An SDLC for the DevSecOps Era

Or SecDevOps, or DevOpsSec, or …

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Who you'll be heckling today

- Started out in offense
  - Pentester / researcher at iSEC Partners / NCC Group
- Moved to defense
  - First CSO at Etsy, built and lead the four security groups
- Now scaling defense for many orgs
  - Co-founder / CSO at Signal Sciences, delivering a product that defends web applications in the DevOps/Cloud world

So what is this talk about anyway?

Lessons learned adapting AppSec/SDLC from a Waterfall world to the DevOps/Cloud world

Spoiler: Security shifts from being a gatekeeper to enabling teams to be secure by default

What has changed?

The new realities in a DevSecOps world:

1. Changes happen multiple orders of magnitude faster than previously
   - Deployments go from a few a year to a few a week, month, or even day
   - Many injection points for security drops to few injections point

2. Decentralized ownership of deployment:
   - The long and perilous journey of *Dev->QA->Security->Dev->Sysops->Production* becomes just *Dev->Production*
   - As Dev/DevOps teams own their own ability to build and deploy production infrastructure/apps, conversations with security become opt-in rather than mandated
     - A large culture shift is necessary around this
       - » Spoken previously on this: http://www.slideshare.net/zanelackey/building-a-modern-security-engineering-organization

The new realities in a DevSecOps world:

- Security can no longer be “outsourced” to the security team, but rather that the security team’s mission changes to providing the resources for teams to be **security self-sufficient**

- Security only becomes successful if it can bake in to the Development/DevOps process

How do legacy AppSec approaches fare in a DevSecOps world?

An example of legacy AppSec approaches in a DevOps world

Select components of common SDLCs:

- Developer Training
- Threat modeling
- Design Reviews
- Static Analysis
- Dynamic Scanning
- Pentesting
- Feedback

What pieces of the SDLC need to adapt the most?

Which components we'll discuss today:

- Developer Training
- Threat Modeling
- Design Reviews
- **Static Analysis**
- **Dynamic Scanning**
- Pentesting
- **Security Visibility**
- **Feedback**
- **Continuous Feedback**

  - Note: Just because we're not discussing several of these items in this talk doesn't mean you stop doing them!

Static Analysis: It’s not a party until the 32847326th page of the report!

Static Analysis (legacy):

- Traditionally done as heavyweight process:
  - Run once a week/month resulting in a large output
  - Extensive configuration/tuning period, typically lasting months+
  - Top down: search for everything, slowly refine to eliminate false positives
- Both of these issues were acceptable-ish in a Waterfall world where you had plenty of time in each release cycle

How do we adapt this control?

Static Analysis (modern):

- Shift from from a top down model to a bottoms up one:
  - Identify specific classes of vulnerabilities you care about most, and start with just those
  - Focus on eliminating false positives and enabling velocity with the goal of only producing real issues that can be directly consumed by a developer themselves
  - Once completed, add one or two more vulnerabilities classes
  - Repeat
- This enables the velocity needed in DevOps of being able to run static analysis on every code commit

Static Analysis (modern):

- Example: Rather than trying to start with static analysis for XSS, SQLi, Directory Traversal, Command Execution, etc all at once, pick one:
  - Pro tip: Pick the easiest to implement first, (ex: Command Execution)
    - Grep'ing for system() has a pretty low false positive rate…
- The focus is not only on findings, but demonstrating to the development org that this approach to static analysis can bring them both value and velocity

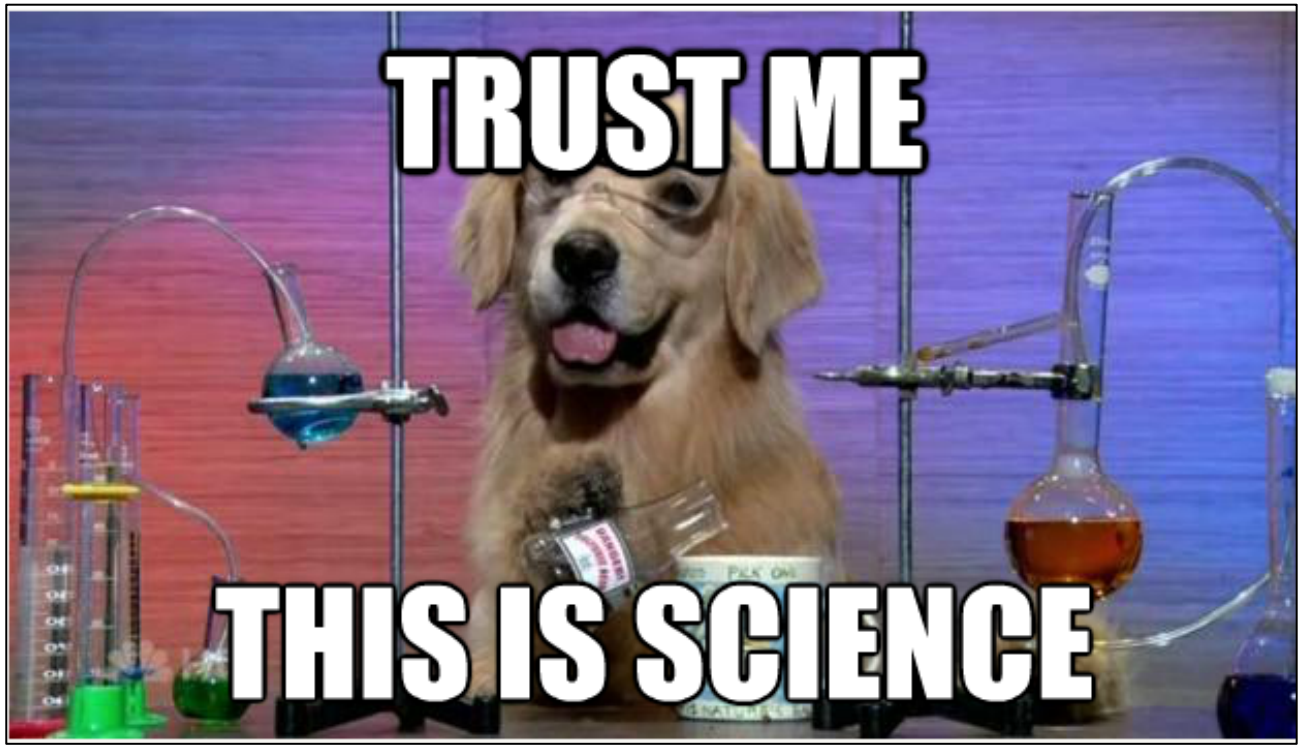
Static Analysis (modern):

- Identify use of certain primitives that should initiate a conversation with the security team rather than just be blocked:
  - Ex: Hashing, Encryption, File system operations, etc

- Common example: Use of hashing or encryption functions
  - Old approach: “MD5 is banned, use SHA256!”
  - New approach: “Hey, we saw you’re making use of a hashing function, can we chat on what you’re trying to protect?”
  - Silently allowing an approved hashing function to be used doesn’t help anyone in cases where it’s not the appropriate use, ex: a case where the data should be encrypted not hashed

Static Analysis (modern):

- Build proactive alerting to know when sensitive and rarely changed portions of the codebase have been modified
  - Can be as simple as alerting on when the hash changes on certain key files
    - Ex: authorization primitives, session management, encryption wrappers, etc
- By not blocking on these changes, you don't impact velocity but you ensure that the relevant security/development engineers know if key platform protections are being changed



Dynamic Scanning

Dynamic Scanning (legacy):

- Used to meet a baseline standard of discovering vulnerabilities:
  - Ex: “If a scanner can find it, we should probably fix it”
- Occasionally even (mis)used as a substitute for pentesting

How do we adapt this control?

Dynamic Scanning (modern):

- Applications architectures and functionality have changed significantly since scanners were pioneered in the early-mid 2000s
  - Modern applications are often far too complex to be effectively covered by scanners
    - Client side functionality, single page applications, etc.
- In the old use cases there's too little bang for the buck from scanners when used with modern apps
- However, scanners can be adapted to two cheap and effective use cases:

Dynamic Scanning (modern):

1. Ensuring that security policies are being enforced
   - Ex: TLS only supporting strong ciphers
   - Ex: Crawl the app and ensure that CSP exists, or that X-Frame-Options header is always set to DENY

2. An extra control on ensuring previous vulnerabilities aren't accidentally regressed back in to the application:
   - Ex: We had an XSS in this parameter before, always check it with this specific payload to ensure the protection didn't get accidentally rolled back

Security Visibility

Security Visibility (legacy):

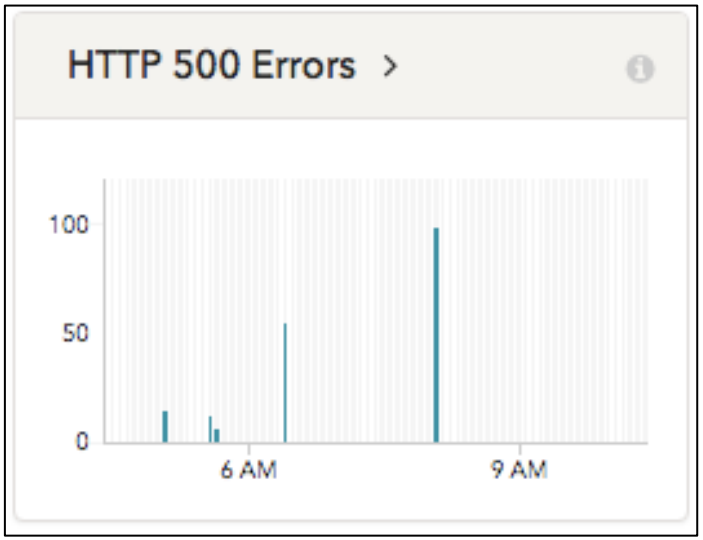
- Logs, customer service reports, outages
- Each source of information was generally isolated in who had access to the data
  - Ex: Ops had logs, customer support dealt with emails from customers, outages would page only certain dev or ops on-call / leads, etc

How do we adapt this control?

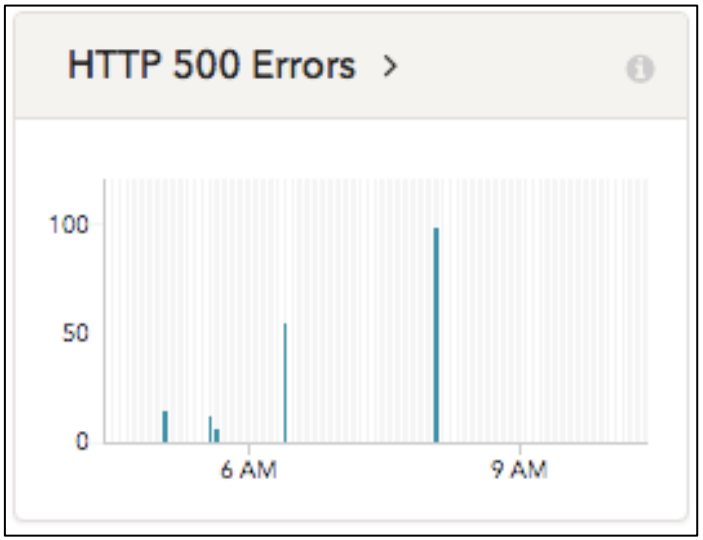
Security Visibility (modern):

- GOAL: Break down the previous silos of data isolation and empower security, development, and DevOps teams to all know security relevant information from their application in real time

- This isn't a new idea! Take principles of general operational visibility, and apply to a security perspective
  - Superset of operational data + security relevant data



This graph provokes wildly different assumptions from Development, DevOps, and Security teams



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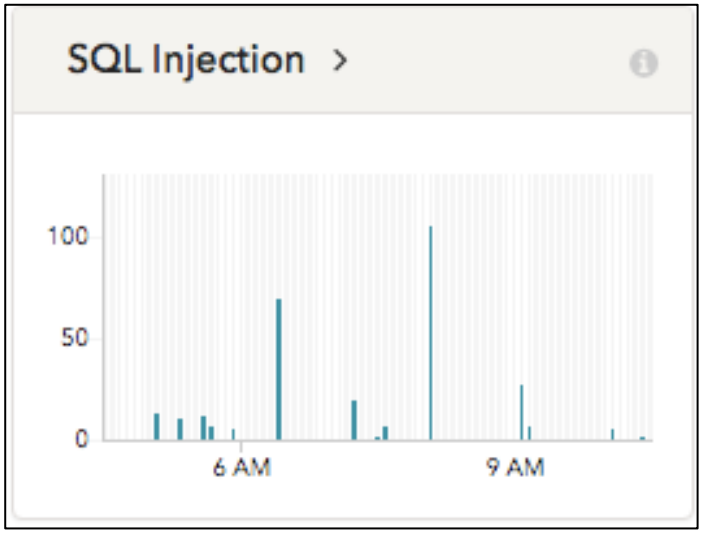

Context is key, for *all* groups

Feedback

Feedback (legacy):

- Typically done as annual pentests
- Unfortunately this really only answers the question “do I have bugs?”
  - Spoiler alert: The answer is yes. Always.
- When applications were released annually or bi-annually that could be “real time enough” feedback

How do we adapt this control?

Feedback (modern):

- Combination of bug bounty + pentests
- Bounty is not a replacement for pentest, it augments pentest
  - Value is in the continuous nature of it, whereas pentests can be more directed
- Bounty gives general but more real time feedback, pentest shifts to giving more directed but less frequent feedback

Break out the Thought Leader-hosen!

It’s time for some thoughts on where modern Application Security should be headed towards

The hallmark of a modern AppSec program is the combination of continuous feedback + visibility

To be successful against real attackers, you need to be able to answer the question:

“How do I know when my attackers are being successful?”

Three pillars of effective visibility + continuous feedback

1. Ability to detect attackers as early as possible in the attack chain
   - You want to know when the attacker discovers the vulnerability, long before the database goes out the door

2. Ability to continuously test and refine your vulnerability triage/response
   - The beauty of DevOps is that you can actually move faster than your attackers for the first time, especially the more you empower development / DevOps teams

Three pillars of effective visibility + continuous feedback

3. Ability to continuously test and refine your incident response/DFIR/SecOps process
   - By treating even benign bug reports as sample incidents, you can continuously exercise and adapt your process
   - Ultimately you want to be able to answer several questions for any given bug report that comes in:
     - Did this bounty participant find any additional issues they're ***not*** reporting?
     - Was this reported vulnerability exploited previously?
     - etc

Continuous feedback loop success story:

"I discovered the vulnerability late Friday afternoon and wasn't quite ready to email it to them … [Etsy] had **detected my requests and pushed a patch** Saturday morning **before I could email them**. This was by far the fastest response time by any company I've reported to."

- Source: https://www.reddit.com/r/netsec/comments/vbrzg/etsy_has_been_one_of_the_best_companies_ive

Conclusions

- The thesis of modern application security is about shifting:
  - **From**: A mindset of "Exclusively focus on gatekeeping controls to eliminate bugs before code is deployed"
    - (An impossible goal, bugs will never be fully eliminated)
  - **To**: Focus on obtaining and refining continuous visibility and feedback from deployed applications, and providing security capabilities that make developers/DevOps teams security self-sufficient

Thanks!

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