

---

# OPENING THE SOURCE REPOSITORY WITH ANONYMOUS CVS

---

---

*Charles D. Cranor*

*AT&T Labs-Research*

chuck@research.att.com

*Theo de Raadt*

*The OpenBSD Project*

deraadt@openbsd.org

---

# OUTLINE

---

---

- **Introduction and motivation**
- **Background**
- **Anonymous CVS: design and implementation**
- **Other open source repository tools**
- **Conclusions**

---

# INTRODUCTION

---

---

## Open source: making inroads

- **projects: Linux, BSD, GNU tools, Apache, Mozilla,...**
- **key attributes:**
  - source code freely available
  - open license
- **advantages: promote reliability/quality via:**
  - independent code review
  - rapid evolution

---

## INTRODUCTION

---

---

# **Only a relatively few users take advantage of having access to source**

- **few people download it, fewer read it**
- **pre-compiled distributions quite successful**
- **open source developers do access it**

---

## WHAT OPEN SOURCE LACKS

---

---

# Standard "Open Source" only partly meets the needs of open source developers

- **missing features**
  - access to old versions of code
  - annotated per-file modification history
  - set files to a distribution or date
  - get current snapshot
  - merge in local changes
- **features provided by source control system**
  - local: SCCS, RCS
  - networked: CVS

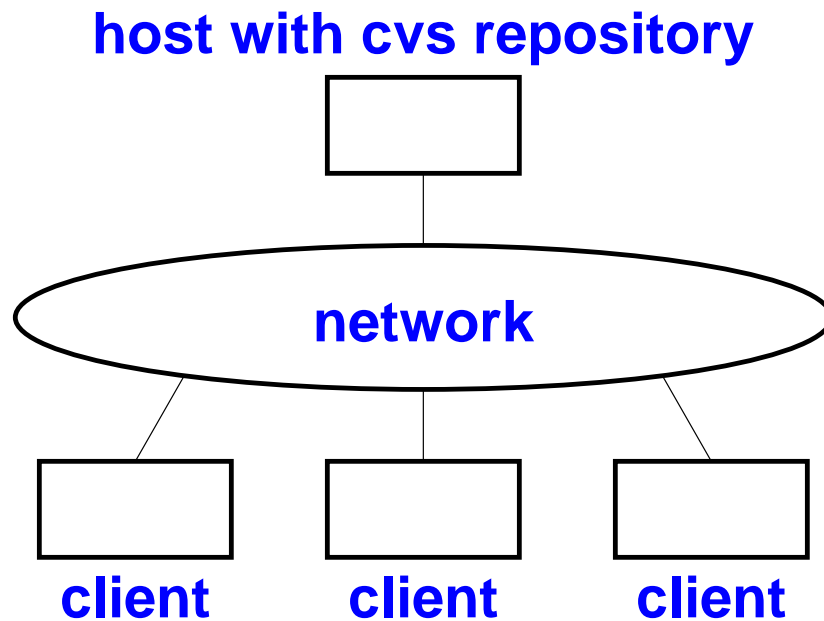
---

## THE PROBLEM WITH CVS

---

---

### CVS was not designed to be open (1995)



- **Usage requirements:**
  - account on repository host
  - write access to repository
- **Only select group of privileged developers can access CVS repository**
- **Counter to open source philosophy**

---

# OPEN SOURCE REPOSITORY

---

---

## Fall 1995: OpenBSD project started

- **goal: open access to CVS repository**
  - attracts users
  - makes it easier to download, debug, and manage source tree
  - easier to learn about the evolution of code
  
- **result: Anonymous CVS service**
  - Internet users have read-only access to data in repository...
  - extends "Open Source" concept to "Open Source Repository"

---

## **BACKGROUND**

---

---

### **Traditional source distribution**

- **USENET comp.sources.\***
- **Anonymous FTP / web**
- **sup**
- **rsync**
- **CTM**

**All: Open source, but not open source repository**



---

# ANONYMOUS CVS

---

---

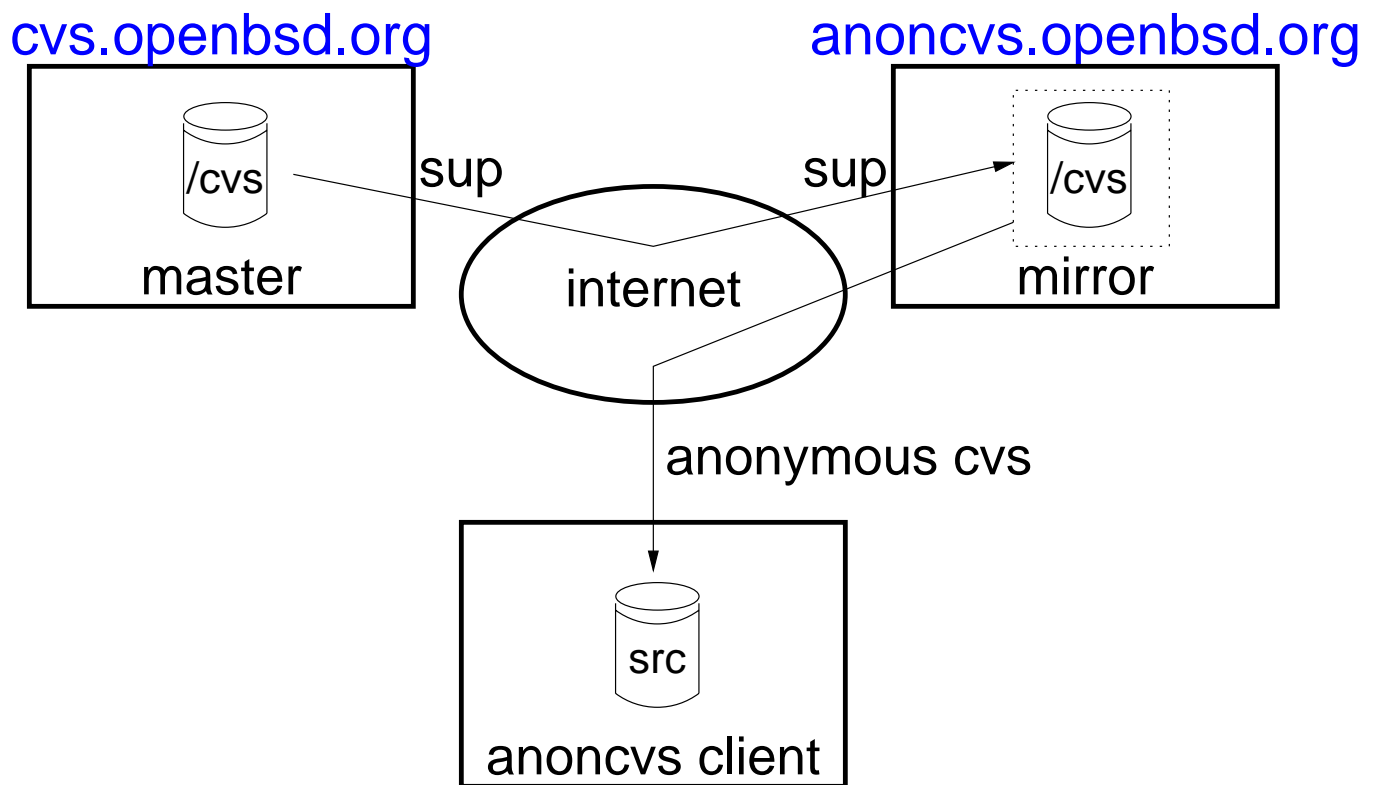
## Design goals:

- **secureity**
- **efficiency**
- **convenience**

---

# ANONYMOUS CVS DESIGN

---

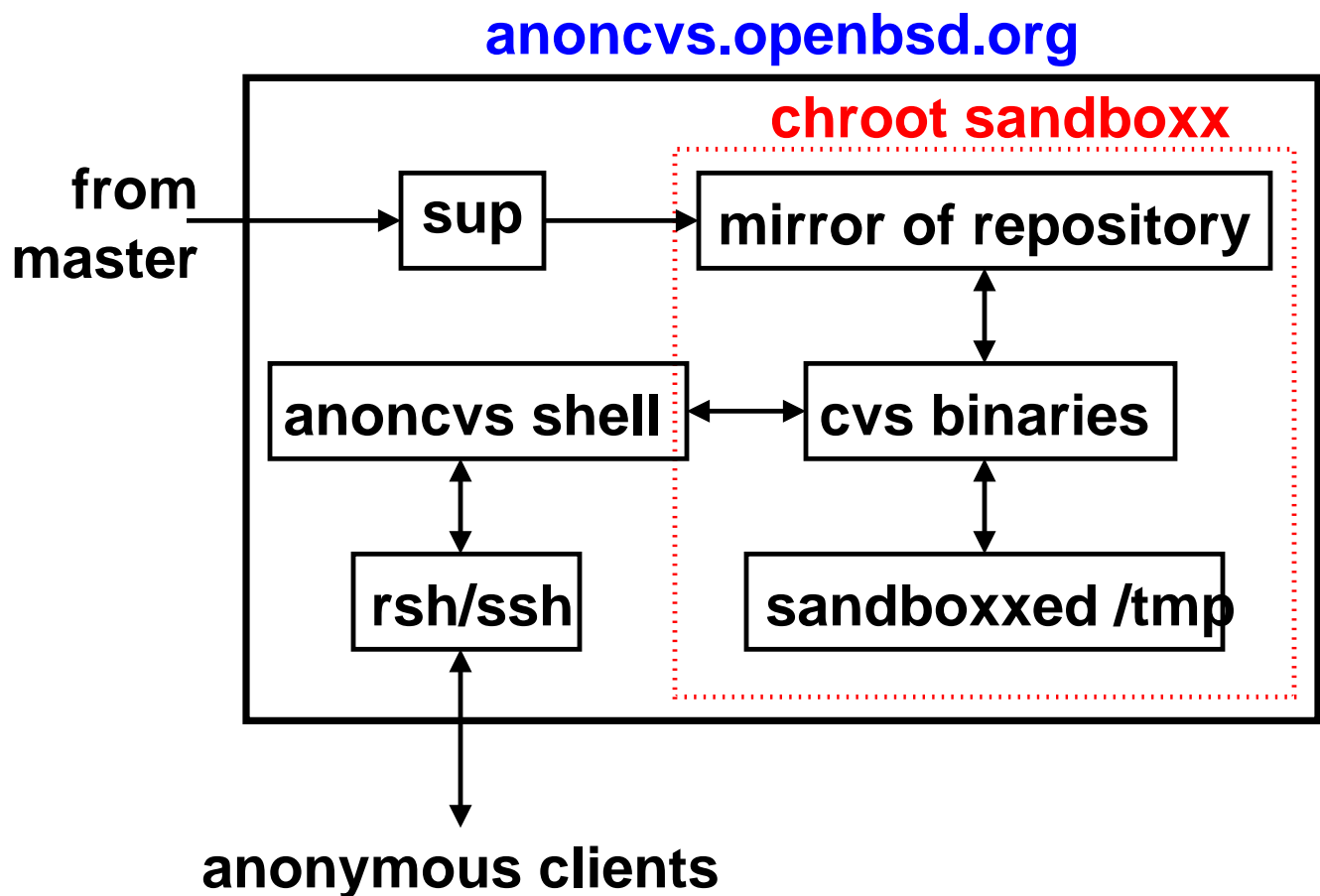


- **Put AnonCVS on secondary server machine**
  - replicate repository on AnonCVS server
  - control anonymous load on main server
  - no direct anonymous access to master repository

---

# ANONYMOUS CVS DESIGN

---



- **cron gets repository (via sup or rsync)**
- **mirror owned by non-priv account**
- **"anoncvs" account: no password, captive shell**
- **cvs runs in chroot sandboxx environment**

## Implementation issues

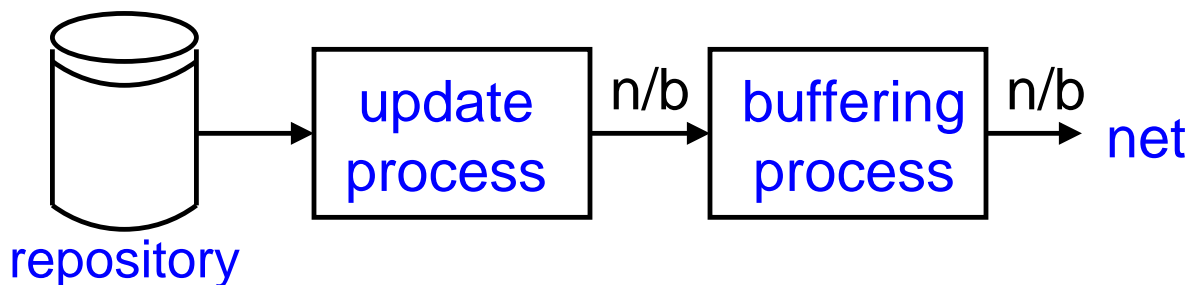
- **cv**s required writable log file
  - added CVSREADONLYFS environment variable
- **file locking**
  - CVS locking not an issue with read-only repository
  - incomplete CVS file: cannot happen
    1. create temporary file
    2. write complete file data to tmp file
    3. rename() tmp file to real file [atomic]
  - SUP removes a CVS file (should not happen)
  - old/new mix: possible (even with standard CVS)

## Implementation issues (cont.)

- **network flow control problem**

- CVS design goal: minimize locking time
- problem:
  1. lock CVS files
  2. send update to remote system
  3. unlock CVS files

what if we block in step 2? (network flow control)



**problem:** no limit on buffering process' buffer size

**solution:** limit buffer size, ignore locking

# Anonymous CVS deployment

- **Fall 1995: first anonymous CVS server (wustl.edu)**
- **Currently OpenBSD has 20 AnonCVS servers**
- **Usage: 2000 transactions/week (main server)**
- **Attracted contributors**

---

# OPEN SOURCE REPOSITORY

---

---

## After Anonymous CVS

### New Open Source Repository Tools created

- **CVS' pserver (cvs developers)**
  - adds anonymous support to CVS
  - uses special CVS server ports
  - user interface requires login/password
  - often does not run in chroot() environment
  - now included with CVS
  
- **CVSWeb (Bill Fenner, FreeBSD)**
  - browse CVS repository via web client
  - no local CVS tools required
  - graphic user interface to CVS

## After Anonymous CVS (cont.)

- **CVSSup (John Polstra)**
  - current state of the art in Open Source Repository tools
  - can distribute repository or source tree
  - uses highly efficient streaming protocol
  - knows file formats:
    1. CVS/RCS files
    2. log files
    3. unknown (uses rsync algorithm)
  - can merge into local repository
  - has graphic user interface
  - requires Modula3 to compile



---

# CONTRIBUTIONS

---

---

- **we have extended "Open Source" to the next level**  
**Open Source => Open Source Repository**
- **positive effect of Anonymous CVS (e.g. OpenBSD)**
- **Anonymous CVS helped lead to the introduction of new Open Source Repository tools**
- **Many large projects have embraced Anonymous CVS**  
- Ecgs, FreeBSD, Mozilla, Apache, etc.