Google

Santa's Got A Brand New Bag

Matt White, Pete Markowsky / 2023-10-12

Agenda

- What is Santa?
- Deployment at Google
- Making a Modern Santa
- What's New?
- Better Detection & Response
- Getting Involved

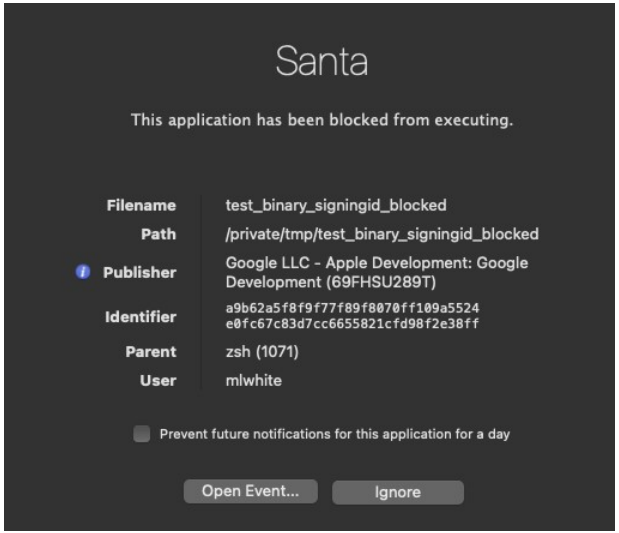
What Is Santa?

What is Santa?

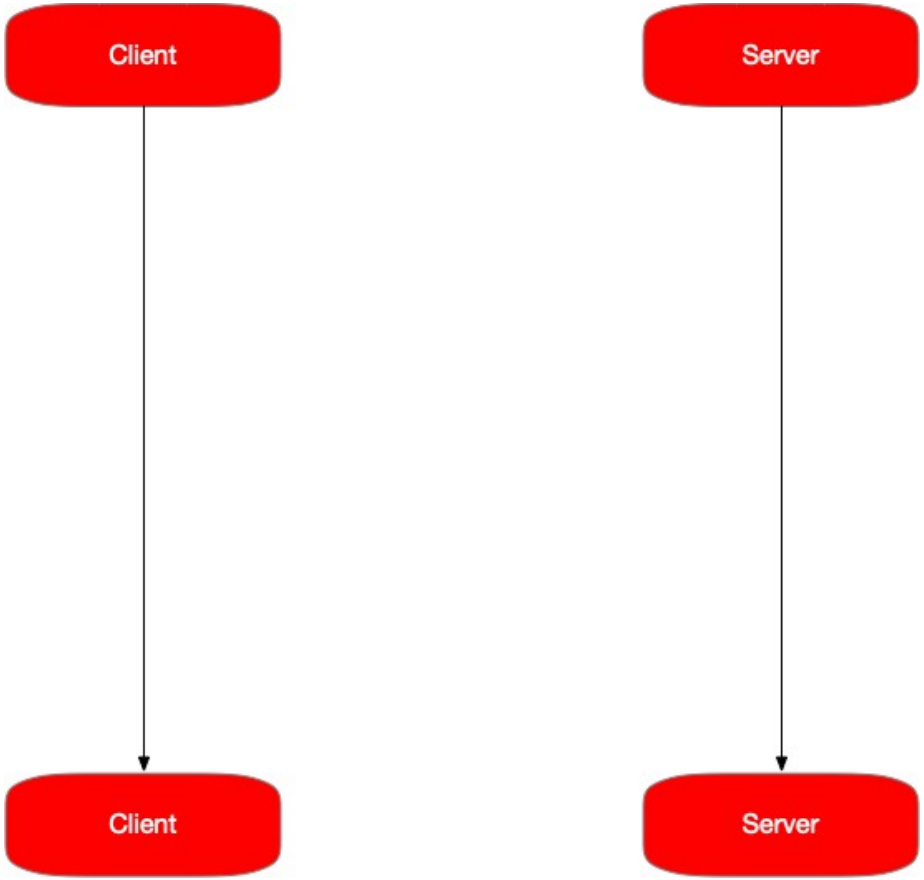
- Policy enforcement
  - Binary and file access authorization
  - USB mass storage protections
- Endpoint telemetry
  - Processes, File operations, Disk events
- Sync protocol

Binary Authorization

- All executions are evaluated against policy
- Supported rule types:
  - Binary Hash, Certificate Hash, Signing ID, Team ID
- Transitive allowlisting
- Lockdown Mode vs. Monitor Mode



Synchronization



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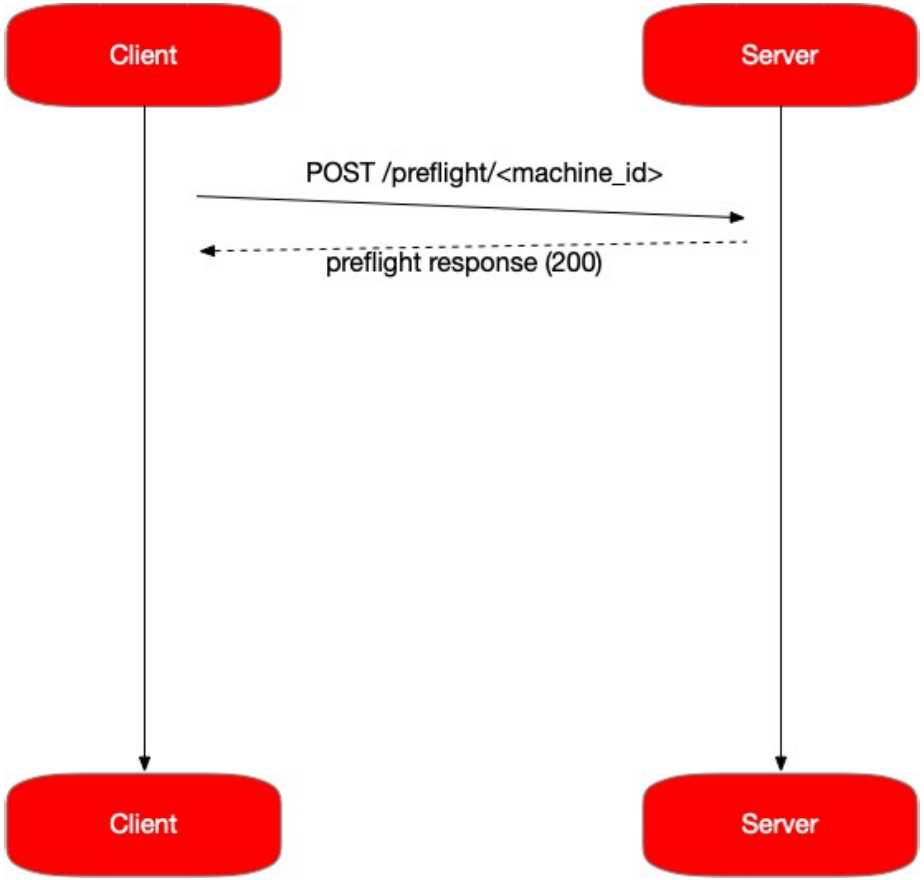

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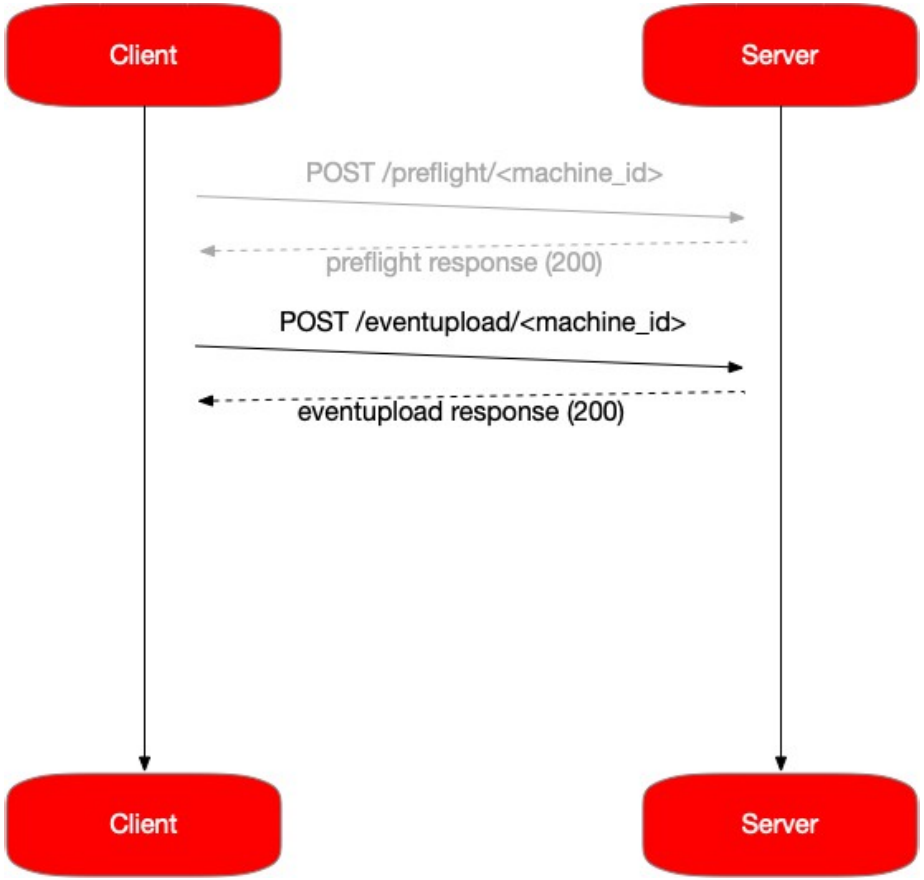

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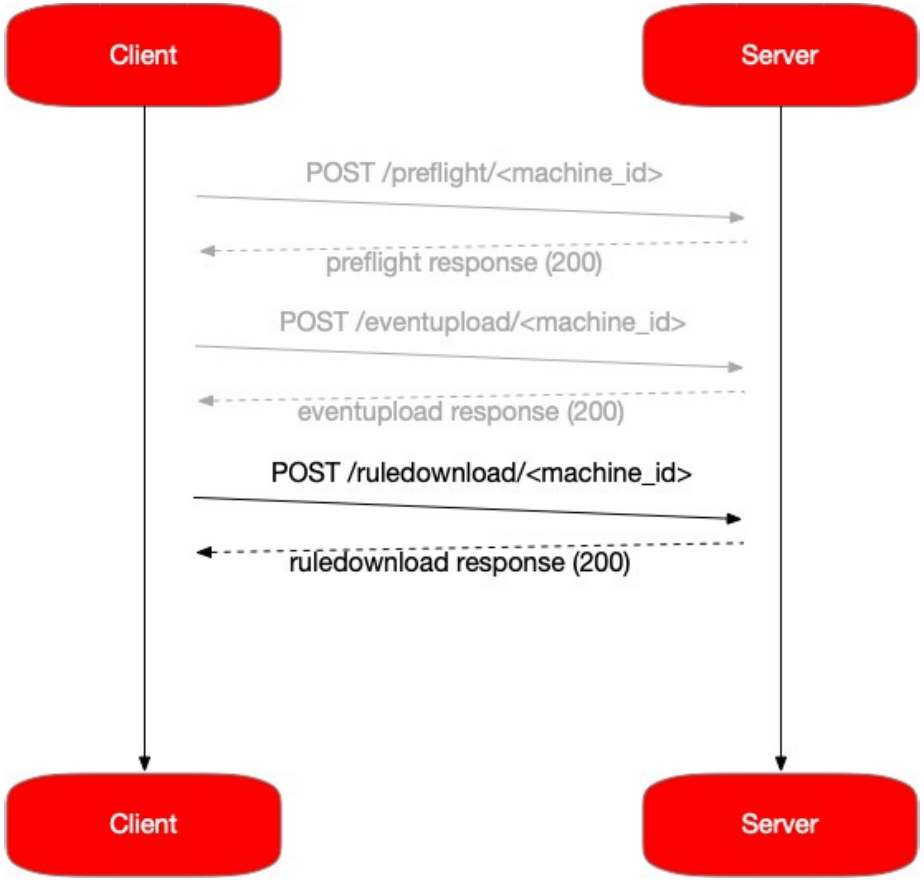

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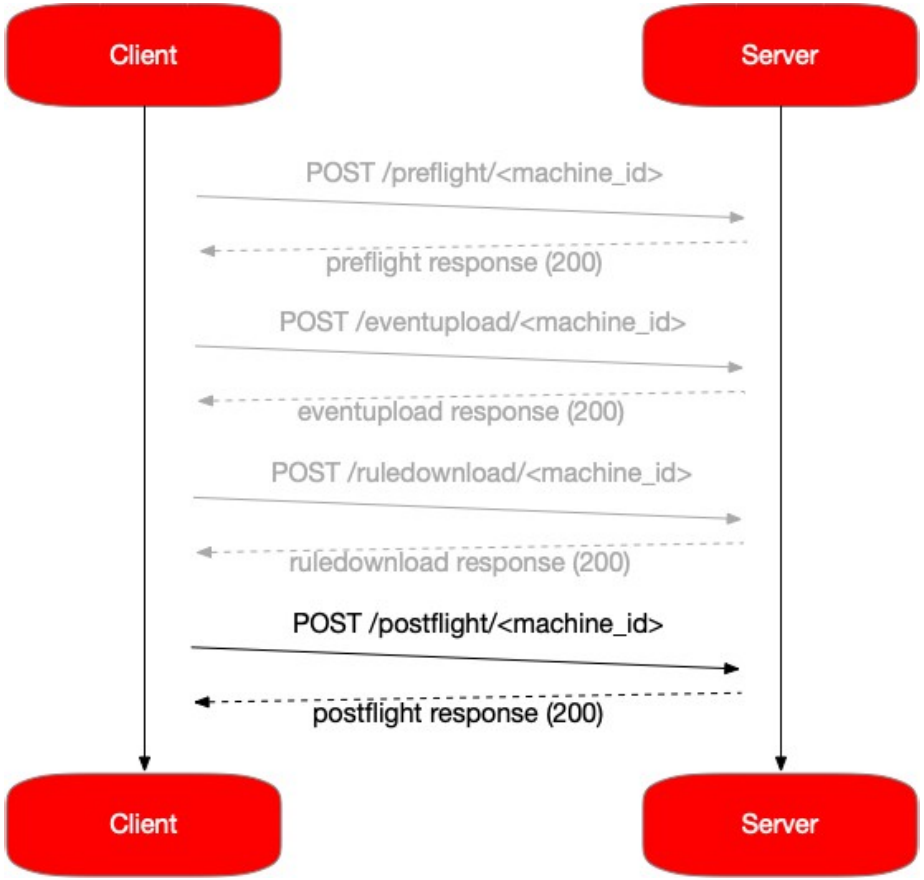

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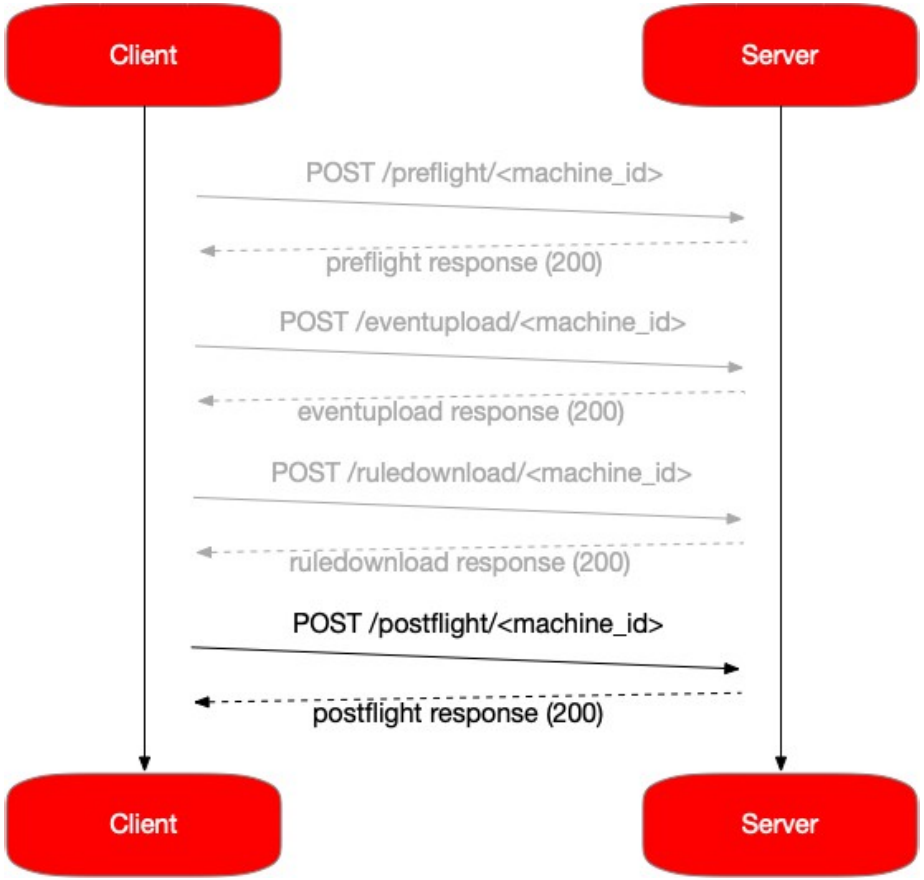

Santa Architecture

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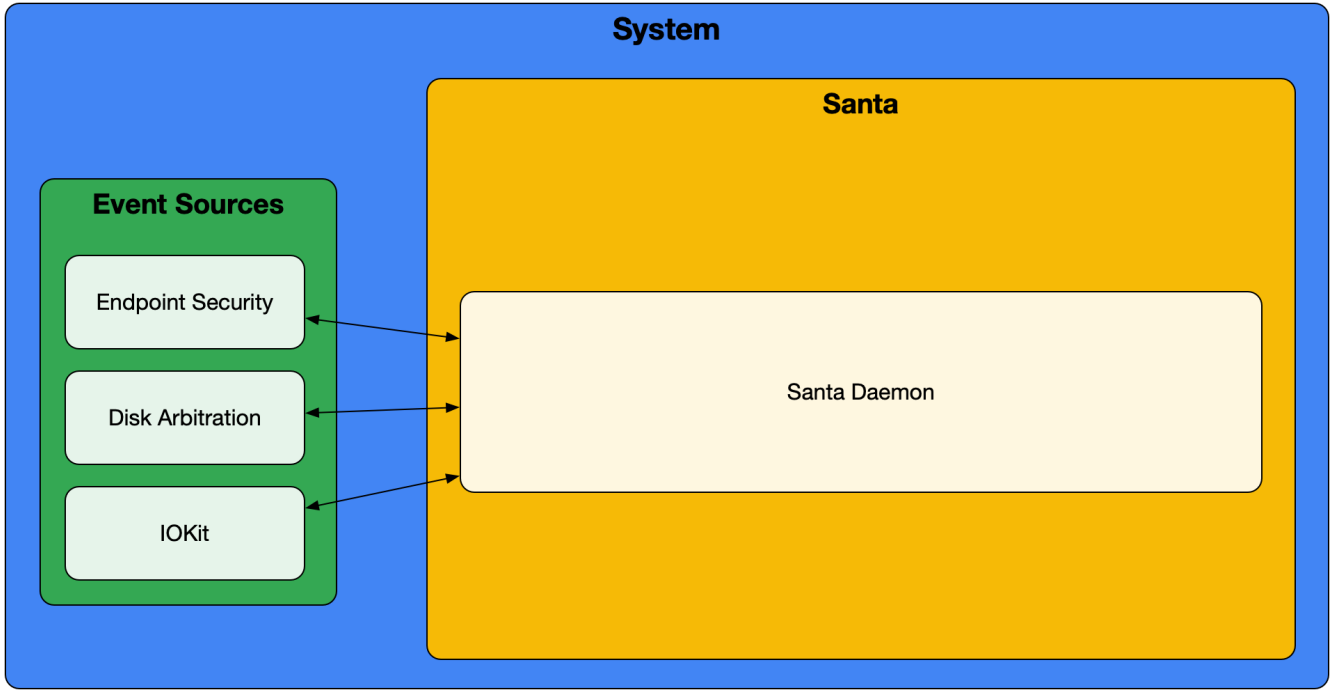

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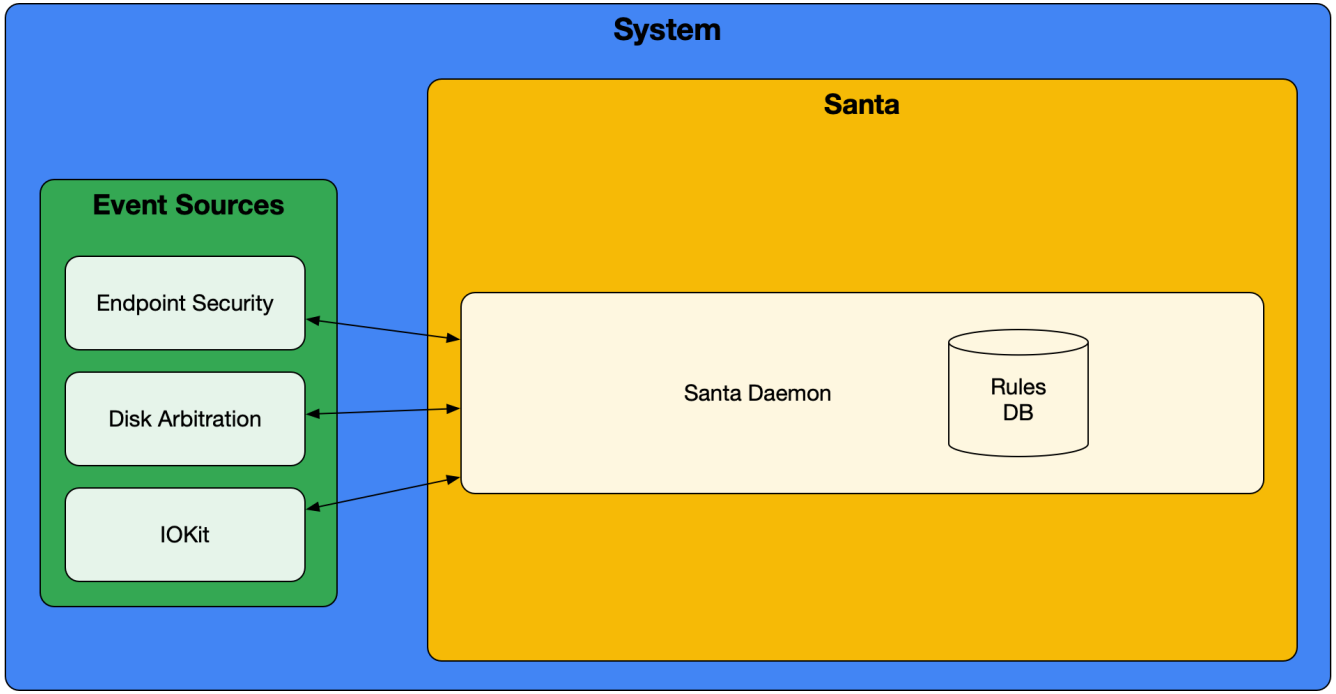

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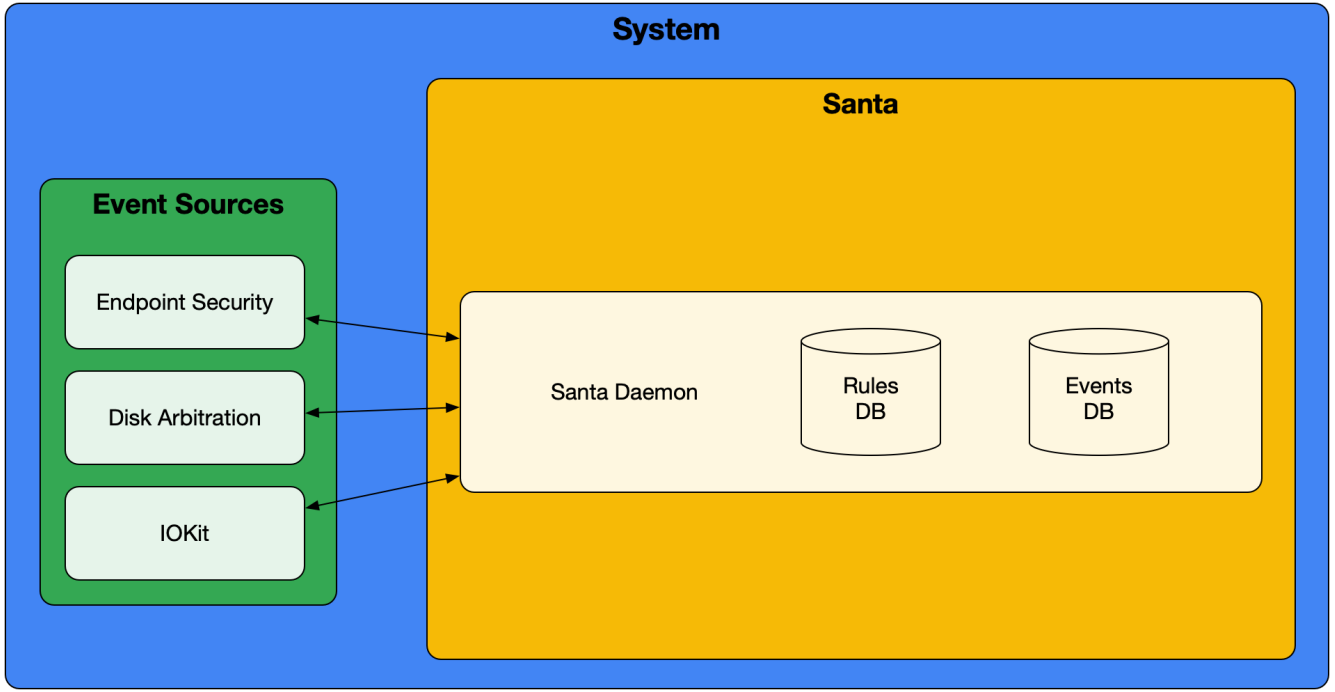

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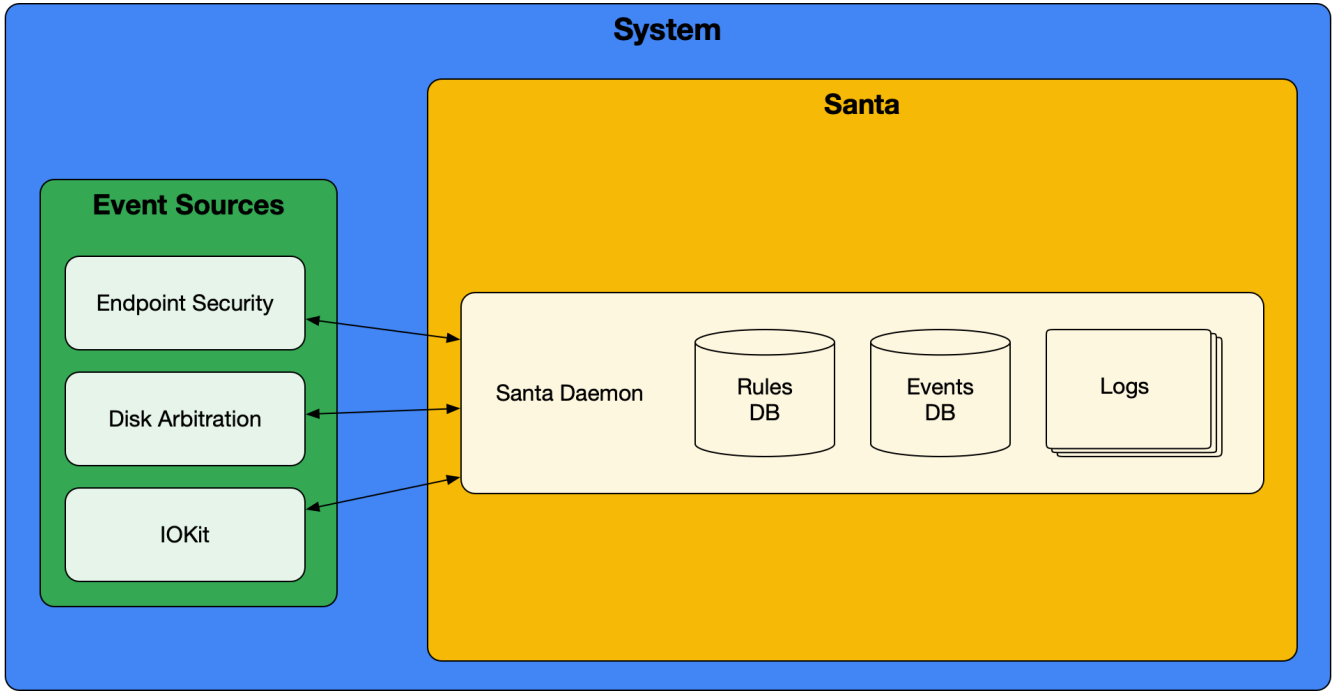

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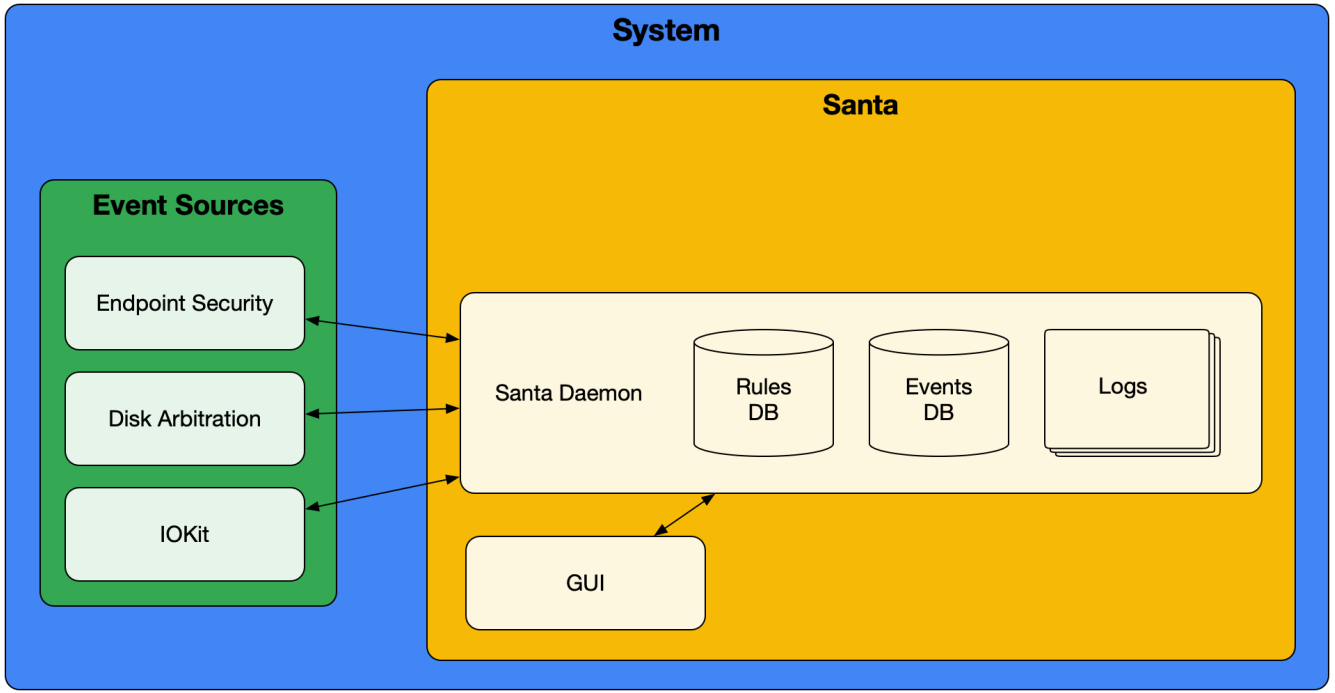

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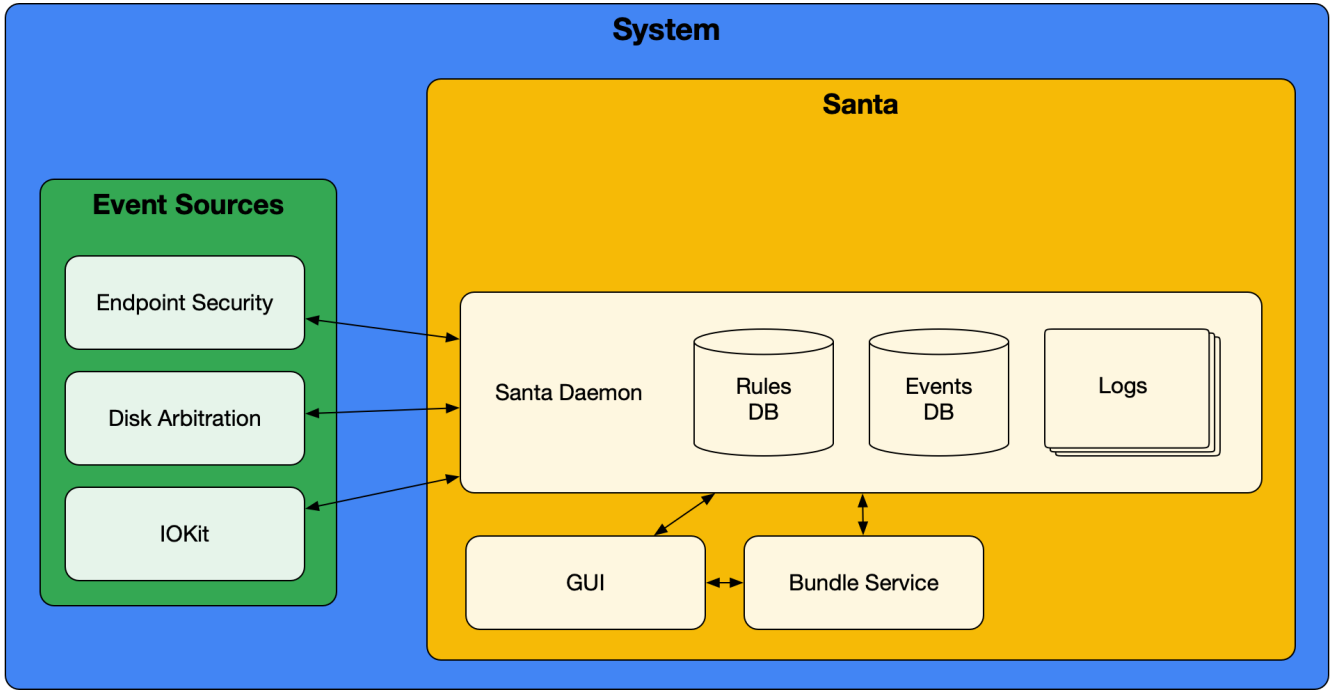

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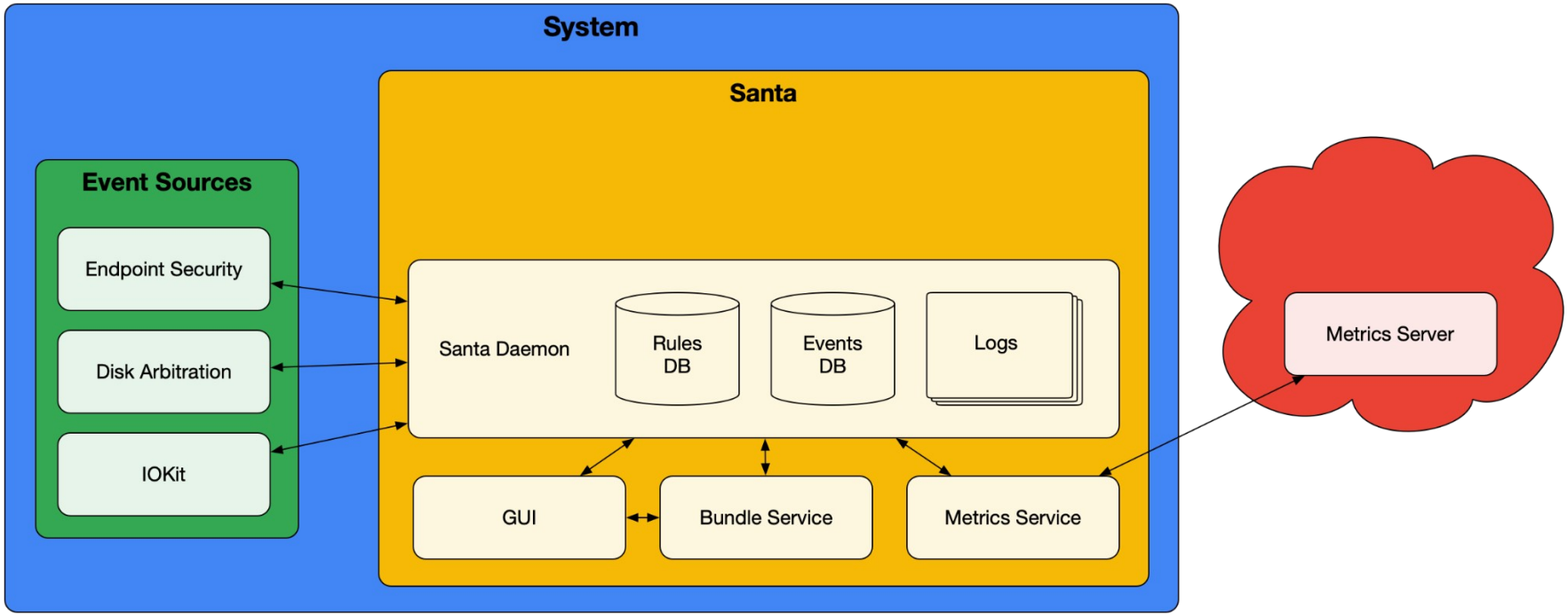
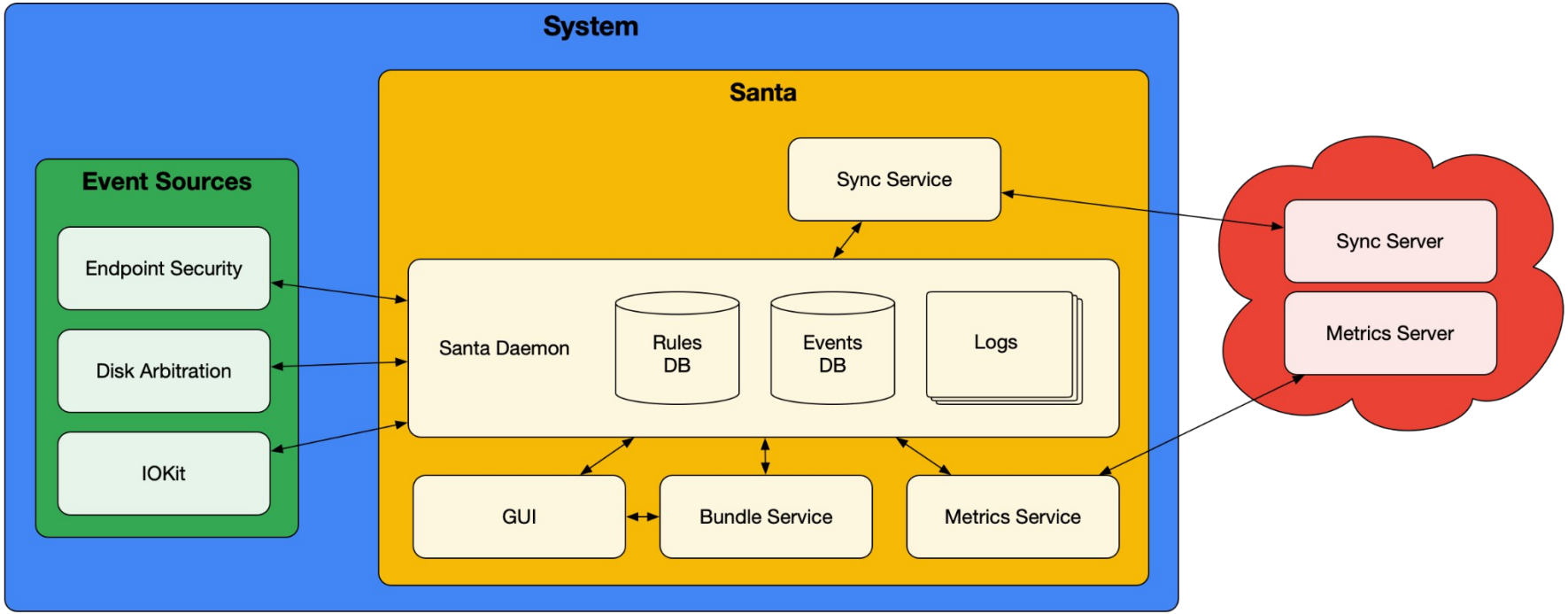


Santa Architecture



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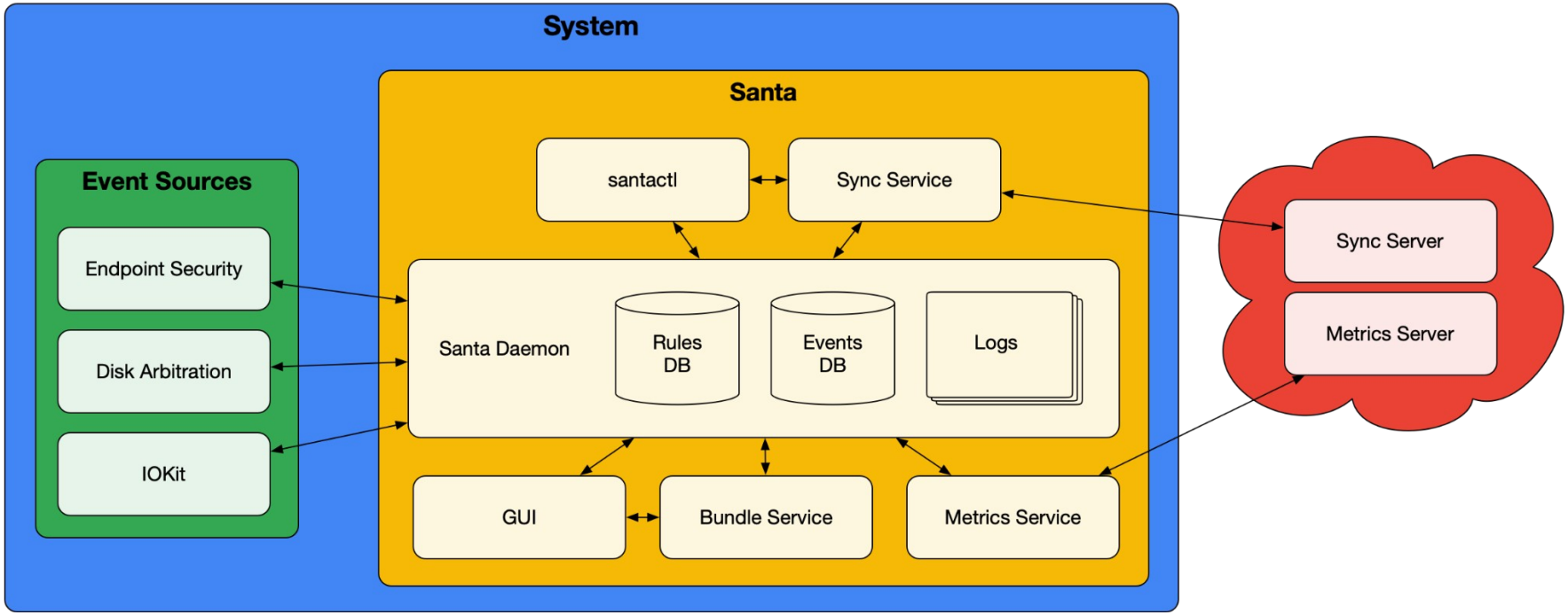

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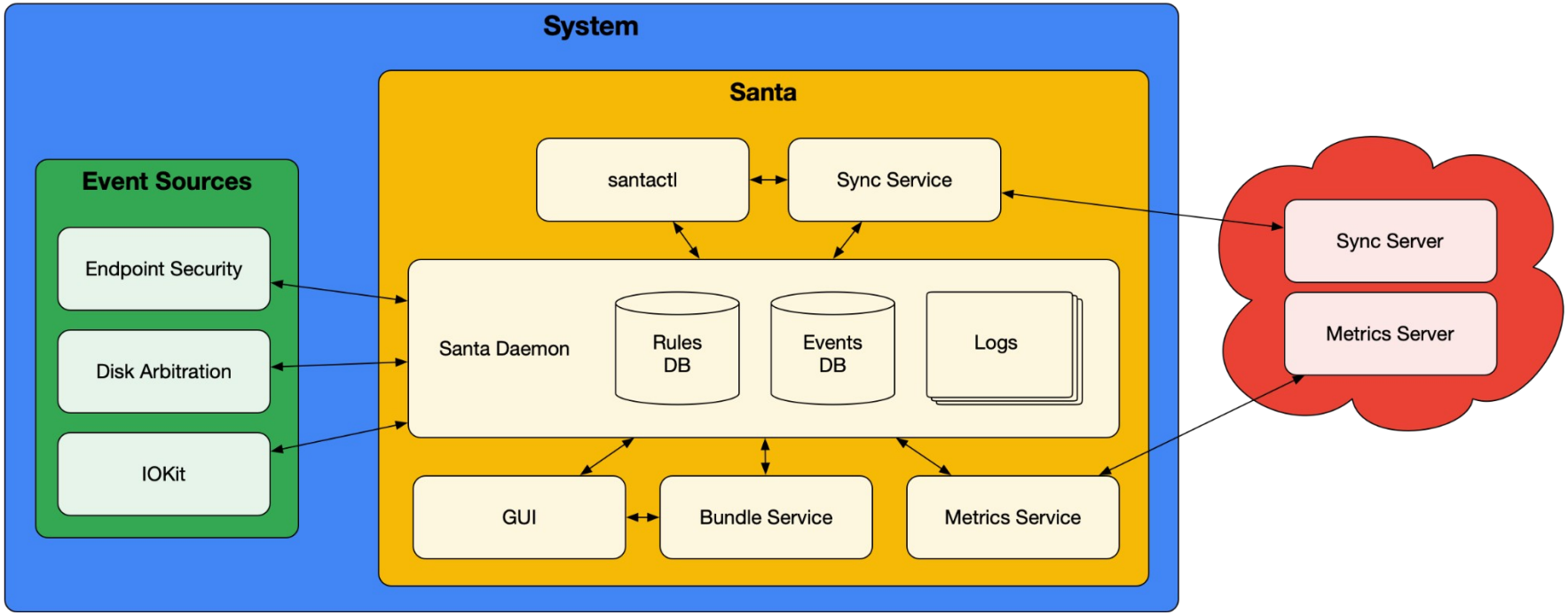
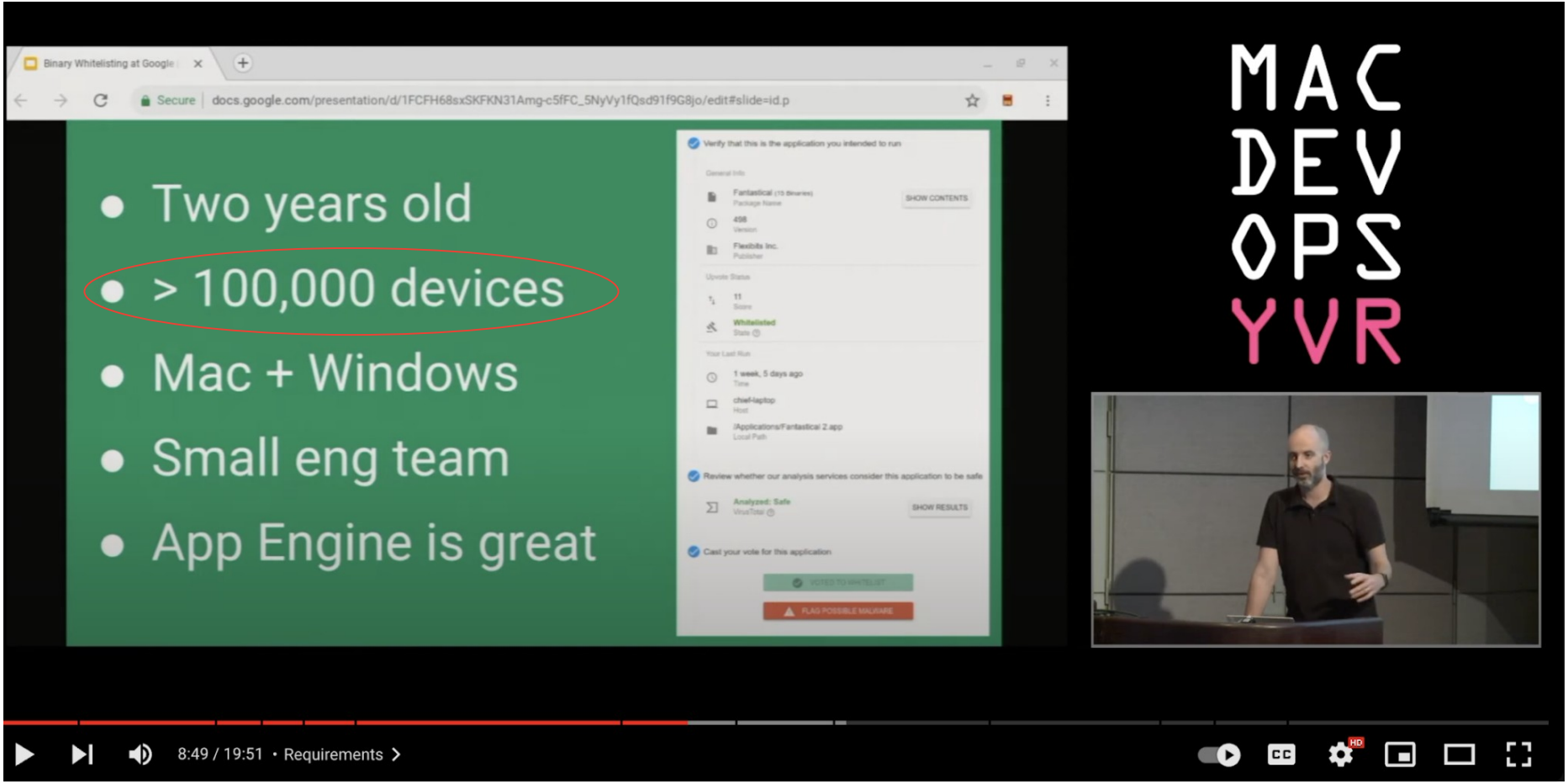


Deployment at Google

Deployment @Google

- Development done entirely in open source
- Build in house
- Binaries deployed via custom package manager
- Configuration managed via MDM

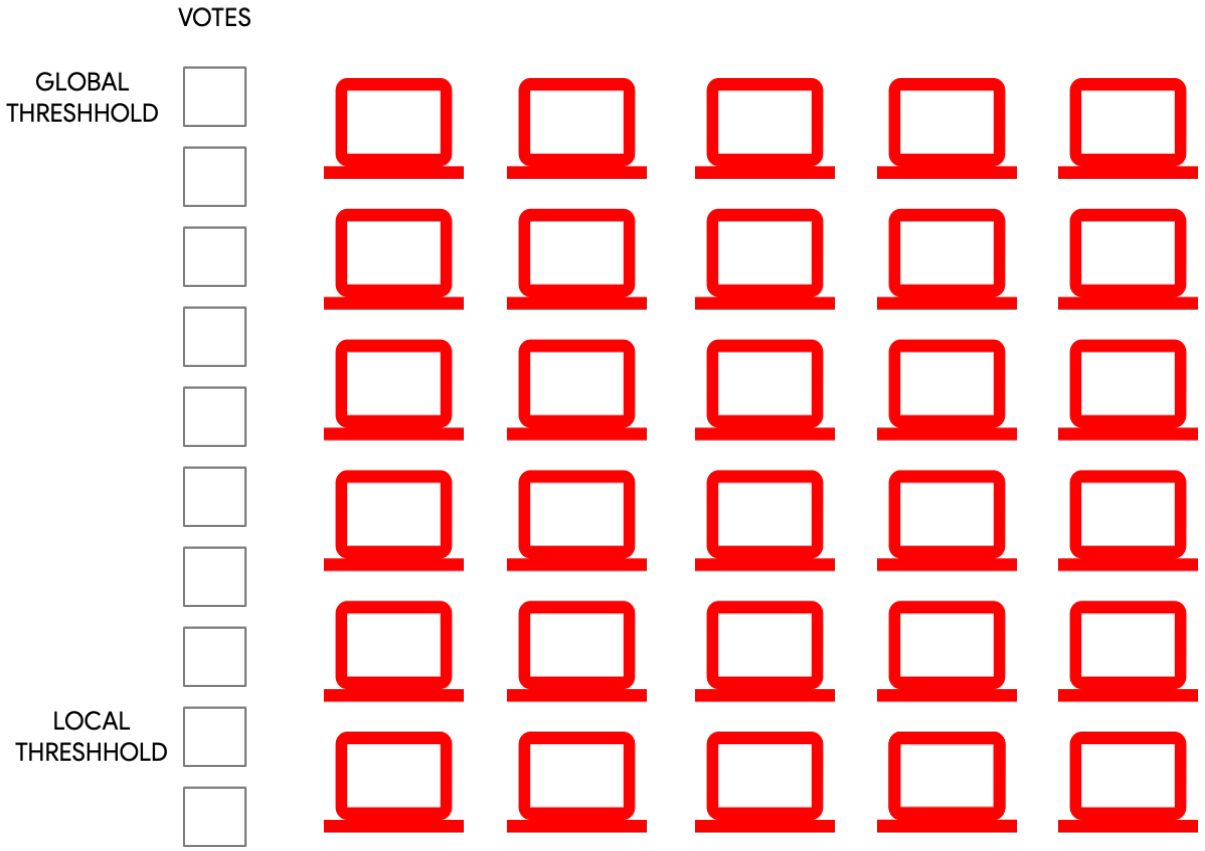

Binary Whitelisting at Google
Secure
docs.google.com/presentation/d/1FCFH68sxSKFKN31Amg-c5fFC_5NyVy1fQsd91f9G8jo/edit#slide=id.p
Two years old
> 100,000 devices
Mac + Windows
Small eng team
App Engine is great
Verify that this is the application you intended to run
Fantastical
SHOW CONTENTS
498
Flexibits Inc.
11
Whitelisted
1 week, 5 days ago
chief-laptop
/Applications/Fantastical 2.app
Review whether our analysis services consider this application to be safe
Analyzed: Safe
SHOW RESULTS
Cast your vote for this application
FLAG POSSIBLE MALWARE
MAC
DEV
OPS
YVR
8:49 / 19:51 • Requirements

Rule Management

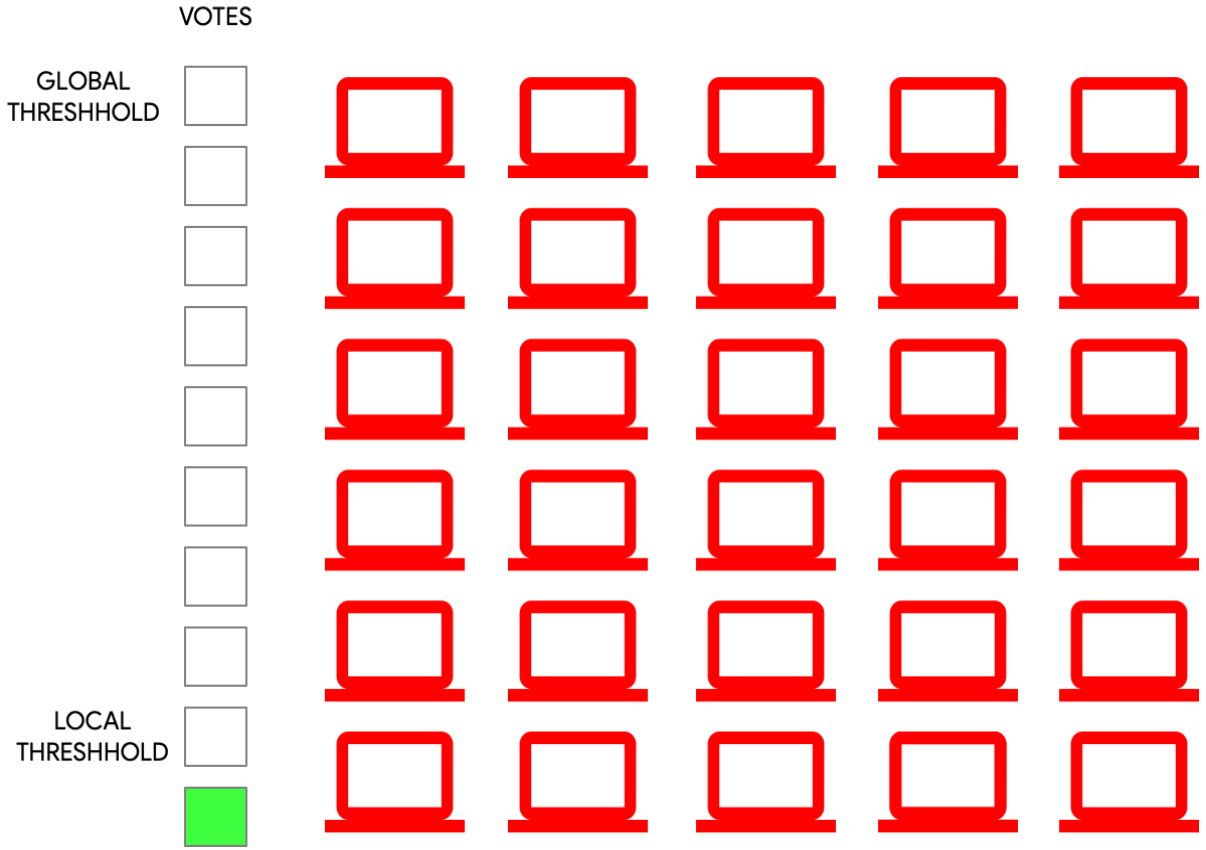
- Most endpoints run in Lockdown mode (default deny)
- Maintaining allowlists not feasible at scale
- Social voting at Google
- First presented by Matt Doyle at MacDevOps YVR

  https://www.youtube.com/watch?v=zUvzTaeOVd8

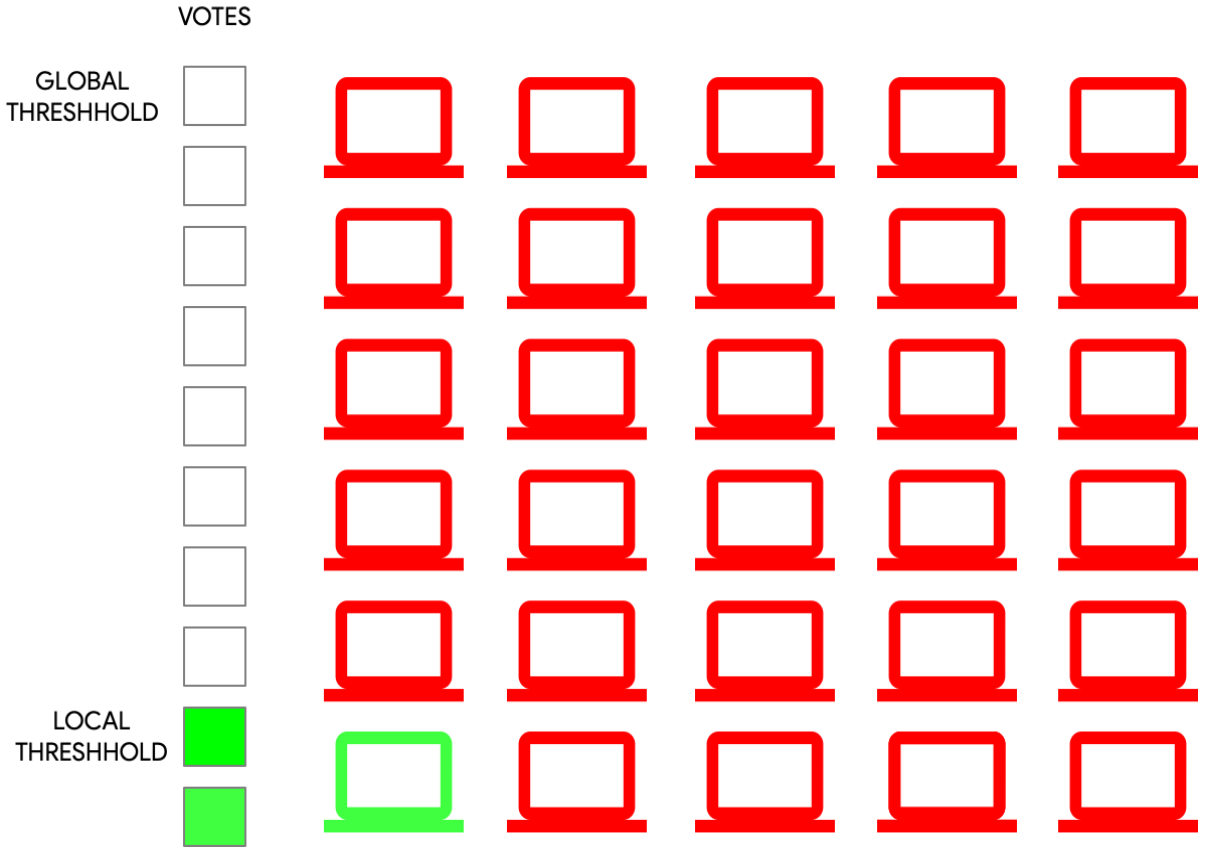
Social Voting



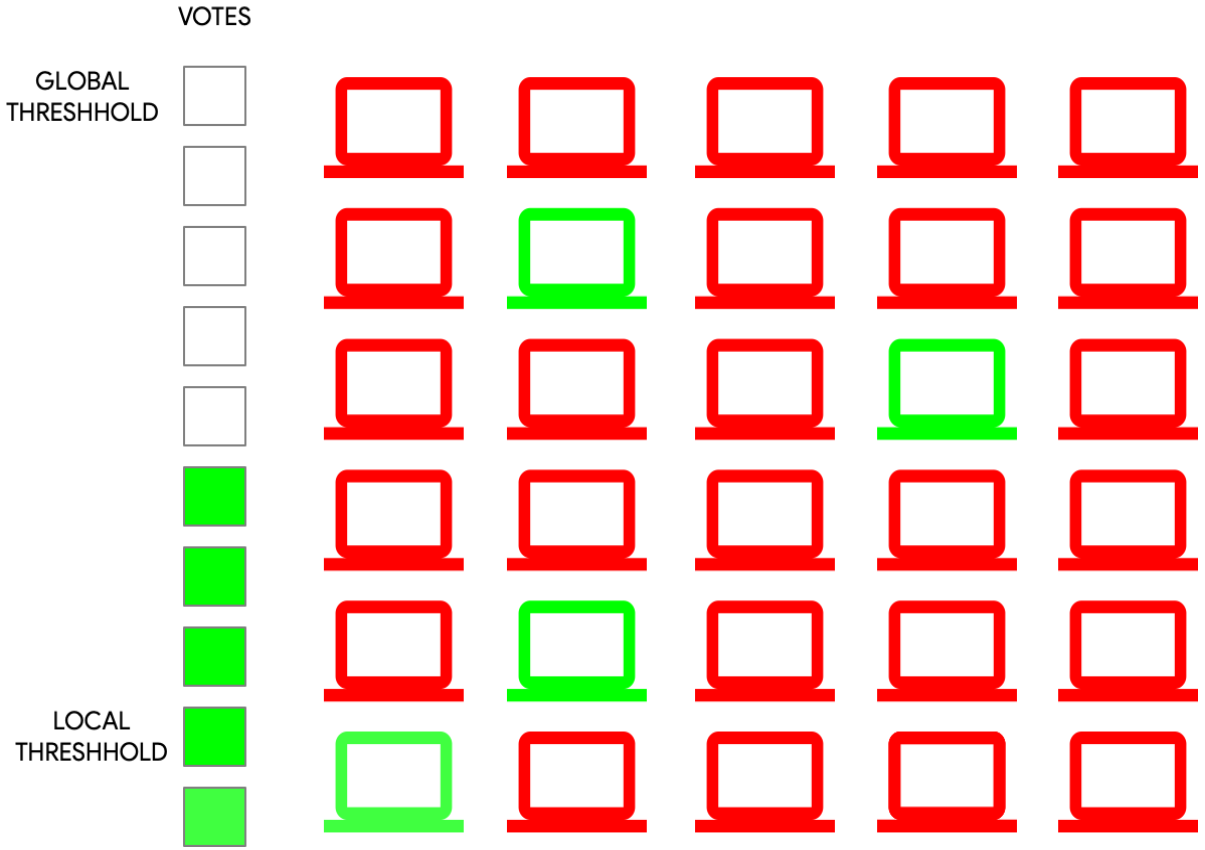
Social Voting



Social Voting



Social Voting



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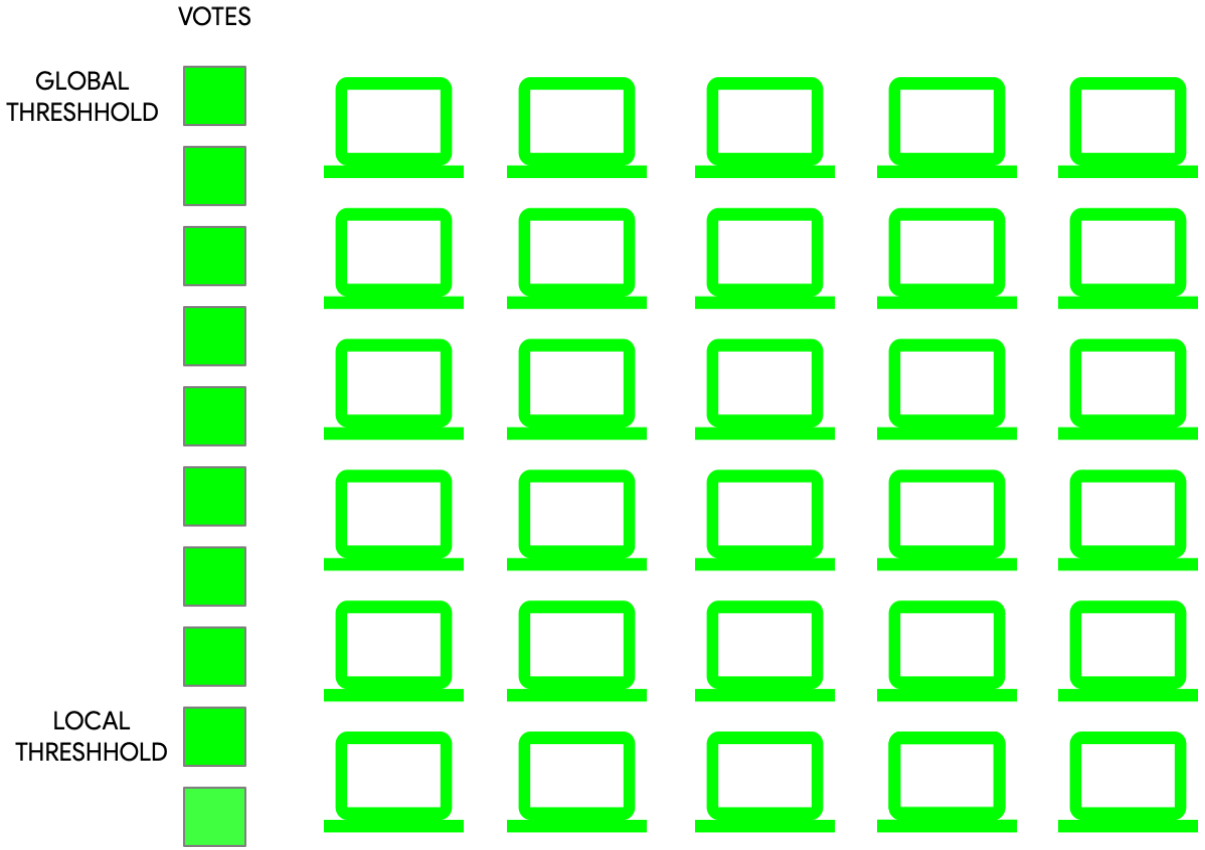
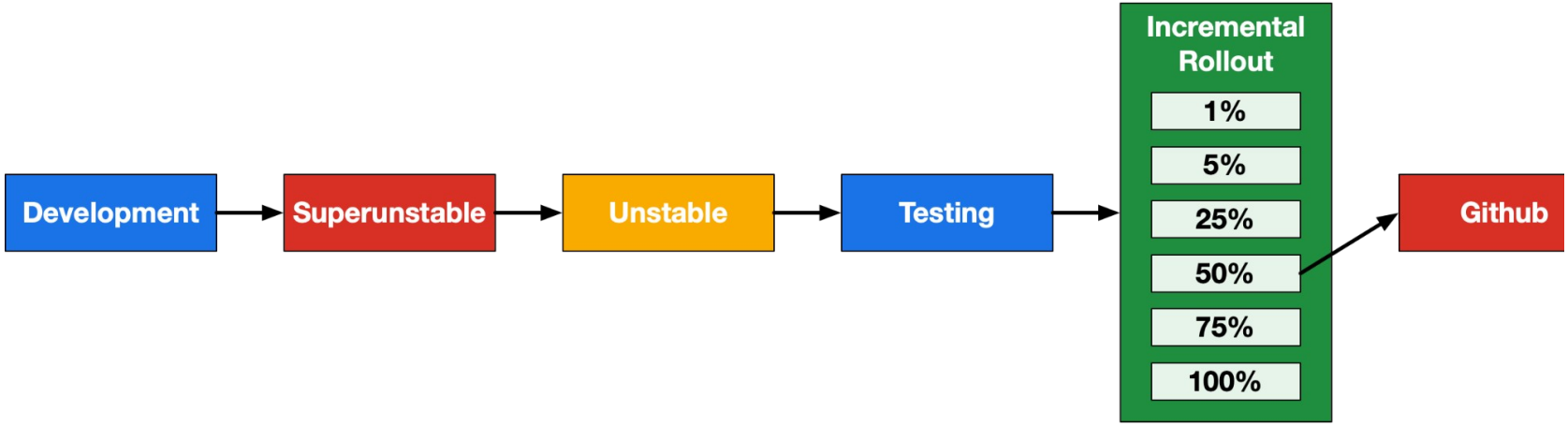


Typical Release Process



Making a Modern Santa

Transitioning to a Dedicated Team for macOS

- Santa originally a 20% project
    - @russellhancox & @tburgin
- Team formed in mid-late 2021 with a macOS endpoints focus

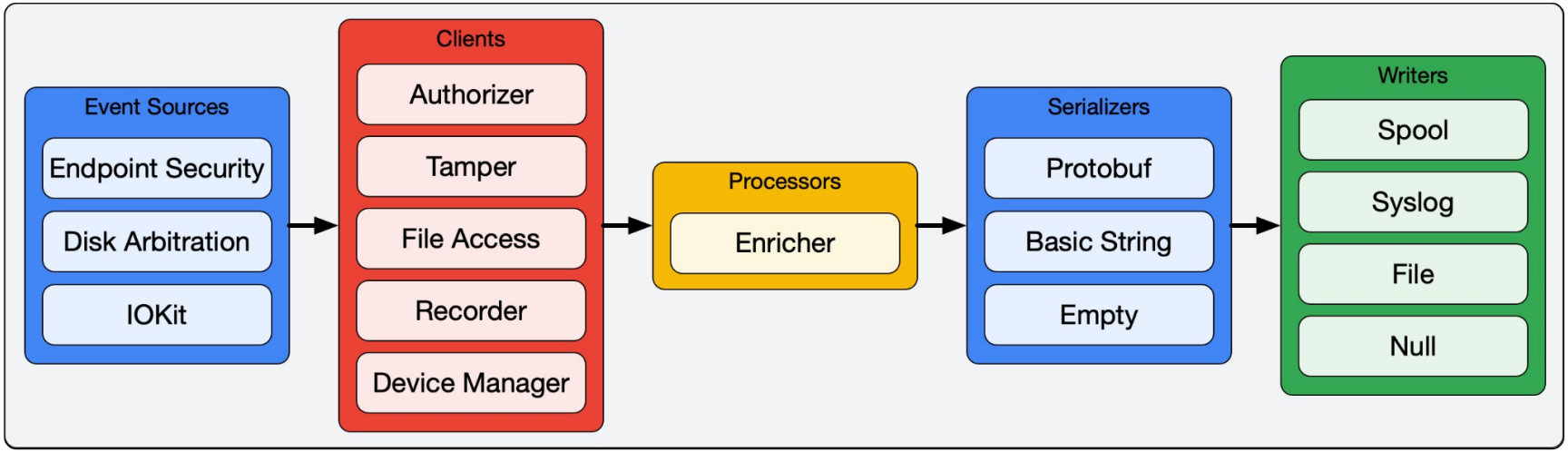
Adopting EndpointSecurity APIs

- Originally a kext-based solution
- Began adopting ES late 2019, macOS 10.15
- ES events translated into existing structures and data flows

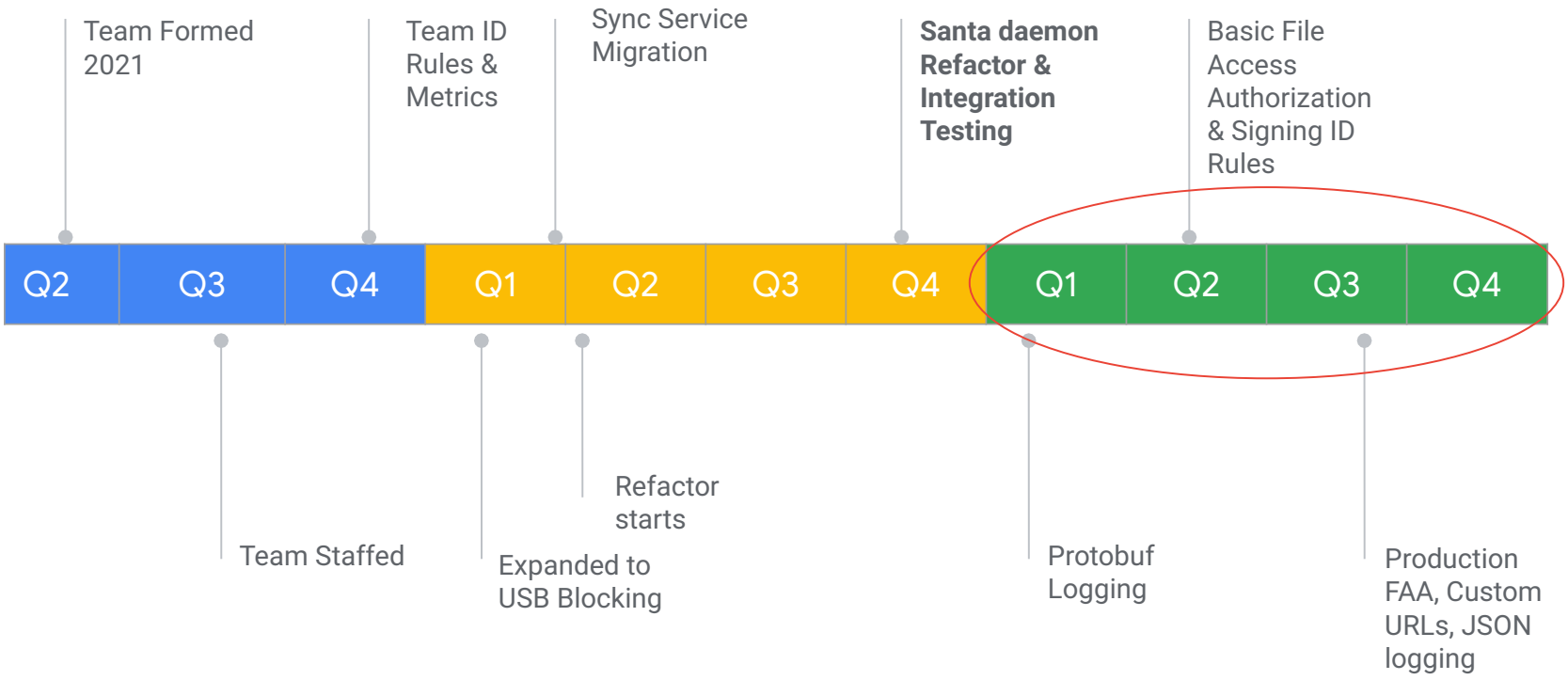
The Need to Redesign

- Performance concerns for new features
- Dropping kext support
- Reducing reliance on Objective-C

Rearchitecting Santa



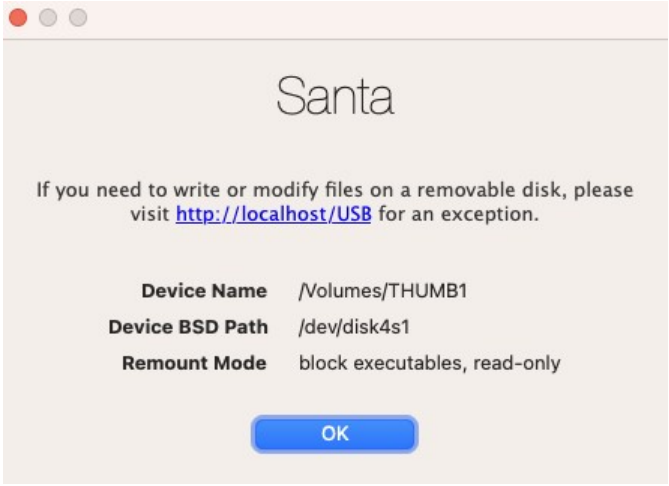
Recent Timeline of Major Features



What's New?

USB Mass Storage Restrictions

- Blocking USB mass storage devices
- Forcing mount flags
- Exception flow via sync protocol



File Access Authorization (FAA)

- Evaluate all file access attempts against policy
- Required OS changes
- Policy overview

File Access Authorization (FAA)

- Evaluate all file access attempts against policy
- Required OS changes
- Policy overview
  - Watch Items

```
<key>ChromeCookiesRule</key>
<dict>
  <key>Paths</key>
  <array>
    <dict>
      <key>Path</key>
      <string>/Users/*/Library/Application Support/Google/Chrome/*/Cookies</string>
      <key>IsPrefix</key>
      <true/>
    </dict>
    ...
  </array>
  ...
</dict>
```

File Access Authorization (FAA)

- Evaluate all file access attempts against policy
- Required OS changes
- Policy overview
  - Watch Items
  - Options

```
<key>ChromeCookiesRule</key>
<dict>
  <key>Paths</key>
  <array>...</array>
  <key>Options</key>
  <dict>
    <key>AllowReadAccess</key>
    <false/>
    <key>AuditOnly</key>
    <false/>
    ...
  </dict>
  ...
</dict>
```

File Access Authorization (FAA)

- Evaluate all file access attempts against policy
- Required OS changes
- Policy overview
  - Watch Items
  - Options
  - Exceptions

```
<key>ChromeCookiesRule</key>
<dict>
  <key>Paths</key>
  <array>...</array>
  <key>Options</key>
  <dict>...</dict>
  <key>Processes</key>
  <array>
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      <string>EQHXZ8M8AV</string>
      <key>SigningID</key>
      <string>com.google.Chrome</string>
    </dict>
    <dict>
      <key>SigningID</key>
      <string>com.apple.mds</string>
      <key>PlatformBinary</key>
      <true/>
    </dict>
  </array>
</dict>
```
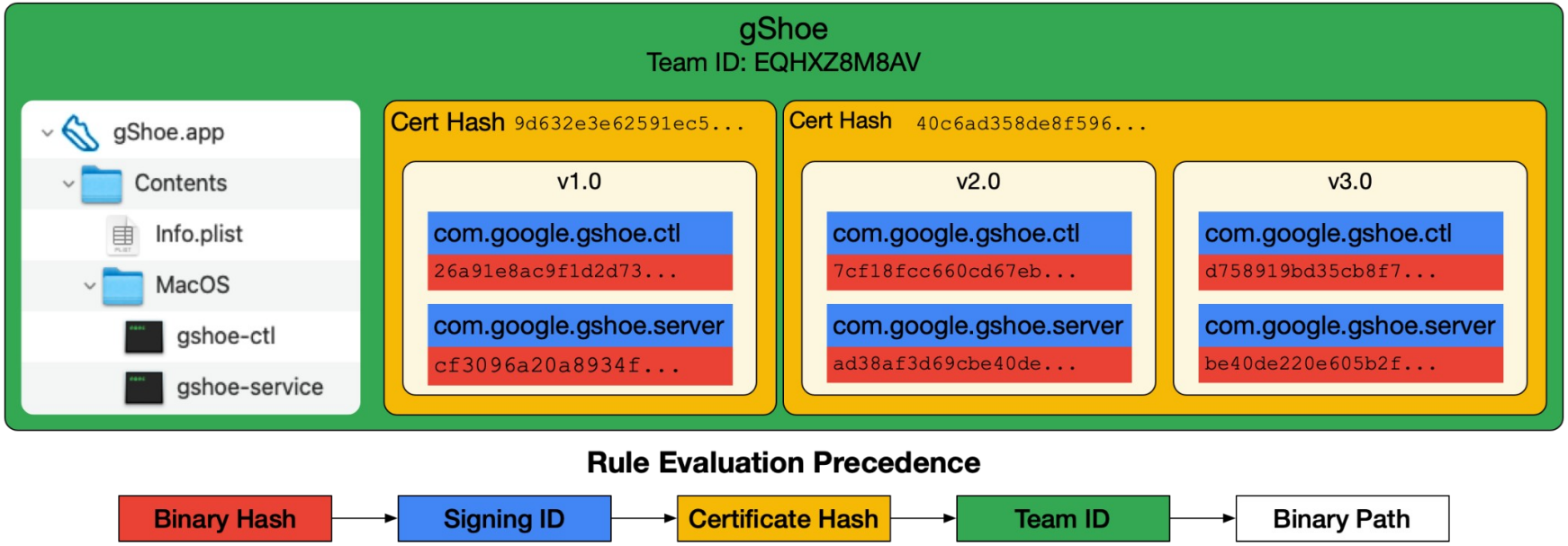

New Rule Types & Rule Precedence

- Team ID
- Signing ID

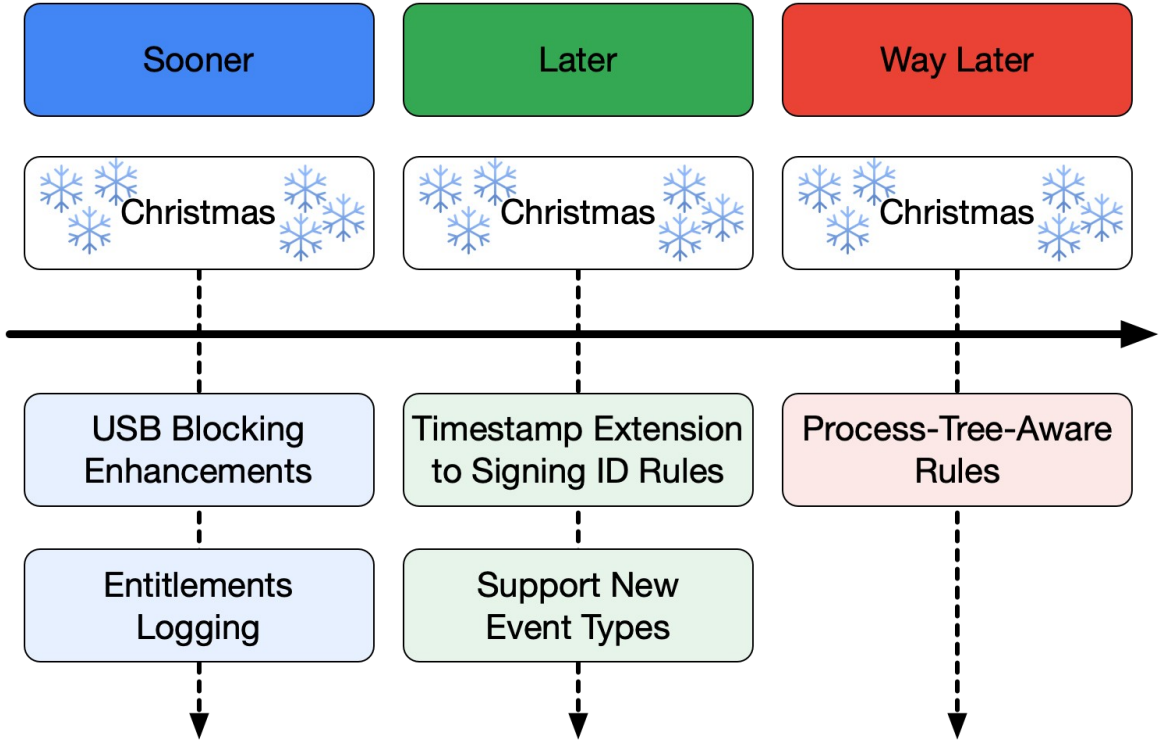
New Rule Types & Rule Precedence



Miscellaneous

- Ways to configure rules
  - Static rules
  - JSON rule import/export
- Per-rule Custom URLs
- Distributed Notifications

Coming Attractions



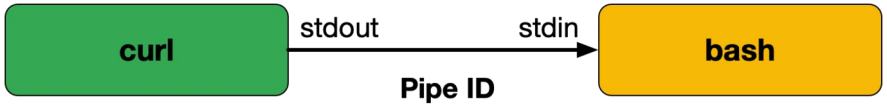
Better Detection & Response

Logging Enhancements

- Structured logging via Protobuf and JSON
- Added new fields to telemetry
- Enrichment data and most ES event data

Powerful Detection Primitives

- Better process grouping (process group/session IDs)
- setuid
- File descriptor info
  - `curl | bash`, Sockets
- Environment vars
- Code signing flags

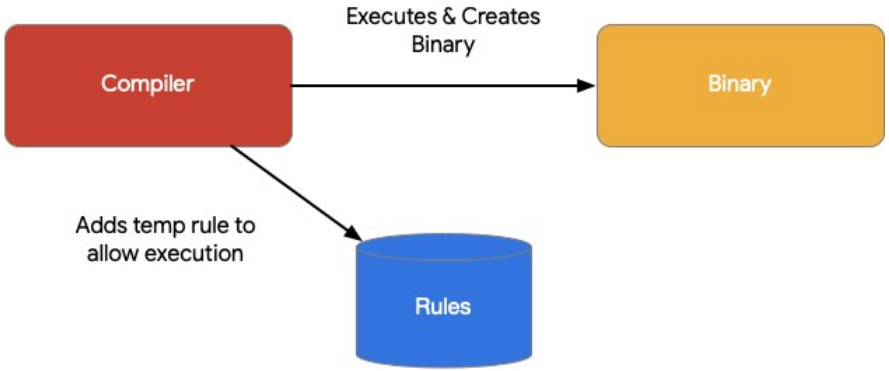


“Tripwire” FAA Rules

- Watch / Lockdown creds
  - Bearer tokens, browser cookies, honey tokens
- Watch / Lockdown config modifications
  - SSH authorized_keys files, sudoers, pam
- Filter by code signing info to avoid false positives

More Livable Lockdown

- Better toolchain support
- Easier to administer transitive allowlisting



Getting Involved

Santa Community

- santa.dev
- github.com/google/santa
- Discussions / Issues / PRs
- Sync service contributions