

MICHIGAN STATE

U N I V E R S I T Y

Project Plan

The Matrix

The Capstone Experience

Team GM

Sam Moore
Duncan Young
Matt Wein

Department of Computer Science and Engineering
Michigan State University

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

Project Overview

- A vehicle simulator
- GM in-vehicle applications need a way to test
- Allows them to trigger custom events with response
- OnStar example
- Caravan example



Functional Specifications

- Simulation
 - Iterate over sessions & event callback
- Setting up simulation
 - Library - sets up session and sends over WCF
- REST data reception
 - WCF listener
- Web client



Design Specifications - Library

- GM imports library
- Sets up simulation scenario
- Executes simulation
- Handles asynchronous response



Design Specifications - Library Mockup

```
1 using Matrix;
2
3 class MatrixClient
4 {
5     public static void Main(string[] args)
6     {
7         Simulator.config("http://www.myserver.com", 80);
8
9         Vehicle vehicle = Simulator.AddVehicle();
10        vehicle.SetStartingLocation("East Lansing, MI 48823");
11        vehicle.SetDestination("Tampa, FL 33602");
12
13        LocationEvent event = new Simulator.LocationEvent();
14        event.name = "Arrived at Destination";
15        event.location = v1.GetDestination();
16        event.callback = OnVehicleArrivedAtDestination;
17        vehicle.SetEventForLocation(event);
18
19        Simulator.Run();
20    }
21
22    public void OnVehicleArrivedAtDestination(EventData data)
23    {
24        Console.WriteLine("Vehicle arrived at destination: {0}", data.vehicle.GetName());
25
26        data.vehicle.SetDestination("East Lansing MI, 48823");
27    }
28 }
```

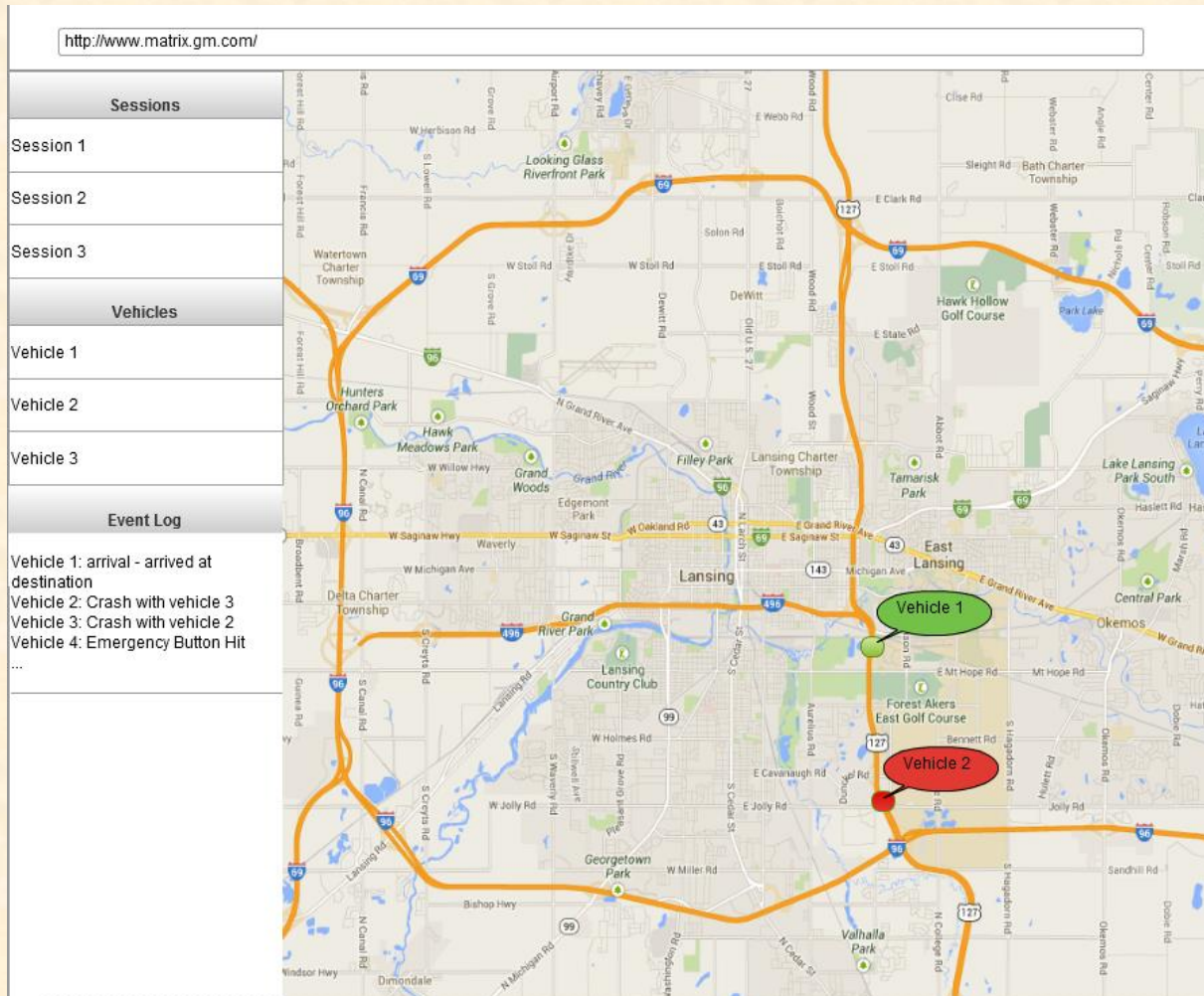


Design Specification - Web client

- Web Client for presentation
- Overview of simulations
- Visual description on map
- Ability to filter and log events



Design Specifications - Client mockup

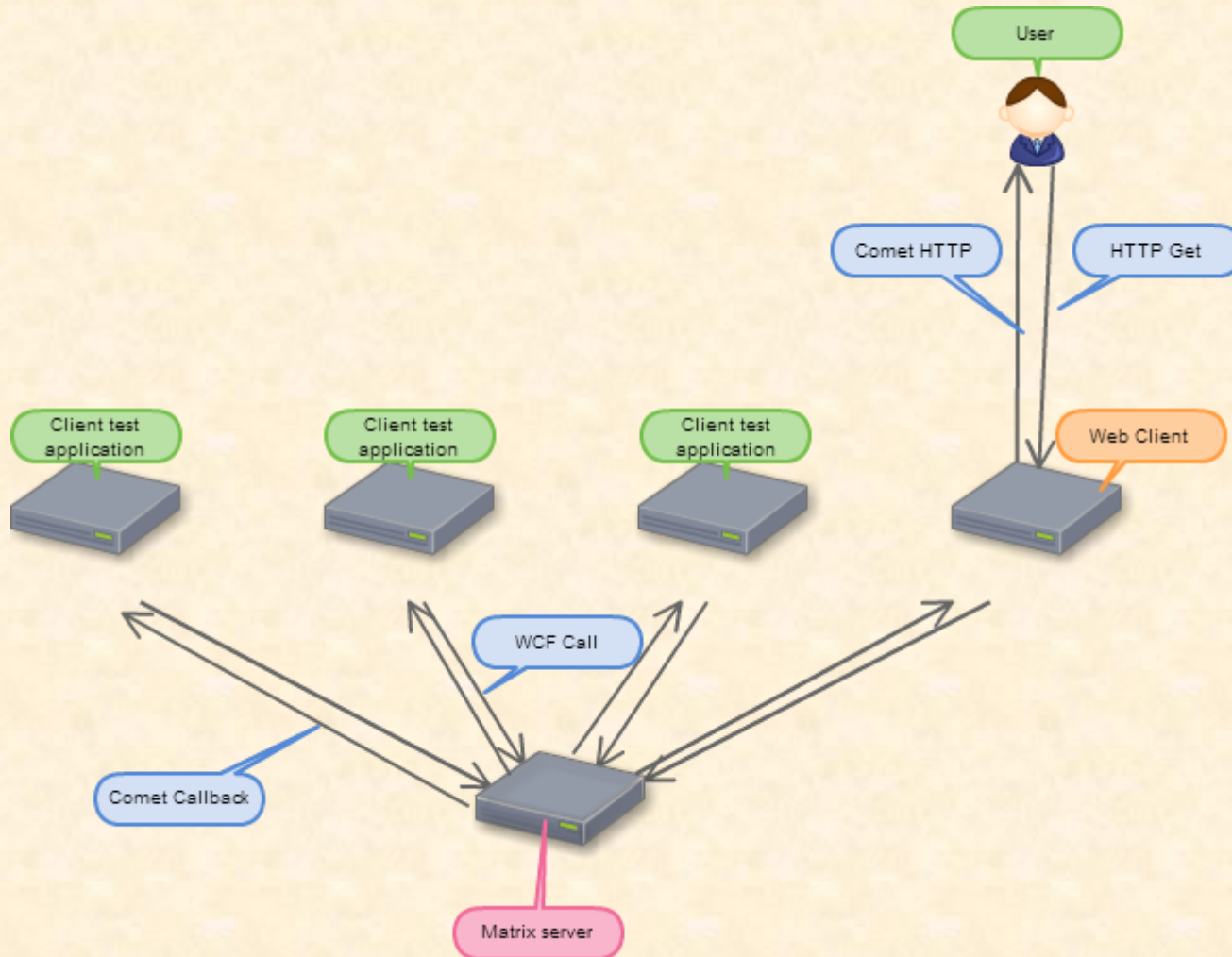


Technical Specifications

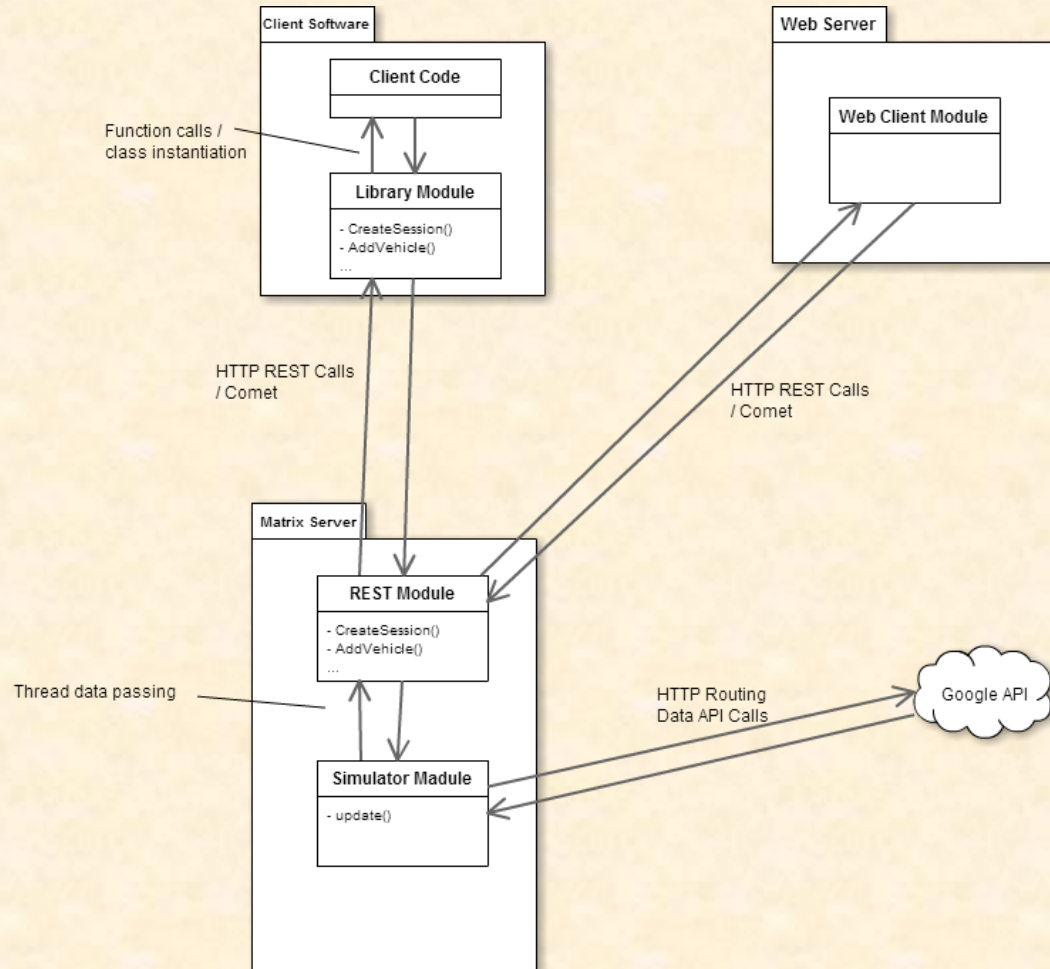
- **Core Simulator**
 - Main thread of native .NET application
- **REST service**
 - Second thread of native .NET application.
 - WCF listener
- **.NET Library**
 - WCF client / Comet
- **Web Client**
 - ASP.NET MVC 4 and Google Maps API



System Architecture



System Architecture



System Components

- Hardware Platforms
 - Dell PowerEdge R210 - Any server
 - Development Machines
- Software Platforms / Technologies
 - Windows Server 2008
 - .Net/WCF
 - IIS



Testing

- Web client acts as a testing interface
- Unit test project for library
- Set up a use test session with GM employees



Risks

- WCF experience
 - Reading tutorials
- Google Maps API Functionality
 - More documentation / experimentation
- Discrete Timer, definition of “time step”
 - Real-time vs sim time - More talks with GM
- Scalability
 - Stress tests
- IIS and persistent connections
 - Read workaround articles

