BASIS TECH WEEK

4TH ANNUAL OSDF

BASIS TECHNOLOGY

2013 Open Source Digital Forensics Conference

# Plaso - reinventing the super timeline.

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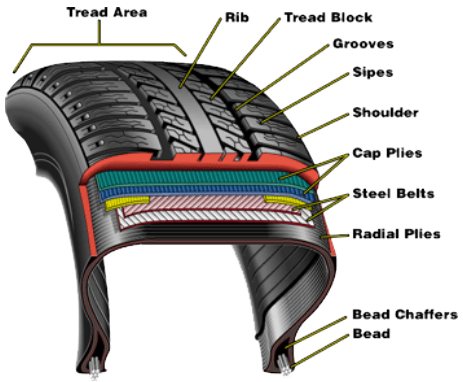
# OSDF Who Am I?

- Incident responder and a forensic analyst
- Software developer
- Work every now and then for Google
- Been endorsed on LinkedIn for:
  - balloon artist
  - certified arborist
  - party favors
  - tires
  - and many other things

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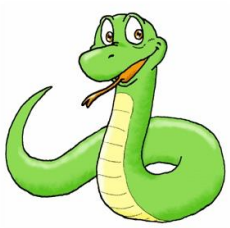
# Why Rewrite log2timeline?

- Few issues came up that required a rewrite
  - Does not scale easily
  - Single-threaded
  - Only second precision
  - Output not structured
  - Hard to add new features
- Why rewrite in Python?
  - Easier to get external contributors
  - Easier to integrate with other projects (TSK, Volatility™, GRR)
  - Most new forensics tools/libraries/scripts are released in Python
  - Google doesn't like Perl
  - Easier to maintain than Perl code

VS



# OSDF Goal With New Version

- Make it easier to create a timeline
- Automate parts of the analysis
  - Tagging/categorization
  - Statistical analysis and reports
  - Clustering/Grouping together events that belong to the same user action
- Create a set of useful libraries for others to use
  - For one-off scripts using parts of the feature set
  - To integrate the functionality into other tools
- Make the tool scalable
  - Both using cores on machine and across machines
- Not just focus on timelines
  - Current examples: image_export and preg

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# What Does Plaso Provide?

- Scalability (more to come)
- Structured events
- Ability to trace where an event was extracted from
- Metadata stored
- Granular filtering
- Directly parse disk images (TSK)
  - Moving to offload that to a new project, pyvfs
- VSS Parsing
- Targeted and kitchen-sink collection
- Tagging of events

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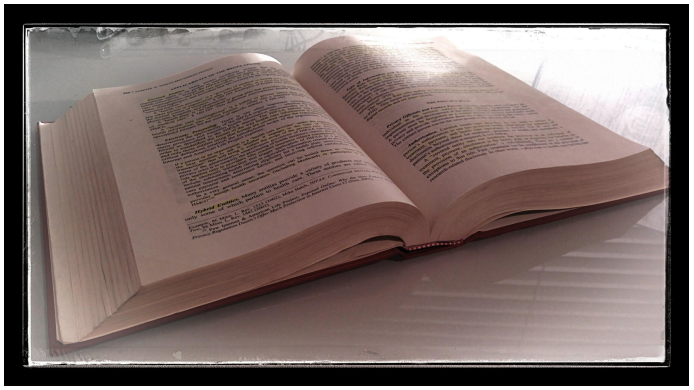
# How Open Source is it?

- All code stored on Google Code
  - https://code.google.com/p/plaso
- All code review done in public
  - https://codereview.appspot.com
- Most if not all design documents open to dev group
  - https://groups.google.com/forum/#!forum/log2timeline-dev
- Documentation actively updated
  - http://plaso.kiddaland.net
  - http://blog.kiddaland.net
- Roadmap open to all
  - http://goo.gl/7x4pIi



# OSDF New Release - 1.0.2alpha

- Halloween brings with it riding witches and other treats
  - Most notably a new plaso release
- Introducing version 1.0.2alpha
  - AKA the spooky release

# OSDF Highlights

- Over 16 new parsers introduced
  - Sometimes a thin line between a plugin and a parser
- Three new output modules
- Two new front-ends
- Several enhancements
- Ready for replacing the 0.X branch

# OSDF Front-Ends Included


log2timeline
: Extract timelines.

psort
: Post processing.

plasm
: Tagging (for now)

pinfo
: Display storage metadata

pshell
: iPython shell (advanced)

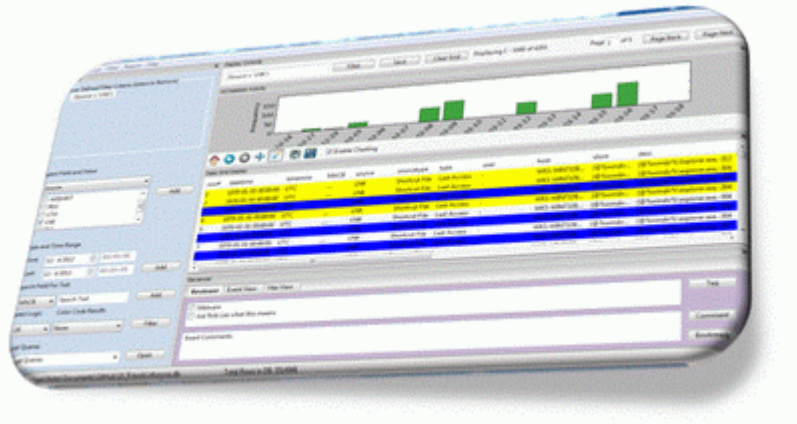
preg
: Registry parsing

pprof
: Profiling runtime, for devs.

image_export
: Exporting files out of an image

# Other tools

- As you may have noticed all of the UIs are CLI
  - Nothing else in the world?
- Due to easy integration into other tools focus is on CLI and backend
  - Others are welcome to make their own UI's
- Example UIs
  - 4n6time
  - GRR (coming soon)



# How To Run the Tool?

**log2timeline.py [OPTIONS] output_file input_file**

log2timeline.py -o 63 [--vss] /cases/12345/storage.dump /cases/12345/evil.dd

- Parameters
  - -o 63: This is a disk image and the partition starts at sector offset 63
  - Could also use --partition 2
  - [--vss]: Optional, include information from VSS
  - storage.dump: This is the path of the storage file
  - evil.dd: This is the input, the disk image

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# What to Collect?

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# What to Collect?

# OSDF Targeted Collection

- Collect browser history
  - Sample target file, does not include all sources

```
/(Users|Documents And Settings)/.+/AppData/Local/Google/Chrome/.+/History

/(Users|Documents And Settings)/.+/Local Settings/Application Data/Google/Chrome/.
+/History

/Users/.+/AppData/Local/Microsoft/Windows/History/History.IE5/index.dat

/Users/.+/AppData/Local/Microsoft/Windows/History/History.IE5/MSHist.+/index.dat

/Users/.+/AppData/Local/Microsoft/Windows/History/Low/History.IE5/index.dat

/Users/.+/AppData/Local/Microsoft/Windows/History/Low/History.IE5/MSHist.+/index.dat

/Users/.+/AppData/Local/Microsoft/Windows/Temporary Internet Files/Content.IE5/index.
dat

/Users/.+/AppData/Local/Microsoft/Windows/Temporary Internet Files/Low/Content.
IE5/index.dat

/Users/.+/AppData/Roaming/Microsoft/Windows/Cookies/index.dat

/Users/.+/AppData/Roaming/Microsoft/Windows/Cookies/Low/index.dat

/Documents And Settings/.+/Local Settings/History/History.IE5/index.dat

/Documents And Settings/.+/Local Settings/Temporary Internet Files/Content.IE5/index.
dat

/Documents And Settings/.+/Cookies/index.dat

/(Users|Documents And Settings)/.+/AppData/Roaming/Mozilla/Firefox/Profiles/.+/places.
sqlite

/(Users|Documents And Settings)/.+/Local Settings/Application
Data/Mozilla/Firefox/Profiles/.+/places.sqlite
```

# OSDF Targeted Collection

- Collect few registry files
  - Again not meant as a complete list, just an example

```
/(Users|Documents And Settings)/.+/NTUSER.DAT
{sysregistry}/SOFTWARE
{sysregistry}/SYSTEM
{sysregistry}/SAM
{sysregistry}/SECURITY
```

# OSDF How To Use the Tool

log2timeline.py -o 63 **-f filter_file.txt** browser_storage.dump /mnt/e01/ewf1

- Same parameters as before, except using “-f”

```
-f FILE_FILTER, --file_filter FILE_FILTER
                List of files to include for targeted collection of
                files to parse, one line per file path, setup is
                /path/file - where each element can contain either a
                variable set in the preprocessing stage or a regular
                expression
```

# OSDF How To Use the Tool

**log2timeline.py --partition 2 -f /cases/filters/browser.txt /cases/12345/plaso.dump image.dd**

- Do some review, notice I might want registry information

**log2timeline.py --partition 2 --use_old_preprocess -f /cases/filters/registry.txt /cases/12345/plaso.dump image.dd**

- Review again, reiterate until done
  - The --use_old_preprocess indicates you don't want to regenerate pre processing data but rely on previous find


Can we start looking
at the timeline now?

# OSDF Where Did the Output Go?

- The tool stores all the data in a compressed container.
- Need to use “psort” to convert the output.
- Available choices (as of now):
  - L2tCSV - the default output of 0.X branch of log2timeline
  - MySQL4n6 - PoC MySQL connection for 4n6time
  - Dynamic CSV (default output)
  - Rawpy - “raw” output of the python event
  - Raw - a string representation of the raw protobuf
  - SQL4n6 - a SQLite database used by 4n6time
  - Pstorage - save back into a plaso storage
- Have different requirements?
  - Write your own output module
  - Ask the developers to add one for you

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# How to Get Data Out?

```
usage: psort.py [-h] [-d] [-q] [-r] [-o FORMAT] [-z TIMEZONE] [-w OUTPUTFILE]
                [--slice DATE] [--slicer] [--slice_size SLICE_SIZE] [-v]
                [PLASOFILE] [FILTER]
```

- Most common parameters:
  - **-o FORMAT**: choose the output module
  - **-w OUTPUTFILE**: the path to the output file
  - **PLASOFILE**: the path to the storage file
  - **FILTER**: filter the output data set
- Other parameters:
  - **--slice/--slicer**: time slices
  - **-z TIMEZONE**: present timestamps in a different timezone than UTC
  - **-q**: Silence a quick runtime statistics in the end

# OSDF Basic Psort

**psort.py mystorage.dump**

- Dumps out all the content in CSV to STDOUT

**psort.py -w l2t.csv -o l2tcsv mystorage.dump**

- Dump all the content of the storage into a L2tCSV file


ANALYZING
TIMELINES IS HARD
LET'S GO
SHOPPING.
quickmeme.com

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# pinfo - Where Metadata Counts

- pinfo presents metadata stored in a plaso storage file

**pinfo.py [-v] storage.dump**

- Prints out information such as
  - When and how the tool was run
  - What parameters were turned on
  - What parsers were loaded
  - Total count of events inside storage
  - Count of events extracted from each parser
- Verbose information includes
  - Information from pre-processing
  - Counters from each store

# OSDF Filtering

- Filters in plaso are modular
  - Current implementations are mostly wrapper around the same filter
- Available filters:
  - Event filter
  - Filter list
  - Dynamic filter (affects output)

- Example event filter

**"date > '2012-01-01 15:12:02' and parser contains 'prefetch' and (executable contains 'cmd' or executable contains 'evil')"**

- Example dynamic filter

**"SELECT datetime, executable WHERE executable contains 'evil' "**

# OSDF Tagging

- PLASM (Plaso Langar Að Safna Minna)
- Tags events based on defined criteria
  - https://code.google.com/p/plaso/source/browse/#git%2Fextra
- Simple definition file

```
TAG NAME
  CONDITION (REGULAR FILTER)
ANOTHER TAG
  CONDITION 1
  CONDITION 2
```

- Example

```
Document Printed
  (data_type is 'metadata:hachoir' OR data_type is 'olecf:summary_info') AND
timestamp_desc contains 'Printed'
```

# OSDF Tagging In Action

**plasm.py tag --tagfile=tag_windows.txt mystorage.dump**

Applying tags…

DONE (applied 157 tags)

- Run pinfo to see all applied tags

**pinfo.py mystorage.dump**

…

Counter information:

Counter: Total = 157

Counter: Application Execution = 91

Counter: Startup Application = 20

Counter: AutoRun = 20

Counter: Document Opened = 20

Counter: Document Printed = 18

Counter: File Downloaded = 16

…

# OSDF Tag Based Filtering

**psort.py -q mystorage.dump "SELECT datetime, timestamp_desc, source, message WHERE tag contains 'Application Execution' and date > '2012-04-04'"**

…

2012-04-05T17:01:00.148000+00:00,Last Time Executed,Windows Job, Application: cmd /c c:\windows\system32\spinlock.exe Scheduled by: SYSTEM Run Iteration: ONCE

…

- The keyword here is “tag contains ‘TAG NAME’”

# OSDF Tying it All Together

1. Run log2timeline.py on a disk image
2. Run plasm to add tagging
3. Run psort.py to show us application executions
4. Run psort again, this time using a slice

Examine the record found earlier:

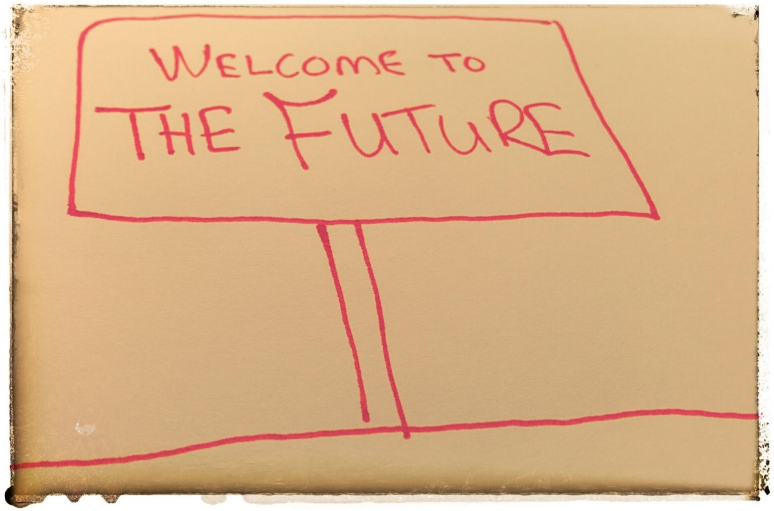
```
2012-04-05T17:01:00.148000+00:00,Last Time Executed,Windows Job,
Application: cmd /c c:\windows\system32\spinlock.exe Scheduled by:
SYSTEM Run Iteration: ONCE
```

psort.py -q **--slice "2012-04-05 17:01:00"** mystorage.dump

- Displays all records that occurred 5 minutes before and after this timestamp.

# OSDF Future Ideas

- Some future ideas*:
  - Create an analysis plugin framework (and plugins)
  - Change many of the parsers into simpler plugins
  - Create codelabs to make it easier for new developers
  - Add clustering/grouping of events
  - Integrate the tool with GRR
  - Support artifacts

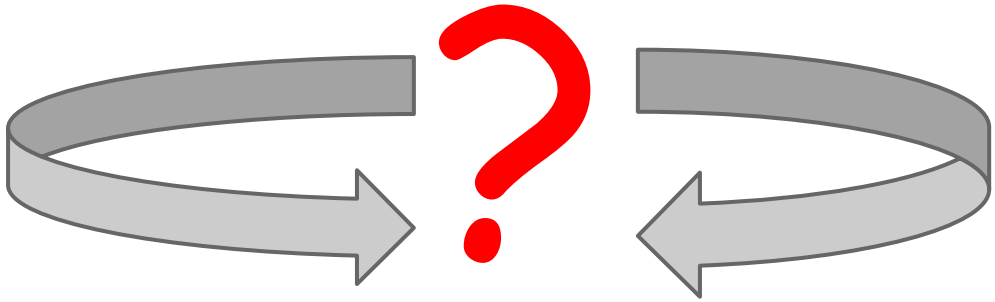


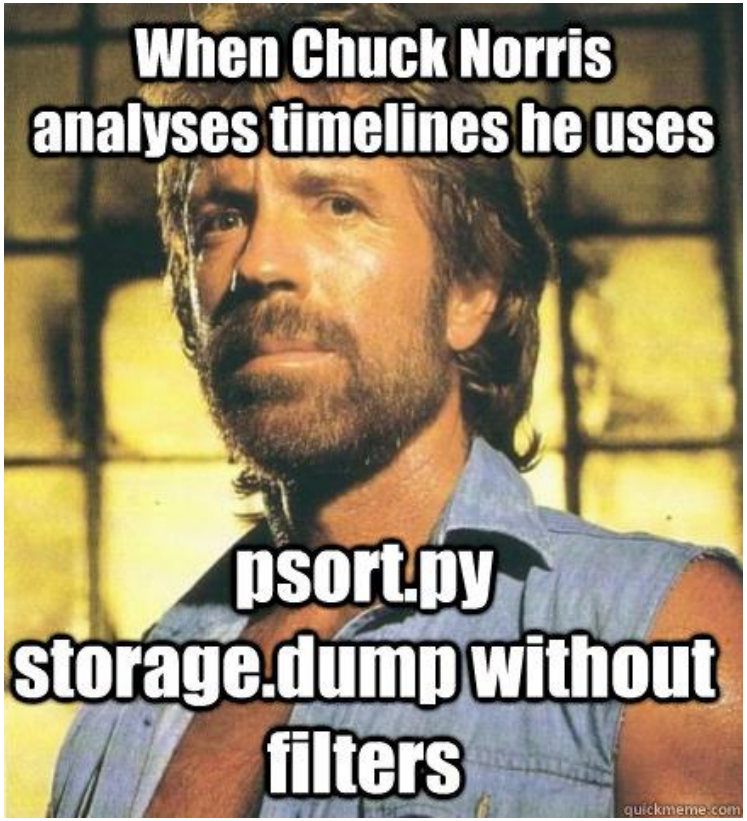

* Visit plaso.kiddaland.net and click roadmap for more details

# OSDF What Can I Do?

- Glad you asked… short answer, plenty
- Contribute code
  - You'll love the code review process
- Testing the tool and providing feedback
- Throw some suggestions our way
  - Missing some parsers?
  - Output is not intuitive?
  - Need a feature?
- Love documentation?
  - We'd love to accommodate you
  - Plenty of documentation that still needs writing

# Questions?




When Chuck Norris
analyses timelines he uses
psort.py
storage.dump without
filters
quickmeme.com