

Comparison of version control software

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The following is a **comparison of version control software**. The following tables include general and technical information on notable version control and software configuration management (SCM) software. For SCM software not suitable for source code, see Comparison of open source configuration management software.

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General information

Table explanation

- *Repository model* describes the relationship between various copies of the source code repository. In a client–server model, users access a master repository via a client; typically, their local machines hold only a working copy of a project tree. Changes in one working copy must be committed to the master repository before they are propagated to other users. In a distributed model, repositories act as peers, and users typically have a local repository with version history available, in addition to their working copies.
- *Concurrency model* describes how changes to the working copy are managed to prevent simultaneous edits from causing nonsensical data in the repository. In a *lock* model, changes are disallowed until the user requests and receives an exclusive lock on the file from the master repository. In a *merge* model, users may freely edit files, but are informed of possible conflicts upon checking their changes into the repository, whereupon the version control system may merge changes on both sides, or let the user decide when conflicts arise. Note that distributed version control almost always implies a merge concurrency model.

Software	Maintainer	Development status	Repository model	Concurrency model	License	Platforms supported	Cost
AccuRev SCM	Micro Focus International	Active	Client–server	Merge or lock	Proprietary	Most Java Platforms (Unix-like, Windows, OS X)	Non-free Quoted on an individual basis. \$350 /seat
GNU Bazaar	Canonical Ltd.	Active	Distributed and Client–server	Merge	GNU GPL	Unix-like, Windows, OS X	Free
BitKeeper	BitMover Inc.	Active	Distributed	Merge	Apache	Unix-like, Windows, OS X	Free
ClearCase	IBM Rational	Active	Client–server	Merge or lock ^[nb 1]	Proprietary	Linux, Windows, AIX, Solaris, HP UX, i5/OS, OS/390, z/OS,	Non-free \$4600 per floating license (held automatically for 30-minutes minimum per user, can be surrendered manually)
Code Co-op	Reliable Software	Active	Distributed	Merge	Proprietary	Windows	Non-free \$150 per seat
Codeville	Ross Cohen	official site offline; latest release July 13, 2007	Distributed	precise codeville merge	BSD	Unix-like, Windows, OS X	Free
CVS	The CVS Team ^[1]	maintained but new features not added	Client–server	Merge	GNU GPL	Unix-like, Windows, OS X	Free
CVSNT	March Hare Software ^[2] and community members	maintained and new features under development	Client–server	Merge or lock	GPL or proprietary	Unix-like, Windows, OS X, i5/OS	Free (with £425 distribution fee) for older version or £85 commercial license for latest version of CVS Suite or Change Management Server
darcs	The Darcs team	Active	Distributed	Merge	GNU GPL	Unix-like, Windows, OS X	Free
Dimensions CM	Serena Software	Active	Client–server	Merge or lock	Proprietary	Windows, Linux, Solaris, AIX, HP UX, z/OS	Non-free
Endevor	CA Technologies ^[3]	Active	Client-server	Merge or Lock	Proprietary	z/OS	Non-free
Fossil	D. Richard Hipp	Active	Distributed	Merge	BSD	POSIX, Windows, OS X, Other	Free
Git	Junio Hamano	Active	Distributed	Merge	GNU GPL	POSIX, Windows, OS X	Free
GNU arch	Andy Tai	unmaintained	Distributed	Merge	GNU GPL	Unix-like, Windows, OS X	Free
IC Manage	IC Manage Inc.	Active	Client–server	Merge or lock	Proprietary	Unix-like, Windows, OS X	Non-free Commercial
PTC Integrity	PTC	Active	Client–server	Merge or lock	Proprietary	Unix-like, Windows	Non-free
Mercurial	Matt Mackall	Active	Distributed	Merge	GNU GPL	Unix-like, Windows, OS X	Free
Monotone	Nathaniel Smith, Graydon Hoare	Active	Distributed	Merge	GNU GPL	Unix-like, Windows, OS X	Free
Perforce	Perforce Software Inc.	Active	Client–server	Merge or lock	Proprietary	Unix-like, Windows, OS X	Cost free license, available on application, for OSS or educational use; Also free for up to 20 users, 20 workspaces, and unlimited files; ^[4] Or free for unlimited users and up to 1,000 files; Else \$740–\$900 per seat in perpetuity, or \$144–\$300 per seat per year on a subscription model, both with volume discounts ^[5]
Plastic SCM	Codice Software	Active	Client–server	Merge or lock	Proprietary	Linux, Windows, OS X	Free for up to 15 users; else starting at \$595 per seat, or \$3,500 per 25 developers per year ^[6]
PVCS	Serena Software	Active	Client–server	Lock	Proprietary	Windows, Unix-like	Non-free

Rational Team Concert	IBM Rational	Active	Client–server ^{[nb 2][7][8]}	Merge or lock	Proprietary	Linux, Windows, AIX, Solaris, HP UX, i5/OS, OS/390, z/OS, OS X	Free for up to 10 users; else non-free
Revision Control System	Thien-Thi Nguyen	Active	local	Merge or lock	GNU GPL	Unix-like	Free
SCM Anywhere	Dynamsoft Corporation	Active	Client–server	Merge or Lock	Proprietary	Unix-like, Windows, OS X	Non-free Single user free; \$299 per user, bulk discount available
Source Code Control System	Jörg Schilling ^[nb 3]	Active	local	lock ^[nb 4]	CDDL / proprietary ^[nb 5]	Unix-like, Windows, OS X	While SCCS has traditionally been bundled in commercial UNIX distributions, free CDDL-licensed versions exist
StarTeam	Borland (Micro Focus)	Active	Client–server	Merge or lock	Proprietary	Windows and Cross-platform via Java based client	Non-free Quoted on an individual basis.
Subversion (SVN)	Apache Software Foundation ^[9]	Active	Client–server ^[nb 6]	Merge or lock ^[nb 7]	Apache	Unix-like, Windows, OS X	Free
Surround SCM	Seapine Software	Active	Client–server	Merge or lock	Proprietary	Linux, Windows, OS X	Non-free \$595 per named user; \$29/month subscription
SVK	Best Practical	unmaintained	Client–server, decentralized	Merge	Artistic/GPL	Unix-like, Windows, OS X	Free
Team Foundation Server (TFS)	Microsoft	Active	Client–server, Distributed	Merge or lock	Proprietary	Windows, cross-platform via Visual Studio Team Services	Free for up to 5 users in the Visual Studio Team Services or for open source projects through codeplex.com; else non-free, licensed through MSDN subscription or direct buy.
Synergy	IBM Rational	Active	Client–server and Distributed	Merge or lock	Proprietary	Linux, Windows, Unix-like	Non-free Contact IBM Rational ^[10]
Vault	SourceGear LLC	Active	Client–server	Merge or lock	Proprietary	Unix-like, Linux, Windows	Non-free \$300 per user
Veracity	SourceGear LLC	web site appears unmaintained; latest release March 25, 2013	Distributed	Merge or lock	Apache	Unix-like, Linux, Windows	Free
Vesta	Kenneth Schalk; Tim Mann, ^{[11][12]}	web site not updated since 2006; latest release February 15, 2009	Distributed NFS-protocol-emulation choice to optionally confederate clients and/or servers	lock on branch; merge branch-to-branch	LGPL	Tru64, Linux	Free
Visual SourceSafe (VSS)	Microsoft	serious bug fixes only	Shared Folder	Merge or lock	Proprietary	Windows	Non-free ~\$500 per license or single license included with each MSDN subscription.
Visual Studio Team Services	Microsoft	Active	Client–server, Distributed	Merge or lock	Proprietary	Windows, cross-platform via Visual Studio Team Services	Free for up to 5 users in the Visual Studio Team Services or for open source projects through codeplex.com; else non-free, licensed through MSDN subscription or direct buy.
Software	Maintainer	Development status	Repository model	Concurrency model	License	Platforms supported	Cost

Technical information

Table explanation

- *Software*: The name of the application that is described.
- *Programming language*: The coding language in which the application is being developed
- *Storage Method*: Describes the form in which files are stored in the repository. A *snapshot* indicates that a committed file(s) is stored in its entirety—usually compressed. A *changeset*, in this context, indicates that a committed file(s) is stored in the form of a difference between either the previous version or the next.
- *Scope of change*: Describes whether changes are recorded for individual *files* or for entire directory *trees*.

- *Revision IDs*: are used internally to identify specific versions of files in the repository. Systems may use *pseudorandom* identifiers, content hashes of revisions, or filenames with sequential version numbers (*namespace*). With Integrated Difference, revisions are based on the Changesets themselves, which can describe changes to more than one file.
- *Network protocols*: lists the protocols used for synchronization of changes.
- *Source code size*: Gives the size of the source code in megabytes.

Software	Programming language	Storage method	Scope of change	Revision IDs	Network protocols	Source code size
AccuRev SCM	C++, Java	Changeset	File	Number pair NN/NN	custom	Unknown
GNU Bazaar	Python 2, Pyrex (optional), C ^[nb 8]	Snapshot	Tree	Pseudorandom	custom, custom over ssh, custom over HTTP, HTTP, SFTP, FTP, email bundles, ^[nb 9] WebDAV (with plugin)	4.1 MB
BitKeeper	C	Changeset	Tree	Changeset keys, numbers	custom, HTTP, rsh, ssh, email	99 MB
CA Software Change Manager	C, C++, Java, HTML	Changeset and Snapshot	File and Tree	Numbers	HTTP, TCP/IP	Unknown
ClearCase	C, Java, Perl	Changeset	File and Tree ^[13]	Numbers	custom (CCFS), custom (MVFS filesystem driver), HTTP	Unknown
Code Co-op	C++	Changeset	Unknown	User ID-Ordinal	e-mail (MAPI, SMTP/POP3, Gmail), LAN	Unknown
Codeville	Python	Unknown	Unknown	Unknown	Unknown	Unknown
CVS	C	Changeset	File	Numbers	pserver, ssh	10.3 MB
CVSNT	C++	Changeset	File and Tree ^[14]	Numbers	custom over ssh, sspi, sserver, gserver, pserver	55 MB
darcs	Haskell	Changeset (Patch) ^[nb 10]	Tree	n/a	custom over ssh, HTTP, email	1.7 MB
Dimensions CM	C, C++, Java, C#	Snapshot or changeset	File and Tree	Numbers	Custom, HTTP/HTTPS	Unknown
Fossil	C	Snapshot or changeset ^[15]	Tree	SHA-1 or SHA-3 hashes ^[16]	HTTP/HTTPS, custom over ssh	7.2 MB ^[nb 11]
Git	C, shell scripts, Perl	Snapshot	Tree	SHA-1 hashes	custom (<i>git</i>), custom over ssh, ^[17] HTTP/HTTPS, rsync, email, bundles	23 MB ^[18]
GNU arch	C, shell scripts	Changeset	Tree	Numbers	HTTP, WebDAV	Unknown
IC Manage	C++, C	Changeset	Unknown	Numbers	custom	Unknown
Mercurial	Python, C	Changeset	Tree	Numbers, ^[nb 12] SHA-1 hashes	custom over ssh, HTTP, email bundles (with standard plugin)	20 MB
MKS Integrity	C, Java	Changeset	File	Numbers	custom, HTTP	Unknown
Monotone	C++	Hybrid ^[nb 13]	Tree	SHA-1 hashes	custom (<i>netsync</i>), custom over ssh, file system	4.4 MB
Perforce	C++, C, LabVIEW	Changeset	Tree	Numbers	custom	Unknown
PVCS	C++, C	Changeset	File	Numbers	Unknown	Unknown
Rational Team Concert	Java	Changeset	Tree	Numbers	REST services over HTTP/HTTPS	Unknown
Revision Control System	C	Changeset	File	Numbers	File system	5.3 MB
SCM Anywhere	C++, Java, C#	Changeset	File and Tree	Numbers	SOAP over HTTP or HTTPS	Unknown
Source Code Control System	C	Changeset	File	Numbers	NFS	1.3 MB
StarTeam	C++, C, Java	Snapshot	File and Tree	MD5 hashes	custom, TCP/IP	Unknown
Subversion	C	Changeset and Snapshot	Tree	Numbers	custom (<i>svn</i>), custom over ssh, HTTP and SSL (using WebDAV)	41 MB
Surround SCM	C++	Changeset	File and Tree	Numbers	TCP/IP	Unknown
SVK	Perl	Changeset	Tree	Numbers	Unknown	Unknown
Synergy	Java	Changeset (text), Snapshot(binary)	File	Numbers	custom, custom over ssh, HTTP	Unknown
Team Foundation Server	C++ and C#	Changeset	File and Tree	Numbers	SOAP over HTTP or HTTPS, Ssh	Unknown
Vault	C#	Changeset	File and Tree	Numbers	HTTP, HTTPS	Unknown
Veracity	C, JavaScript	Changeset	Tree	Numbers, ^[nb 14] SHA-1, SHA-2 and Skein hashes.	HTTP	52 MB
Vesta	C++	Snapshot	Tree	Unknown	NFS	15.8 MB
Visual SourceSafe	C	Snapshot	File	Numbers	SMB, DCOM	Unknown
Visual Studio Team Services	C++ and C#	Changeset	File and Tree	Numbers	SOAP over HTTP or HTTPS, Ssh	Unknown
Software	Programming language	Storage method	Scope of change	Revision IDs	Network protocols	Source code size

Features

Table explanation

- *Software*: The name of the application that is described.
- *Atomic commits*: refers to a guarantee that all changes are made, or that no change at all will be made.
- *File renames*: describes whether a system allows files to be renamed while retaining their version history.
- *Merge file renames*: describes whether a system can merge changes made to a file on one branch into the same file that has been renamed on another branch (or vice versa). If the same file has been renamed on both branches then there is a rename conflict that the user must resolve.
- *Symbolic links*: describes whether a system allows revision control of symbolic links as with regular files. Versioning symbolic links is considered by some people a feature and some people a security breach (e.g., a symbolic link to /etc/passwd). Symbolic links are only supported on select platforms, depending on the software.
- *Pre-/post-event hooks*: indicates the capability to trigger commands before or after an action, such as a commit, takes place.
- *Signed revisions*: refers to integrated digital signing of revisions, in a format such as OpenPGP.
- *Merge tracking*: describes whether a system remembers what changes have been merged between which branches and only merges the changes that are missing when merging one branch into another.
- *End of line conversions*: describes whether a system can adapt the end of line characters for text files such that they match the end of line style for the operating system under which it is used. The granularity of control varies. Subversion, for example, can be configured to handle EOLs differently according to the file type, whereas Perforce converts all text files according to a single, per-client setting.
- *Tags*: indicates if meaningful names can be given to specific revisions, regardless of whether these names are called tags or labels.
- *International support*: indicates if the software has support for multiple language environments and operating system
- *Unicode filename support*: indicates if the software has support for interoperations under file systems using different character encodings.
- *Supports large repos*: Can the system handle repositories of around a gigabyte or larger effectively?

Software	Atomic commits	File renames	Merge file renames	Symbolic links	Pre-/post-event hooks	Signed revisions	Merge tracking	End of line conversions	Tags	International support	Unicode filename support	Supplarge
AccuRev SCM	Yes	Yes	Partial ^[nb 15]	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes ^[19]	Yes ^[2]
GNU Bazaar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes ^[22]	Yes	Yes	Yes	Unk
BitKeeper	Yes	Yes	Yes	Yes	Yes	Unknown	Yes	Yes	Yes	Unknown	Unknown	Y
CA Software Change Manager	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unk
ClearCase	Partial ^[nb 16]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes ^[23]	Unknown	Y
Code Co-op	Yes	Yes	Yes	No	Partial	No	No	No	Yes	Unknown	Unknown	Unk
Codeville	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unk
CVS	No	No	No	No	Partial	No	No	Yes	Yes	Unknown	No	Y
CVSNT	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Y
darcs	Yes	Yes	Yes	No ^[nb 17]	Yes	Yes	N/A ^[nb 18]	No	Yes	No	Yes ^[nb 19]	Unk
Dimensions CM	Yes	Yes	Yes	No	Yes	Unknown	Yes	Yes	Yes ^[nb 20]	No ^[nb 21]	Yes	Y
Fossil	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes ^[nb 22]	Yes	Yes	Yes	Unk
Git	Yes	Partial ^[nb 23]	Yes	Yes	Yes	Yes ^[nb 24]	Yes	Yes	Yes	Yes	Yes ^[nb 25]	Partial
GNU arch	Yes	Yes	Unknown	Yes	Yes	Yes	Unknown	Unknown	Yes	Unknown	Unknown	Unk
IC Manage	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unknown	Unk
MKS Integrity	Yes	Yes	Yes	No	Yes	Yes ^[nb 27]	Yes ^[nb 28]	Yes	Yes	Yes	Yes	Unk
Mercurial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes ^[nb 29]	Partial ^[nb 30]	Parti
Monotone	Yes	Yes	Yes	No ^[nb 31]	Yes	Yes, mandatory	Yes	Yes	Yes	Unknown	Yes	Unk
Perforce	Yes	Yes ^[25]	Yes ^[26]	Partial ^[nb 32]	Yes	Yes	Yes ^[27]	Yes	Yes	Yes ^[28]	Yes ^[29]	Y
Rational Team Concert	Yes	Yes	Yes	Yes	Yes ^[nb 33]	Yes	Yes	Yes	Yes	Yes	Yes	Unk
Source Code Control System	Yes	No	N/A	N/A	No	No	Yes	No	No	Partial ^[nb 34]	Yes	Y
StarTeam	Yes ^[nb 35]	Yes	Unknown	Yes	No	No	Yes	Yes	Yes	Yes	Unknown	Y
Subversion	Yes	Yes ^[nb 36]	Partial ^[nb 37]	Yes	Yes	No ^[nb 38]	Yes ^[nb 39]	Yes	Partial ^[nb 40]	Yes	Yes	Y
Surround SCM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes ^[30]	Yes	Yes	Y
SVK	Yes	Yes	Yes	Yes	Yes ^[nb 41]	Yes ^[31]	Yes	Yes	Yes	Yes	Unknown	Unk
Synergy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes ^[nb 42]	Y
Team Foundation Server	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Y
Vault	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	Unknown	Unknown	Unk
Veracity	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Y
Vesta	Yes	Yes	Unknown	Unknown	Yes	No	No	No	Yes	No	Unknown	Y
Visual SourceSafe	No	No ^[nb 43]	Unknown	No	Yes	No	No	Unknown	Yes	Yes	Unknown	Unk
Visual Studio Team Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Y
Software	Atomic commits	File renames	Merge file renames	Symbolic links	Pre-/post-event hooks	Signed revisions	Merge tracking	End of line conversions	Tags	International support	Unicode filename support	Supplarge

Advanced features

Table explanation

- *keyword expansion*: Supports automatic expansion of keywords such as file revision number.
- *interactive commits*: Interactive commits allow the user to cherry-pick the patch-hunks that become part of a commit (leaving unselected changes as changes in the working copy), instead of having only a file-level granularity.
- *external references*: embedding of foreign repositories in the source tree
- *partial checkout/clone*: Ability to check out or clone only a specified subdirectory from a repository.
- *permissions*: Tracks file permission bits in the revision history.
- *timestamp preservation*: Overwrites the *last modified* filesystem attribute with the commit time upon checkout.
- *custom automatic merge tool*: Automatic merging can be attempted by any tool of the user's choice (hopefully configurable on a per-file basis)
- *supported formats*: either read/write support or read-only (conversion, potentially repeated)

- *shared build cache of derived objects*: the ability to wink-in derived-objects that were built by other confederated clients that share exactly the same dependencies instead of rebuilding them locally

Software	Keyword expansion	Interactive commits	External references	Partial checkout/clone	Permissions	Timestamp preservation	Custom automatic merge tool	Supported formats	Shared build cache of derived objects
AccuRev SCM	Yes	Unknown	Yes	Yes	execution bit only	Yes	Yes	git (bi-dir) ^[32]	No
GNU Bazaar	Yes ^[33]	Yes ^[34]	Yes ^[35]	No	execution bit only	No ^[nb 44]	Yes ^[36]	bzr, subversion, ^[37] git, ^[38] hg, ^[39] any that has a fastexporter	No
BitKeeper	POSIX and RCS	Yes	Yes	Yes	Yes	Yes	Yes	bitkeeper	No
CA Software Change Manager	No	Yes	No	Yes	execution bit only	Yes	Yes	CA Software Change Manager	No
ClearCase	Yes ^[40]	No	No	Yes	Yes	Yes ^[nb 45]	Yes	ClearCase	Yes
CVS	RCS	No	Yes	Yes ^[nb 46]	Partial ^[nb 47]	Yes	No	cvs	No
CVSNT	RCS	Yes ^[nb 48]	Yes ^[nb 49]	Yes ^[nb 50]	Yes	Yes	No	cvs	Yes ^[nb 51]
darcs	No	Yes	No	No ^[nb 52]	Partial ^[nb 53]	No	conflicts only	darcs	No
Dimensions CM	Yes	No	Yes ^[nb 54]	Yes	Yes	Yes	Yes	Migration from ClearCase, Subversion, CVS, PVCS, ChangeMan DS	Unknown
Fossil	No	Yes	Yes ^[nb 55]	No	execution bit only ^[41]	No	No	fossil (uses sqlite), any that has a fastexporter ^[42]	No
Git	No ^[nb 56]	Yes ^[nb 57]	Yes ^[43]	Yes ^[44]	execution bit only	No ^[nb 58]	Yes	git, cvs, subversion, hg, any that has a fastexporter	No
Mercurial	Yes ^[45]	Yes ^[46]	Yes ^[47]	Partial ^[48]	execution bit only	through (alpha) extension ^[49]	non-trivial cases only	hg, subversion, ^[50] git, ^[51] any other format supported by the Convert extension ^[52]	No
Perforce	Yes ^[53]	No	No	Yes	Yes	Yes ^[54]	Yes ^[55]	Perforce	No
Rational Team Concert	No	Yes	Yes	Yes	Yes	Unknown	Unknown	N/A	No
Source Code Control System	Yes	No	N/A	Yes	execution bit only	some variants	No	rcs	No
Surround SCM	Yes	No	No	Yes	No	Yes	Yes ^[nb 59]	Surround	No
SVK	Yes	Yes ^[nb 60]	Unknown	Yes	Unknown	Unknown	Unknown	subversion	No
Subversion	Yes ^[56]	Partial ^[nb 61]	Yes ^[57]	Yes	execution bit only	Partial ^[nb 62]	Yes ^[nb 63]	subversion	No
Team Foundation Server	No	Yes	Unknown	Yes	Yes	Unknown	Yes	Unknown	Unknown
Veracity	No	No	No	No	Yes	Yes	Yes	git, cvs, subversion, hg, any that has a fastexporter	No
Vesta	No	No	Yes via SDL	No	Unknown	Yes	No	Vesta	Yes
Visual SourceSafe	Yes	Unknown	Unknown	Yes	Yes	Unknown	Yes	Unknown	No
Visual Studio Team Services	No	Yes	Unknown	Yes	Yes	Unknown	Yes	Unknown	Unknown
Software	Keyword expansion	Interactive commits	External references	Partial checkout/clone	Permissions	Timestamp preservation	Custom automatic merge tool	Supported formats	Shared build cache of derived objects

Basic commands

Table explanation

- Commands in green rectangles that are not surrounded by [square brackets] are at an interactive command-line prompt. Text in [square brackets] is an explanation of where to find equivalent functionality.
- *repository init*: Create a new empty repository (i.e., version control database)
- *clone*: Create an identical instance of a repository (in a safe transaction)
- *pull*: Download revisions from a remote repository to a local repository
- *push*: Upload revisions from a local repository to a remote repository
- *local branches*: Create a local branch that does not exist in the original remote repository
- *checkout*: Create a local working copy from a (remote) repository
- *update*: Update the files in a working copy with the latest version from a repository
- *lock*: Lock files in a repository from being changed by other users
- *add*: Mark specified files to be added to repository at next commit
- *remove*: Mark specified files to be removed at next commit (note: keeps cohesive revision history of before and at the remove.)
- *move*: Mark specified files to be moved to a new location at next commit
- *copy*: Mark specified files to be copied at next commit
- *merge*: Apply the differences between two sources to a working copy path
- *commit*: Record changes in the repository

- *revert*: Restore working copy file from repository
- *generate bundle file*: Create a file that contains a compressed set of changes to a given repository
- *rebase*: Forward-port local commits to the updated upstream head

Software	Repository init	clone	pull	push	Local branches	checkout	update	lock	add	remove	move	co
AccuRev SCM	mkdepot	N/A	N/A	N/A	mkstream	mkws	update	anchor	add	defunct	move	cp [the incl.
GNU Bazaar	init / init --no-tree ^[nb 64] / init-repo / init-repo --no-trees ^[nb 65]	branch / branch --no-tree ^[nb 66]	pull	push	init / branch	checkout / checkout --lightweight ^[nb 67]	update	N/A	add	rm	mv	N
BitKeeper	setup	clone	pull -R	push	clone	co	pull	Unknown	add	rm	mv	c
ClearCase	init	N/A	N/A	N/A	N/A	checkout	update	lock / unlock	mkelem	rmname	mv	N
CVS	init	N/A	N/A	N/A	N/A	checkout	update	Unknown	add	rm	N/A	N
CVSNT	init	N/A	N/A	N/A	N/A	checkout	update	edit	add	rm	rename	N
darcs	init	clone	pull ^[58]	push	N/A ^[nb 69]	clone	pull ^[58]	Unknown	add	remove	move	N
Fossil	new / open	clone	pull	push	branch / commit --branch	clone/open	update	N/A	add	rm/del	mv/rename	N
Git	init / init --bare	clone / clone --bare	fetch	push	branch	checkout	pull	N/A	add	rm	mv	cp [th addl
Mercurial	init	clone	pull	push	bookmark ^[nb 72]	update / up / checkout / co	pull -u	N/A	add	remove / rm	move / mv	copy
Monotone	init	clone	pull	push	N/A	checkout	update	Unknown	add	drop	rename	N
Perforce	p4 client && p4 sync	p4 sync	p4 sync	p4 submit	Requires migration to recent streams feature	edit	sync	lock / unlock	add	delete	move	co
SVK	svk depotmap [or] svnadmin create)	mirror	pull	push	copy	checkout	update	Unknown	add	rm	mv	c
Subversion	svnadmin create	svnadmin hotcopy	[work-around]: svnadmin load	[work-around]: svnadmin dump	N/A	checkout / co	update / up	lock	add	delete / del / remove / rm	move / mv / rename / ren	copy
Surround SCM	mkmainline	N/A	N/A	N/A	mkbranch	checkout	get	checkout	add	rm	move	N
Team Foundation Server	using Git	clone using Git	get	commit	shelfset	checkout	get	lock	add	delete	rename	usin
Veracity	repo init	clone	pull	push	branch	checkout	pull -u	lock	add	rm	mv	N
Vesta	vcreate	vrepl	vrepl	vrepl	N/A	vcheckout	vadvance	vcheckout	[... then] vcheckin ^[nb 73]	vrm	mv [then] vcheckin ^[nb 74]	cp [vcheck
Visual SourceSafe	?	Unknown	Unknown	Unknown	N/A	Get Latest	Get Latest	Check Out	Add Files	Delete	?	Unk
Visual Studio Team Services	using Git	clone using Git	get	commit	shelfset	checkout	get	lock	add	delete	rename	usin
Software	Repository init	clone	pull	push	Local branches	checkout	update	lock	add	remove	move	co

Advanced commands

Table explanation

- Commands in green rectangles that are not surrounded by [square brackets] are at an interactive command-line prompt. Text in [square brackets] is an explanation of where to find equivalent functionality.
- *command aliases*: create custom aliases for specific commands or combination thereof
- *lock/unlock*: exclusively lock a file to prevent others from editing it
- *shelve/unshelve*: temporarily set aside part or all of the changes in the working directory
- *rollback*: remove a patch/revision from history

- *cherry-picking*: move only some revisions from a branch to another one (instead of merging the branches)
- *bisect*: binary search of source history for a change that introduced or fixed a regression
- *incoming/outgoing*: query the differences between the local repository and a remote one (the patches that would be fetched/sent on a pull/push)
- *grep*: search repository for lines matching a pattern
- *record*: include only some changes to a file in a commit and not others

Software	Command aliases	Lock/unlock	Shelve/unshelve	Rollback	Cherry-picking	Bisect	Incoming/outgoing	Grep	Record
AccuRev SCM	No	enable file locking	No	revert / purge	promote	No	No	No	Unknov
GNU Bazaar	[in '.bazaar/bazaar.conf' file]	No	shelve/unshelve	uncommit	merge (non-tracking)	bisect (bisect plugin)	missing --theirs-only/missing --mine-only	grep (grep plugin)	No
BitKeeper	Unknown	Unknown	park/unpark	undo	Unknown	bisect	changes -R/-L	grep	Unknov
CVSNT	[in '.cvsrc' file]	edit -x/unedit ^[nb 76]	No	admin -o ^[nb 77]	yes ^[nb 78]	annotate ^[nb 79]	No	no ^[60]	No
Darcs	No	No	revert/unrevert	unrecord	yes ^[nb 80]	test --bisect	pull/push --dry-run	No	record
Fossil	No	No	stash pop/stash apply ^[nb 81]	merge --rollback	merge --cherrypick	bisect	No	search	No
Git	[in '.gitconfig' file]	No	stash/stash pop ^[nb 82]	reset HEAD^	cherry-pick	bisect	cherry	grep	add -p
Mercurial	[in '.hgrc' file]	No	shelve/unshelve (bundled extension ^[61])	strip (bundled extension ^[62])	graft(core ^[63]) or transplant(bundled extension ^[64])	bisect	incoming/outgoing	grep	record (bundled extension)
Monotone	[in monotonerc]	No	No	kill_rev_locally ^[nb 83]	pluck	bisect	No	No	Unknov
Perforce	via broker ^[66]	lock/unlock	shelve/unshelve	obliterate	integ ^[67]	Unknown	Unknown	grep	Unknov
SVK	No	No	No	No	svk merge	No	status ^[nb 84]	No	No
Subversion	No	lock/unlock	No	No	svnmerge cherry-picking	Third party tool ^[nb 85]	status -u ^[nb 86]	No	No
Surround SCM	No	checkout	shelf	rollback	duplicatechanges	No	diff	search	No
Team Foundation Server	Yes	lock/unlock	shelve/unshelve	rollback	merge	No	Unknown	Unknown	No
Veracity	No	lock/unlock ^[nb 87]	No	No	No	No	incoming/outgoing	No	No
Visual Studio Team Services	Yes	lock/unlock	shelve/unshelve	rollback	merge	No	Unknown	Unknown	No
Software	Command aliases	Lock/unlock	Shelve/unshelve	Rollback	Cherry-picking	Bisect	Incoming/outgoing	Grep	Record

User interfaces

Table explanation

- *Software*: The name of the application that is described.
- *Web Interface*: Describes whether the software application contains a web interface. A web interface could allow the software to post diagnostics data to a website, or could even allow remote control of the software application.
- *GUIs*: A GUI is a graphical user interface. If a software product features a GUI its functionality can be accessed through application windows as opposed to accessing functionality based upon typing commands at the command prompt such as a DOS interface.
- *Plug-ins*: functionality is available through an Integrated Development Environment. Minimum functionality should be to list the revision state of a file and check in/check out files.

Software	Web interfaces	Stand-alone GUIs	Integration and/or Plug-ins for IDEs
AccuRev SCM	Yes	Windows (incl. Explorer integration) , Linux, Unix, OS X, BeOS available	IntelliJ IDEA , Eclipse, Visual Studio
GNU Bazaar	can use a plain webserver	Olive, bzz-gtk (GTK+), Bazaar Explorer (Qt), QBzr (Qt), TortoiseBzr (Windows)	Eclipse (BzrEclipse, QBzrEclipse), Visual Studio (bzz-visualstudio), TextMate (TextMateBundle), Komodo IDE, WingIDE
BitKeeper	included	included (bkd)	Unknown
CA Software Change Manager	included	Eclipse-based GUI	Eclipse, MS Visual Studio
ClearCase	included, Clearcase Web Interface	older: MS Windows native, Motif-based GUI for Unix-like systems, TSO client for z/OS.	Emacs, Eclipse (IBM Proprietary , Eclipse-CCase), Visual Studio (IBM proprietary), KDevelop (standard?), IntelliJ IDEA (standard in Ultimate Edition)
Code Co-op	Not necessary since entire project is replicated locally	Windows	Unknown
CVS	cvsweb, ViewVC, others	TortoiseCVS, TkCVS (Tcl/Tk), (Windows Explorer), WinCVS, OS X, GTK, Qt available	Eclipse (Team), KDevelop (standard), IntelliJ IDEA (standard in Community and Ultimate Editions), Emacs (standard VC), Komodo IDE , BBEdit, WingIDE
CVSNT	cvsweb, ViewVC, others	Windows, OS X, OS/400, GTK, Qt available	All those that support CVS, plus commercial plugins for SCCI, Bugzilla, Build
darcs	darcs.cgi included; darcsweb, Trac	under development; TortoiseDarcs (Windows Explorer), OS X (alpha),	Eclipse (eclipse-darcs), Emacs (vc-darcs.el)
Dimensions CM	Yes	Windows (incl. explorer integration)	Eclipse, Visual Studio , IntelliJ IDEA , XCode, Powerbuilder
Fossil	Embedded webserver included (ui/server mode), ability to run multiple repositories via CGI mode	fuel-scm	Unknown
Git	Gitweb, wit, cgit, GitLab, GitHub, gitorious, Trac, Kallithea, Bitbucket, Stash, Springloops, Bonobo Git Server	gitk, git-gui (Tcl/Tk), tig, Gitbox (OS X), TortoiseGit, qgit, giting (GNOME/GTK), (h)gct (Qt), git-cola (Qt), Git Extensions (Windows), GitEye, SmartGit/Hg, Tower, SourceTree (OS X/Windows), Sprout (OS X), GitX (OS X), GitUp (OS X), GitKraken	Aptana 3 Beta (Aptana Studio 3 with Git Integration); Eclipse (JGit/EGit); Netbeans (NbGit); KDevelop; Visual Studio (Git Extensions); Emacs (extension for standard VC); SAP Web IDE; TextMate (Git TextMate Bundle); Vim (VCSCommand plugin and fugitive plugin); IntelliJ IDEA >8.1 (standard in Community and Ultimate Editions); Komodo IDE ; Anjuta; XCode, WingIDE
GNU arch	ArchZoom	ArchWay (GTK2), TlaLog	Emacs (standard VC)
IC Manage	included	Windows, Linux, Unix, OS X	Emacs, Cadence Design Framework, Synopsys Custom Designer
MKS Integrity	Yes	Windows, Linux, Unix, Solaris, AIX,	Eclipse, Microsoft Visual Studio, Perforce and others. Also provides support for the industry standard Source Code Control (SCC) interface ^[68]
Mercurial	included, ^[nb 88] Bitbucket, Trac, Kallithea	Hgk (Tcl/Tk), (h)gct (Qt), TortoiseHg (Windows Explorer, Nautilus), MacHg, MacMercurial, Murky , SourceTree (Windows/OS X), TortoiseHg, SmartGit/Hg	IntelliJ IDEA (hg4idea 3rd party plugin), Eclipse (Mercurial Eclipse), NetBeans, Visual Studio 2008, Emacs, Vim (VCSCommand plugin), Komodo IDE , Eric Python IDE , WingIDE
Monotone	ViewMTN, TracMonotone,	Monotone-Viz (GTK+), Guitone (Qt), Monotone Browser (GTK+, Perl)	Unknown
Perforce	included, P4Web, P4FTP	Windows, Linux, Unix, OS X, BeOS available	Eclipse, Visual Studio (P4SCC), KDevelop (standard?), IntelliJ IDEA (standard in Ultimate Edition), Komodo IDE , BBEdit, Emacs (p4.el), WingIDE
Rational Team Concert	Yes	Eclipse-based GUI	Eclipse integration; MS Visual Studio integration(Limited)
StarTeam	included	Windows, Java, Eclipse, Visual Studio, BDS2006 integration, plus Java command-line	IntelliJ IDEA (standard in Ultimate Edition), Visual Studio, JBuilder , Eclipse
Subversion	Apache 2 module included, WebSVN, ViewSVN, ViewVC, Trac, SharpForge, sventon, Springloops	Java, KDESVN, OS X ^[69] (including Finder integration), Nautilus, Qt, RabbitVCS, RapidSVN, SourceTree (OS X), TortoiseSVN (Windows Explorer)	Anjuta, BBEdit, Eclipse (Subclipse, Subversive), Emacs (standard VC), IntelliJ IDEA (standard in Community and Ultimate Editions), KDevelop (standard), Komodo IDE , MonoDevelop (standard), Netbeans, RabbitVCS (for GEdit), TextMate (SVNMate plugin), Visual Studio (AnkhSVN , VisualSVN), WingIDE. See also Comparison of Subversion clients
Surround SCM	Yes	Windows, OS X, Linux	Dreamweaver , Eclipse, IntelliJ IDEA , JDeveloper , KDevelop , NetBeans , Powerbuilder , Visual Studio , WebStorm
Synergy	via Telelogic Change interface	Windows (incl. explorer integration), Linux, Unix	Eclipse (Telelogic proprietary), Visual Studio (Telelogic proprietary), IntelliJ IDEA (Telelogic proprietary)
Team Foundation Server	included (Sharepoint Server used for web services)	Windows included; OS X, Unix available	Visual Studio. Java client for Eclipse IDE and IntelliJ IDEA (standard in Ultimate Edition)
Vault	included	Windows, Unix-like, OS X	Visual Studio 2003 and higher , Eclipse 3.2 and higher
Veracity	included	Tortoise interface for Windows	No
Vesta	VestaWeb	No	No
Visual SourceSafe	none included; SSWI, VSS Remoting	Windows included; Linux, OS X and Solaris using SourceOffSite; any Java VM using Sourceanywhere for VSS	Visual Studio, IntelliJ IDEA (standard in Ultimate Edition)
Visual Studio Team Services	Yes	Windows included; OS X, Unix available	Visual Studio. Java client for Eclipse IDE and IntelliJ IDEA (standard in Ultimate Edition)
Software	Web interfaces	Stand-alone GUIs	Integration and/or plug-ins for IDEs

History and adoption

Table explanation

- *Software*: The name of the application that is described.
- *History*: briefly describes the software's origins and development.
- *Notable users*: is a list of well known projects using the software as their *primary* revision control system, excluding the software itself, followed by a link to a full list if available.

Software	History	Notable users
AccuRev SCM	First publicly released in 2002	American Airlines , Ford, Lockheed Martin , Orbitz, ^[70] Xerox, McAfee, ^[71] Polycom, SanDisk, ^[72] Siemens, Sony, Symantec, ^[73] Thomson Financial , Verizon Wireless ^[74] and many others
GNU Bazaar	Loosely related to baz. Sponsored by Canonical Ltd. .	Ubuntu, Launchpad, KatchTV, ^[75]
BitKeeper	Influenced by Sun WorkShop TeamWare	Linux Kernel (2002–2005) and many companies ^[76]
CA Software Change Manager	Original company founded in 1977; CA SCM (then called CCC/Harvest) first released in 1995.	CA does not disclose customer lists without the companies' permission. CA SCM is used by companies with global development teams including 13 of the Fortune 100.
ClearCase	Developed beginning in 1990 by Atria Software, following concepts developed by Apollo Computer in DSEE during the 1980s. The most recent version is 9.0.0, released in March 2016.	IBM, Alcatel-Lucent , Cisco, Motorola, Siemens, Ericsson, Nokia, Society for Worldwide Interbank Financial Telecommunication and other large organizations worldwide
Code Co-op	The first distributed VCS, demoed in 1997, ^[77] released soon after .	
CVS	First publicly released July 3, 1986; based on RCS	OpenBSD
CVSNT	First publicly released 1998; based on CVS. Started by CVS developers with the goal adding support for a wider range of development methods and processes.	Primarily professionals (not hobbyists), e.g.: AnandTech, ^[78] Wachovia, ^[79] Wells Fargo, ^[80] Goldman Sachs ^[81]
darcs	First announced on April 9, 2003	Mnet, xmonad, Projects Using Darcs
Dimensions CM	Developed by SQL Software under the name "PCMS Dimensions" during the late 1980s (PCMS standing for Product Configuration Management). Through number of company acquisitions the product was released under names "PVCS Dimensions" (1990s, Intersolv), "Dimensions" (early 2000s, Merant), "ChangeMan Dimensions" (2004, Serena Software) and finally "Dimensions CM " (since 2007, Serena Software).	Lockheed Martin , European Space Agency , Fujitsu Business Communication Systems and many companies worldwide ^[82]
Fossil	Fossil and SQLite have used Fossil since 21 July 2007.	SQLite, Tcl/Tk Project
Git	Started by Linus Torvalds in April 2005, following the BitKeeper controversy. ^[83]	Linux kernel , Android, Bugzilla, GNOME, GNU Emacs , GRUB2, KDE, MySQL , Perl 5, ^[84] PostgreSQL , X.Org, Cairo, Qt Development Frameworks , Samba, OpenEmbedded , Ruby, Ruby on Rails, Wine, Fluxbox, Openbox, Compiz Fusion , XCB, ELinks, XMMS2 , e2fsprogs, GNU Core Utilities , DokuWiki, Drupal, LibreOffice, MediaWiki, ^[85] Mono, ASP.NET MVC , ADO.NET Entity Framework , NuGet, jQuery and many of its plugins , OpenCV , Wireshark, Django, many companies like Ericsson, Microsoft, Huawei, Apple, Amazon, LG
GNU arch	Started by Tom Lord in 2001, it later became part of the GNU project. Lord resigned as maintainer in August 2005.	available for GNU Savannah and Gna.org projects
IC Manage	Developed by IC Manage, Inc which was founded in 2003 by Shiv Sikand and Dean Drako.	many organizations worldwide ^[86]
MKS Integrity	Originally developed by MKS Software. Purchased by PTC in May 2011 ^[87]	Many global engineering and IT organizations ^[88]
Mercurial	Started April 6, 2005 by Matt Mackall, following the BitKeeper controversy. ^[83] First released on April 19, 2005	Python, ^[89] Mozilla, OpenJDK, NetBeans, Xine, Xen, OpenSolaris, wmii, MoinMoin , Linux-HA, Pidgin, Gajim, Nginx, PyPy, SDL
Monotone	First released in April 2003	CTWM, Xaraya, I2P, ^[90] Botan ^{[91][92]}
Perforce	Developed by Perforce Software, Inc which was founded in 1995 by Christopher Seiwald.	many organizations worldwide, ^[93] FreeBSD, ^[94] Google ^[95]
Rational Team Concert	Version 1.0 released in June, 2008	IBM
Revision Control System	July 1985	RCS is generally (but not always) superseded by other systems such as CVS, which began as a wrapper on top of RCS.
Source Code Control System	Started by Marc Rochkind in 1972 (binary history files, written in Snobol on IBM-370, ^[96] SCCSv4 with text history files was published February 18, 1977. ^[97] The same history file format is still used in SCCS 5.0. ^[98]	as the POSIX source-control tool, SCCS is widely available on UNIX platforms, but not included in many Linux distributions. Sun WorkShop TeamWare uses SCCS files.
StarTeam	Version 1.0 1995; ^[99] Developed by StarBase software, acquired by Borland(which was acquired by Micro Focus).	Borland, BT, Cintas, EDS, Kaiser Permanente, Met Office, Quest Software, Raymond James, Siemens, and many more globally distributed companies ^[100]
Subversion	Started in 2000 by CVS developers with goal of replacing CVS	ASF, clang, gcc, SourceForge, FreeBSD, Google Code, KDE (until 2011), PuTTY, Zope, Xiph, GnuPG, CUPS, Apache OpenOffice, TWiki, WebKit, available on CodePlex , and many organizations worldwide ^[101]
SVK	Authored by Chia-liang Kao with Audrey Tang. First version was on November 19, 2003. 1.00 on May 9, 2005. 2.0.0 on Dec 28th, 2006. SVK became a product of Best Practical on June 5, 2006.	Request Tracker
Synergy	Developed beginning in 1988 by Caseware, as AmplifyControl. The company was renamed Continuous in 1994, where the product became better known as Continuous/CM. Continuous was acquired by Telelogic in 1999 shortly after going public; the product was renamed Telelogic Synergy. IBM acquired Telelogic in 2008 for integration into their Rational tool suite. The product is now known as IBM Rational Synergy.	
Team Foundation Server	First publicly released in March, 2006	
Vault	First publicly released in February , 2003	Unknown
Vesta	First publicly released under the LGPL in 2001	DEC Alpha team, Compaq Alpha team, Intel microprocessor development
Visual SourceSafe	originally created by a company called One Tree Software, version 3.1. Company was bought by Microsoft which released version 4.0 of VSS around 1995	Unknown
Visual Studio Team Services	Release year 2014	
Software	History	Notable users

See also

- List of revision control software
- Comparison of source code hosting facilities

Notes

1. In ClearCase, a trigger may be set to allow for the lock model, and this is done at many sites. However, ClearCase development usually takes place on private branches where each developer is given their own branch, so the lock vs. merge concurrency model doesn't matter as much. Code is merged back to the main branch once the developer is ready to deliver their code to the project.
2. RTC is not a distributed revision control system; but has some distributed feature that can be configured
3. Various forks of the original Unix sources exist, only one of which is actively maintained
4. While it is possible for multiple users to edit the same version of a file concurrently, only one of them can write back the changes.
5. While some forks of SCCS are free software, others remain closed as parts of commercial Unix distributions.
6. SVK allows Subversion to have **Distributed** branches.
7. In Subversion, a file attribute enables the lock model on per-file basis. This file attribute can be set automatically using file name wildcard expressions.
8. Bazaar's critical modules are written in Pyrex. They are automatically translated to pure C; except for the **patience sorting** module, used in merge resolution, which is written directly in the C language.
9. A Bazaar bundle is a summary diff, with sufficient extra information to preserve history.
10. Snapshots with binary files. It's discussed to have binary changesets in future (dargs 3)
11. 4 MB of which are sqlite3.c
12. Mercurial revision numbers are local to a repository; they can differ from repository to repository depending on in which order merges are performed.
13. A Monotone's revisions represent changesets and its manifests represent snapshots, each revision is linked to some manifest. But manifests are legacy constructs, they aren't kept in the database anymore and reconstructed on the fly if needed. The real work now happen in rosters which are hybrid snapshot/changeset structures.
14. Veracity revision numbers are local to a repository; they can differ from repository to repository depending on in which order merges are performed.
15. Evil twins are common. **Evil Twins in SCM, Not Hollywood** (<http://accurev.com/blog/2008/01/24/evil-twins-in-scm-not-hollywood/>)
16. Atomic commit can be enabled for individual checkin's **ClearCase 7.1.1 release notes** (https://publib.boulder.ibm.com/infocenter/cchelp/v7r1m0/index.jsp?topic=/com.ibm.rational.clearcase.relnotes.doc/topics/c_cc_relnotes_features.htm).
17. See FAQ (<http://dargs.net/FAQ#can-dargs-handle-symlinks>)
18. dargs' patches each bear a unique identifier, impossible to merge twice the same patch in a repository (without destructively modifying history using "unsafe" commands).
19. Although it stores (and shows by default) 8-bit filename. See FAQ (<http://dargs.net/FAQ#can-i-version-control-files-with-characters-in-the-full-unicode-spectrum>)
20. Using Item Revision Attributes ("Working with Items" demo, covering user define attributes (http://help.serena.com/doc_center/demos/CM_Essentials_items_1.html)).
21. In the sense that its messages and graphic interfaces have English only localization, though the software is certified running fine on various language operating systems.
22. Controlled by the 'cml-glob' setting ([1] (<http://fossil-scm.org/index.html?help/setting>))
23. Git does not explicitly track renames, because by design it does not track individual files. Renames and split of source files are detected after the fact, if the file content does not change dramatically.
24. Since git-1.7.9 (see **release notes** (http://git.kernel.org/?p=git/git.git;a=blob_plain;f=Documentation/RelNotes/1.7.9.txt;hb=HEAD)). Older versions do not sign commits, only tags (see the -s option in **git-tag(1) Manual page** (<http://www.kernel.org/pub/software/scm/git/docs/git-tag.html>))
25. UTF-8 filenames are supported as of version 1.7.10 (MSysGit release notes (<https://raw.githubusercontent.com/msysgit/msysgit/f45b8ee0ef75c03c210a476db9184824ffcb33c1/share/WinGit/ReleaseNotes.rtf>)).
26. Git has some issues with very large repositories. See Section *Better big-file support* and Section *Designing a faster index format* in SoC 2012 Ideas (<https://github.com/peff/git/wiki/SoC-2012-Ideas>).
27. Integrity enabled change packages provide complete workflow and 21 CFR Part 11 compliant digital signatures against the item controlling the change package.
28. 2009 SP5 added a feature to merge child development paths.
29. Mercurial is in the process of being translated to at least Dutch and Chinese
30. Support depends upon host OS and is well supported under Unix, but not Windows OSs, due to lack of host support. See [2] (<https://www.mercurial-scm.org/wiki/EncodingStrategy>)
31. It could be done via user level hooks
32. Perforce will version-control symbolic links themselves, but will not recognise its own version-controlled views (local file trees), if you access them via symbolic links.
33. Through the process behaviour components: Operation advisors and Operation participants. <http://jazz.net/library/article/292>
34. While the source code of SCCS has been written to support internationalisation, only English message texts exist.
35. StarTeam supports atomic commits as of version 2006
36. Subversion can move a file and conserve its history, if and only if the target of the move is in the same Subversion repository as the source. Cross-repository moves require third-party tools such as **svk**.
37. Since SVN 1.8 subversion supports improved move-tracking on the client side. On the server-side it's not supported yet.
38. "**Changeset Signing**" (<http://svn.haxx.se/dev/archive-2015-06/0052.shtml>). Apache Subversion Mailing Lists. Retrieved 2016-08-05.
39. New to SVN 1.5 <<http://subversion.apache.org/docs/release-notes/1.5.html#merge-tracking>>. A separate tool "svnmerge" <<http://www.dellroad.org/svnmerge/>> provides merge tracking for older versions.
40. In Subversion, tags are a special case of the more generic "cheap copy" concept of Subversion. Per convention, a tag is a copy into a directory named "tags". Because of this, even tags are versioned. See <http://svnbook.red-bean.com/nightly/en/svn.branchmerge.tags.html> for more information. The reason for partial support in the table is because Subversion's emulation of tags in this manner does not meet the requirement that the tag name can be used in place of any revision identifier wherever the user may be required to enter one. This column would be meaningless if the definition were to be loosened enough to encompass Subversion's approach as every version control system supports branching and would therefore support tags as well.
41. Uses subversion server
42. in Asian releases (v6.6a to v7.1a) and since version 7.2 in general
43. Version change history is removed upon rename; old name not referenced.
44. not implemented yet (<https://bugs.launchpad.net/bzr/+bug/245170>)
45. Can not be disabled in dynamic views.
46. Using alias of the CVSROOT/modules file.
47. CVS records executable bit when a file is added, but does not allow changing it later on.
48. This is a GUI feature supported by TortoiseCVS and WinCVS both of which include/use CVSNT.
49. Same as CVS, plus also the ability to have replicated repositories including 'shadow' repositories.
50. Use the module/directory name or an alias created using CVSROOT/modules or CVSROOT/modules2 administration file.
51. CVSNT supports this when the make/build tool used also supports it.
52. Dargs can do sparse checkouts from explicit checkpoints on dargs-1 repositories, but not from dargs-2 ones
53. Dargs can automatically detect #! scripts and make them executable on checkout.
54. Using Sub Project functionality (**Documentation Portfolio | User's Guide | Relating a Project or Stream to Other Objects** (http://help.serena.com/doc_center/doc_center.html#dcm)).
55. Checkouts can be nested with "fossil open --nested"
56. The Git FAQ (https://git.wiki.kernel.org/index.php/GitFAQ#Does_Git_have_keyword_expansion.3F) states that keyword expansion is not a good thing
57. *add -i* and *add -p*, see **git-add(1) Manual Page** (<http://www.kernel.org/pub/software/scm/git/docs/git-add.html>)
58. The Git FAQ (https://git.wiki.kernel.org/index.php/GitFAQ#Why_isn.27t_Git_preserving_modification_time_on_files.3F) explains why preserving modification time is considered harmful
59. Configurable on server as a Project Option and on the client as a User Option.
60. *commit --interactive*, see **SVK::Command::Commit** (<http://search.cpan.org/dist/SVK/lib/SVK/Command/Commit.pm>)
61. Through third-party tools such as **Tortoise SVN**.
62. SVN can not preserve file modification times. On request by the client, it can restore check-in time as last-modified time. Disabled by default.
63. MIME type of the file must be detected as a "human-readable" MIME type, even if the merge tool can work with non-human-readable files
64. **Standalone Branch** (<http://wiki.bazaar.canonical.com/StandaloneBranch>)
65. **Shared Repository** (<http://wiki.bazaar.canonical.com/SharedRepository>)
66. **Standalone Branch** (<http://wiki.bazaar.canonical.com/StandaloneBranch>)
67. **Heavyweight Checkout and Lightweight Checkout** (<http://wiki.bazaar.canonical.com/Checkout>)
68. **rebase plugin**
69. dargs doesn't have named branches, local or not, branching is handled solely through repository cloning
70. *dargs send* prepares a bundle of patches, defaults to sending it by mail but can send it to a file instead
71. copies are detected after the fact, much like renames
72. **Mercurial Bookmarks** (<https://www.mercurial-scm.org/wiki/Bookmarks>) are similar to local branches.
73. Through any of various means, place (to-be-immutable) file in an immutable directory prior to vcheckin.
74. *mv(1)* or *link(2)* the immutable file from its origin immutable directory to its destination immutable directory prior to vcheckin.
75. Through any of various means, copy the immutable file from its origin immutable directory to its destination immutable directory prior to vcheckin.
76. One can also enable this as a central preference in the repository server control panel or configuration file.

77. Requires administrator privileges. One can 'roll back' a change using 'cvs update -e -j @commitid -j "@<commitid"' but the change and rollback evidence remain in the history.
78. yes – use TortoiseCVS or WinCVS to commit the change to the destination and select which specific files to keep
79. bisect is also available for cvs which should work with CVSNT
80. darcs operate on patches not revision, cherypicking simply consists in pulling a given patch from one repository to another one as long as the dependencies are fulfilled
81. fossil stash supports multiple shelves with comments.
82. git stash is a multi-level shelve, it's possible to shelve several change groups at the same time
83. Only works on a local repository and only on revisions without children. The disapprove command might be an alternative.
84. svk status lists differences between working copy and repository, not differences between two repositories
85. SVN Bisect tool [svn-bisect](http://search.cpan.org/dist/App-SVN-Bisect/bin/svn-bisect) (<http://search.cpan.org/dist/App-SVN-Bisect/bin/svn-bisect>)
86. svn status lists differences between working copy and repository, not differences between two repositories
87. locks are advisory, and can't be enforced on disconnected instances
88. hgweb for single-repository access and hgwebdir for multiple repository access from a single HTTP address

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