MICHIGAN STATE
UNIVERSITY

Project Plan Presentation
Hybrid Cyberattack Simulator

The Capstone Experience

Team Vectra AI

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From Students…
…to Professionals

Project Sponsor Overview

VECTRA®

- Leader in Cybersecurity
- Focus on network security
- Utilizes AI to detect, investigate, and report attacks
- Modular security to provide customized coverage

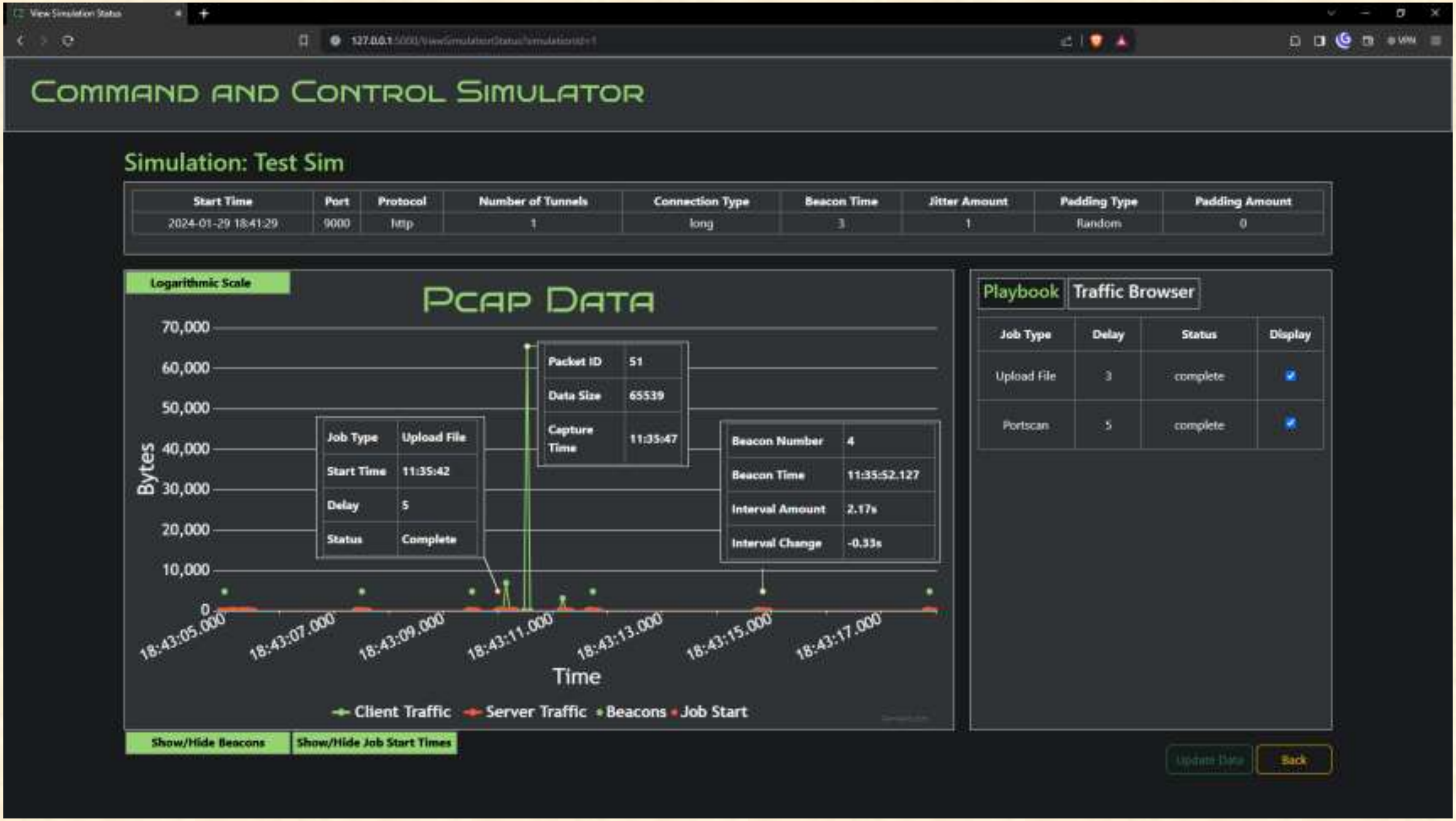
Project Functional Specifications

- Vectra's AI models need relevant training data to maintain accuracy
- Several more network protocols and hybrid attack capabilities are being added to the Command & Control (C2) Simulator
- Vectra will be able to prepare for diversified attacks using many different protocols and attack vectors

Project Design Specifications

- Hybrid Attack Simulation
  - MAAD-AF
  - DeRF
- Advanced C2
  - Webshells
  - Beaconless servers
- UI Enhancements

Screen Mockup: Simulation Overview with Playbook Display



Command and Control Simulator

Simulation: Test Sim

Start Time	Port	Protocol	Number of Tunnels	Connection Type	Beacon Time	Jitter Amount	Padding Type	Padding Amount
2024-01-29 18:41:29	9000	http	1	long	3	1	Random	0

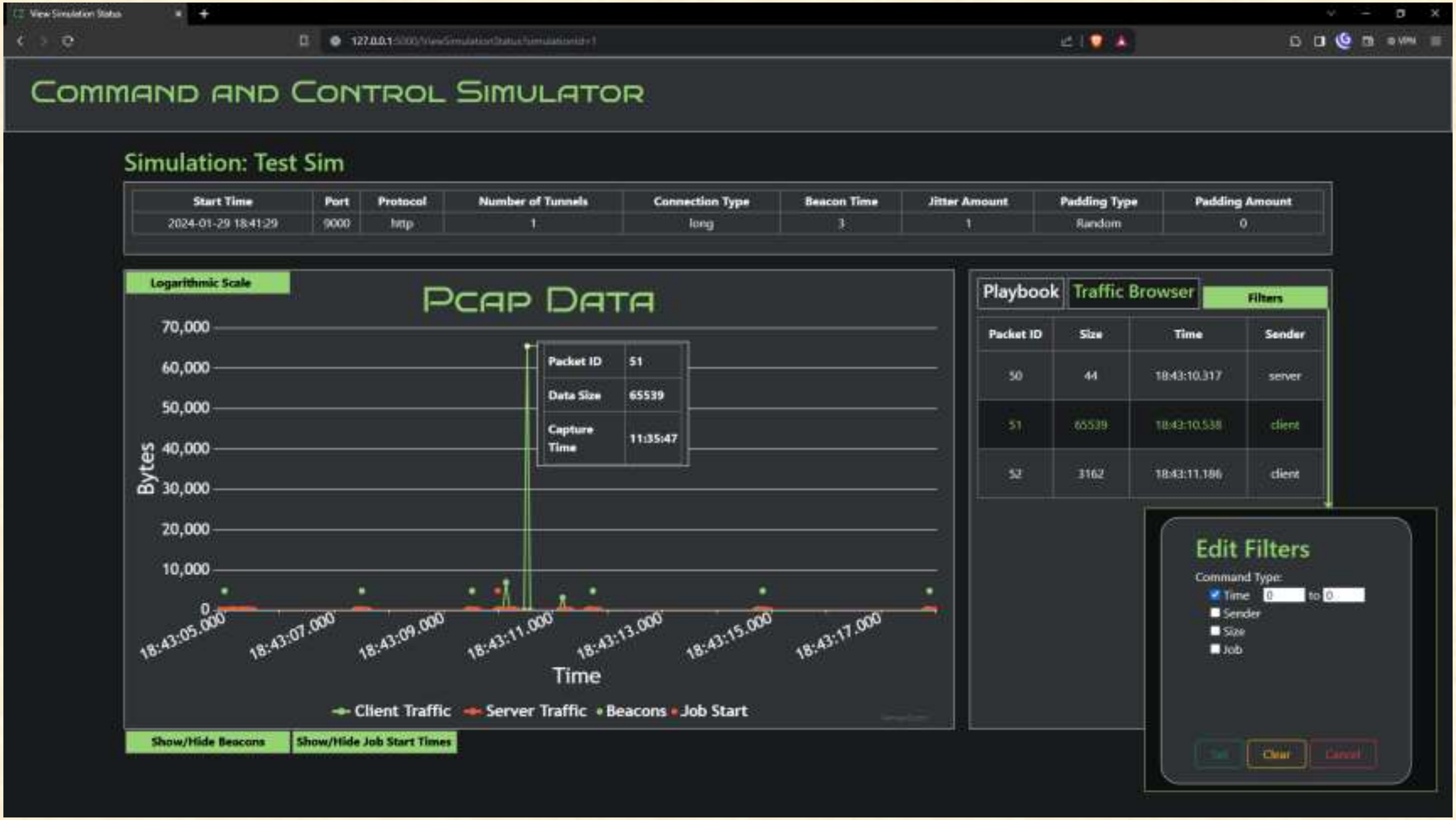
Job Type	Upload File
Start Time	11:35:42
Delay	5
Status	Complete

Packet ID	51
Data Size	65539
Capture Time	11:35:47

Beacon Number	4
Beacon Time	11:35:52.127
Interval Amount	2.17s
Interval Change	-0.33s

Job Type	Delay	Status	Display
Upload File	3	complete	☑
Portscan	5	complete	☑

Screen Mockup: Simulation Overview with Browser Display



Command and Control Simulator

Simulation: Test Sim

Start Time	Port	Protocol	Number of Tunnels	Connection Type	Beacon Time	Jitter Amount	Padding Type	Padding Amount
2024-01-29 18:41:29	9000	http	1	long	3	1	Random	0

Packet ID	51
Data Size	65539
Capture Time	11:35:47

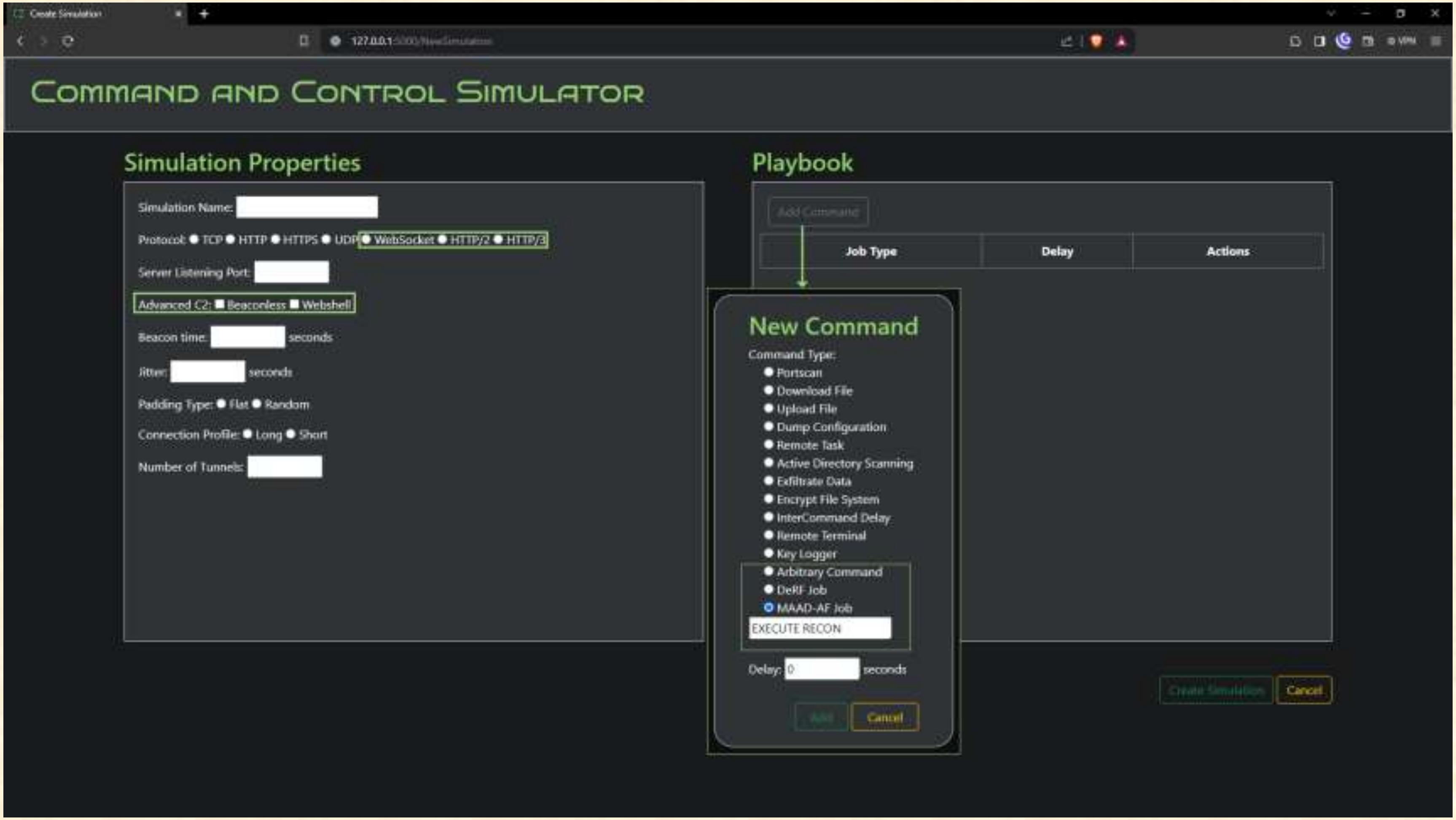
Packet ID	Size	Time	Sender
50	44	18:43:10.317	server
51	65539	18:43:10.538	client
52	3162	18:43:11.186	client

Edit Filters

Command Type:

- ☑ Time 0 to 0
- □ Sender
- □ Size
- □ Job

Screen Mockup: Create Simulation Page



Simulation Properties

Simulation Name:

Protocol: ○ TCP ○ HTTP ○ HTTPS ○ UDP ○ WebSocket ○ HTTP/2 ○ HTTP/3

Server Listening Port:

Advanced C2: □ Beaconless □ Webshell

Beacon time: seconds

Jitter: seconds

Padding Type: ○ Flat ○ Random

Connection Profile: ○ Long ○ Short

Number of Tunnels:

Playbook

Job Type	Delay	Actions

New Command

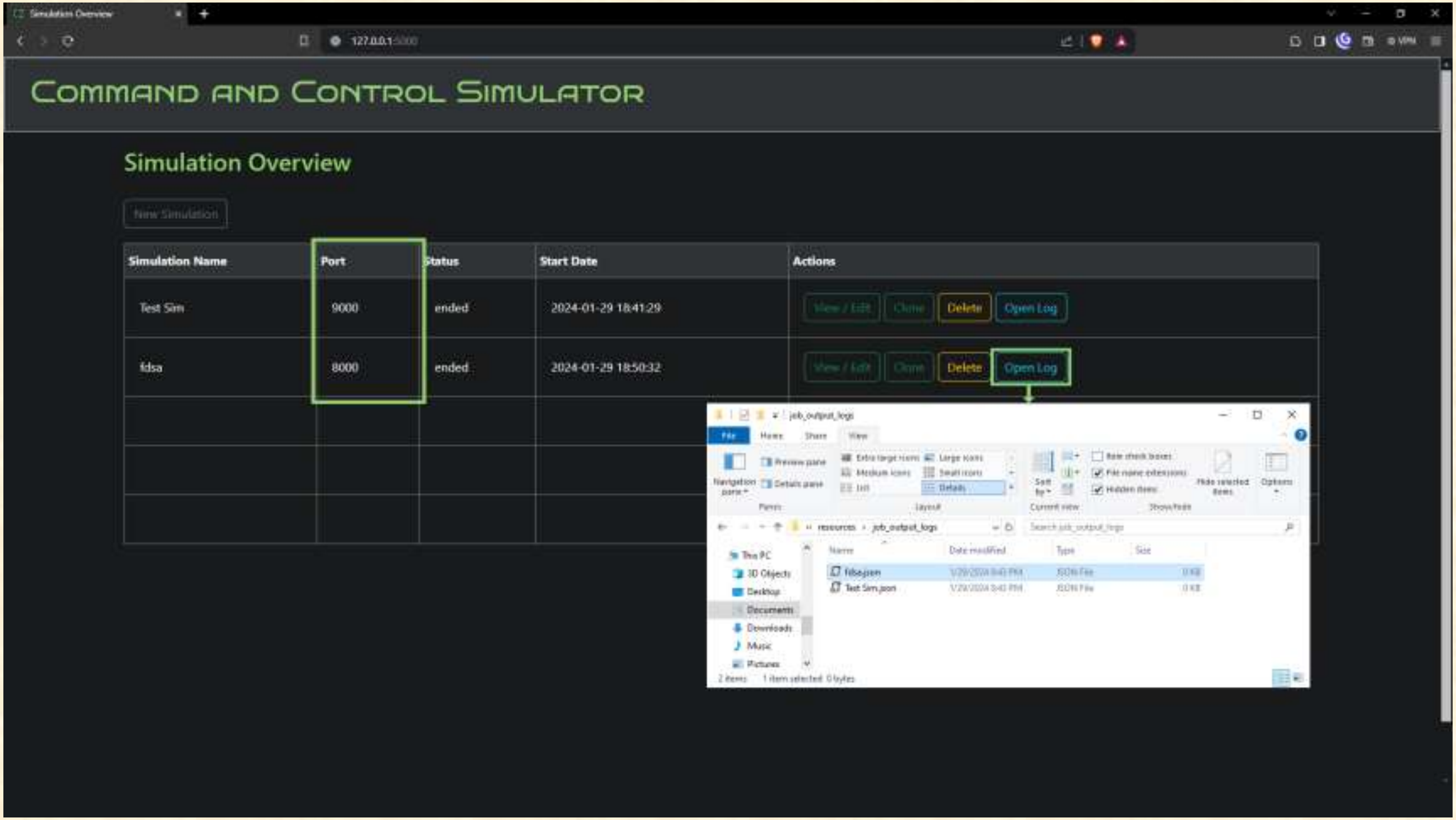
Command Type:

- ○ Portscan
- ○ Download File
- ○ Upload File
- ○ Dump Configuration
- ○ Remote Task
- ○ Active Directory Scanning
- ○ Exfiltrate Data
- ○ Encrypt File System
- ○ InterCommand Delay
- ○ Remote Terminal
- ○ Key Logger
- ○ Arbitrary Command
- ○ DeRF Job
- ● MAAD-AF Job

EXECUTE RECON

Delay: 0 seconds

Screen Mockup: Simulation Overview Page



Simulation Overview

Simulation Name	Port	Status	Start Date	Actions
Test Sim	9000	ended	2024-01-29 18:41:29	View / Edit Clone Delete Open Log
fdsa	8000	ended	2024-01-29 18:50:32	View / Edit Clone Delete Open Log

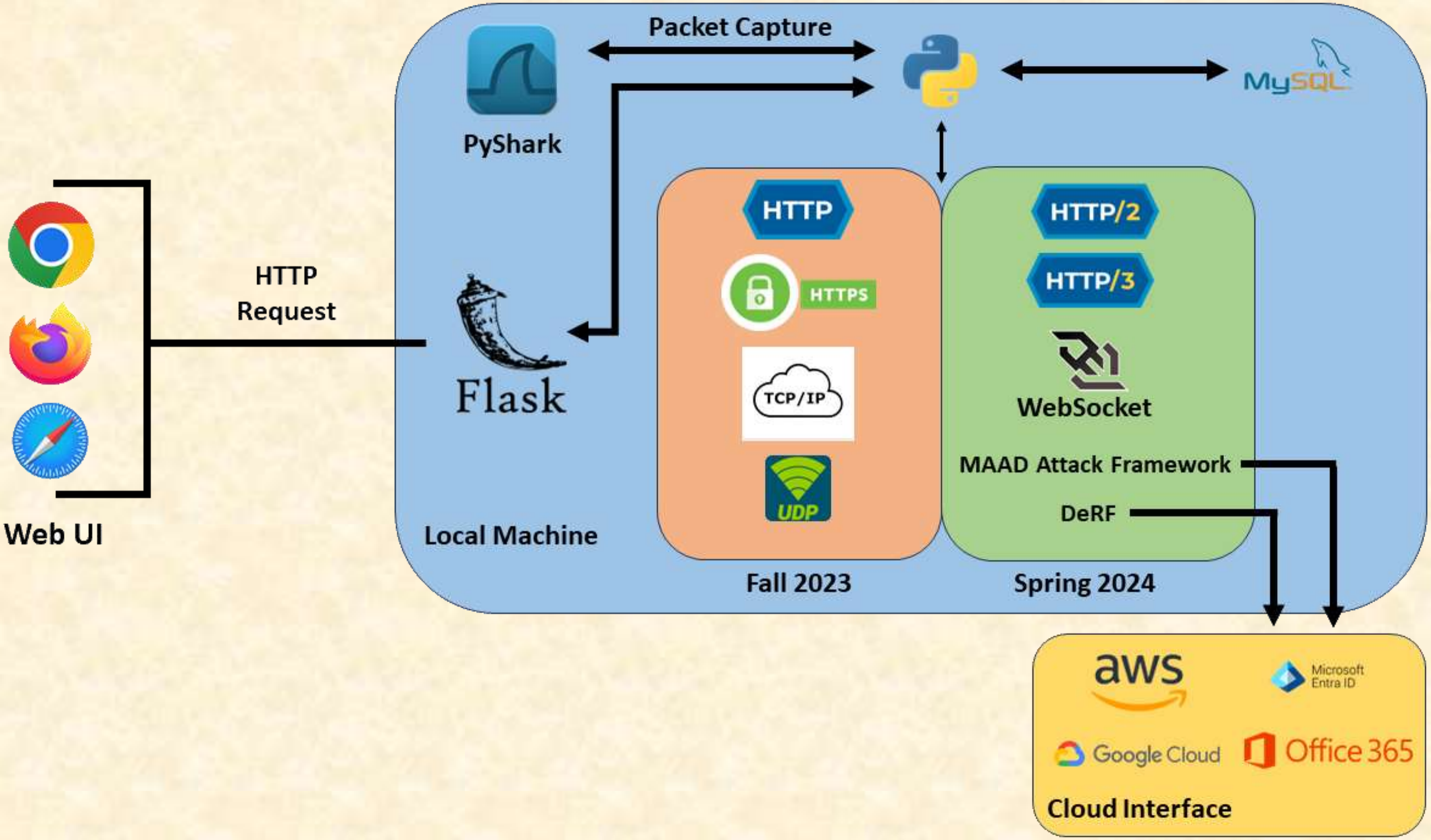
Name	Date modified	Type	Size
fdsa.json	1/29/2024 6:40 PM	JSON File	0 KB
Test Sim.json	1/29/2024 6:40 PM	JSON File	0 KB

2 items 1 item selected 0 bytes

Project Technical Specifications

- Implementing WebSocket, HTTP/2 and HTTP/3
- Also adding MAAD-AF and DeRF frameworks for Hybrid Attacks
- PyShark library to capture network packets, and MySQL to store them
- All of this is built on Python3

Project System Architecture



Project System Components

- Hardware Platforms
  - AWS Server
  - Google Cloud Server
  - Two Lab PCs
- Software Platforms / Technologies
  - Python
  - MySQL
  - Flask
  - VSCode

Project Risks

- Compatibility
  - Make sure all third-party apps work together
  - Using active libraries and using version control
- Generating realistic data
  - Generate realistic enough data for AI models to train on
  - Analyzing real world attacks and mimicking their outputs
- Performance Issues
  - Make large amounts of data in reasonable amounts of time
  - Spending time optimizing code; looking at distributed computing
- Portability
  - The program needs to be able to run on multiple OS without issue
  - Using cross-platform libraries and allowing API calls to server to abstract user operating system

Questions?

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