



SATbill Server Sizing

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Revision Chart

This chart contains a history of this document's revisions.

Version	Primary Author(s)	Description of Version	Date Completed
June 2014	Louise Jones & Adrian Elson	Initial document	01.06.2014
Feb 2015	Louise Jones & Adrian Elson	Updated for VM and 64-bit operation	19.02.2015
March 2015	Louise Jones	Updated for 4D version 14.	16.03.2015
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1. Introduction

1.1 About this document and its intended uses

This document is intended to help new SATbill customers prepare for a SATbill implementation. It describes the necessary pre-requisites for a SATbill technical installation.

1.2 Versions of SATbill covered by this guide

This guide is consistent with SATbill versions and features up to release 2.08.00 (December 2015) on Windows platforms, using 4D versions 13 and 14.

SATbill has not yet been verified on 4D v15. That will happen during 1Q2016.

2. Server and client pre-requisites

2.1 Server

SATbill is a client-server application and all the core processing takes place on a single Windows-based server. This server also manages all the data storage for SATbill, both internal in the 4D data file, and in the associated external files. The core processing cannot be balanced across multiple servers (nor has this been found to be necessary so far), so the performance is dependent on the performance of the physical/virtual server and on the density of other applications which are co-hosted with it. A 'hot standby' server may be maintained by the use of mirroring; this is discussed later.

2.1.1 Operating system

Windows Server 2008 R2 or higher, any edition, any version. 64-bit OS is highly recommended as it enables the use of much larger cache sizes, and this dramatically improves the performance of larger SATbill systems.

SATbill can be run on a virtualised server. Implementations on "VM Ware" and "KVM" virtual server managers have run successfully. We have seen issues with "Hyper-V" due to the interaction between 4D Server and the VM manager, which has generated very high CPU loading. There are some ways to mitigate this, so if you must run SATbill on a Hyper-V virtual server please contact Symbiosys to discuss options for ensuring the performance is acceptable and that other server applications are able to access sufficient CPU time.

Note that for large SATbill systems (greater than 250,000 CDRs processed per month) we strongly recommend you run on a dedicated physical server and not on a virtual server as the performance is normally better.

Standard 4D Server (and all versions of 4D Client) are 32-bit applications, but using 64-bit server hardware and server operating system (Windows 64-bit editions) will improve SATbill's performance.

4D v14 offers a specific true 64-bit server edition. This is highly recommended for large SATbill installations as the increase in available cache memory can give a significant performance improvement in the intensive tasks, such as in the billing run.

The server chosen to run SATbill should not be running any other intensive tasks. The heaviest use of the server is, of course, during the monthly billing processes. Whilst the overnight "Hot Billing" process also uses significant server resources, this usually runs outside the normal working day and is a shorter task than the monthly billing. At other times the SATbill server loading is low.

2.1.2 Processor

Minimum four cores with 2.3+ GHz processor(s). SATbill will utilise multiple processors and cores. 8+ cores recommended for very large systems.

2.1.3 Memory

On a 32-bit OS 4GB is recommended (the maximum on a 32-bit OS).

If you are running a 64-bit OS then we recommend:

- a minimum of 8GB on a dedicated (non-virtualised) server

- at least 16GB if your SATbill system is large
- and 24+GB for very large systems (>750,000 CDRs per month)

If the server is virtualised, then the physical server should have at least twice the RAM detailed above, with the same minimums as above allocated to the SATbill virtual server, along with at least 4 virtual CPUs.

2.1.4 Hard disk

About 1GB of space is required for the installation of the 4D Server application. This normally resides on the standard OS disk.

The SATbill data and index files must have the fastest possible access from/to the server, so always place them on your fastest disk array with the highest channel capacity and IO rates. In larger systems the SATbill files should not be on the same physical drive or array as the OS installation.

RAID is recommended for both performance and resilience, and is highly recommended to lower the risk of disk failure. RAID 5 for performance is highly recommended for large SATbill installations (>250,000 CDRs per month). A high-performance RAID controller is required, so ensure this is specified when defining the server. The controllers typically shipped in low-to-medium-performance servers have been found to be insufficiently powerful when handling SATbill's intense IO during the billing and 'hot billing' runs. Using a high-performance controller has a dramatic impact, reducing the billing run durations by up to 75%.

A solid state drive (SSD) is recommended for maximum performance from large SATbill systems.

The SATbill data and index files (SATbill.4DD and SATbill.4DINDEX) and program files (SATbill.4DC, SATbill.4DA, SATbill.Match and SATbill.4DINDY) are usually situated within the same server folder. However you may separate the data and program files if you wish. This does not have an impact on performance. However the data file (SATbill.4DD) and the data index file (SATbill.4DINDEX) must reside in the same folder; they cannot be separated.

2.1.5 Disk space for the database

The initial system will typically require 100MB of disk to load (customers, terminals, call plans, air-time agreements etc.). The monthly CDRs & invoices will cause almost all the growth in the data and index files. Allow 120MB for each 100,000 of loaded and invoiced CDRs. For example, an expected volume of 200,000 CDRs per month will require about 3GB of additional disk space per year. CDR volume is, by far, the biggest driver of disk space.

In the current release of SATbill there is no provision for the archiving or deletion of CDRs. They are kept indefinitely in SATbill. A future release will contain the ability to define retention limits for CDRs, and offer the option of a permanent deletion after this time, or an export out of SATbill to an archival database or location. Three years' CDR retention will be recommended. Hence plan for a maximum system data file size of at least three times your annual needs.

If your stable system size is planned to be >20GB, then it is recommended you use a RAID array which supports striping of the data – RAID 5, for example.

Note that for virtualised SATbill servers you may also need to adjust (raise) the IO priority of the virtual server as SATbill's IO loading is heavy during the billing runs. Unless you do this your billing performance may be compromised.

2.1.6 Disk space for billing documents

The PDF billing documents are stored on a server location. This location is set in SATbill and does not have to be the same server which is running SATbill. Each PDF invoice document set is typically between 15KB and 200KB, depending on the billing options chosen and the call volumes. Allow 50KB per invoice for sizing purposes, so if you expect a volume of 1,000 invoices per month, you will need about 600MB a year. Normally at least seven year's invoice data will need to be stored.

You will also need space for the Word Invoices (25-30KB per invoice), Excel Traffic advices (20KB to >1MB per Excel file, depending on call volumes), and downstream CDR files (up to 100MB per customer per month, but wholly dependent on your downstream CDR volumes), if you enable these options.

Various other files are stored by SATbill onto a server location, including copies of all CDR files loaded to the system. This may use up to 500MB per year, although much less for small systems.

2.1.7 Backup

The 4D server application contains a built-in backup utility and this is used to automatically backup SATbill at a time and frequency which you may define. Daily overnight would be the usual recommended backup frequency. If you wish, you may additionally back up the system as it is being used during the day, however the on-line performance will be degraded. Users may remain logged in to the system during the backup, and all screens will remain open, however any open transactions will be paused until the backup is completed: the database effectively becomes 'read-only' during the time the backup takes to complete. This may take from 2 to 20 minutes, depending on the size of your SATbill system. In most SATbill systems this temporary interruption is acceptable as it may be scheduled outside of normal operations. If a high availability is required, then the database mirroring discussed below may be suitable.

The 4D backup (SATbill.4BK) file size is typically one quarter of the data file size (e.g. 500MB for a 2GB data file), and it must be located on the SATbill server: it cannot be on a networked drive, for reasons of performance. It may then be backed up to tape or other permanent networked storage, as you wish. To reduce the volume of the backup, the SATbill data index file is not backed up; instead it is automatically regenerated whenever 4D server is started on a restored database.

SATbill also generates a transaction log file, called a 'journal' file, and this too is backed up, thus allowing both transaction 'roll-forward' in case of a restore to a previous night's backup, and 'roll-back' from the current database position.

Typically the backed up SATbill files are then secured to a separate server or location, using your normal server backup or imaging software.

2.1.8 Database mirroring

4D Server offers an integrated solution that allows the setting up of a standby system via a logical mirror. This means that all the changes made to your primary SATbill system may be automatically applied to a 'hot' standby system, enabling you to rapidly resume operations in the event of a loss of your primary server. Using a mirror also means that the primary system is not paused when the backup process runs: instead the transaction log file is automatically closed at a set frequency, and the log file sent to the backup server. The primary system remains on-line and fully useable throughout.

A standby system using a logical mirror is not compatible with the 'standard' backups on a SATbill database since the simultaneous use of these two backup modes ('standard' and 'mirror') would lead to the desynchronization of the primary and mirror databases. Consequently, you must ensure that no 4D server backups, whether automatic or manual, are ever carried out on the operational database. On the other hand, it is possible to use 4D to back up the mirror database. For similar reasons, the mirror database must not use a 4D transaction log file as this would again cause desynchronization.

You will require a second fully licensed copy of 4D Server to run a logical mirror.

In nearly all SATbill environments, the standard 4D server backup and log file is sufficient to ensure business continuity. If you wish to explore the mirroring option for SATbill please contact Symbiosys.

2.2 SATbill client

This can be running Windows 7, Windows 8.1 or Windows 10.

Note that Windows 8, Vista and XP are not supported.

4GB RAM minimum, 8GB is recommended.

Minimum screen resolution of 1280x1024. Higher resolutions give a much improved user experience.

Minimum of 2+GHz dual-core processor.

About 1GB of hard-disk for installation of 4D Client.

2.3 Network

Minimum 100Mbps network connection.

For the PC(s) which run the monthly billing for large SATbill systems, you will obtain a significant reduction (up to 50%) in the time to complete the billing runs by ensuring these PC(s) have a Gigabit link, and that the network segment is not heavily utilised already.

This becomes especially noticeable if you are billing more than 100,000 CDRs per month, and a Gigabit link is highly recommended in this case. If you are billing less than 100,000 CDRs per month then a 100Mbps network link will be adequate, depending on your current network utilisation.