of SQL server

This section describes how to fully restore your SQL server, after your PC or disk crashes.

First, reinstall Windows and make a full restore of your PC's hard drive(s) and reboot, as described in chp. 6.8., "Full restore techniques", or resetup your system with Disaster Recovery. Don't restore the SQL databases yet, just the normal files, and System State. This will restore your entire SQL installation, but not the databases. Because there is no **master database** at that time, the SQL server cannot start yet after reboot.

Use the following procedure, which is standard and documented in the SQL server documentation, for full restore.

Build a default master database with the **rebuildm** utility from SQL server binary directory (e.g. C:\MSSQL7\Binn\rebuildm.exe). You will need the SQL server CD for this, or the database files from the CD available at some known location. This will allow SQL server to start, because it has a master database, although it is not yet the correct one which was backed up.

Start SQL server manually in **single user mode**, with command *sqlservr -m* manually from the command prompt (sqlservr.exe is from SQL server binary directory, e.g. C:\MSSQL7\Binn\sqlservr.exe).

Start Stratesave restore program and restore the master database only. After master database is restored, SQL server will stop automatically.

Start the SQL server service MSSQLServer, manually with Services from Control panel -> Administrative Tools or through reboot.

Restore the SQL databases except master.

6.10. Restore from old backups

Restore program can also restore files from older than the latest backup. Of course the backup must still be present on server and is neither overwritten nor deleted.

To restore from old backups, start the same way as restore from latest backup. At first, load log from server. This process is described in chp. 6.1. "Load log".

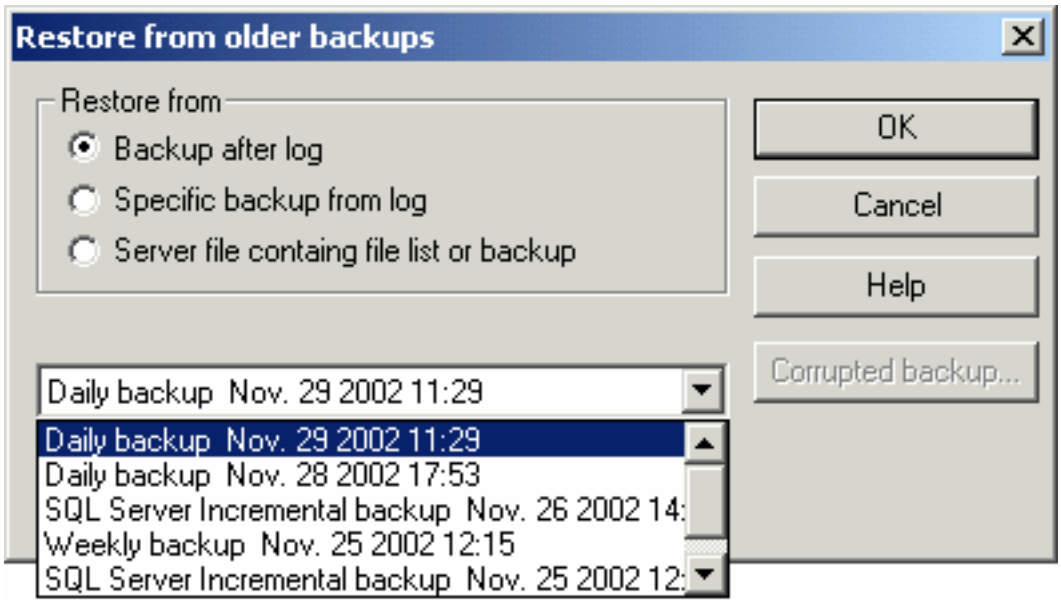
Then, click on *Select Backup from which to Restore...* in left pane tree-view.

Standard - Latest Backups after Log

Stratesave automatically restores the files from the correct backups (full/differential), based on the selected backup under **Backup to refer to**. This normally is the newest backup, to restore most actual state of your system.

Special

This option is for restore from a single backup outside the backup plan, or restore from a selected backup in case the Log is lost, or scan a backup for backed up files if the catalog is lost.

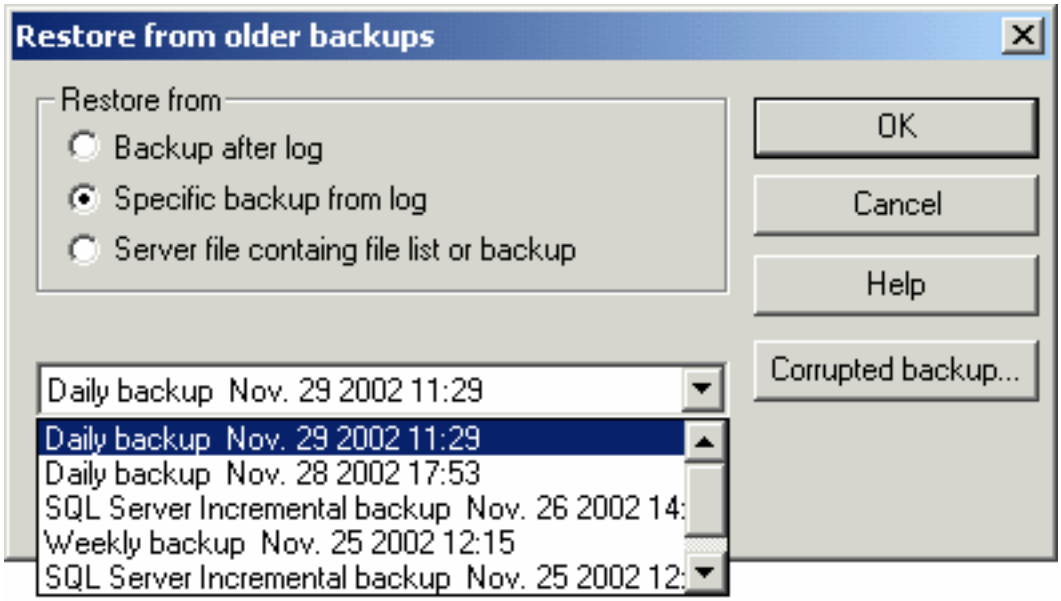


Select option *Restore after log*; then select the desired backup from list box and click *OK*. The following restores and prints of Catalog relate to selected backup, and no longer to latest backup. Output window *Parameters* lists, which backup is used. Per default it is *Latest backup after log*.

When a backup is selected with option *Restore from backup after log* as described, a file will not necessarily be restored from the selected backup. It means only that the files present on PC at that time will be restored. It is possible, that the files are stored in a older backup. As an example, you want to restore a file that you lost a week ago. In *Restore from older backups*-dialog, select the last backup before file was lost. Let us assume it is a daily backup. If this is a differential backup, file is possibly restored from an older weekly or monthly backup.

6.11. Restore from specific server file containing backup

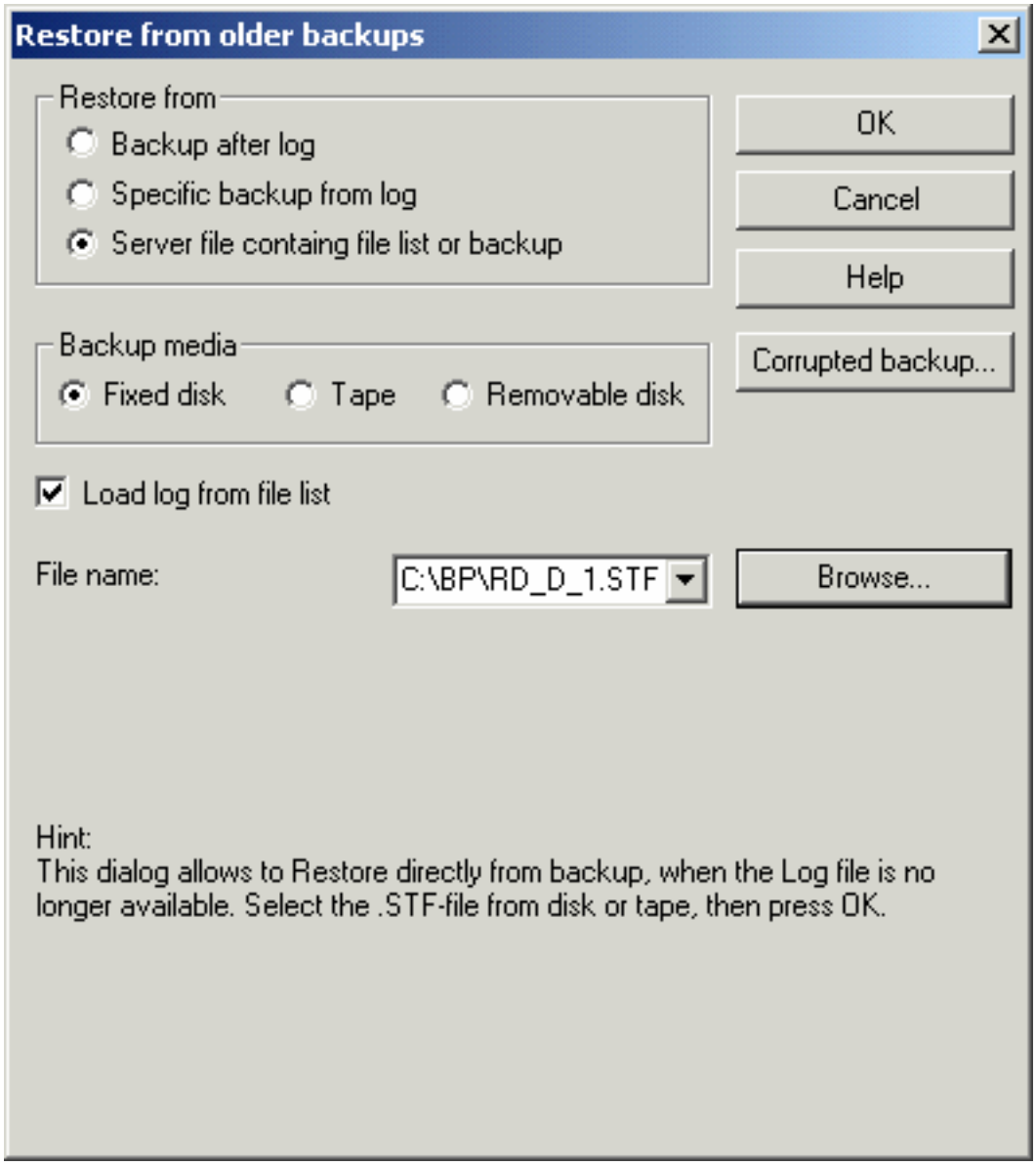
To restore from specific backup, click on *Select Backup from which to Restore...* in left pane tree-view then select *Special*.



In dialog *Restore from older backups,* select option *Specific backup from log* or *Server file containing backup.*

Button *Corrupted backup...* leads to a dialog which is explained in chp. 6.12., "Restore from corrupted backups".

Option *Server file containing backup* leads to a dialog, where server file can be selected by its file name and eventually tape- or removable disk name. Chp. 8.19. "Backup file names" describes the naming of backup files.



For restoration from tape, tape name does not have to be specified. When restoration is made from removable disk, disk name can also be left out. If the tape- or diskname is not specified, option *Mount by operator or media changer* in device dialog (see chp. 4.8.1. "Tape device and settings") must not be set. The reason is, that operator or robot must know, which tape is to be entered.

Push button *BROWSE* or *DIR* lets you view the catalog files (.STC files), and the backup files (.STS files). For every backup there is a .STC file, which contains list of backed up files and backup positions. Select the .STC file of the backup you want to restore from, then press OK.

OK or *Cancel* quit dialog, *Cancel* ignoring changements. After *OK*, Catalog will be loaded from selected backup. If option *corrupted backup* (see chp. 6.12., "Restore from corrupted backups") has been set, entire backup will be scanned in the search of

backed up files. In Output window *Parameters* the name of backupfile on server is shown under *Restore from:*. All restores and all printed Catalogs are from selected backup.

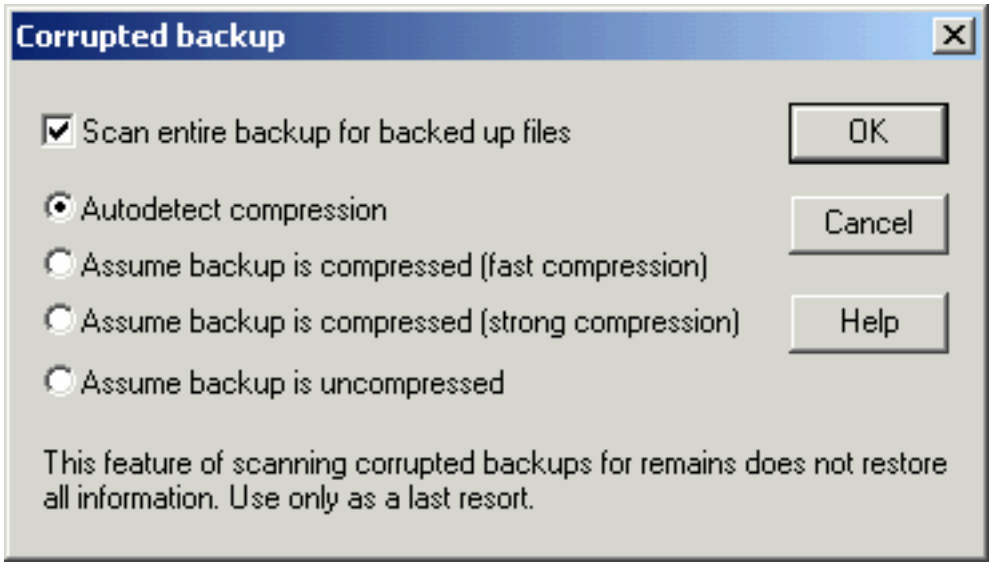
6.12. Restore from corrupted backups

This feature is useful, when the normal restore reports data errors and can not restore files. It allows to restore as many files as possible from even heavily corrupted backups, where the normal restore would fail. The entire backup will be scanned in the search of backed up files. Please note that this feature is not an error correction. Data-errors will recognized and listed, but not corrected in the current version of Stratesave. All uncorrupted files can be restored, even if they are stored behind corrupted files. This feature also works around data errors in the Catalog and the file headers. For encrypted backups, working around data errors is limited, some data errors turn entire backup, or remaining rest invalid to restore from.

Please note that this feature should only be used as a last resort, because it does not allow to restore special information like security, very long filenames, extended attributes etc. Preferably, select the .STC file for restore instead of scanning the backup with corrupted-backup option.

The restore can only be done from a single backup, independent of the backup plan. This means that if the files are stored in several backups (e.g. daily and monthly backups), several restore passes will be necessary. Following informations will not be restored: File attributes, empty directories, files creation and last access dates, Windows security. File names containing international Unicode characters (e.g. Japanese, chinese cyrillic, hebrew, arabic etc.) will be replaced with UNICODE_number.

Start with *Select Backup from which to Restore...* in left pane tree-view then select *Special* and follow steps of restauration from *Specific serverfile containing backup*, which is explained in chp. 6.11. "Restore from specific server file containing backup". Push button *Corrupted backup...* leads to following dialog:



Scan entire backup for backed up files enables restoration from corrupted backup. If *Autodetect compression* is enabled, restore program will detect itself if backup is stored in compressed format. If the backup is heavily corrupted, this might fail, so options *Assume backup is compressed/uncompressed* specify if backup is compressed or not.

After *OK* is clicked in dialog *Restore from older backups*, entire backup will be scanned for backed up files, instead of the normal reading of Catalog. If backed up files with invalid names are found (because file name was corrupted), a new name will be assigned, and a warning message will be shown in Output window *Messages*.

6.13. How to restore files, when log is lost

Log is the sign post for restore program. With log, restore program finds out where the backups are stored. If log is lost, you have to specify the backup file or backup tape/removable disk with the backup you want to restore from. The backup contains a copy of the log, within the Catalog (.STC) file. The .STF file contains list of backed up files, and is always stored together with the backup (.STS file). Select .STC, which, as the backup, can be on fixed disk, tape, or removable disk, with dialog *Old or corrupted backups - Serverfile containing backup*. If you have several tapes and don't know which one contains latest backup, you will have to scan each and compare backup dates. After having loaded Log from latest backup, you can store it back to disk with command *Save Log...* in Menu *Special*.

6.14. Undo last restoration

A completed or interrupted restoration can be undone. This option is valid, as long as there is no other restore started and restore program is not quit.

Activate command *Undo restore* from menu *Special.* A dialog appears where you can confirm that you want to delete restored files.

If you confirm with *Yes,* files and directories created during last restoration are deleted. Files which were overwritten, are replaced by their original version, if option *Make temp. copies of overwritten files* (see chp. 6.5. "Restore options") was enabled.

Please note that restore of locked files, registry files and databases can not be undone.

6.15. Check backups

There are two ways to control the backup files with restore program, without actually restoring the files. You can check the stored files with help of their checksums. You can also compare the files in backup with those on PC. The detected errors in backup or differences between backup and PC are listed in Output window *Messages.* This checks all backed up files and databases, independent from selection.

6.15.1. Check backup with checksum

Activate command *Verify backup(s)* from menu *Action*. The backup or backups used for restore (see Output window *Parameters)* are checked with their checksum. Corrupted files in backup are listed in Output window *Messages.*

6.15.2. File-compare between backup and PC (True compare)

For this, you must load log from server first (see chp. 6.1. "Load log"). Select the files and directories to be compared. This step is explaned in chp. 6.3. "Display Catalog and select files". Files in backup and on PC can be stored in different directories. Start file compare with command *Compare selected files in backup(s) and on PC* from menu *Action*.

The Stratesave compare function compares complete directory structure, file dates, attributes, security, in addition to simply file data. It also reports files and directories which have been added to PC. For registry hives, it optionally lists all added/changed/removed keys, if compare option *Compare registry keys* is set. You can now compare the actual state of your PC with the state at the last backup. For example after installing some downloaded Software, you might want to know about what changes this Software has made to your system.

Please note that this is an advanced feature, and requires some knowledge to interprete the result list. After some heavy system activity or after a reboot there will be a few registry changes which are also reported.

If compare option *Compare only directory tree, not file data* is set, changes made since last backup are detected quickly. New/deleted files and directories will be listed, also changed files, if either filesize or filedate are changed. The file data and file security settings are not compared.

6.16. Remove backup from log

Command *Remove backup from log...* in menu *Special* leads to a dialog where you can select a backup and remove it from log. Optionally, the new log can be stored back to server.

This is useful, when you know that a backup is no more available, because the backup tape is defective. Backup and Restore programs can manage better when the backup is removed from log.

To remove a backup, selected it in list box on the left and push on button *Remove*. *OK* and *Cancel* quit dialog, *Cancel* ignores the changes. After *OK*, you can decide whether the updated log should be saved, making the changement irrevesible. A backup removed from log can not be inserted again.

6.17. Create ASR Restore Disk

Within dialog Create *ASR Restore Disk*, which is called from menu *Special*, you can create a Restore disk, to be used for disaster recovery (ASR) on Windows 2003 and XP Professional. This allows you to fully restore your system without reinstalling Windows and Stratesave. For disaster recovery, reboot the System with the Windows 2003/XP installation CD, and press F2 during reboot. Then provide the ASR restore floppy disk, and Stratesave Restore program will be started, where you can restore your system.

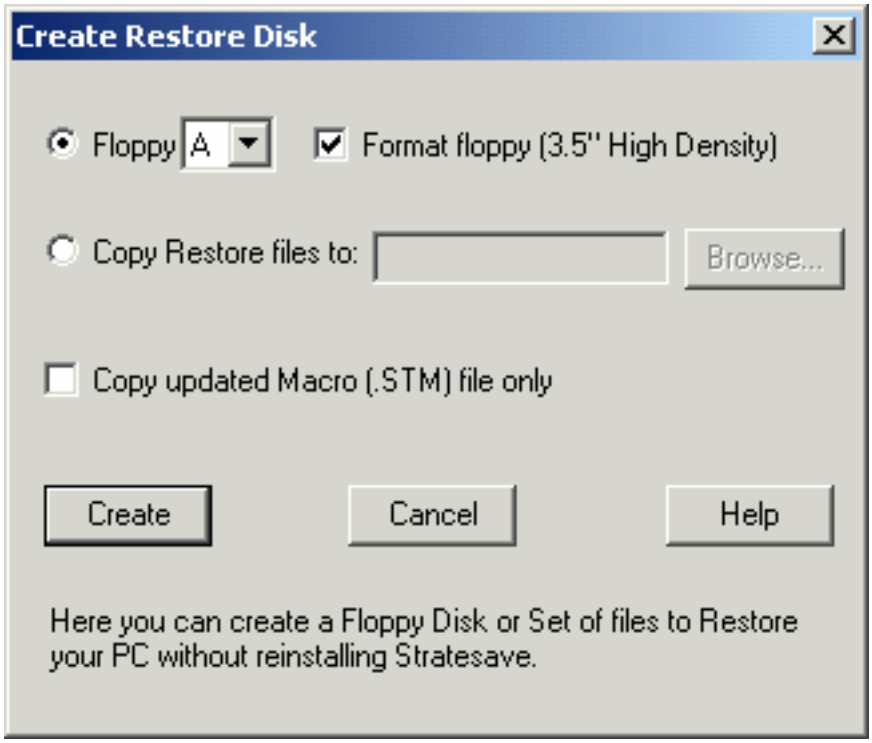
Before creating the Restore disk, first load the backup macro, Log and Catalog.

With Floppy selection list, you can choose between floppy drives A and B. If button **Format** is selected, the floppy will be formatted. Alternatively, you can copy the Restore files to a defined location. The restore disk contains a file README.TXT, explaining its use for disaster recovery.

See also chp. 8.11., "Disaster Recovery".

6.18. Create Restore disk

Command *Create Restore disk...* in menu *Special* leads to a dialog, which will create a Restore disk, to be used for restoration, when the backup program is no more available, for example after a PC crash. With the Restore disk, you do not need to install Stratesave before you can restore. It is sufficient to install Windows and network.



With Floppy selection list, you can choose between floppy drives A and B. If button Format is selected, the floppy will be formatted to 1.6 MBytes, to provide enough space for the Restore program. Alternatively, you can copy the Restore files to a defined location. If only the macro was changed, check box *Copy updated Macro (.STM) file only* can be set, and the other files will not be copied again. The restore disk contains a file README.TXT, explaining its use for restoration.

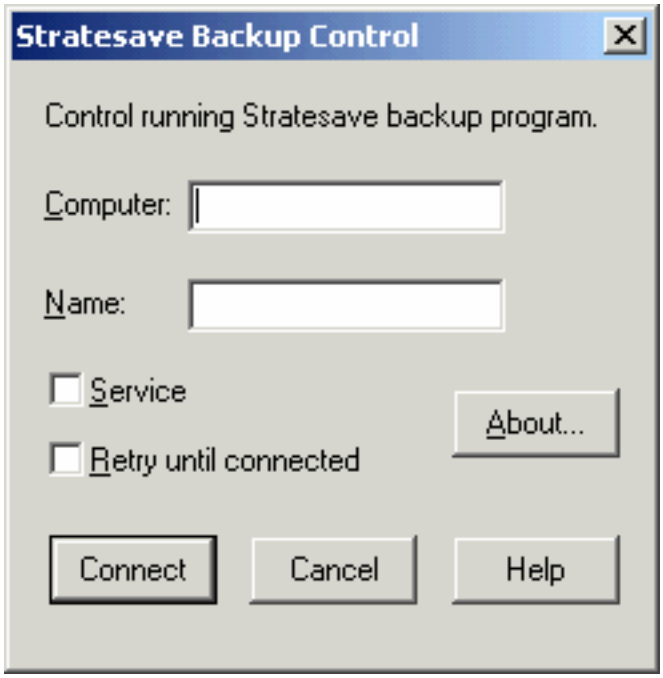
7.Remote Backup Control

The Remote Backup Control feature connects to a running backup program, and allows to control the backup program. The remote backup control program runs on the same computer or remotely on a different computer than the backup program. The user interface of the remote backup control is similar to the backup.

The remote backup control feature is especially useful, if the backup program is run as a service, or scheduled by the Windows AT-command. It is best security policy to not allow the service to interact with the desktop, but control it with the remote backup control program. The remote backup control runs in the context of the user who started it, and is terminated automatically when the user logs out. It can also control the backup service from a remote computer. Or you can run the remote backup control from a terminal server session. To connect to a backup program that runs under the system account (service or AT-scheduled), the remote backup control user must be in the Administrator group, or the Backup Operator group. If the backup program runs under another account, the remote backup control user must have the rights of that account.

7.1. Remote Backup Control Main dialog

The dialog to connect to a running Stratesave Backup is started from Command *Remote Control Backup Service* in menu *Special:*



- **Computer**

  Computername of the computer where backup program runs. If this is not specified, or . (dot) is specified, it means local machine.

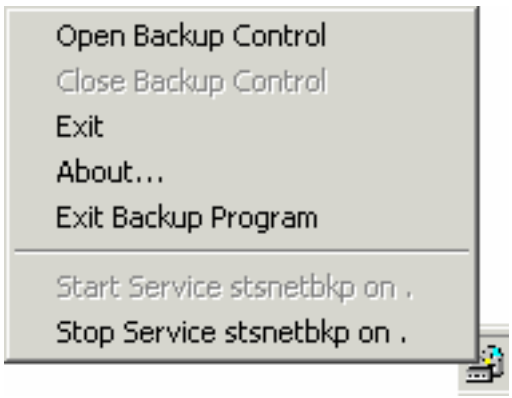
- **Name**

  Specifies the "name" of the backup program. The same name must be specified to the backup program. If the backup program runs as a service, the service name should be specified.

- **Retry**

  The remote backup control program will show an icon in task-bar. This will show even if the backup program is not run, and it will retry to connect to backup program.

- **Service**
  The backup programs runs as a Windows Service. The task-bar icon will have some entries in its menu, for start and stop of the service. When the macro (backup plan) was changed, the service should be restarted for the changes to take effect.


Open Backup Control
Close Backup Control
Exit
About...
Exit Backup Program
Start Service stsnetbkp on .
Stop Service stsnetbkp on .

8.Special subjects

8.1. Network backup with Stratesave

Stratesave backs up remote network drives, which can be selected through network share (UNC) name, e.g. \\myserver\share\dir, or \\mypc\C$. Network full backups, which include remote registry backups, require Stratesave Network Agent key. Also for network full backups, specify/select remote drives through their share (UNC) names, not with the mapped drive letter. That way, you can fully backup/restore networks with unlimited number of Windows PCs, without Software installed on the networked PCs.

Since NTFS specialities must be backed up and Windows Networking is used for Network backup, following are Operating System requirements of Network Backup Server (=Computer where Stratesave is installed).

Network Backup Server should be Windows 7, 2008, Vista, XP or 2003 (Windows 2000 also possible, but XP recommended). A Windows XP as Network backup Server can fully backup remote Windows 2008 and 2003 Servers.

The Network Backup Server is not necessarily a "Server" or "Advanced server" version of Windows. A Windows XP Professional will do as backup server, even with Windows 7/2008/2003/2000 Server or Advanced Server as network backup clients. For remote backup of SQL or Exchange server, it also is not necessary to have SQL/Exchange server installed on the backup server, if the necessary DLLs are available on the backup computer.

Best policies for network backups

- Select remote shares for backup,don't backup mapped drives. That way, at restore, it will be clear which computer's data is backed up. If you have backup of J:, where J: is a mapped drive, maybe it is not clear later to which PC the drive J: belongs to. Also Stratesave can make VSS Openfile backups, and registry

backup and restore of registry files and locked files only if they are specified through their network share names, not via mapped drives!

- For Remote Backup of Windows 7 and Vista, remote access must be enabled by UAC. On the remote Windows 7/Vista-Computer, define DWORD Registry value LocalAccountTokenFilterPolicy in HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Policies\System, set it to value 1, then reboot. Alternatively, enable the real built-in Administrator account and use it for the remote access. Another option is to turn off User Access Control (UAC).
- Best policy is to run Stratesave from an account which also has Administrator access on the remote computers (same username/password). This avoids Stratesave retrying with provided credentials, which does not always work. Remote ESE98 and sometimes SQL server and Remote System State are not visible if account names/passwords do not match.
- For full backup, select the Administrative shares C$, D$ etc. for backup, which backup the entire drive. Do not backup SYSVOL share, or other system defined shares.
- For backups of remote Windows 95, 98 and ME systems, you can work with remote administration enabled, if desired. That way you can specify \\PC\C$ for backup (=C:\ drive). The C$ share is not visible immediately after reboot, even if remote administration is enabled. But after a connection is made to the ADMIN$ share, the C$ (and D$, E$ if present) share appear. If you select C$ for backup, but it is not yet enabled, Stratesave tries to pop it up, by making a connection to ADMIN$ automatically during backup.
- To backup Windows computer remotely, security settings must allow access from the backup Server. This should be Administrator access for full backups and remote registry access. Also, networked full backup including Registry and COM+ databases need the Remote Registry Service running. This service is running per default.

See also: chp. 8.9., "Network Database Backup".

chp. 8.17., "Backup to Network server disk (for example for Laptops)".

8.2. Image Backup

Stratesave supports backing up disk partition images. This is always a full backup. Only the used disk blocks are backed up. The image can be restored to the same or a different partition, which must be as least as big as backed up partition. Alternatively, images can be restored as disk files in VHD-format to be processed with VHDMOUNT or other tools.

Stratesave creates most precise image backups: VSS is used to create partition snapshot. VSS Writer Applications with files in the partition are automatically selected to participate in image creation. For System disk image, VSS System State backup image will be created.

In addition, Stratesave backs up disk headers. This is the space on disk before the first partition, usually 63 sectors. It contains boot record, disk identification and partition information.

During Restore of a partition image or disk header a dialog will be shown, where the target disk and partition numbers can be selected. There is also a final confirmation dialog before restore.

Remote Image Backup/Restore

For the remote image backup, a TCP/IP-connection will be established from the backup server where Stratesave is running to the backup client on port 5132. The firewall on the backup-client must be opened on this port, and any firewall in between, for the connection to work. Otherwise the transfer is done over named pipe connection, which is slower. For the image restore if backup client is running on recovery DVD, a dialog will be shown during restore, to manually start STSRE.EXE or STSRE64.EXE on backup client. Then Stratesave will connect backup client computer on port 5132.

8.3. Backup to Sftp-Server

Backups can optionally be stored on Sftp server. This is securely encrypted transfer over internet or local network. Sftp server can be Linux or other Unix, or Windows. Supported is SSH-2 protocol. Backups can be mixed with local backups. For example, store monthly full backups to DVD, and incremental daily backups online to Sftp-server. It is also possible to use several Sftp-servers for backup alternately.

With the integrated scheduler, backups are automatically done in background as soon as the computer is connected.

For backups to Sftp-server, define server and user under Settings. Under Backup Storage, define Sftp-Server directories: sftp:dirname specifies directory 'dirname' on Sftp-server. dirname is relative to home-directory of user, and usually is a subdirectory-name. sftp,user@server:dirname is a full name which also specifies the server and user names. Use this if backups are stored on different Sftp-servers.

The Backup Log, list of executed backups, can also be stored on Sftp-Server. If all backups are stored on Sftp-Server, it is best to store the Log also there.

When connecting to a sftp-server for the first time, the server host's SSH-server-key will be stored on the PC. For future connections, the key will be verified, and a

Warning-dialog will be shown, if the server-key has changed. This is to warn of and prevent "man in the middle"-attacks, where a different computer pretends to be the server. If Force Server certificate flag is set, server must have a valid certificate installed. Also it needs the latest SSH Server software supporting certificates with x509v3-sign-rsa key exchange protocol.

8.4. How Stratesave backs up the System State

Windows defines the System state, a set of directories and databases forming the base operating system, which should be backed up/restored together. The system state components are:

- Files in root directory, WFP-protected files (many files from \Windows\System32 directory-tree).
- System registry.
- COM+ database.
- SysVol directory tree (domain controllers only).
- Active Directory database (domain controllers only).
- Certificate Server (CA) database (Certificate Authority servers only).
- *Cluster database (cluster nodes only).

(*) Cluster database is currently not backed up with Stratesave on Windows 2000. This is used for cluster nodes only. On Windows 2003 Cluster database is backed up with VSS.

Stratesave has a single-icon-selection for System State. Stratesave supports differential backups of System State. So the full system can be regularly be backed up, still by keeping the frequent differential backups small.

For VSS Backups in Windows 2003 and later, there is also the **Service State**, which has elements important for Services of this computer, but not vital for the base operating system. These are Event Logs, IIS Metabase, and others. Service State elements can be single selected or excluded for backup.

During restore, the System State components should be restored together. But if desired, individual elements of System State can be restored independently. Boot computer in Directory Services Restore mode, before restoring system state. This is also best policy for restoring System State for a Workstation, or if directory services are not installed.

For backup of Certificate Authority (CA) database: The CA database and configuration is backed up, but not the certificate (private key). This highly sensitive

information should be backed up manually, once after the Certificate Services is installed, or when a new certificate is issued. The Certification Authority tool from Windows 2000 lets you backup the certificate to a password protected file (PKCS # 12 file, .p12 file), which can then be backed up with Stratesave. In the CA tool backup Wizard, select Private key and CA certificate for backup, but don't select Issued certificate log and pending certificate request queue. The later is the CA database, which can be backed up with Stratesave. Alternatively, you can backup the certificate with the certutil command (certutil -backupkey). When the CA database is backed up with Stratesave, be sure to also include the \Windows\System32\CertSrv\CertEnroll directory in the backup.

The **Removable Storage Manager (RSM)** database is not defined as part of the system state, but it can also be backed up and restored with the system state components. If removable storage is not used (no autoloader is installed), it is also not necessary to backup and restore the RSM database. Backing up the RSM database activates the RSM service which is normally not started.

8.5. How Stratesave backs up the Registry

The registry database is stored in files. Most of the registry is stored in files in \Windows\system32\config-directory, user parts are in user directories. These registry files are also called REGISTRY HIVES. For example HKEY_LOCAL_MACHINE\SAM-tree is stored in \Windows\system32\config\SAM.

If a registry hive file is to be backed up, Stratesave asks Windows to dump the hive contents from the registry database to a new file. This dump file is then backed up under the name of the hive file.

Often the dumped file is smaller than the hive file, because empty database stuff is removed in the process. Thats where the messages 'Size of backed up registry file differs from real file' are coming from.

Every registry hive (part of the registry) is stored in two files: Primary hive file (for example SAM) and temporary hive file (e.g. SAM.LOG). The temporary hive file is only used while the hive is loaded (active), for temporary updates. When rebooting, everything is stored in the primary hive file. Only the primary hive file needs to be backed up. In fact, when the registry is dumped, only one hive file (the primary) is created and this one is backed up. The backed up SAM-file is a registry dump, and contains all information stored in primary and temporary hive files SAM and SAM.LOG. Thats where the messages '... not backed up: Temporary registry file' are coming from.

8.5.1. How Stratesave restores the registry

See also chp. 8.5., "How Stratesave backs up the Registry". To Restore registry hive files, select them for restore as if they were normal files. Be sure that restore option 'Restore locked files and registry at reboot' is on. After restore, you will be asked to reboot the system, to replace the old with the restored registry.

To see what's in the backed up hive file without actually restoring it, follow these steps:

1. Restore the hive file to a new file
2. Start REGEDT32-program on Windows 2000/NT (not REGEDIT.EXE), or REGEDIT on Windows XP or later.
3. Select HKEY_LOCAL_MACHINE or HKEY_USERS key by mouse-click.
4. In Registry-menu, select Load hive... and specify restored hive file

8.6. SQL Server backup

Stratesave supports backup of running SQL Server 2008, 2008 R2, 2005, 2000, 7.0 databases. Backups can be full, differential or incremental (transaction logs). The backups are performed through the SQL server backup programming interface or VSS, to assure accuracy of backed up data.

For network backup of SQL Server, there are 2 possible modes: Using a remote process, or remote SQL Server function. For remote SQL Server function, the SQL Server must be configured to allow remote TCP/IP access. See chp. 8.9., "Network Database Backup" for details.

Stratesave backs up SQL server at the **database level**. Within macros, you can select SQL server databases for backup. The **master database** contains SQL server security and other customized settings. The backed up databases are stored in SQL server dump format, which is not compatible with the raw database files.

During a **full** backup, entire database is backed up. In a **differential** backup, changes are backed up, since last full backup. Differential backups are not supported for SQL Server 6.5. Optionally, differential backups can be configured to fully backup the SQL server. During **incremental** backup, only the update since last incremental backup or last full or differential backup will be backed up, keeping the backups small. Incremental backups are therefore for short-interval backups. During restore, Stratesave automatically restores the full backup, differential and all incremental backups in correct order, to recover the database to most recent state.

For incremental backups (Transaction Log backups) to work, SQL database option *trunc. log on chkpt.* must be set off on SQL Server 7, or Recovery Model must be set to *Full* or *Bulk-Logged Recovery* on SQL Server 2008/2005/ 2000. On SQL Server

6.5, database option *Truncate Log on checkpoint* must be set off, and Database Devices for Database and Logs should be different. These options must be set for every database which is backed up with incremental backups.

You can restore the databases back to SQL server, if SQL server is running. Alternatively, you can restore the backed up SQL database(s) to file(s). The resulted files can then be used as input to the SQL server **Enterprise Manager's** restore. Stratesave allows restore to new SQL database. If a new target database name specified, a dialog will popup during Restore, where the new storage file names can be chosen and confirmed.

If you want to restore master database, or restore SQL server after a full restore, see also chp. 6.9., "Full restore of SQL server".

Alternatively, SQL Server on Windows 2008/2003 can be backed up by VSS (Volume Snapshot Service) through Service State\MSDEWriter or VSS\SqlServerWriter. These are always full backups, but they can be combined with standard SQL differential and incremental backups. Sql Server Writer is for SQL Server 2008/2005 and is active only if the SQL Writer Service is started. If SQL Writer Service is running the SQL Server databases are no longer visible under MSDEWriter. To switch back to MSDEWriter usage, stop SQL Server Writer Service, set it to Manual Start and set Registry Value HKLM\SYSTEM\CurrentControlSet\Services\VSS\Settings\MSDEVersionChecking to 0.

SQL Server database with VSS full backup and standard SQL differential/incremental backups must be restored in 2 runs. First restore the VSS database (under MSDE writer or SQL Server writer) with option *Don't recover restored SQL databases*=On. Then Restore the incremental/differential SQL databases (selectable under SQL Server), with option *Don't recover restored SQL databases*=Off.

VSS backups with SqlServerWriter can be restored under new database name under the same instance. The new database must not exist already. For renamed restore, a dialog will popup during Restore, where the new storage directory names can be chosen, but the database file names remain unchanged, even if they contain the name of the backed up database. This limitation is given by SQL Server VSS writer.

8.7. Exchange Server backup

Stratesave supports backup of running Exchange Server 2010, 2007, 2003 and 2000 databases. Backups can be full, differential or incremental. The backups are performed through the Exchange server backup programming interface (ESE98) or VSS, to assure accuracy of backed up data (Exchange 2010 only VSS).

Exchange backup through ESE98 interface

For network backup of Exchange Server, there are 2 possible modes: Using a remote process, or remote Exchange Server backup function. For remote Exchange Server backup functions, ESEBCLI2.DLL must be copied to backup server from Exchange Server. Also remote backup of Exchange Server must be enabled for Exchange Server 2007. See chp. 8.9., "Network Database Backup" for details.

Stratesave backs up Exchange server at the **database level**. Within macros, you can select local or remote Exchange Server server for backup. Exchange Server 2007/2003/2000 is shown under ESE98-tree. ESE98 is a backup protocol used by Exchange Server. If installed, other ESE98-compatible databases can also be selected under that tree.

During a **full** backup, entire database is backed up. In a **differential** backup, changes (database logs) are backed up, since last full backup. Optionally, differential backups can be configured to fully backup the Exchange server. During **incremental** backup, only the update since last incremental backup will be backed up, keeping the backups small. Incremental backups are therefore for short-interval backups. During restore, Stratesave automatically restores the full backup, differential and all incremental backups in correct order, to recover the database to most recent state. Exchange server does not allow both incremental and differential backups in backup plan. Only incremental or differential backups can be done, not both.

During **Restore**, select the Store or Storage Group, and also select the corresponding Logs-folder (with the .log databases) under the Storage Group.The Logs are common for all Stores per Storage Group. The Logs-folder must be selected if any Store from the Storage Group is being restored.

Restoring to **Exchange Server Recovery Storage Group** is supported, for local and Network Backup. This allows extracting single mailboxes, for example if it is necessary to recover deleted mails. See Exchange Server or online documentation for details on how to use the Exchange Server Recovery Storage Group.

Exchange backup with VSS

Exchange Server 2010/2007/2003 can be backed through VSS. Exchange 2010/2007 VSS backups also support incremental backups. Stratesave is VSS Exchange Server 2010/2007 aware and supports Exchange Server 2007 VSS restores to a different storage group or to a recovery storage group. Exchange 2010 databases can be restored to different database or to recovery database. For this to work, the new target storage group and target database must be created in advance and Powershell 2.0 needs to be installed on Exchange Server. Select the database or storage group to restore, and with right-mouse-click choose Restore to alternate directory/database... In the dialog, modify the target to point to new name.

If needed you can also restore the backed up database(s) to file(s), for manual processing.

8.8. Exchange Server- and SQL Server incremental backup

Stratesave supports incremental backups (transaction log backups). These purely incremental backups contain only the changed data since last incremental backup (or last full/differential backup, if it is first incremental backup).

Why incremental database backups?

The standard full or differential backups are normally run only once per day, which usually is sufficient for pure file data. For database data though, it can be important to recover to a more accurate installation after a crash. If SQL server completes a transaction, and crashes later in the day, it may be important to recover to a state which contains this transaction. Best is to recover to the exact state before the crash, or at least to a state as close as possible. The same applies to Exchange server. If the Exchange server has received an email, the sending side takes it for granted that this email will eventually be received and read. The loss of email messages, which have been received but not yet read, and which have not been backed up, can possibly hurt business relationships.

Here the database incremental backups can help you. Since they contain only data added or updated since last incremental backup, incremental backups are small, and can therefore be repeated very often, to keep the critical "time window of potential data loss" very small. Incremental database backups can for example be repeated every 30 minutes, every 10 minutes, or even more often (to once per minute shortest interval). Incremental backups contain typically 5MBytes of data for Exchange server, and 1MBytes or less for SQL server per database, depending on how much data changed since last incremental backup. These figures can be smaller if compressed backups are used. If for example, the Exchange server is fully backed up once per week, with incremental backups every 5 minutes, approx. 5*12*24*7=10'000 MBytes=10GBytes space is required to store the incremental data. This can easily be stored on a single hard drive. SQL server supports incremental and differential backups. A useful combination there might be weekly full backups, daily differential backups, and incremental backups every 5 minutes. In this case the incremental data must be kept for only one day, saving disk space. Exchange server unfortunately supports only differential or incremental backups, not both in the same backup plan. This means either full Exchange backup every night, or every week but more disk space must be reserved for the incremental backups, because they cover updates since last weekly backup.

VSS incremental backups

VSS (Volume Snapshot Service) databases can also be selected for incremental backups, but only those VSS writer which support incremental backups. For example VSS Exchange supports incremental backups, while VSS SQL does not.

Incremental database backups and VSS full backups

Incremental SQL Server backups can be combined with VSS (Volume Snapshot Service) full backups (MSDEWriter, SqlServerWriter).

Restore from incremental database backups

Incremental database backups are also listed in Log, and are therefore fully kept tracked of by Stratesave. If a database is selected for restore, Stratesave automatically restores the full database data, differential data, and all incremental backups in the right order. The database is restored to most recent state automatically. If desired, the process can also be done "manually", and individual differential and incremental backups can be restored to the database as desired. Optionally, the backups can also be restored to file, for further processing with other methods or database tools.

Databases with VSS full backup and standard differential/incremental backups mustbe restored in 2 runs. First restore the VSS database with option *Don't recover restored SQL databases*=On. Then Restore the incremental/differential SQL databases (selectable under SQL Server), with option *Don't recover restored SQL databases*=Off.

Backup storage for incremental database backups

Incremental database backups can be stored on fixed disk only. But they can be combined with differential or full backups to tape or removable disks. All incremental database backups are stored to same directory, until a full or differential backups with same database is done. Then the incremental database backups are stored on next directory in rotation scheme. For incremental database backups, the rotation is done around the basing full or differential backups.

8.9. Network Database Backup

Stratesave supports databases backed up remotely. This works even if the server Software is not installed. For example a Windows XP Professional can fully backup a Windows 2008 or 2003 Server or Advanced server with SQL and Exchange Server databases. Administrator access is needed for Remote backup of SQL or Exchange Server.

8.9.1. SQL Server

For network backup of SQL Server, there are 2 possible modes: Using a remote process, or remote SQL Server function. This can be selected in SQL Server Backup Settings (in left pane under Settings). The remote process uses more overhead, but works sometimes where remote SQL functions do not, because SQL Server backup is started locally on the machine with SQL Server. Per default, SQL Server function is used.

Additional info on remote SQL Server function

Stratesave uses ODBC32 driver, which is included with Windows. It is not always possible to provide remote access username/password, so username/password on Stratesave backup computer should match with SQL server. Also the SQL Server must be configured for remote TCP/IP access, and the backup Server where Stratesave is run should have actual version of SQL client connectivity (MDAC) or the latest Windows service pack installed. There are also firewall port settings to be configured for remote SQL Server access (TCP port 1433, UDP port 1434, program sqlservr.exe, see SQL Server documentation for details).

Additional info on remote Process

This sometimes does not work if the SQL Server runs under System account, where Access is denied. If this happens, try running SQL Server under a different account, or use remote SQL Server function.

8.9.2. Exchange Server

For network backup of Exchange Server, there are 2 possible modes: Using a remote process, or remote Exchange Server backup function. This can be selected in Exchange Server Backup Settings (in left pane under Settings). The remote process uses more overhead, but works sometimes where remote Exchange functions do not, because Exchange Server backup is started locally on the machine with Exchange Server. Per default, remote process is used for restore, full backups and differential backups, but not for the very frequent incremental database backups.

Additional info on remote Exchange Server function

Stratesave uses edbbcli.dll for Exchange Server 5.5, esebcli2.dll for Exchange Server 2007/2003/2000 (ESE98). These dlls don't come with Windows, but they can be copied from Exchange server to backup server (\Windows\System32 or Stratesave program directory). It is not possible to provide remote access username/password, so username/password on Stratesave backup computer should match with Exchange server. For remote backup of Exchange Server 2007/2003/2000 selecting server with

IP-address currently does not work, so servername must be specified instead of server's IP-address.

For Exchange Server 2007, remote backup of Exchange Server must be enabled on the Exchange Server computer. Create registry DWORD Value HKLM\System\CurrentControlSet\Services\MSExchangeIS\ParametersSystem\Enable Remote Streaming Backup, set it to value 1. If the backup computer where Stratesave runs is 32-bit, but the Exchange Server is 64-bit, copy ESEBCLI2.DLL from 32-bit Exchange version to backup server. Similarly, if Exchange Server is 32-bit but Backup Server is 64-bit, 64-bit ESEBCLI2.DLL from 64-bit Exchange installation is required on backup Server. Use the latest ESEBCLI2.DLL from Exchange Server 2007 for backup/restore of Exchange Server 2007.

If problems occur during remote database backup or restore, please check first that logged in username/password has remote Administrator access on the remote computer to be backed up or restored. Also check for Eventlog-messages on SQL/Exchange Server.

See also: chp. 8.1., "Network backup with Stratesave".

8.10. VSS / Open File Backup

Open File Backup is supported for local and Network backups (not for Windows 2000). It uses **Volume Snapshot Service (VSS)**, which is built in Windows.

At start of backup, a Snapshot is taken of all disks to be backed up. The Snapshot is then backed up. This has the advantage, that the state of all backed up files is taken at the same time. Stratesave also backs up the System State "VSS-aware", following the VSS guidelines.

VSS Writers can be selected for backup under VSS-database tree. For example Exchange Server, SQL Server have writers and are therefore selectable under VSS. SQL Server databases are selectable under Service State\MSDEWriter. If the SQL Writer Service is running, SQL Server 2008/2005 databases are under VSS\SqlServerWriter. Backups of VSS databases are currently always full backups, but SQL Server VSS full backs can be combined with normal differential and incremental SQL Server backups.

While **VSS databases** are backed up as files it is not sufficient to select for backup only the directories where databases are stored. Only if the databases are selected under VSS tree there is the correct snapshot which is created in cooperation with the writers. If the VSS databases and the corresponding files/directories are both selected, there is no duplication in backup, each VSS database internally points to its database file(s). So it is possible to select entire drives and the VSS databases.

During *Disaster Recovery*, where in the first step the partition images are restored or all files and directories with System State, it is often not necessary to do the second

restore step for the VSS databases, because the database data is already restored with the files and the configuration is also restored with files and registry.

Open File backup can be enabled in Dialog *Backup parameters*. Optionally, you can revert to normal backup if Snapshot cannot be created.

To build and maintain a Snaphot, backup privilege is required and enough free disk space must be available. If not enough disk is available, Snapshot automatically terminates during backup, and backup fails on error.

8.11. Disaster Recovery

Disaster Recovery (fully restoring a System without reinstalling Windows and Stratesave) needs a Windows PE (Preinstall Environment) CD/DVD to boot from. This can be Vista PE or Windows PE 2.0, Bart PE (for Windows XP+2003). Stratesave.exe can be run from PE environment. For network disaster recovery where Stratesave runs on a different computer, you will be prompted to start STSRE.EXE on the target computer.

Disaster recovery is naturally done from Image backup, but Stratesave supports Disaster recovery from both Image backup and File backup with System State. This works because file backups are precise: NTFS specialities (Security, Links, Streams, Sparse Files etc.) are included in backup.

The first step is usually to Restore Disk Header or partition target drive.

Then Restore the system partition and other partitions.

Remarks

Stratesave also supports the ASR (Automated System Recovery) procedure with prepared floppy on Windows 2003+XP, but this is rarely used.

Removable Storage Manager (RSM) for tape autoloaders can't be used in Windows PE during disaster recovery for local restores. Tapes and tape autoloaders can be used in SCSI direct mode.

On Windows PE 2.0, use NETSH-command to configure Network and NET-command to to map remote-drives. BartPE and VistaPE have tools included for that purpose.

On Windows 2003, if MSDTC service fails to start or system spends very long time with "Applying computer settings..." during reboot, run command MSDTC -resetlog from the command prompt in safe mode.

8.12. Encrypted backups

Stratesave allows backups optionally to be stored encrypted. The reason to store backup encrypted, is that backup media, especially tapes and removable disks, can easily be stolen or copied. The backups very often contain confidential data. If someone has access to a backup media where backup is stored encrypted, he/she can copy or destroy the media, but can not retrieve the data, without also having the encryption key. Encryption is done for the backup data. The catalog is encrypted, if it is stored on tape or removable disk, but remains unencrypted, if stored on fixed disk or network server disk. The Log (list of executed backups) is also stored unencrypted..

Public/private key encryption

Stratesave encrypted backups are encrypted with a public/private encryption scheme. For the backup, only the public key is required. For automatic backup, the public key is used very often, and can be stored in system stash or in a file (see also backup programs commnadline parameter /ENCRYPTKEYFILE=). If someone manages to get hand on the backup tape, and also somehow reads the stored encryption key, he/she still can not retrieve the backed up data. For the restore, the private key is required to type in. Since the private key is only needed for the restore (and for the file-compare), it can be kept secretly in a safe place.

What to choose for key?

The (private) key is sort of a password or passphrase. A key can be specified as a string of uppercase and lowercase letters, decimal digits, the underline character, and the dot character (A-Z,a-z,0-9,_,.). The key should be larger than a usual logon-password, because a key cracker who already has your backup can try out lots of possible key combinations in short time, without you noticing. A key that provides optimal security is made of 20-22 or more completely random characters. Stratesave has a builtin random key generator, through Random-button in Key-input-dialog.

Random generated keys are hard to remember, so you probably must write it down somewhere. Alternatively, you can choose a passphrase as your key, up to 255 characters are significant. Because the passphrase is not purely random, it should be made of lots more than 20 characters. Spaces are replaced by underline-characters. A possible passphrase is "I_live_in_a_beautiful_green_house_near_the_beach.". This is something you possibly can remember.

Whether you choose a random key, or a textual passphrase, it is important to not lose or forget your key. Otherwise you won't be able to restore your data, and nobody can help you out. Even having the public key does not help, because that key is used to make backup only.

What algorithms does Stratesave use for encryption?

Advanced encryption technologies Elliptic Curve, SHA1, AES Rijndael.

How to maximize security?

Now that someone can't retrieve the data, even with the public key used to make the backups, he/she can try to replace your public key, with a different public key, let you make the backup with their public key, and then copy or steal the tape later, after you then make the backup. This is of course more difficult than simply reading the key. Still, it's best for you to give only trusted people access to your PC. If you are suspicious someone might have changed your public key, you can restore some files from lates backup, or make file-compare after backup, which requires private key. If the operation succeedes, backup was made with the correct public key.

Summary:

Public/private key encryption is a powerful tool, but standard security measures (keep your PCs, backup media and public key secured) should still be followed. Utmost care must be taken to protect the private key, to 1. not lose it, and 2. nobody else can get hands at it.

How to get the public key from private key, and vice versa?

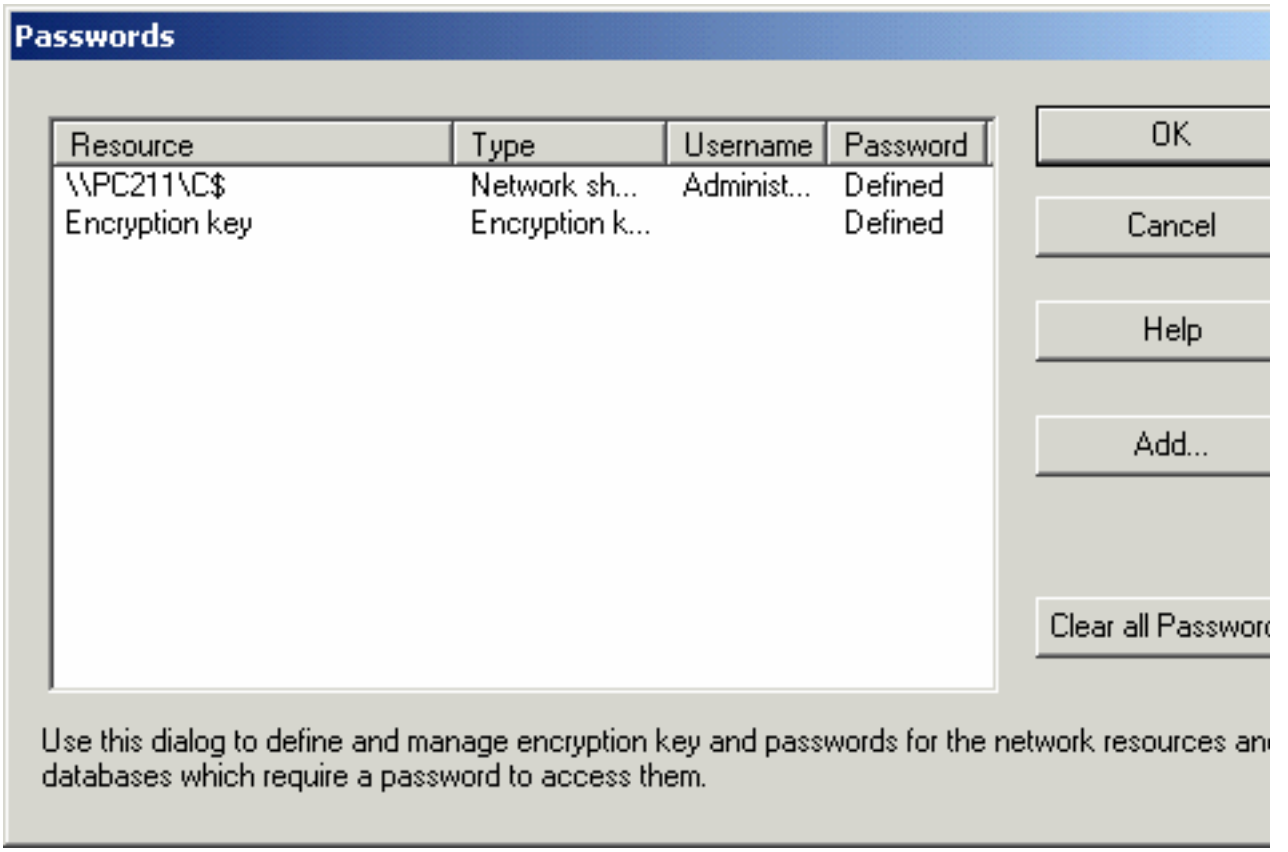
The private key is the random key you define. Each private key has a fixed assigned public key. To get the public from private key, go to menu Special->Passwords/Encryption key. Then Pushbutton Add..., select Encryption key. In the input field, type your private key, press Key Info... leads to dialog Encryption Key Info, which shows the public key. You can copy/paste or print it from this dialog.

Although public key is followed from private key, the invers cannot be calculated. It is impossible to get private key from public key. It is important to keep the private key, which is required for the restore, stored secretly and safely.

See also chp. 8.14., "Where the passwords/encryption keys are stored".

8.13. Dialog Passwords/Encryption key

Start from Menu *Special -> Passwords/Encryption key...*. Here you can add/edit/remove the stored passwords and encryption key in the Stratesave password list. Stratesave optionally saves the password it needs for network and database access.



The listview shows all stored passwords, with Resource name, type of resource, username, and a flag if the password/encryption key has been defined, defined for temporary storage, or not defined. You can double click on the listview item to edit its password, or click with right mouse button to popup a menu where you can choose to edit/clear password, or remove entire entry. Dialog button *Add...* defines a new entry into list, button *Clear all passwords* clears the passwords, but leaves the entries in list. Press *OK* to make the changes permanent.

See also chp. 8.14., "Where the passwords/encryption keys are stored".

8.14. Where the passwords/encryption keys are stored

Stratesave stores the saved passwords/encryption keys for user Administrator and System in system stash, which is designed for storing critically secret data, to be protected from ordinary users. If Stratesave is run from a non-administrative user-account, passwords are stored in registry. They are stored in the user registry part, so the ordinary users can't read or modify each other's passwords. The passwords are stored scrambled, but not fully encrypted.

For backup encryption, only the public key is stored, which can be used for backup only, not for restore.

8.15. Backup to CD/DVD

In Stratesave macro definition, select Removable disk as Storage media for backups to CD/DVD, and specify the volume names for backup rotation. CD/DVDs are somewhat more delicate than ordinary removable disks. One of the problems is data underrun, which occurs when there is no more data available while the CD is being written to, and makes the CD defective when it occurs. For network backups (and local backups to a lesser degree), a CD/DVD drive with burn-proof or other underrun-safe technology is recommended. The modern drives nowadays have this builtin. Another problem is overheating of drive or CD/DVD. If burning several CD/DVDs on the same drive one after the other, it might be best to wait a few minutes before burning another CD/DVD, to let the drive cool down.

Stratesave has builtin engine for backup to CD/DVD. Alternatively, access through 3rd party packet driver Software is also supported.

Use of builtin engine is the default selection in Removable Disk (incl CD/DVD) device and settings. Stratesave supports backup to DVD+RW, (DVD-RW), DVD+R, DVD-R, CD-RW, CD-R. DVD+RW is preferred reusable media and does not need blanking when reused. Backups can be extended over several CD/DVDs (multi volume backup), and multiple CD/DVD drives can be used. The backup can be unattended with multiple drives and volumes. Just put the DVDs into the drives before backup starts. The builtin engine always overwrites CD/DVD from the beginning, automatically blanking or formatting the CD/DVD if necessary. Non-rewritable CD/DVD+-R media can be used for a single backup only. The builtin CD/DVD driver-engine uses the SCSI passthrough interface (SPTI), which requires Administrator rights.

When using third-party packet-writing Software which allows to copy files to a CD/DVD like a normal removable media, Stratesave has some additional options to leave free space on disk, or ask for reformatting the disk when reused. These can help for stable CD/DVD backups with packet-writing. The packet-writing Software also must allow to write large files, because entire backup on CD/DVD is written as a single file.

Backup to CD/DVD-R or CD-RW/DVD+RW?

Stratesave has builtin rotation scheme, where the backup media is periodically rewritten. Therefore the rewritable CD-RW/DVD+RW is the more natural choice for backups with Stratesave. CD/DVD+-Rs are probably best for for longer periods, e.g. monthly to yearly backups. CD-RW/DVD+RW are best for daily and weekly (possibly monthly) backups, which are overwritten more often. DVD-RW are supported, but not recommended, because they need lengthy blanking operation everytime when reused. Better use DVD+RW, where this step is not necessary.

Backup over multiple CD/DVDs

Stratesave allows backups to extend over multiple CDs / DVDs. In Macro Editor's dialog Backup storage, you can enter a list of volume names into each field for removable disks, separated by blank or comma. When first volume gets filled, and a second volume has been specified in list, Stratesave will continue backup on the second volume. Dito for 3rd, 4th volume etc. When no continuous volumes are defined with macro, volume names are automatically generated.

See also: chp. 4.8.2., "Removable disk-device and ".

8.16. Backup with Tape Autoloader

When Stratesave needs a tape during backup or restore, instead of showing a dialog asking to put the tape into drive manually, it passes the request to the autoloader, which then moves the tape from defined storage slot to the tape drive. When the tape is no longer needed by Stratesave, it ranges it back to its slot.

Stratesave supports 2 modes for using tape autoloaders. Either through Windows Removable Storage Manager (RSM) service. The other mode is accessing SCSI tape autoloaders directly, without RSM. Normally RSM is used to manage Autoloaders, so this is recommended selection.

Autoloader and RSM

Windows has the Removable Storage Manager (RSM) builtin. RSM takes control over all autoloaders on the system. Applications which need a tape can then pass the request to the RSM, instead to the autoloader directly, so several applications can share an autoloader. The RSM service has its own controlling interface (Control Panel->Administrative Tools->Computer Management->Removable Storage).

On Windows Vista and later, RSM is not installed by default. To install RSM, go to Control Panel->Programs and Features->Turn Windows features on or off, and set Checkbox for Removable Storage Management. This step will install RSM and ntmsapi.dll.

RSM supports Barcode scanners, Cleaner cardridge management, Media Pool Security, and Offsite Storage. These are handled entirely by RSM, and are not influenced by Stratesave. If needed, these features can be configured through RSM controlling interface.

RSM organizes tapes in media pools. Stratesave enters its new tapes or Stratesave tapes from Import media pool to media pool Stratesave\Device-type (e.g. Stratesave\4mm DDS). Stratesave also recognizes its tapes from other media pools, so you can move tapes to another media pool, and define a different organization of pools and tapes if desired.

Stratesave automatically installs the DLL STSMLL.DLL/STSMLL64.DLL to RSM, which is necessary for RSM to recognize Stratesave labelled tapes. This is done automatically when Stratesave tape is mounted by RSM, but it requires Administrator privilege. If you want ordinary users to be able to backup to RSM managed tapes, Administrator must mount a tape with RSM at least once.

Normal unprivileged users can use tapes mounted by RSM for backup, but with default RSM security settings, tapes must be initialized by Administrator, and tape option *Initialize media during backup automatically when needed* does not work for normal users.

RSM can't be used during Disaster Recovery for local restores. Autoloaders must be accessed in direct SCSI mode, or tape must be put into drive manually during Disaster Recovery.

SCSI Autoloader directly accessed

Stratesave allows SCSI tape Autoloaders to be accessed directly. Usually the best is to use RSM instead. Direct access might be best if either Autoloader is shared with another application, which requires RSM to be turned off, or if it is only used by Stratesave, and the direct access, which usually works with less tape mounts, is preferred. For this to work, Removable Storage Service must be set to Disabled. RSM service can be turned off as follows. From Control panel, go to Administrative Tools -> Services. Find service Removable Storage (Service name NtmsSvc). Stop the service, and change Startup type from Automatic to Disabled. Please note that services Remote Storage Media and Remote Storage Engine depend on Removable Storage Media, and can't start if RSM is disabled. These services are used to automatically migrate rarely used files from disk to tape, and recover them in case they are still accessed. These services can't be used if RSM is turned off.

The slot-number of the volume is defined in the same dialog with the volume name. Autoloaders with barcode scanners are supported, but Stratesave makes no use of the barcode scanner, since the slotnumber is defined in macro, and therefore known to Stratesave. Stratesave can handle simple problems automatically, for example if a tape is not ranged after backup, and next backup is stored on another tape, Stratesave will then range the previous tape first, before the current tape is loaded from its slot. If Stratesave can't find the defined tape in its slot, or it doesn't know where to range a tape which is already in drive, or if the autoloader is malfunctioning, backup is halted, and the problem will be shown in an error dialog. It is important that every tape has its volume name, and its slot number labeled on the cover, so in the worst case the tape can be ranged manually.

You can combine loading tape with SCSI autoloader and manual inserted tapes. If you don't specify a slotnr for a given tape volume, Stratesave prompts you to insert

tape during backup. Manual tape mount is useful for rarely used tapes, e.g yearly backup tapes, while the frequent daily and weekly tapes are handled by autoloader.

See also: chp. 4.8.1., "Tape device and settings".

8.17. Backup to Network server disk (for example for Laptops)

Stratesave can be used to backup a computer, and store the backup on the disk of a nework file server. The backup is run on the computer which is backed up. This is the contrary of Network backup with Network Agent, where the backup clients are included in the backup which is run on the server.

Backup to network server disk is for example useful to backup Laptops, which are not always or even rarely connected to the net. The Laptop user can connect the laptop to the network and run the backup from the Laptop. This can be a full-backup if the Laptop is on a fast connection and connected long enough, or a differential daily backup from a modem VPN connection.

Another scenario would be to backup desktop personal computers, where the desktop users want to have client-controlled network backup with maximum influence in the configuration and run of their backups.

For setup, the Client computer user must have a user account on the backup server. This should be a normal unprivileged account, possibly with interactive login disabled. Several users can share an account, but for security it is better to give each laptop owner his/her own account on the backup server. The backup directories, owned by the backup accounts, are then shared on the network. The backup server can be a Windows machine, or Unix / Linux Sftp-Server or with Samba.

On the client-side, the Log-directory specified (where list of executed backups is stored) should point to the backup server, in the UNC form \\backupserver\sharename\backupdir, or to the Sftp-Backup server. The Log is an important signpost for the Restore, so it is best stored on the backup server. The backup-storage-directories are also best in UNC-form, pointing to the backup server. The macro (backup plan) is preferrably stored locally. It must be stored locally if Stratesave is installed as a service on the Laptop, because it must be available when service starts.

If the network directories are specified in UNC form (\\backupserver\share\...), Stratesave will prompt for the network access password if needed. This also works when the backup is installed as a Service.

About Licensing

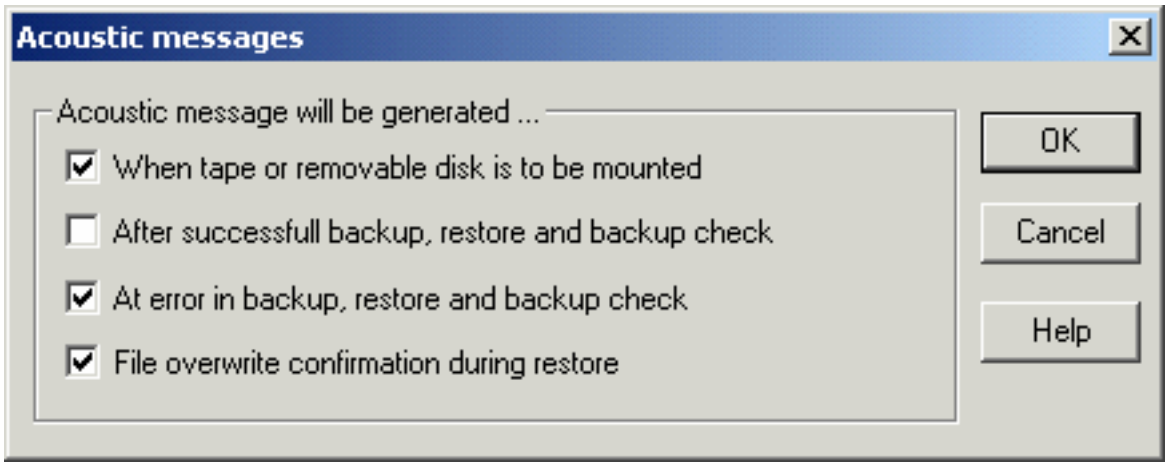
One Stratesave licence is required per computer where Stratesave is installed, so backing up client-controlled to Network server disk as described requires one licence

per backed up computer. Network backup with Network Agent, where Stratesave is not installed on the backup clients, requires only Stratesave Server+Network, independent of number of backup clients.

See also: chp. 8.1., "Network backup with Stratesave".

8.18. Acoustic messages

Backup- and restore programs generate an acoustic message in certain situations. You can set the acoustic function in dialog *Acoustic messages.* Dialog is started with command *Acoustic messages...* in menu *Options*.



- **When tape or removable disk must be mounted**
  An acoustic message will appear, when is be asked to enter a tape or disk into drive. If mounting is done by an operator or automatic media changer, there will be no acoustic message.
- **After successful backup, restore or backup check**
  An acoutic message will be generated, when a backup, backup check or restoration completes without error.
- **After error in backup, restore or backup check**
  An acoustic message will be sounded, if a backup, backup check or restore terminates with an error. If operation is cancelled by user, there will be no acoustic message.
- **File overwrite-dialog during restore**
  An acoustic message will be generated, when user is asked during restoration, whether a file should be overwritten or not. Dialog is explained in chp. 6.6. " Confirmation dialog for *Ask*-option".

OK or *Cancel* quit dialog. The new settings are valid with *OK* and will be maintained between backup and restore sessions.

8.19. Backup file names

Backups are stored under the filenames **Macroname_PeriodPeriodnr_rotationnr.**STS. **Macroname** stands for macro, the backup plan. Per default, macroname is equal to the network name of PC. **Period** is one of following letters: Y (yearly backup), S (semester backup), Q (quartal backup), M (monthly backup), W (weekly backup), D (daily backup) or H (hourly backup). **Periodnr** is a number to differentiate backup of same period length, for example Daily Backup 1 and Daily Backup 2. **Rotationnr** is a number between 1 and 12 to differentiate backups of same period (see chp. 4.5. "Backup Storage").

Sample: The first daily backup on fixed disk will be stored in server file MYPC_D1_1.STS, the second in MYPC_D1_2.STS etc.

The Catalog, which is the catalog containing additional file information, and exact location of file in backup, is stored in file with extension .STC file, but otherwise the same name as backup file.

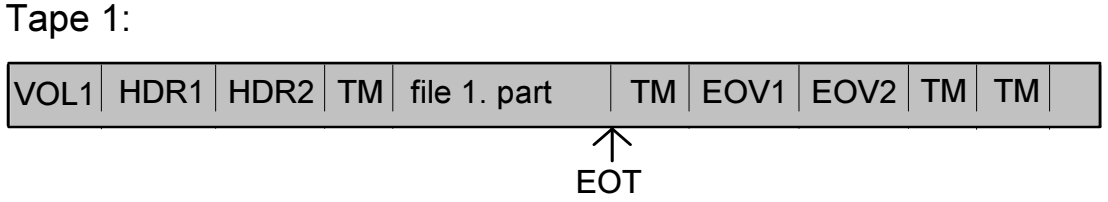
8.20. ANSI tape format

In addition to pure data, **labels** (control blocks) are written on tape. There are some big advantages in using ANSI-format:

- Files (for Stratesave, backups) can be extended over several tapes
- Tape name, which must be different for every tape, is stored in the first label (volume label) on the tape. This is a protection if by mistake the wrong tape is entered into drive.
- Names and dates of files on tape are stored in labels.

Labels are blocks with a size of 80 bytes. For tapes which support only fixed block size, the labels have the tape's block size instead of 80.

Labels for a backup which extends to 2 tapes:



Backup, extending over 2 tapes, with data- and control blocks

TM = Tape mark, also named end of file mark. Two tape marks one after another indicate end of data on tape.

VOL1 = Volume label, contains tape name. Volume label is placed at beginning of tape.

HDR1 = File label 1, also named header label 1. Contains name of following file

HDR2 = File label 2. Contains additional file information.

EOF1 and **EOF2** (End Of File labels) mark end of file

EOV1 and **EOV2** (End Of Volume labels) mean that tape is full and data continues on next tape.

EOT = End of tape. This is a fix hardware mark near physical end of tape. If, during write, the EOT mark is passed, there will still be enough space on tape to write the EOV-labels.

In the example shown, part of the file is on tape 1, rest is on tape 2.

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Glossary

Backup file

File containing a backup. The backup file is stored on a fixed disk, on one or more tapes or on one or more removable disks.

Backup period

Time width, according to which a backup with the same settings is repeated. With Stratesave, you can define hourly, daily, weekly, monthly, quartal, semester and yearly backups. Special periods can be defined for SQL Server and Exchange Server Incremental backup.

Backup plan

For a regular backup, it is inevitable to follow a backup plan. The plan contains information about backed up files, backup periods, backup storage, tape rotation and more. Stratesave has a macro editor, which makes it easy to create and edit the backup plan. The plan is stored as a macro on PC.

Catalog

List of backed up files and directories. Compared with log, Catalog is a more detailed list, where all files are listed with file dates and attributes. Catalog is stored with backup, and can be loaded with restore program. Optionally for backups to tape or removable disk it can also be stored in a separate file in log directory. This allows to view list of backedup files, without mounting tape/removable disk containing backup.

Checksum

Unique number, which is calculated from an amount of data. With the checksum, it can later be checked if the data is still correct. Stratesave adds a 32-bits checksum to every backed up

PC-file. The checksum is generated with the modern CRC-method. During restoration or backup checks, errors detected by checksum will be displayed.

Client

Computer, which demands a service from another computer. With Stratesave Server and Network, the backup clients are remotely backed up, without prior installing Software on them. The backup clients can also be Server versions of Windows. A backup server with Windows XP can remotely backup Windows 2003 servers as backup clients.

Differential backup

In a differential backup, the files that are already saved in a previous backup are skipped. That means only the new or changed files will be backed up. In a differential backup, all files changed since last backup with longer period are backed up. As an example, a differential daily backup does not backup files, if they are already contained in a weekly, monthly, quartal, semester or yearly backup. Stratesave supports differential backups for files and databases.

Disaster Recovery

Setting up a system again from backup after the system disk gets lost. Stratesave supports local and remote disaster recovery, without reinstalling the system first.

Image Backup

Backing up raw disk partitions.

Incremental backup

In an incremental backup, only the changes since last incremental backup or last differential or full backup are saved. For the restore, the whole chain of incremental backups must be available. Stratesave supports Differential backups for files and databases, and purely incremental backups for SQL and Exchange server databases. Purely incremental backups of databases allows for very frequent backups (e.g. once every 10 minutes), because the backups are small since they contain only changes made since last incremental backup. This allows to restore the database almost up to date in case of crash, which can be important in some environments.

Log

The log belonging to its macro contains list of executed backups. Every backup is listed with its backed up directories, backup time, location of backup and other information. Log is an important sign post for restore program. Restore program restores backed up files with help from the logfile. Log is stored in filename *macroname*.STL, in log directory which can be specified in backup plan definition.

Macro

Macro is the backup plan. It is stored in file macroname.STM. It contains defined periods (daily backup, weekly backup etc.) with directories to be backed up and further definitions. Macro can be created and modified with the macro editor.

Restore disk

A floppy disk, which allows you to restore after a PC crash, without installing Stratesave. The ASR restore disk allows disaster recovery of Windows 2003 and XP without reinstalling Windows. The file README.TXT on disk explains its use for restoration.

Windows 2008 and Vista require a prepared Windows PE 2.0 CD/DVD, instead for ASR disaster recovery.

System State

Set of files and databases (Registry and others), forming the operating system base, which should be backed up together. Stratesave has single selection for System State. There is also the Service State, for base service elements.