

# CVS – concurrent versions system

APRICOT 2008  
Network Management  
Taipei, Taiwan  
February 20–24, 2008



# Overview – what is CVS ?

-CVS is a Version Control System (VCS)

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# Overview – what is version control

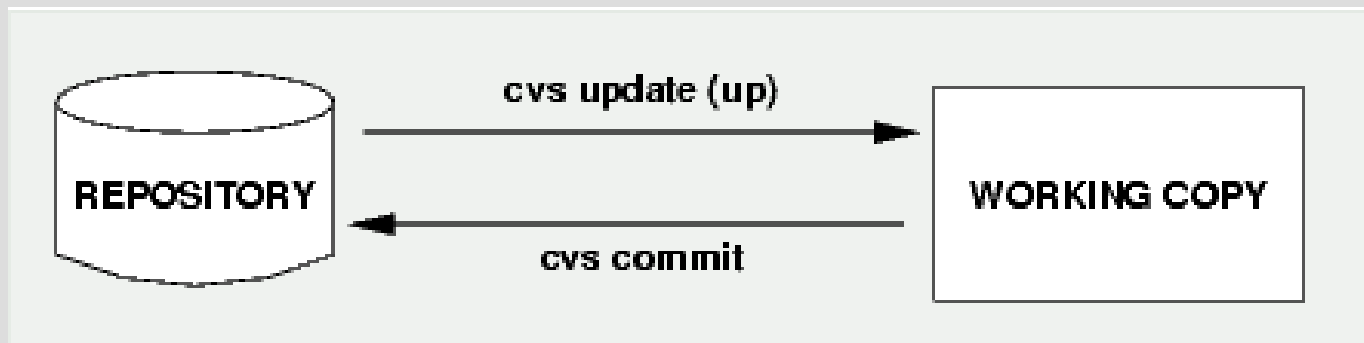
- Version control, and change management
  - Keep track of changes (revisions)
  - Share changes with others (public repository)
  - Maintain multiple versions of a same set of data (branches)
- What kind of data ?
  - Source code
  - Documentation
  - Configuration files
  - Binary data as well (less efficient)

# CVS terminology

- repository
  - Central, master copy containing all files being versioned. Directory structured
- working copy
  - Local copy of a project, checked out from a repository. Contains special directories (CVS) with information about which files are under CVS control, where they files come from and where they should be committed.
  -
- module
  - A set of directories, files or other modules under a common “shortcut” name

# CVS principles

- CVS uses a centralized “master copy”: the *repository*
- All work is done in a *working copy*
- Changes are *committed* back to the *repository*
- Special directory, *CVS*



# CVS – the repository

- CVS is a centralized VCS (1 repository)
- The repository contains files in the RCS format, all ending in ' ,v '
- Each RCS file contains a complete history, with changelog, of the file being versioned
- Well adapted to text files
- The repository is NEVER edited by hand
- A number of tools exist to analyze or browse the repository
  - [cvsweb/webcvs](http://cvsweb/webcvs)



# CVS – the repository

- Clients can access the repository locally or over the network.
- The repository is indicated (UNIX) using the CVSROOT environment variable:
- CVSROOT=
  - /cvs/myprojects # local disk
  - :pserver:myserver.com:/cvs/myprojects # via pserver
  - :ext:user@myserver.com:/cvs/myprojects # via SSH
- Allows for distributed work over LAN/WAN

# CVS – example workflow

- Initial checkout

- `cv`s `co` *projectname*
- `vi` *filename*
- `cv`s `commit` [*filename*]

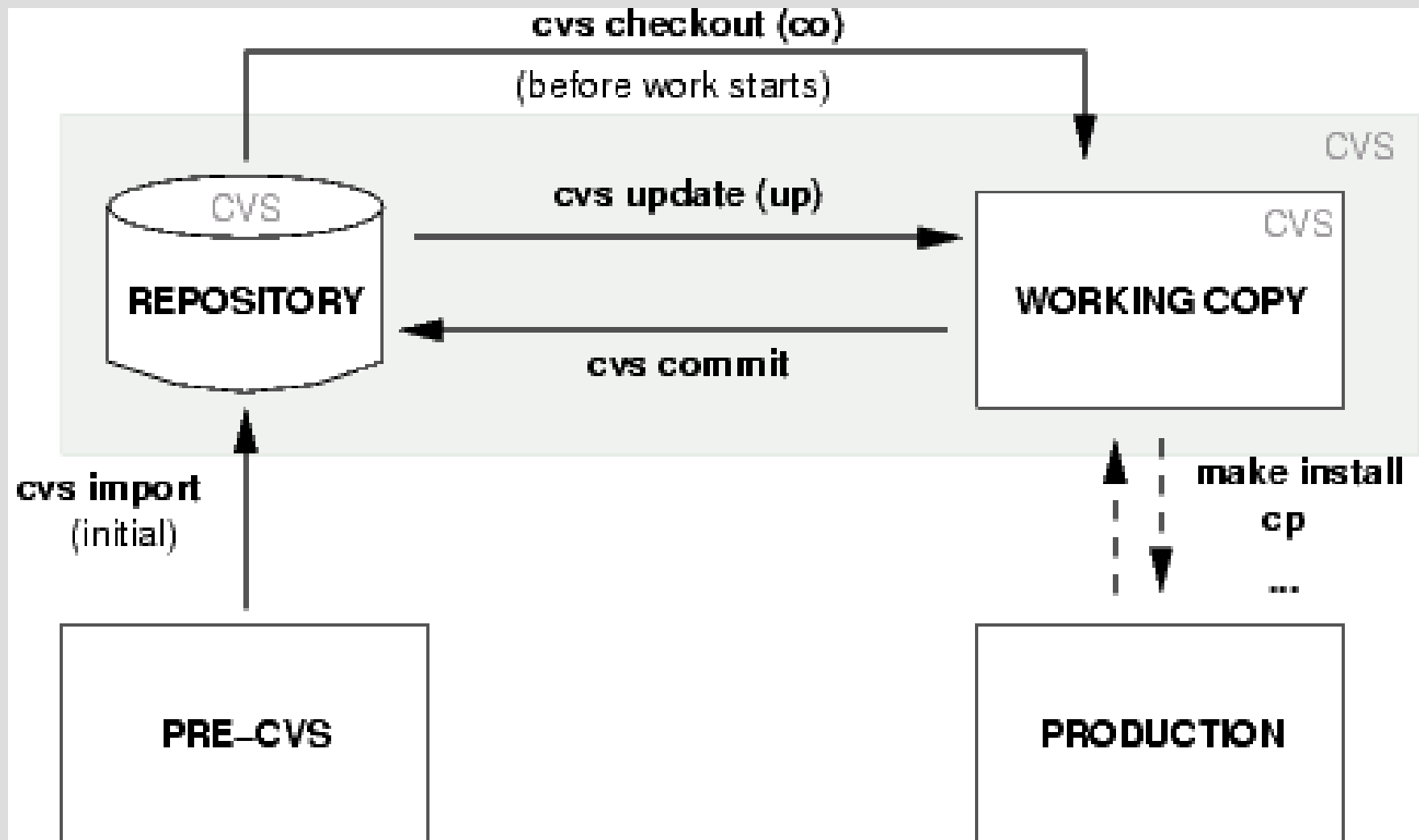
initial checkout  
... work ...  
record changes

- Later:

- `cv`s `up`
- `vi` *filename*
- `cv`s `commit` [*filename*]

update working copy  
from repository  
... work ...  
record changes

# CVS – example workflow – cont'd



# CVS clients

- Exist for most operating systems
  - cvs command line (UNIX, Win32)
  - TortoiseCVS – embeds in Explorer (Win32)
  - WinCVS (Win32)
  - ...
- Access the repository over the network or locally

# CVS commands – action commands

- import
  - import a new project into an existing repository
- checkout (co)
  - check out a working copy of a project/file/module from the repository
- update (up)
  - update a working copy from the CVS version
- commit
  - commit changes back to the repository (incl. new files)

# CVS commands – action commands cont'd

- add
  - add a new file in the working copy, ready to commit
- delete (del)
  - remove a file from the working copy, ready to commit

# CVS command – status commands

- status
  - see the status and version of a given file or by default all files
- diff
  - show the difference between a given revision (by default: the last one) of the named file and the file in the working repository
- log
  - show revision history for one or more files

# A working example

```
% CVSROOT=:ext:server.name:/data/cvs
% export CVSROOT
% cvs co someproject
Password: ****
cvs server: Updating someproject
U dir/file1
U dir/file2
...
% ls -l dir/
-rwxr-xr-x 2 regnauld staff 512 Dec 20 15:44 CVS/
-rw-r--r-- 1 regnauld staff 1244 Nov 17 14:21 file1
-rw-r--r-- 1 regnauld staff 341 Dec 3 21:04 file2
...
% vi file1
...
% cvs commit file1
```





# What's in the CVS/ directory ?

- Entries
  - existing files, and newly added files
- Root
  - where is the repository located
- Repository
  - name of module or path in the repository

# The CVS `$Id$` directive

- In an existing file, we add the following line

`$Id$`

- Now `cv`s commit the file, and look at the file again

# Setting up a new repository

- Anyone can create a repository, anywhere
- Done using the `cv`s `init` command
- Example:
  - `mkdir /data/cvsrepo`
  - `export CVSROOT=/data/cvsrepo`
  - `cv`s `[-d /data/cvsrepo] init`
  - `ls -l /data/cvsrepo`

```
drwxrwxr-x 3 pr staff 1024 Dec 20 15:45 CVSROOT/
```

# Accessing the new repository

- Locally
  - `cvs -d /data/cvsrepo ...`
    - Not necessary to specify `-d` if `CVSROOT` is defined
- Remotely
  - `cvs -d :ext:servername:/data/cvsrepo ...`
  - SSH must be available!
- Ready for import!

# Importing a new project...

```
% CVSROOT=/data/cvs; export CVSROOT
% cd someplace/myproject/
% cvs import my/new/project before_cvs start

..... editor .....
/ Import pre-CVS version of my new project /
\ \
/ CVS:----- /
\ CVS: Enter Log. Lines beginning with `CVS:' are \
/ CVS: removed automatically /
\.....\
N my/new/project/file1
N my/new/project/file2
...
No conflicts created by this import

%
```

# Importing a new project...cont'd

- The location for this project in the repository is now my/new/project, under the /data/cvs repository i.e.:
  - /data/cvs/my/new/project
- Let's test that we can check out the project:

```
% cvs co new/project
U my/new/project/file1
U my/new/project/file2
% cd my/new/project
% ls -l
...
```

# Modules

- my/new/project is maybe too long as a project name
- solution: modules, which are shorter names for directories or groups of directories and other modules.

- For example:

```
project          my/new/project
```

- With such a module defined, it will be possible to checkout, commit, etc... using the simple name “project”

```
cvs -d :ext:/data/cvs co project
```

- We'll see how to define modules later.



# The CVSROOT/ directory

- A default module is always created when one inits a repository: CVSROOT

```
% cvs co CVSROOT
U CVSROOT/checkoutlist
U CVSROOT/commitinfo
U CVSROOT/config
U CVSROOT/cvswrappers
U CVSROOT/editinfo
U CVSROOT/logininfo
U CVSROOT/modules
U CVSROOT/notify
U CVSROOT/rcsinfo
U CVSROOT/taginfo
U CVSROOT/verifysg
```

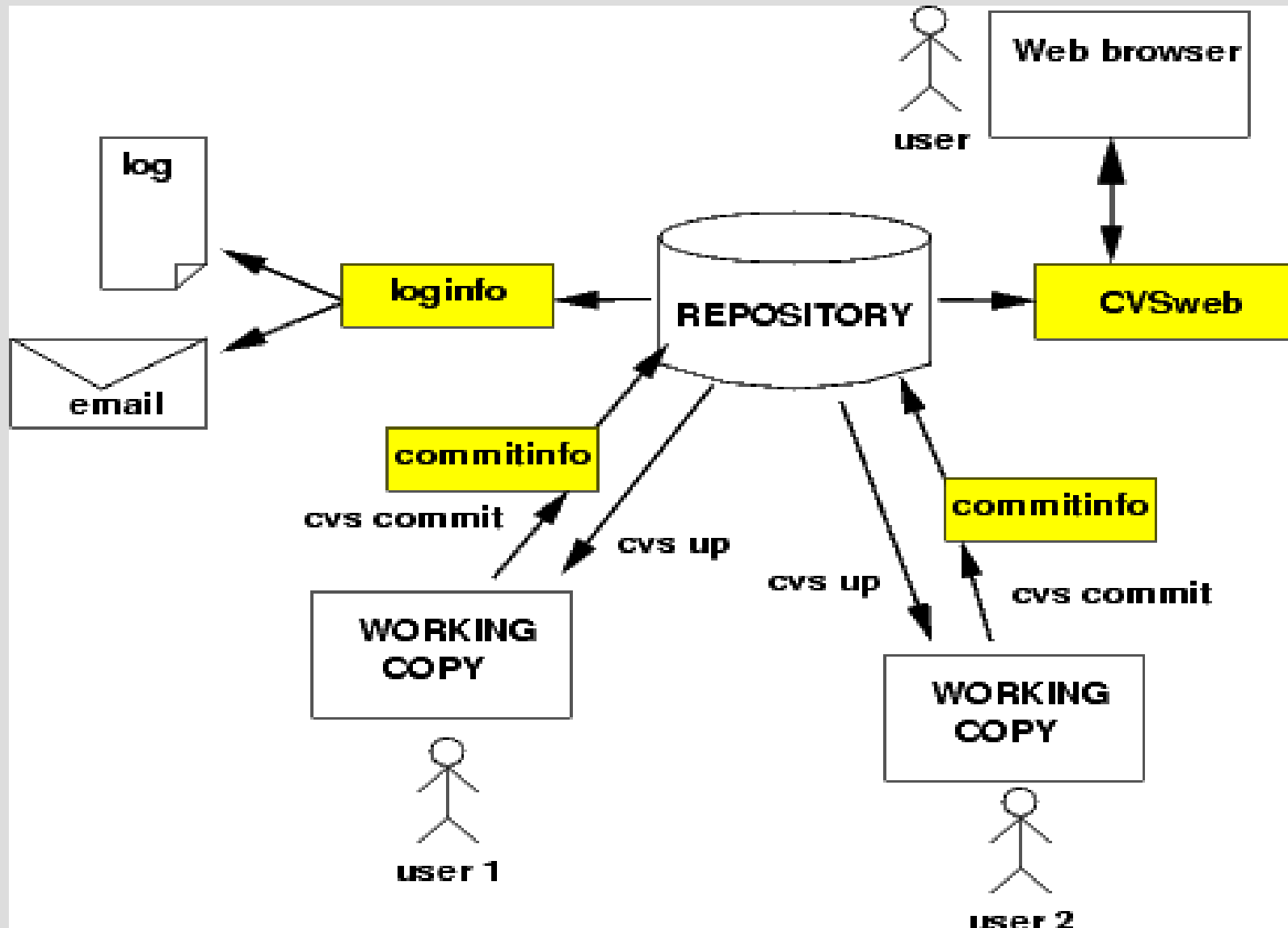
# The CVSROOT/ directory – cont'd

- Files described in cvs(5)
  - man 5 cvs
- Most relevant:
  - modules                    define modules
  - commitinfo                pre-commit scripts
  - cvswrappers               handle special files
  - loginfo                     post-commit scripts

# Pre- and post- jobs

- Using commitinfo and loginfo, it is possible to have automatic jobs run before and after each commit, for instance:
- pre-commit stage (commitinfo)
  - verify that a user is allowed to modify a given file
  - check syntax for a file
  - ...
- post-commit stage (loginfo)
  - send update as a mail
  - append it to a log
  - ...

# The big picture: mail, cvsweb, lists



**Putting it all together...**

# CVS shortcomings

- symlinks and ownership of files are not recorded
- no renaming of files (copy + delete)
- no changesets
  - each file has 1 version, need postprocessing work to figure out “all files for this commit”
- no disconnected operation
  - add, remove, commit, ... all need access to the server
- branching/merging is quite complicated

# Automated scenarios

- Idea: automatize configuration management tasks so that configuration files are automatically versioned using CVS...
- ... even when the sysadmin forgets :)
- Implementation – cron job
  - look at all files in a given directory
  - if they exist in the repository already -> commit
  - if they don't, add, then commit

# Automated scenarios – cont'd

- Already exists for network equipment:  
RANCID
  - <http://www.shrubbery.net/rancid/>
- Simple concept to implement for all relevant files in /etc
- Subscribe all admins to the alias / mailing list, so everyone receives a notification when a change takes place – whether planned or not!



# References

- <http://www.nongnu.org/cvs/>
- <http://cvsbook.red-bean.com/>
- <http://www.tortoisecvs.org/>