SAND2015-6237C

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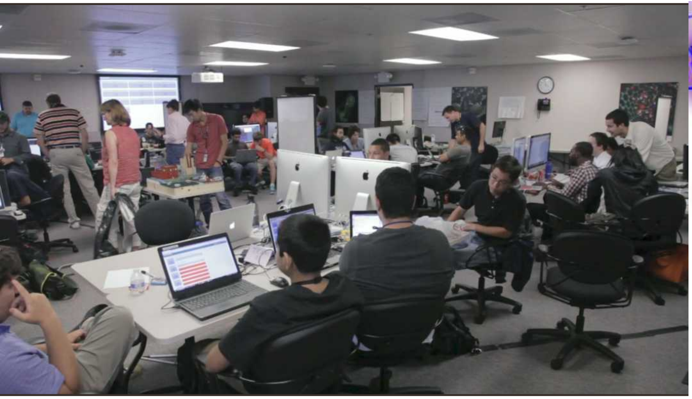

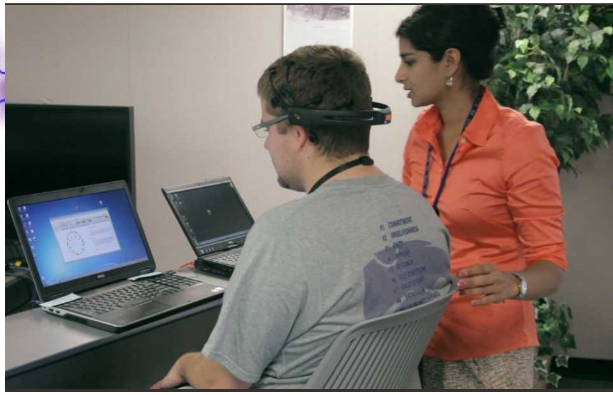

Measuring Expert and Novice Performance within Computer Security Incident Response Teams

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Introduction

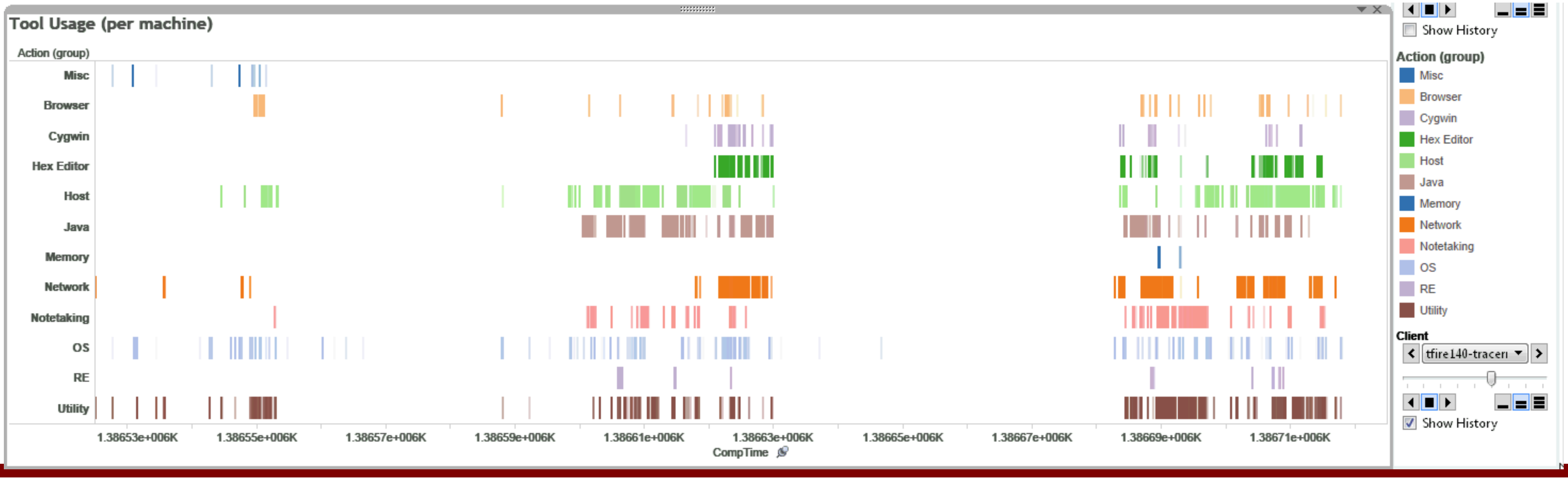
- Cyber threats are increasing and not going away
- There is a need to understand the the characteristics of high-performing individuals in cybersecurity, as well as their impact on incident outcomes .
- This methodology seeks to advance:
  - The ability to **identify individuals with a high aptitude** to excel in the cybersecurity domain in order to inform recruiting and enhance training.
  - The ability to **build a better cybersecurity workforce** that will directly contribute to the crucial task of protecting organizations' information and infrastructure.

What is Tracer FIRE?

- A game-based training environment for incident responders (IRs)
- Teams compete in a variety of challenges related to various aspects of cybersecurity
- As teams solve individual puzzles in the the game, they unlock new pieces of the narrative.

Methodology

- Performance Data
  - Computer instrumentation (from TracerFIRE)
    - Correct submissions
    - Tools used
    - # of submissions
    - Who submitted answers



□ Show History

Client: tfire140-traceri

☑ Show History

Methodology

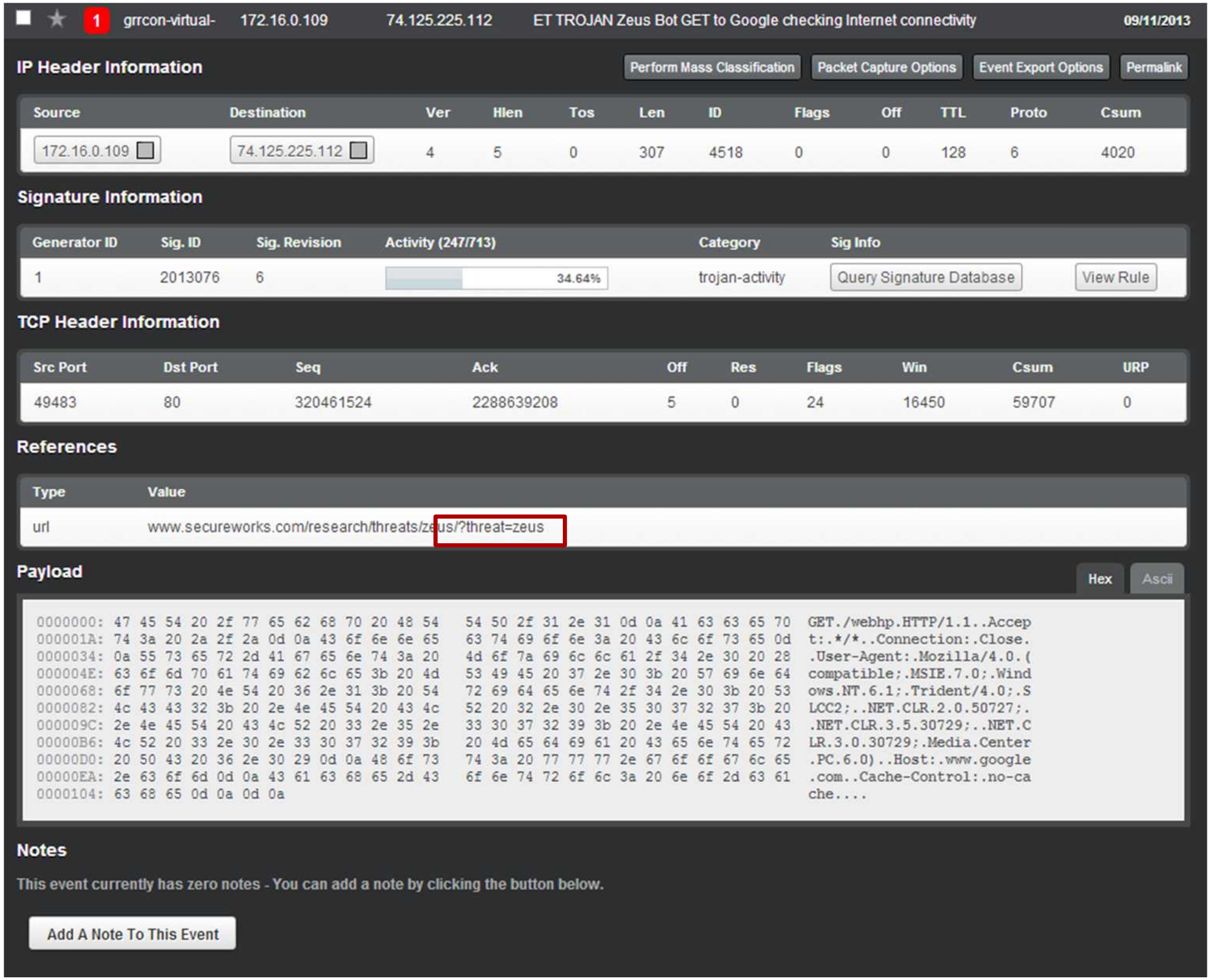
- Cognitive/Behavioral Data
  - Eye Tracking
    - Domain-general task
    - Domain-specific task
  - Electroencephalography
    - Recognition memory test
  - Self-report measures
    - Big Five Personality Inventory
    - Need for Cognition Scale
    - General Decision-Making Style

Eye Tracking Collection

12 Novice Subjects:

- Domain-specific task
- T/L visual discrimination task
- Sandia Progressive Matrices task

Sample Domain-specific Task



1 grrcon-virtual- 172.16.0.109 74.125.225.112 ET TROJAN Zeus Bot GET to Google checking Internet connectivity 09/11/2013

IP Header Information

Source	Destination	Ver	Hlen	Tos	Len	ID	Flags	Off	TTL	Proto	Csum
172.16.0.109	74.125.225.112	4	5	0	307	4518	0	0	128	6	4020

Signature Information

Generator ID	Sig. ID	Sig. Revision	Activity (247/713)	Category	Sig Info	
1	2013076	6	34.64%	trojan-activity	Query Signature Database	View Rule

TCP Header Information

Src Port	Dst Port	Seq	Ack	Off	Res	Flags	Win	Csum	URP
49483	80	320461524	2288639208	5	0	24	16450	59707	0

References

Type	Value
url	www.secureworks.com/research/threats/zeus/?threat=zeus

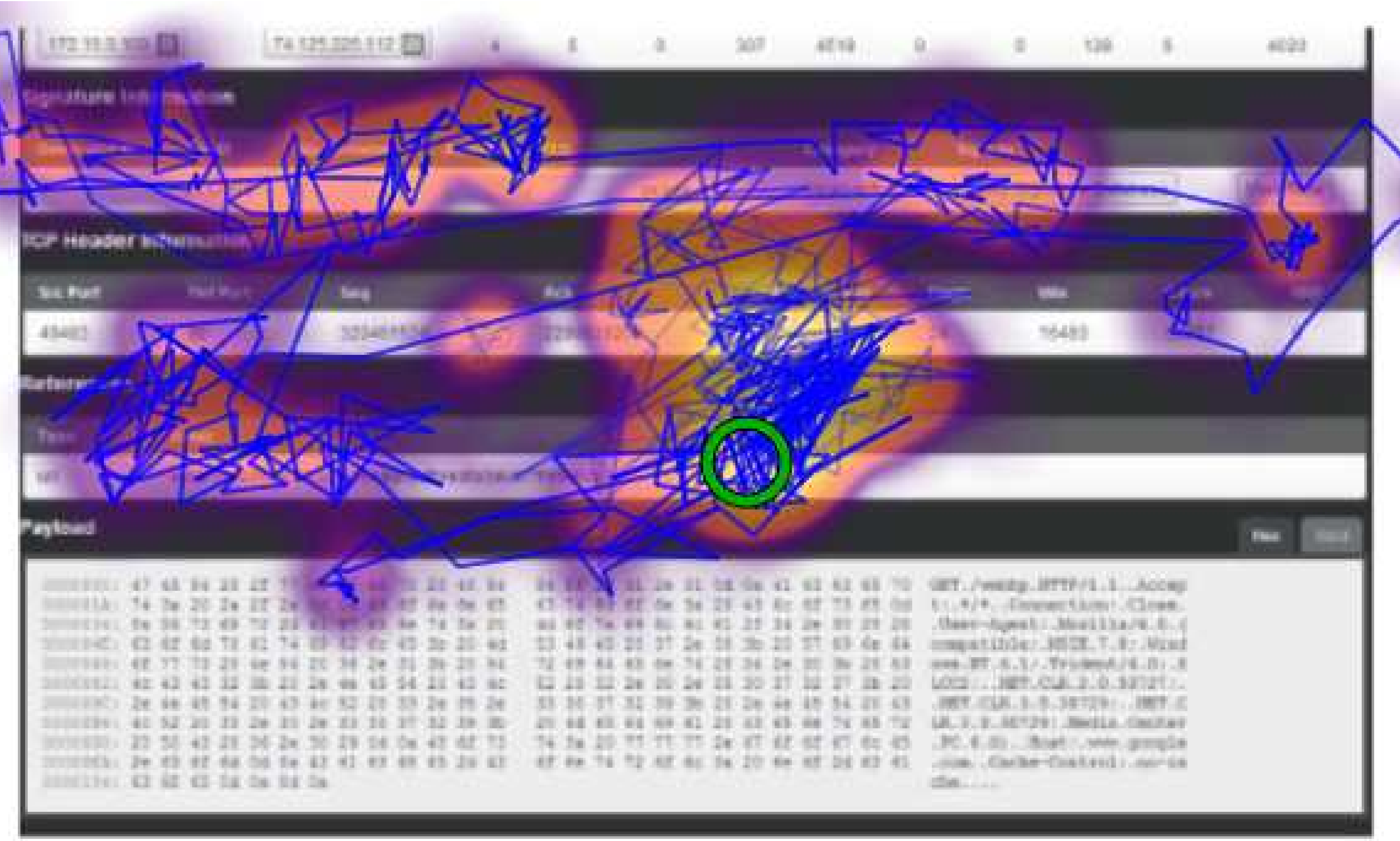
Payload

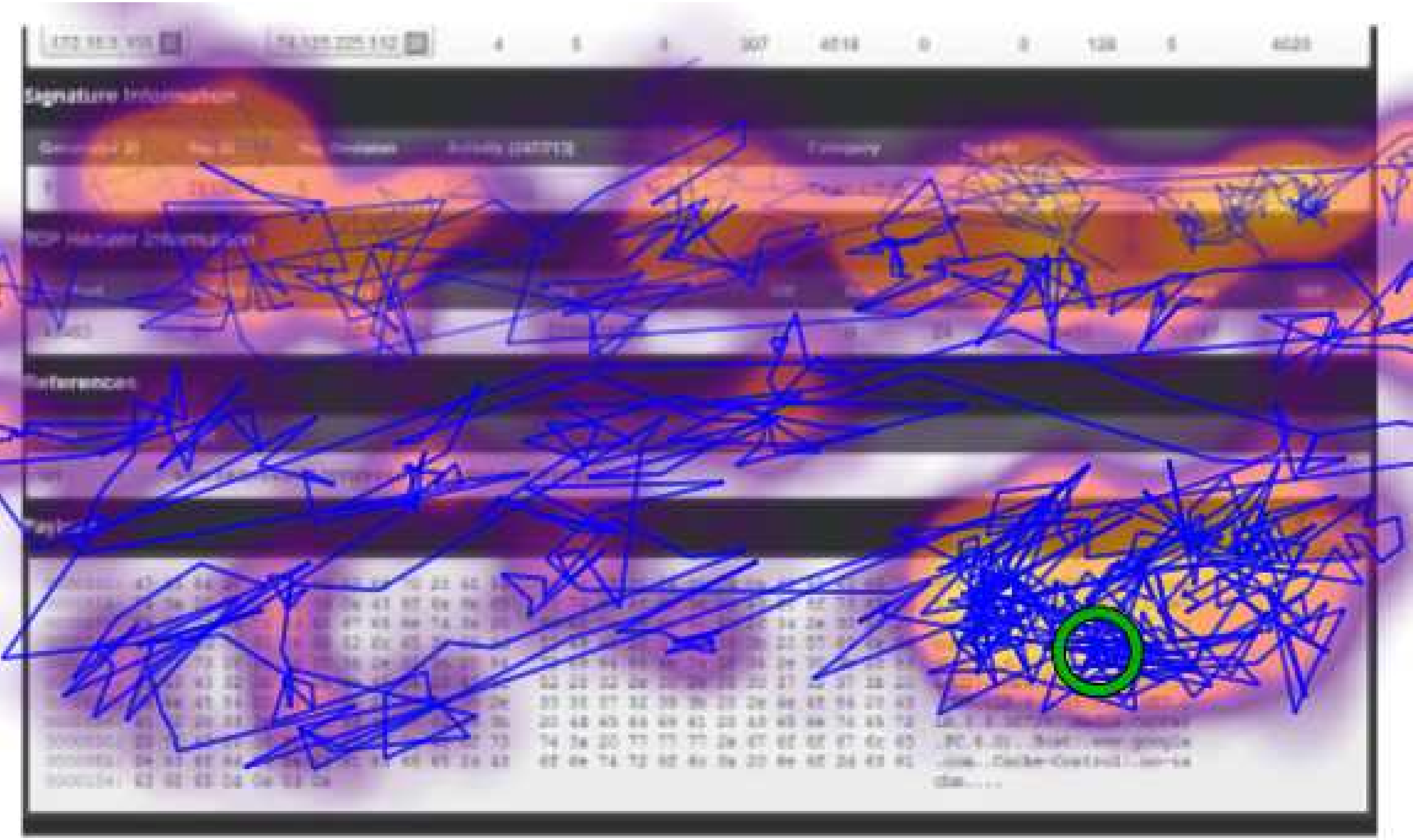
```
0000000: 47 45 54 20 2f 77 65 62 68 70 20 48 54   54 50 2f 31 2e 31 0d 0a 41 63 63 65 70   GET./webhp.HTTP/1.1..Accep
000001A: 74 3a 20 2a 2f 2a 0d 0a 43 6f 6e 6e 65   63 74 69 6f 6e 3a 20 43 6c 6f 73 65 0d   t:.*/*..Connection:.Close.
0000034: 0a 55 73 65 72 2d 41 67 65 6e 74 3a 20   4d 6f 7a 69 6c 6c 61 2f 34 2e 30 20 28   .User-Agent:.Mozilla/4.0.(
000004E: 63 6f 6d 70 61 74 69 62 6c 65 3b 20 4d   53 49 45 20 37 2e 30 3b 20 57 69 6e 64   compatible;.MSIE.7.0;.Wind
0000068: 6f 77 73 20 4e 54 20 36 2e 31 3b 20 54   72 69 64 65 6e 74 2f 34 2e 30 3b 20 53   ows.NT.6.1;.Trident/4.0;.S
0000082: 4c 43 43 32 3b 20 2e 4e 45 54 20 43 4c   52 20 32 2e 30 2e 35 30 37 32 37 3b 20   LCC2;..NET.CLR.2.0.50727;.
000009C: 2e 4e 45 54 20 43 4c 52 20 33 2e 35 2e   33 30 37 32 39 3b 20 2e 4e 45 54 20 43   .NET.CLR.3.5.30729;..NET.C
00000B6: 4c 52 20 33 2e 30 2e 33 30 37 32 39 3b   20 4d 65 64 69 61 20 43 65 6e 74 65 72   LR.3.0.30729;.Media.Center
00000D0: 20 50 43 20 36 2e 30 29 0d 0a 48 6f 73   74 3a 20 77 77 77 2e 67 6f 6f 67 6c 65   .PC.6.0)..Host:.www.google
00000EA: 2e 63 6f 6d 0d 0a 43 61 63 68 65 2d 43   6f 6e 74 72 6f 6c 3a 20 6e 6f 2d 63 61   .com..Cache-Control:.no-ca
0000104: 63 68 65 0d 0a 0d 0a                                                                che....
```

Notes

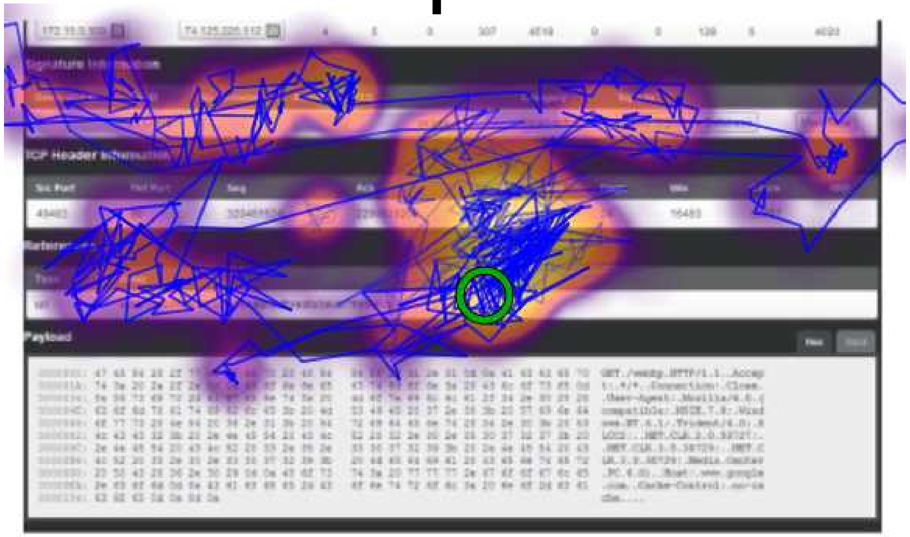
This event currently has zero notes - You can add a note by clicking the button below.

Question: What is the common name of the malware reported by the IDS alert provided?

172.15.3.103
74.125.225.112
4
5
3
307
4519
0
0
128
5
4023
Signature Information
TCP Header Information
Src Port
Seq
Ack
Win
43482
15483
Payload
Hex
GET./webhp.HTTP/1.1..Accep
t:.*/*..Connection:.Close.
.User-Agent:.Mozilla/4.0.(
compatible;.MSIE.7.0;.Wind
ows.NT.6.1;.Trident/4.0;.S
LCC2;..NET.CLR.2.0.50727;.
.NET.CLR.3.5.30729;..NET.C
LR.3.0.30729;.Media.Center
.PC.6.0)..Host:.www.google
.com..Cache-Control:.no-ca
che....

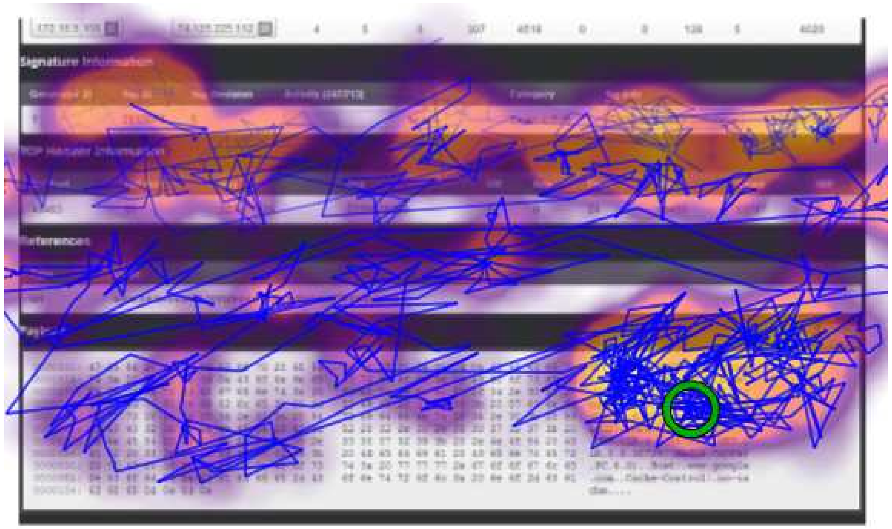

Signature Information
TCP Header Information
References
Payload

Expert



6 Sec

Novice



20 Sec

Cognitive Measures

- Self report measures are hypothesized to show:
  - High performers that fell within the ROI quickly would have higher reported need for cognition scores
  - High performers that answered soon after entering the ROI would be rational-intuitive decision makers
  - Low performers and those with high levels of avoidance would not answer without investigating the screen in its entirety.

Future Work

- Acquire more data from domain experts
- Help alleviate problems due to attribution within the teams
- Use a dynamic cyber domain task for more operational relevance

Conclusion

- It is possible to perform complex in-situ testing in the cyber domain to identify differences between expert and novice individuals and teams
- Differences in skill can be detected using the eye trackers but more data is needed for more robust results
- Cognitive measures and behavioral game data can be leveraged alongside eye tracking information to understand expertise in topical space or tool.