AMIRA

Automated Malware Incident Response and Analysis

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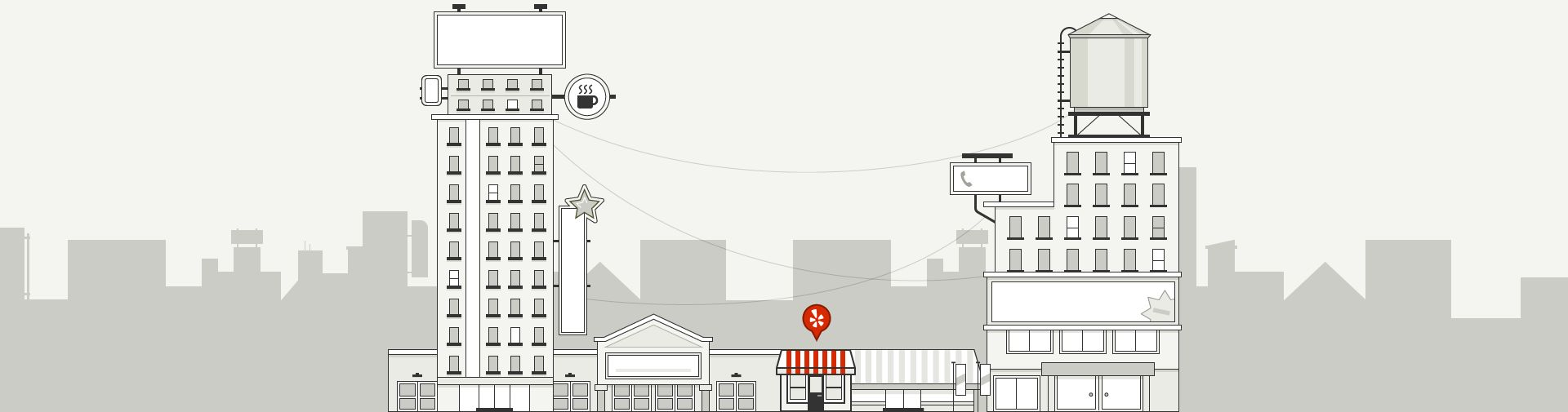
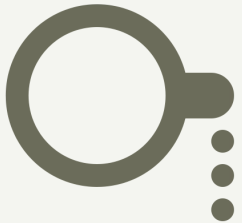
@jsendor



Dramatis personæ

Yelp
Employee

HelpDesk
IT Engineer



Security Team
Malware Analyst

- *Is this machine infected?*
- *How'd that malware get there?*
- *How can I prevent and detect further infection?*

Malware incident response process

Initial triage // Malware Analyst

Forensics collection // IT Engineer

Forensics analysis // Malware Analyst

Final remediation // IT Engineer

OSXCOLLECTOR

Forensic Evidence Collection & Analysis Toolkit

Yelp / **osxcollector**

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A forensic evidence collection & analysis toolkit for OS X http://yelp.github.io/osxcollector

235 commits | **29** branches | **0** releases | **11** contributors

branch: **master** | **osxcollector** / +

Merge pull request #91 from Yelp/issue_90 ···

jjsendor authored 5 days ago — latest commit `e5ae922678`

osxcollector	Fix bad boolean compare that strips most browser lines	5 days ago
tests	Deleting never_write_api_cache	a month ago
.gitignore	Add OpenDNSFilter	5 months ago
.pre-commit-config.yaml	Update pre-commit hooks	3 months ago
.travis.yml	Add comment explaining why the language in .travis is obj-c	4 months ago
LICENSE.md	Install precommit hooks and do lots of guided cleanup	5 months ago

Code

Issues 10

Pull requests 1

Pulse

Graphs

HTTPS clone URL

`https://github.com/Yelp/o`

You can clone with HTTPS or Subversion.

Clone in Desktop

Forensics Collected by OSXCollector

OS System Info

Applications

Browser History

Kernel Extensions

Quarantines

Email Info

Downloads

Startup Items

Groups & Accounts

OSXCollector output

path, hashes, timestamps, signature chain, ...


```
{
  "file_path": "/System/Library/Extensions/Apple_iSight.kext/Contents/MacOS/Apple_iSight",
  "sha2": "19b7b85eaedb17d9565dce872f0d1ea8fc0761f508f28bedcc8606b828cbf614",
  "sha1": "99005b68295c202fd359b46cd1411acea96b2469",
  "md5": "b8cc164b6546e4b13768d8353820b216",
  "ctime": "2016-03-31 16:50:39",
  "mtime": "2016-03-30 00:16:50",
  "osxcollector_section": "kext",
  "osxcollector_incident_id": "DelayedHedgehog-2016_08_01-12_35_11",
  "osxcollector_plist_path": "/System/Library/Extensions/Apple_iSight.kext/Contents/Info.plist",
  "osxcollector_bundle_id": "com.apple.driver.Apple_iSight",
  "signature_chain": [
    "Software Signing",
    "Apple Code Signing Certification Authority",
    "Apple Root CA"
  ]
}
```

Manual analysis with **grep** and **jq** works pretty well

grep a time window

```
$ cat bheurope.json | grep '2016-11-03 14:1[2-8]'
```

only urls in a time window

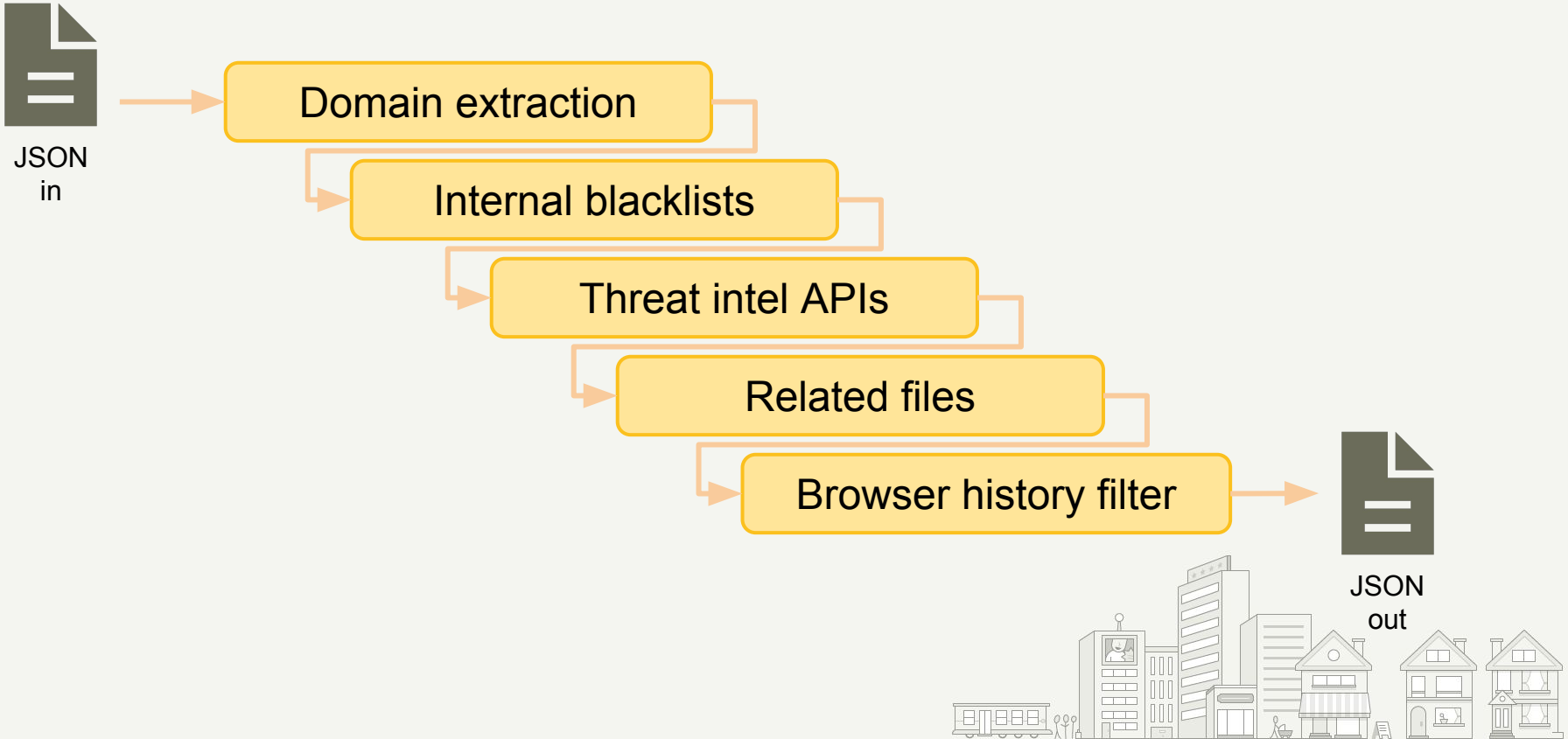
```
$ cat bheurope.json | grep '2016-11-03 14:1[2-8]' | jq 'select(has("url")).url'
```

grep a single user

```
$ cat bheurope.json | jq 'select(.osxcollector_username=="kuba")|.'
```

```
$ sudo osxcollector.py
Wrote 35394 lines.
Output in osxcollect-2016_11_03-14_12_39.tar.gz
```

OSXCollector Output Filters



Automated

Malware

Incident

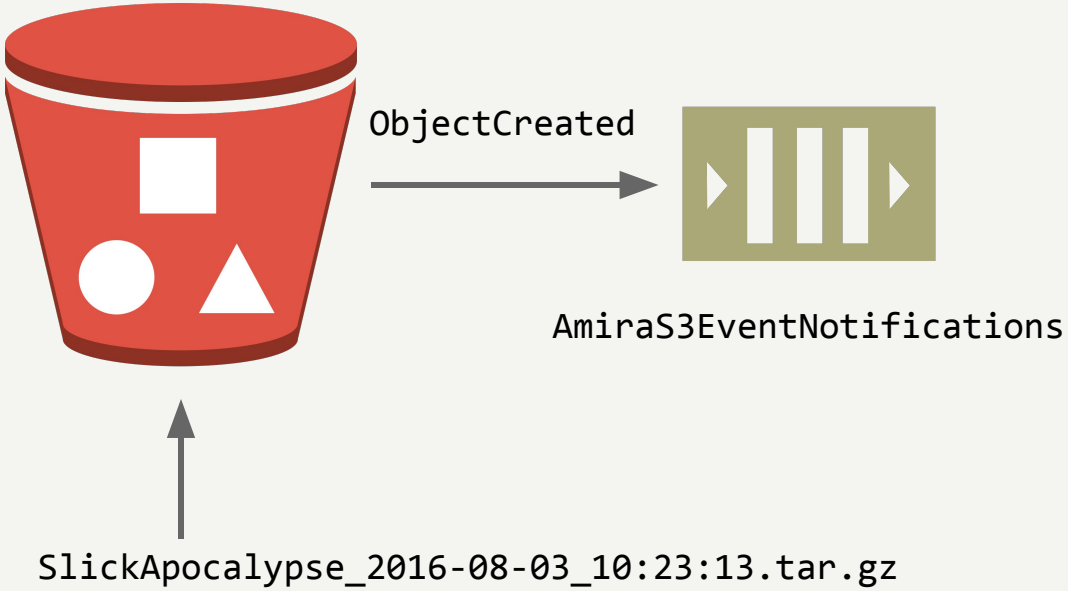
Response and

Analysis

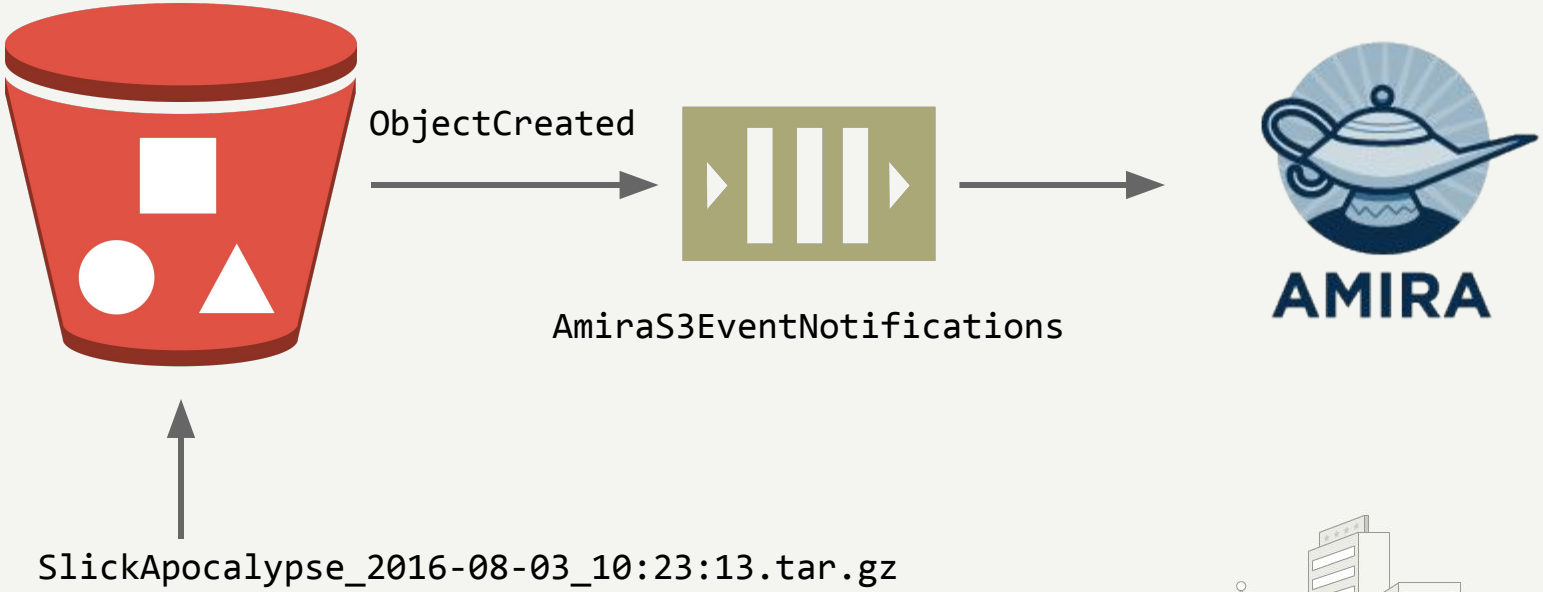
Uploading OSXCollector output

SlickApocalypse_2016-08-03_10:23:13.tar.gz

S3 Event Notifications



S3 Event Notifications



S3 Event Notifications

SlickApocalypse_2016-08-03_10:23:13.tar.gz

SlickApocalypse_2016-08-03_10:23:13.tar.gz

Automated analysis

Internal blacklists

Domain extraction

Threat intel APIs

AMIRA

Related files

Browser history filter

Uploading the results

SlickApocalypse_2016-08-03_10:23:13.json

SlickApocalypse_2016-08-03_10:23:13.html

Analysis results

- Domains and hashes found on the blacklist.
- Threat intel APIs hits for domains and file hashes.
- Blacklist suggestions.

Running AMIRA

Prerequisites:

- SQS queue for the S3 event notifications.
- S3 bucket configured to send S3 event notifications.
- *(optional)* Another S3 bucket for the analysis results.

```
from amira.amira import AMIRA

amira = AMIRA('us-west-1', 'AmiraS3EventNotifications')


# register results uploader

from amira.s3 import S3ResultsUploader

s3_results_uploader = S3ResultsUploader('amira-results-bucket')
amira.register_results_uploader(s3_results_uploader)


# Ready, set, GO!

amira.run()
```

Automated forensics collection

1. Trigger OSXCollector via inventory management system.

2. Upload the results to an S3 bucket*.

3. Profit!

**hint: use create-only rights in the S3 bucket policy*

```
#!/bin/bash

file="$1"
bucket="$2"

echo "Uploading file $file to bucket $bucket"

resource="/${bucket}/${file}"
contentType="application/x-compressed-tar"
dateValue=`date -u +"%a, %d %b %Y %T GMT"`
stringToSign="PUT\n\n${contentType}\n${dateValue}\n${resource}"
s3Key="$3"
s3Secret="$4"

signature=`echo -en ${stringToSign} | openssl sha1 -hmac ${s3Secret} -binary |
base64`

curl -X PUT -T "${file}" \
    -H "Host: ${bucket}.s3.amazonaws.com" \
    -H "Date: ${dateValue}" \
    -H "Content-Type: ${contentType}" \
    -H "Authorization: AWS ${s3Key}:${signature}" \
    "https://${bucket}.s3.amazonaws.com/${file}" | cat
```

Automation FTW

Before

1-2 days

Now

Several minutes, up to a couple of hours in the worst case

Malware incident response process

- Initial triage // Malware Analyst
- Forensics collection // AMIRA
- Forensics analysis // AMIRA/Malware Analyst
- Final remediation // IT Engineer

Takeaways

- Automated process equal less human errors
- No need for physical collection.
- More proactive forensics collection.

Try it out!

https://github.com/Yelp/amira

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