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UNIFIED SECURITY: IMPROVING THE FUTURE

Fact Tables: A Case Study in Reducing Reactive Time-to-Know by 95%

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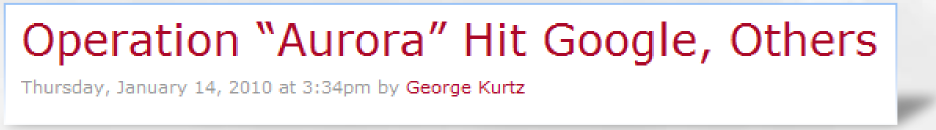
Today’s Talk

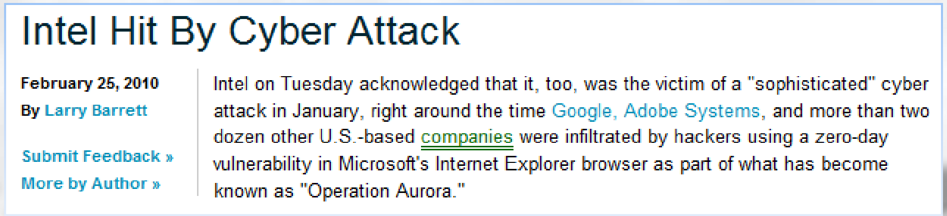
- Our wake-up call
- What we had in terms of “SBI”
- Where we are today
- What is this “Order-1” or “Fact Table” concept
- How it fits in our workflow
- Other use cases

Where it Started – Operation Aurora



Operation “Aurora” Hit Google, Others

Thursday, January 14, 2010 at 3:34pm by George Kurtz



Intel Hit By Cyber Attack

February 25, 2010
By Larry Barrett

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Intel on Tuesday acknowledged that it, too, was the victim of a "sophisticated" cyber attack in January, right around the time Google, Adobe Systems, and more than two dozen other U.S.-based companies were infiltrated by hackers using a zero-day vulnerability in Microsoft's Internet Explorer browser as part of what has become known as "Operation Aurora."

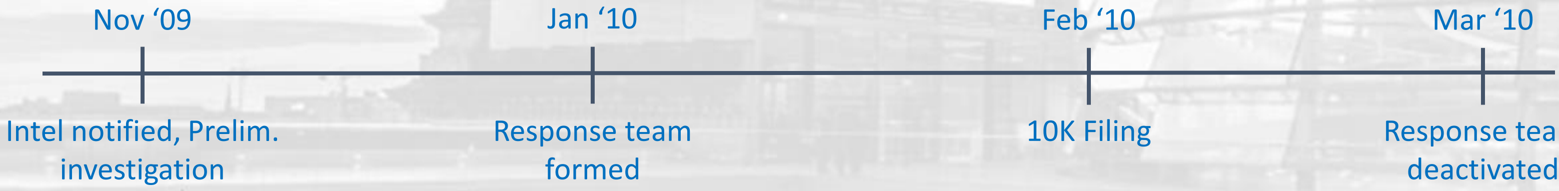
Highly resourced, coordinated attack campaign affecting dozens of US-based companies in the technology, finance, media, & chemical sectors

What Went Well

- Intel ahead of most peers in response
- Required expertise largely existed in-house

What Didn’t

- People, Process, Tool issues
  - New team unknown to some data owners
  - Accessibility/Availability of data
  - Geo challenges
  - No real time monitoring
- Challenges to sustaining response
  - Day jobs didn’t go away
  - If another APT event had occurred …



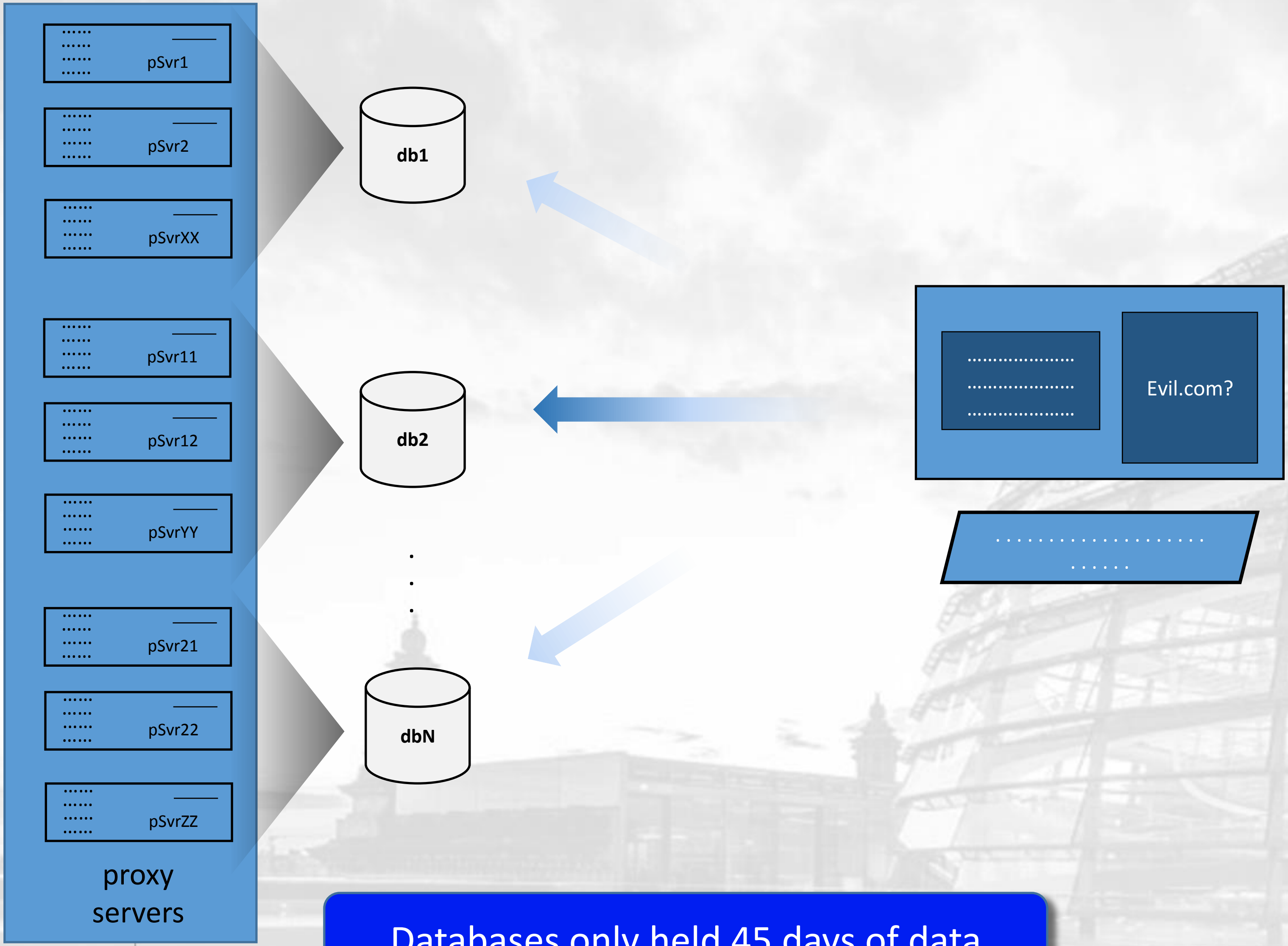
Nov ‘09
Intel notified, Prelim. investigation

Jan ‘10
Response team formed

Feb ‘10
10K Filing

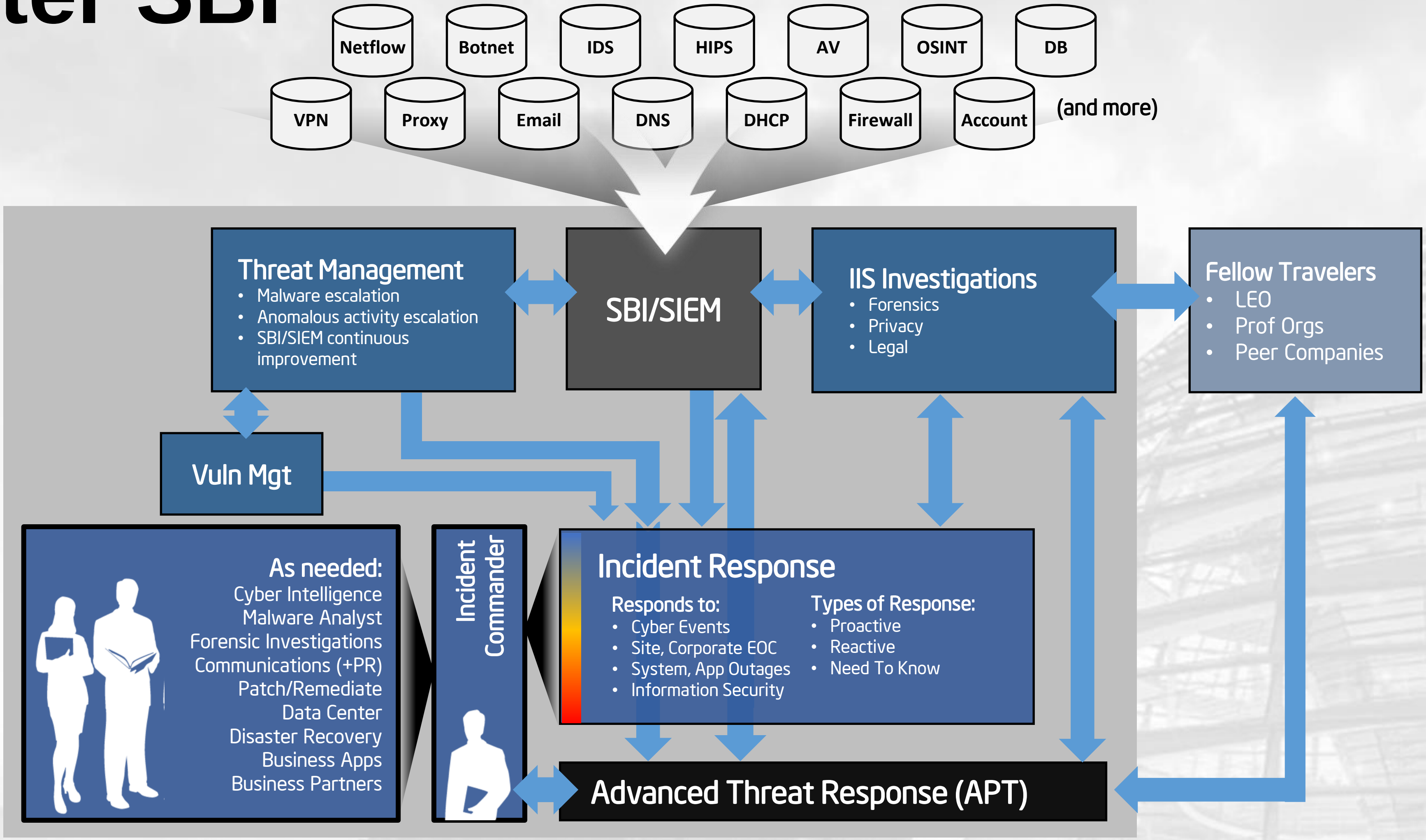
Mar ‘10
Response team deactivated

Pain



Databases only held 45 days of data

Enter SBI



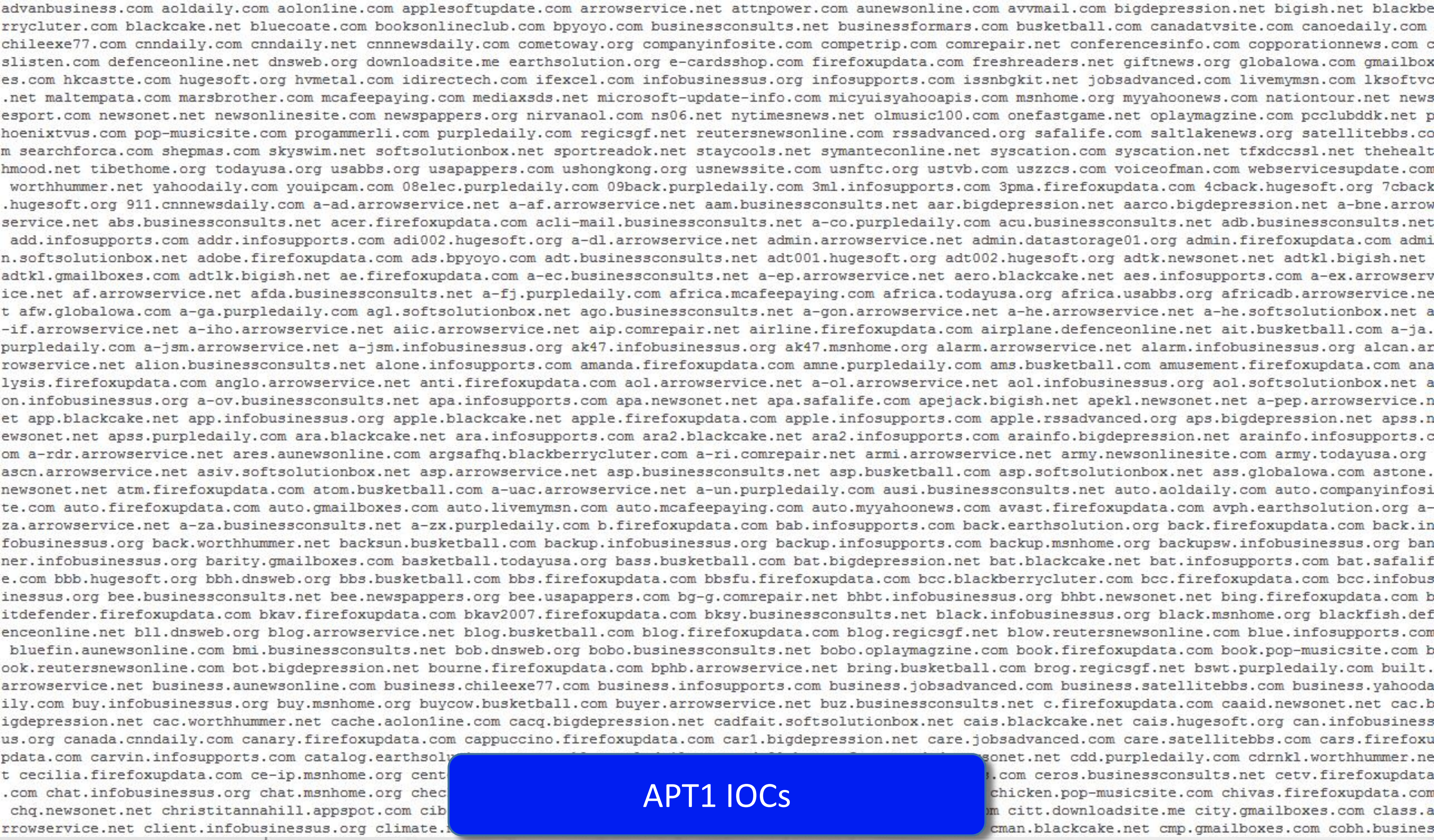
1yr data for all event sources – but there's a LOT of data

Order(1) Proxy Searches

IOC – Have You Seen It?

evil.com

IOCs – Have You Seen These?



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APT1 IOCs

Fact Table

```
PROXYDB
timestamp
client_IP
username
category
method
scheme
host
port
uriPath
uriQuery
user-agent
bytesSent
bytesRcv
response
proxy_IP
...
```

Requirements

- Have we seen attempts to *blah*?
- How many?
- What date range?
- Keep for a long time (2-5 yrs)
- Speed

Fact Table

PROXYDB
timestamp
client_IP
username
category
method
scheme
host
port
uriPath
uriQuery
user-agent
bytesSent
bytesRcv
response
proxy_IP
...

```
select
       host,
       min(timestamp) as “First Seen”,
       max(timestamp) as “Last Seen”,
       count*
from proxyDB
group by 1
```

Host	First Seen	Last Seen	Count
example.com	1970-01-01 09:15:31 UTC	1970-01-01 23:05:31 UTC	84
…			
example.com	1974-01-12 18:32:08 UTC	1974-01-12 18:32:08 UTC	2

Take all the sites we saw on $day and add to O1db

Uses

Have we ever seen traffic to example.com or example2.com?

```
select Destination, min(MIN_TS) as “First Seen”, max(MAX_TS) as “Last Seen”,
sum(Count) from proxy01DB where Destination in “example.com,example2.com” and
MIN_TS=”01-01-1970 00:00:00” and MAX_TS=”12-31-2008 23:59:59” group by 1
```

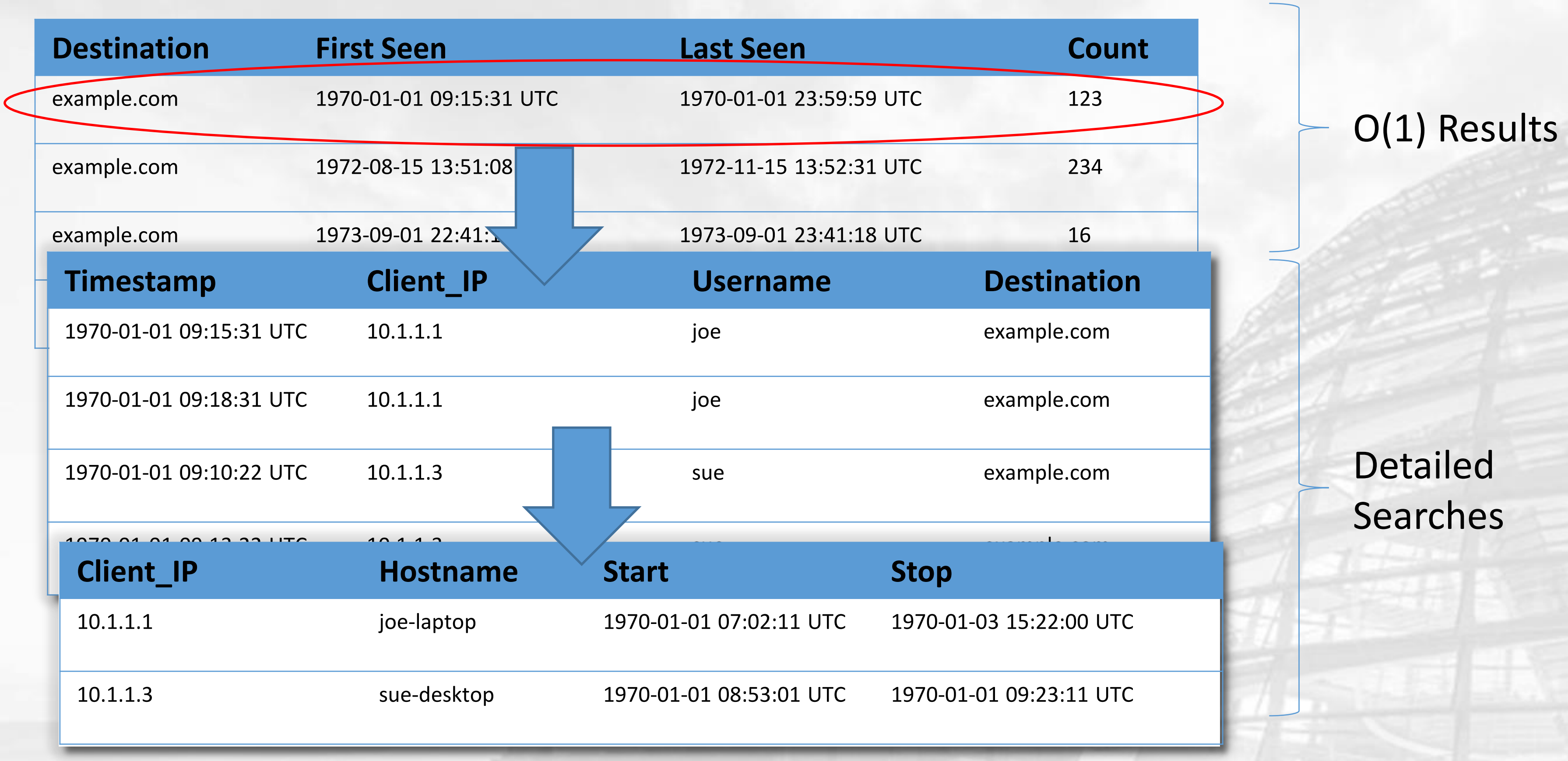
Destination	First Seen	Last Seen	Count
example.com	1970-01-01 09:15:31 UTC	1974-01-12 18:32:08 UTC	854
example2.com	1998-11-21 19:13:01 UTC	2008-12-02 04:12:01 UTC	20

When did we see traffic to example.com?

```
select Destination, min(MIN_TS) as “First Seen”, max(MAX_TS) as “Last Seen”,
sum(Count) from proxy01DB where Destination = “example.com” and MIN_TS=”01-01-
1970 09:15:31” and MAX_TS=”01-12-1974 18:32:08” group by 1
```

Destination	First Seen	Last Seen	Count
example.com	1970-01-01 09:15:31 UTC	1970-01-01 23:59:59 UTC	123
example.com	1972-08-15 13:51:08 UTC	1972-11-15 13:52:31 UTC	234
example.com	1973-09-01 22:41:15 UTC	1973-09-01 23:41:18 UTC	16
example.com	1974-01-12 03:00:01 UTC	1974-01-12 18:32:08 UTC	481

Now We Have Something to Pivot On



Destination	First Seen	Last Seen	Count
example.com	1970-01-01 09:15:31 UTC	1970-01-01 23:59:59 UTC	123
example.com	1972-08-15 13:51:08	1972-11-15 13:52:31 UTC	234
example.com	1973-09-01 22:41:1	1973-09-01 23:41:18 UTC	16

Timestamp	Client_IP	Username	Destination
1970-01-01 09:15:31 UTC	10.1.1.1	joe	example.com
1970-01-01 09:18:31 UTC	10.1.1.1	joe	example.com
1970-01-01 09:10:22 UTC	10.1.1.3	sue	example.com
1970-01-01 09:13:22 UTC	10.1.1.3	sue	example.com

Client_IP	Hostname	Start	Stop
10.1.1.1	joe-laptop	1970-01-01 07:02:11 UTC	1970-01-03 15:22:00 UTC
10.1.1.3	sue-desktop	1970-01-01 08:53:01 UTC	1970-01-01 09:23:11 UTC

O(1) Results

Detailed Searches

What used to take weeks now takes <1 day

DNS Use Case

Requirements essentially the same

- Have we seen attempts to *blah*?
- How many?
- What date range?
- Keep for a long time (2-5 yrs)
- Exclude Intel lookups
- Speed

Our O(1) DNS only stores non-intel.com queries

Improvements, Automation, Additional Work

Proxy/DNS "Firehose"

Current

- Provide IOCs to engine
- Engine queries on O(1) tables

Future

- Automatically open a case
- Engine automatically pulls proxy/DHCP
  - And employee entitlements/access

Do all the work an analyst currently does manually
Generate shareable threat intelligence

DNS Tunnel Detection

- Query O(1) DNS table
- Remove Alexa Top 1 Million
- Count primary domains
- High counts could indicate tunnels

Detected pen testing vendor

Other Use Cases

- User-Agent
  - Many malware uses specific U-A strings
- Observed Malware
  - How many times are you seeing a malware family
- Email
  - Phishing campaigns based on sender, subject, etc
- VPN
  - Identify geo-spatial issues or anomalies

Be mindful of privacy requirements

Acknowledgements

Steve Mancini	Idea development
Victor Colvard	Solution engineering
Stacy Purcell	SBI evangelist

Questions?

Jeff Boerio, Sr. Advanced Intrusion Analyst, Intel Corp.
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Victor Colvard, Security Systems Engineer, Intel Corp.
See Jeff for Contact Details