MICHIGAN STATE
UNIVERSITY

Project Plan Presentation

AI Cyberattack Early Warning System

The Capstone Experience

Team Vectra AI

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From Students…
…to Professionals

Project Sponsor Overview

- Cybersecurity Monitoring Company
  - Founded in 2011
- Pioneers of Generative AI
- Attack Signal Intelligence
  - Monitor attacks *WITHOUT* decryption
  - Machine learning to detect attacks and offer solutions
- Past Michigan State Capstone Sponsors
  - C2 simulator

VECTRA®

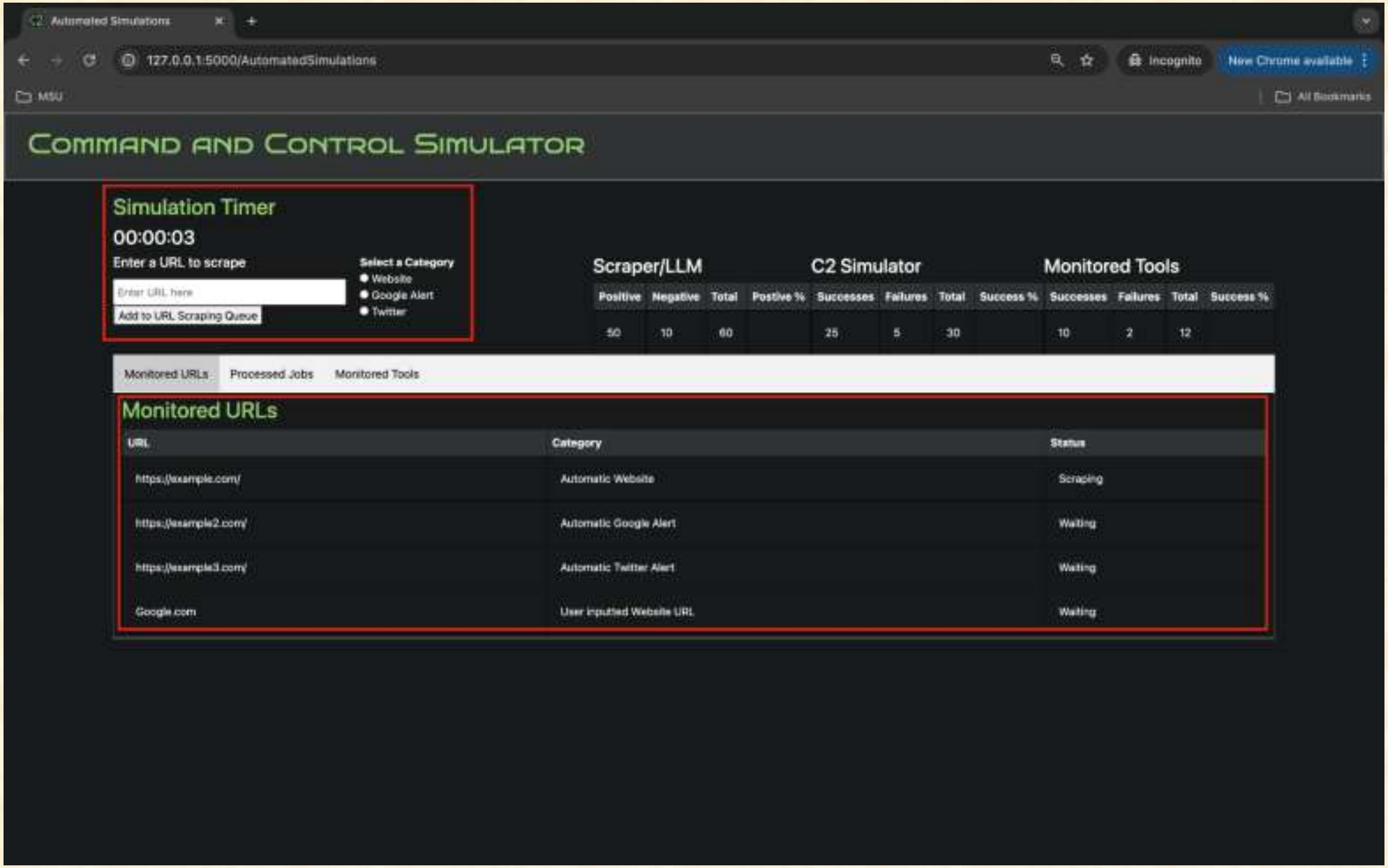
Project Functional Specifications

- Problem
  - Data scientists have to manually read reports and configure the C2 simulator
- Solution
  - Automate the process by web scraping threat intel resources, extrapolating C2 configs, and generate PCAP samples
- Result
  - Human intervention in the process is eliminated

Project Design Specifications

- Users should be able to pass in a URL in through a user interface
- Users should know the current URLs in the queue and ones already being monitored
- Users should be able to see the results of run C2 Simulator
- Users should be able to run other detection tools with valid configurations
- Users should be able to see the statistics of how the application is working as well as success rates

Screen Mockup: Opening Screen



Command and Control Simulator

Simulation Timer

00:00:03

Enter a URL to scrape

Enter URL here

Add to URL Scraping Queue

Select a Category
- ● Website
- ● Google Alert
- ● Twitter

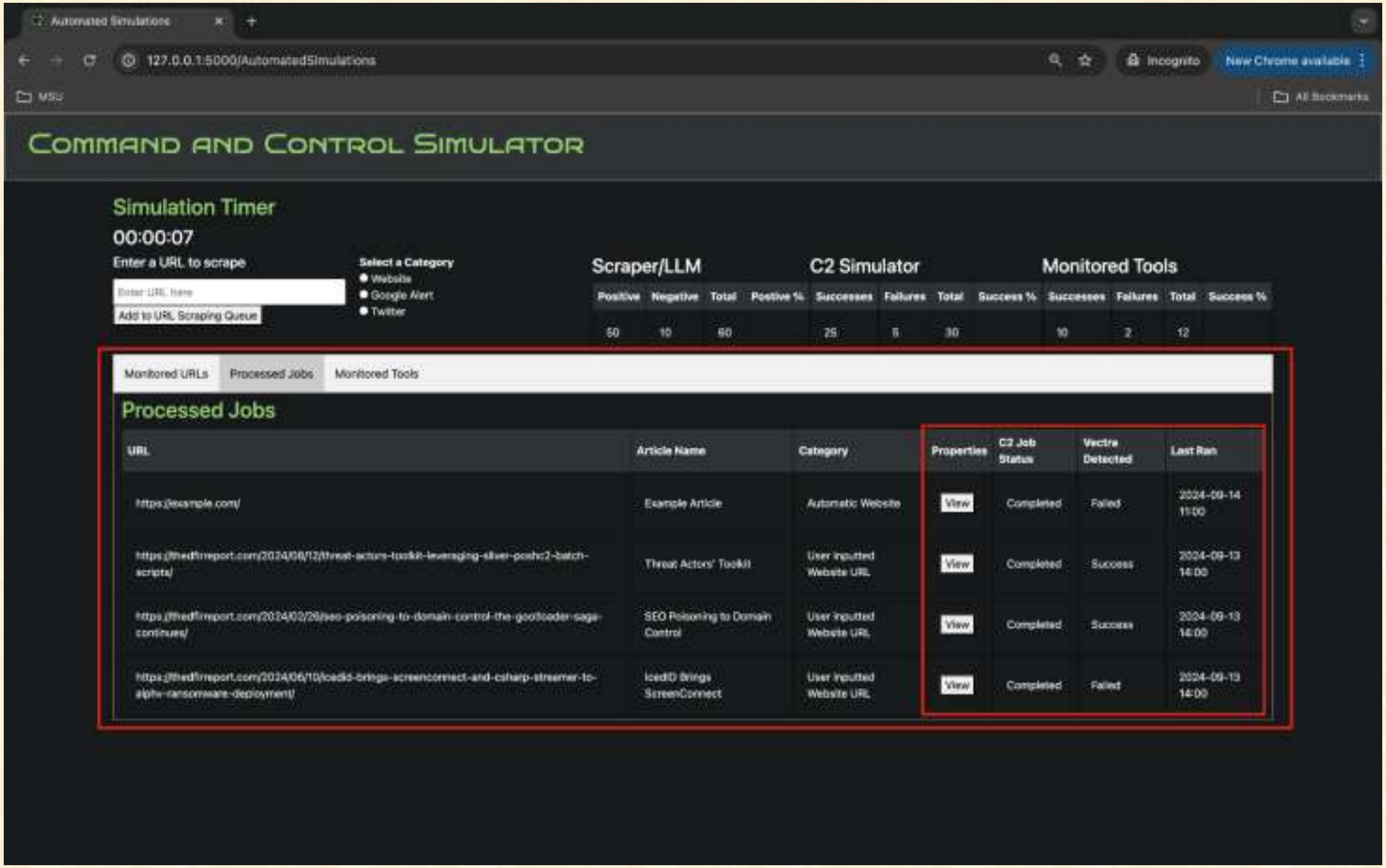
Scraper/LLM				C2 Simulator				Monitored Tools			
Positive	Negative	Total	Postive %	Successes	Failures	Total	Success %	Successes	Failures	Total	Success %
50	10	60		25	5	30		10	2	12	

Monitored URLs | Processed Jobs | Monitored Tools

Monitored URLs

URL	Category	Status
https://example.com/	Automatic Website	Scraping
https://example2.com/	Automatic Google Alert	Waiting
https://example3.com/	Automatic Twitter Alert	Waiting
Google.com	User inputted Website URL	Waiting

Screen Mockup: Processed Jobs



Command and Control Simulator

Simulation Timer

00:00:07

Enter a URL to scrape

Enter URL here

Add to URL Scraping Queue

Select a Category

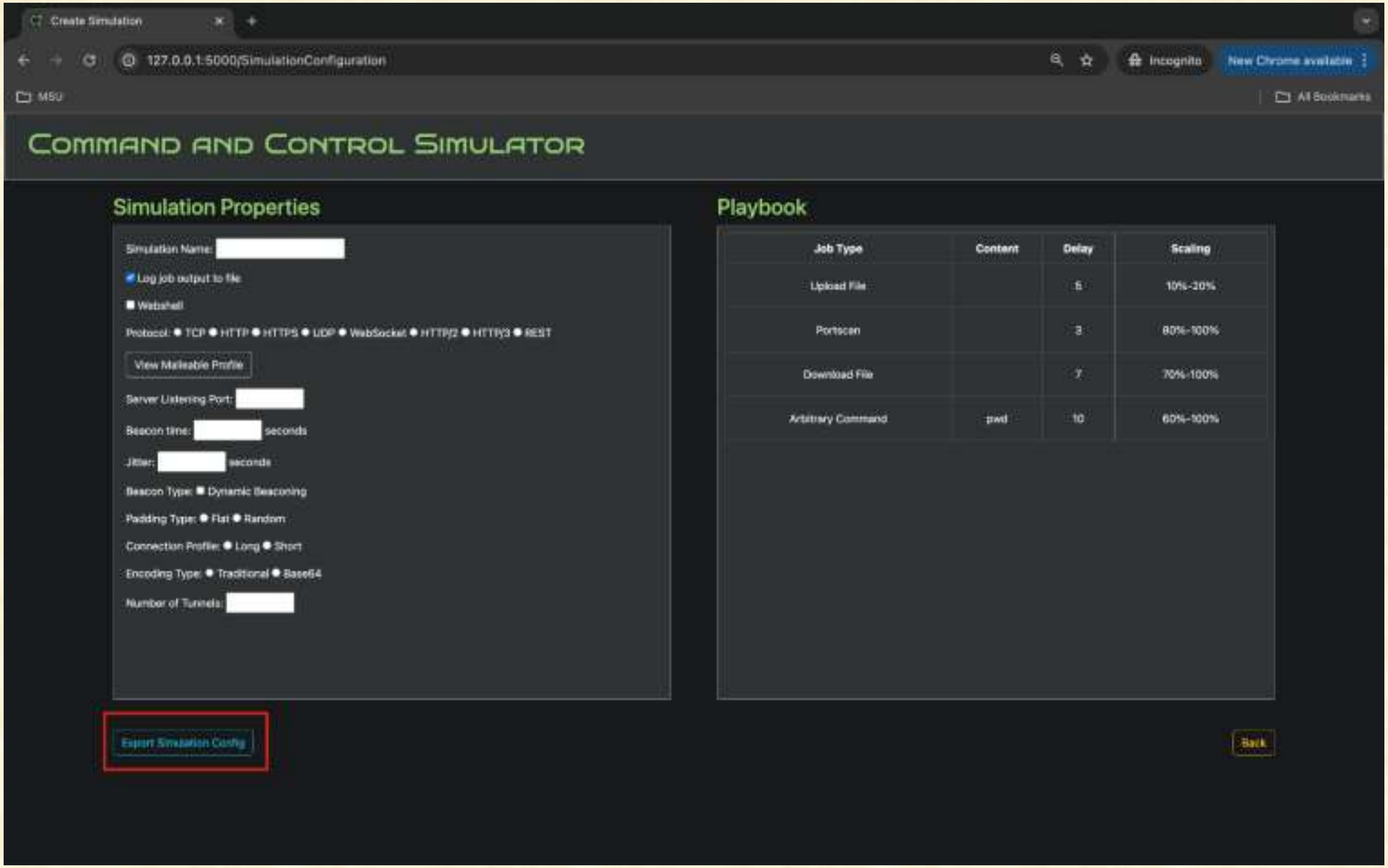
- ● Website
- ● Google Alert
- ● Twitter

Scraper/LLM				C2 Simulator				Monitored Tools			
Positive	Negative	Total	Positive %	Successes	Failures	Total	Success %	Successes	Failures	Total	Success %
50	10	60		25	5	30		10	2	12	

Processed Jobs

URL	Article Name	Category	Properties	C2 Job Status	Vectre Detected	Last Ran
https://example.com/	Example Article	Automatic Website	View	Completed	Failed	2024-09-14 11:00
https://thedfirreport.com/2024/08/12/threat-actors-toolkit-leveraging-sliver-poshc2-batch-scripts/	Threat Actors' Toolkit	User Inputted Website URL	View	Completed	Success	2024-09-13 14:00
https://thedfirreport.com/2024/02/26/seo-poisoning-to-domain-control-the-gootloader-saga-continues/	SEO Poisoning to Domain Control	User Inputted Website URL	View	Completed	Success	2024-09-13 14:00
https://thedfirreport.com/2024/06/10/icedid-brings-screenconnect-and-csharp-streamer-to-alphv-ransomware-deployment/	IcedID Brings ScreenConnect	User Inputted Website URL	View	Completed	Failed	2024-09-13 14:00

Screen Mockup: Simulation Config



Command and Control Simulator

Simulation Properties

Simulation Name:

☑ Log job output to file

☐ Webshell

Protocol: ● TCP ● HTTP ● HTTPS ● UDP ● WebSocket ● HTTP/2 ● HTTP/3 ● REST

View Malleable Profile

Server Listening Port:

Beacon time: seconds

Jitter: seconds

Beacon Type: ☐ Dynamic Beaconing

Padding Type: ● Flat ● Random

Connection Profile: ● Long ● Short

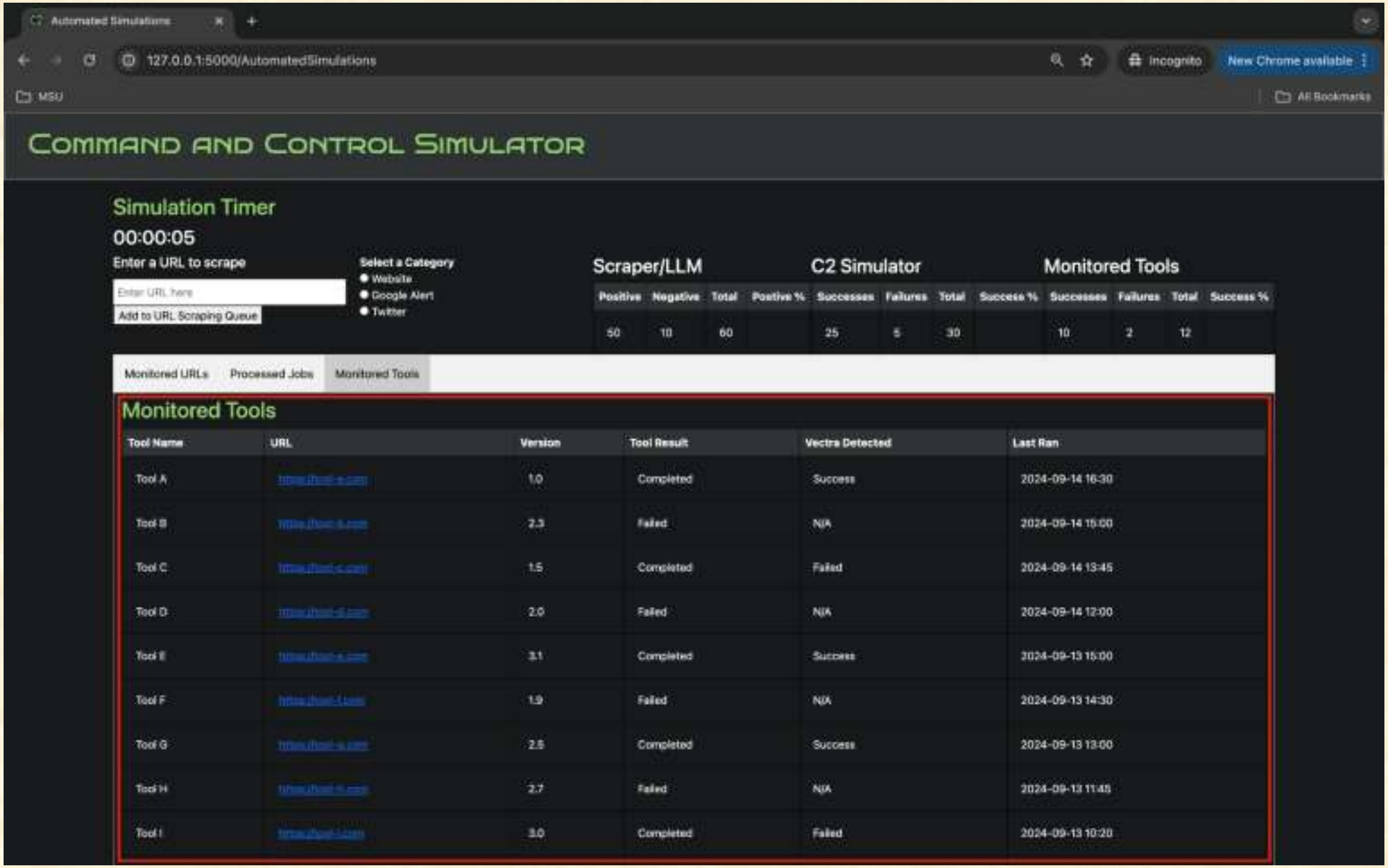
Encoding Type: ● Traditional ● Base64

Number of Tunnels:

Playbook

Job Type	Content	Delay	Scaling
Upload File		5	10%-20%
Portscan		3	80%-100%
Download File		7	70%-100%
Arbitrary Command	pwd	10	60%-100%

Screen Mockup: Monitored Tools



Command and Control Simulator

Simulation Timer

00:00:05

Enter a URL to scrape

Enter URL here

Add to URL Scraping Queue

Select a Category

● Website
● Google Alert
● Twitter

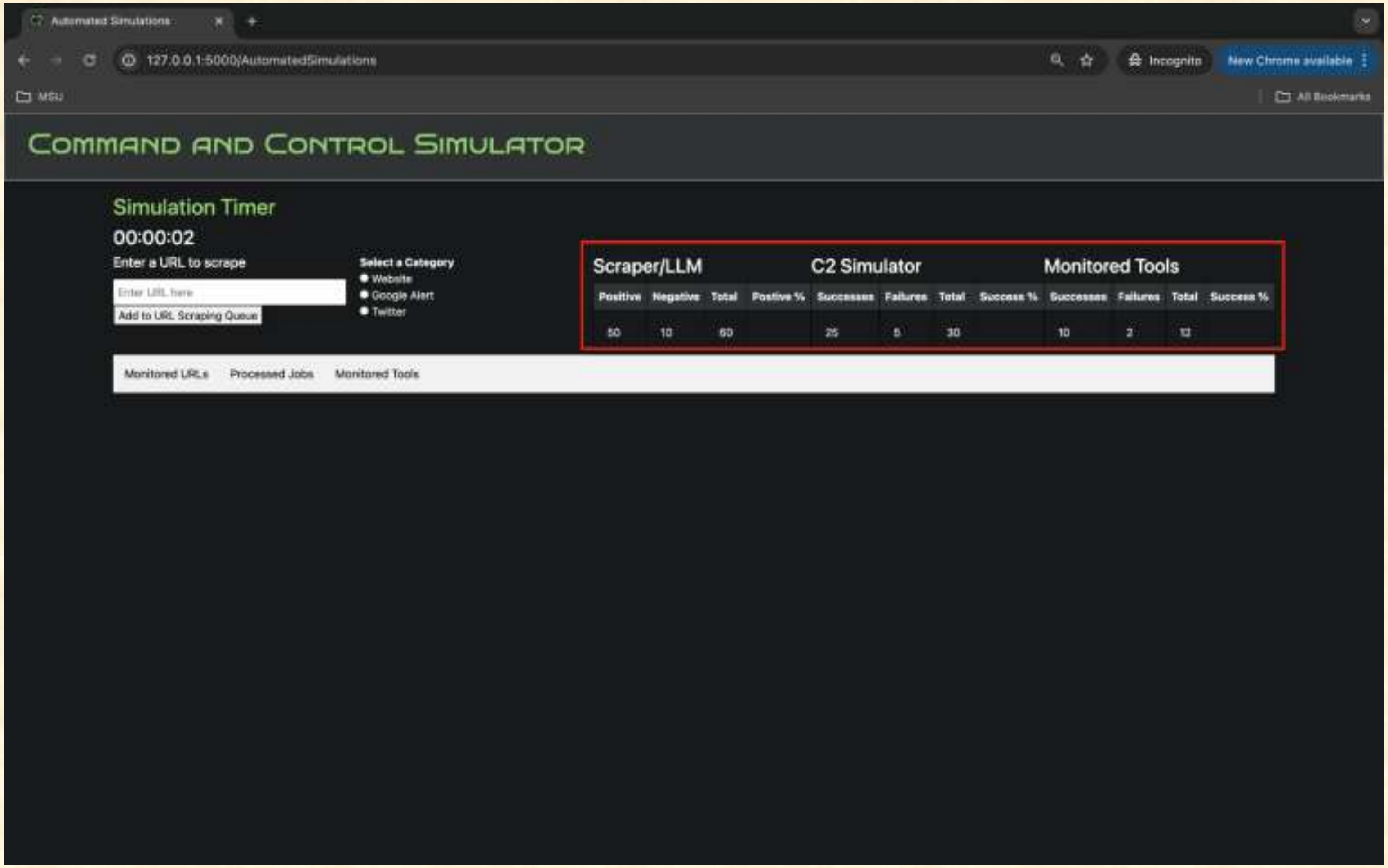
Scraper/LLM				C2 Simulator				Monitored Tools			
Positive	Negative	Total	Postive %	Successes	Failures	Total	Success %	Successes	Failures	Total	Success %
50	10	60		25	5	30		10	2	12	

Monitored URLs | Processed Jobs | Monitored Tools

Monitored Tools

Tool Name	URL	Version	Tool Result	Vectra Detected	Last Ran
Tool A	https://tool-a.com	1.0	Completed	Success	2024-09-14 16:30
Tool B	https://tool-b.com	2.3	Failed	N/A	2024-09-14 15:00
Tool C	https://tool-c.com	1.5	Completed	Failed	2024-09-14 13:45
Tool D	https://tool-d.com	2.0	Failed	N/A	2024-09-14 12:00
Tool E	https://tool-e.com	3.1	Completed	Success	2024-09-13 15:00
Tool F	https://tool-f.com	1.9	Failed	N/A	2024-09-13 14:30
Tool G	https://tool-g.com	2.5	Completed	Success	2024-09-13 13:00
Tool H	https://tool-h.com	2.7	Failed	N/A	2024-09-13 11:45
Tool I	https://tool-i.com	3.0	Completed	Failed	2024-09-13 10:20

Screen Mockup: Statistics



Command and Control Simulator

Simulation Timer

00:00:02

Enter a URL to scrape

Enter URL here

Add to URL Scraping Queue

Select a Category

- ● Website
- ● Google Alert
- ● Twitter

Scraper/LLM				C2 Simulator				Monitored Tools			
Positive	Negative	Total	Postive %	Successes	Failures	Total	Success %	Successes	Failures	Total	Success %
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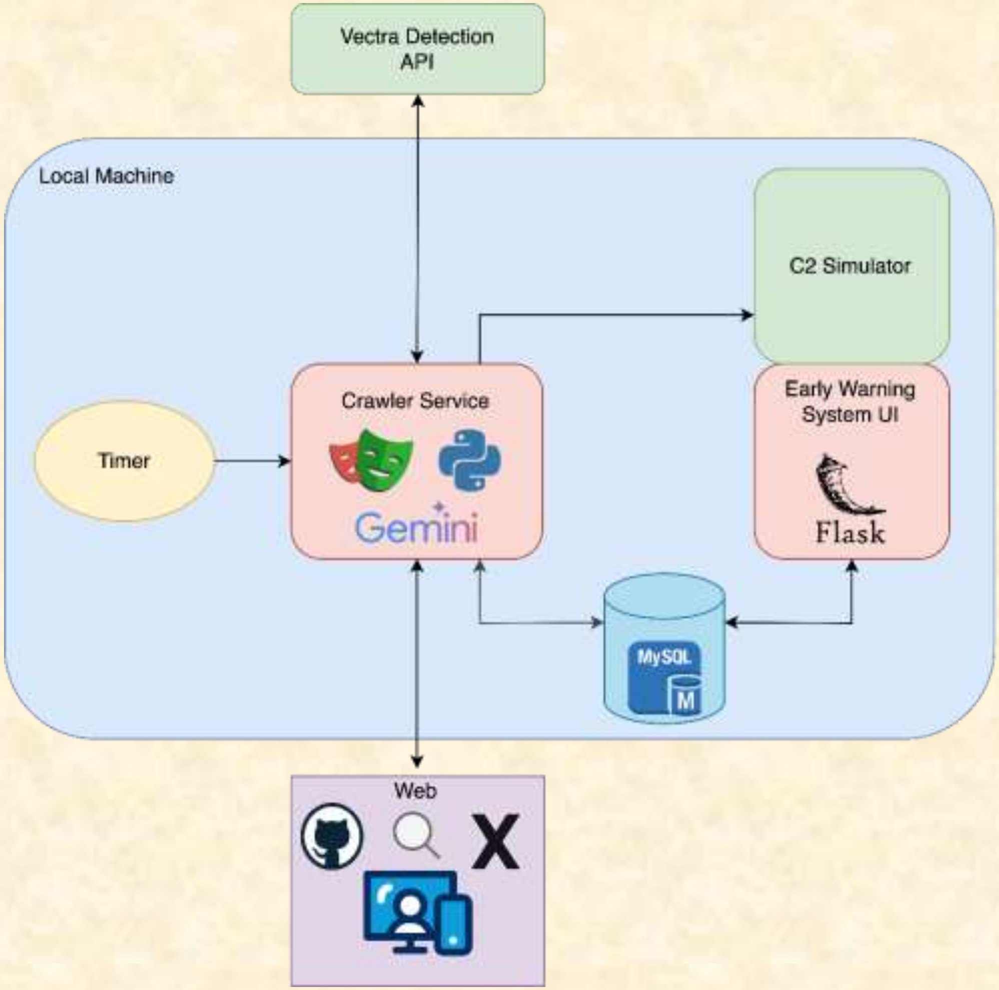
Project Technical Specifications

- Playwright and Python to scrape HTML content
- Gemini LLM to extract C2 configuration parameters
- Frontend built using Flask, HTML, CSS, and Jinja
- Backend and connector code written in Python
- MySQL for data storage

Project System Architecture



Project System Components

- Hardware Platforms
  - Computers
- Software Platforms / Technologies
  - Playwright
  - Gemini
  - Flask
  - VSCode
  - Pyshark
  - MySQL
  - Python

Project Risks

- Website Accessibility
  - Some URLs require authorization we don’t have
  - Human manned accounts as well as utilizing alternative data sending from sources that have it
- Website Content Filtration
  - Certain websites contain tags that will not be standardized
  - We can utilize our LLM to ignore the tags in the summary
  - We can develop a filtration system within our webscraper
- Automation of Cyberattack Tools
  - Cyberattack tools that are parsed in by the user need to be ran without being known
  - We can make use our LLM to find out how to run any given tool and then use Argparse to run the commands that the LLM returns
- High Cost of LLM Model Tiers
  - Calling the API for LLMs can be very pricey and our project triggers the “high risk” filters
  - We need to prompt engineer and change data so that our prompts won’t get an invalid call

Questions?

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