

# Cloud and Cluster Database Management Project

## Project 1

Jonathan Jensen, Timothy Jensen, Nicholas Hoover, Matthew Pate

### 1 Tasks

1. Map the given data to the key/value model, document model, or column family model.

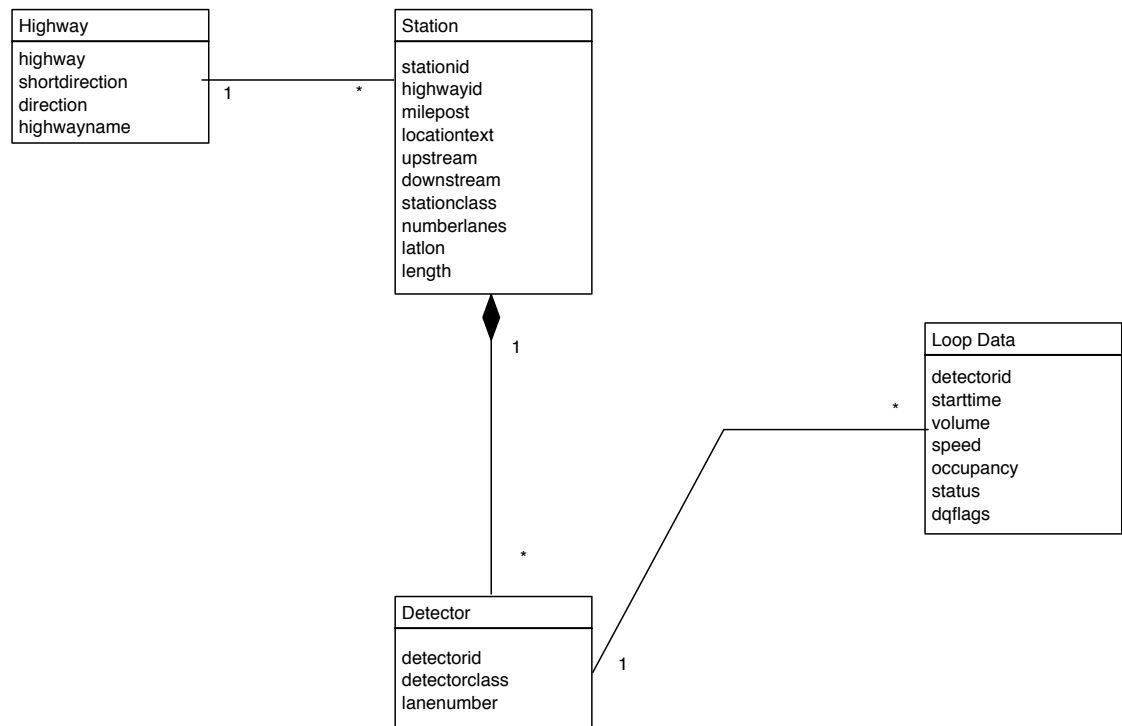


Figure 1: UML Diagram of NoSQL Aggregates for Document Model

Example Aggregates for Document Model:

```
// -----
// Freeway Stations
// -----
{
  "stationid" : ,
  "highwayid" : ,
  "milepost" : ,
  "locationtext" : ,
```

```
// -----
// Freeway Loop Data
// -----
{
  "detectorid" : ,
  "starttime" : ,
  "volume" : ,
  "speed" : ,
```

```

"upstream" : ,                "occupancy" : ,
"downstream" : ,              "status" : ,
"stationclass" : ,            "dqflags" :
"numberlanes" : ,              }
"lat" : ,
"lon" : ,                      // -----
"length" :                     // Highway
"freeway_detectors" : [        // -----
{                                {
  "detectorid" : ,              "highway" : ,
  "detectorclass" : ,           "shortdirection" : ,
  "lanenumber" : ,              "direction" : ,
},                               "highwayname" :
{                                }
  /.../
}
]
}

```

2. Describe in words or pseudo-code how you could answer the queries below.

- a. Count high speeds: Find the number of speeds  $> 100$  in the data set.

```

In the FREEWAY_LOOPDATA table,
  for all rows{
    if SPEED > 100
      increment counter
  }
return counter
}

```

- b. Volume: Find the total volume for the station Foster NB for Sept 21, 2011.

```

In the FREEWAY_STATIONS table,
  scan LOCATION_TEXT column for "Foster NB"
  FS_ID = Station_ID
In the FREEWAY_DETECTORS table,
  for all rows where STATION_ID == FS_ID{
    FD_ID = DETECTOR_ID
    In the FREEWAY_LOOPDATA table:
      for all rows where DETECTOR_ID = FD_ID{
        if STARTTIME includes 9/21/2011
          TOTAL_VOLUME = TOTAL_VOLUME + VOLUME
      }
  }
}

```

```
}  
}
```

- c. Peak Period Travel Times: Find the average travel time for 7-9AM and 4-6PM on September 22, 2011 for station Foster NB. Report travel time in seconds. You should have one average travel time for 7-9AM and one average travel time for 4-6pm.

```
In the FREEWAY_STATIONS table,  
  scan LOCATION_TEXT for "Foster NB"  
    STATION_ID_KEY = FREEWAY_STATIONS.STATION_ID  
    LENGTH = FREEWAY_STATIONS.LENGTH
```

- d. Route Finding: Find a route from Johnson Creek to Columbia Blvd on I-205 NB using the upstream and downstream fields.

```
In the FREEWAY_STATIONS table,  
  next_station_id = downstream where locationtext == "Johnson Cr NB"  
  while (locationtext != "Columbia to I-205 NB" where stationid ==  
    next_station_id){  
    next_station_id = downstream  
  }
```

- e. Update: Update stationid 1140 to have a length of 2.3.

```
In the FREEWAY_STATIONS table  
  set (1140, 2.3)
```