University of Applied Sciences
HOCHSCHULE EMDEN·LEER

Threat and Weakness Analysis in SimplyTag

ORGADATA COMPANY, LEER

Manoj Selvaraju - 7025649
Vatsal Mahajan - 7025694
Vijay Singh - 7025700

January 15, 2025

Table of Content I

Introduction

Objective:

Identify and mitigate potential threats and weaknesses in Orgadata's SimplyTag system.

Background:

- SimplyTag is a web application enabling quick access to construction-related data.
- Ensuring data integrity is critical to prevent exploitation by malicious actors.

Approach:

Analyze web application logs to detect suspicious activities and safeguard the system.

Overview of Analysis

- Analyzed large-scale web application logs for patterns and anomalies.
- Monitored HTTP status codes (e.g., 404 errors for bad requests, 200 codes for potential breaches).
- Traced user requests using trace IDs for activity tracking and debugging.
- Investigated user agents and request paths to identify malicious actors.
- Developed strategies to mitigate identified vulnerabilities and improve response protocols.

Challenges we Faced

- Managing and analyzing large-scale logs for meaningful insights.
- Distinguishing between genuine user activities and malicious attempts.
- Handling complex patterns in user behavior and request logs.

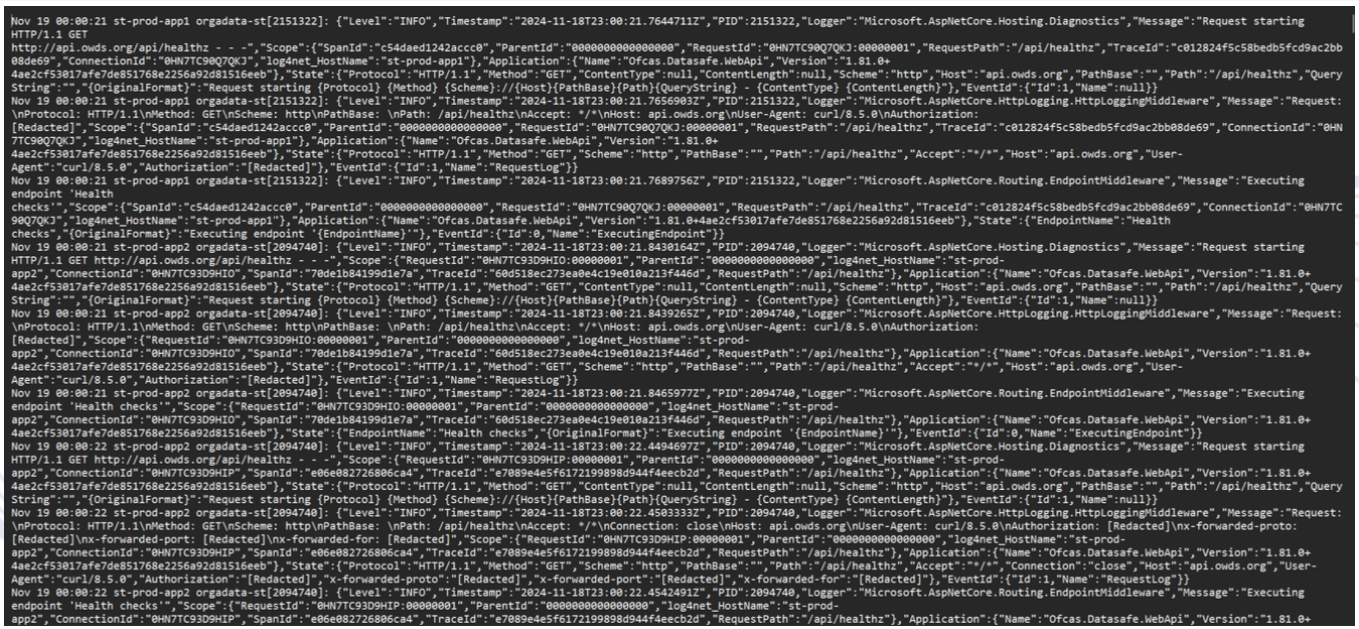

Figure: Raw log data

Application Sector

- **Step 1: Connect the Vision Shield to the Arduino Portenta H7**
  - Align the Vision Shield with the high-density connectors on the Portenta H7.
  - Press down firmly to ensure a secure connection.
- **Step 2: Connect the Arduino Portenta H7 to the Laptop**
  - Use a USB Type-C cable to connect the Portenta H7 to your laptop.
  - Ensure the connection is stable and the board is powered on.
- **Step 3: Install Necessary Libraries and Dependencies**
  - Open the Arduino IDE on your laptop.
  - Navigate to the Library Manager (`Sketch` → `Include Library` → `Manage Libraries`).
  - Install the required libraries for the Vision Shield and Portenta H7.
- **Step 4: Verify the Hardware Connection**
  - Ensure the LED on the Portenta H7 starts blinking green.
  - If the board does not respond, double-press the reset button to enter bootloader mode.

What the Analytics is doing?

- **Loading the Pre-trained AI Model**
  - Obtain a pre-trained AI model optimized for object detection.
  - Ensure the model is compatible with the resources of the Portenta H7.
- **Optimizing the Model for Embedded Deployment**
  - Convert the model to a format that can be efficiently run on the microcontroller.
  - Use frameworks like TensorFlow Lite for Microcontrollers.
  - Perform quantization to reduce the model size and inference time.
- **Deploying the Model on the Portenta H7**
  - Load the converted model onto the Portenta H7's flash memory.
  - Utilize Arduino libraries to interface with the model.
- **Real-time Inference on the Portenta H7**
  - Capture images from the Vision Shield's camera.
  - Pass the images to the AI model for inference.
  - Interpret the output to identify and classify objects in real-time.

Positioning Analytics in XYZ

- **Capturing Live Video Frames:**
  - The Vision Shield's camera captures live video frames.
  - Frames are continuously fed into the Portenta H7 for processing.
- **Processing Frames in Real-time:**
  - Each frame is processed by the AI model deployed on the Portenta H7.
  - The model performs object detection, identifying and classifying objects in the frame.
- **Annotating Detected Objects:**
  - Detected objects are annotated directly on the video feed.
  - Bounding boxes and labels are overlaid to highlight detected objects.
- **Displaying Output:**
  - The annotated video feed is displayed on the Vision Shield's built-in display.
  - Real-time feedback provides immediate visual confirmation of detected objects.

Knowledge Discovery in Database (KDD) Process

- Live video feed from the Vision Shield's camera module.
- Real-time annotation of detected objects on the video feed.
- Accurate and efficient object detection and classification.
- Instant visual feedback displayed on the Vision Shield's built-in display.
- Potential for further customization and integration into larger systems.

Conclusion and Future Scope

Real-time object detection with the Arduino Portenta H7 and Vision Shield has numerous applications across various industries:

- **Surveillance and Security Systems:** Enhance security measures by detecting and identifying intruders or suspicious objects in real-time.
- **Industrial Automation and Quality Control:** Ensure product quality by identifying defects or anomalies on manufacturing lines.
- **Robotics and Autonomous Navigation:** Enable robots and autonomous vehicles to perceive and react to their surroundings, enhancing safety and efficiency.
- **Smart Home Devices and IoT Applications:** Create intelligent devices capable of recognizing and responding to human activities or environmental changes.

Real-time object detection provides valuable insights and automation capabilities in diverse fields, making it a versatile and powerful technology for modern applications.

Literature

- The project showcases the potential of AI-enabled embedded systems for real-time object detection.
- By leveraging the computational power of the Arduino Portenta H7 and the image processing capabilities of the Vision Shield, complex tasks like object detection can be performed efficiently and accurately in real-time.
- The project opens up possibilities for a wide range of applications in industries such as surveillance, industrial automation, robotics, and IoT, where real-time object detection is crucial for decision-making and automation.

Thank you

for your attention