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University of Bedfordshire

MyHealthAvatar: A Lifetime Visual Analytics Companion for Citizen Well-being

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University of Bedfordshire, UK

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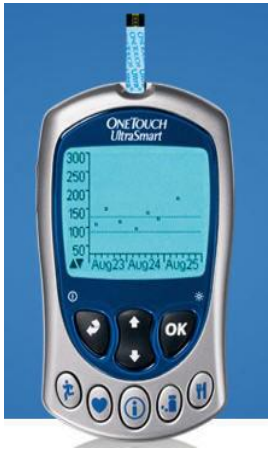
Fitbit

twitter

Moves

Nike FuelBand



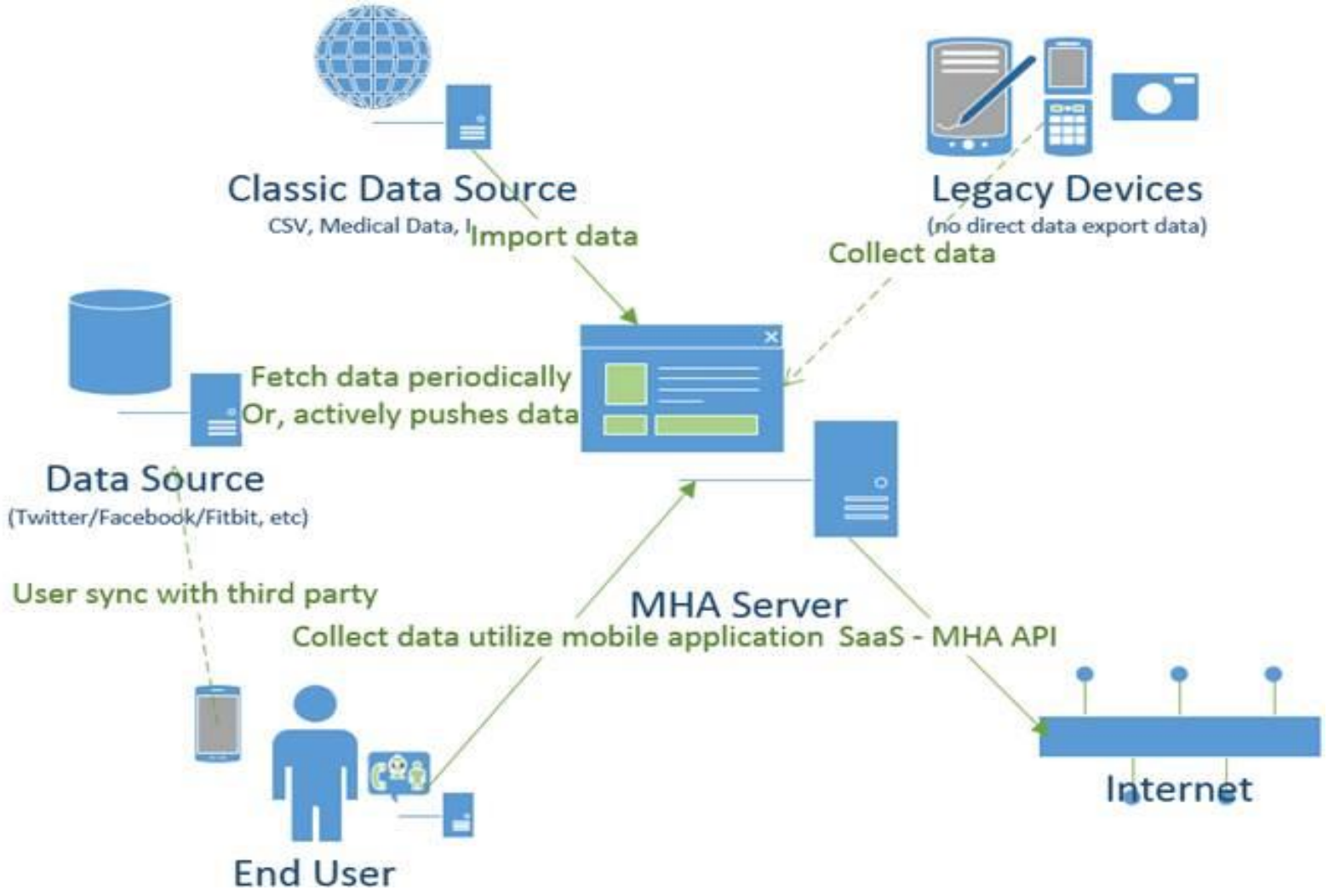
LifeScan

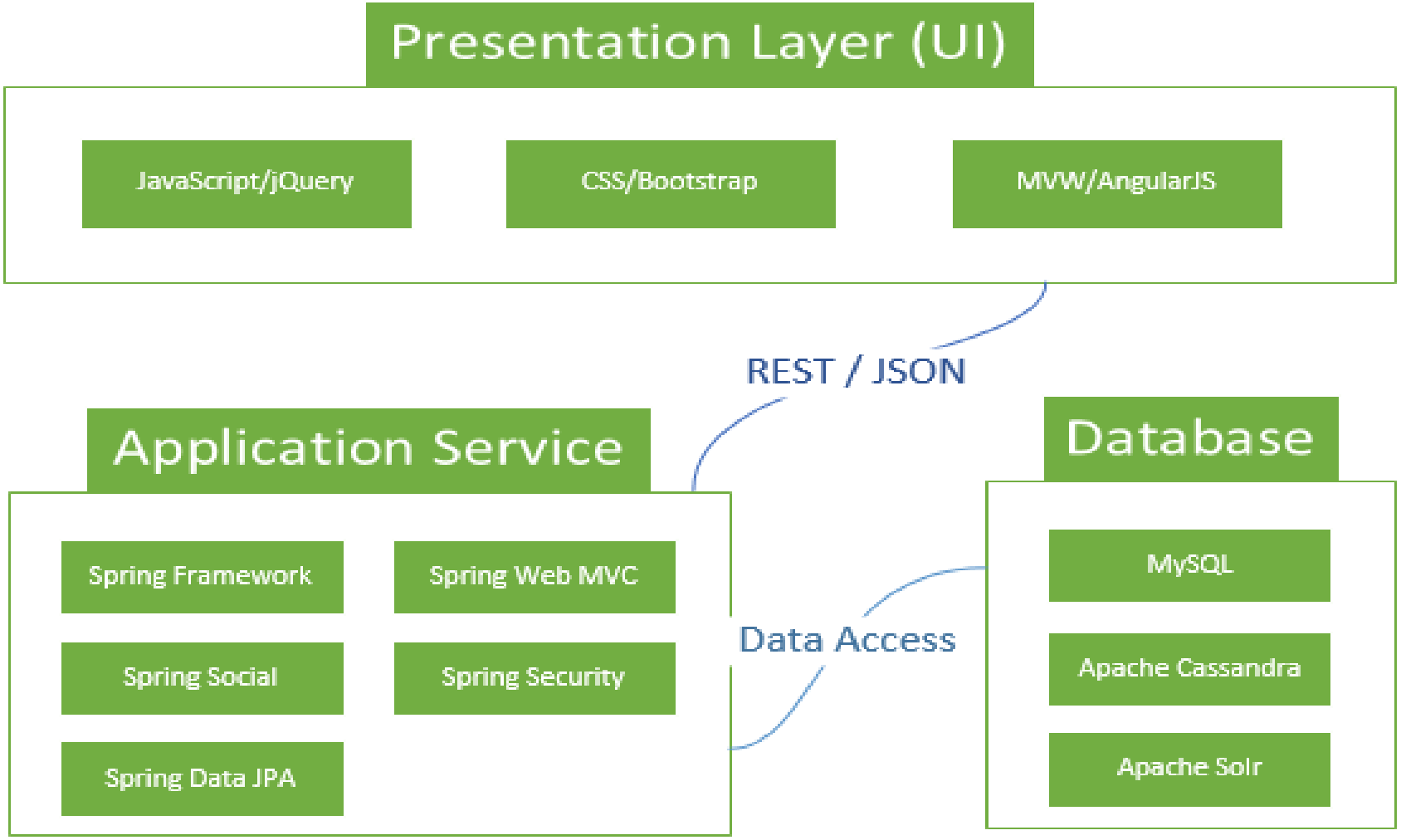
iHealth

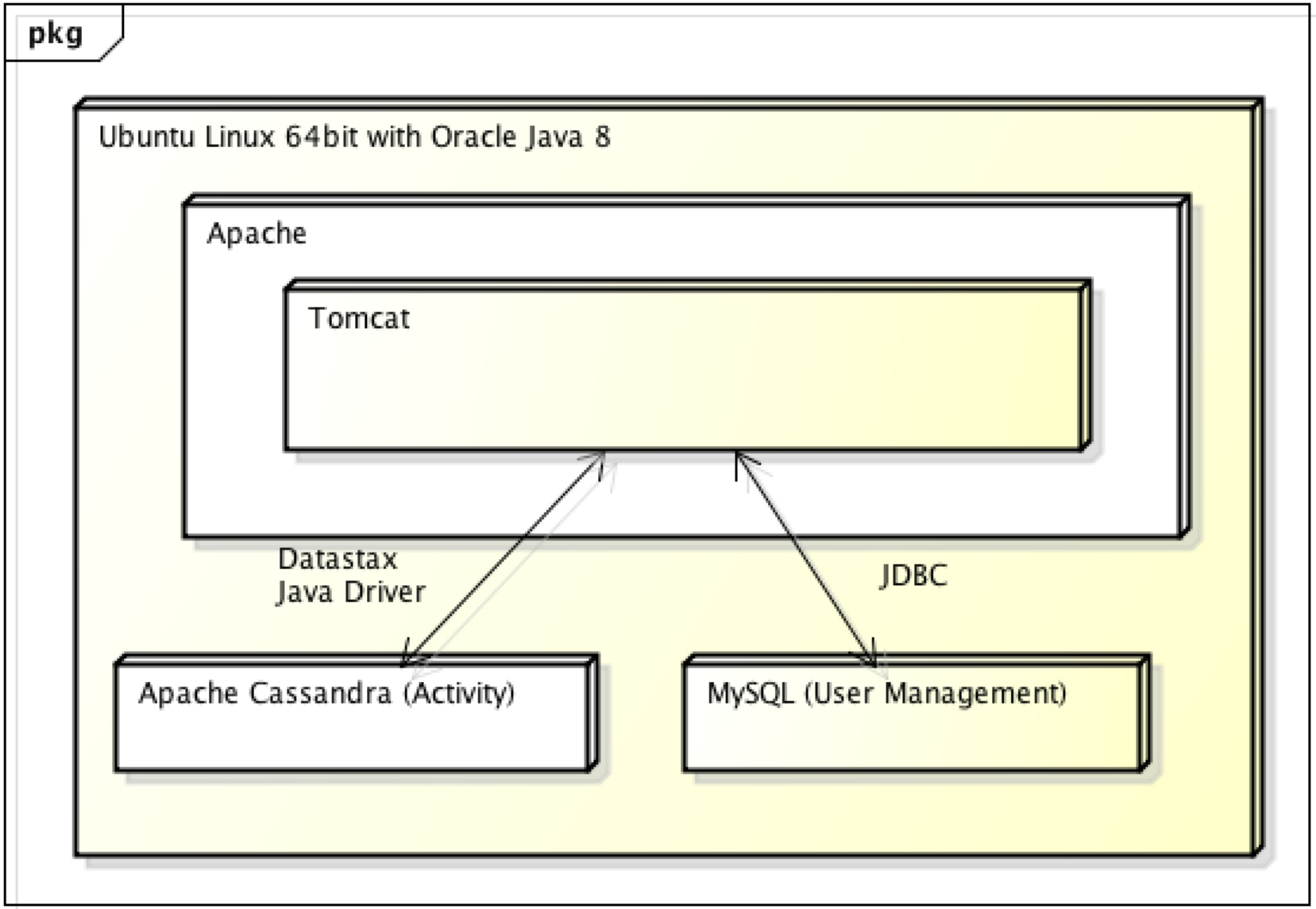
Withings

TABLE I: Pros and Cons of existing life-logging health data collection tools

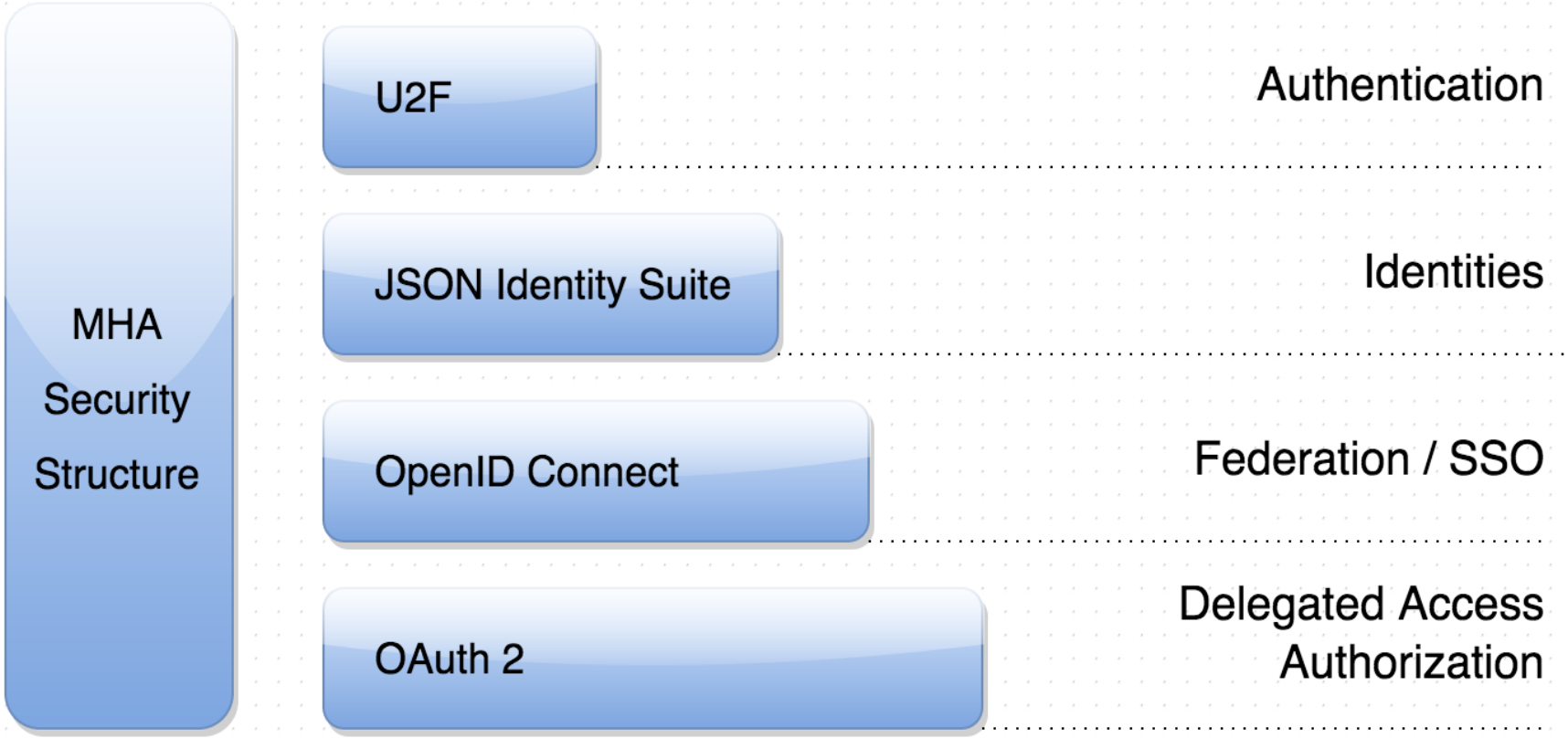
	Tools	Data	Pros	Cons
Mobile Apps	**Moves**	route, steps	Android and iOS	Moderate battery longevity
	Endomondo	route, distance, speed	Community sharing, Android and iOS	Short battery longevity, not work indoor
	MyTracks	route, distance, speed	view data live, API support, only Android	Short battery longevity, not work indoor
	Cardiio	heart rate	Touch free, support iOS	Low accuracy, no API support
	Emotionsense	mood	Context-awareness by sampling strategies	No API support, only research purpose
Device	**Fitbit**	steps, calorie, food	reasonable cost, Android and iOS	Limited API
	Withings	steps, SpO2, sleep	reasonable cost, Android and iOS	Reasonable API
	Nike+	steps, calorie, food	reasonable cost, Android and iOS	Variations on accuracy
	Jawbone Up	steps, distance, calorie	reasonable cost, Android and iOS	Limited API
Social Media	**Twitter**	mood	Large volume of dataset	Privacy and legal issue
	Facebook	mood	Large volume of dataset	Privacy and legal issue
Platform	**HealthVault**	multiple types of data	many devices and apps, privacy and security	Focus more on medical record.
	MyFitnessCompanion	multiple types of data	Real-time visualization	No API


Classic Data Source
CSV, Medical Data, I
Import data
Legacy Devices
(no direct data export data)
Collect data
Fetch data periodically
Or, actively pushes data
Data Source
(Twitter/Facebook/Fitbit, etc)
User sync with third party
MHA Server
Collect data utilize mobile application SaaS - MHA API
Internet
End User


Presentation Layer (UI)
JavaScript/jQuery
CSS/Bootstrap
MVW/AngularJS
REST / JSON
Application Service
Spring Framework
Spring Web MVC
Spring Social
Spring Security
Spring Data JPA
Data Access
Database
MySQL
Apache Cassandra
Apache Solr


pkg
Ubuntu Linux 64bit with Oracle Java 8
Apache
Tomcat
Datastax
Java Driver
JDBC
Apache Cassandra (Activity)
MySQL (User Management)

- **U2F** – Universal Second Factor protocol (e.g. Google Authenticator), allows the MHA to argument its security of password infrastructure
- **JavaScript Object Notation (JSON) based identity protocol**, JSON Web Toke (JWT) encode token, JSON Web Key (JWK) encryption, JSON Web Signature (JWS) digital signature
- **OpenID Connect** (effectively 3rd version of OpenID), allows Federation and Single Sign On (SSO), it is built atop of OAuth 2.
- **OAuth 2** delegate access to third-parties applications, reduce password sharing between users and third-parties.


MHA
Security
Structure
U2F
JSON Identity Suite
OpenID Connect
OAuth 2
Authentication
Identities
Federation / SSO
Delegated Access
Authorization

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MyHealthAvatar Repository

- Cassandra 2.x Cluster (4+ nodes)
- Linode Public Cloud Nodes and Forth Private Cloud Nodes
- RDF Repository (Virtuosso)
- Raw data stored in Cassandra: activities, general health, user tagging (input), etc.
- Extracted knowledge store in RDF repository (data mining).

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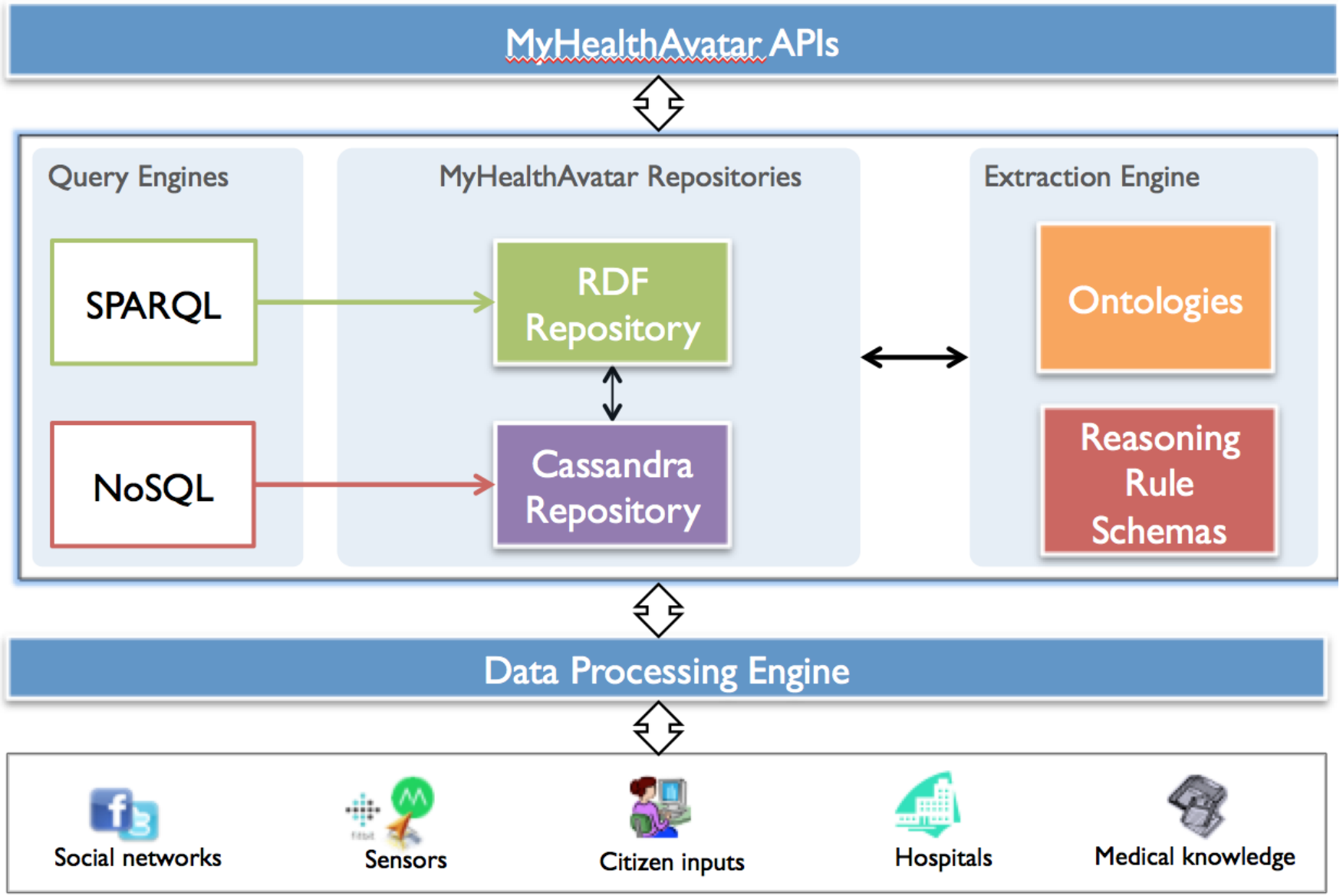

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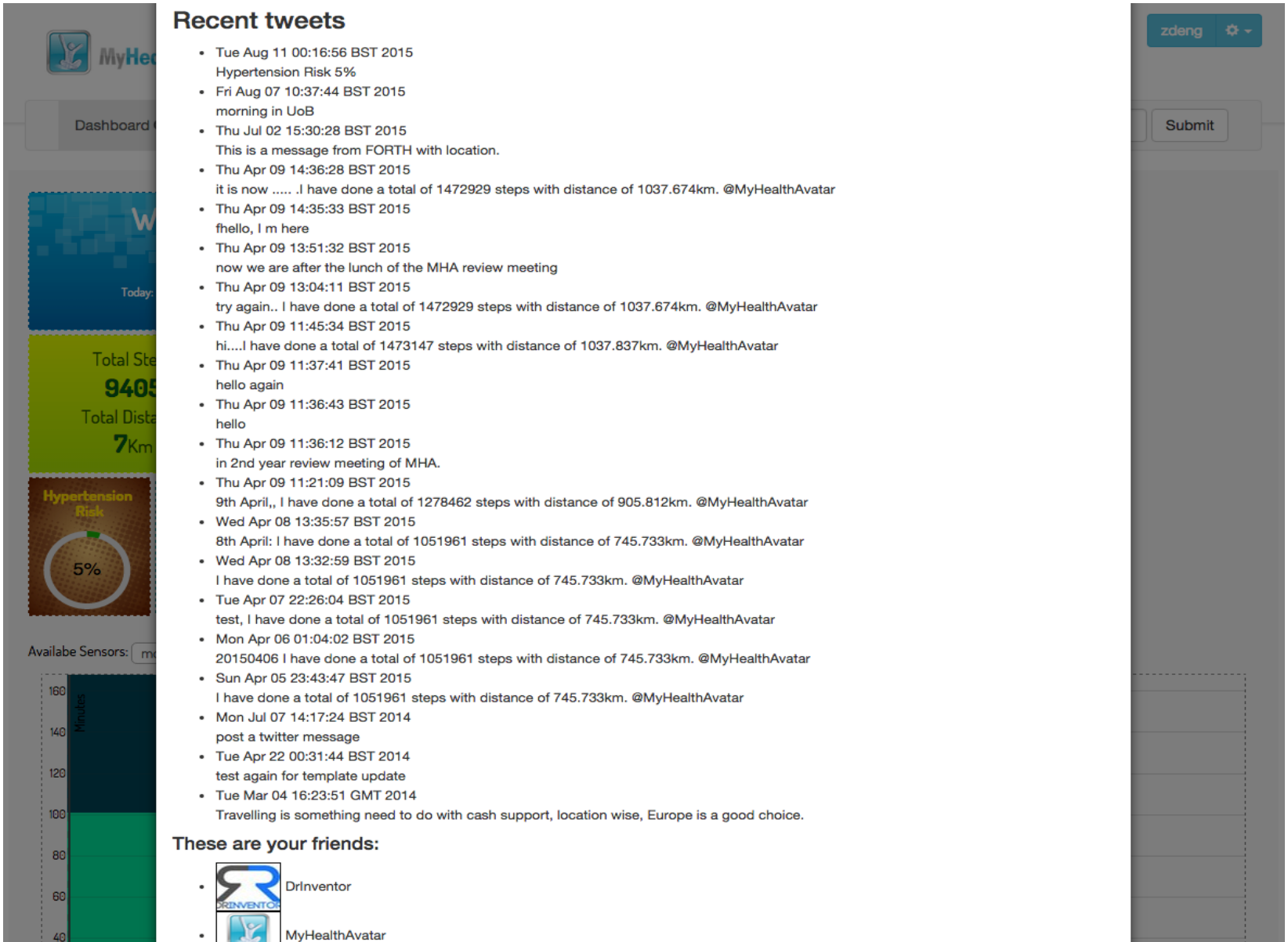

Recent tweets

- Tue Aug 11 00:16:56 BST 2015
  Hypertension Risk 5%
- Fri Aug 07 10:37:44 BST 2015
  morning in UoB
- Thu Jul 02 15:30:28 BST 2015
  This is a message from FORTH with location.
- Thu Apr 09 14:36:28 BST 2015
  it is now ..... .I have done a total of 1472929 steps with distance of 1037.674km. @MyHealthAvatar
- Thu Apr 09 14:35:33 BST 2015
  fhello, I m here
- Thu Apr 09 13:51:32 BST 2015
  now we are after the lunch of the MHA review meeting
- Thu Apr 09 13:04:11 BST 2015
  try again.. I have done a total of 1472929 steps with distance of 1037.674km. @MyHealthAvatar
- Thu Apr 09 11:45:34 BST 2015
  hi....I have done a total of 1473147 steps with distance of 1037.837km. @MyHealthAvatar
- Thu Apr 09 11:37:41 BST 2015
  hello again
- Thu Apr 09 11:36:43 BST 2015
  hello
- Thu Apr 09 11:36:12 BST 2015
  in 2nd year review meeting of MHA.
- Thu Apr 09 11:21:09 BST 2015
  9th April,, I have done a total of 1278462 steps with distance of 905.812km. @MyHealthAvatar
- Wed Apr 08 13:35:57 BST 2015
  8th April: I have done a total of 1051961 steps with distance of 745.733km. @MyHealthAvatar
- Wed Apr 08 13:32:59 BST 2015
  I have done a total of 1051961 steps with distance of 745.733km. @MyHealthAvatar
- Tue Apr 07 22:26:04 BST 2015
  test, I have done a total of 1051961 steps with distance of 745.733km. @MyHealthAvatar
- Mon Apr 06 01:04:02 BST 2015
  20150406 I have done a total of 1051961 steps with distance of 745.733km. @MyHealthAvatar
- Sun Apr 05 23:43:47 BST 2015
  I have done a total of 1051961 steps with distance of 745.733km. @MyHealthAvatar
- Mon Jul 07 14:17:24 BST 2014
  post a twitter message
- Tue Apr 22 00:31:44 BST 2014
  test again for template update
- Tue Mar 04 16:23:51 GMT 2014
  Travelling is something need to do with cash support, location wise, Europe is a good choice.

These are your friends:

- DrInventor
- MyHealthAvatar

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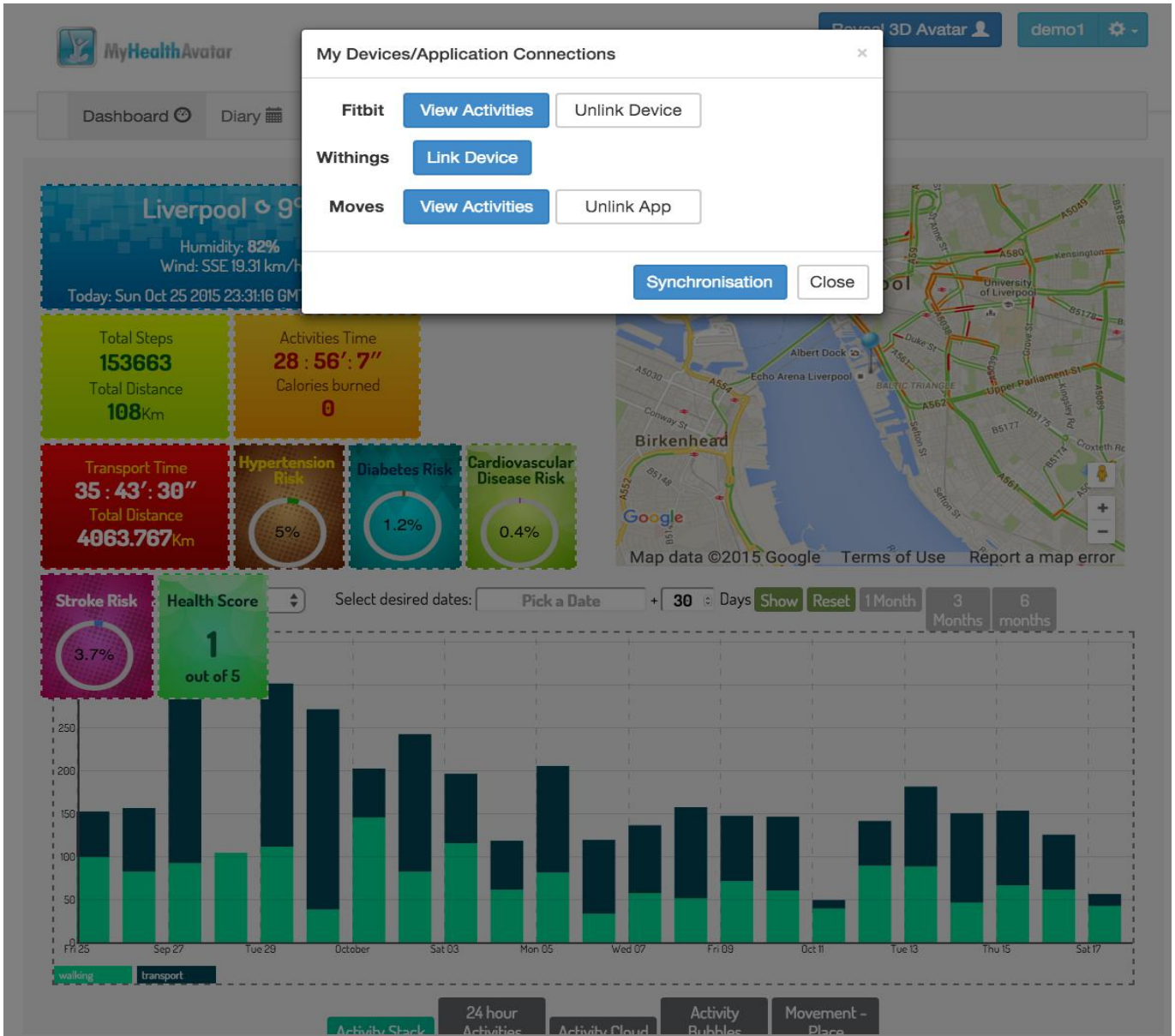

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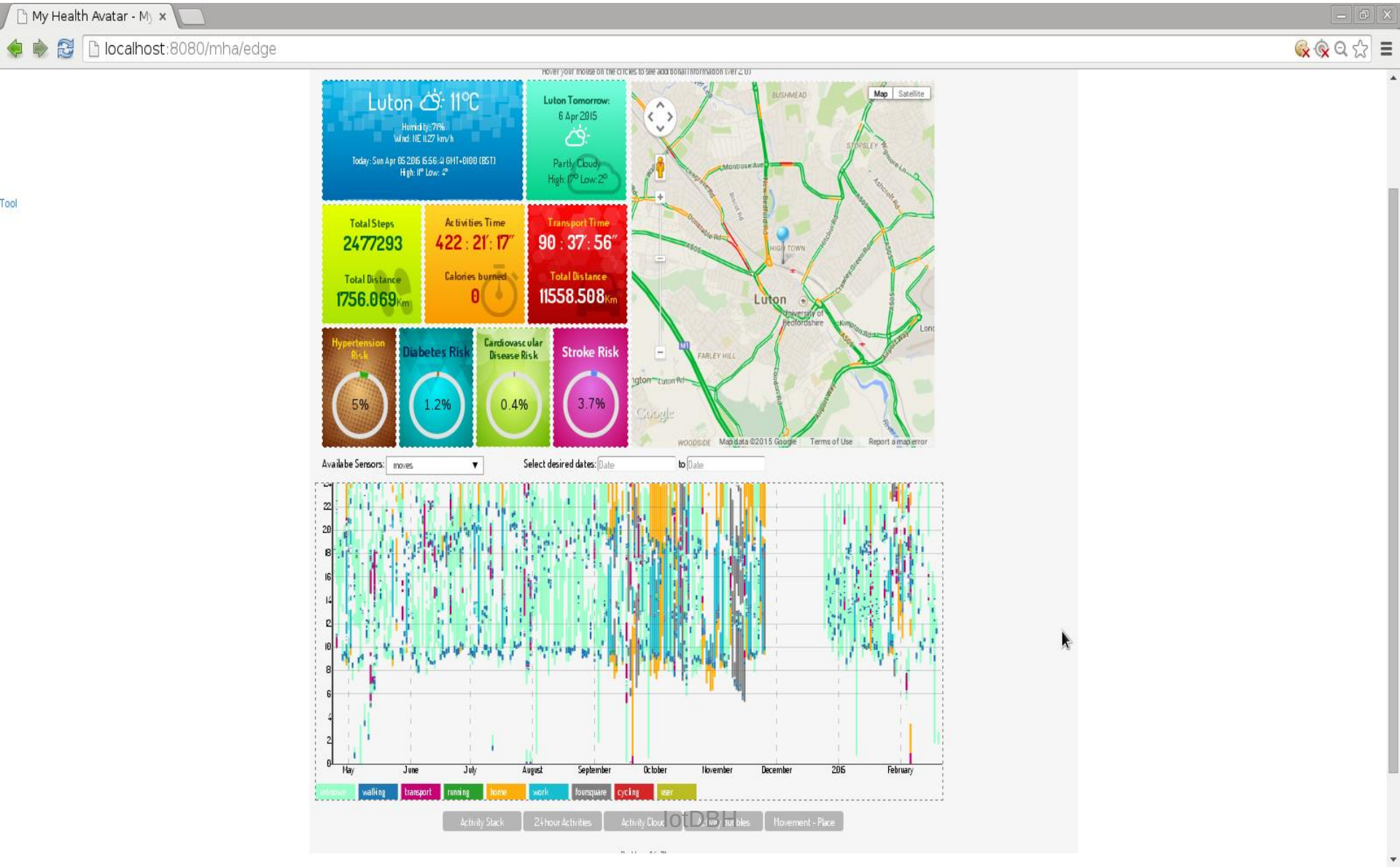
Visual Analytics Components

- Dashboard
  - Summarisation, filtering
- Timeline
  - Temporal visualisation, filtering, clustering, multiscale, integrated analytics
- Diary
  - Temporal visualisation, filtering, clustering
  - human input, Integrated analytics
- Map
  - Spatial-temporal visualisation, integrated analytics
- ClockView
  - Visualise daily events in a radial layout

Dashboard


My Health Avatar - M
localhost:8080/mha/edge
Luton 11°C
Humidity: 71%
Wind: NE 11.27 km/h
Today: Sun Apr 05 2015 15:56:41 GMT+0100 (BST)
High: 11° Low: 2°
Luton Tomorrow:
6 Apr 2015
Partly Cloudy
High: 10° Low: 2°
Total Steps
2477293
Total Distance
1756.069Km
Activities Time
422 : 21' : 17"
Calories burned
0
Transport Time
90 : 37' : 56"
Total Distance
11558.508Km
Hypertension Risk
5%
Diabetes Risk
1.2%
Cardiovascular Disease Risk
0.4%
Stroke Risk
3.7%
Map
Satellite
Luton
Availabe Sensors:
moves
Select desired dates:
Date
to
Date
May
June
July
August
September
October
November
December
2015
February
unknown
walking
transport
running
home
work
foursquare
cycling
user
Activity Stack
24-hour Activities
Movement - Place

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Event/Activity Editor

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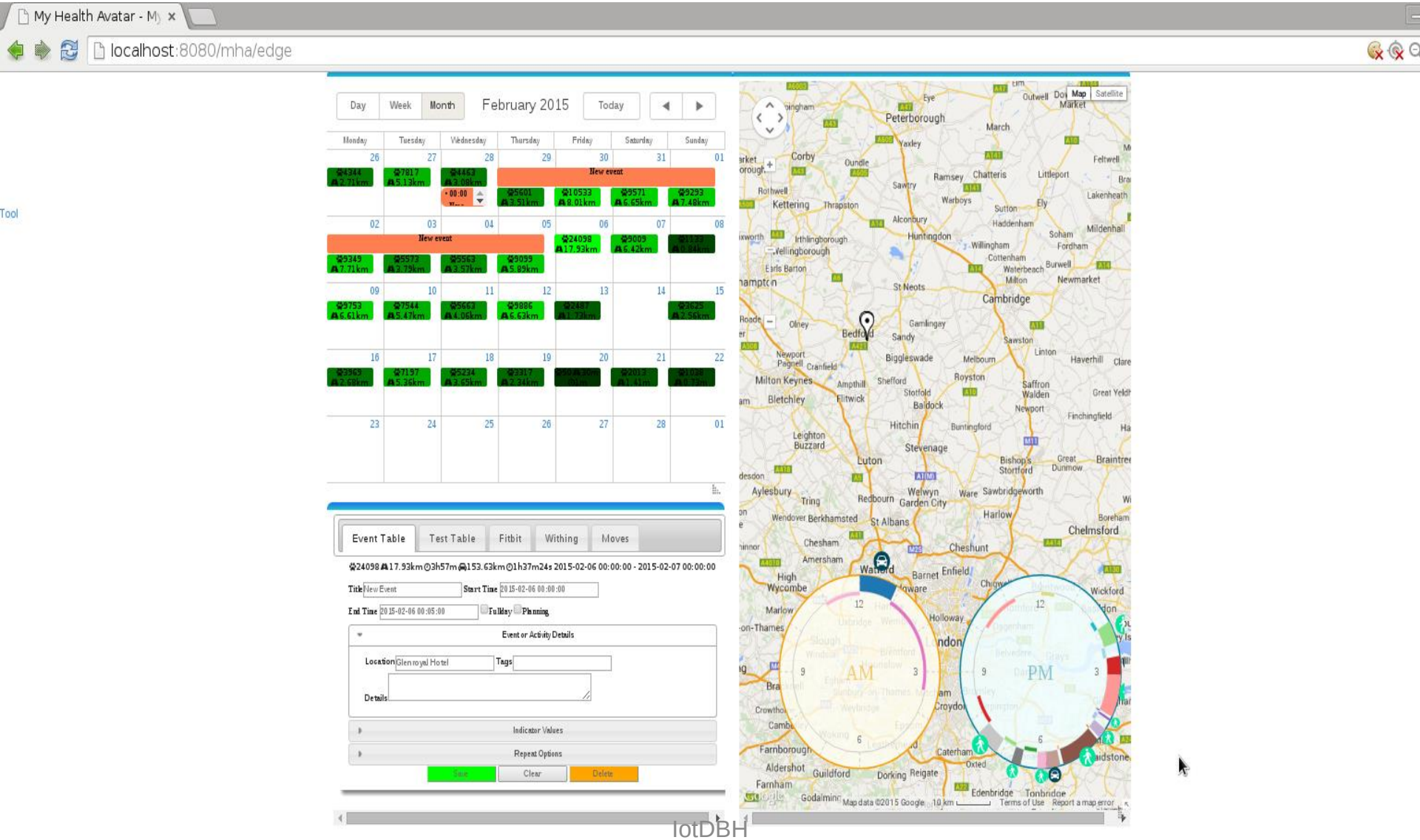
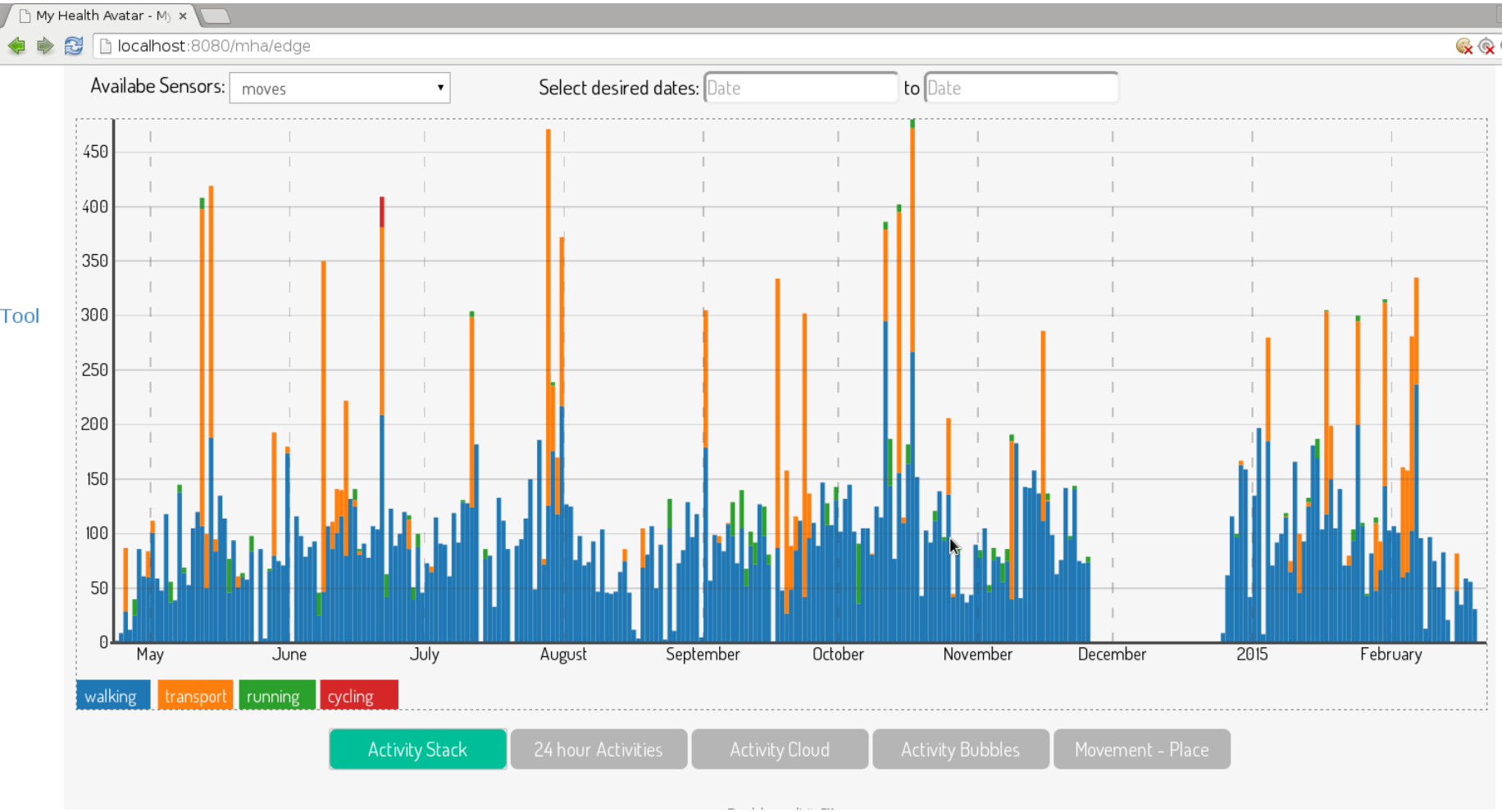


IotDBH

Timeline - Activity Stack



Timeline - Daily Activity

Tool

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Map

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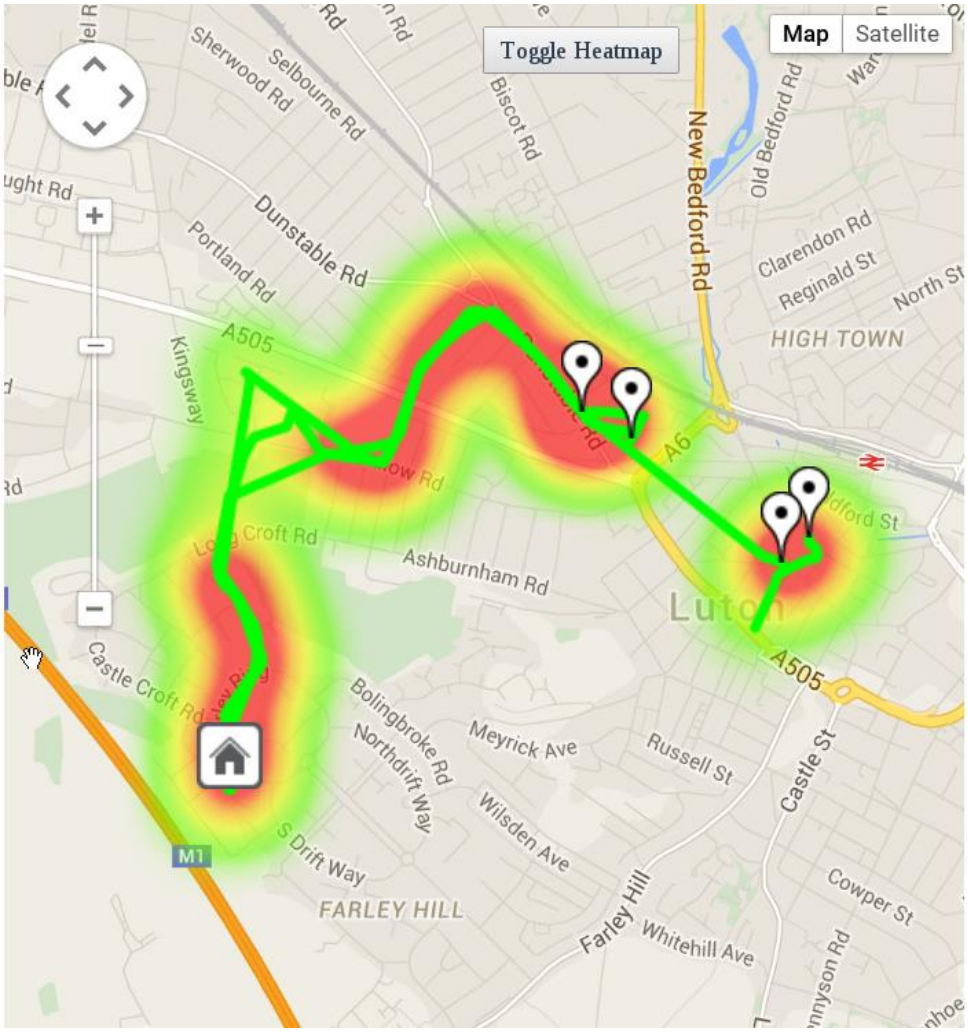
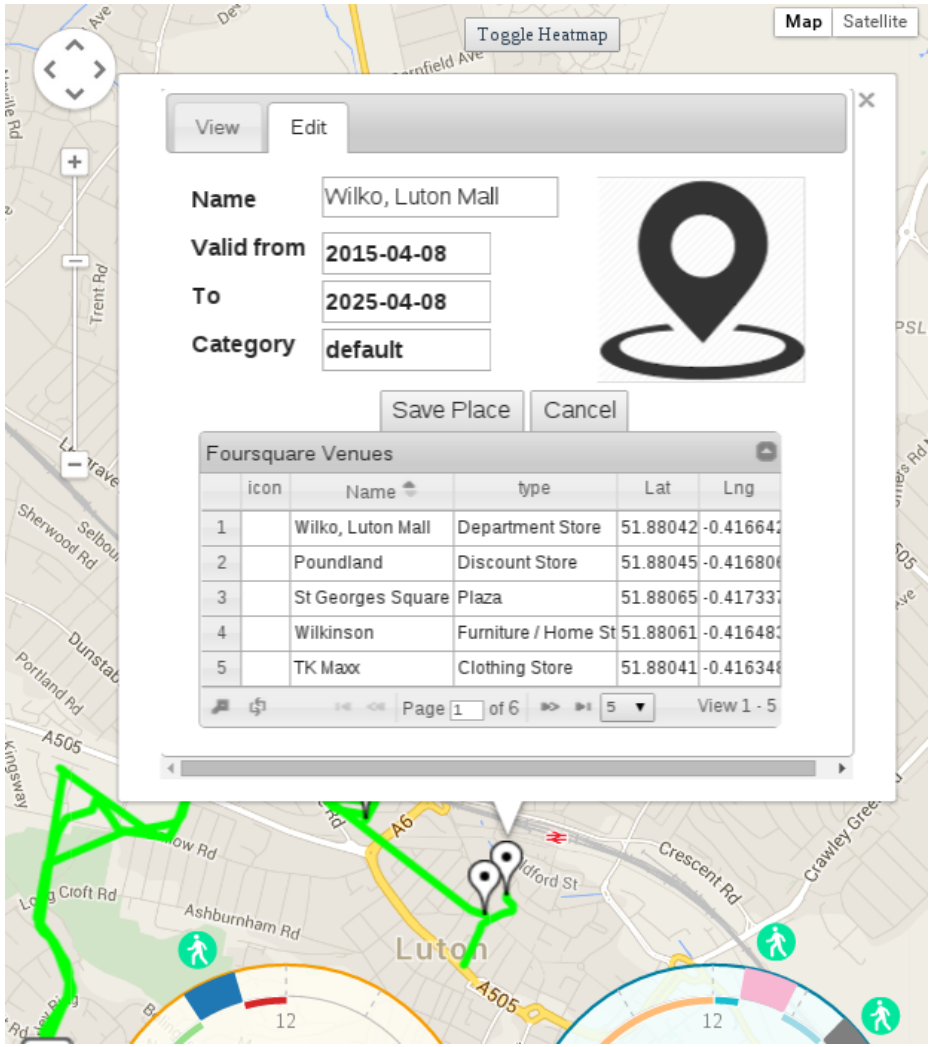
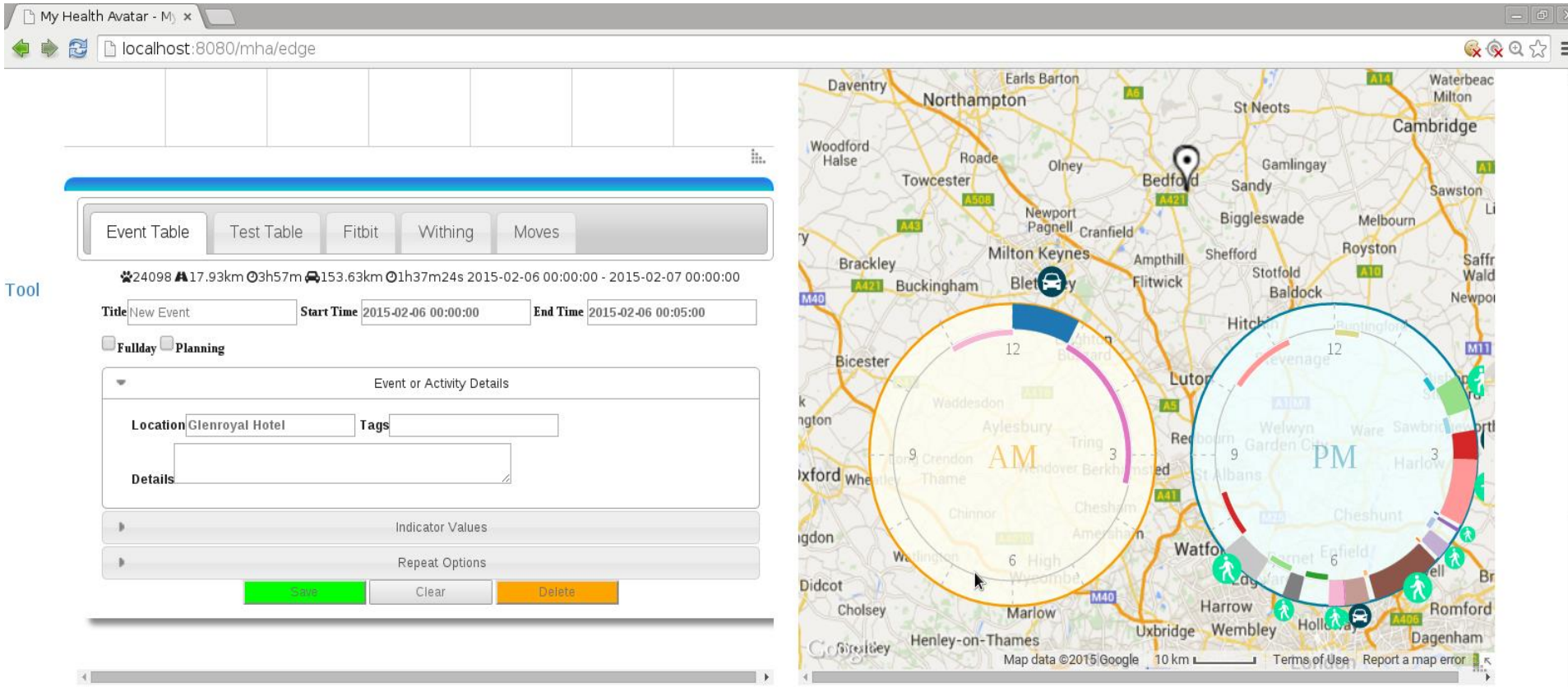




Event Editor and Clock View



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Thank you!