Automation & Incident Response

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INFO30004: Information Systems Security Auditing

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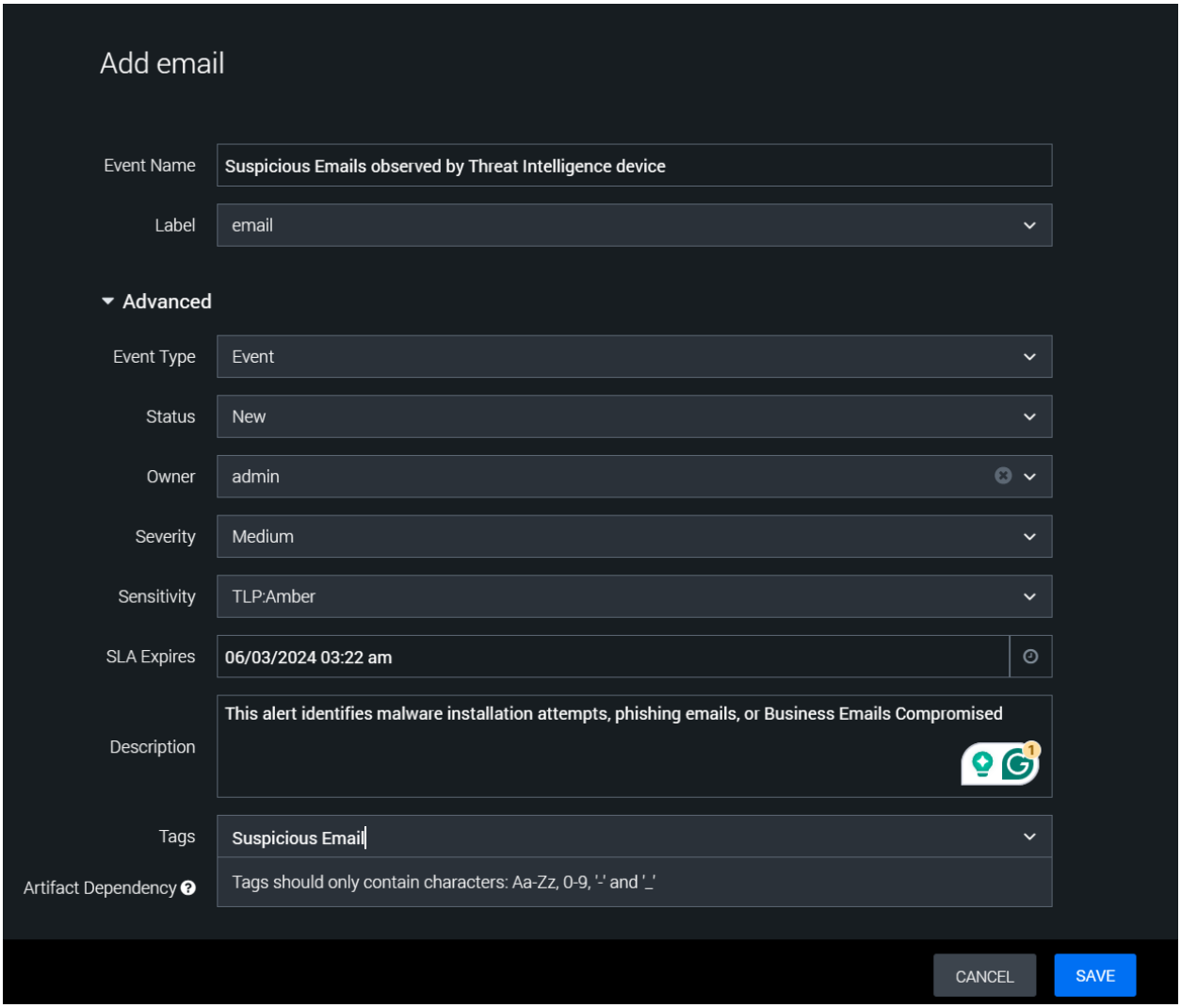
TABLE OF CONTENT

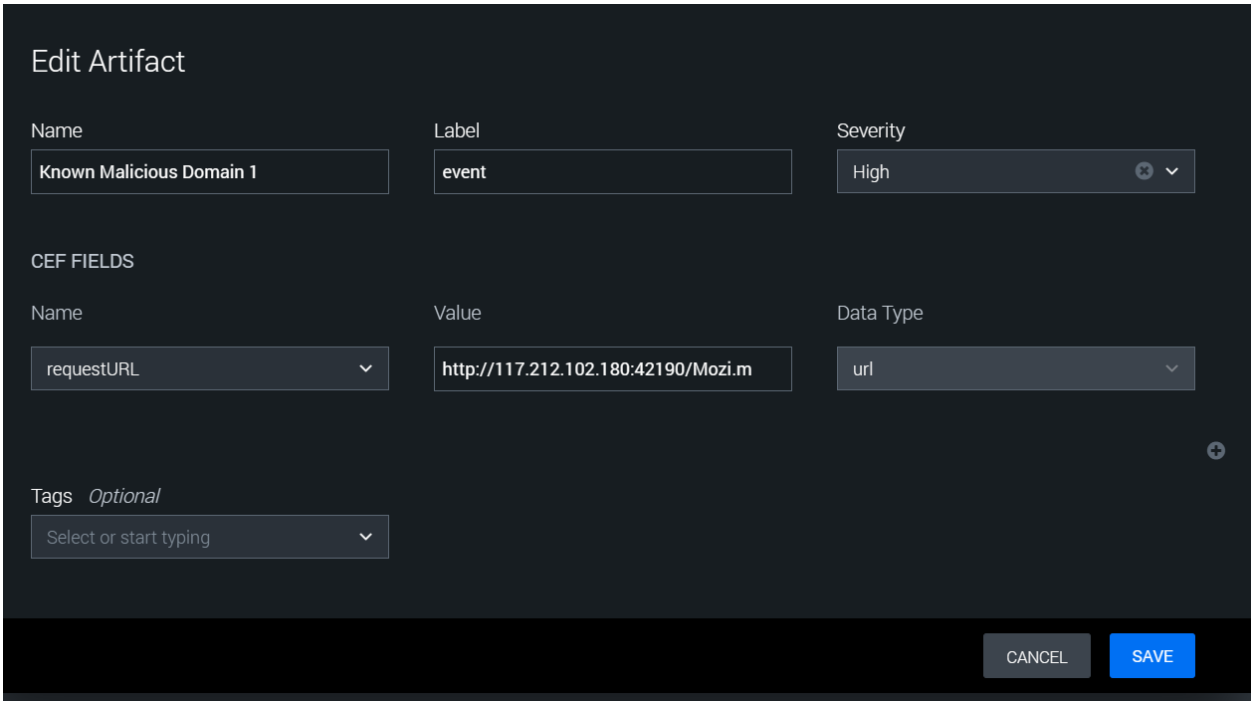
Part 1: Splunk Phantom - Playbook

We have decided to create a playbook using ipqualityscore.com API to check whether a RequestURL from an email is unsafe, which automates the detection of phishing and malicious attempts in the event of suspicious email transactions.

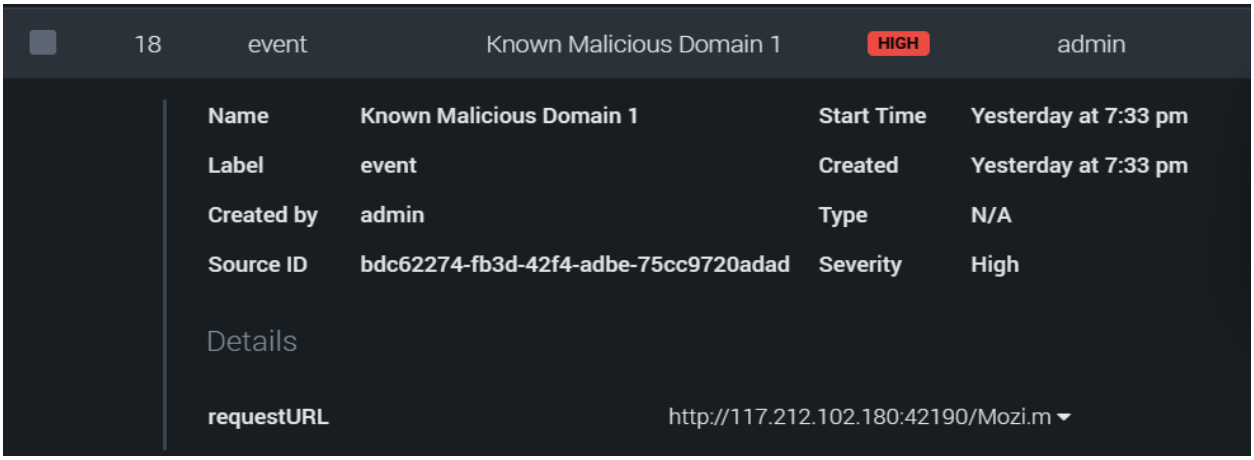
Step 1: Create a sample event container to test the playbook:

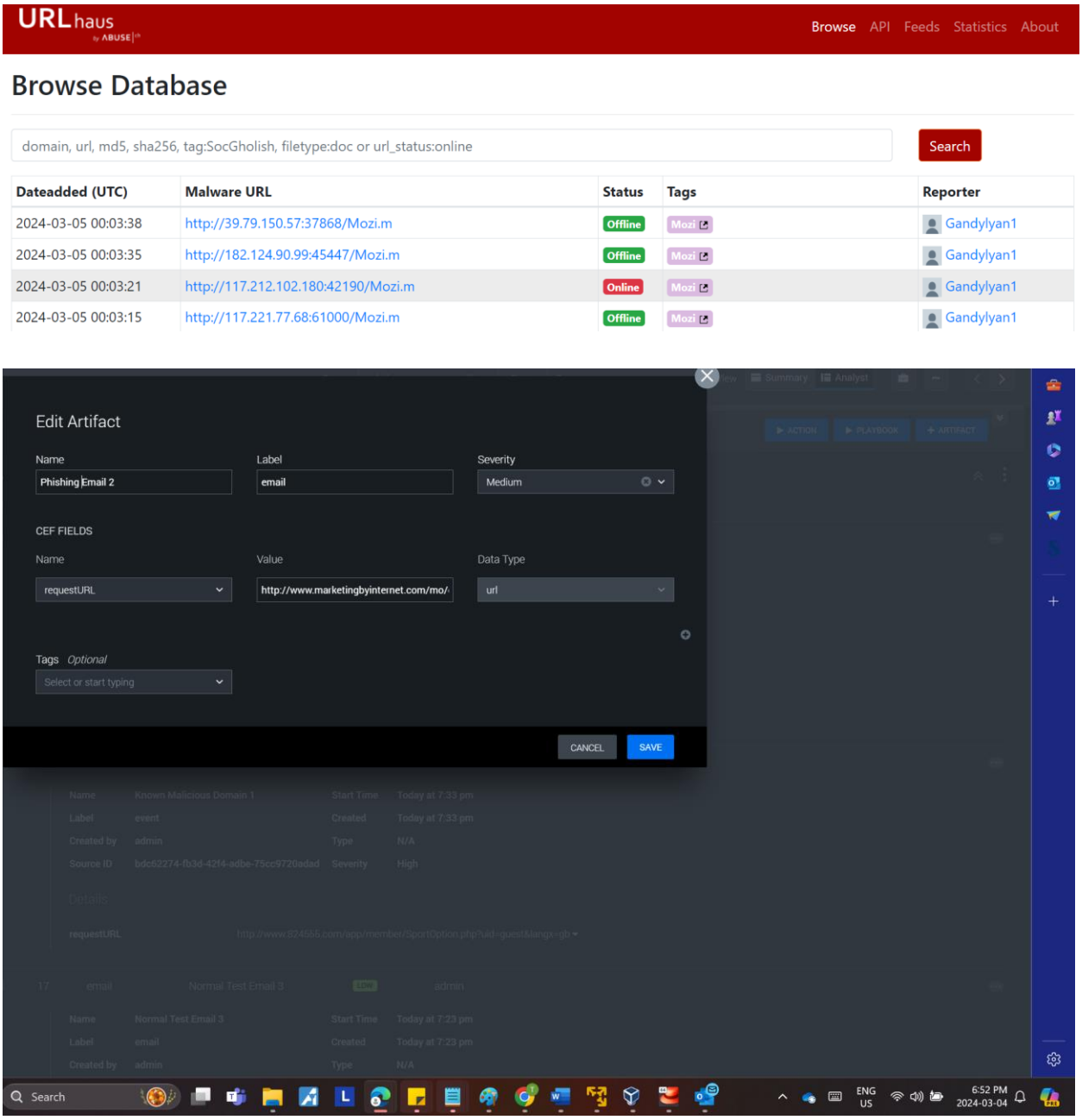


Step 2: Create Artifacts with RequestURL CEF directed to known sites (malicious/benign) within the Evident Container to test the playbook:

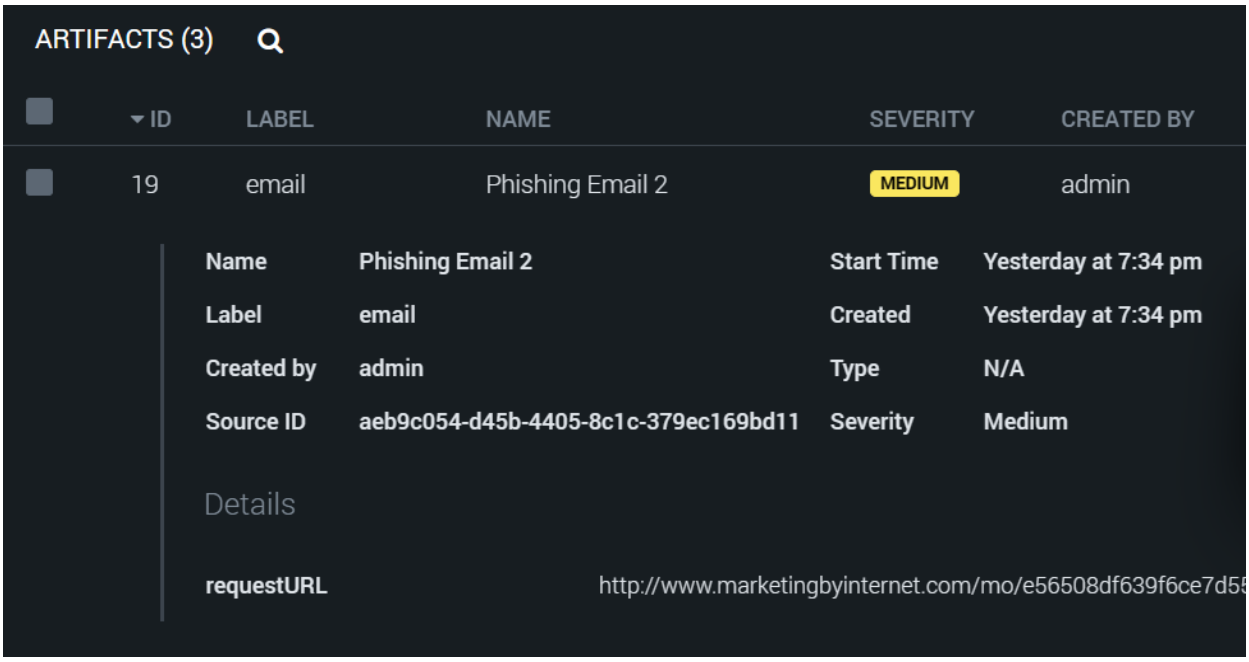


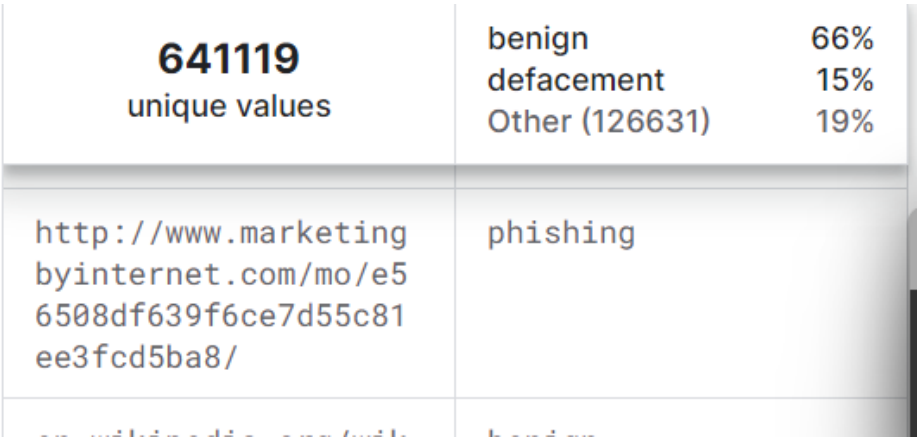
- **Exhibit 1:** A Known Malicious Domain (contains malware)

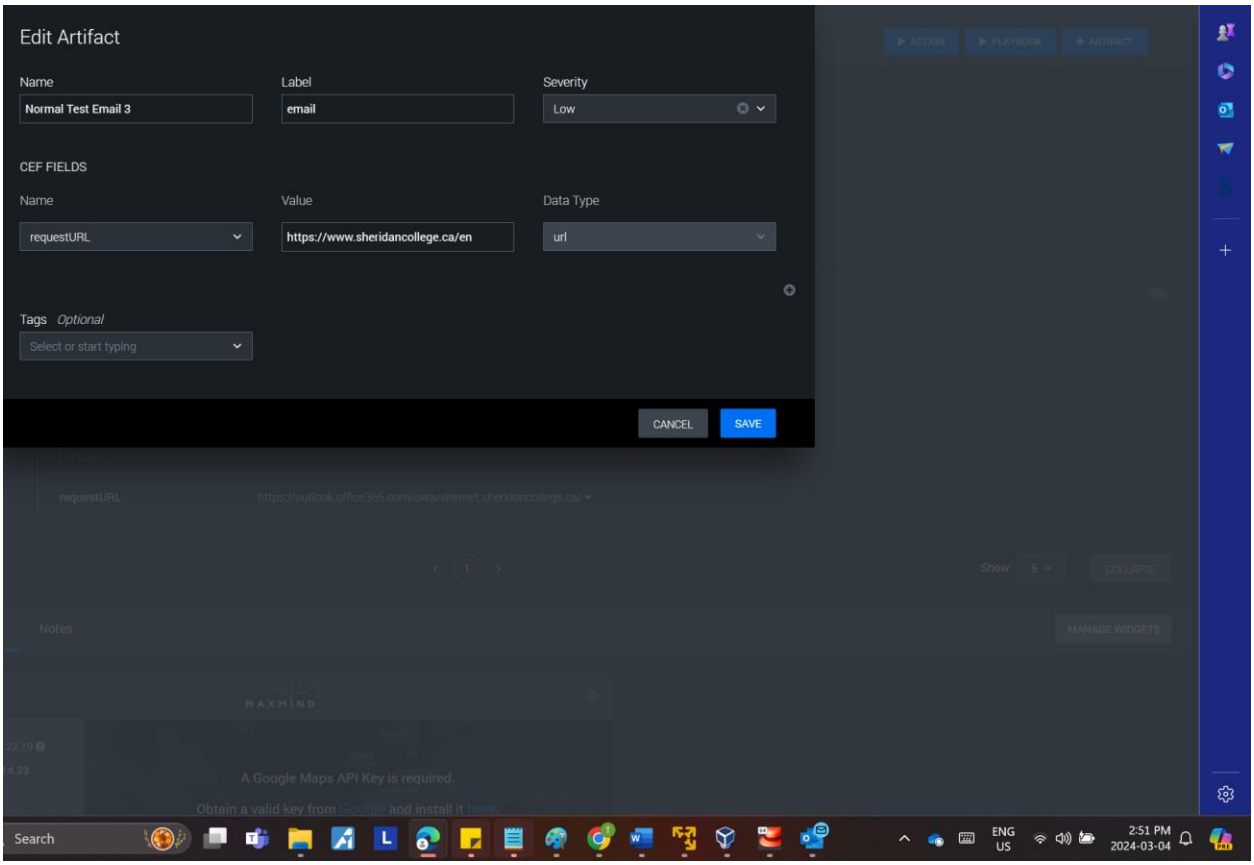




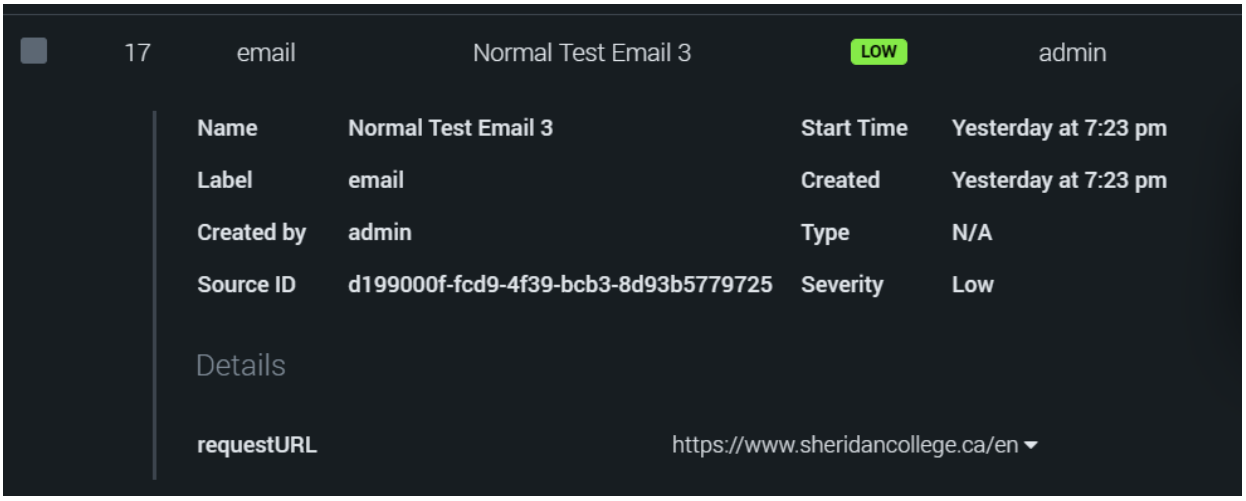
- **Exhibit 2:** A Known Phishing Site (does not contain malware)

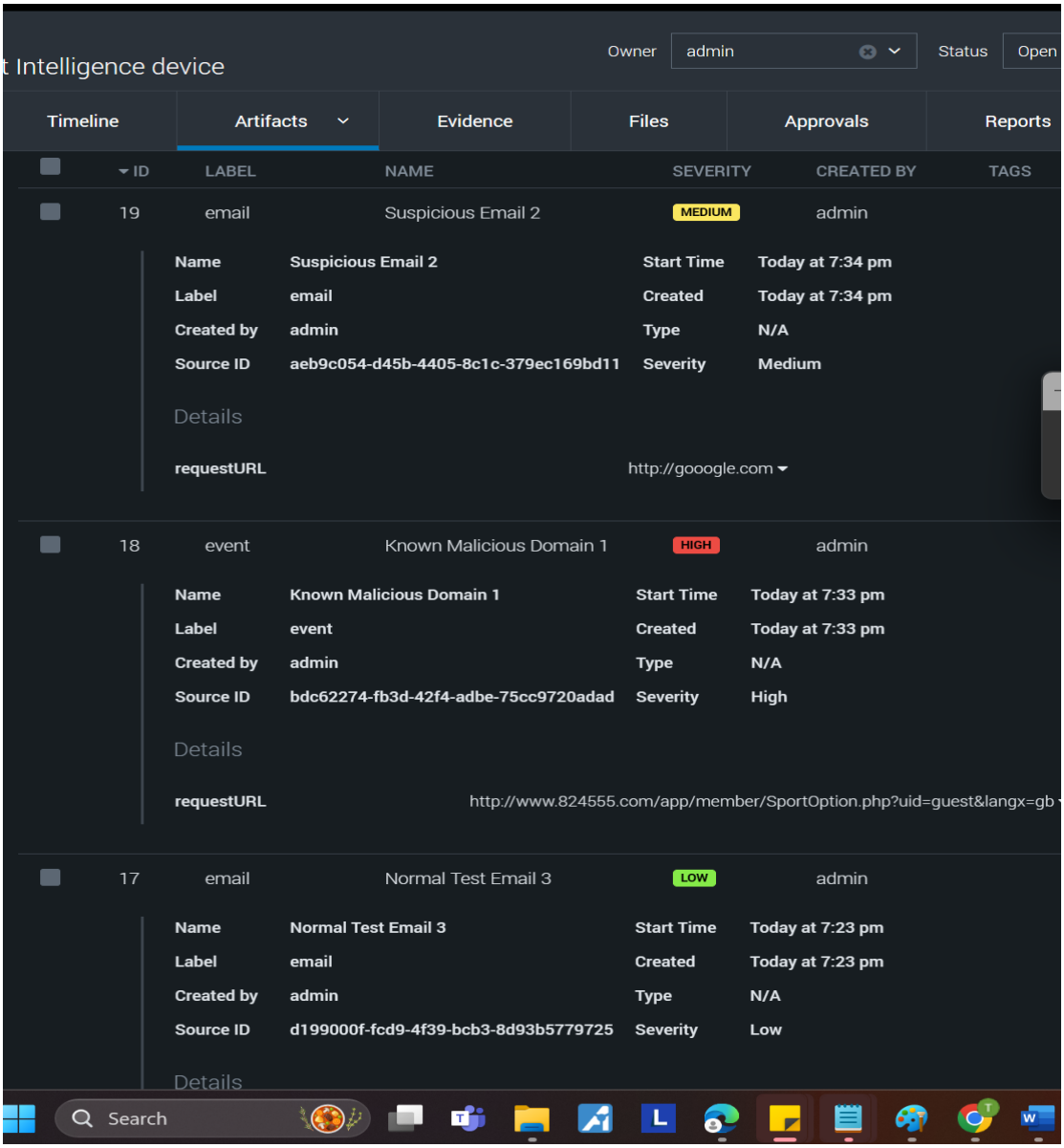

ARTIFACTS (3)
ID
LABEL
NAME
SEVERITY
CREATED BY
19
email
Phishing Email 2
MEDIUM
admin
Name
Phishing Email 2
Start Time
Yesterday at 7:34 pm
Label
email
Created
Yesterday at 7:34 pm
Created by
admin
Type
N/A
Source ID
aeb9c054-d45b-4405-8c1c-379ec169bd11
Severity
Medium
Details
requestURL
http://www.marketingbyinternet.com/mo/e56508df639f6ce7d55


641119
unique values
benign 66%
defacement 15%
Other (126631) 19%
http://www.marketing byinternet.com/mo/e5 6508df639f6ce7d55c81 ee3fcd5ba8/
phishing



- **Exhibit 3:** A Benign Web Site to test the good boundary/input.

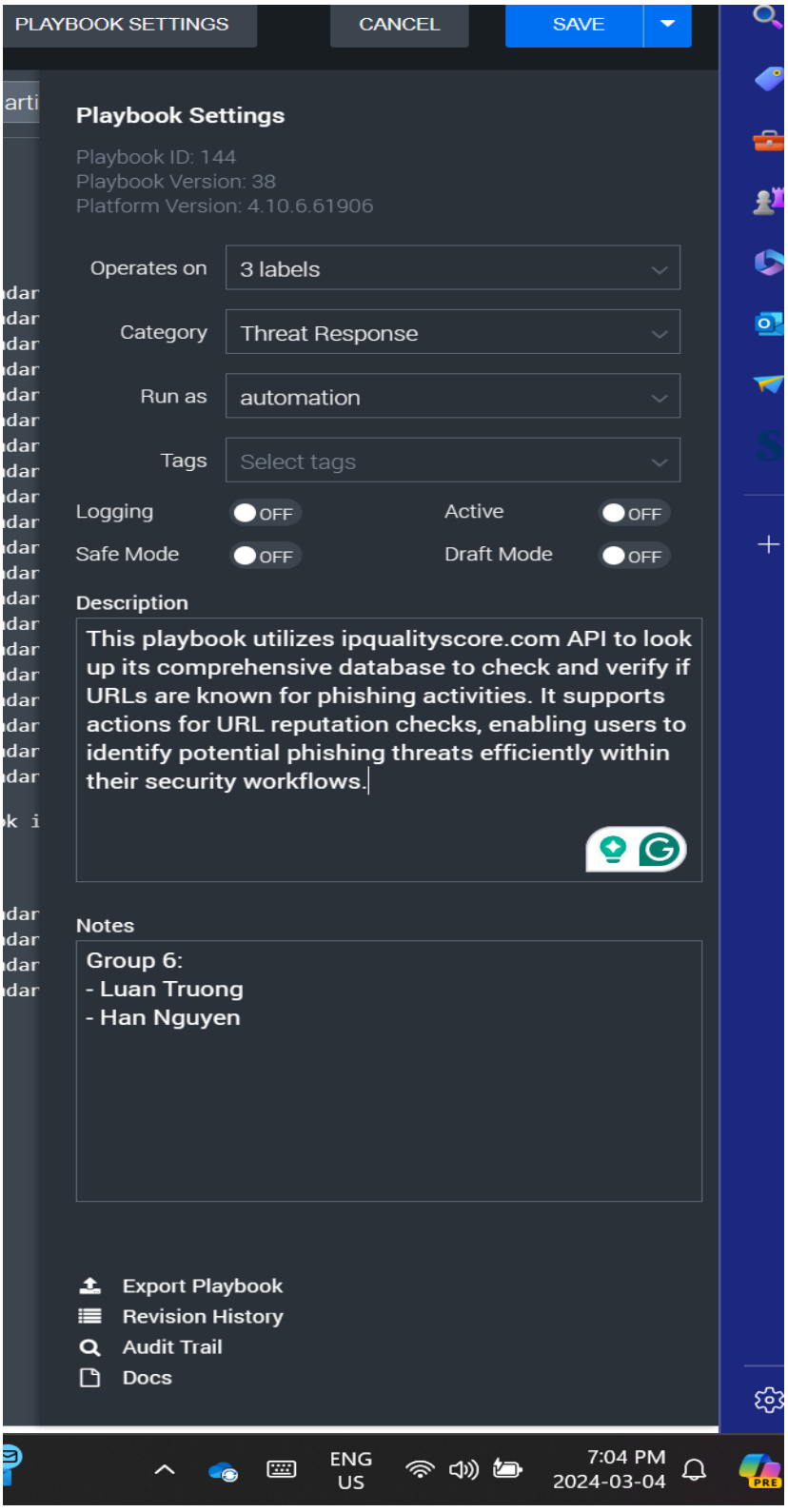




There is a total of 3 artifacts within Event ID = 4 (Suspicious Emails observed by Threat Intelligence device)

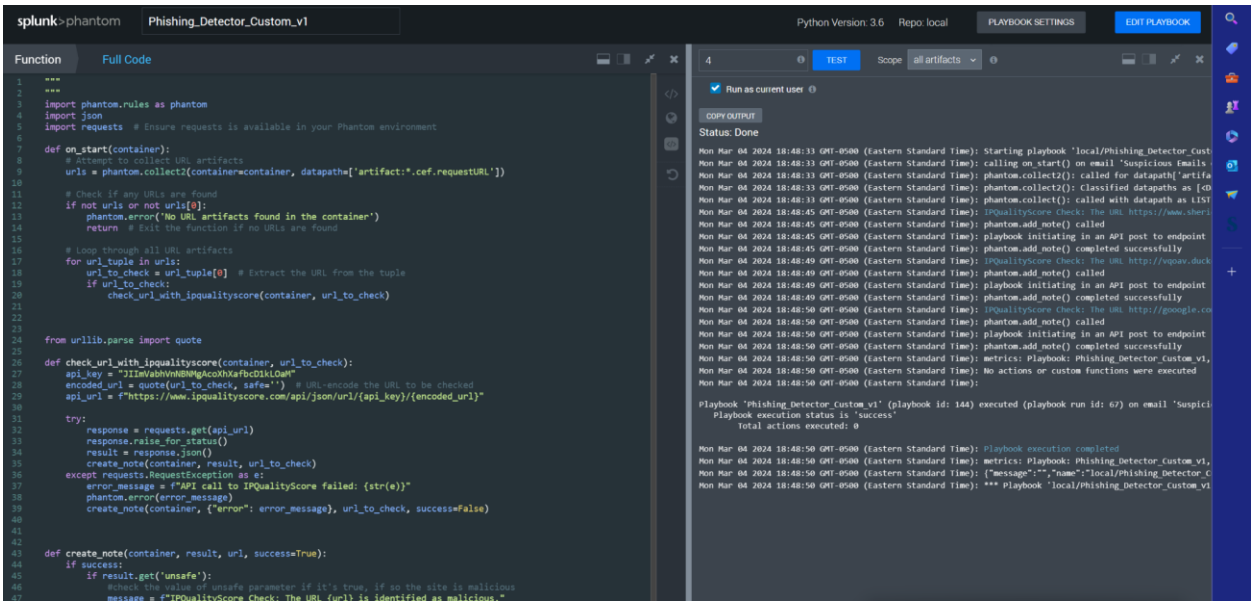
Step 3: Create a playbook named **Phishing_Detector_Custom_v1**

- The purpose is to detect malicious URLs, utilizing integration with the Phishing Initiative domain names database to check for known malicious sites if any event requests match the known URLs (RequestURL CEF). After verifying, it prints out a note to inform whether the URL invoked is safe or not.



Playbook settings for automating malicious URL detections on email, events, generated data

#1: Attempt to collect URL artifacts



The source code and explanation as well as proof of successful execution:

```
import phantom.rules as phantom
import json
import requests  # Ensure requests is available in your Phantom environment

def on_start(container):
    # Attempt to collect URL artifacts
    urls = phantom.collect2(container=container, datapath=['artifact:*.cef.requestURL'])

    # Check if any URLs are found
    if not urls or not urls[0]:
        phantom.error('No URL artifacts found in the container')
        return  # Exit the function if no URLs are found

    # Loop through all URL artifacts
    for url_tuple in urls:
        url_to_check = url_tuple[0]  # Extract the URL from the tuple
        if url_to_check:
            check_url_with_ipqualityscore(container, url_to_check)
```

This part of the code above is designed to execute at the start of a Splunk Phantom playbook when triggered by an event, such as the receipt of an email that needs to be analyzed for potential threats. The primary goal here is to extract URLs from the artifacts associated with the container (e.g., an email or event that the playbook is analyzing) and then check each URL against the IPQualityScore service to assess if any of them are malicious. Here's a step-by-step explanation:

1. **Import Statements:**

· import phantom.rules as phantom: Imports the Phantom module for interacting with the Phantom platform.
· import json: Imports the json module, which could be used for parsing JSON data, although it's not directly used in the provided code snippet.
· import requests: Imports the requests library, which is a popular HTTP library used for making requests to web services.

2. The on_start Function:

· This function is automatically called when the playbook starts. It receives a container parameter, which represents the data context the playbook is working with (e.g., an event, an email, etc.).

3. Collecting URL Artifacts:

· urls = phantom.collect2(container=container, datapath=['artifact:*.cef.requestURL']): This line uses the collect2 method to gather data from the artifacts associated with the container. Specifically, it's looking for data at the path artifact:*.cef.requestURL, which would be URLs extracted from the container's artifacts. The method returns a list of tuples, where each tuple contains data extracted from an artifact.

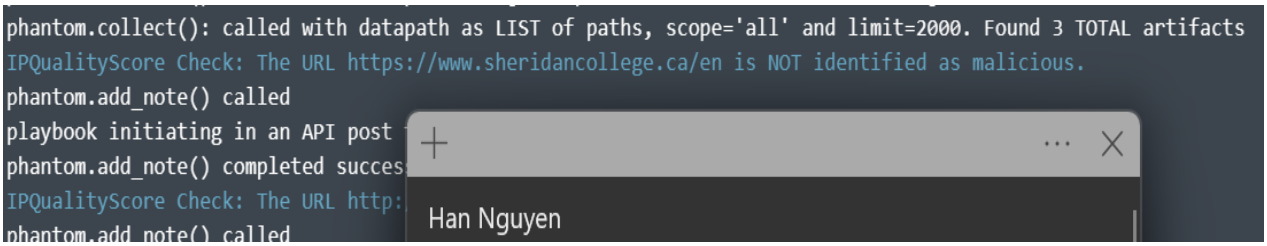
4. Checking for URLs:

· The if not urls or not urls[0]: condition checks if any URLs were found. If urls is empty or the first item in urls is not present, it logs an error (phantom.error('No URL artifacts found in the container')) and exits the function early with return. This is to prevent the rest of the code from executing if no URLs are found.

5. Looping Through URL Artifacts:

· The code then enters a loop for url_tuple in urls: that iterates through each tuple in the urls list. Each tuple represents a URL artifact.
· url_to_check = url_tuple[0]: For each tuple, it extracts the first element (expected to be the URL) and assigns it to url_to_check. The assumption here is that the collect2 method returns a list where each tuple contains at least one item, and that item is the URL to be checked.
· if url_to_check:: Checks if url_to_check is truthy (not an empty string, None, etc.). If so, it proceeds to call check_url_with_ipqualityscore(container, url_to_check), passing the current container and the URL to a function designed to check the URL's safety.

Hence, the result of the execution indicated exactly 3 artifacts we had created:



#2: check_url_with_ipqualityscore API

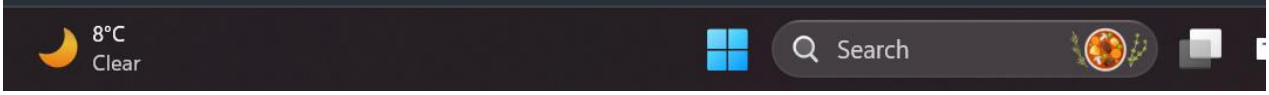
```
23
24    from urllib.parse import quote
25
26    def check_url_with_ipqualityscore(container, url_to_check):
27        api_key = "JIImVabhVnNBNMgAcoXhXafbcD1kLOaM"
28        encoded_url = quote(url_to_check, safe='')  # URL-encode the URL to be checked
29        api_url = f"https://www.ipqualityscore.com/api/json/url/{api_key}/{encoded_url}"
30
31        try:
32            response = requests.get(api_url)
33            response.raise_for_status()
34            result = response.json()
35            create_note(container, result, url_to_check)
36        except requests.RequestException as e:
37            error_message = f"API call to IPQualityScore failed: {str(e)}"
38            phantom.error(error_message)
39            create_note(container, {"error": error_message}, url_to_check, success=False)
40
41
```

This code snippet integrates with the IPQualityScore API to check the safety of a URL in a Splunk Phantom playbook. It encodes the URL to ensure safe transmission, constructs the request with the API key, makes a GET request to the IPQualityScore API, and handles the response or any errors that occur:

1. quote from urllib.parse: Encodes the URL to be checked.
2. Function check_url_with_ipqualityscore: Takes a container and a URL, makes an API call to check the URL's safety, and processes the response.
3. Uses requests.get: Sends a GET request to the IPQualityScore API with the encoded URL.
4. Error Handling: Catches exceptions from the request, logs errors, and creates a note in Phantom for both successful and failed checks.

#3: Create notes based on results from the lookup and showcase findings

```
42
43  def create_note(container, result, url, success=True):
44      if success:
45          if result.get('unsafe'):
46              #check the value of unsafe parameter if it's true, if so the site is malicious
47              message = f"IPQualityScore Check: The URL {url} is identified as malicious."
48          else:
49              message = f"IPQualityScore Check: The URL {url} is NOT identified as malicious."
50      else:
51          message = f"IPQualityScore Check failed to execute. Error: {result.get('error')}"
52
53      phantom.debug(message)
54      phantom.add_note(container=container, note_type='general', title='IPQualityScore Check',
55
56
57  def on_finish(container, summary):
58      phantom.debug('Playbook execution completed')
59
60      return
```



The above create_note function is designed to create a note in a Splunk Phantom container based on the results of a URL safety check performed by the IPQualityScore API:

- Function Parameters: Accepts a container (context for the operation), the API result (result), the URL that was checked, and a success flag indicating if the API call was successful.
- Success Path: If the API call succeeded (success is True), it checks if the result dictionary indicates the URL is unsafe. Based on this, it sets a message indicating whether the URL is malicious.
- Failure Path: If the API call fails (success is False), it constructs a message detailing the failure, using an error message from the result.
- Creating a Note: Uses Phantom's add_note function to add a note to the specified container, containing the constructed message about the URL's safety status.

Resulting Notes: Playbook has correctly identified the quality of 3 RequestURL:

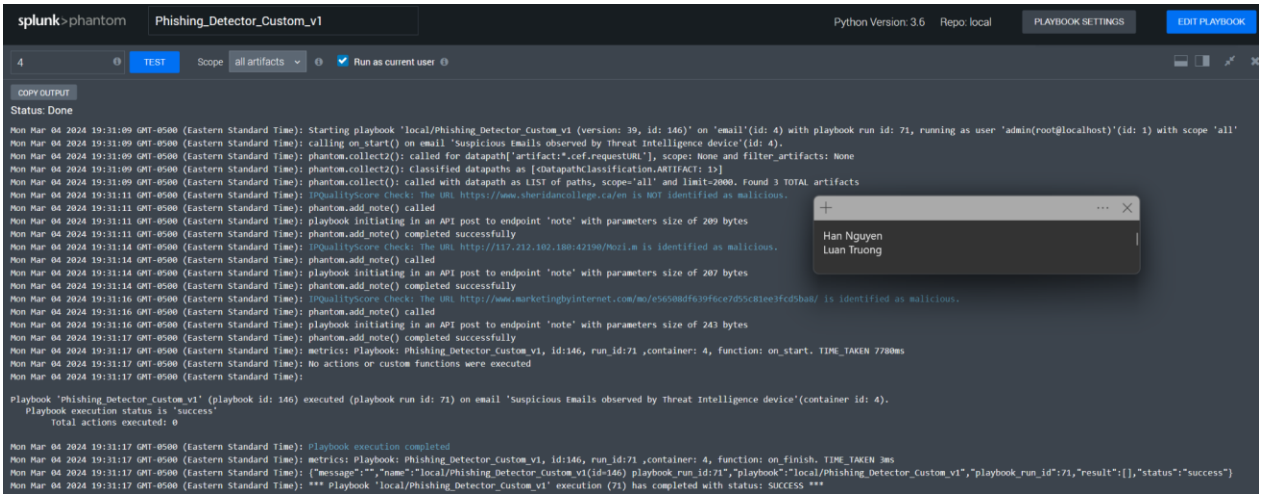
```
phantom.collect(): called with datapath as LIST of paths, scope='all' and limit=2000. Found 3 TO
IPQualityScore Check: The URL https://www.sheridancollege.ca/en is NOT identified as malicious.
phantom.add_note() called
playbook initiating in an API post to endpoint 'note' with parameters size of 209 bytes
phantom.add_note() completed successfully
IPQualityScore Check: The URL http://117.212.102.180:42190/Mozi.m is identified as malicious.
phantom.add_note() called
playbook initiating in an API post to endpoint 'note' with parameters size of 207 bytes
phantom.add_note() completed successfully
IPQualityScore Check: The URL http://www.marketingbyinternet.com/mo/e56508df639f6ce7d55c81ee3fcd
phantom.add_note() called
playbook initiating in an API post to endpoint 'note' with parameters size of 243 bytes
```

The playbook has been successfully finished execution:

```
Playbook 'Phishing_Detector_Custom_v1' (playbook id: 146) executed (playbook run id: 71) on email 'Suspicious Emails observed by Threat Intelligence device'(container id: 4).
   Playbook execution status is 'success'
        Total actions executed: 0
```

```
Playbook execution completed
metrics: Playbook: Phishing_Detector_Custom_v1, id:146, run_id:71 ,container: 4, function: on_finish. TIME_TAKEN 3ms
{"message":"","name":"local/Phishing_Detector_Custom_v1(id=146) playbook_run_id:71","playbook":"local/Phishing_Detector_Custom_v1","playbook_run_id":71,"result":[],"status":"success"}
*** Playbook 'local/Phishing_Detector_Custom_v1' execution (71) has completed with status: SUCCESS ***
```

Full result with timestamps



The full source code:

"""

"""

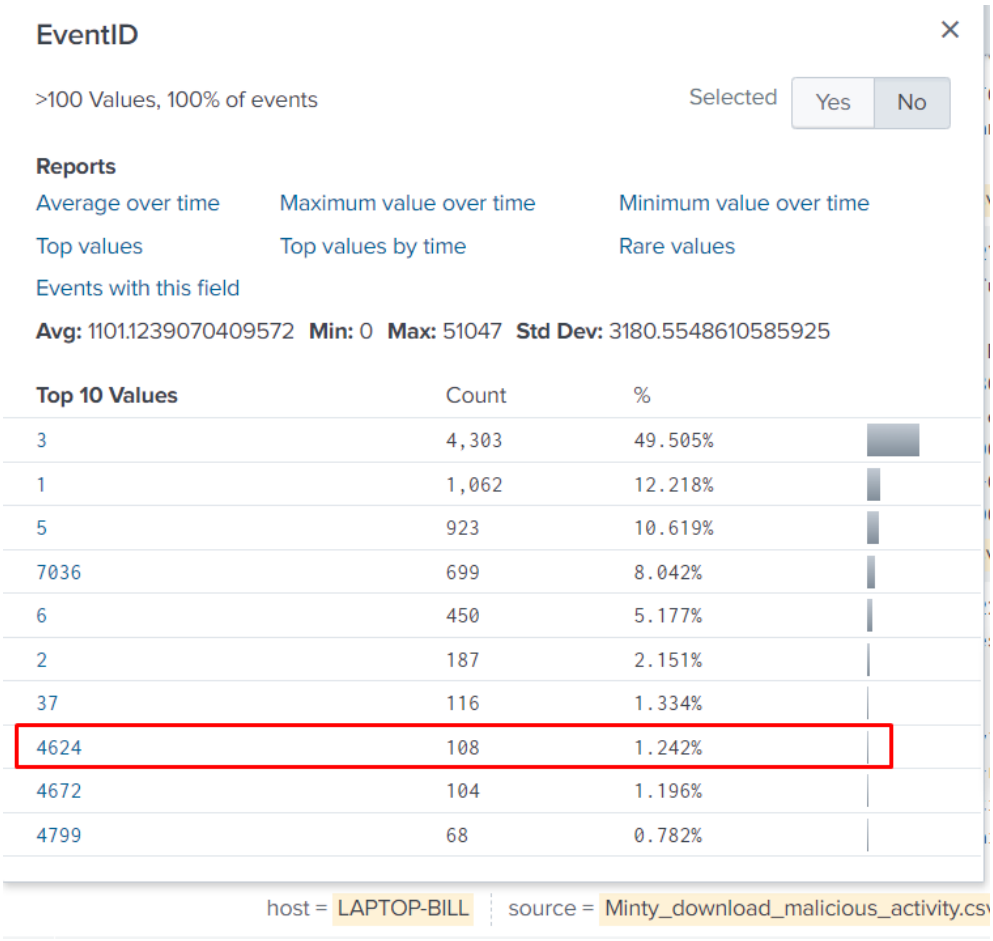
```
import phantom.rules as phantom
import json
import requests  # Ensure requests is available in your Phantom environment

def on_start(container):
    # Attempt to collect URL artifacts
    urls = phantom.collect2(container=container, datapath=['artifact:*.cef.requestURL'])

    # Check if any URLs are found
    if not urls or not urls[0]:
        phantom.error('No URL artifacts found in the container')
        return  # Exit the function if no URLs are found

    # Loop through all URL artifacts
    for url_tuple in urls:
        url_to_check = url_tuple[0]  # Extract the URL from the tuple
        if url_to_check:
            check_url_with_ipqualityscore(container, url_to_check)
```

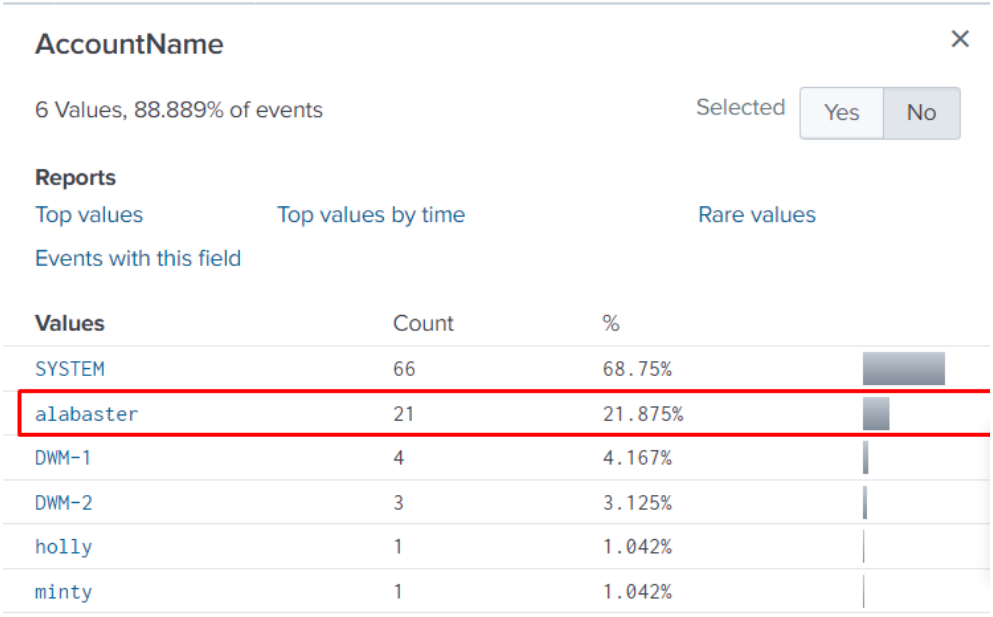
```
from urllib.parse import quote

def check_url_with_ipqualityscore(container, url_to_check):
    api_key = "JIImVabhVnNBNMgAcoXhXafbcD1kLOaM"
    encoded_url = quote(url_to_check, safe='')  # URL-encode the URL to be checked
    api_url = f"https://www.ipqualityscore.com/api/json/url/{api_key}/{encoded_url}"

    try:
        response = requests.get(api_url)
        response.raise_for_status()
        result = response.json()
        create_note(container, result, url_to_check)
    except requests.RequestException as e:
        error_message = f"API call to IPQualityScore failed: {str(e)}"
        phantom.error(error_message)
        create_note(container, {"error": error_message}, url_to_check, success=False)



def create_note(container, result, url, success=True):
    if success:
        if result.get('unsafe'):
            #check the value of unsafe parameter if it's true, if so the site is malicious
            message = f"IPQualityScore Check: The URL {url} is identified as malicious."
        else:
            message = f"IPQualityScore Check: The URL {url} is NOT identified as malicious."
    else:
        message = f"IPQualityScore Check failed to execute. Error: {result.get('error')}"

    phantom.debug(message)
    phantom.add_note(container=container, note_type='general', title='IPQualityScore Check',
content=message)


def on_finish(container, summary):
    phantom.debug('Playbook execution completed')

    return
```

Part 2: Incident Response

1) The attacker pivoted to another workstation using credentials gained from Minty's computer. Which account name was used to pivot to another machine?

Event ID 4624 documents every successful attempt at logging on to a local computer. This event is generated on the computer that was accessed, in other words, where the logon session was created. A related event, Event ID 4625 documents failed logon attempts.

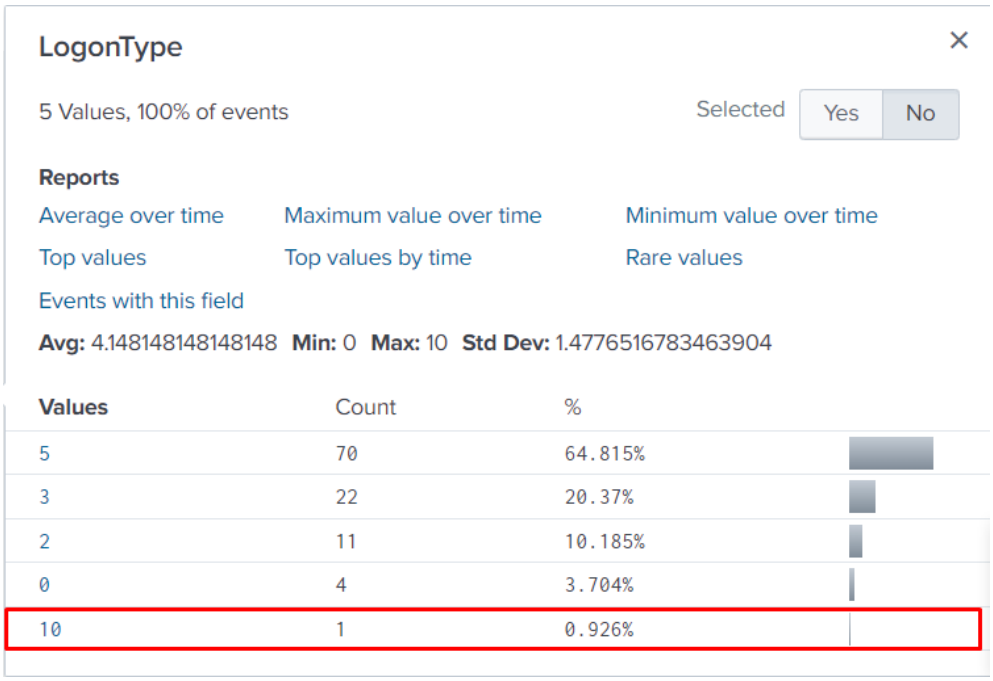


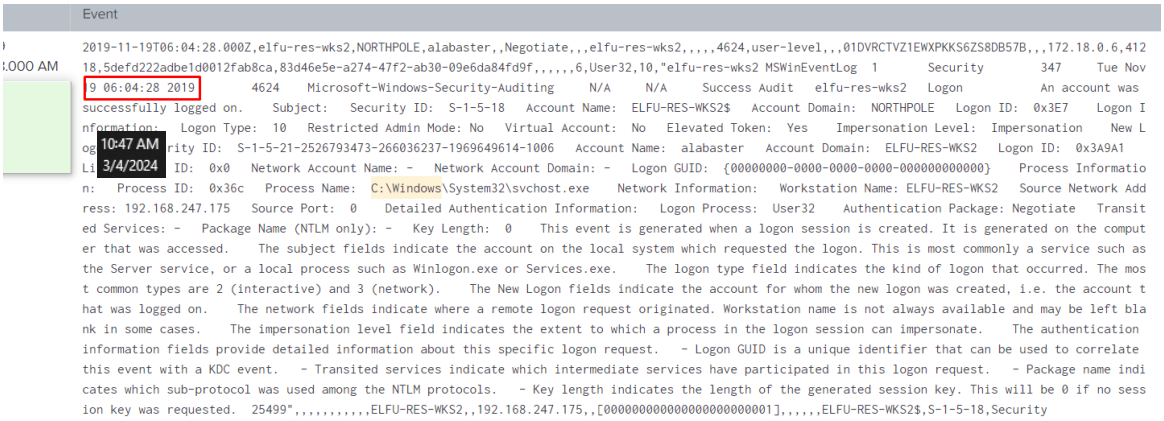


→ **Answer: alabaster**

2) What is the time (HH:MM:SS) the attacker makes a Remote Desktop connection to another machine?

Logon type 10: RemoteInteractive (Terminal Services, Remote Desktop or Remote Assistance)

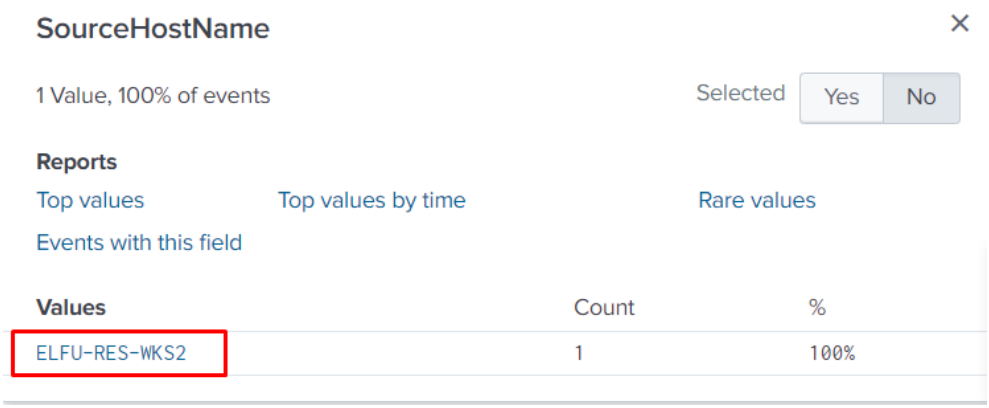




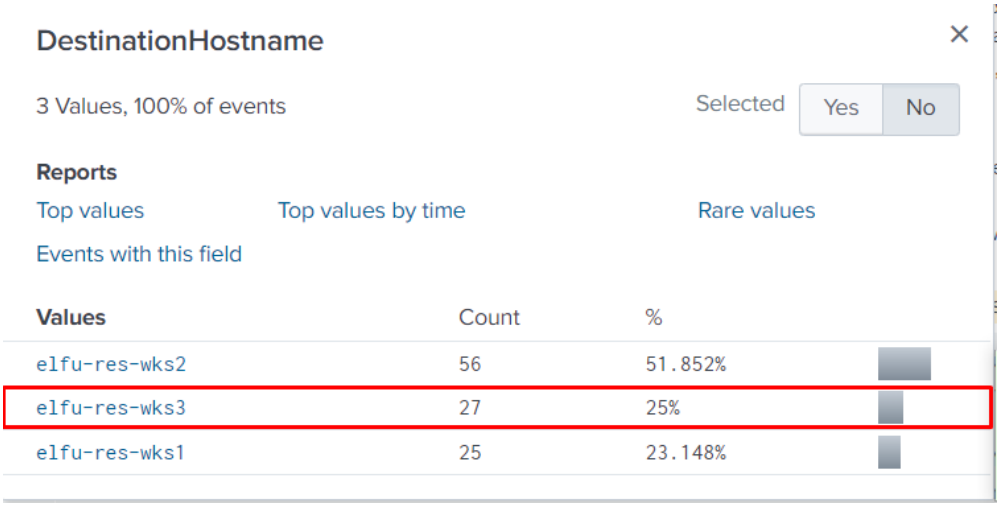
→ **Answer: 06:04:28**

3) The attacker navigates the file system of a third host using their Remote Desktop Connection to the second host. What is the SourceHostName, DestinationHostname, LogonType of this connection?

From the above result, when we navigate to the SourceHostName:



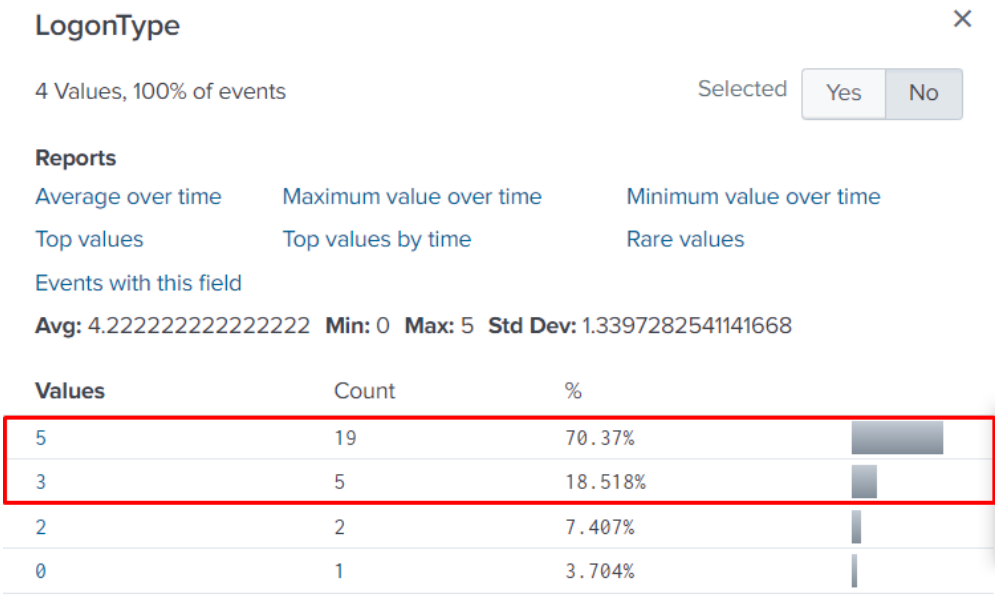
→ **SourceHostName: ELFU-RES-WKS2**



10:52 AM
3/4/2024

We can see there are 3 stations, and the amount of events in station 3 is slightly larger therefore we investigate station 3.

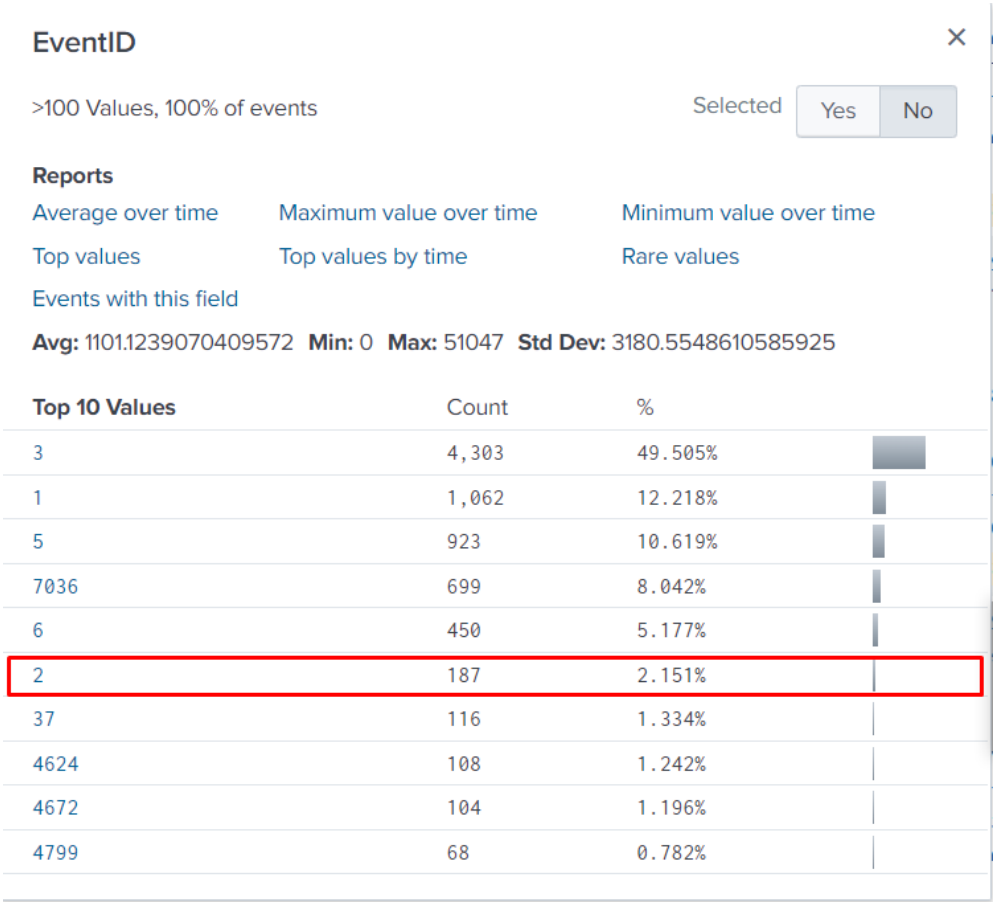
Logon type 3: Network (i.e. connection to a shared folder on this computer from elsewhere on the network). Since Logon type 5 is Service (Service startup). Therefore, we are going with type 3 and we can see the successful network authentication for this with event id 4624 and logon type 3.



10:52 AM
3/4/2024

→ **DestinationHostName: ELFU-RES-WKS3**
→ **LogonType: 3**

4) What is the full-path + filename of the secret research document after being transferred from the third host to the second host?



EventID

>100 Values, 100% of events

Selected Yes No

Reports

Average over time | Maximum value over time | Minimum value over time

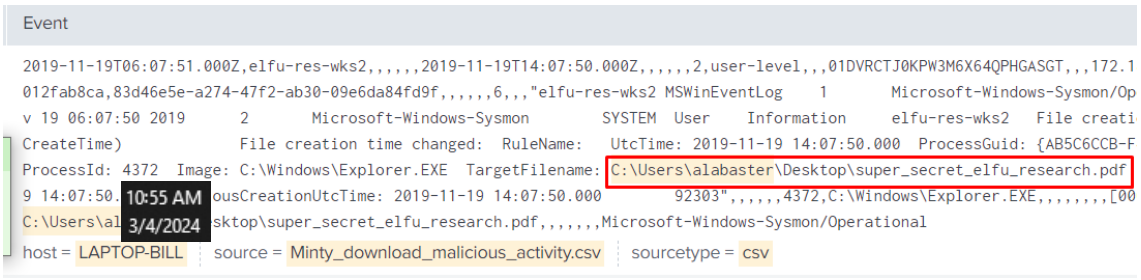
Top values | Top values by time | Rare values

Events with this field

Avg: 1101.1239070409572 **Min:** 0 **Max:** 51047 **Std Dev:** 3180.5548610585925

Top 10 Values	Count	%
3	4,303	49.505%
1	1,062	12.218%
5	923	10.619%
7036	699	8.042%
6	450	5.177%
2	187	2.151%
37	116	1.334%
4624	108	1.242%
4672	104	1.196%
4799	68	0.782%

10:55 AM
3/4/2024



Event

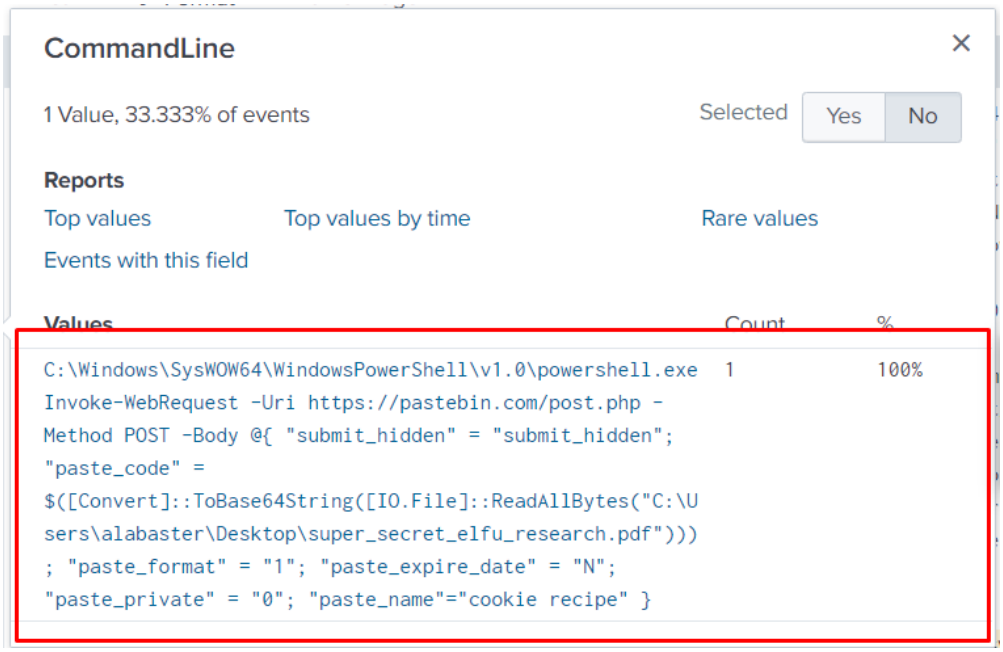
2019-11-19T06:07:51.000Z,elfu-res-wks2,,,,,,2019-11-19T14:07:50.000Z,,,,,,2,user-level,,,01DVRCTJ0KPW3M6X64QPHGASGT,,,172.1
012fab8ca,83d46e5e-a274-47f2-ab30-09e6da84fd9f,,,,,,6,,,"elfu-res-wks2 MSWinEventLog 1 Microsoft-Windows-Sysmon/Op
v 19 06:07:50 2019 2 Microsoft-Windows-Sysmon SYSTEM User Information elfu-res-wks2 File creati
CreateTime) File creation time changed: RuleName: UtcTime: 2019-11-19 14:07:50.000 ProcessGuid: {AB5C6CCB-F
ProcessId: 4372 Image: C:\Windows\Explorer.EXE TargetFilename: C:\Users\alabaster\Desktop\super_secret_elfu_research.pdf
9 14:07:50. 10:55 AM ousCreationUtcTime: 2019-11-19 14:07:50.000 92303",,,,,,4372,C:\Windows\Explorer.EXE,,,,,,,,[00
C:\Users\al 3/4/2024 sktop\super_secret_elfu_research.pdf,,,,,,,Microsoft-Windows-Sysmon/Operational

host = LAPTOP-BILL | source = Minty_download_malicious_activity.csv | sourcetype = csv

Because we have already known the attacker is alabaster and the station is 2, we can easily filter with the eventID 2 which is the change file creation time event registered when a file creation time is explicitly modified by a process. This event helps to track the real creation time of a file. Attackers may change the file creation time of a backdoor to make it look like it was installed with the operating system.

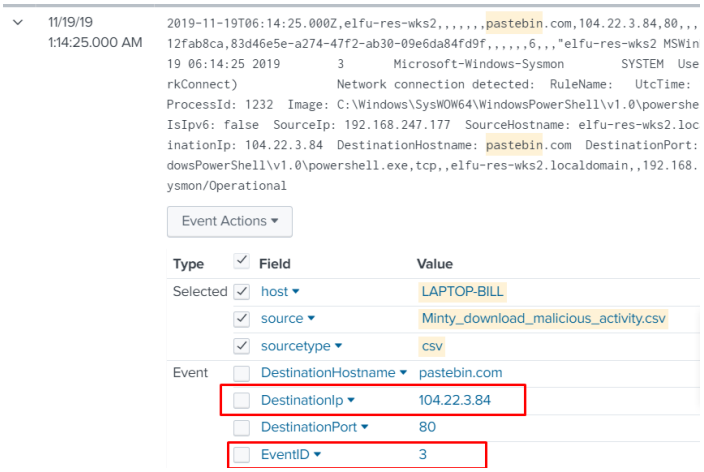
→ **Answer: C:\Users\alabaster\Desktop\super_secret_elfu_research.pdf**

5) What is the IPv4 address (as found in logs) the secret research document was exfiltrated to?



11:01 AM
3/4/2024

From the CommandLine, we can see the attacker using Powershell which creates a networking event to pastebin domain. When we search pastepin, we can find the Destination IP address.



11:01 AM
3/4/2024

→ **Answer: 104.22.3.84**