



Feasibility of Crowd-sourcing and Efficient Transmission of Geospatial Data over Vehicular Social Networks



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Objectives

Using smart phones and sensors onboard vehicles to collect and process geospatial data

- Challenges: Heterogeneous geospatial data with dynamic status in vehicular networks
- Approaches: Construct a Data storage media - XML, parser, and XML schema
Create a reliable and reusable framework - Object model, Dynamically linked library

Harnessing popular social network applications to disseminate the geospatial data over vehicular networks, so as to support collaborations in transportation

- Challenges: High efficient requirement, should be easy to use for end users
- Approaches: Disseminate and display OBD Data on Twitter via Windows Phone smart phone – develop mobile application that works on a real time basis



Twitter



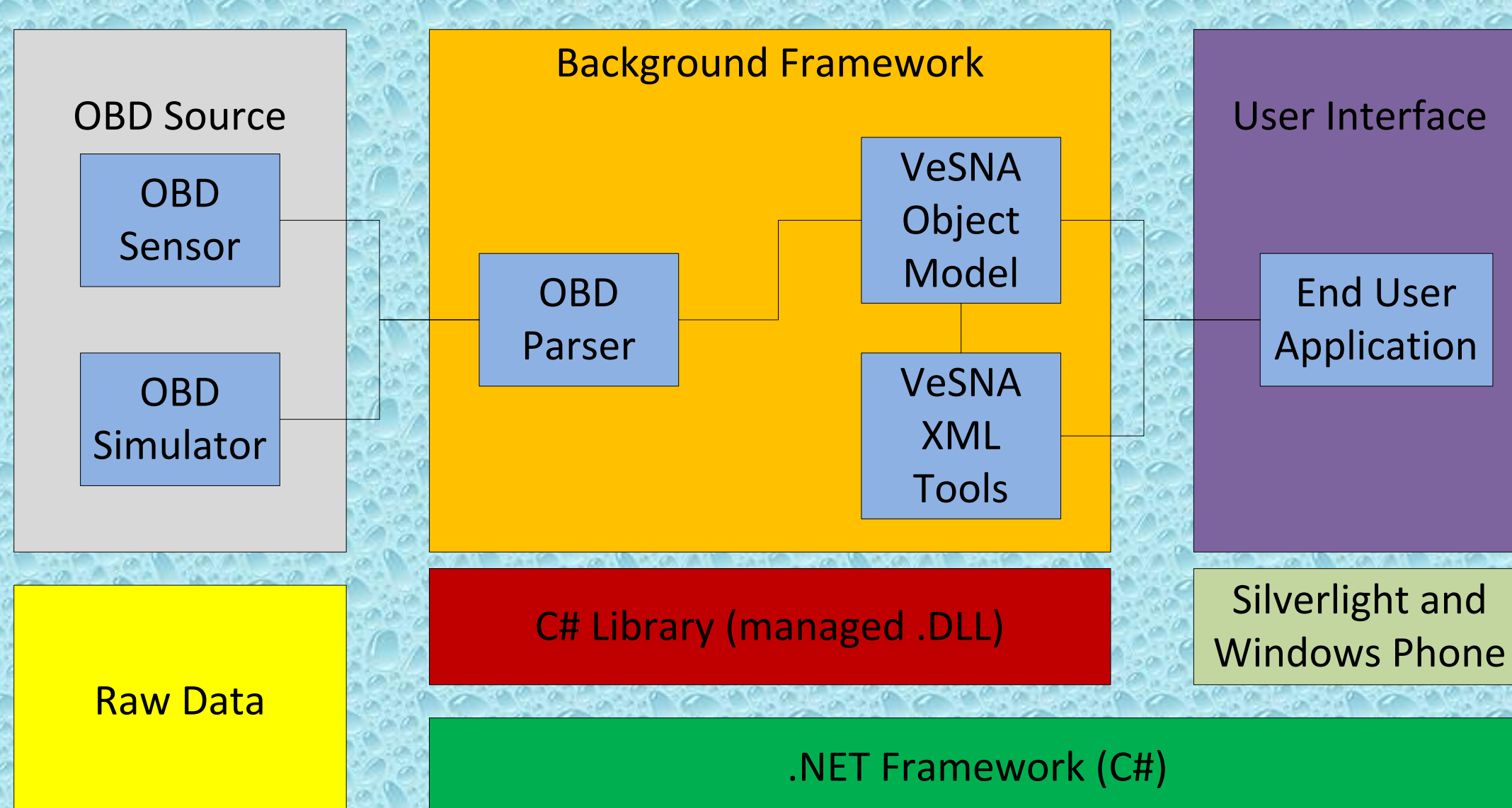
OBID - II



Windows Phone

Design Overview

Vehicular Social Network Applications (VeSNA) Project Overview



Architecture of the VSN application

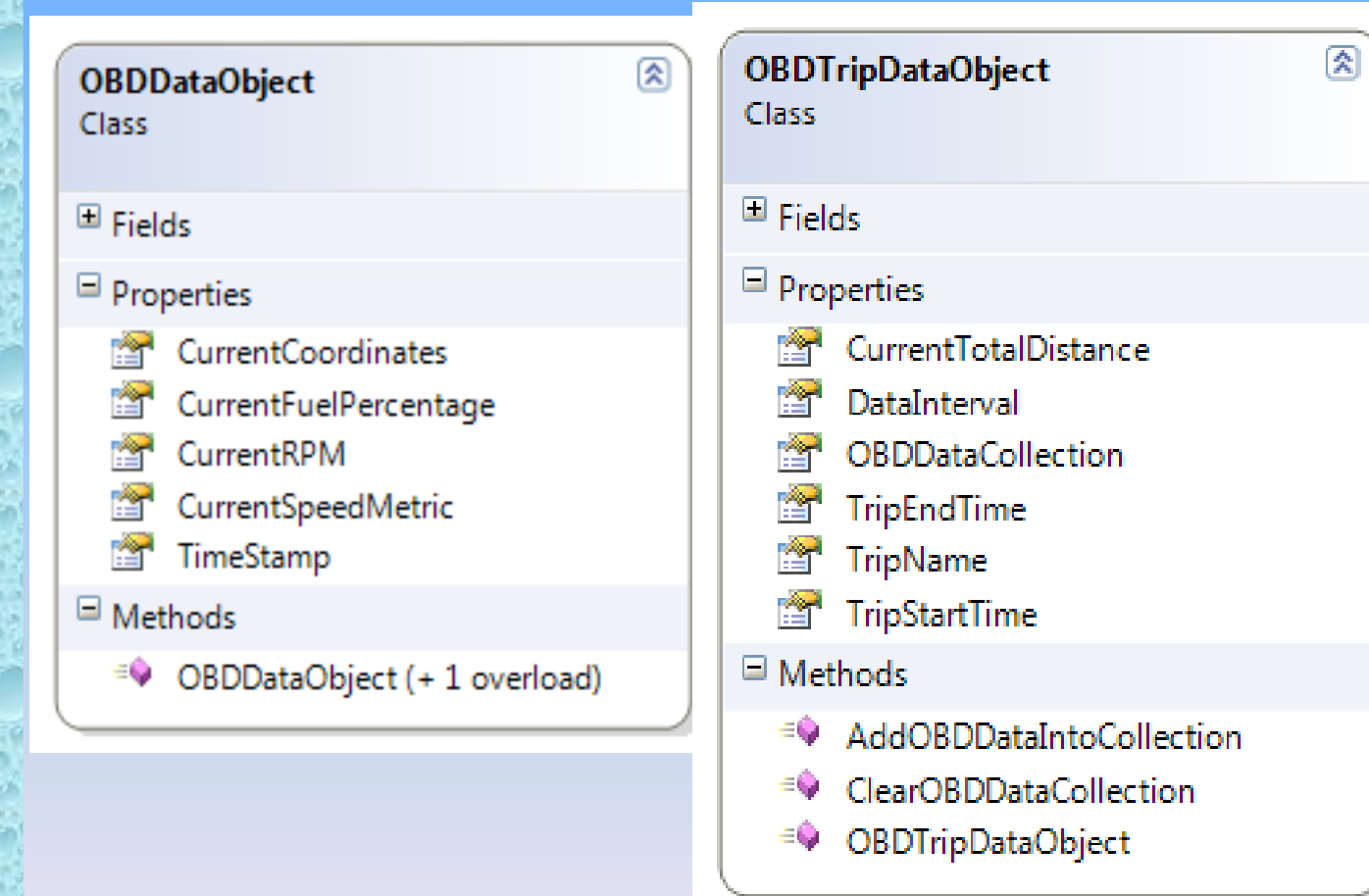
OBID Parser

Input:
An OBID Data String with the format [mode][PID][Data1][Data2]
E.g. "010C 244.0 0.0"
More info on http://en.wikipedia.org/wiki/OBD-II_PIDs

Output:
A corresponding object from the object model is created:
OBIDDataObject
OBIDTripDataObject

Internal Dictionary Entry:
`// Vehicle speed
_obidDictionary.Add("010C", new OBIDObject("V", "01", 1, (A, B) => return A; "Vehicle speed", "V", "010C", 8, 25, OBIDObject.IsObid));`

OBID Object Model



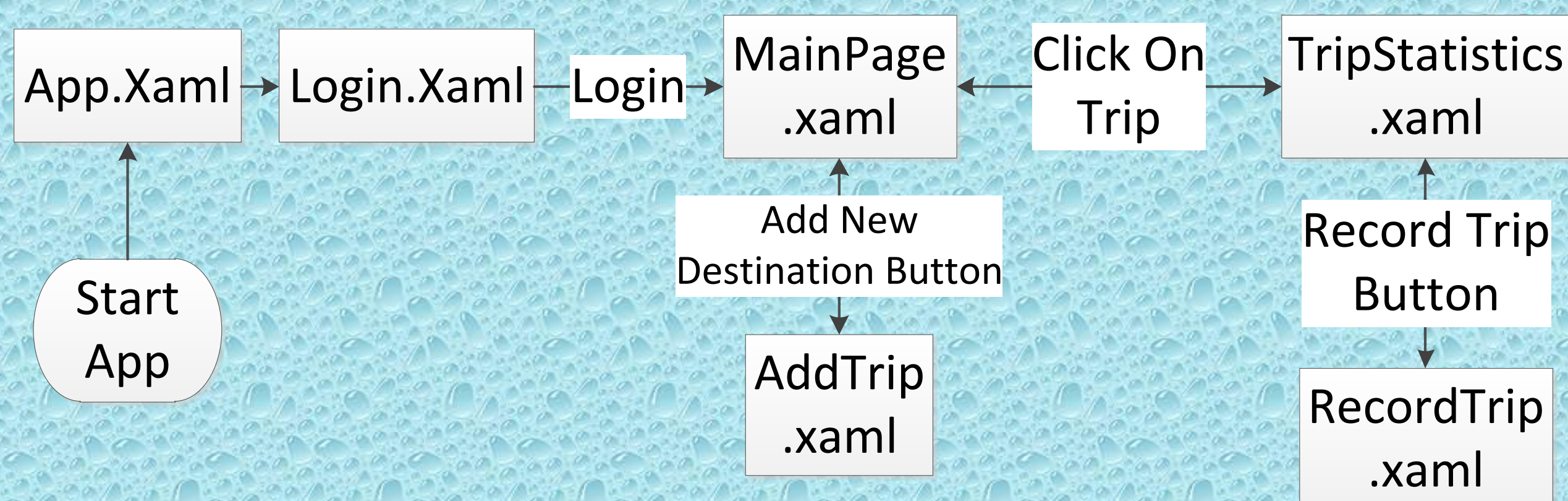
OBID XML Tools

Schema	Reader	Writer
• Rules to follow	• XML to Object Model	• Object Model to XML

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- This XML Schema was created by Sean Henderson, please email seanhenderson@hotmail.com for any questions -->
<OBIDDataSet>
  <TimeData>
    <TimeStamp>2012-04-05T01:16:24.2557922-07:00</TimeStamp>
    <TimeData>
      <PositionInfo>
        <CurrentLocation>[261.44757188466,294.237129452749]</CurrentLocation>
        <PositionInfo>
          <CurrentSpeedMetric>115.20340340919952</CurrentSpeedMetric>
          <CurrentRPM>2790.805971826861</CurrentRPM>
        </MovementInfo>
        <FuelInfo>
          <CurrentFuelPercentage>20.60331540210327</CurrentFuelPercentage>
        </FuelInfo>
      </OBIDDataSet>
```

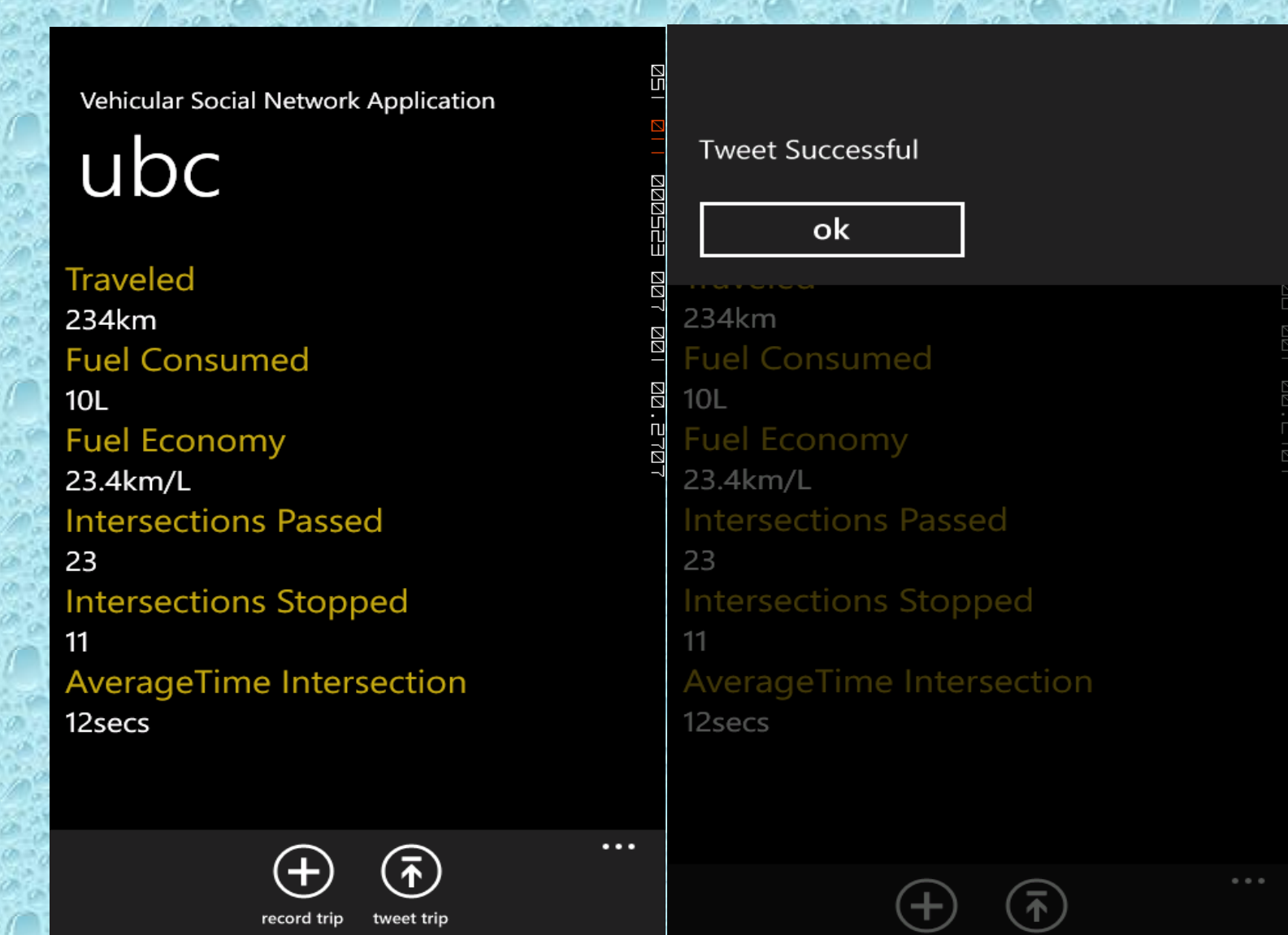
Modules of the data framework

Flow Chart of Windows Phone User Interface

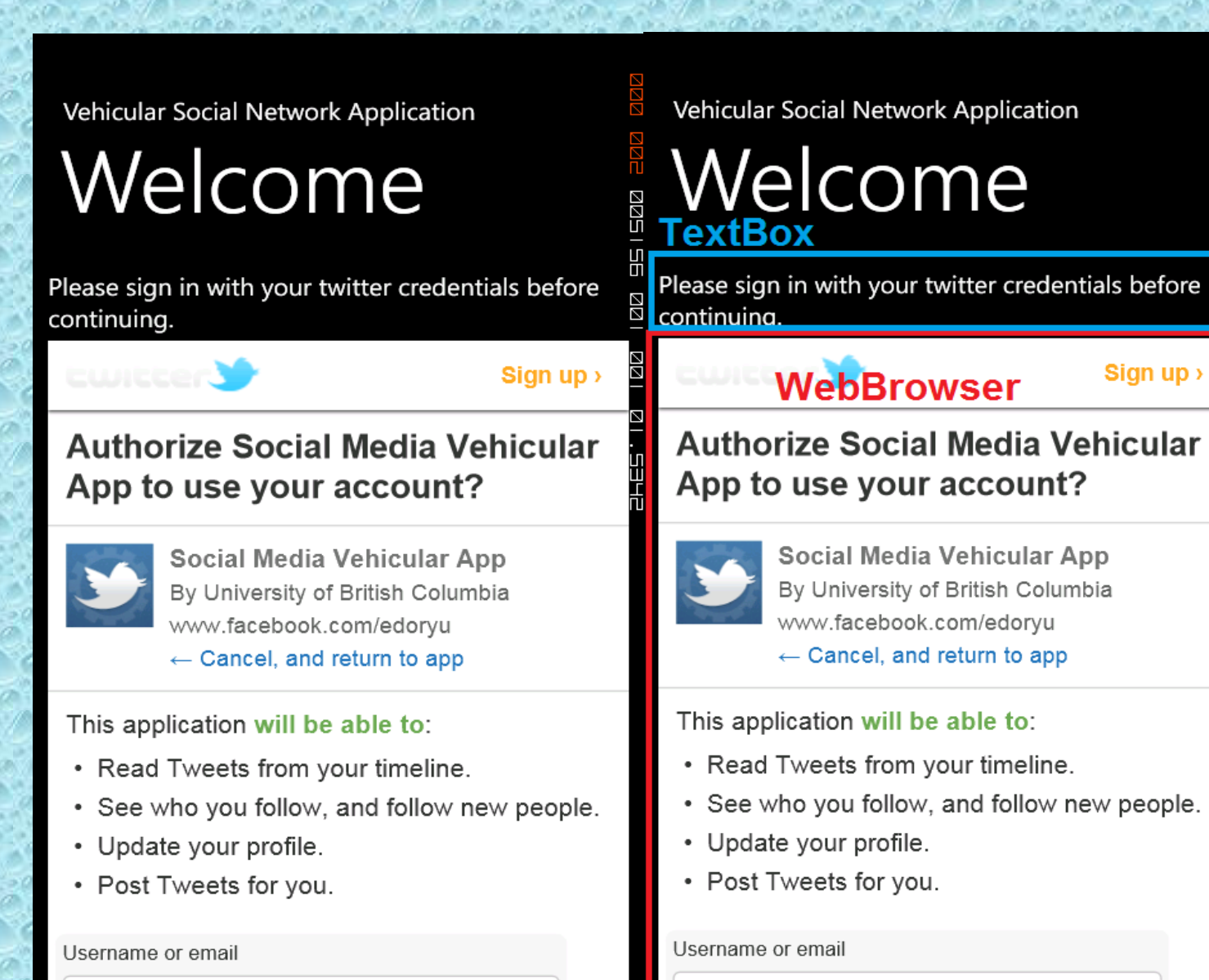


Demonstration Case: public travel and geospatial information through Twitter on Windows Phone

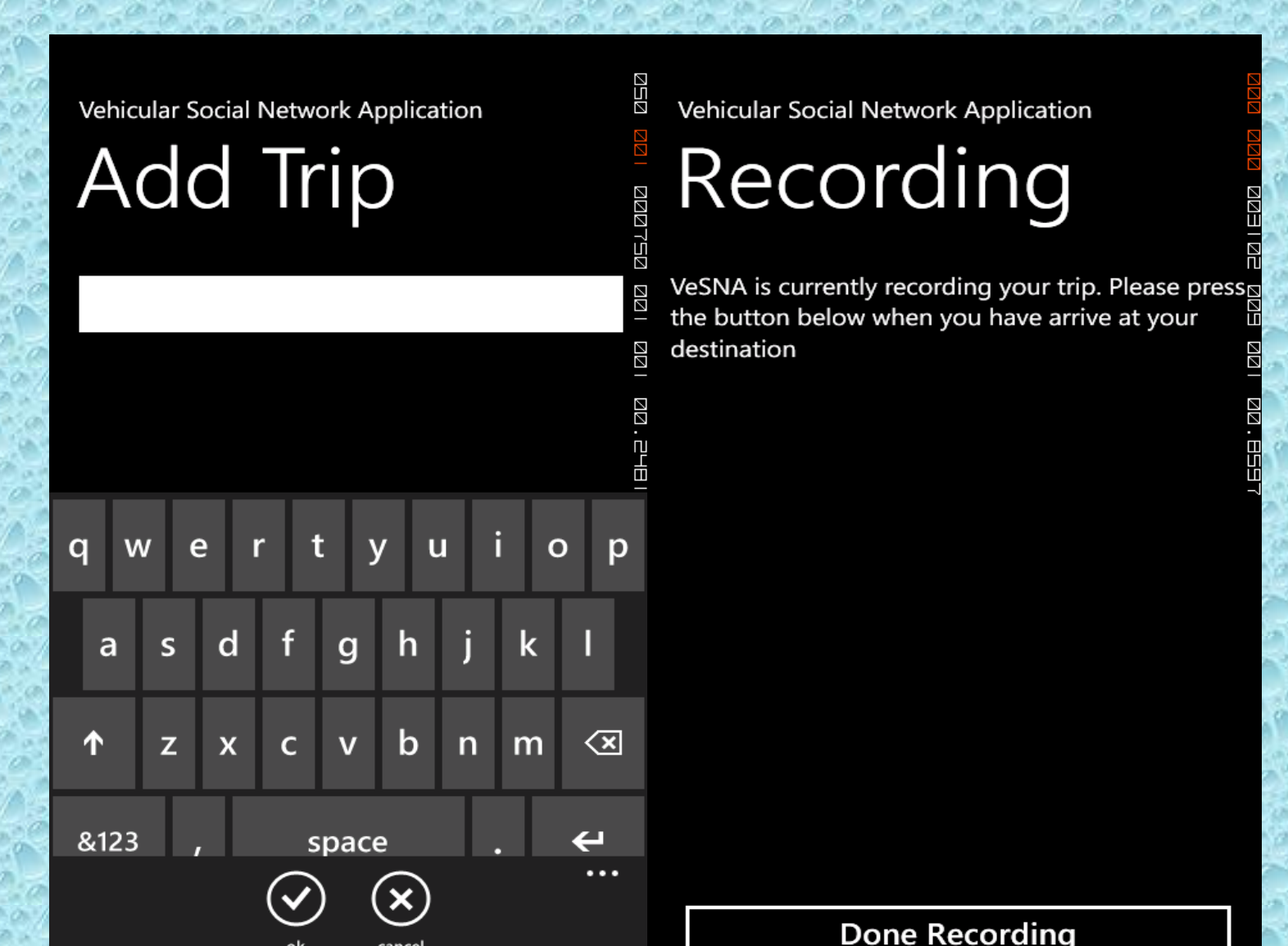
Trip Statistics



Login Page



Miscellaneous



Contributions

- This project provides a reusable data framework which can be used to process multiple real-time geospatial data in vehicular application areas
- It provides a convenient mobile application based on Twitter that can be easily used by people in vehicular scenarios
- It verifies the feasibility of disseminate geospatial data (i.e., OBD data) over vehicular environments through conventional social network application-Twitter

Evolutions

- Other versions of this application that can work in other mobile operating systems such as Android and iOS need to be developed
- More practical experiments about this application need to be demonstrated, especially for different OBD modules with different type of vehicles