

MICHIGAN STATE

U N I V E R S I T Y

Alpha Presentation

Matrix Vehicle Simulator

The Capstone Experience

Team GM

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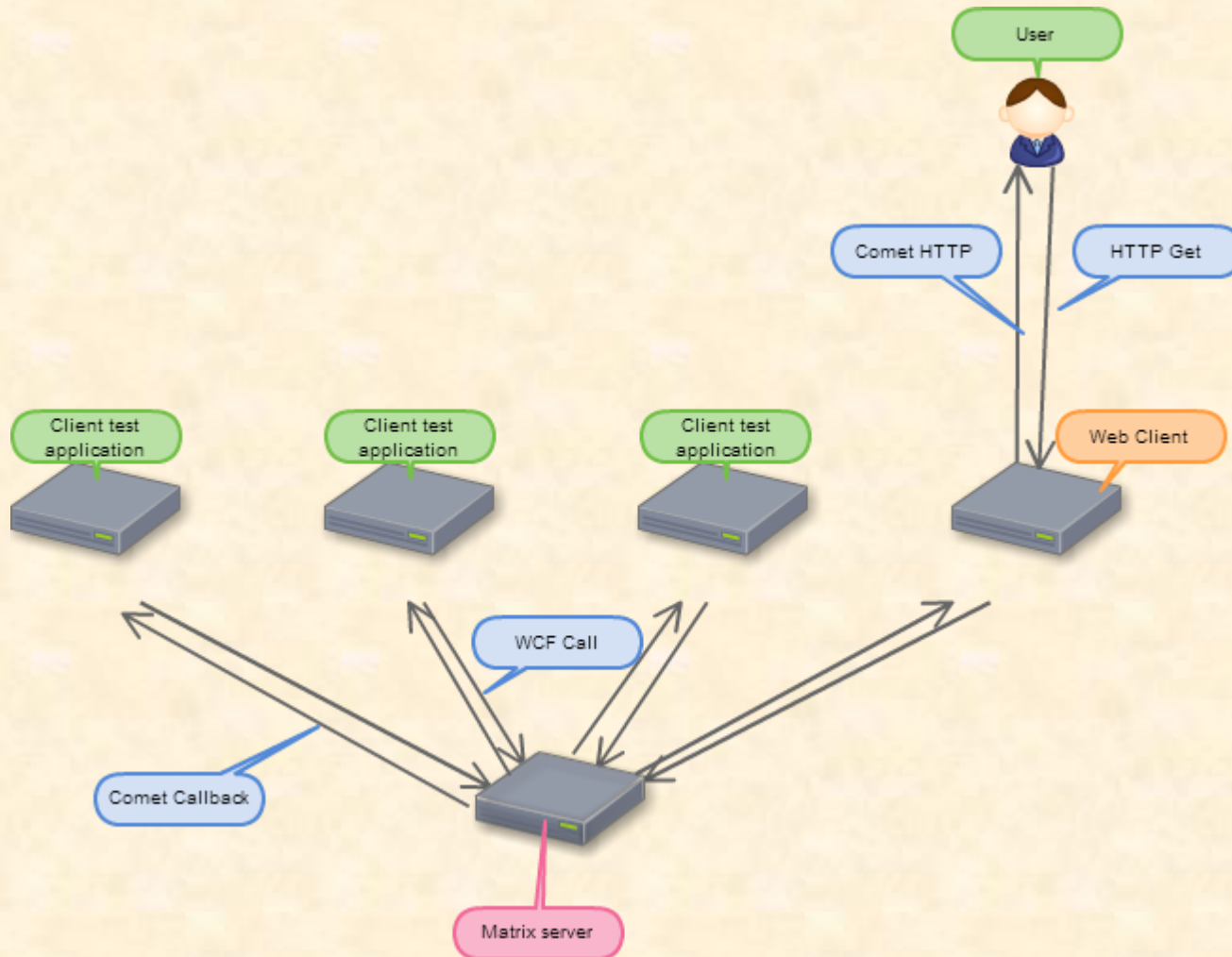
*From Students...
...to Professionals*

Project Overview

- Route and Event Simulator
- Testing Vehicle Applications
- Developer API
- Seatbelt Example



System Architecture



Developer API

```
RESTClient.Connect("http://35.9.22.109:8080/Matrix/");

Session session = new Session();
Vehicle vehicle = new Vehicle();
Vehicle vehicle2 = new Vehicle();
Vehicle vehicle3 = new Vehicle();
vehicle.m_name = "Spark";
vehicle2.m_name = "Silverado";
vehicle3.m_name = "Corvette";

Event e = new Event();
e.vehicle = vehicle;
e.name = "Made it to my house in EL";
e.m_threshold = 0.3f;
e.locationName = "1921 Abbot Rd, East Lansing, MI";

e.callbacks += EventHit;
RESTClient.eventCallbacks.Add(e.m_id, e.callbacks);

session.m_events.Add(e);

Event e2 = new Event();
e2.vehicle = vehicle2;
e2.name = "Duncan picked up his lunch";
e2.m_threshold = 0.3f;
e2.locationName = "1040 Blanchette Dr, East Lansing, MI";

e2.callbacks += EventHit;
RESTClient.eventCallbacks.Add(e2.m_id, e2.callbacks);
```

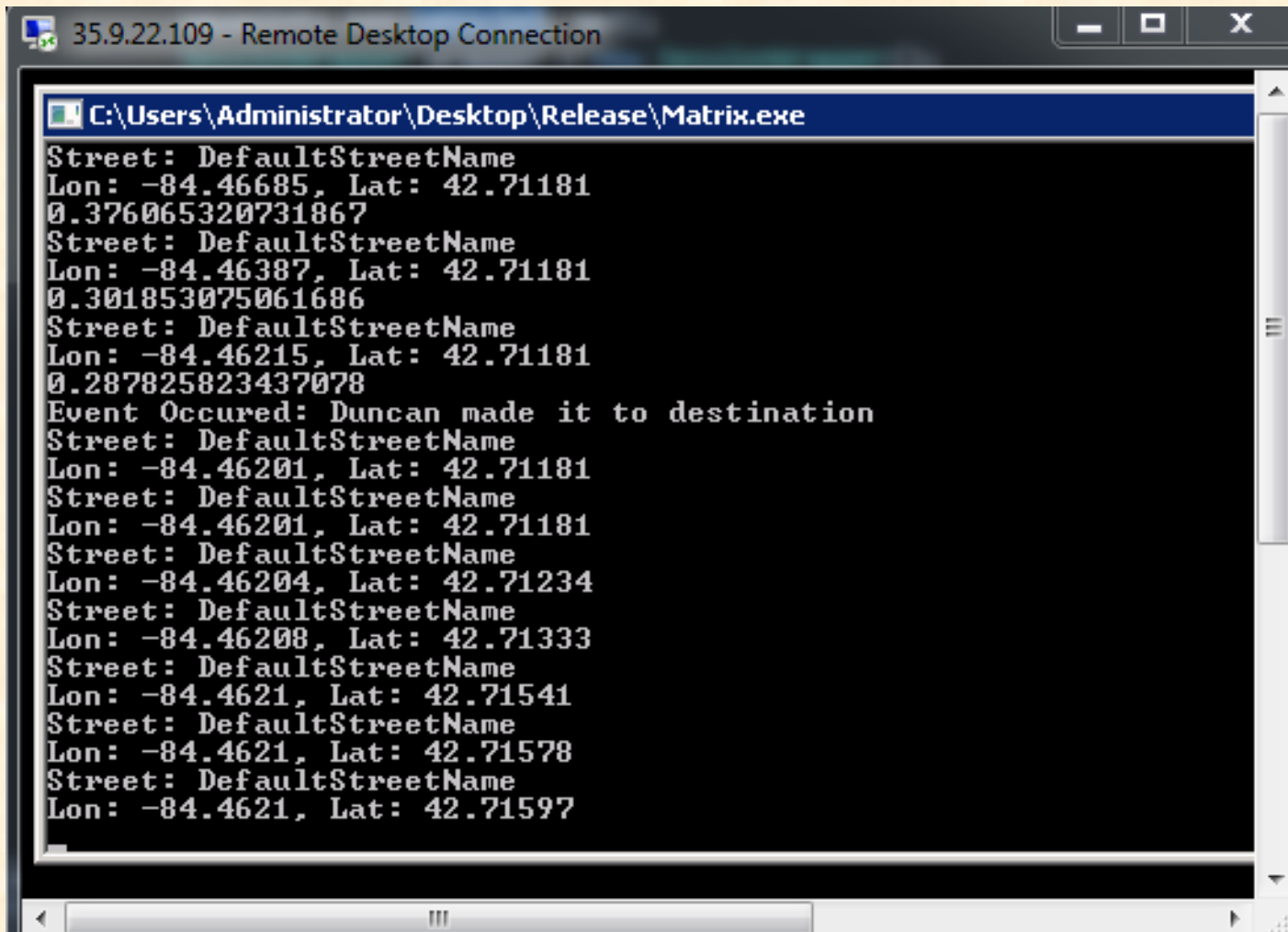
```
Dictionary<Vehicle, List<string>> waypoints = new Dictionary<Vehicle, List<string>>();
List<string> wp = new List<string>(){
    "189 Spartan Ave, East Lansing, MI",
    "1921 Abbot Rd, East Lansing, MI",
    "1140 Blanchette Dr, East Lansing, MI"
};
waypoints.Add(vehicle, wp);
List<string> wp2 = new List<string>(){
    "1140 Blanchette Dr, East Lansing, MI",
    "1040 Blanchette Dr, East Lansing, MI",
    "4642 S Hagadorn Rd, East Lansing, MI"
};
waypoints.Add(vehicle2, wp2);
List<string> wp3 = new List<string>(){
    "4642 S Hagadorn Rd, East Lansing, MI",
    "189 Spartan Ave, East Lansing, MI",
    "1921 Abbot Rd, East Lansing, MI"
};
waypoints.Add(vehicle3, wp3);
SessionWrapper wrapper = new SessionWrapper();
wrapper.session = session;
wrapper.waypoints = waypoints;

addCar(vehicle);
addCar(vehicle2);
addCar(vehicle3);

id = simulatorClient.CreateSession(wrapper);
RESTClient.ConnectCallback += Update;
RESTClient.SessionComplete += onSessionEnded;
```



Matrix Server



A screenshot of a Remote Desktop Connection window titled "35.9.22.109 - Remote Desktop Connection". The window displays a command prompt window titled "C:\Users\Administrator\Desktop\Release\Matrix.exe". The output of the program is as follows:

```
Street: DefaultStreetName  
Lon: -84.46685, Lat: 42.71181  
0.376065320731867  
Street: DefaultStreetName  
Lon: -84.46387, Lat: 42.71181  
0.301853075061686  
Street: DefaultStreetName  
Lon: -84.46215, Lat: 42.71181  
0.287825823437078  
Event Occured: Duncan made it to destination  
Street: DefaultStreetName  
Lon: -84.46201, Lat: 42.71181  
Street: DefaultStreetName  
Lon: -84.46201, Lat: 42.71181  
Street: DefaultStreetName  
Lon: -84.46204, Lat: 42.71234  
Street: DefaultStreetName  
Lon: -84.46208, Lat: 42.71333  
Street: DefaultStreetName  
Lon: -84.4621, Lat: 42.71541  
Street: DefaultStreetName  
Lon: -84.4621, Lat: 42.71578  
Street: DefaultStreetName  
Lon: -84.4621, Lat: 42.71597
```



GUI

The screenshot displays a software interface with a map and a data table. The table lists three vehicles with their coordinates. The map shows a route through a city area with various streets and landmarks. A text box on the left provides a session log.

Vehicles	Latitude	Longitude
Spark	42.7534	-84.49905
Silverado	42.71578	-84.4621
Corvette	42.75593	-84.48371

Pause

Session started!
Duncan picked up his lunch Fired for vehicle: Silverado!
Duncan ate his lunch. Fired for vehicle: Corvette!
Made it to my house in EL Fired for vehicle: Spark!
Sam made it to destination Fired for vehicle: Spark!
Matt made it to destination Fired for vehicle: Corvette!
Duncan made it to destination Fired for vehicle: Silverado
Session ended!

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Demo

Demo



What's left to do?

- Persistent Connection
- GUI
- API
- Time Steps
- Unit Tests

