

Designing a solution

Server Architecture

CVSNT Server runs equally well on Unix, Linux, Mac OS X and Windows. Deciding which server architecture to use may depend on:

- security requirements
- performance and hardware requirements
- memory requirements
- disk requirements
- locally available administrative skills

Security Requirements

These requirements may be based solely on your authentication needs – but may also incorporate the relative security of the underlying system architecture.

Security requirements are also discussed in Part II.

chroot jail

CVSNT on Unix, Linux and Mac OS X may be set up in a *chroot jail* which prevents any hacker gaining access via the cvs server to the remainder of your system. Microsoft windows does not have a similar concept.

Authentication

CVSNT Server on Windows, Unix or Mac OS X can authenticate:

- to native operating system usernames/passwords
- to windows active directory usernames/passwords
(on unix/mac uses the *winbind* daemon: *Samba* plus *winbind* must be installed and operational)
- to CVSNT's own internal database of usernames and passwords

To use CVSNT's own internal database of usernames and passwords you must use the pserver or sserver protocols

See the section *Security Architecture* below, particularly the headings *What are the drawbacks to using server authentication* and *Why are security protocols/authentication mechanisms important* for more information

Performance and Hardware Requirements (Server)

CVSNT performs very well on even modestly configured hardware, however on Windows the server requirements are higher.

***Minimum Hardware requirements for CVSNT Server
on Windows XP Pro/2000 Pro***

Processor	Pentium III or higher. (AMD K6 is not supported)
Minimum available RAM	Typically 128Mb. 12MB per simultaneous user over minimum OS requirements. Triple this if using binary deltas. The physical memory should be at least triple the size of the largest file to be committed or checked in. Also see notes.
Minimum available Disk Space	5GB (disk must be local to CVSNT server)
Recommended disk	SCSI with RAID or SAN (iSCSI or Fibre)

CM Server requires modern server hardware.

***Minimum Hardware requirements for CM Server
on Windows Server 2003 or 2008***

Processor	Pentium IV or higher.
Minimum available RAM	Typically 384Mb. 12MB per simultaneous cvs/cvsnt user over minimum OS requirements. Triple this if using binary deltas. The physical memory should be at least triple the size of the largest file to be committed or checked in. Also see notes.
Minimum available Disk Space	Database dependant, however a minimum of 5GB is common.
Recommended disk	Database dependant, however most databases would work best with SCSI with RAID or SAN (iSCSI or Fibre)

Software Requirements

CVSNT requires a suitable operating system configuration to run.

Software requirements for CVSNT Server (Windows)**Server**

Operating System	Windows Server 2000, 2003 or 2008 recommended. Windows NT 4 SP6, 2000 Pro, Windows XP Pro or Windows Vista Business.
Optional Software	Perl 5.6.1, MySQL Server 4.1
Incompatible with	Cygwin CVS. Virus scanner should not scan CVSNT temp or repository directories ⁸ . CruiseControl CVS plugin (use the supplied CVSNT Build Integration). Nod32 Anti Virus (in particular the IMON service). Aventail AutoSocks.

Software requirements for CVSNT Client (Windows)**Client**

Operating System	Windows 2000 Pro, Windows XP Pro or Windows Vista Business recommended. Windows NT 4 SP6, Windows XP Home, Windows Vista Home.
Incompatible with	Cygwin CVS. Virus scanner should not scan CVSNT temp directories. Nod32 Anti Virus (in particular the IMON service). Aventail AutoSocks.

⁸ Be sure to read the section *Anti Virus Controls* under *Server Administration* for detailed information on virus scanner support.

Software requirements for CM Server (Windows)**Server**

Operating System	Windows Server 2003, or 2008.
Database	SQL Server 2005.

Software requirements for CVSNT (Non Windows)**Server**

Operating System	SuSE Enterprise Linux 9, Red Hat Enterprise Linux 4 or 5, Solaris 9 or 10, HPUX 11i, Mac OS X 10.3.7 or higher.
Optional Software	MySQL Server 4.1 (for Bugzilla)

Client

Operating System	SuSE Enterprise Linux 9, Red Hat Enterprise Linux 4 or 5, Solaris 9 or 10, HPUX 11i, Mac OS X 10.3.7 or higher, OS/400 V5R2 or higher.
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Server Memory Requirements

The first area of big memory consumption is during a large checkout, when using the CVSNT Server. The server may consist of two processes for each client that it is serving. Memory consumption on the child process will remain fairly small. Memory consumption on the parent process, particularly if the network connection to the client is slow, will grow to slightly more than the size of the sources in a single directory, or two megabytes, whichever is larger.

Multiplying the size of each CVSNT Server process by the number of processes that you expect to have active at one time will give an estimate of memory requirements for the server. The memory consumed by the parent process can be swap space rather than physical memory.

The second area of large memory consumption is diff, when checking in large files. This is required for binary, Unicode and ASCII (normal) files. Allow ten times the size of the largest file you will want to check in, although five times may be adequate (and three times would be the absolute minimum). For example, if you want to check in a file which is 10 megabytes, you should have 100 megabytes of memory on the machine doing the *checkin* (the server machine for client/server, or the machine running CVSNT for non-client/server). This can be swap space rather than physical memory. Because the memory is only required briefly, it is not customary to calculate the required memory for more than one such *checkin* at a time.

Note that 32 bit operating systems such as Windows and Linux have relatively low limits on the maximum usable memory that can have a serious and detrimental effect when implementing a CVSNT based Configuration Management system that must handle large (greater than 500Mb) binary files.

Server Disk Requirements

The second area to address in configuration planning is the type of disk subsystems. Critical requirements include

- speed of read
- speed of write
- redundancy
- reliability
- size

Disk: Size (Capacity)

The amount of disk space required will vary greatly depending on the type of files versioned (binary files use up space in the repository faster), the number of development streams (or branches), the frequency of changes and the size and the number files versioned.

Disk: Speed of Read, Speed of Write

The majority of disk activity generated is usually read not write, however disk systems (particularly RAID) can be significantly slower on write than read so attention needs to be paid to both. Generally high speed SCSI disks on a wide bus (eg: U320 15KRPM) are chosen over slower technologies such as SATA.

Faster disks are generally more valuable than more processors or faster processors in a CVSNT Server system. When some people have analysed the CPU activity on CVSNT server systems they have been surprised that it can be quite high. This does not mean that adding processing power will help – it means that the disks are fast enough to drive the server process. If under heavy load a CVSNT Server is not consuming most of the available processor time then it is usually because the processes are waiting for I/O completion and that faster disks or disk connectivity is required.

Disk: Redundancy and Reliability

This book and March Hare Software do not offer advice on disk reliability or redundancy with respect to capacity planning. Careful attention should be paid to the performance impact of both read and write transactions of redundant and hot swap systems.

Locally available administrative skills

If your organization has many Unix administrators but only one Windows administrator then this may influence your choice of server. The CVSNT Server does not require a great deal of administration once it is set up, however when it does require maintenance you will generally want a very fast and knowledgeable response.

Performance and Hardware Requirements (Client and Network)

The following guidelines describe the client requirements.

***Minimum Hardware and Network requirements for CVSNT Client
on Windows Vista / XP / 2000***

Processor	Pentium III or higher. (AMD K6 is not supported)
Minimum available RAM	Negligible over basic operating system requirements. Graphical interfaces such as WinCVS and TortoiseCVS require 128Mb over this for graphics libraries.
Minimum available Disk Space	5GB (disk for sandbox recommended to be local to CVSNT client, no support for network sandboxes without basic or professional support)
Recommended disk	Depends on user requirements. A slow client disk can significantly affect slow processes such as checkout and update.
Network	TCP/IP (or IP over PPP/VPN). CVSNT is compatible with wide area networks. If the network is slow then increasing compression will generally improve performance. Gigabit networking is recommended where available. If using network drives for storing checkouts (workspaces) then significantly more traffic is generated since the same information is passing across the network several times.

Security Architecture

By choosing to implement CVSNT you have chosen the most secure Open Source Version Control solution available today. Most version control solutions provide very little security choices in their protocols. When making decisions about your CVS Security you will need to decide about the security of the network traffic as well as the authentication.

Security requirements are also discussed in Part II under the heading *Configuring Network Access*.

Security of the CVS repository

Once a person gains direct access to the CVS Repository or access to the CVS “admin” commands then it is possible for them to corrupt or remove audits, including changes made to your source code and documents.

The security of this information is therefore the lowest common denominator when setting up a secure CVS environment. Administrators should be chosen carefully and should be the only ones allowed direct access to the files that comprise the CVS repository.

Security of the CVS audit logs

If you are creating any user defined audit logs using the audit plugin or using *notifyinfo* or other trigger scripts then the location that you store the audit file and the users who have access to delete or amend it will provide the parameters for its integrity.

If a security log can be deleted or amended by any user then the value of that log is reduced. This is important for text log files as well as logs stored within a database.

Proper backup of these log files also need to be taken into consideration when planning your CVS security.

Why are security protocols/authentication mechanisms important

The authentication mechanism is separate to the other functions of the CVSNT Server. Until you successfully log on you cannot use any of the more sophisticated hacking techniques to damage files and folders.

Authentication can be further removed to the operating system of the server itself. For maximum security March Hare recommend allowing the server operating system to handle security: SSPI (on windows), and ssh (using a Unix server and high strength RSA keys). See the SSPI authentication section for details about the relative security of Kerberos and NTLM when using SSPI.

What are the drawbacks to using server authentication

Some administrators can be concerned that allowing the server operating system to authenticate users can pose a security threat in itself. The expectation being that if a hacker can bypass the operating system security then they have "free reign".

This can be mitigated by setting expiration times on the security tickets (eg: Microsoft Active Directory has a kerberos ticket lifetime that can be locked down so it doesn't automatically renew), and the CVSNT passwd file can be used to restrict authenticated users to a subset of the possible users on the server.

Native usernames versus CVS PASSWD usernames

CVSNT Server on Windows, Unix or Mac OS X can authenticate:

- to native operating system usernames/passwords
- to windows active directory usernames/passwords
(on unix/mac uses the winbind daemon: Samba plus winbind must be installed and operational)
- to CVSNT's own internal database of usernames and passwords.

To use CVSNT's own internal database of usernames and passwords you must use the pserver or sserver protocols.

Two factor server authentication (RSA SecurID)

Using a product such as RSA SecurID it is possible to set up two factor authentication for your operating system. If you have installed two factor authentication then CVSNT will automatically use it. See the section *Configuring Network Access* for more information.

What are the recommended security protocols/authentication

We recommend that pserver is disabled (CVSNT allows protocols to be disabled without the need to re-compile). For specific client and server protocols please see the tables below:

<i>Server Platform Security Recommendation</i>	<i>Protocol</i>
Server	
Windows	sspi,sserver ¹
Mac OS X	ssh ¹
Unix	ssh ¹

Note 1: See the SSPI authentication section for details about the relative security of Kerberos and NTLM when using SSPI

What is a "chroot jail" and how do I set one up

A "chroot jail" is a security mechanism for Unix based operating environments such as SuSE Linux, Red Hat Linux, Solaris, HP-UX and Mac OS X. It is a place to install CVSNT so that no other files can be accessed either accidentally or by a hacker.

There is no equivalent mechanism for the Windows Operating System.

To create it you must set the Chroot variable in `/etc/cvsnt/PServer` and the CVSNT Server will *chroot* after doing the authentication - you no longer need to put any libraries in the chroot which is much safer (it just needs a `/tmp` to put the temporary files in).

How do I disable insecure authentication protocols

Once you have decided which authentication protocol you will use based on your security requirements – disable all other protocols by deleting the DLL's (Windows) or Shared Libraries (Unix).

On Unix, Mac OS X and Linux the protocols are stored in the directory `/usr/lib/cvsnt` by default. On Windows they are stored by default in `c:\Program Files\CVSNT`.



All About CVS & CM

CVS SUITE AND CM SUITE 2009 Build 4669 October 2012



Optimized for



March Hare Software Ltd

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Who Should Read This Book

Software developers, web developers and anyone who has ever wanted to find yesterdays (or last weeks) copy of a file should read this book.

If you have a legislative or contractual requirement to track by whom or when changes are made to computer based files then this course will give you a detailed understanding of various approaches to this goal.

Anyone who wants to implement / install CVS should read this book.

About This Edition

This edition was originally released with CVS SUITE AND CM SUITE 2009 Build 4669 in October 2012.

The following technical issues have been identified in this release:

- *Refer to separate document Windows installation guide which explains the new installer and configuration wizard*
- *Limited information is provided on CM Suite 2008*
- *Limited information is provided on migrating from CVS Suite to CM Suite*
- *To configure multi-site repositories contact your technical account manager for a quote for on site installation – detailed instructions are NOT provided in this guide*
- *Solaris version of login command echos the password to the terminal*
- *CVS Suite for HP-UX 11.23 Itanium is an experimental build*
- *Limited information is provided on upgrading Audit schemas*
- *Limited information is provided regarding the integration with Jira and Mantis*
- *Installing database driver(s) on Linux does not install Audit SQL create table scripts*

This edition contains items from the CVSNT Reference (build 2680) and march-hare.com FAQ (as at May 27th, 2006).