IFIP WCC Topical Day on
Open Source Software in Dependable Systems

Trusting Strangers
Open Source Software and Security

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Outline

1. Software and Trust
2. Certifying Security
3. Open vs. Closed
Visible (inspect-able?) systems
Less visible

- Even a basic car like a Citroen 2-cv hides a lot under the hood
- Consider a modern airliner
What about this building?

Or this one?

(CDG terminal 5/23/04)
Or your microwave oven?

We rely on many anonymous strangers to design, build, deliver, and maintain critical systems.
But it’s not blind trust

- We have building codes and inspectors
- We have safety regulations
- We have product liability
- We have publicity when accidents and failures occur, and consumers react
Software is an unusual artifact

- Little physical substance, but can convey sensitive information and control significant energy
- Significant costs in design and implementation
- Low cost of replication
- Small changes to its representation can yield major behavioral changes to systems
- Usually licensed, rarely sold
- Licenses typically relieve producer from product liability
Certifying Software Systems

- Safety certification:
  - Baseline assumption: incompetence, not malice
  - Typically a combination
    - Development process controls
    - Inspection and testing
  - Additional strong economic factor:
    - consumer response to accidents
  - Status: not perfect, but reasonably effective
Certifying Security

- Baseline assumption: malicious attacker
- Common Criteria (CC) scheme
  - Permit separate specification of function and assurance requirements
  - Develop Security Target (specification)
  - Develop Target of Evaluation (implementation)
  - CC Testing Lab checks whether TOE meets ST
- Issues:
  - Unless relatively high assurance levels are requested, source code will not be reviewed by lab
    - And most flaws exploited in today’s attacks are in the implementation, not the spec
  - Scheme remains component-oriented
    - Security is a system property
  - Cost-effectiveness unknown
Open vs. Closed

Should we encourage/allow/disallow the use of open source software in security-critical applications?

+ Arbitrary tools can be used to investigate, modify, re-link, rebuild, analyze, the software
+ Third party can examine in as much detail as you can afford but
  - Liability for the results will rest with you
  - If you don’t review the software, there’s no guarantee anyone else has either
    - most of those “thousands of eyes” lack expertise and interest
    - some of them might be malicious
Is closed source better?

- Carries the producer’s economic interest in the product - a potent factor
  - Can drive control of software development
  - For large companies, reputation is a factor
- But
  - Not much product liability for licensed software either
  - Hackers find flaws even without source access
Conclusions

- **Caveat emptor**
  - Neither open nor closed source produces “bullet-proof” software without specific investment for that purpose
  - Exposing source doesn’t automatically improve its security properties
  - Neither does hiding it

- **Seek product and architectural assurance**
  - Process assurance is uncertain in a world of outsourced component software modules

- **Exploit what you know, and what know you don’t know**
  - If you use open source, consider whether to reconfigure or rebuild
  - If you purchase closed source, investigate the developer’s processes, motives, independent evaluations
  - Build system architecture taking these into account
Thank you!

Discussion?

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"I still don't have all the answers, but I'm beginning to ask the right questions."