

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

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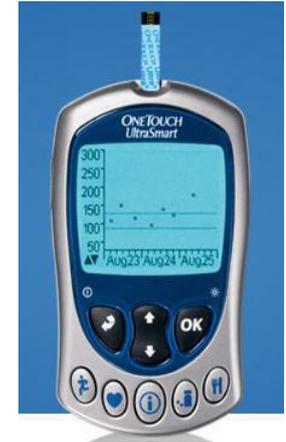
Fitbit



Moves



Nike FuelBand



LifeScan



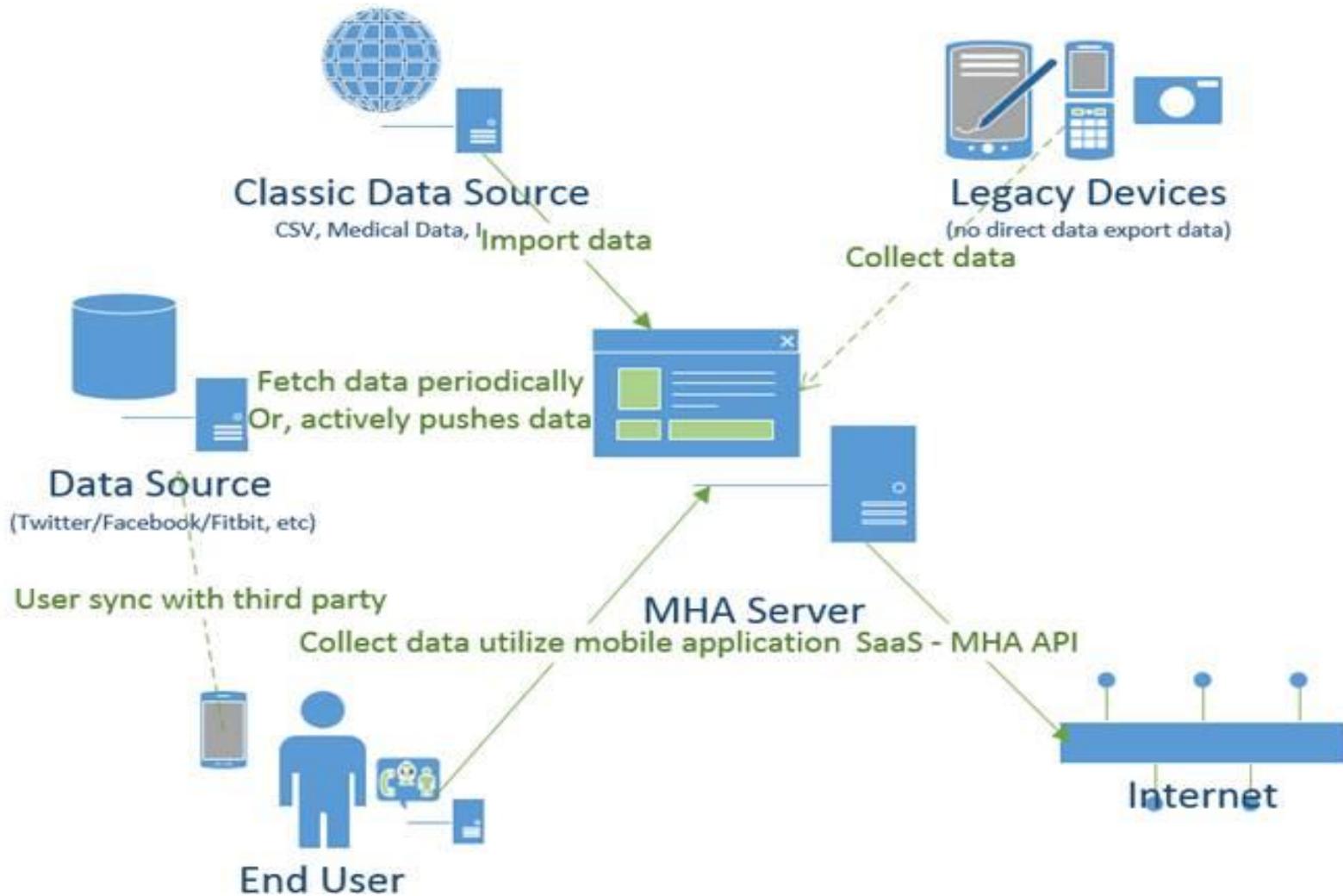
iHealth

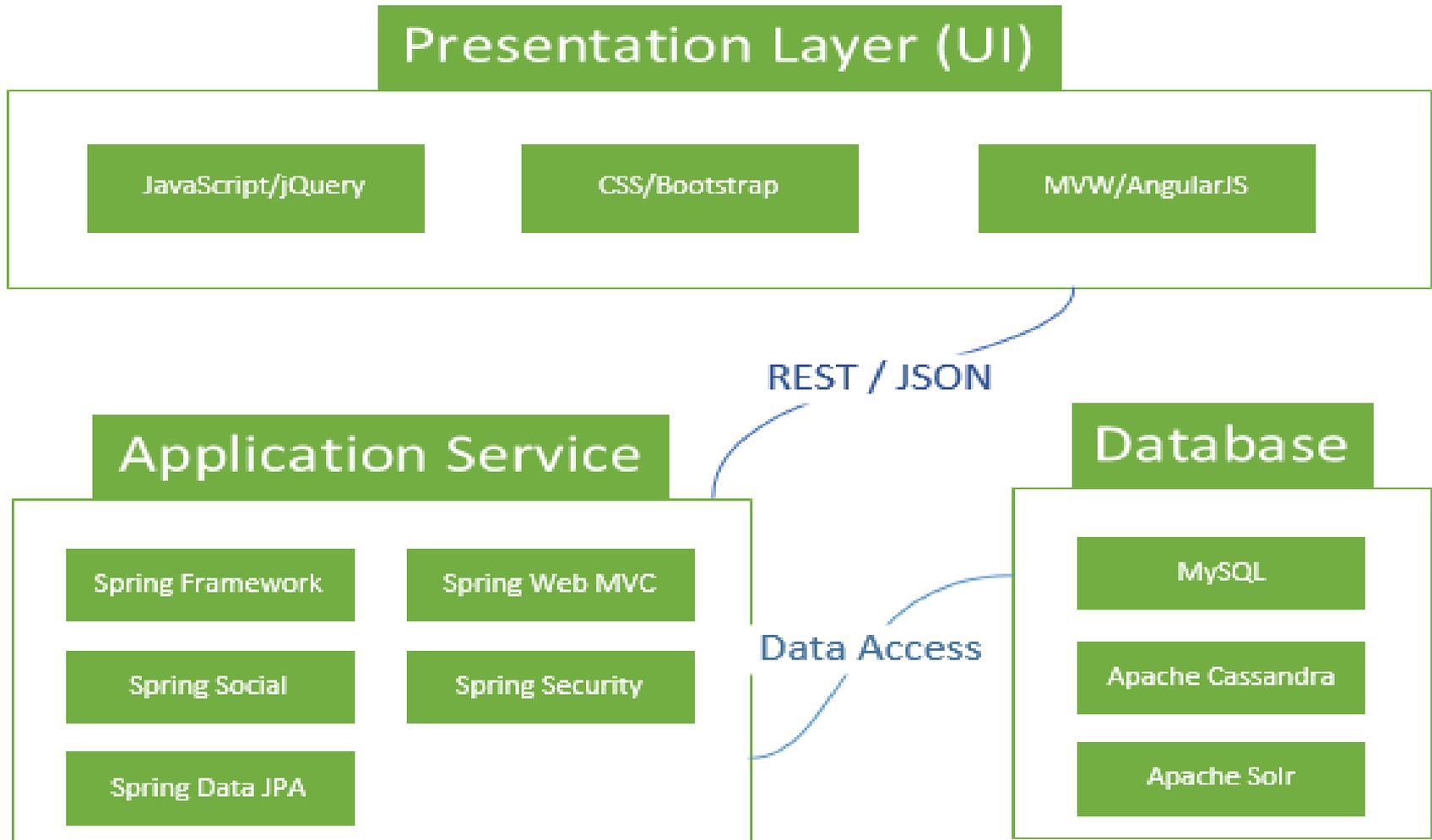


Withings

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
	Cardio	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





pkg

Ubuntu Linux 64bit with Oracle Java 8

Apache

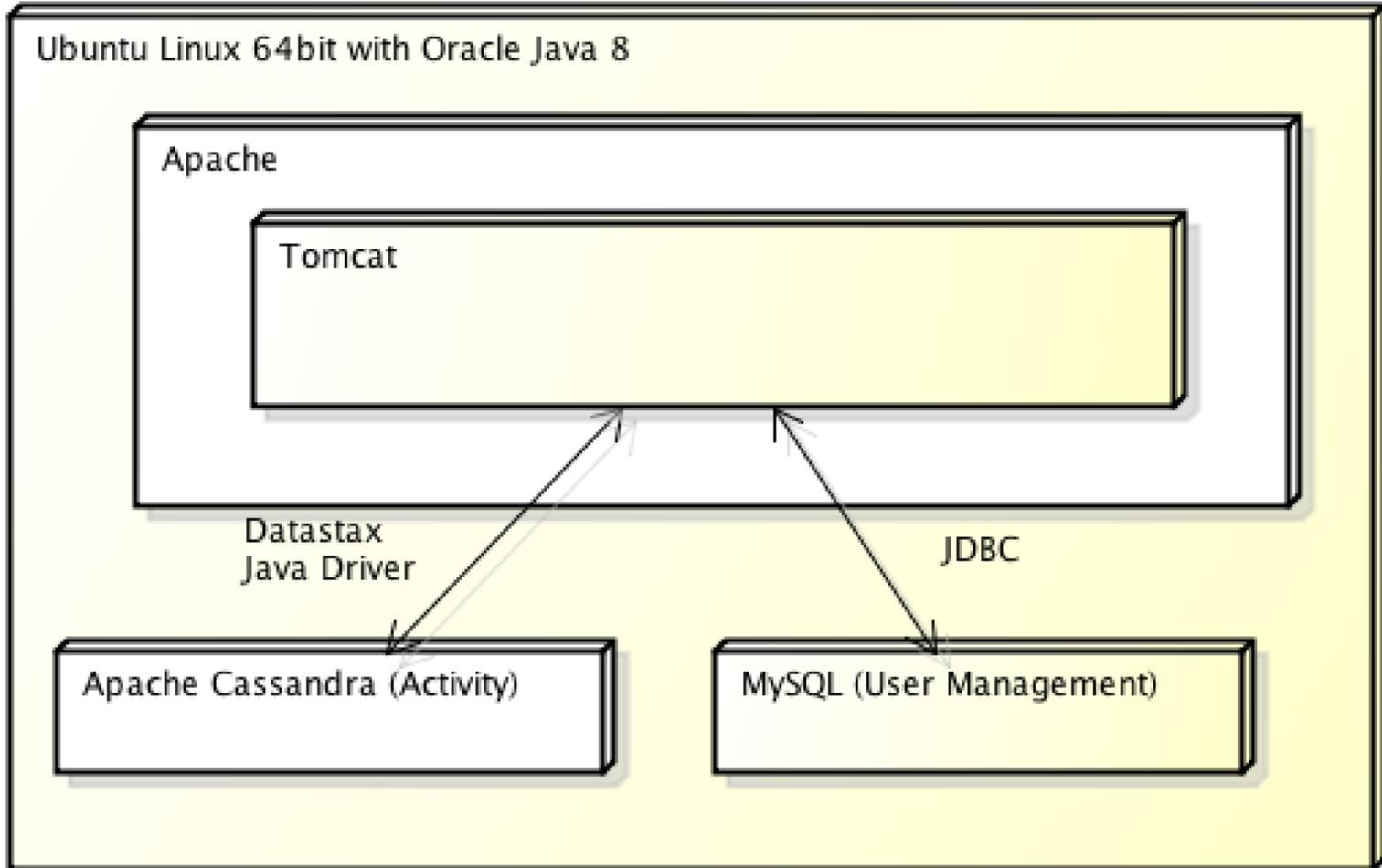
Tomcat

Datastax
Java Driver

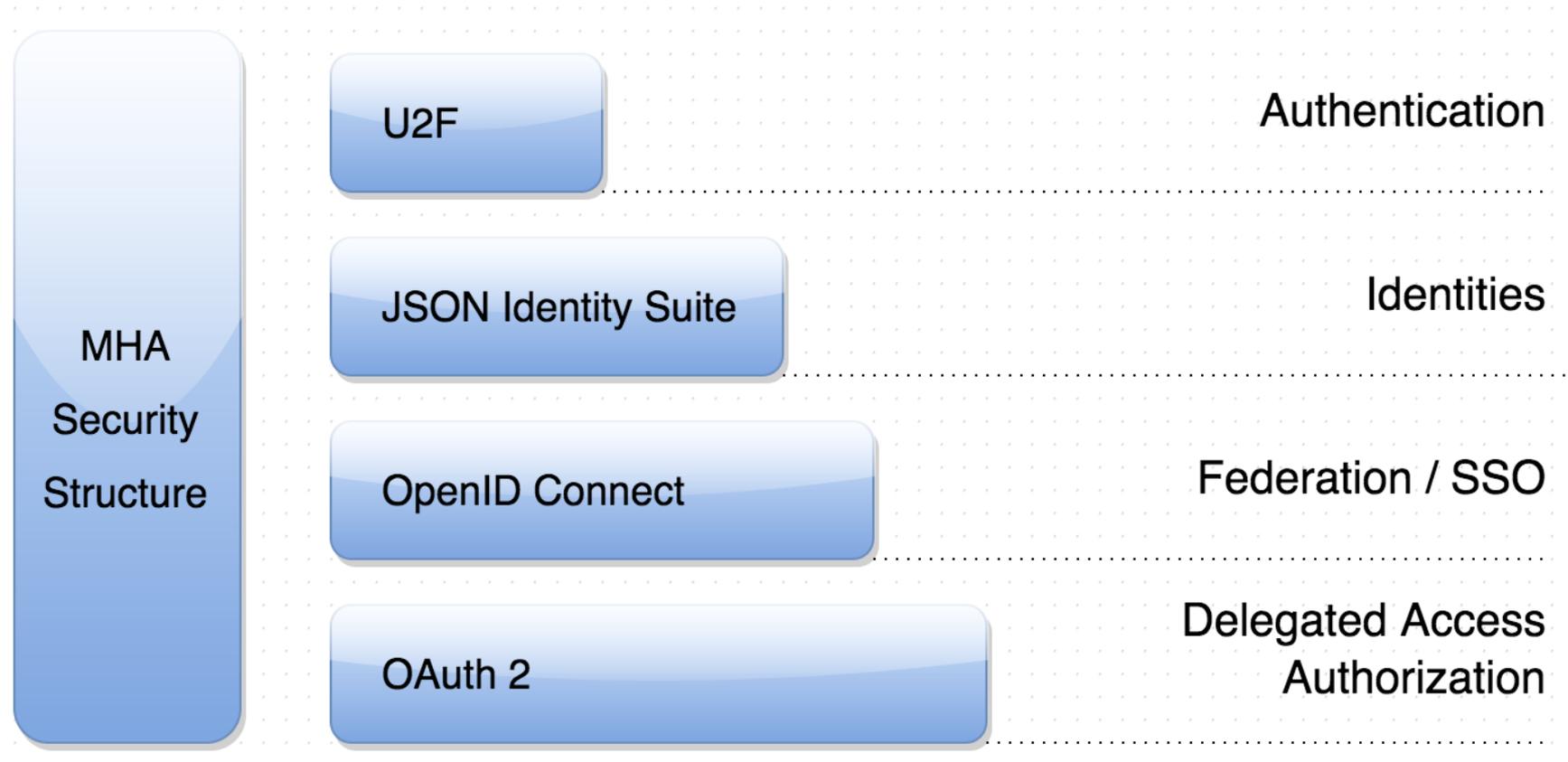
JDBC

Apache Cassandra (Activity)

MySQL (User Management)



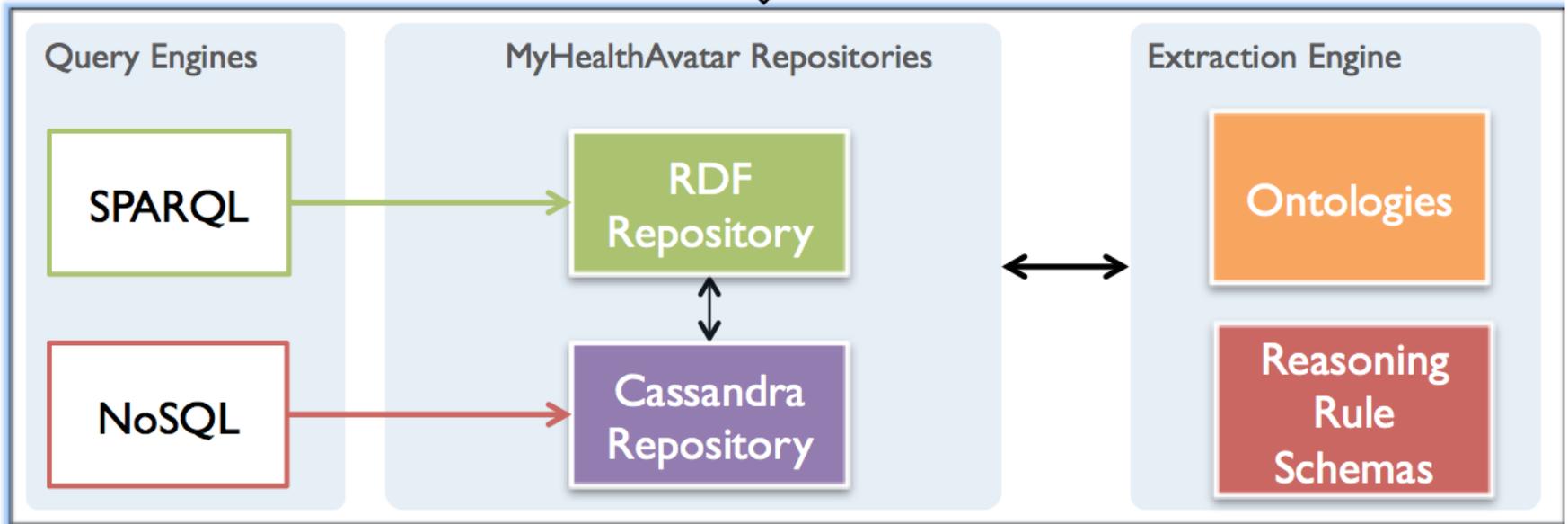
- **U2F** – Universal Second Factor protocol (e.g. Google Authenticator), allows the MHA to argue its security of password infrastructure
- **JavaScript Object Notation (JSON) based identity protocol**, JSON Web Token (JWT) encode token, JSON Web Key (JWK) encryption, JSON Web Signature (JWS) digital 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-party applications, reduce password sharing between users and third-parties.



MyHealthAvatar Repository

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

MyHealthAvatar APIs



Data Processing Engine



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



MyHealthAvatar Dashboard

Dashboard

Today:

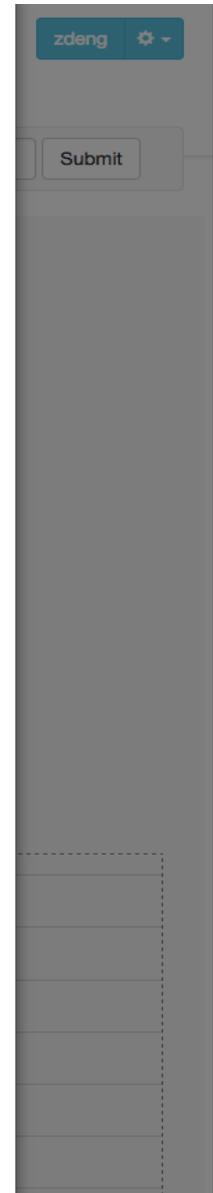
Total Steps: 9405

Total Distance: 7Km

Hypertension Risk: 5%

Available Sensors: m

Minutes: 160, 140, 120, 100, 80, 60, 40



zideng

Submit

MyHealthAvatar
3D Avatar
demo1

Dashboard
Diary

Liverpool 9°C

Humidity: 82%
Wind: SSE 19.31 km/h

Today: Sun Oct 25 2015 23:31:16 GMT

Total Steps
153663

Total Distance
108Km

Activities Time
28 : 56' : 7"

Calories burned
0

Transport Time
35 : 43' : 30"

Total Distance
4063.767Km

Hypertension Risk

5%

Diabetes Risk

1.2%

Cardiovascular Disease Risk

0.4%

Stroke Risk 3.7%

Health Score 1 out of 5

Select desired dates: + Days Show Reset 1 Month 3 Months 6 months

Legend: walking (green), transport (dark blue)

Activity Stack
24 hour Activities
Activity Cloud
Activity Bubbles
Movement - Place

My Devices/Application Connections

Fitbit	View Activities	Unlink Device
Withings	Link Device	
Moves	View Activities	Unlink App

Synchronisation
Close

Map data ©2015 Google [Terms of Use](#) [Report a map error](#)

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

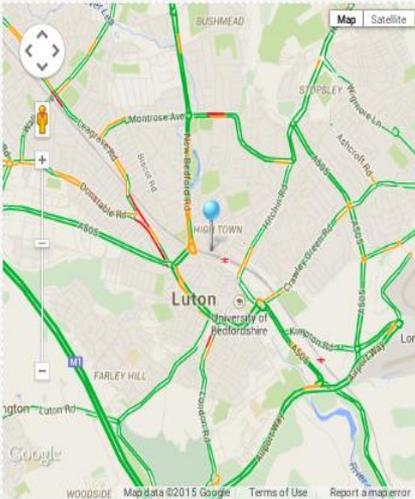
Hover your mouse on the circles to see additional information (they're 2D)

Luton ☁️: 11°C
Humidity: 71%
Wind: NE 11.27 km/h

Today: Sun Apr 05 2015 15:56:34 GMT+0100 (BST)
High: 18° Low: 5°

Luton Tomorrow:
6 Apr 2015

Partly Cloudy
High: 17° Low: 2°



Total Steps
2477293

Total Distance
1756.069 km

Activities Time
422 : 21 : 17"

Calories burned
0

Transport Time
90 : 37 : 56"

Total Distance
11558.508 km

Hypertension Risk

5%

Diabetes Risk

1.2%

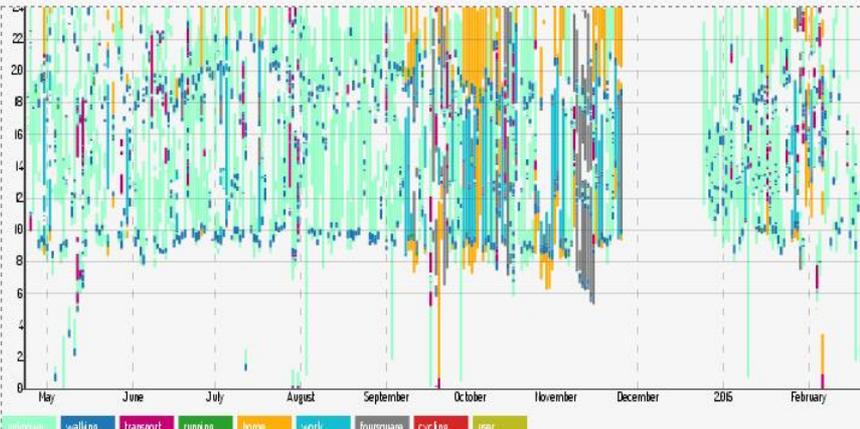
Cardiovascular Disease Risk

0.4%

Stroke Risk

3.7%

Available Sensors: Select desired dates: to

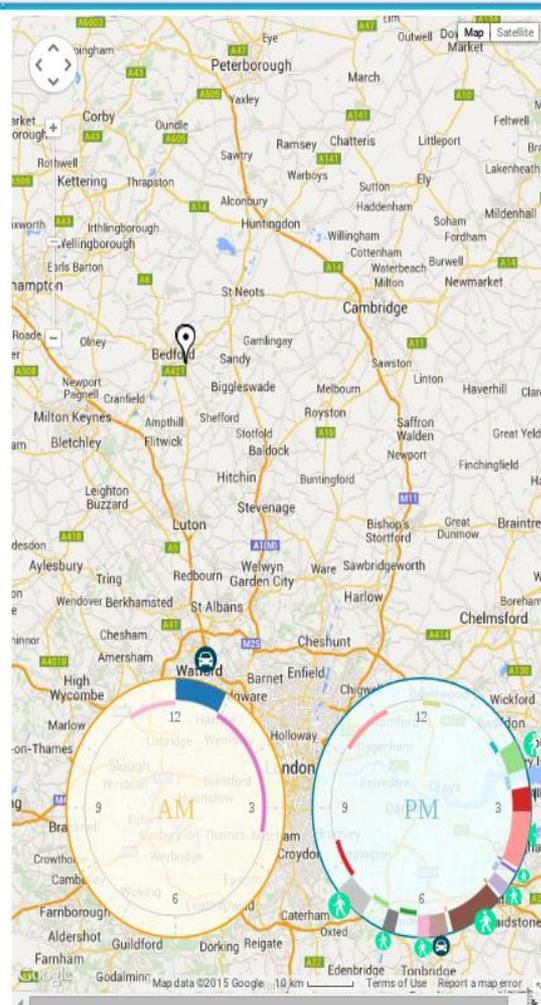


Legend: unknown, walking, transport, running, home, work, foursquare, cycling, user

Activity Stack | 24 hour Activities | Activity Cloud | **Activity DBH** | Job files | Movement - Place

Day Week Month February 2015 Today

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
26 Q1434 A 2.91km	27 Q7817 A 5.13km	28 Q4483 A 3.88km 00:00	29 Q5401 A 3.31km	30 Q10533 A 2.01km	31 Q9571 A 6.53km	01 Q9293 A 7.49km
02 Q9345 A 7.71km	03 Q5578 A 2.75km	04 Q5552 A 3.57km	05 Q9055 A 5.95km	06 Q24098 A 17.33km	07 Q2005 A 6.42km	08 Q2006 A 6.42km
09 Q9753 A 6.61km	10 Q7544 A 5.47km	11 Q5467 A 4.05km	12 Q5986 A 5.52km	13 Q24099 A 17.33km	14 Q24100 A 17.33km	15 Q24101 A 17.33km
16 Q9905 A 2.86km	17 Q7137 A 3.36km	18 Q5234 A 2.29km	19 Q2317 A 2.21km	20 Q2007 A 6.42km	21 Q2008 A 6.42km	22 Q2009 A 6.42km
23	24	25	26	27	28	01



Event Table Test Table Fitbit Withing Moves

Q24098 A 17.33km @ 3h57m @ 153.63km @ 1h37m 24s 2015-02-06 00:00:00 - 2015-02-07 00:00:00

Title: Start Time:

End Time: Full Day Planning

Event or Activity Details

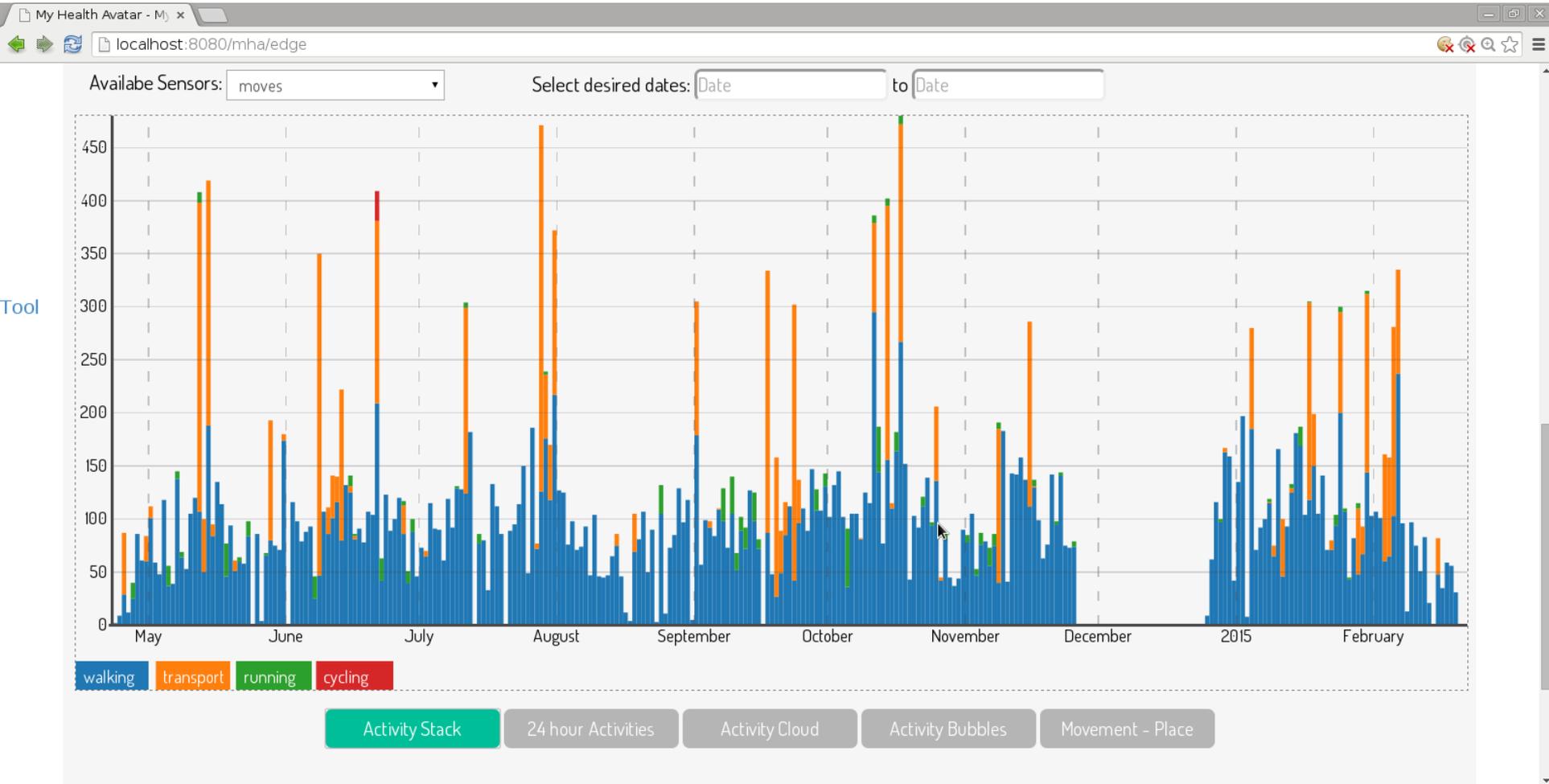
Location: Tags:

Details:

Indicator Values

Repeat Options

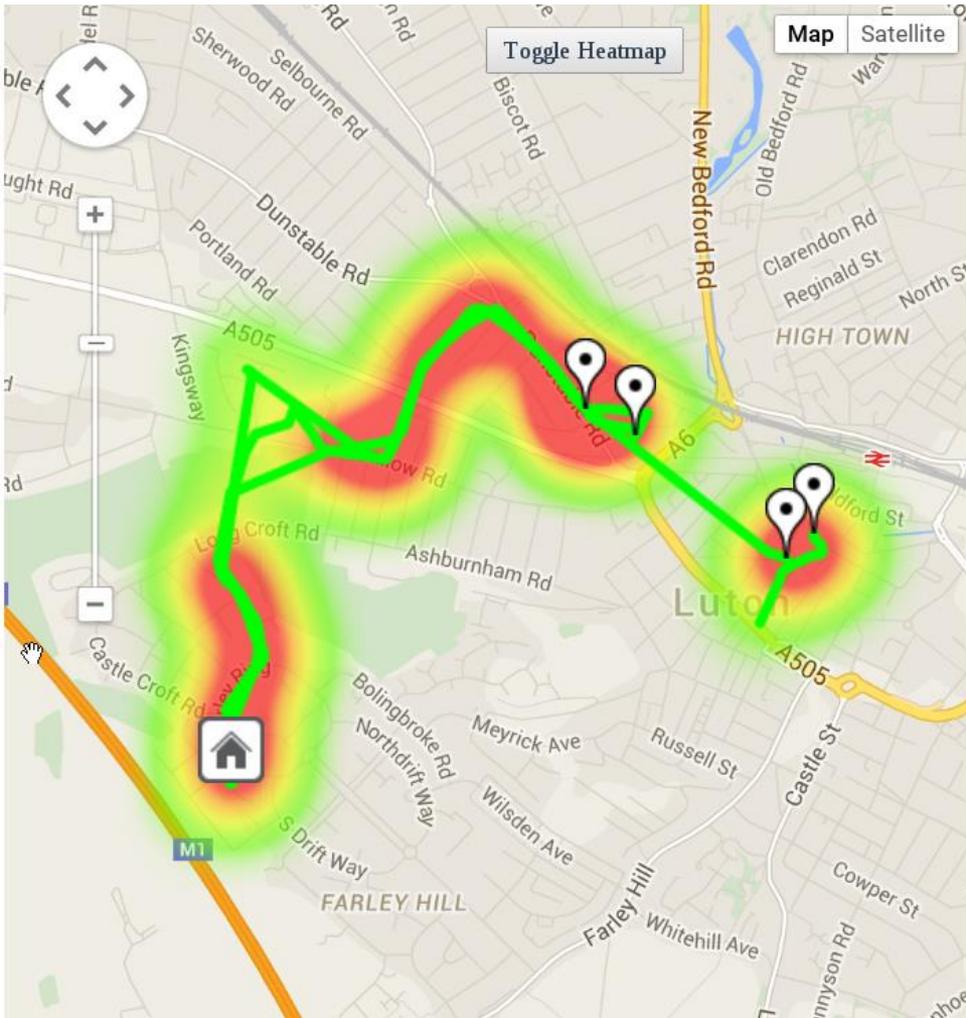
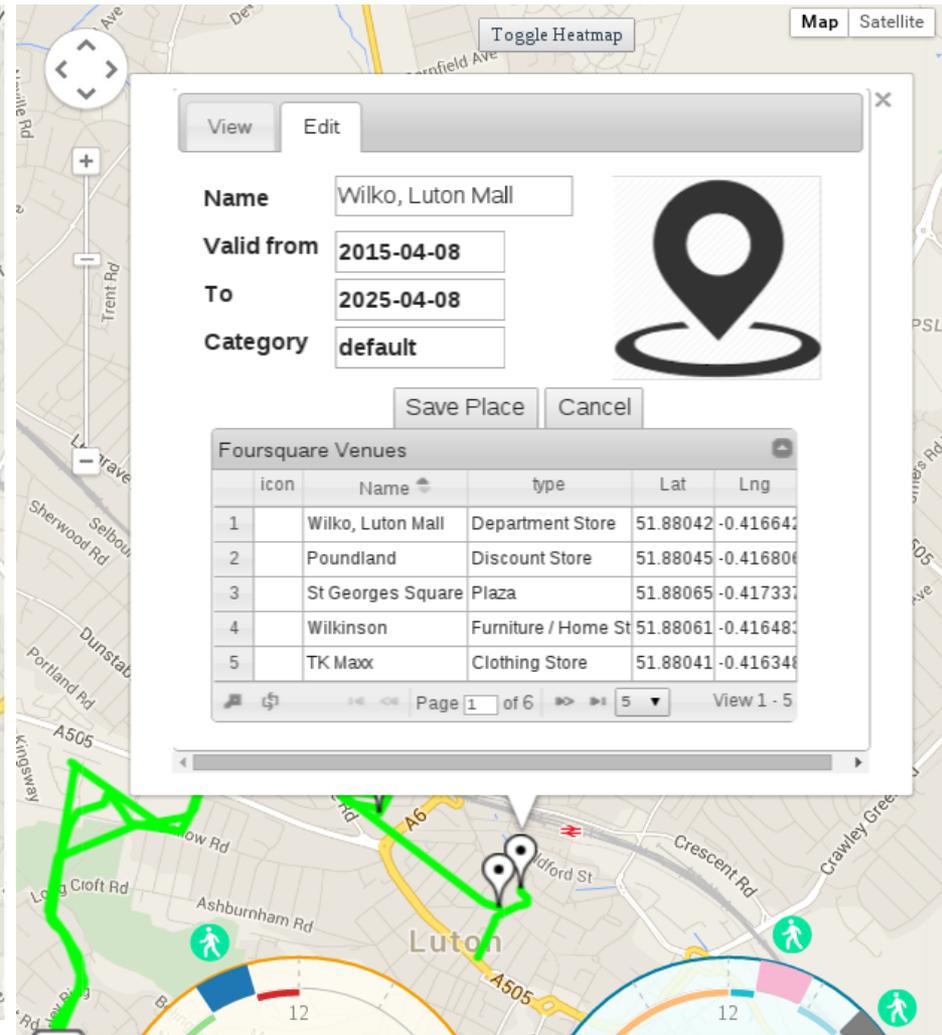
Timeline - Activity Stack



Timeline - Daily Activity



Map

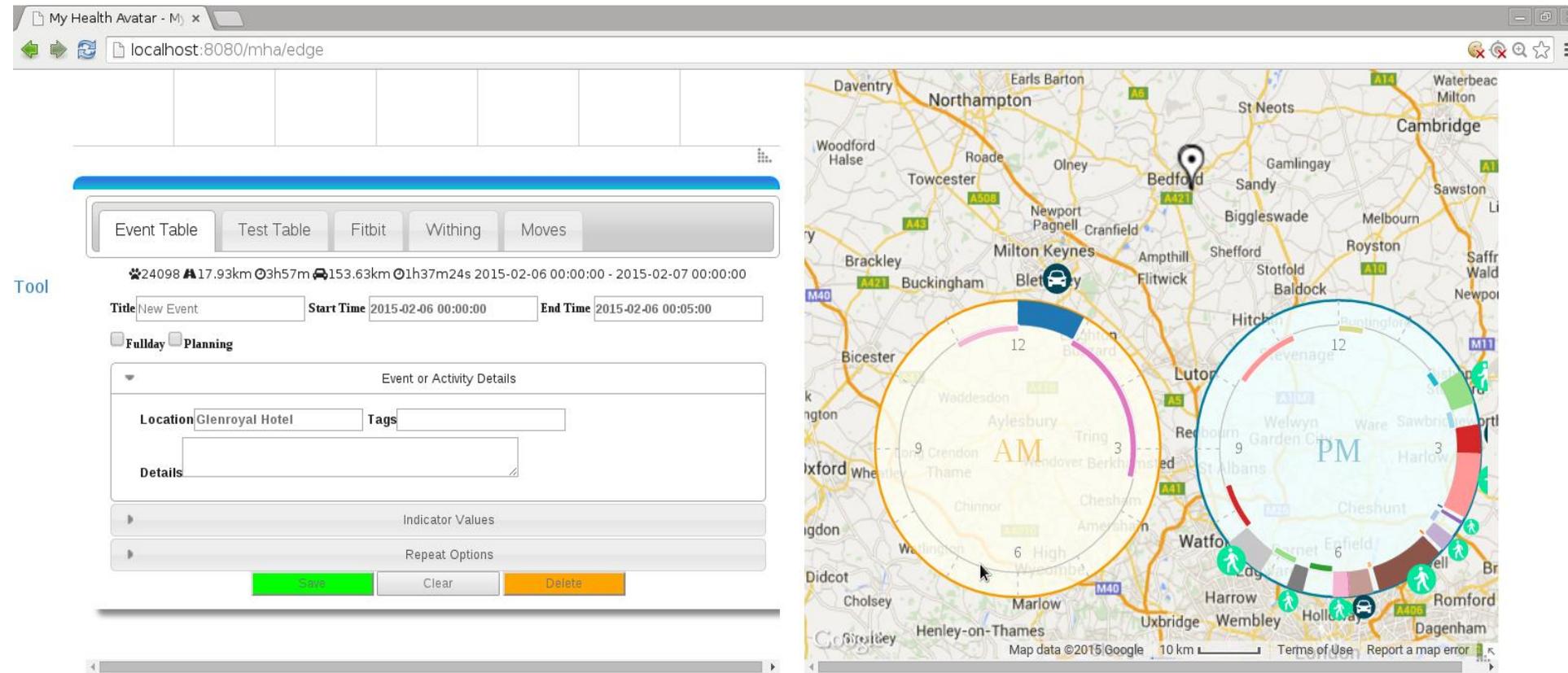
A screenshot of a map interface showing a 'Save Place' dialog box. The dialog box contains the following information:

- Name:** Wilko, Luton Mall
- Valid from:** 2015-04-08
- To:** 2025-04-08
- Category:** default

Below the dialog box is a table of Foursquare Venues:

icon	Name	type	Lat	Lng
1	Wilko, Luton Mall	Department Store	51.88042	-0.41664
2	Poundland	Discount Store	51.88045	-0.41680
3	St Georges Square	Plaza	51.88065	-0.41733
4	Wilkinson	Furniture / Home St	51.88061	-0.41648
5	TK Maxx	Clothing Store	51.88041	-0.41634

The table also shows 'Page 1 of 6' and 'View 1 - 5'.



The screenshot shows a web browser window with the URL `localhost:8080/mha/edge`. The interface is divided into two main sections:

- Event Editor (Left):**
 - Navigation tabs: Event Table, Test Table, Fitbit, Withing, Moves.
 - Summary: 24098, 17.93km, 03h57m, 153.63km, 01h37m24s, 2015-02-06 00:00:00 - 2015-02-07 00:00:00.
 - Form fields: Title (New Event), Start Time (2015-02-06 00:00:00), End Time (2015-02-06 00:05:00).
 - Options: Fullday, Planning.
 - Event or Activity Details: Location (Glenroyal Hotel), Tags, Details.
 - Indicator Values and Repeat Options sections.
 - Buttons: Save (green), Clear, Delete (orange).
- Clock View (Right):**
 - A map of the Bedfordshire region with two circular clock-like overlays.
 - The left clock is orange and labeled "AM", with segments for 12, 3, 6, and 9.
 - The right clock is blue and labeled "PM", with segments for 12, 3, 6, and 9.
 - Icons for walking, running, and cycling are visible on the map.

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MyHealthAvatar 2014



Thank you!

