DevOps, CI, APIs, Oh My!
Security Gone Agile

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Matt Tesauro
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About Me

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Who am I?

Racker since October 2011

Rackspace's Product Security Group

Product Security Senior Engineer

Work with developers and QE

matt.tesauro@owasp.org

matt.tesauro@rackspace.com

Former OWASP International Foundation Board Member and Treasurer

Project Leader of

OWASP Live CD / OWASP WTE

OWASP OpenStack Security Project

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DevOps, CI, APIs, Oh My!

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A quick Overview of DevOps

- The combination of traditional development activities with operations and testing (QA/QE)
- Collaboration, communication and integration is key
- Agile development model (sprints, scrum, stories…)
- Release coordination and automation

"DevOps" is an emerging set of principles, methods and practices for communication, collaboration and integration between software development (application/software engineering) and IT operations (systems administration/infrastructure) professionals.

CI, CD, CD, TDD and API

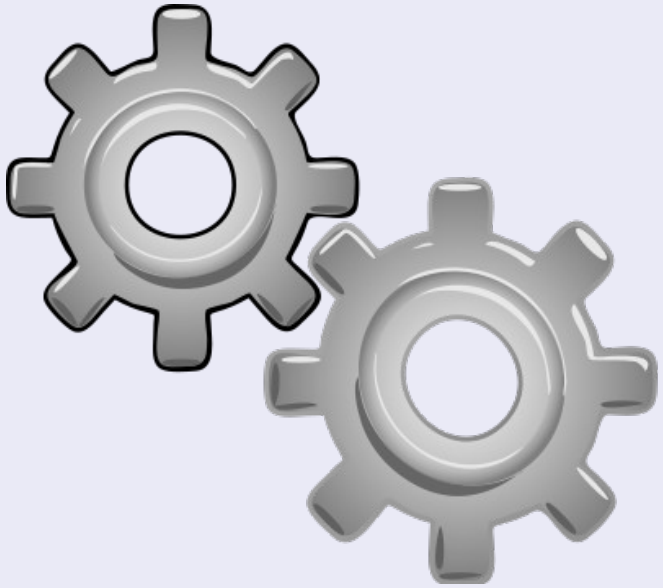
CI == Continuous Integration

CD == Continuous Deployment

CD == Continuous Delivery

TDD == Test Driven Development

API == Application Programming Interface



The Problem

- Cycle time for software is getting shorter
- Continuous delivery is a goal
- Scanning windows are not viable
- First mover / first to market advantage

The Problem – or at least more problems

- Traditional software development left little time to test
- DevOps, Agile and Continuous Delivery squeeze those windows even more
- New languages and programming methods aren't making this better
  - Growth of interpreted languages with loose typing hurts static analysis efforts
  - Few automated tools to test APIs especially RESTful APIs
- Little time for any testing, manual testing is doomed

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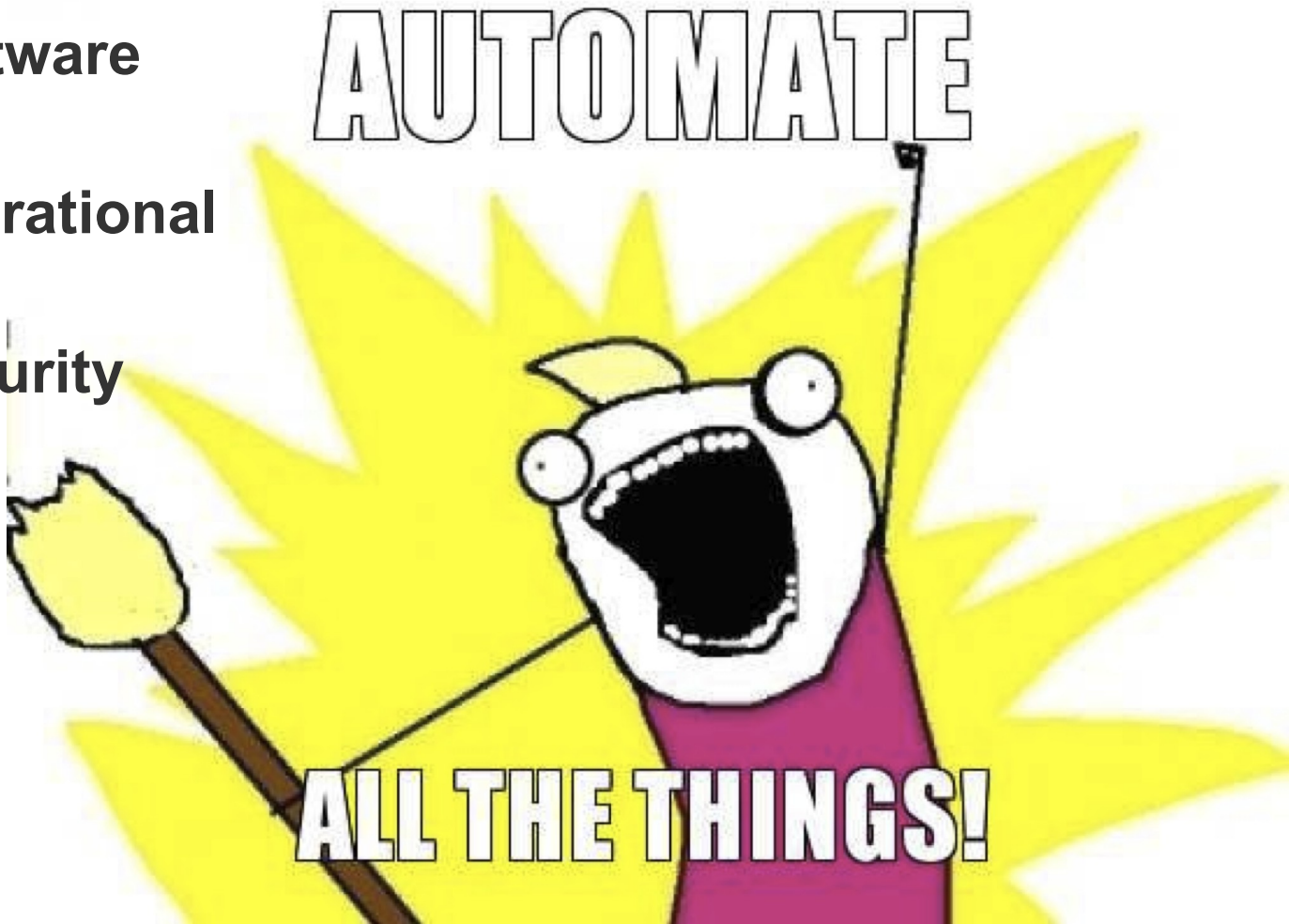
THE SOLUTION

- Automated software testing
- Automated operational infrastructure
- Automated security testing



Think like a developer

Sprints break software into little pieces…

- Break your testing into little pieces
- Use your threat model to know the crucial bits to test

Long and short running tests

- Testing time drives testing frequency
- Code for tests needs to be optimized

Smoke test versus full regression test

- Smoke test early and often
- Full regression tests on regular intervals

Maximize what you've got

Make the most of your frameworks

- Embrace, understand and fill gaps where necessary

Make the best use of your time…

- Make tests easily repeatable
- Make tests easy to understand
- Make tests abstract and combine-able
  - Ala carte tests for mixing and matching
  - Think about the Unix pipe | and its power

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Test Driven ~~Development~~ Security

Under the constraints of DevOps, Continuous Deployment

Your testing has to be nimble

Dare I say…Agile

In TDD, you know your code works when the tests pass

In TD(S), you know your app has met the baseline when the tests pass

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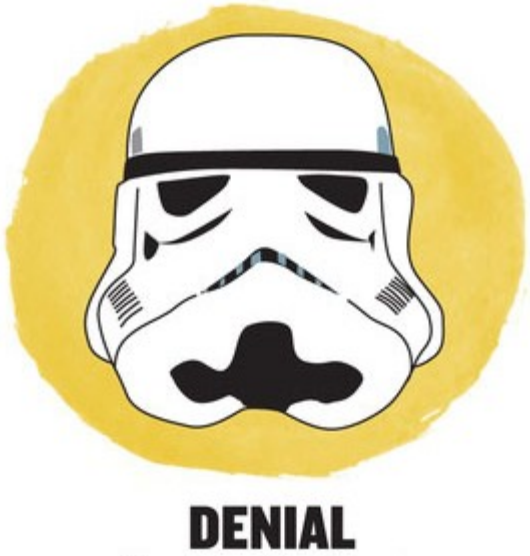
A time to morn...



5 Stages of Grief

This agile thing is a fad...

Waterfall is the only way to produce quality software...

5 Stages of Grief

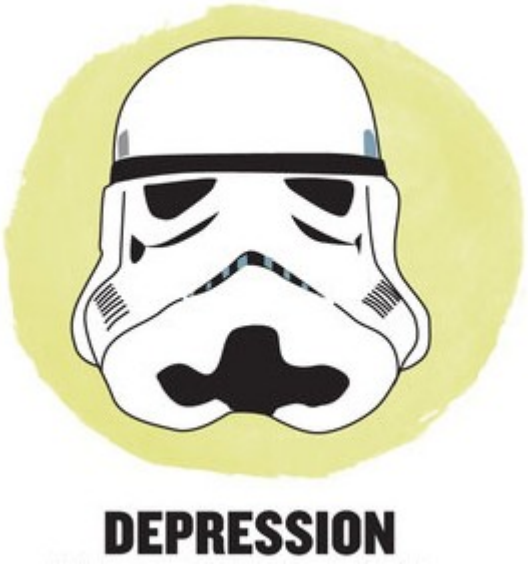
There's no way I can test in that time frame...

If I see another freaking sticky note...

5 Stages of Grief

Well, I think I can test some of it in two days...

I guess I can test it after its deployed to prod...



5 Stages of Grief

After that launch, I updated my LinkedIn profile...

Game over man, GAME OVER...

(Thanks Aliens)

5 Stages of Grief

So when can you add a story to work on that auth regression...

After reviewing your deployment recipe, we filed a pull request to fix...

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Fly through those 5 stages by addressing…

- Securing Infrastructure
- Securing Apps and APIs
- Securing Code

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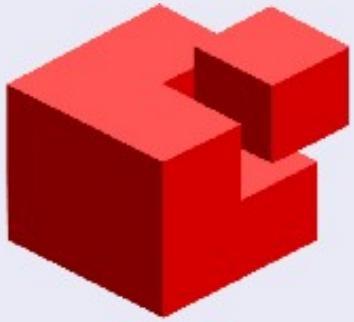
Securing Infrastructure

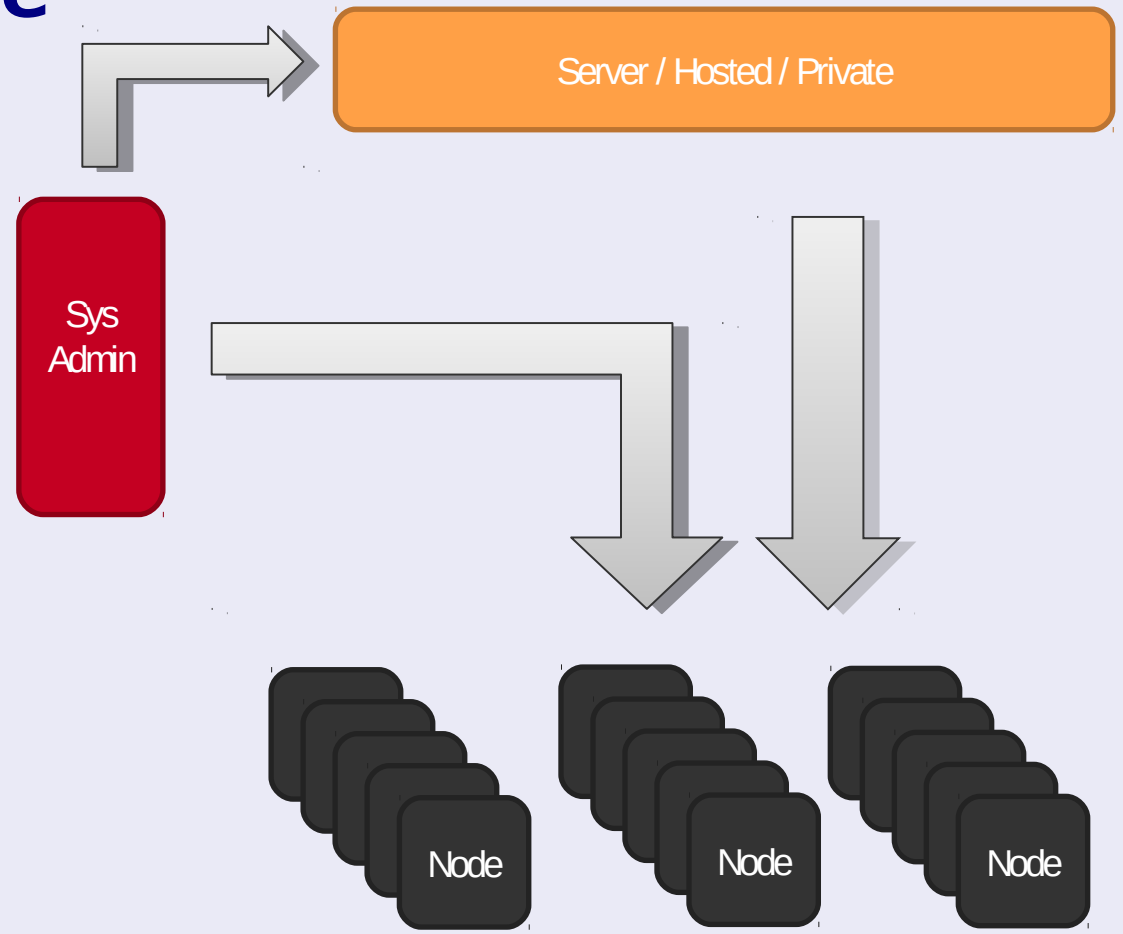
Automating Infrastructure



- Declarative configuration language
- Plain-text configuration in source control
- Fully programmatic, no manual interactions

Chef for example

1. Solo
2. Server
3. Hosted
4. Private Hosted

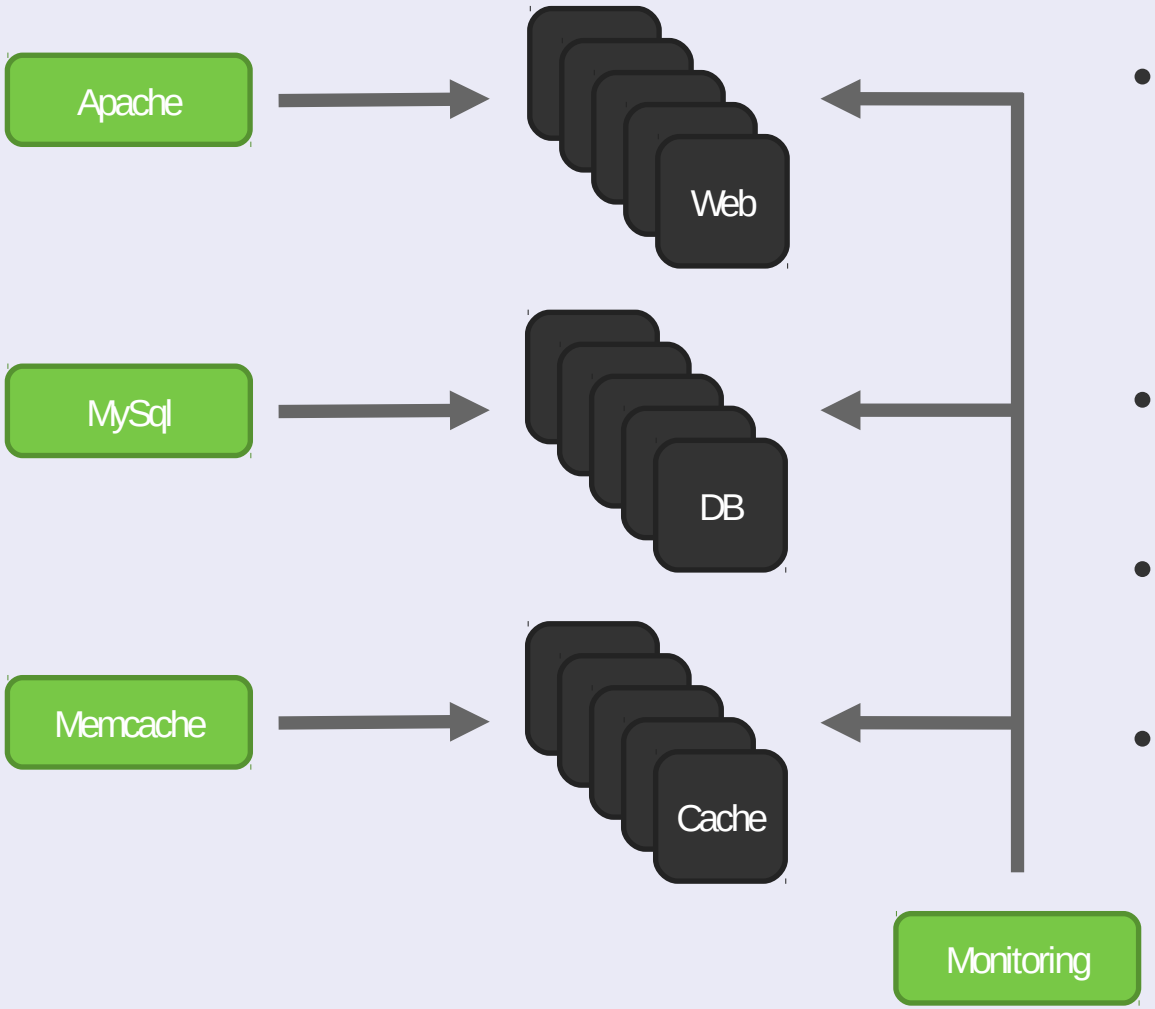


Cookbooks, Stacks, Playbooks, ...

```
case node['platform']
when "ubuntu","debian"
  %w{build-essential binutils-doc}.each do |pkg|
    package pkg do
      action :install
    end
  end
when "centos","redhat","fedora"
  %w{gcc gcc-c++ kernel-devel make}.each do |pkg|
    package pkg do
      action :install
    end
  end
end

package "autoconf" do
  action :install
end

package "flex" do
  action :install
end

package "bison" do
  action :install
end
```

- Most have methods to bundle / share automation routines
- You will have to write your own / customize
- Good place to spend security cycles
  - Merge patches upstream for extra points.

Grouping & Tagging



- Tagging your servers applies the required set of automation
- A base set of for all servers
- Each server can have multiple tags
- Map tags to security requirements

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Inspector – you need one

- For each group and/or tag
  - Review the recipe
  - Hook provisioning for post deploy review
- Focus on checking for code compliance
  - Not perfection, bare minimums
- Can include multiple facets
  - Security
  - Scalability
  - Compliance

Agent – one mole to rule them all

- Add an agent to the standard deploy
  - Read-only helps sell to SysAdmin
  - Looks at the state of the system
  - Reports the state to the “mothership”
- Add a dashboard to visualize state of infrastructure
  - Change policy, servers go red
  - Watch the board go green as patches roll-out
- Roll your own or find a vendor

  Mozilla MIG

  CloudPassage

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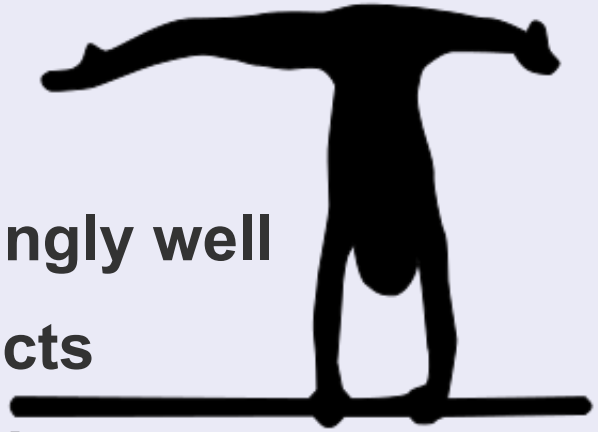
Turn Vuln scanning on its head

- Add value for your ops teams
  - Subscribe and parse vuln emails for key software
  - Get this info during threat models or config mgmt
  - Provide an early warning and remove panic from software updates
- Roll your own or find a vendor
  - Gmail + filters can work surprisingly well
  - Secunia VIM covers 40K+ products
- Reverse the scan then report standard



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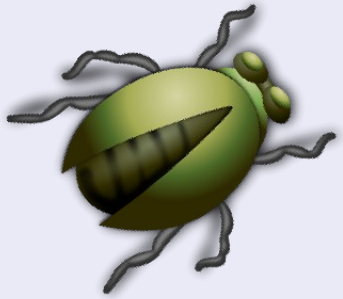
Securing Apps & APIs

Findings directly to bug trackers

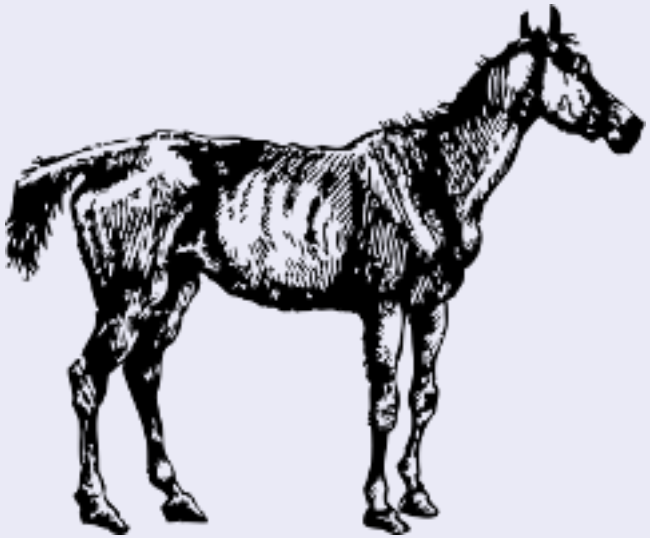
- PDFs are great, bugs are better
  - Work with developer teams to submit bugs
  - Security category needs to exist
  - Bonus points if the bug tracker has an API
- Security issues are now part of the normal work flow
  - Beware of death by backlog
  - Occasional security sprints
  - Learn how the team treats issues



- ThreadFix is nice for metrics and pumping issues into issue trackers - http://code.google.com/p/threadfix/

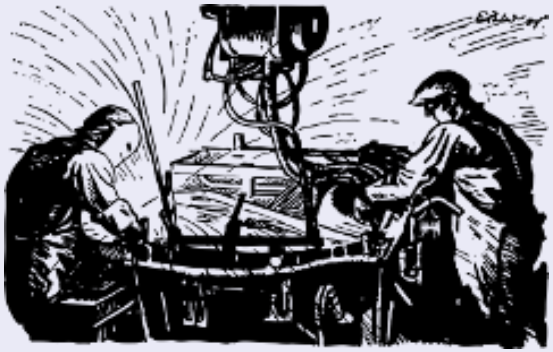
For the reticent: nag, nag, nag

- Attach a SLA to each severity level for findings
  - Remediation plan vs Fixed
  - "Age" all findings against these SLAs
  - Politely warn when SLA dates are close



- Walk up the Org chart as things get older
- Bonus points for dashboards and bug tracker APIs
- Get management sold first

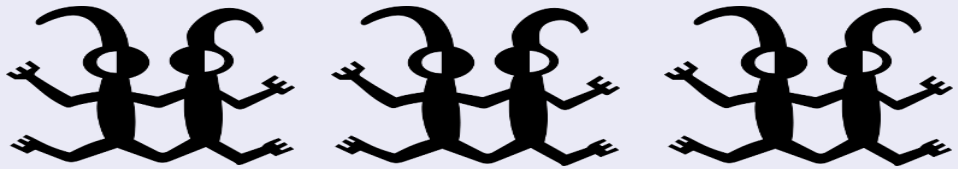
Reports = Findings + Automation



- Consider markup for findings
  - Markdown, Wiki Text, asciidoc
  - Pandoc to convert to whatever
    - HTML, PDF, .doc, .odt, ...
- Keep testers writing the least possible
  - Template and re-use boiler plate items
  - New finding == new template for next time
- Web app to keep things consistent
  - Create your own or maybe Dradis

Leverage existing consistencies

- Requires consistent (generally automated) input
  - Find these and write some scripts
  - Automate the drudgery
- Examples:
  - Automate finding/bug submission
  - Automate report PDF generation
  - API documentation to basic testing harness
  - Sec tool output – combine and convert



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Securing Code

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Start with the developers

- Finding details have to be detailed enough to:
  - Reproduce the issue after 6 months
  - Allow QE to test the issue
  - Allow developers to find/fix the issue
- Consider quick and dirty scripts to reproduce issue
  - Script to abuse an API
  - Web page of reflective XSS findings
  - Gauntlt - http://gauntlt.org/
- Once findings start flowing, look for training requests

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Cherry pick what you look at

- Threat Models are your friends
  - Focus on weak, unclear or suspicious areas
  - Focus on connections with external systems
  - Focus on format translations (XML to JSON)
- When code changes in those areas,
  - Red flag it for review
  - Change +2 to +3 to before accepting pull request
- Use search features in source code management
- Start a list of problematic methods, calls, etc

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No False Positive, period.

- If you can automate code review, you still must triage
  - 1 false positive == 100 valid bugs
  - If results aren't actionable, fail
- Stick to diff analysis
  - Threat Modeling + “Scary Parts” + Code diffs == Quick triage of code changes
  - Automate where you can, iterate until you're happy
- Need to build cred points with the dev teams

Quiet is better then wrong

- Hire or befriend developers
  - Need to speak their language, not security's
  - Suggest requirements not implementation
  - Mitigation suggestions either generic or in the language the app is written in
- Remember: Fast deploys also means fast fixes
  - Trying to shrink any vuln window not eliminate
  - Be prepared to retest / verify fix quickly

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What is Rackspace's Product Security doing?

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Securing Infrastructure

- Rack has Chef, Puppet, Salt and Ansible, depending on the team
    - Reviewing the deployment scripts
    - Validating them with external vuln scans
    - Re-checks after bug fixes
- Rack is using CloudPassage as a “mole” for some deployments
    - Also have some mole-like agents for one-offs
- Rack has been conducting threat models ++ and using that info to watch for vulnerabilities

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Securing Apps and APIs

- Product Security finding workflow
  - PS team member finds an issue
  - Documents it in Test Tracker app
  - Pushed finding(s) to ThreadFix
  - ThreadFix integrates with bug trackers
  - Metrics are driven off the ThreadFix database
- We're re-implementing the ~~nag~~, *err* reminder script for the new workflow
- Using asciidoc markup for findings – easily creates PDFs, HTML, doc, reports based on templates

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Securing Code

- Rack is using Veracode if the language is supported
  - Self-service for the dev teams
  - Jenkins integration for submitting code to scan
  - API automation to pull findings into our workflow
- PS team produces detailed finding blocks
  - Creates quick re-test scripts ad-hock
- PS team holds trainings and has e-learning modules
- PS team works with devs daily
  - Loaned to teams, attend stand-ups, …
- PS “Dev Days” - team works on our automation

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Key take aways

- Automate, automate, automate
  - Look for “paper cuts” and fix those first
- Finding workflow
  - Figure this out and standardize / optimize
- Create systems which can grow organically
  - App is never done, its just created to easily be added to over time
  - Finding blocks become templates for next time
- Learn to talk “dev”

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Change is here and more is coming...

"Whosoever desires constant success must change his conduct with the times."

— Niccolo Machiavelli

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THANK YOU

Questions?