Is Threat Modeling For Me?

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Threat modeling helps you …

Identify threats your system faces

Challenge assumptions

Prioritize other security efforts (pen test, review, fuzzing)

Document what you have learned

Definitions

- Threat Agent
  - Someone (or a process) who could do harm to a system (also adversary or attacker)
- Threat
  - An adversary's goal
- Vulnerability
  - A flaw in the system that could help a threat agent realize a threat
- Asset
  - Something of value to valid users and adversaries alike
- Attack
  - When a motivated and sufficiently skilled threat agent takes advantage of a vulnerability

Getting started

- Gather documentation (requirements, high-level design, detailed design, etc.)
- Gather your team (don't make this one person's job only!)
  - Developers, QA, Architects, Project Managers, Business Stakeholders
- Understand business goals
- Understand technical goals
- Agree on meeting date(s) and time(s)
- Plan on 1-2 hours at a time spread over a week or weeks – keep sessions focused

Threat Modeling Framework – 4 Questions*

What are you building?

What can go wrong?

What are you going to do about it?

Did you do a decent job of analysis?

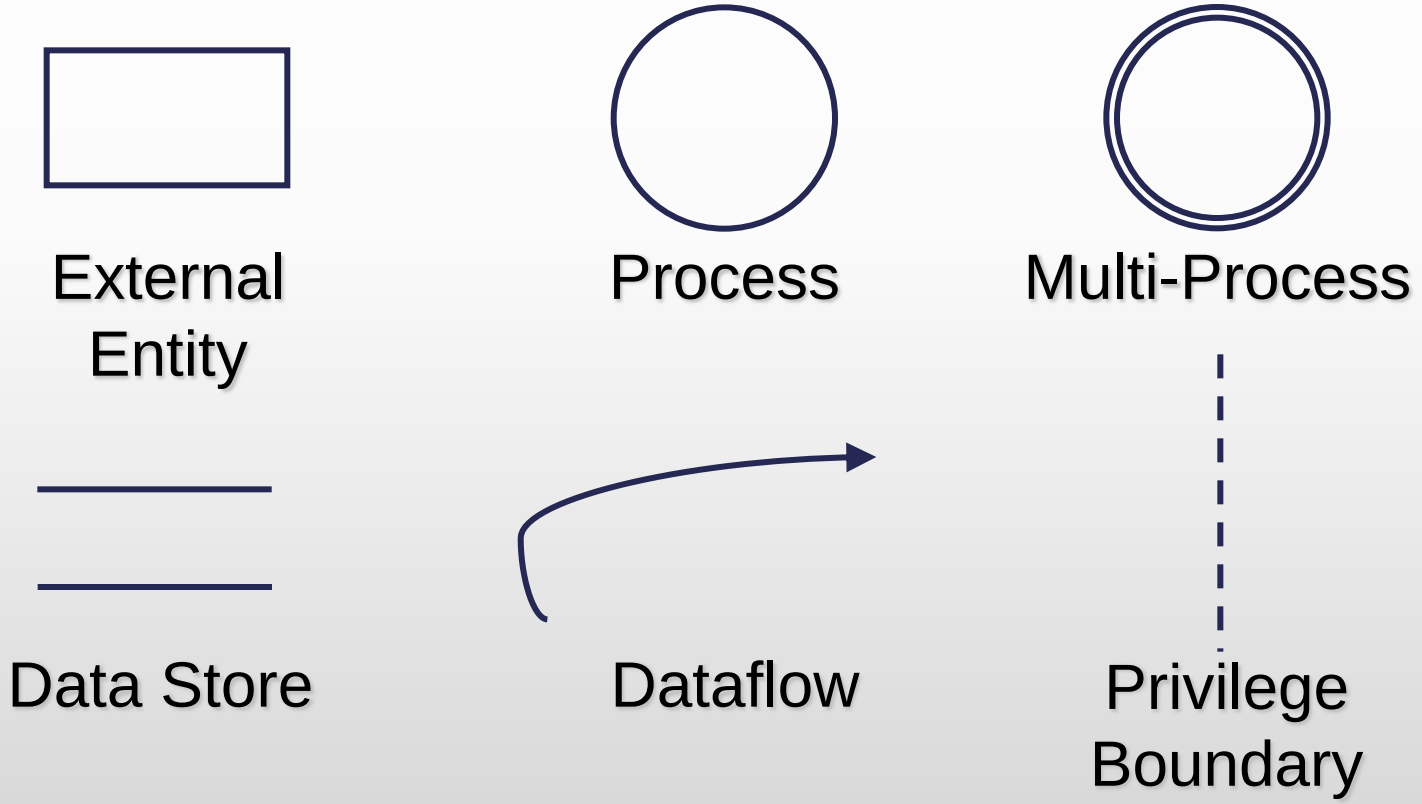
* From Threat Modeling: Designing for Security by Adam Shostack

Threat Modeling Framework – Steps*

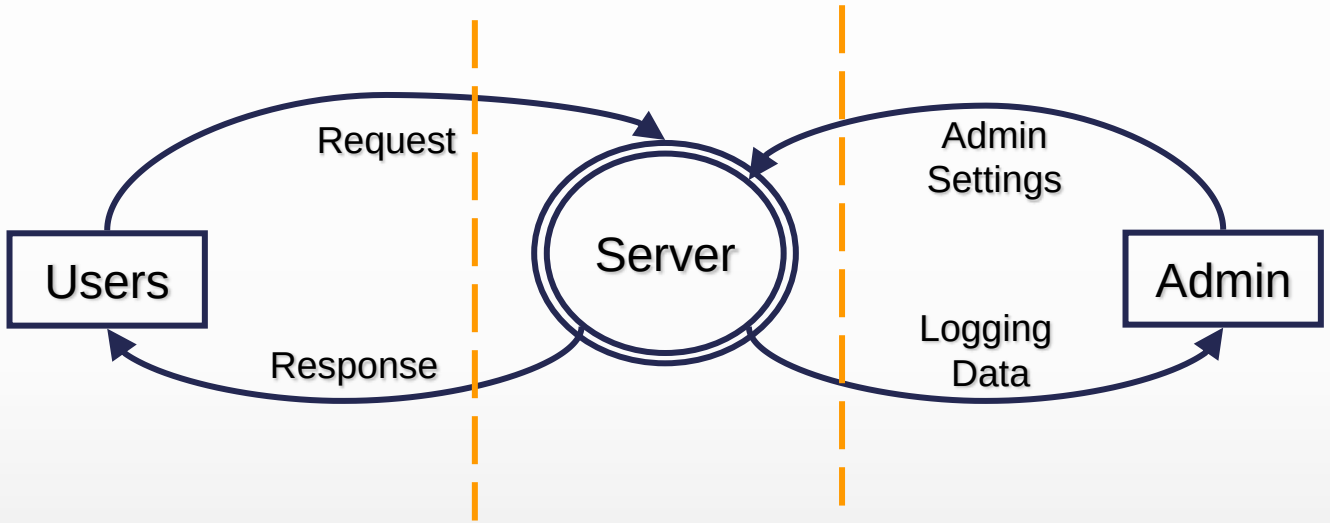
* From Threat Modeling: Designing for Security by Adam Shostack

Model the system

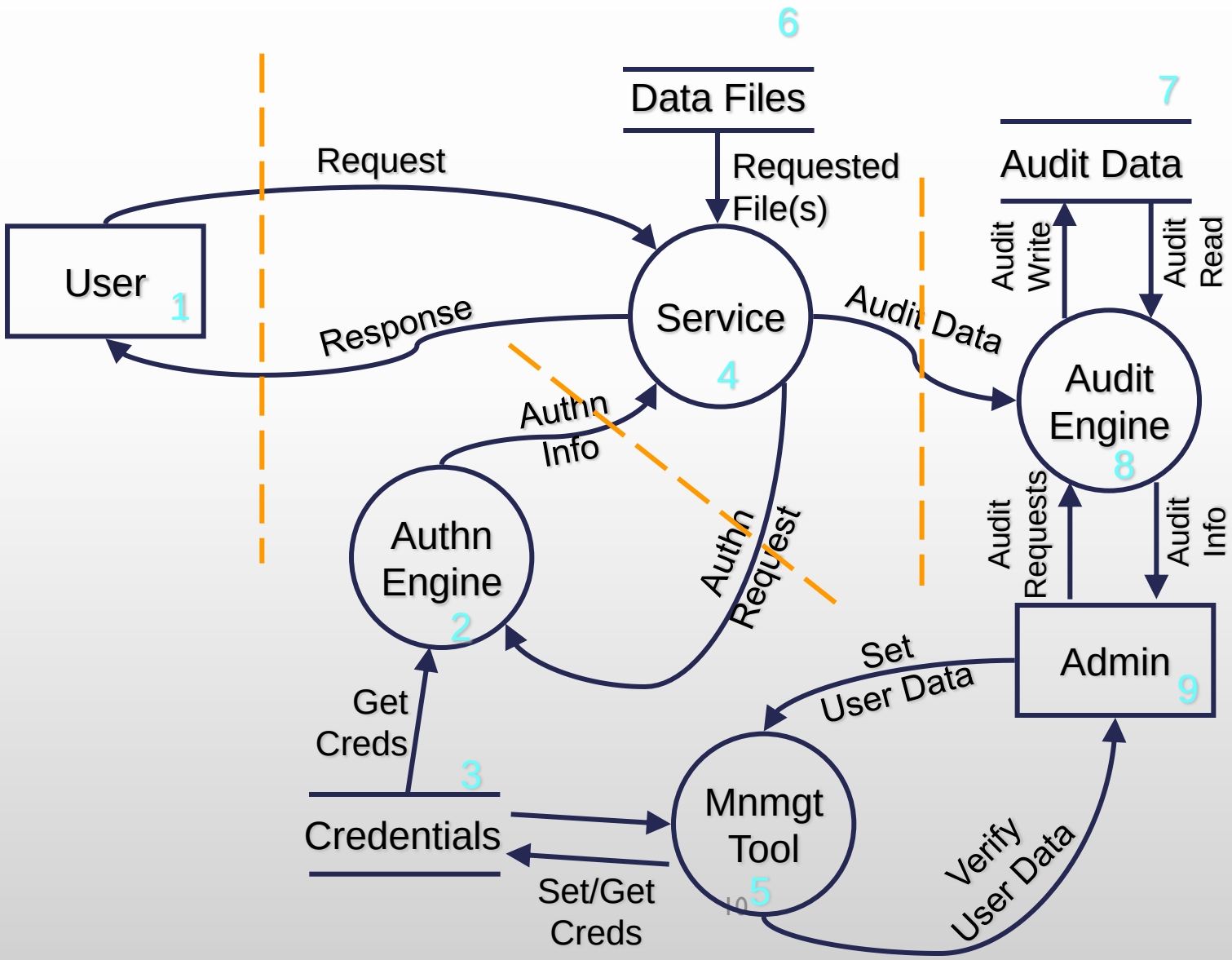
- DFD – Data Flow Diagrams (from Microsoft SDL)



Create the DFD



Create the DFDs



Identify threats

- Attack Trees
- Threat Libraries (CAPEC, OWASP Top 10)
- Checklists
- Use Cases
- STRIDE
- P.A.S.T.A. – Process for Attack Simulation and Threat Analysis

STRIDE Framework* for finding threats

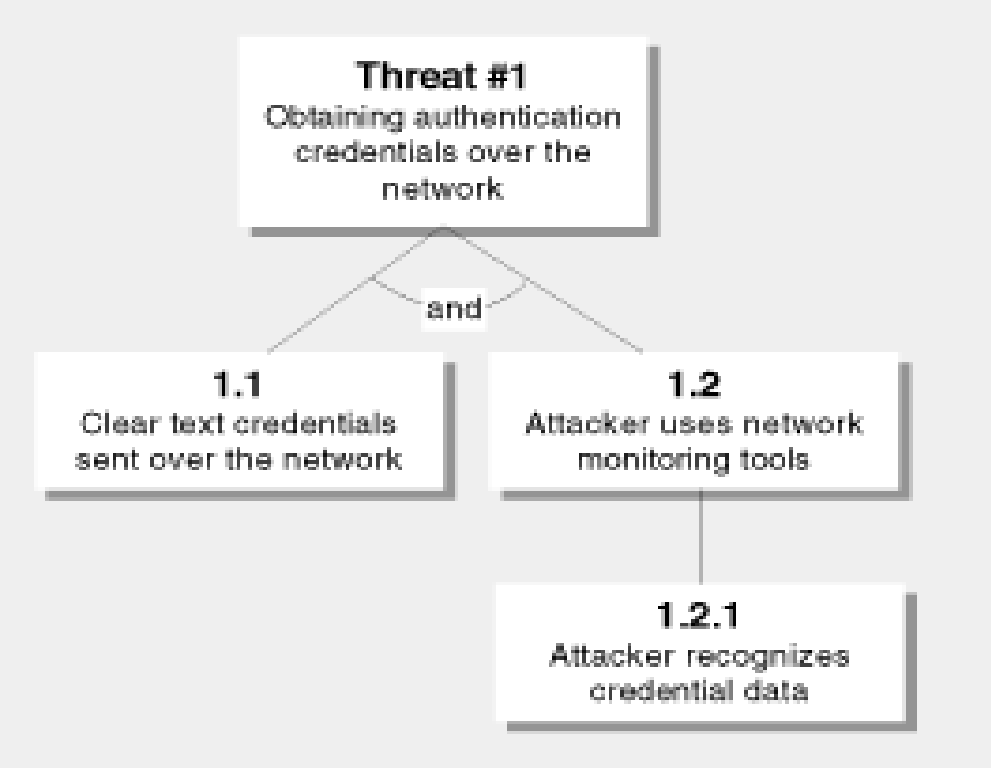
Threat	Property we want
Spoofing	Authentication
Tampering	Integrity
Repudiation	Non-repudiation
Information Disclosure	Confidentiality
Denial of Service	Availability
Elevation of Privilege	Authorization

* Framework, not classification scheme. STRIDE is a good framework, bad taxonomy

Threat Trees

- A graphical representation of security-relevant pre-conditions in a system
- First outlined in Edward Amoroso's "Fundamentals of Computer Security Technology"
- Based on hardware fault trees
- There are many "threat tree patterns"

Threat Tree Example



Threat Tree for Web Access Attack

Goal: Gain privileged access to Widget Web server
- **AND** 1. Identify Widget domain name
- 2. Identify Widget firewall IP address
  - **OR** 1. Interrogate domain name server
  - 2. Scan for firewall identification
  - 3. Trace route through firewall to Web server
- 3. Determine Widget firewall access control
  - **OR** 1. Search for specific default listening ports
  - 2. Scan ports broadly for any listening port
- 4. Identify Widget Web server operating system and type
  - **OR** 1. Scan OS services' banners for OS identification
  - 2. Probe TCP/IP stack for OS characteristic information
- 5. Exploit Widget Web server vulnerabilities
  - **OR** 1. Access sensitive shared intranet resources directly
  - 2. Access sensitive data from privileged account on Web server

Threat Modeling Tools

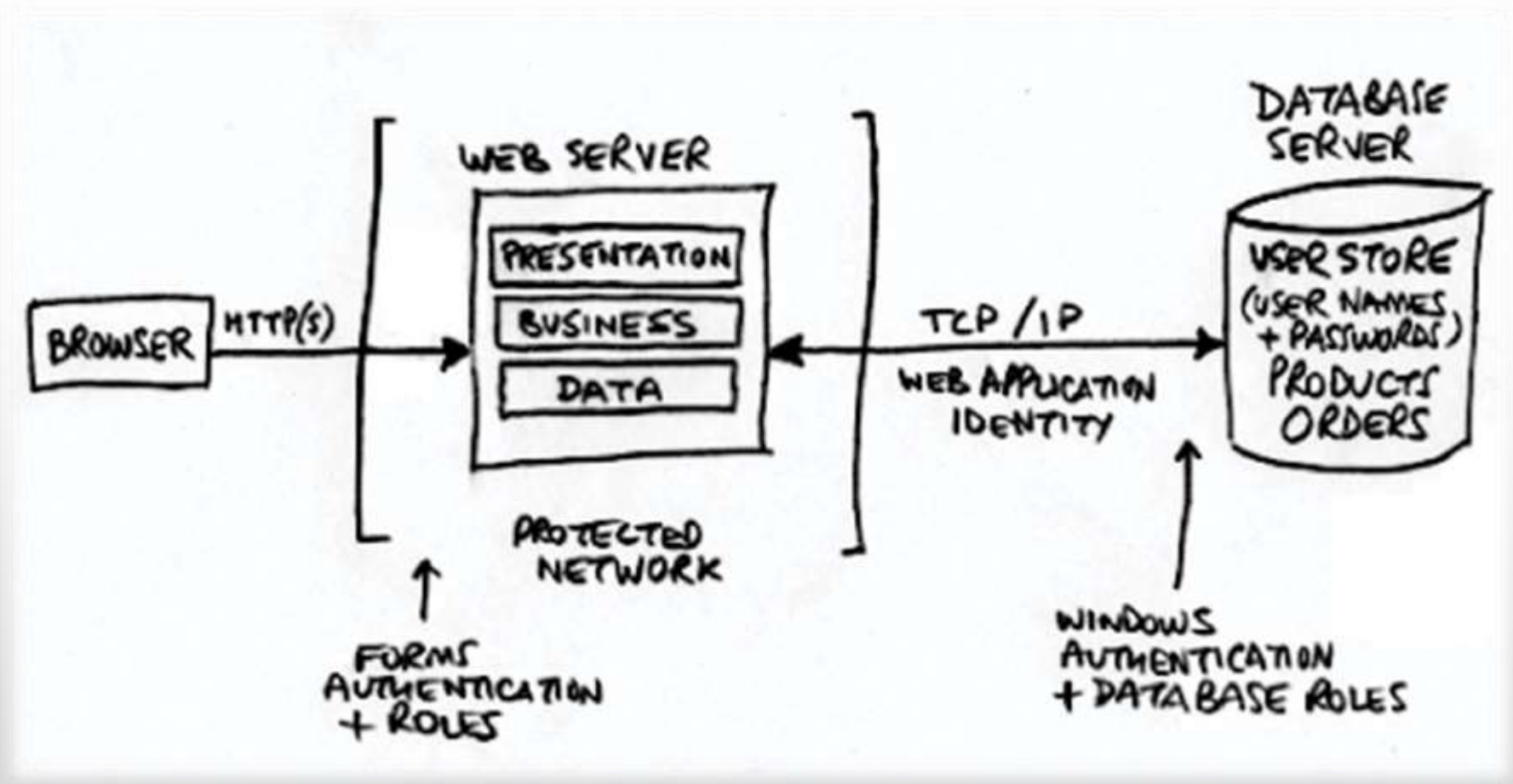
- Whiteboard
- Visio (or equivalent)
- Word (or equivalent)
- Microsoft Threat Modeling Tool 2014
- Elevation of Privilege (EoP) Game
- TRIKE
- ThreatModeler (MyAppSecurity.com)

Consider Elevation of Privilege (EoP) game

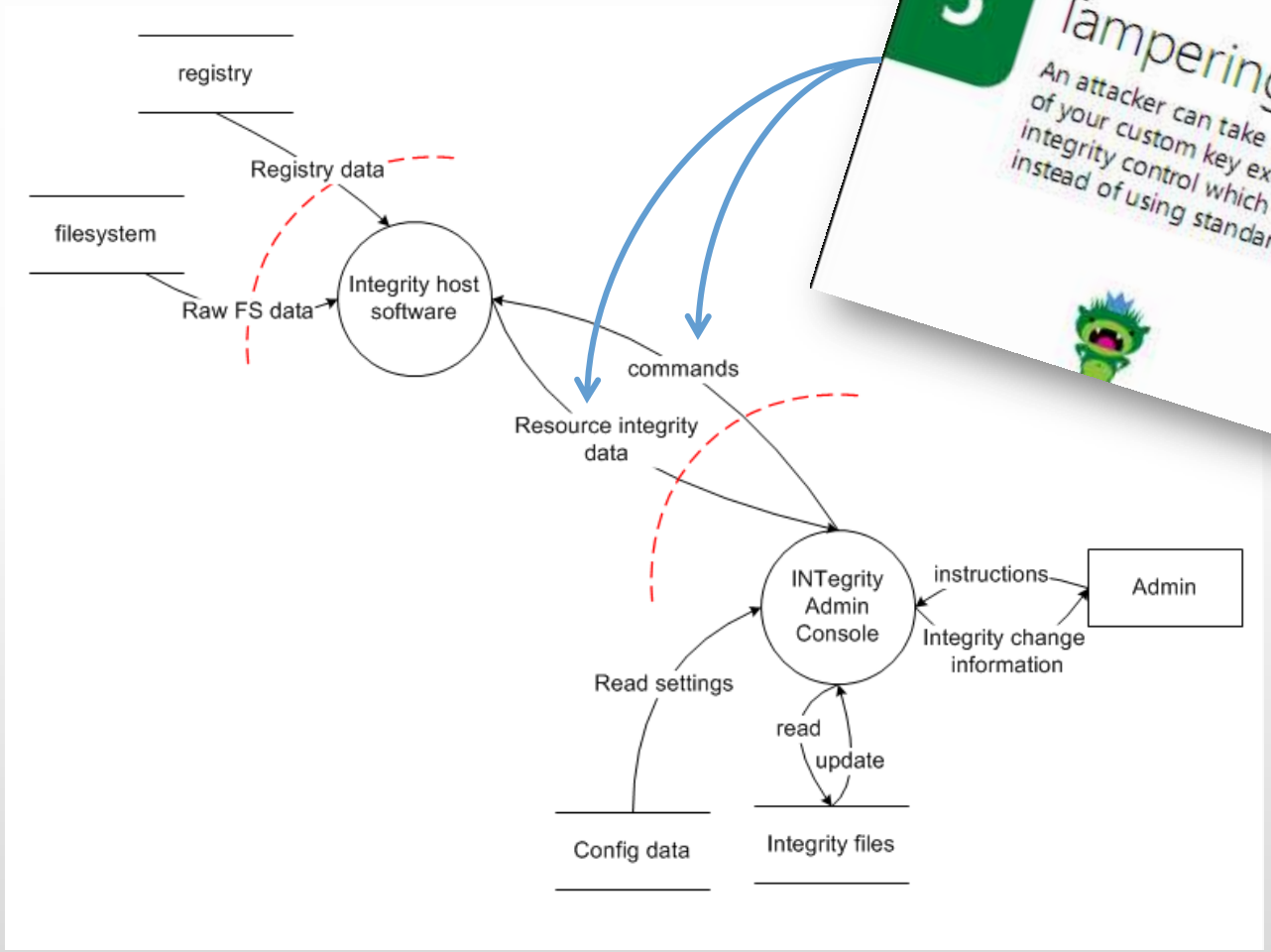
- Great for teams new to threat modeling
- Everyone likes games

- Draw a diagram of your system
- Play / draw cards
- Apply what makes sense

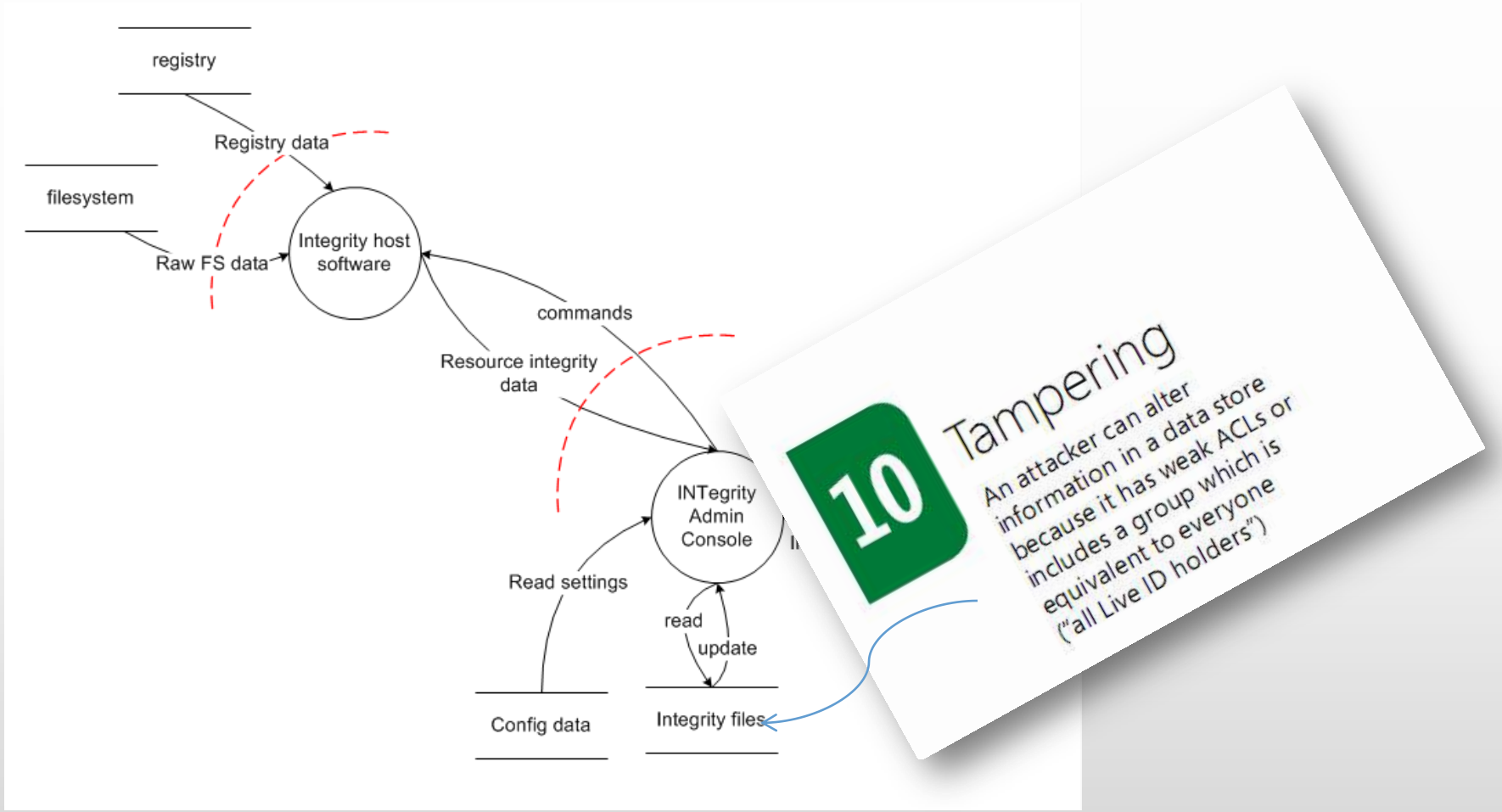
Draw a diagram



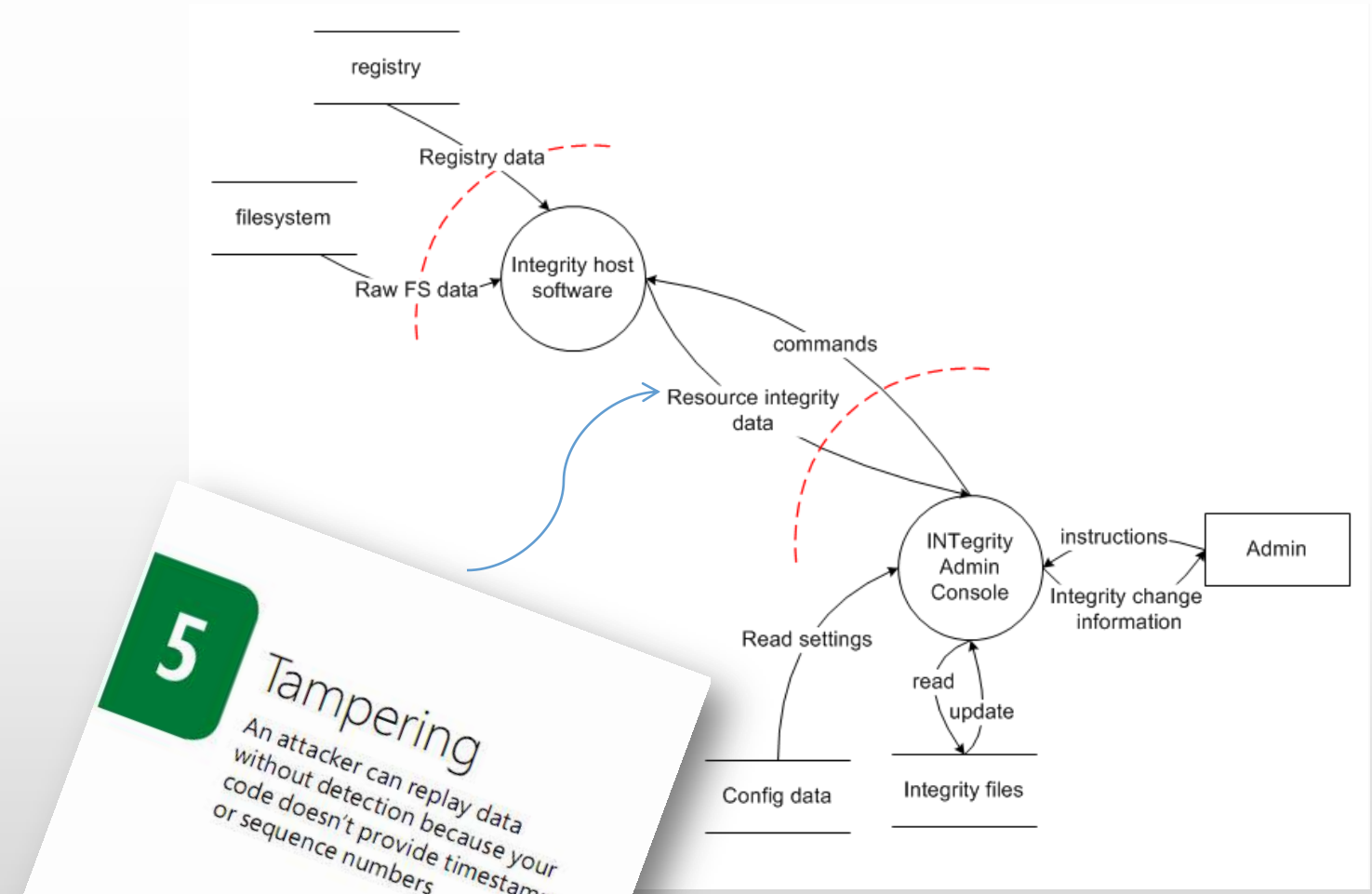
EoP Game Example



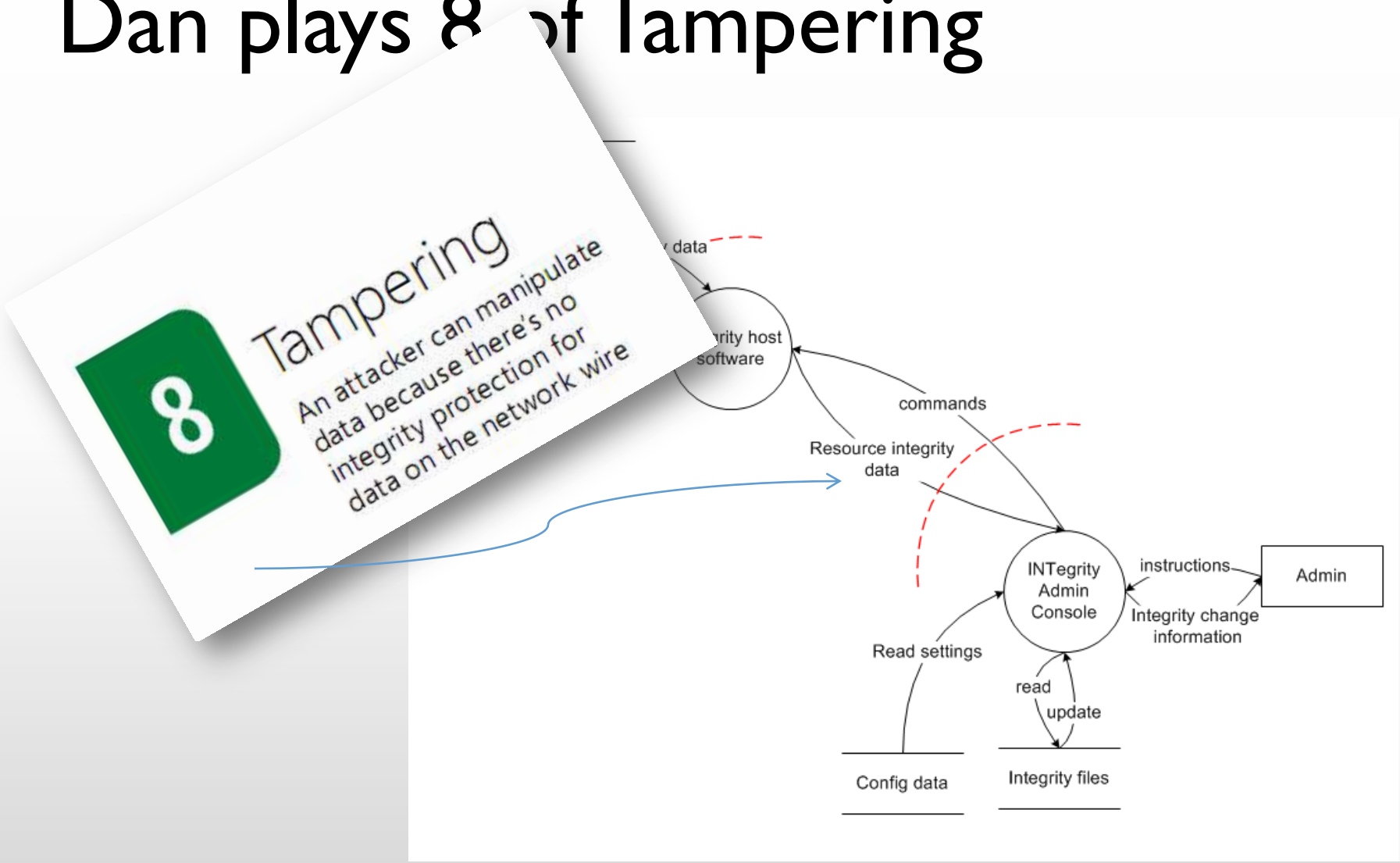
Bob plays 10 of Tampering



Charlie plays 5 of Tampering



Dan plays 8 of Tampering



Address the threats

- File bugs
- Mitigation Options:
  - Leave as-is
  - Remove from product
  - Remedy with technology countermeasure
  - Warn user
- What is the risk associated with the vulnerability?

Address the threats

- Risk Management
  - Bug Bar (Critical / Important / Moderate / Low)
  - FAIR (Factor Analysis of Information Risk) – Jack Jones

Validate your work

How well did you do?

When do you know you are done?

- Filed bugs
- Diagrammed the system(s)

Your challenge

Add threat modeling to your security toolkit

Consider threat modeling first (secure design, before new features, etc.)

Many ways … just do it!

Resources

- Threat Modeling: Designing for Security book by Adam Shostack
  http://threatmodelingbook.com/
- Measuring and Managing Information Risk: A FAIR Approach by Jack Jones and Jack Freund
- Risk Centric Threat Modeling: Process for Attack Simulation and Threat Analysis book by Marco Morana and Tony UcedaVelez (available June, 2015)
  http://www.wiley.com/WileyCDA/WileyTitle/productCd-0470500964.html

Resources - Tools

- Microsoft Threat Modeling Tool 2014

  http://www.microsoft.com/en-us/download/details.aspx?id=42518

- Elevation of Privilege (EoP) Game

  http://www.microsoft.com/en-us/download/details.aspx?id=20303

- Protection Poker paper by Laurie Williams, Michael Gegick, and Andrew Meneely

  http://collaboration.csc.ncsu.edu/laurie/Papers/essos09_submission_30.pdf

Questions?

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