



Richard M. Okhai

Technical Portfolio

Cybersecurity | Data Science | Technology & Engineering



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Summary

Sourcing and utilizing systems data in cybersecurity is becoming more popular as technology grows to become more sophisticated.

With modernization of security solutions, enhanced with powerful capabilities to draw an in-depth mathematical analysis of a security event with KPI's to gauge the effectiveness of the overall process for continuous and proactive security hygiene.

This portfolio has been designed to outline similar process with homegrown program written in Python and some sample dataset:

Threat Hunt and Malware Analysis: “Homegrown Python Program”

- Dataset: Firewall and proxy block event report.
- Objective: Combating persistent common ICT threats on managed host.
- Solution: Detective/investigative control process.


Process Automation – Host Discovery Scan and Risk Assessment

- Dataset: Quarterly scan results of network boundary.
- Objective: Risk assessment for host with misconfiguration and open ports.
- Solution: Technical/administrative control process.

Competitive Intelligence – Supply Chain & Program Modernization

- Dataset: Kaggle.
- Objective: Supply chain product for sales prediction.
- Solution: Sales prediction program.

Domain 1: Cybersecurity/Information Security

- Incident Response and Malware Analysis:
 - Threat-Hunt Tool:
 - Scenario: Detect & respond to a phishing attack.
 - Action Plan: Correlate a persistent “Blocked” traffic of a security event on a known endpoint.
 - Validation: Utilize global threat intelligence | Utilize KPI to preview malware event overtime.
 - Continuous Monitoring: Preview news update artifacts for news article pertaining to IOC.
 - Process Automation – Cybersecurity:
 - Host Discovery Scan and Risk Assessment Tool:
 - Scenario: OS fingerprint and vulnerable port identification.
 - Action Plan: NMAP scan of network boundary.
 - Continuous Monitoring: Dashboard of quarterly risk overview.
- 



1.0: Incident Response & Malware Forensics

```
[Threat Hunt - Detection and Analysis]

User Interactive Mode

Quick Hunt Category:

[0]: Threat Event Correlation Database ← Detect
[1]: Detection Over 90 Days by Malware Category
[2]: Top 5 Most-Recent Detection by Malware Category
[3]: Global Threat Hunt (i.e. Common ICT Threats)
[4]: Global URL Verdict (i.e. Threat Intelligence Info Gathering) ↓ Global Threat Intel - Validation
[5]: IOC Data Retention
[6]: Image Forensics (i.e. JPG, PNG)
[7]: Threat Event Dashboard ← Malware event overtime - KPI
[8]: Cybersecurity News Artifacts ↑ Artifacts from news article

Enter ':q' to quit

Select Category (e.g., 0) or ':q' to terminate session: |
```

Objective: Daily proxy report shows a persistent threat on a host from a previous security event from a firewall detection.

IOC Retained: IP Address & URL.

1.1: Incident Response & Malware Forensics

```
User Interactive Mode

Quick Hunt Category:
[0]: Threat Event Correlation Database ← IOC Correlation from Proxy Event
[1]: Detection Over 90 Days by Malware Category
[2]: Top 5 Most-Recent Detection by Malware Category
[3]: Global Threat Hunt (i.e. Common ICT Threats)
[4]: Global URL Verdict (i.e. Threat Intelligence Info Gathering)
[5]: IOC Data Retention
[6]: Image Forensics (i.e. JPG, PNG)
[7]: Threat Event Dashboard
[8]: Cybersecurity News Artifacts

Enter ':q' to quit

Select Category (e.g., 0) or ':q' to terminate session: 0

IOC Database Tailored to Threat-Hunt Process for diverse use-case.
Information Contained is retained in Database.
Dataset include but not limited to:
- Proxy Event Report.
- Email Threat Detection Report
- Firewall Sinkhole Report
Enter IOC Value to lookup in Database (e.g., email@secureline.com): https://www.polyfill.io/

You have hit a match ← IOC Match found with similar IOC with 20 offense count

IOC_Type      IOC_Value      Date_Detected      Description      Severity_Level      Offense_Count
Malware_Category
CnC           URL            https://www.polyfill.io/  2024-02-17      Blocked proxy event      Medium            20
```

- **Action Plan** – Correlate IOC from proxy with IOC Database for previous event detected.
- **Provided IOC:** URL.
- **Provided Source:** Proxy Daily Report.

1.2: Incident Response & Malware Forensics

```
Quick Hunt Category:
[0]: Threat Event Correlation Database ← IOC correlation with IP from proxy event
[1]: Detection Over 90 Days by Malware Category
[2]: Top 5 Most-Recent Detection by Malware Category
[3]: Global Threat Hunt (i.e. Common ICT Threats)
[4]: Global URL Verdict (i.e. Threat Intelligence Info Gathering)
[5]: IOC Data Retention
[6]: Image Forensics (i.e. JPG, PNG)
[7]: Threat Event Dashboard
[8]: Cybersecurity News Artifacts

Enter ':q' to quit

Select Category (e.g., 0) or ':q' to terminate session: 0

IOC Database Tailored to Threat-Hunt Process for diverse use-case.
Information Contained is retained in Database.
Dataset include but not limited to:
- Proxy Event Report.
- Email Threat Detection Report
- Firewall Sinkhole Report
Enter IOC Value to lookup in Database (e.g., email@secureline.com): 10.30.4.1 ← IOC Value

You have hit a match Match criteria from a CnC event from a firewall report on 02/17

Malware_Category  IOC_Type  IOC_Value  Date_Detected  Description  Severity_Level  Offense_Count
CnC               IP Address 10.30.4.1   2024-02-17 00:00:00  CnC Detection  Critical        5
```

- **Further Action Plan:** Correlation of destination IP address from proxy event with IOC Database.
- **IOC Type:** IP address

1.3: Incident Response & Malware Forensics

```
PS C:\Users\Richard Mahmud Okhai\Desktop\Cybersecurity & Data Science\Personal Capstone\Threat Hunt>
[Threat Hunt - Detection and Analysis]

User Interactive Mode

Quick Hunt Category:

[0]: Threat Event Correlation Database
[1]: Detection Over 90 Days by Malware Category
[2]: Top 5 Most-Recent Detection by Malware Category
[3]: Global Threat Hunt (i.e. Common ICT Threats)
[4]: Global URL Verdict (i.e. Threat Intelligence Info Gathering)
[5]: IOC Data Retention
[6]: Image Forensics (i.e. JPG, PNG)
[7]: Threat Event Dashboard
[8]: Cybersecurity News Artifacts

Enter ':q' to quit

Select Category (e.g., 0) or ':q' to terminate session: 4
Please enter the URL to scan: https://www.polyfill.io/
Boolean expression: False equals to No
"URL is not clean"

Clean Verdict: False
Viruses Found: None
Website Response Code: 0
Threat Type: UnableToConnect
```

Verdict: After analyzing the PCAP data. It was seen in most host running an obsolete version of Mozilla Firefox with the JS Framework embedded into these versions of Mozilla Firefox(s).

Correlation with Global Threat Intelligence: Shows result as False (Clean? “No”).

1.4: Incident Response & Malware Forensics

- **Dashboard Report Analysis:** Top 10 Detection Overview | Event Correlation: None existent.

Select Category (e.g., 0) or ':q' to terminate session: 7

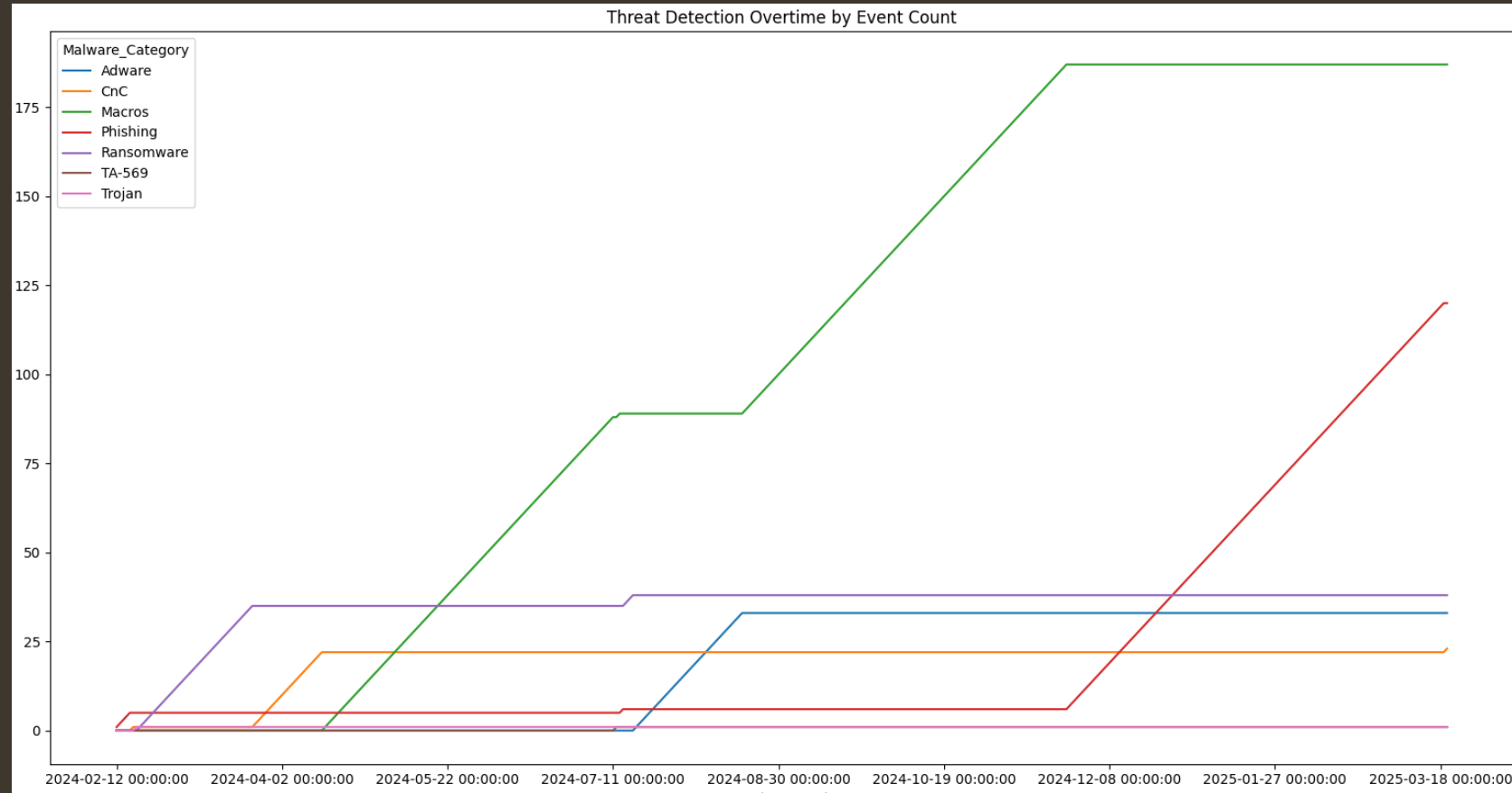
[Local Threat Hunt Report]

Timestamp: 2024-06-28 16:10:47.103834

Threat Overview - Top 10 Detection by Event Count

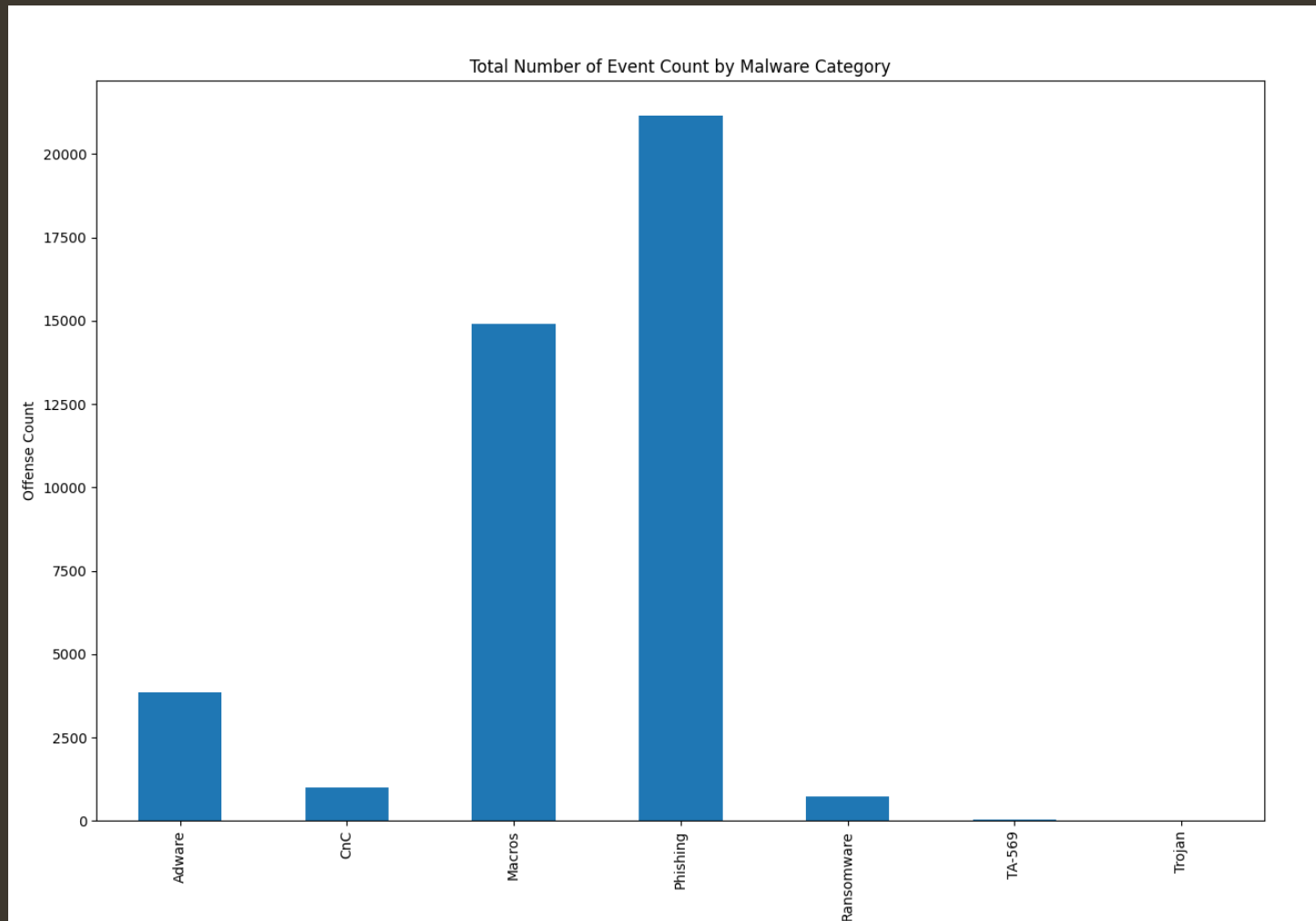
Malware_Category	IOC_Type	IOC_Value	Date_Detected	Description	Severity_Level	Offense_Count
Phishing	URL	druknr1.pl	2025-02-11 00:00:00	Known phishing domain	Medium	640
Phishing	URL	breakthroughenergy.org	2025-02-04 00:00:00	Known phishing domain	Medium	640
Phishing	URL	shellbefehe.de	2025-01-18 00:00:00	Known phishing domain	Medium	640
Phishing	URL	linius.com	2025-01-11 00:00:00	Known phishing domain	Medium	640
Phishing	URL	pharmacie-hanbury.voila.net	2024-12-25 00:00:00	Known phishing domain	Medium	640
Phishing	URL	prep.ac.th/	2024-12-18 00:00:00	Known phishing domain	Medium	640
Phishing	URL	akopos.lt	2024-12-01 00:00:00	Known phishing domain	Medium	640
Phishing	URL	picayunekatrina.blogspot.com/	2025-01-31 00:00:00	Known phishing domain	Medium	576
Phishing	URL	jimmowrer.net	2025-01-30 00:00:00	Known phishing domain	Medium	576
Phishing	URL	ec2-3-8-141-80.eu-west-2.compute.amazonaws.com	2025-01-29 00:00:00	Known phishing domain	Medium	576

1.5: Incident Response & Malware Forensics



- **Dashboard Report Analysis:** Threat Detection Assessment Overtime by Event Count.

1.5: Incident Response & Malware Forensics



- **Dashboard Report Analysis:** Total Number of Event Count by Malware Category.

1.6: Incident Response & Malware Forensics

- **Continuous Monitoring:** News Article Correlation to Help Event Verdict

Select Category (e.g., 0) or ':q' to terminate session: 8

Provide Newsfeed Category to review: ['Phishing email', 'Cyber breach', 'Ransomware', 'Cybersecurity', 'Social Engineering']
Newsfeed Category: Phishing email

Newsfeed based on Phishing email

Source	Description	Artifacts	Web URL	Published Date
The New York Times	A new book by Scott J. Shapiro, a law and phil...	Don't let the adorable title fool you: As Scot...	https://www.nytimes.com/2023/05/31/books/revie...	2023-05-31
The New York Times	Young artists say they often receive offers by...	Many young artists survive their early careers...	https://www.nytimes.com/2023/03/17/arts/artist...	2023-03-17
The New York Times	A woman's fiancé wants to drag her along. Must...	Rachel writes: My fiancé, Steve, wants me to g...	https://www.nytimes.com/2022/06/23/magazine/ju...	2022-06-23
The New York Times	As pandemic-related scams rise, experts say co...	LONDON – The email from the payroll department...	https://www.nytimes.com/2021/05/13/world/europ...	2021-05-13
The New York Times	The technology giant also confirmed reports th...	WASHINGTON – Chinese hackers are targeting the...	https://www.nytimes.com/2020/06/04/us/politics...	2020-06-04
The New York Times	“Facebook users understood that they had to gi...	Turning Point: Cambridge Analytica, a politica...	https://www.nytimes.com/2018/12/06/opinion/mag...	2018-12-06
The New York Times	Scammers constantly change their tactics to tr...	Q. I got a message asking me to verify a new D...	https://www.nytimes.com/2017/09/14/technology/...	2017-09-14
The New York Times	The band just completed a 13-show run in New Y...	The Popcast is hosted by Jon Caramanica, a pop...	https://www.nytimes.com/2017/08/11/arts/music/...	2017-08-11
The New York Times	Recipients who clicked on the email and follow...	Google said it was investigating an email scam...	https://www.nytimes.com/2017/05/03/technology/...	2017-05-04
The New York Times	Fake messages claiming to be from Amazon are o...	Q. I got an email from Amazon for something I ...	https://www.nytimes.com/2016/11/29/technology/...	2016-11-29

References

Reference Article: <https://www.nytimes.com/2017/09/14/technology/personaltech/spotting-the-phish-in-a-sea-of-email.html>
Reference Article: <https://www.nytimes.com/2021/05/13/world/europe/phishing-test-covid-bonus.html>
Reference Article: <https://www.nytimes.com/2016/11/29/technology/personaltech/skip-the-phish-on-the-menu.html>
Reference Article: <https://www.nytimes.com/2017/05/03/technology/personaltech/email-attack-hits-google-what-to-do-if-you-clicked.html>
Reference Article: <https://www.nytimes.com/2018/12/06/opinion/maggie-shen-king-the-big-phish.html>
Reference Article: <https://www.nytimes.com/2017/08/11/arts/music/popcast-phish-bakers-dozen.html>
Reference Article: <https://www.nytimes.com/2023/05/31/books/review/fancy-bear-goes-phishing-scott-shapiro.html>
Reference Article: <https://www.nytimes.com/2022/06/23/magazine/judge-john-hodgman-on-phish-shows.html>
Reference Article: <https://www.nytimes.com/2023/03/17/arts/artist-email-scam.html>
Reference Article: <https://www.nytimes.com/2020/06/04/us/politics/china-joe-biden-hackers.html>

1.7: Process Automation – Cybersecurity

```
PS C:\Users\Richard Mahmud Okhai\Desktop\Cybersecurity & Data Science\Personal Capstone\Host Discovery_Risk Assessment>
Disclaimer Message: The process you are about to initiate requires a formal approval from the Asset Owner.
Initiating this scan without a formal approval is a violation of The U.S. Computer Fraud and Abuse Act.

-----
Active Status ...
2024-07-02 21:03:27.942073

-----
Host Discovery Scan & Risk Assessment

[Selection Category]

0: Network Scan      Action Plan: OS Fingerprint and Open Port network scan
1: Dashboard - Network Scan
2: Web Scan/Scraper
3: Dashboard - Web Scan
4: CISA Vulnerability Catalog

-----
Select Category (e.g., 0) or ':q' to quit: 0

Select Quarter Cycle (e.g., Q1, Q2, Q3, Q4): Q2

Enter IP address or subnet (e.g., 192.168.1.0/24): 10.10.10.59

Enter Nmap scan option [e.g., -sP]: -O

Select Scan Speed [e.g., -T4 for faster scans]: -T4

Running command: nmap -O -T4 10.10.10.59

-----
Scan Completed
Result Saved Successfully..      Scan completed and result retained successfully


-----
Select Category (e.g., 0) or ':q' to quit:
```


- Objective: Host discovery scan and risk assessment.
- Ad-hoc Scan: OS Fingerprint.
 - Risk Assessed:
 - Open Ports.
 - Misconfiguration(s).
 - Vulnerabilities.


1.8: Process Automation – Cybersecurity


- **Action Plan:** Assess risk with open port and OS fingerprint information:
- **Discovery/Findings:** OS Version & Open Port.
 - **Vulnerable Justification:** After manual test, some services were discovered to be utilizing default credentials.

Hostname	OS	Open_Ports	Date_Scanned	Vulnerable	Not_Vulnerable
192.168.1.10	Microsoft Windows 10	135/tcp, 139/tcp, 445/tcp	2024-07-02	Yes	No


 IP of Host
Scanned

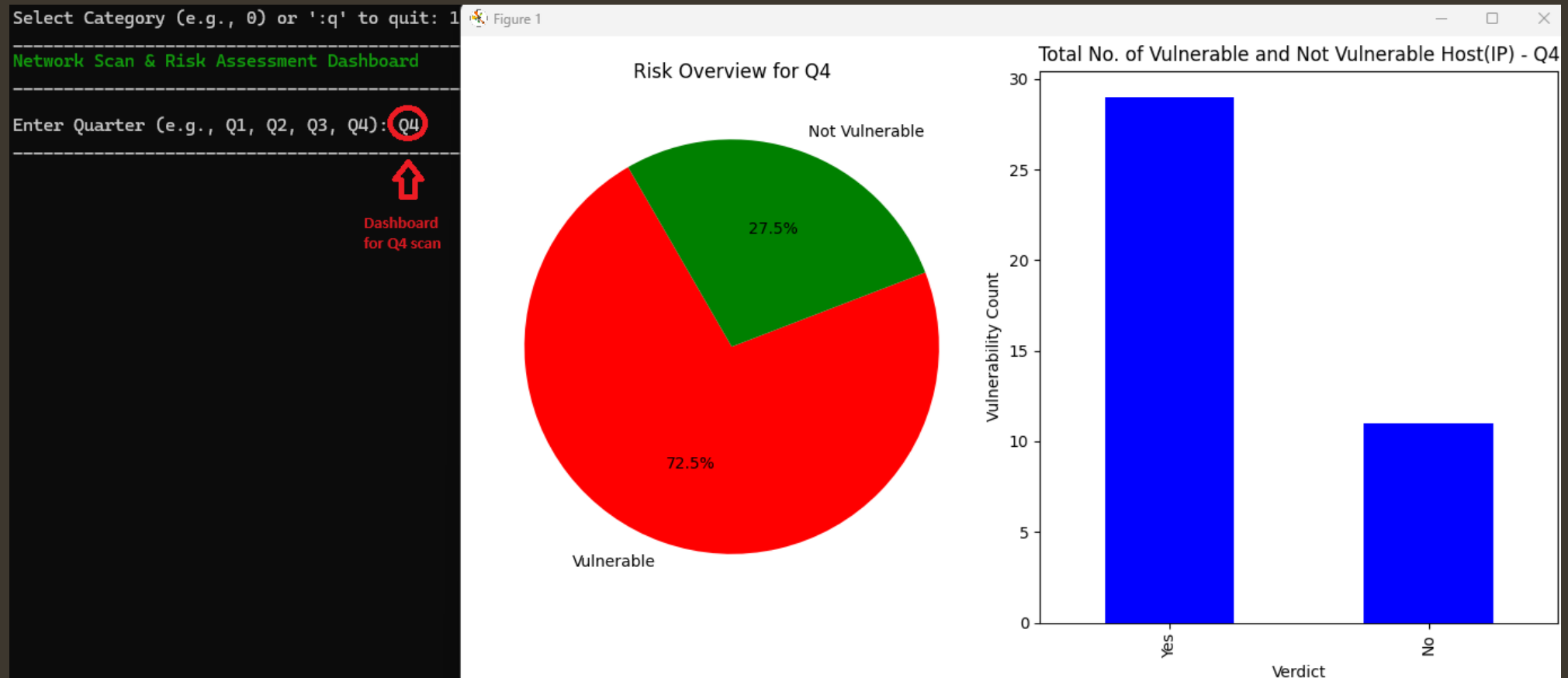

 OS Version


 Open Ports


 Date Scanned

1.9: Process Automation – Cybersecurity

- Risk Assessment Dashboard for Process Evaluation:



Domain 2: Supply Chain Optimization

- **Data Science:**
 - Objective: Movie App Automation:
 - Business | Use Case: Address customer movie request latency issue.
 - Automation Task: Implement a BOT to retrieve list of movies by search criteria from Movie Database.
 - Resolution: Process/App modernization and API request limit threshold modification.

2.3: Movie App Automation

- **Problem:** Reported latency previewing movie genre based on search criteria.
- Data Science & Security Team Investigated
 - Cause of Action: Security Due Diligence.
 - Justification: API Key blacklisted by third-party web application due to API request.
 - Resolution: Request timeout enacted.
- Data Science Team
 - Cause of Action: App Modernization.
 - Justification: BOT assistance with new request delay and query limits.
 - Resolution: API data-integration into an automated engine, as a compressed list that provides movie info to viewers based on search criteria.

2.4: Movie App Automation - Cybersecurity

- **API Security:**
 - .ENV Hardcoded into App without revealing API Key to the public.

```
# Set environment variables from the .env in the local environment
load_dotenv()
nyt_api_key = os.getenv("NYT_API_KEY")
tmdb_api_key = os.getenv("TMDB_API_KEY")
type(nyt_api_key)
type(tmdb_api_key)
```


2.5: Movie App Automation - Cybersecurity

- Twelve second interval hard-coded into program
 - Twelve seconds delay API Request:

```
response = requests.get(reqst_url)
# Add a twelve second interval between queries to stay within API query limits
time.sleep(12)
# Try and save the reviews to the reviews_list
```

- Request Counter for 50 Requests:

```
#Enumerate method utilized for request counter
for idx, title in enumerate(title_db):
    if idx % 50 == 0 and idx != 0:
        time.sleep(50)
```

2.6: Movie App Automation – Data Science

- **Program Modernization:** Bot feature with new request delay.
 - **Movie search, based on keyword and search criteria:**
 - Product Test: Romantic movie search query.

Before:

```
[
  {
    "title": "The Attachment Diaries",
    "genres": [
      "Drama",
      "Mystery",
      "Thriller",
      "Horror"
    ],
    "languages": [
      "Spanish"
    ],
    "countries": [
      "Argentina"
    ],
    "release_date": "2021-10-07",
    "runtime": 102,
    "vote_average": 3.0,
    "vote_count": 4
  },
  {
    "title": "What",
    "genres": [],
    "languages": [],
    "countries": [],
    ...
    "vote_average": 6.3,
    "vote_count": 193
  }
]
```

After:

```
Found movie The Attachment Diaries
Found movie What
Found movie You Can Live Forever
Found movie A Tourist
Found movie Other People
Found movie One True Loves
Found movie The Lost Weekend: A Love Story
Found movie A Thousand and One
Found movie Your Place or Mine
Found movie Love in the Time of Fentanyl
Found movie Pamela, a Love Story
Found movie In From the Side
Found movie After Love
Found movie Alcarràs
Found movie Nelly & Nadine
Found movie Lady Chatterley
Found movie The Sound of Christmas
Found movie The Inspection
Found movie Bones and All
Found movie My Policeman
Found movie About Fate
Found movie Waiting for Bojangles
Found movie I Love My Dad
Found movie A Love Song
Found movie Alone Together
...
Found movie The Ottoman Lieutenant
Found movie Love & Taxes
Found movie Everybody Loves Somebody,
Found movie Kedi,
```

Domain 3: KeyVault (In Development)

- **Credential Management:**
 - Objective: Secure/cost effective approach to credential management:
 - Business | Use Case: Approach to Zero Trust Architecture.
 - Automation Task: Application Development.
 - Resolution: Python script | Database (MySQL) | Azure Infrastructure.

2.7: Save Credentials

- Credentials Saved in a database table.

```
-----
Active Status: 2024-07-21 11:52:56
-----

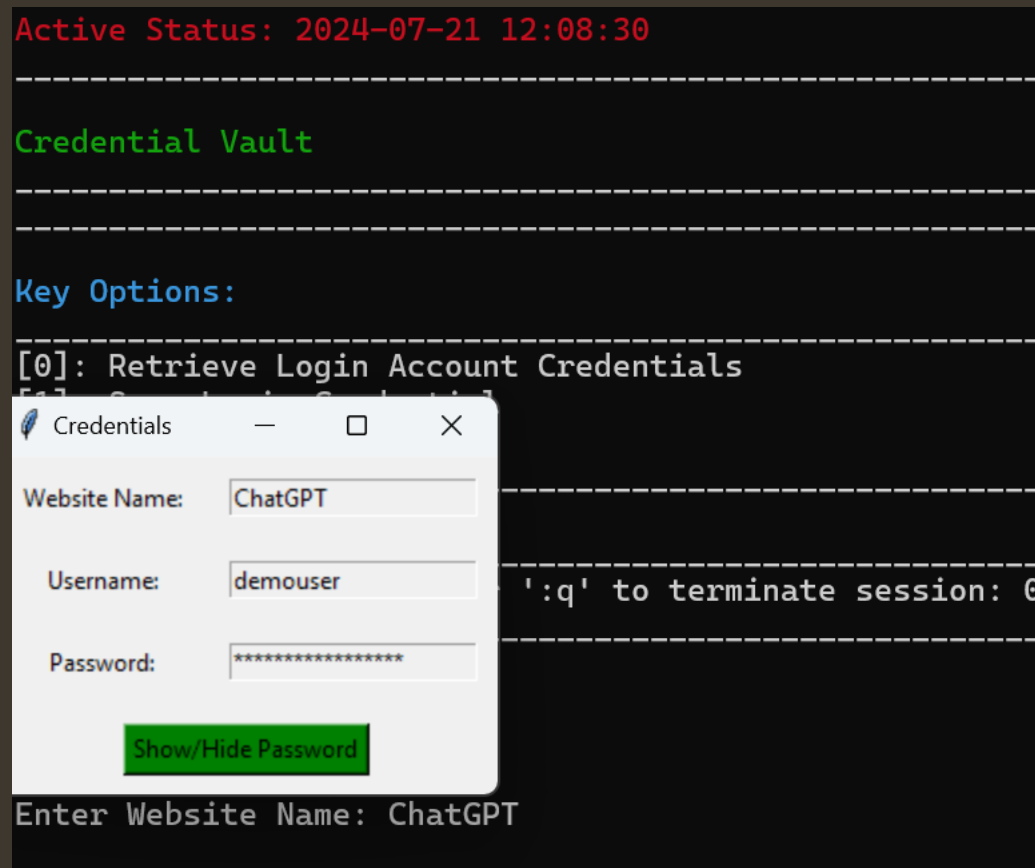
Credential Vault
-----

Key Options:
-----
[0]: Retrieve Login Account Credentials
[1]: Save Login Credential
[2]: Generate Password
-----
Enter ':q' to quit
-----
Select Option (e.g., 0) or ':q' to terminate session: 1
-----
Enter Website Name (or ':q' to quit): ChatGPT
Enter Username (or ':q' to quit): demouser
Enter Password (or ':q' to quit): notsecurepassword
Credential Logged
-----

Key Options:
-----
[0]: Retrieve Login Account Credentials
[1]: Save Login Credential
[2]: Generate Password
-----
Enter ':q' to quit
-----
Select Option (e.g., 0) or ':q' to terminate session: |
```

2.8: Retrieve Credentials

- Credential Utilized in next login.



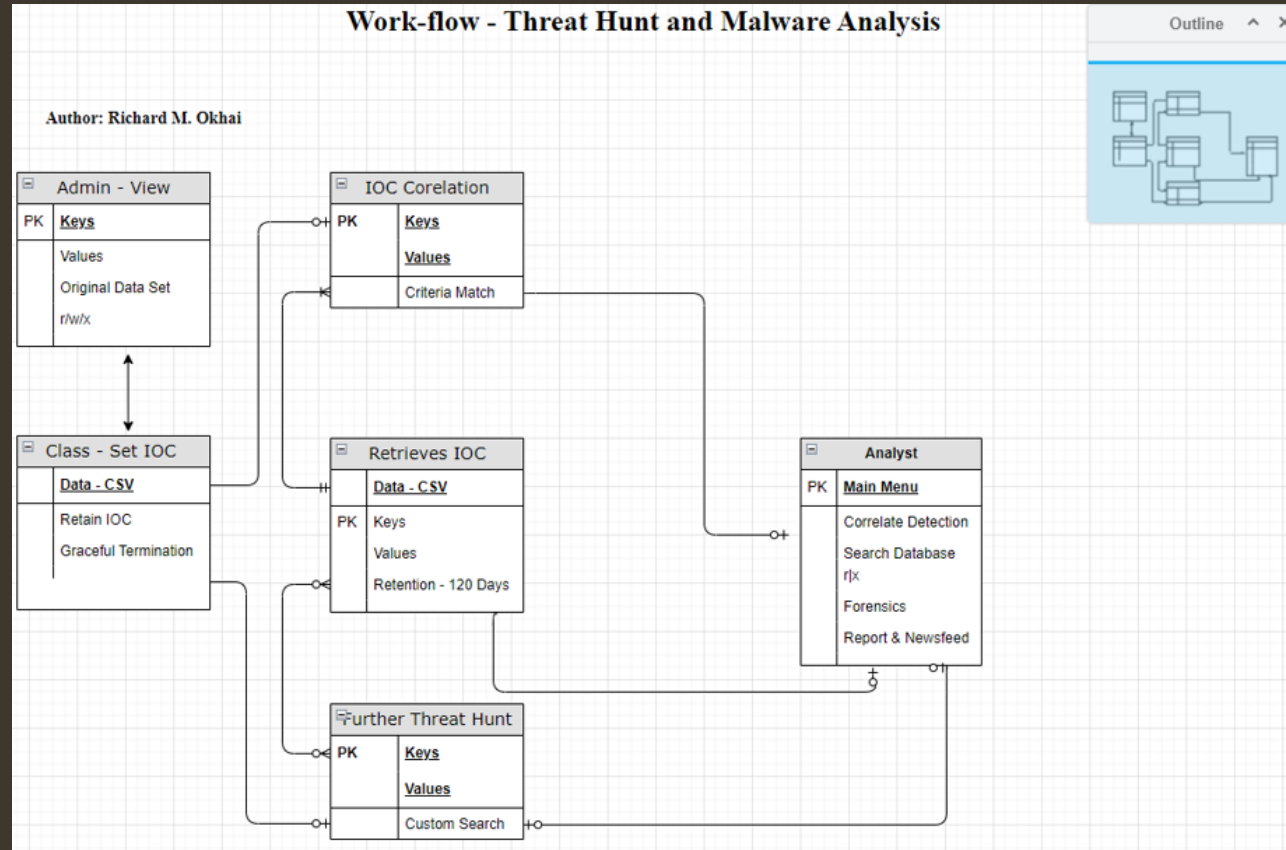
2.9: Generate Credentials

- Generate Credentials on a website for future login.

```
Active Status: 2024-07-21 12:12:00
-----
Credential Vault
-----
Key Options:
-----
[0]: Retrieve Login Account Credentials
[1]: Save Login Credential
[2]: Generate Password
-----
Enter ':q' to quit
-----
Select Option (e.g., 0) or ':q' to terminate session: 2
-----
Enter length of password (i.e., 7): 10
Generated Password: q\tgN'se*q
-----
Key Options:
-----
[0]: Retrieve Login Account Credentials
[1]: Save Login Credential
[2]: Generate Password
-----
Enter ':q' to quit
-----
Select Option (e.g., 0) or ':q' to terminate session: |
```

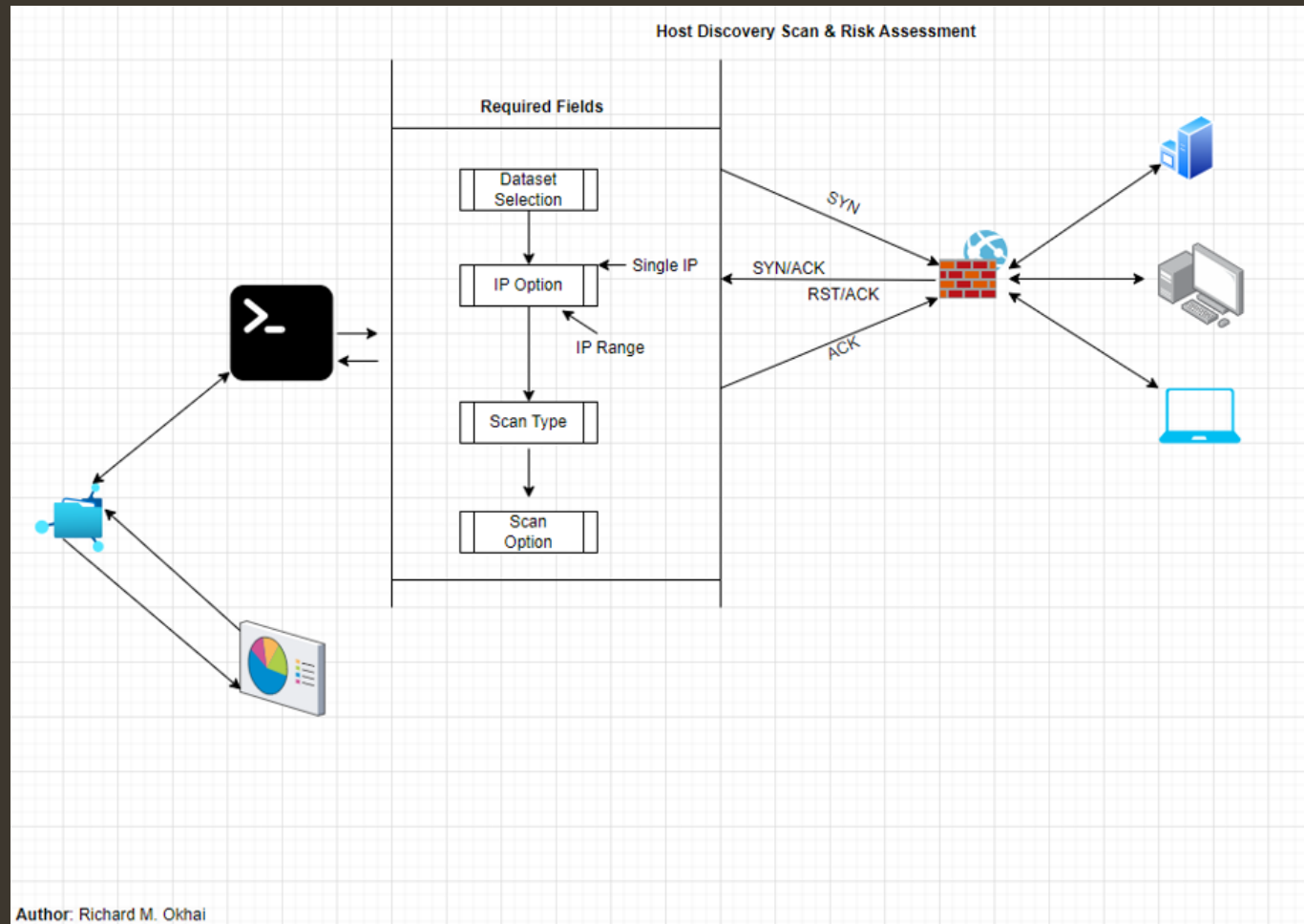
Appendix

1.0: Workflow: Threat-Hunt Tool



- **Language:** Python
- **Product Type:** Threat-Hunt Tool (Prototype)

1.1: Workflow: Host Discovery & Risk Assessment



- **Language:** Python
- **Product Type:** Security Assessment Tool (Prototype)

1.2: Workflow: KeyVault

Language: Python
Product: Credential
Management App (In
Development)

