Open Source Software (OSS) and Security

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Outline

- **Extreme claims**
- **Open design: A security fundamental**
- **Problems with hiding source & vulnerability secrecy**
- **Proprietary advantages… not necessarily**
- **Common criteria evaluation challenges**
- **OSS bottom line**

Extreme claims

- **Extreme claims**
  - **“OSS is always more secure”**
  - **“Proprietary is always more secure”**
- **Reality: Neither OSS nor proprietary always better**

Open design: A security fundamental

- **Saltzer & Schroeder [1974/1975] - Open design principle**
- **OSS better fulfills this principle**
- **Security experts perceive OSS advantage**
  - **Bruce Schneier, Vincent Rijmen (AES), Whitfield Diffie, ...**

Problems with hiding source & vulnerability secrecy

- **Hiding source doesn't halt attacks**
  - **Dynamic attacks**
  - **Static attacks (binaries, disassemblers, decompilers)**
  - **Can't keep source secret**
  - **Inhibits help**
- **Vulnerability secrecy doesn't halt attacks**
  - **Rediscovery**
  - **Days works, not years**

Proprietary advantages… not necessarily

- Experienced developers who understand security produce better results
- Proprietary developers higher quality?
- No guarantee OSS is widely reviewed

Common Criteria and OSS

- Common Criteria (CC) can be used on OSS
- CC matches OSS imperfectly
- Government policies discriminate against OSS

OSS bottom line

- **OSS security preconditions**
  - **Developers/reviewers need security knowledge**
    - **Knowledge more important than licensing**
  - **People have to actually *review* the code**
  - **Problems must be fixed**
- **OSS: less secure, later more secure (~yr)**
- **Neither OSS nor proprietary always better**

Detailed Slides

Outline

- Extreme claims
- Open design: A security fundamental
- Problems with hiding source & vulnerability secrecy
- Proprietary advantages… maybe
- Common criteria evaluation challenges
- OSS bottom line

Extreme claims

- **Extreme claims**
  - **“OSS is always more secure”**
  - **“Proprietary is always more secure”**
- **Reality: Neither OSS nor proprietary always better**

Open design: A security fundamental

- **Saltzer & Schroeder [1974/1975] - Open design principle**
  - **the protection mechanism must not depend on attacker ignorance**
- **OSS better fulfills this principle**
- **Security experts perceive OSS advantage**
  - **Bruce Schneier: “demand OSS for anything related to security”**
  - **Vincent Rijmen (AES): “forces people to write more clear code & adhere to standards”**
  - **Whitfield Diffie: “it’s simply unrealistic to depend on secrecy for security”**

Problems with hiding source & vulnerability secrecy

- **Hiding source doesn't halt attacks**
  - **Dynamic attacks don't need source or binary**
  - **Static attacks can use pattern-matches against binaries, disassembled & decompiled results**
  - **Presumes you can keep source secret**
    - **Attackers may extract or legitimately get it**
  - **Secrecy inhibits those who wish to help, while not preventing attackers**
- **Vulnerability secrecy doesn't halt attacks**
  - **Vulnerabilities are a time bomb and are likely to be rediscovered by attackers**
  - **Brief secrecy works (10-30 days), not years**

Proprietary advantages… not necessarily

- **Experienced developers who understand security produce better results**
  - **Experience & knowledge *are critical*, but...**
  - **OSS developers often very experienced & knowledgeable too (BCG study: average 11yrs experience, 30 yrs old)**
- **Proprietary developers higher quality?**
  - **Dubious; OSS often higher reliability**
  - **Market rush impairs proprietary quality**
- **No guarantee OSS is widely reviewed**
  - ***True!*** **& unreviewed OSS may be very insecure**
  - **Also true for proprietary (rarely reviewed!)**

Common Criteria and OSS

- **Common Criteria (CC) can be used on OSS**
  - **Red Hat Linux, SuSE Linux (FIPS 140-2: OpenSSL)**
- **CC matches OSS imperfectly**
  - **CC developed before rise of OSS**
  - **Doesn't credit mass peer review or detailed code review**
  - **Requires mass creation of documentation not normally used in OSS development**
- **Government policies discriminate against OSS**
  - **Presume that vendor will pay hundreds of thousands or millions for a CC evaluation ("big company" funding)**
    - **Presumes nearly all small business & OSS insecure**
  - **Presume that "without CC evaluation, it's not secure"**
  - **Need to fix policies to meet real goal: secure software**
    - **Government-funded evaluation for free use/support?**
    - **Multi-Government funding?**
    - **Alternative evaluation processes?**

OSS bottom line

- **OSS security preconditions**
  - **Developers/reviewers need security knowledge**
    - **Knowledge more important than licensing**
  - **People have to actually *review* the code**
    - **Reduced likelihood if niche/rarely-used, few developers, rare computer language, not really OSS**
    - **More contributors, more review**
  - **Problems must be fixed**
- **OSS: less secure, later more secure (~yr)**
  - **Borland InterBase/Firebird (user: politically)**
- **Neither OSS nor proprietary always better**

Backup Slides

Basics of Open Source Software (OSS) / Free Software (FS)

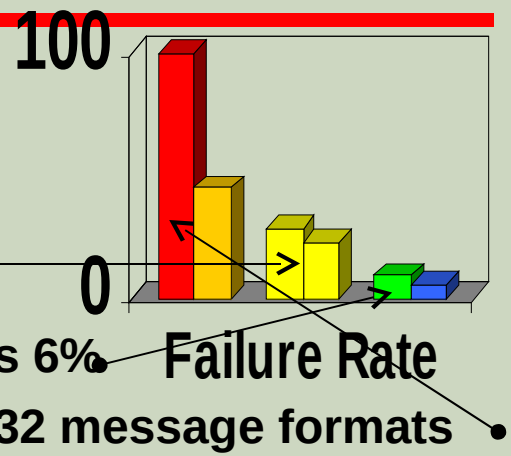
- **Open Source Software / Free Software (OSS/FS) programs have licenses giving users the freedom:**
  - **to run the program for any purpose,**
  - **to study and modify the program, and**
  - **to freely redistribute copies of either the original or modified program (without royalties, etc.)**
- ***Not* non-commercial, *not* necessarily free-of-charge**
  - **Often supported via commercial companies**
- **Synonyms: Libre software, FLOS software (FLOSS)**
- **Antonyms: proprietary software, closed software**

Extreme claims (and counterexamples)

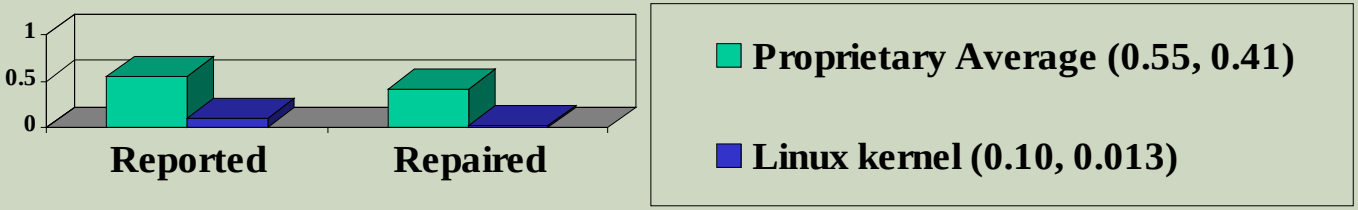
- **"OSS is always more secure"**
  - **Counterexample: Sendmail**
- **"Proprietary is always more secure"**
  - **Counterexample: Windows & IIS**
  - **Vulnerabilities: Apache 0, IIS 8 over 3yrs**
  - **J.S. Wurzler hacker insurance costs 5-15% more for Windows than for Unix or Linux**
  - **Windows websites more vulnerable**

Category	Proprietary	OSS/FS
Defaced	**66% (Windows)**	**17% (GNU/Linux)**
Deployed Systems	**49.6% (Windows)**	**29.6% (GNU/Linux)**
Deployed websites (by name)	**24.81% (IIS)**	**66.75% (Apache)**

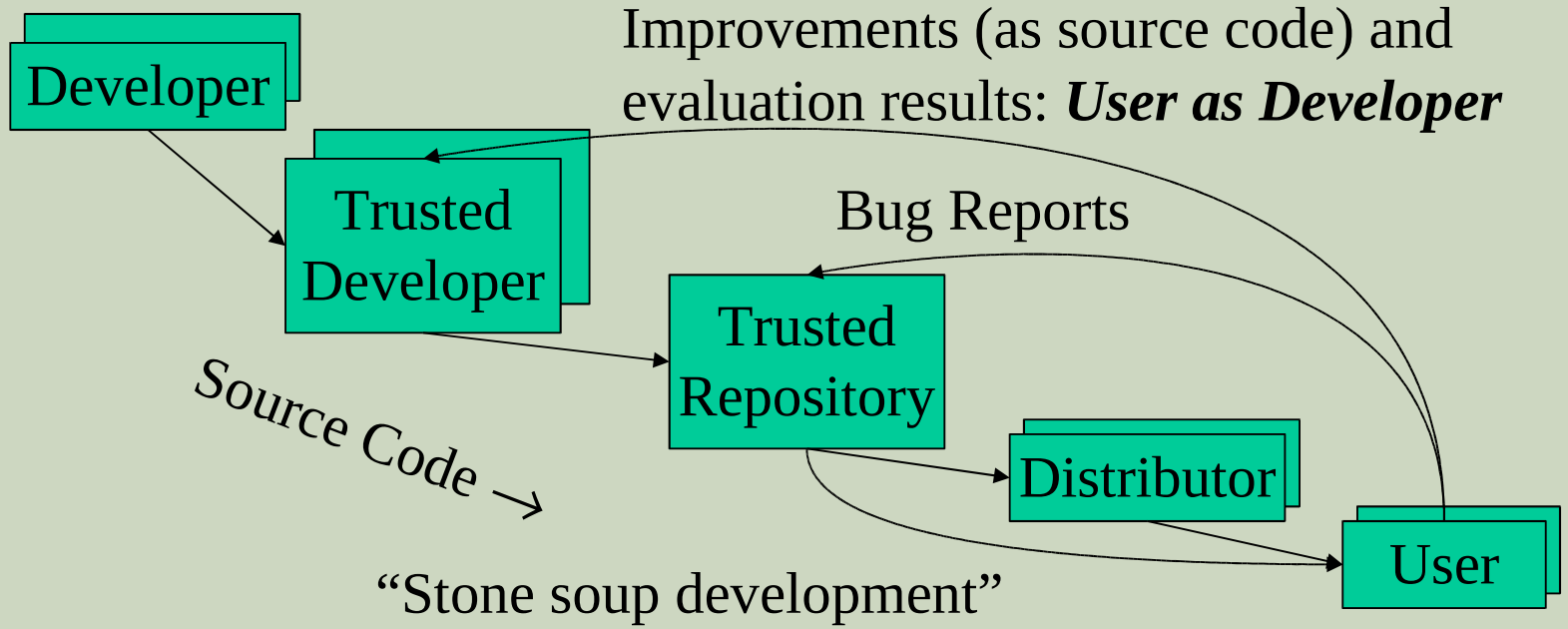
Reliability



- Fuzz studies found OSS/FS apps significantly more reliable [U Wisconsin]
  - Proprietary Unix failure rate: 28%,23%
  - OSS/FS: Slackware Linux 9%, GNU utilities 6%
  - Windows: 100%; 45% if forbid certain Win32 message formats
- GNU/Linux vs. Windows NT 10 mo study [ZDNet]
  - NT crashed every 6 weeks; both GNU/Linuxes, never
- IIS web servers >2x downtime of Apache [Syscontrol AG]
- Linux kernel TCP/IP had smaller defect density [Reasoning]



OSS/FS Development Model



- OSS/FS users typically use software without paying licensing fees
- OSS/FS users typically pay for training & support (competed)
- OSS/FS users are responsible for developing new improvements & any evaluations that they need; often cooperate/pay others to do so

Acronyms

- COTS: Commercial Off-the-Shelf (either proprietary or OSS)
- DoD: Department of Defense
- HP: Hewlitt-Packard Corporation
- JTA: Joint Technical Architecture (list of standards for the DoD); being renamed to DISR
- OSDL: Open Source Development Labs
- OSS: Open Source Software
- RFP: Request for Proposal
- RH: Red Hat, Inc.
- U.S.: United States

Interesting Documents/Sites

- **“Why OSS/FS? Look at the Numbers!” http://www.dwheeler.com/oss_fs_why.html**
- **“Use of Free and Open Source Software in the US Dept. of Defense” (MITRE, sponsored by DISA)**
- **President's Information Technology Advisory Committee (PITAC) -- Panel on Open Source Software for High End Computing, October 2000**
- **“Open Source Software (OSS) in the DoD,” DoD memo signed by John P. Stenbit (DoD CIO), May 28, 2003**
- **Center of Open Source and Government (EgovOS) http://www.egovos.org/**
- **OpenSector.org http://opensector.org**
- **Open Source and Industry Alliance http://www.osaia.org**
- **Open Source Initiative http://www.opensource.org**
- **Free Software Foundation http://www.fsf.org**
- **OSS/FS References http://www.dwheeler.com/oss_fs_refs.html**