

# University of Stuttgart

**IPVS**



## Watson & Twitter App using IBM Bluemix

Lab: Advanced Information Systems, 15-Sept-2015

### Team

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# Agenda

- Purpose
- Introduction
- Demo
- Milestones
- Architecture
- Implementation
- Summary

# Purpose of this application

- To create a cognitive application that allows user to interact with IBM Watson via Twitter.
- IBM Watson is an artificially intelligent question answering computing system built by IBM.



# INTRODUCTION

# Introduction

## Purpose of lab:

To create a cognitive application that allows user to interact with IBM Watson via Twitter.

## IBM Watson:

- Artificially intelligent question answering computing system built by IBM.
- Watson takes in data from all sort of sources, interprets and evaluates data and then makes decisions.
- Watson could read millions of unstructured documents in seconds.
- [https://www.youtube.com/watch?v=WFR3lOm\\_xhE](https://www.youtube.com/watch?v=WFR3lOm_xhE)



# Introduction

- Scope:

Enable interaction between user and IBM Watson via Twitter.

- User Interfaces:

Twitter accounts

- Application account
- User account



# Introduction

- Input: User tweets a question from user account to application account.
- Output: Application tweets the answer from application account.
- Criteria: User account follows the application account.



# Introduction

- Dataset:
  - Healthcare
  - Travel
- Languages:
  - English
  - Spanish
  - French
  - Portuguese





# System

- IBM Bluemix
  - Liberty for Java runtime environment
  - Question and Answer Service
  - Language Translation Service
- Twitter
  - Two Twitter accounts
  - Two Twitter application accounts



# DEMO

Will be presented in twitter now..



## Application

@app\_queswatson FOLLOWS YOU



Tweet to



Message

TWEETS  
35

FOLLOWING  
1

FOLLOWERS  
1



Following

### Tweets & replies



**Application** @app\_queswatson · 12m  
[@user\\_queswatson](#) Lugares para visitar en Bélgica



**Application** @app\_queswatson · 14m  
[@user\\_queswatson](#) places to visit in Belgium



**Application** @app\_queswatson · Jul 13  
[@user\\_queswatson](#) Qué hacer en Coimbatore



**Application** @app\_queswatson · Jul 13  
[@user\\_queswatson](#) places to visit in coimbatore



### Who to follow · Refresh · View all



**VISHAL DADLANI** ✓ @Vish... ✕

+ Follow



**Shiv Aroor** ✓ @ShivAroor ✕

+ Follow



**Arun Jaitley** ✓ @arunjaitley ✕

+ Follow

Find friends

### Stuttgart Trends · Change

#diwa2015  
#SHESKINDAHOT  
#merkelstreichelt  
#EidMubarak



User

@user\_queswatson FOLLOWS YOU

 Tweet to

 Message

TWEETS  
100

FOLLOWING  
2

FOLLOWERS  
2



Following

Tweets Tweets & replies



User @user\_queswatson · 17m

famosa por su larga tradición en arte, moda y dining. bien, confidence=2.0%



User @user\_queswatson · 17m

su rico patrimonio y hermosas. Se cuenta con un número de ciudades fascinadamente histórica medieval y lleno de arquitectura Art Nouveau y



User @user\_queswatson · 17m

Mayormente conocido por su papel clave en la administración de la Unión Europea, la pequeña nación de Bélgica podría salir sorprendido por



Who to follow · Refresh · View all



DIE WELT @welt

 Follow



Lukas-Podolski.com @...

 Follow



SPIEGEL Eilmeldungen

 Follow

Find friends

Trends · Change

#SHESKINDAHOT

#1DRADIOPARTY

#WorldEmojiDay

#EidMubarak

John Stones

#Bundestag

Martin Wheatley

Mittelalter

Danny Willett

Abkühlung

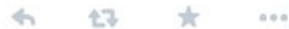


sorprendido por



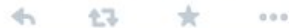
**User** @user\_queswatson · 25m

ng traditions in arts, fashion and fine dining.,  
confidence=2.0%



**User** @user\_queswatson · 25m

ous heritage. It boasts a number of  
fascinatingly historic cities packed with  
medieval and Art Nouveau architecture and  
famous for their lo



**User** @user\_queswatson · 25m

Mostly known for its key role in European  
Union administration, the small nation of  
Belgium might leave you surprised by its  
rich and gorge



**User** @user\_queswatson · Jul 13

upias por head., confidence=17.0%



Abkühlung



# Milestones



# Milestones

Milestones	Deadlines
Familiarization	11-May-2015
Software Proposal Document	18-May-2015
Software Specification Document	02-Jun-2015
Software Design Document	8-Jun-2015
Finished Implementation	13-Jul-2015
<b>Bluemix Meetup Presentation</b>	<b>17-Jul-2015</b>
Finished Software Tests	11-Sep-2015
User Documentation / Manual	10-Sep-2015
Results Presented	16-Sep-2015



# ARCHITECTURE





IBM **Bluemix**<sup>TM</sup>

- Cloud platform (paas)
- Supports several programming languages  
Ex: Java, Python, Ruby....
- Powerful set of Watson Services  
Ex: Q&A, Language Translation, Speech Recognition ...



Why Bluemix in this project?

To make use of services provided by Bluemix cloud



# WATSON SERVICES



# Watson Question & Answer Service

- Purpose: Response to user inquiries
- $\beta$ -level Service: Optimized to Healthcare, Travel data

User Questions



Answers with confidence scores

## Input Paramaters

1. Dataset val (String )  
dataset = travel/healthcare
2. User question (json type)

## Output Parameters

1. Result set (json)
2. Confidence level(Integer)

Q: Need visa to enter Brazil ? (dataset = "travel")



Example with required elements:

```
{ "question":  
  { "questionText":  
    "Need visa to enter Brazil ?" }  
}
```



A: US passport holders need. EU not. (Confidence=80%)



# Language Translation Service

Language Identification

Machine

## Language Identification:

Identify Language: Identifies language of input text

### Input Parameter:

Text(String in  
UTF-8 format)



### Output Parameter:

Language(json)

### Example:

Gracias

Spanish

- Translation applies to specific set of languages
- Change from  $\beta$ -level to standard level.



# Language Translation Service

## Machine Translation :

Translate: Translates input text from source to target language

### Input Parameters:

1. Text (String type)
2. Source (String )
3. Target (String )



### Output Parameter:

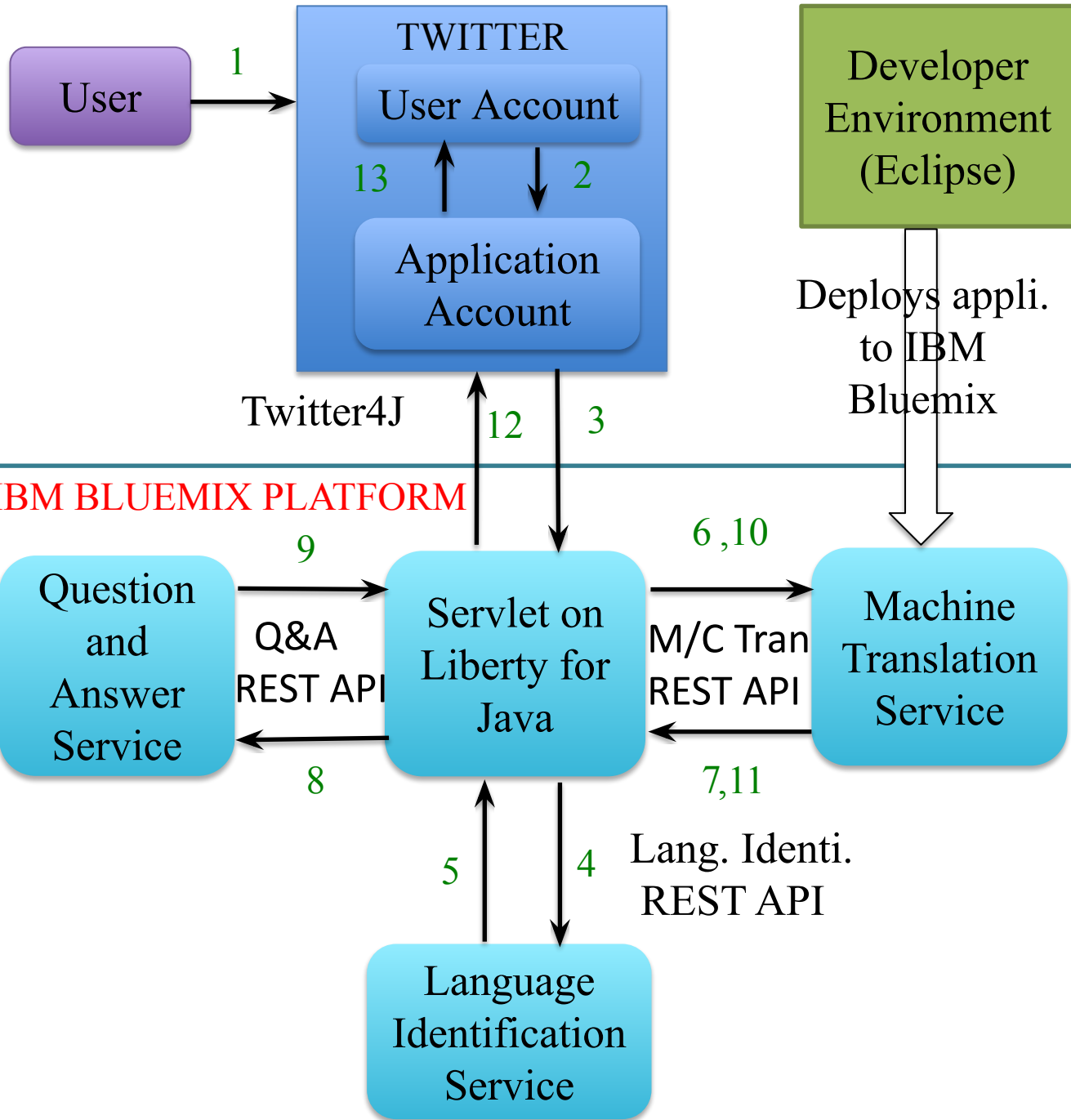
Translation output  
(json)

### Example:

Brauchen Visum nach Brasilien US- Pass-Inhaber müssen.  
ein?  
EU nicht.

Reference: <https://console.ng.bluemix.net/catalog/language-translation/>

DESIGN



## Notation

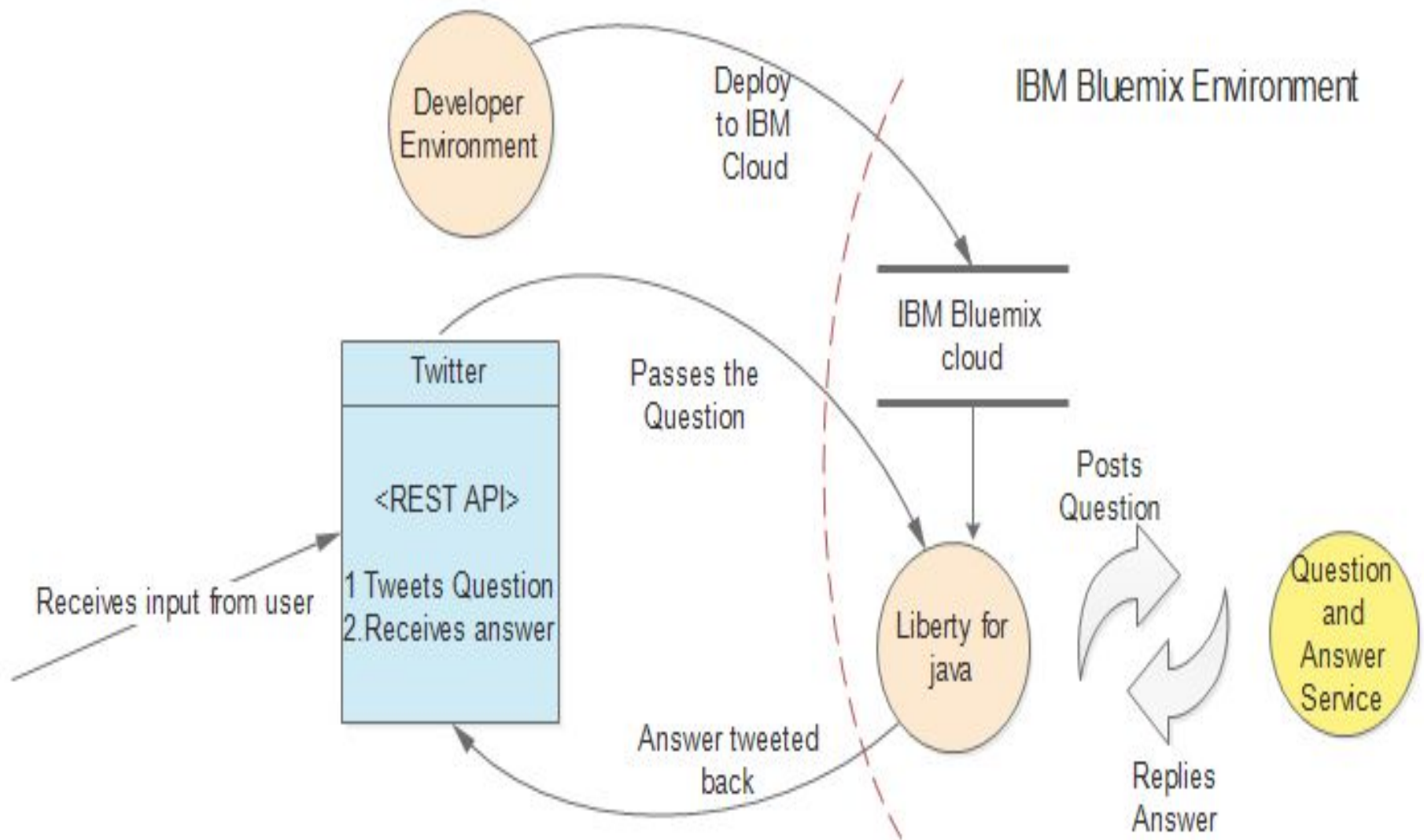
Q: User Question  
A: Answer to Q  
en: English

## STEPS

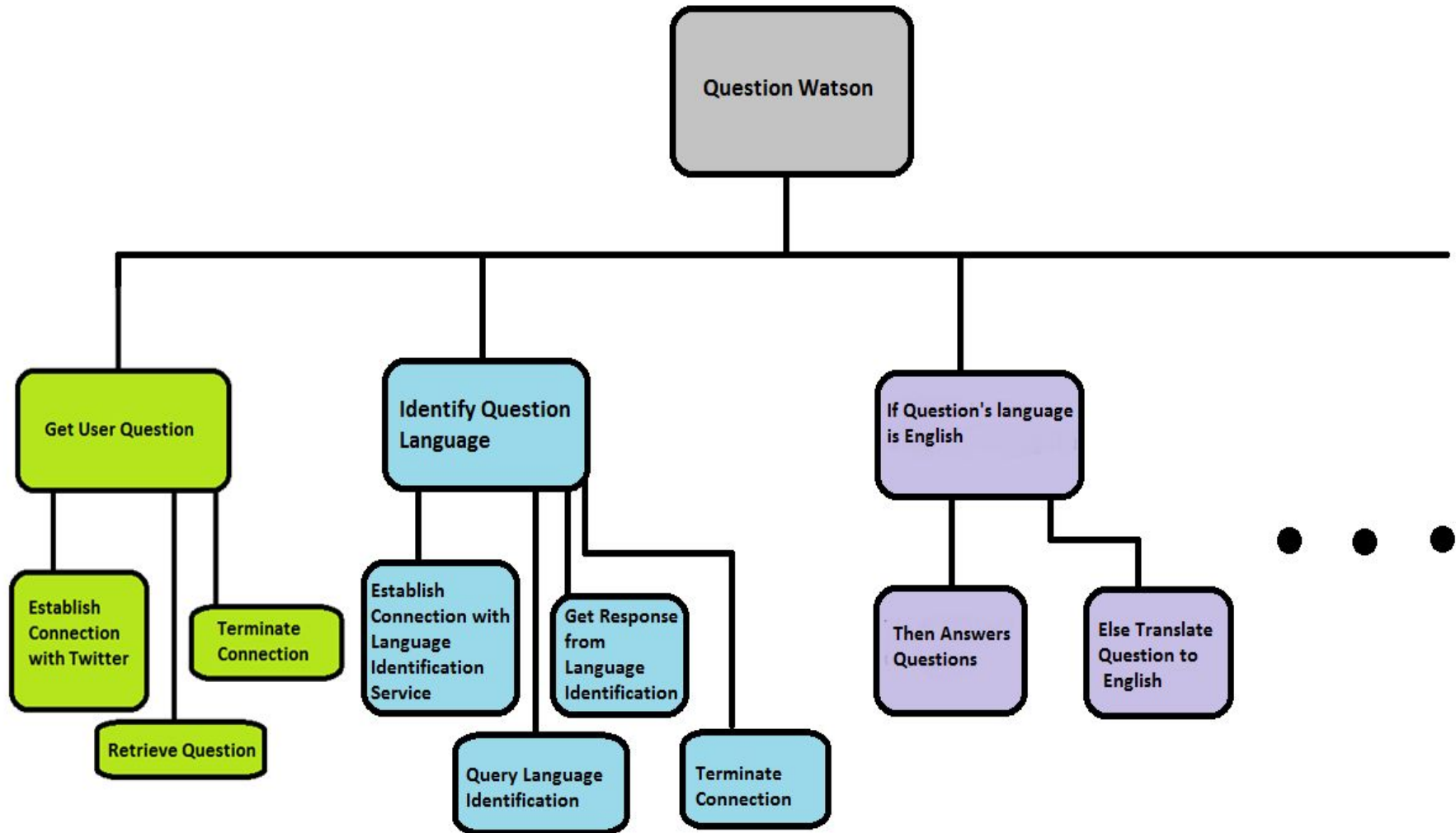
1. Login
2. Tweet Q in diff. Lang
3. Pass Q in diff Lang
4. Post Q
5. Get Lang
6. Q post (if Q! =en)
7. Get Q in en
8. Post Q in en
9. Get Response in en
10. A post ((if Q! =en)
11. Get A in en
12. Pass A to app. acc.
13. Pass A to user acc.



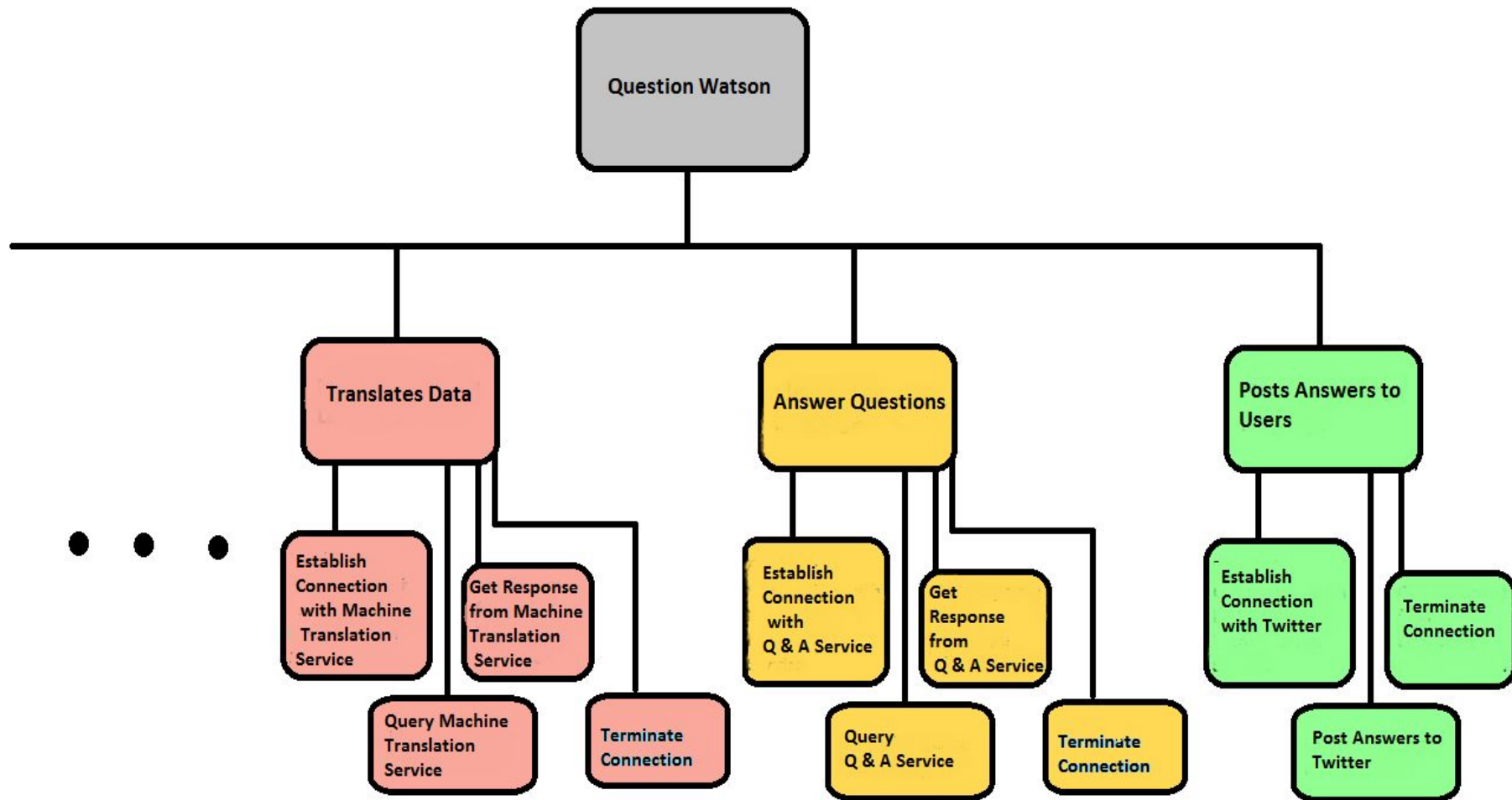
# Data Flow Diagram



# Structural Decomposition Diagram(1)



# Structural Decomposition Diagram(2)





# IMPLEMENTATION





# Create App in IBM Bluemix

- Create an user account and login into IBM Bluemix
- Create a web application with Cloud Foundry Apps
  - Choose Liberty for Java as runtime
  - Bind services to the application
    - » Question and Answer Service
    - » Language Translation Service



# App Dashboard

**tweetwatson2**  
Routes: [tweetwatson2.mybluemix.net](https://tweetwatson2.mybluemix.net)

  
**LIBERTY FOR  
JAVA™**

**INSTANCES:**  

1

**MEMORY QUOTA:**  


512


  
(MB per Instance)


**AVAILABLE  
MEMORY:**  
**7.250 GB**

SAVE

RESET


 **ADD A SERVICE OR API**

 **BIND A SERVICE OR API**



**Language Translation**  
Language Tran...  
standard

Show Credentials ^ Docs



**Question and Answer**  
Question and ...  
question\_and\_a...

Show Credentials ^ Docs



# Create Twitter Accounts and Applications

- Create two twitter accounts, one for user and other for application.
- Create two twitter applications with the twitter accounts.
  - Login into the Twitter Developer Site
  - Create a new application
  - Add permissions to read, write and access
  - Generate oAuth authentication keys



# Connect to Twitter-Twitter4J

- Twitter4J Java library is used to connect our java application with Twitter.
- Interfaces/Classes used:
  - TwitterStream: connect to twitter user account
  - FilterQuery : filter tweets from user account
  - StatusListener: for listening to tweets
  - TwitterFactory: for sending tweets





# Configure Watson Services

- VCAP\_SERVICES environment variable contains the connection details of all services bound to the application.
- The below credentials of services could be retrieved and used for connecting to the services.
  - url
  - username
  - Password



# Connect to QA service

- Create new instance of the service

```
QuestionAndAnswer service = new QuestionAndAnswer();
```

- Set the user credentials

```
service.setUsernameAndPassword(usernameQuestionAnswer,  
passwordQuestionAnswer);
```

- Set the category

```
service.setDataset(QuestionAndAnswerDataset.HEALTHCARE);
```

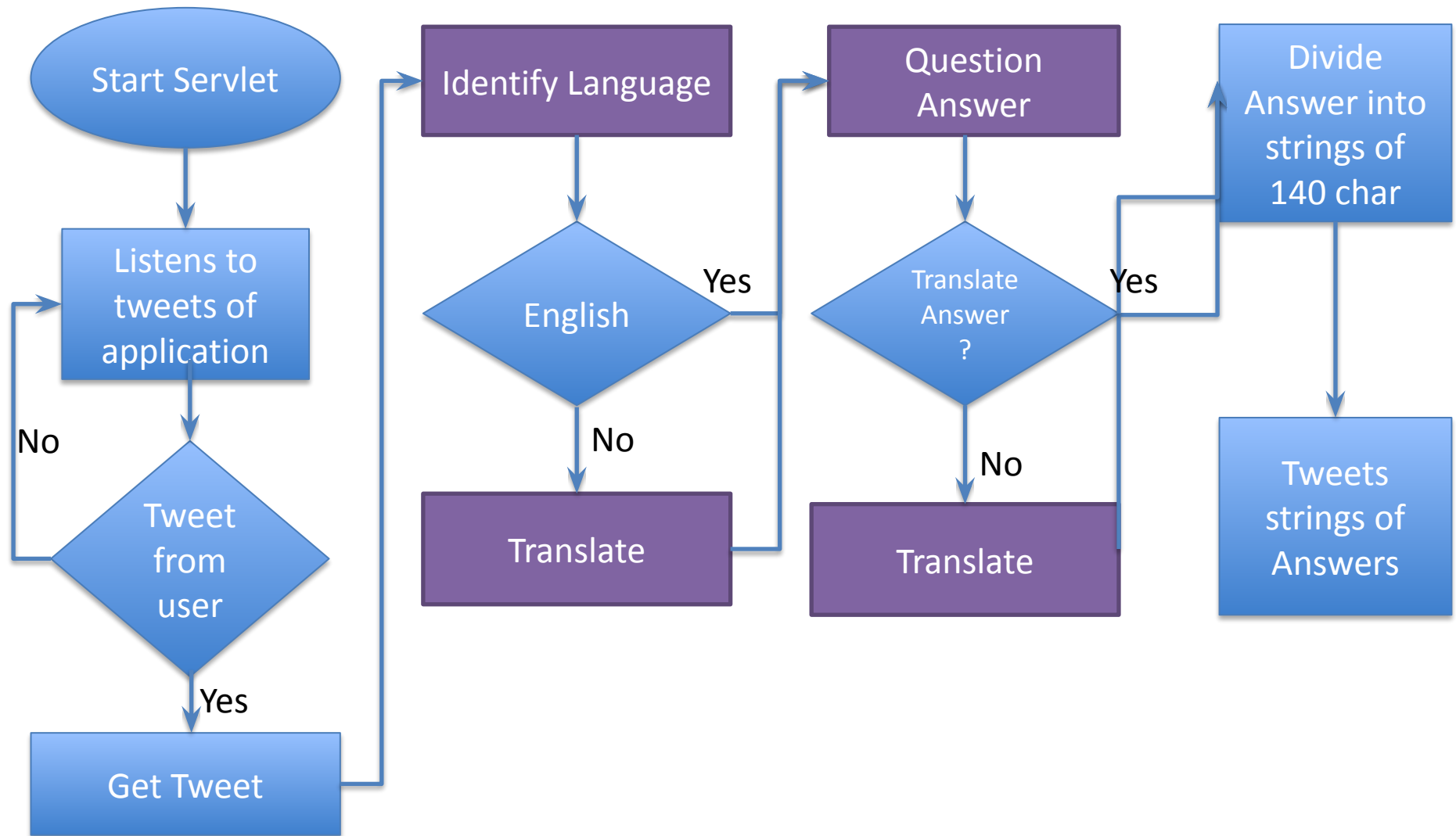
- Ask question to the service

```
WatsonAnswer watsonAnswers = service.ask(question);
```

- Convert answer in json format to text



# Data Flow





# Summary

- A basic idea about Watson.
- Focus of the project and the milestones.
- Demo of the implemented project in twitter.
- The architecture and implementation of the project in Java.
- Finally completed the Watson and Bluemix App Using Twitter that reads and responds to Tweets.



Thank You!!!

# HealthCare: What is HIV?

## ( Language: English )

MSN Deutschland – mit H... x Twitter x +

Twitter, Inc. (US) | https://twitter.com

Home Notifications Messages

Search Twitter

Application @app\_watson

TWEETS 278 FOLLOWING 2 FOLLOWERS 2

Stuttgart Trends · Change

- #AA
- Promoted by NISSAN Deutschland
- #Tatort
- #refugees
- #GroKo
- Tony Abbott
- #happybirthdayniall
- #Merkel
- #Seehofer
- #photography
- Hasskommentare
- #AA2015

Refresh · View all

Prince Everald @PrinceEverald

DANCEHALL ... @dancehalllink

Preethi Baskar @preethi\_baskar

Follow Follow Follow

What's happening?

Application @app\_watson · now

s that can help people live longer, healthier lives. Confidence=98%

Application @app\_watson · now

HIV stands for human immunodeficiency virus. This is the virus that causes AIDS. There is no cure yet for HIV/AIDS, but there are treatment

User @user\_watson · now

@app\_watson What is HIV?

User @user\_watson · 33s

@app\_watson I am at risk for high blood pressure?

Firefox automatically sends some data to Mozilla so that we can improve your experience.

Choose What I Share

7:47 PM 9/14/2015

# HealthCare: What is HIV?

## ( Language: French )

MSN Deutschland – mit H... x Twitter x +

Twitter, Inc. (US) | https://twitter.com

Home Notifications Messages

Search Twitter

Application @app\_watson

TWEETS 278 FOLLOWING 2 FOLLOWERS 2

Stuttgart Trends - Change

- #IAA
- Promoted by NISSAN Deutschland
- #Tatort
- #refugees
- #GroKo
- Tony Abbott
- #happybirthdayniall
- #Merkel
- #Seehofer
- #photography
- Hasskommentare
- #IAA2015

Here are some people you might enjoy following.

Prince Everald @PrinceEverald

DANCEHALL ... @dancehallink

Preethi Baskar @preethi\_baskar

What's happening?

Application @app\_watson · now

xiste des traitements qui peuvent aider les gens vivent plus longtemps, la vie saine. % Confidence=98

Application @app\_watson · now

VIH virus de l'immunodéficience humaine est pour. C'est le virus qui provoque le sida. Il n'est pas de remède pour le VIH/sida, mais il e

User @user\_watson · now

@app\_watson Qu'est-ce que le VIH?

Application @app\_watson · now

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Firefox automatically sends some data to Mozilla so that we can improve your experience.

Choose What I Share

7:52 PM 9/14/2015



# HealthCare: What is HIV?

## ( Language: Spanish)

MSN Deutschland – mit H... Twitter

Twitter, Inc. (US) | https://twitter.com

Home Notifications Messages

Search Twitter

Here are some people you might enjoy following.  
Refresh · View all

**Application**  
@app\_watson  
TWEETS 278 FOLLOWING 2 FOLLOWERS 2

Stuttgart Trends · Change

- #AA
- Promoted by NISSAN Deutschland
- #Tatort
- #refugees
- #GroKo
- Tony Abbott
- #happybirthdayniall
- #Merkel
- #Seehofer
- #photography
- Hasskommentare
- #AA2015

**Prince Everald**  
@PrinceEverald  
Follow

**DANCEHALL ...**  
@dancehallink  
Follow

**Preethi Baskar**  
@preethi\_baskar  
Follow

What's happening?

**Application** @app\_watson · now  
pueden ayudar a la gente a vivir más, una vida más saludable.  
Confidence=97%

**Application** @app\_watson · now  
VIH virus de inmunodeficiencia humana. Este es el virus que causa el sida. No hay cura para el VIH/SIDA todavía, pero hay tratamientos que

**User** @user\_watson · now  
@app\_watson ¿Qué es el VIH?

**Application** @app\_watson · 30s

Firefox automatically sends some data to Mozilla so that we can improve your experience.

Choose What I Share

7:51 PM  
9/14/2015



# HealthCare: What is HIV? ( Language: Portuguese )

The screenshot shows a Twitter interface in Portuguese. The browser address bar displays 'https://twitter.com'. The page header includes navigation links for Home, Notifications, and Messages, along with a search bar and a 'Tweet' button. On the left sidebar, the profile of 'Application' (@app\_watson) is shown with 278 tweets, 2 following, and 2 followers. Below the profile is a 'Stuttgart Trends' section with various hashtags. The main content area features a recommendation section titled 'Here are some people you might enjoy following.' with three suggested users: Prince Everald, DANCEHALL, and Preethi Baskar. Below this is a 'What's happening?' section containing a tweet from 'Application' (@app\_watson) about HIV. The tweet text is: 'HIV defende vírus da imunodeficiência humana. Este é o vírus que causa a Aids. Não há cura para o HIV / AIDS ainda, mas há tratamentos que'. The tweet includes interaction icons for reply, retweet, and like. At the bottom of the page, a Firefox notification states: 'Firefox automatically sends some data to Mozilla so that we can improve your experience.'

MSN Deutschland - mit H... x Twitter x +

Twitter, Inc. (US) | https://twitter.com

Home Notifications Messages

Search Twitter

Here are some people you might enjoy following.  
Refresh View all

Application  
@app\_watson  
TWEETS 278 FOLLOWING 2 FOLLOWERS 2

Stuttgart Trends · Change

#IAA Promoted by NISSAN Deutschland

#Tatort

#refugees

#GroKo

Tony Abbott

#happybirthdayniall

#Merkel

#Seehofer

#photography

Hasskommentare

#IAA2015

Prince Everald  
@PrinceEverald  
Follow

DANCEHALL ...  
@dancehallink  
Follow

Preethi Baskar  
@preethi\_baskar  
Follow

What's happening?

Application @app\_watson · now  
podem ajudar as pessoas a viver mais, a vida saudável. Confidence=98%

Application @app\_watson · now  
HIV defende vírus da imunodeficiência humana. Este é o vírus que causa a Aids. Não há cura para o HIV / AIDS ainda, mas há tratamentos que

User @user\_watson · now  
@app\_watson O que é HIV?

Application @app\_watson · 3m  
s that can help people live longer, healthier lives. Confidence=98%

© 2015 Twitter About Help Terms Privacy  
Cookies Ads info Brand Blog Status  
Apps Jobs Advertise Businesses Media  
Developers

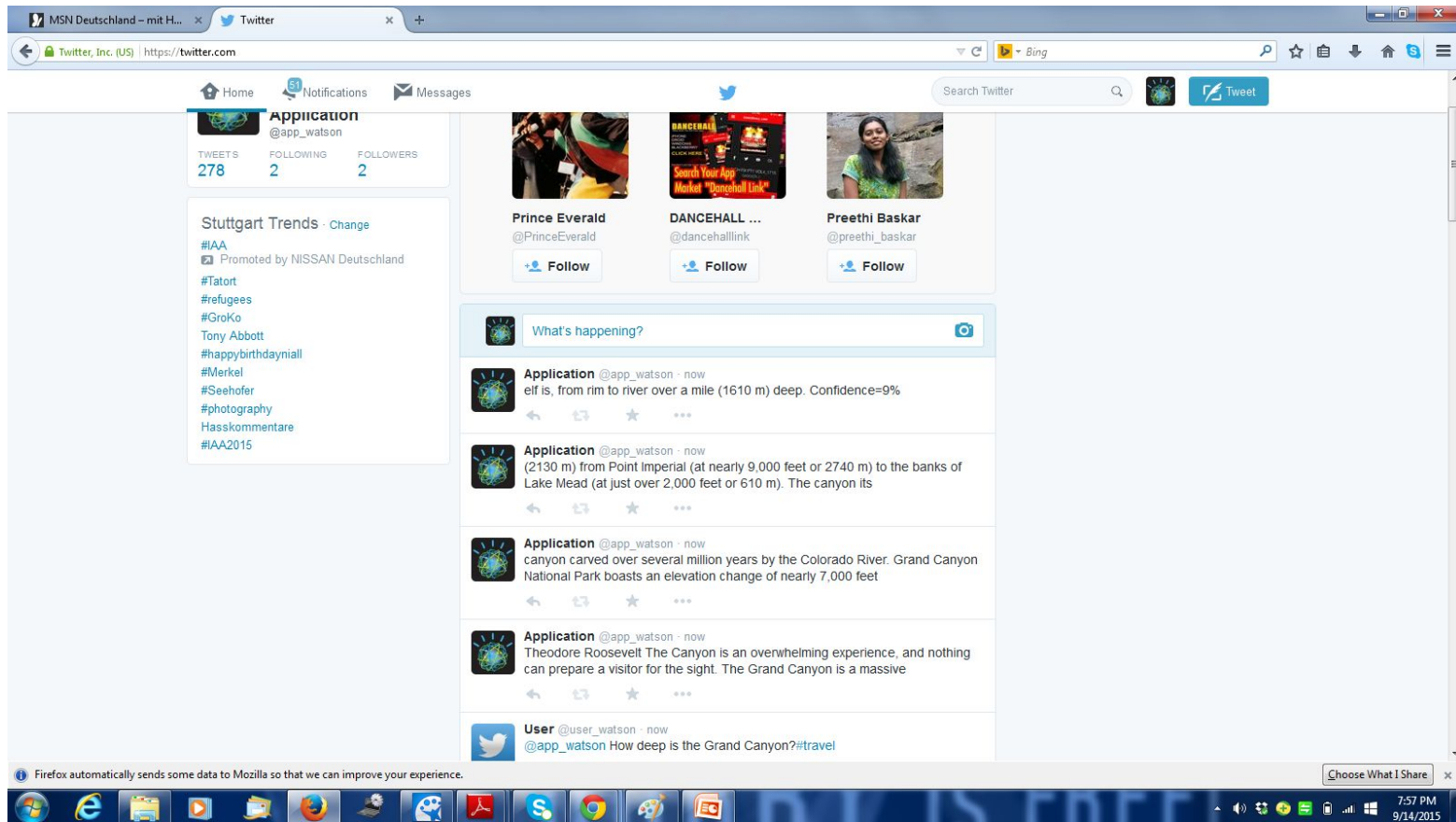
Firefox automatically sends some data to Mozilla so that we can improve your experience.

Choose What I Share

7:50 PM  
9/14/2015

# Travel: How deep is the Grand Canyon?

## (Language: English)



The screenshot shows a Twitter search results page for the query "How deep is the Grand Canyon?". The page is displayed in a web browser window with the address bar showing "https://twitter.com". The search bar at the top right contains the text "Search Twitter".

On the left side, there is a sidebar for the user "Application" (@app\_watson), showing 278 tweets, 2 following, and 2 followers. Below this, there is a section for "Stuttgart Trends" with various hashtags like #IAA, #Tatort, #refugees, #GroKo, Tony Abbott, #happybirthdayniall, #Merkel, #Seehofer, #photography, Hasskommentare, and #IAA2015.

The main content area displays a list of tweets. The first tweet is from "Application" (@app\_watson) with the text: "elf is, from rim to river over a mile (1610 m) deep. Confidence=9%". The second tweet is also from "Application" (@app\_watson) with the text: "(2130 m) from Point Imperial (at nearly 9,000 feet or 2740 m) to the banks of Lake Mead (at just over 2,000 feet or 610 m). The canyon its". The third tweet is from "Application" (@app\_watson) with the text: "canyon carved over several million years by the Colorado River. Grand Canyon National Park boasts an elevation change of nearly 7,000 feet". The fourth tweet is from "Application" (@app\_watson) with the text: "Theodore Roosevelt The Canyon is an overwhelming experience, and nothing can prepare a visitor for the sight. The Grand Canyon is a massive".

At the bottom of the list, there is a tweet from "User" (@user\_watson) with the text: "How deep is the Grand Canyon?#travel".

The bottom of the browser window shows the Firefox status bar with the message "Firefox automatically sends some data to Mozilla so that we can improve your experience." and the system tray with the date and time "7:57 PM 9/14/2015".

# Watson not Confident!

The screenshot shows a Twitter profile for 'Application' (@app\_watson) with 278 tweets, 2 following, and 2 followers. The profile is located in a web browser window with the address bar showing 'https://twitter.com'. The main content area displays a tweet from 'Application' (@app\_watson) stating 'Watson is not confident on this question'. Below this, there are two more tweets from 'Application' (@app\_watson) discussing the confidence of Watson in its responses. The first tweet mentions 'xiste des traitements qui peuvent aider les gens vivent plus longtemps, la vie saine. % Confidence=98'. The second tweet mentions 'VIH virus de l'immunodéficience humaine est pour. C'est le virus qui provoque'. The browser window also shows a search bar, navigation links (Home, Notifications, Messages), and a footer with a Firefox privacy notice.

MSN Deutschland - mit H... x Twitter x +

Twitter, Inc. (US) | https://twitter.com

Home Notifications Messages

Search Twitter

Here are some people you might enjoy following.  
Refresh · View all

**Application**  
@app\_watson  
TWEETS 278 FOLLOWING 2 FOLLOWERS 2

Stuttgart Trends · Change

- #IAA Promoted by NISSAN Deutschland
- #Tatort
- #refugees
- #GroKo
- Tony Abbott
- #happybirthdayniall
- #Merkel
- #Seehofer
- #photography
- Hasskommentare
- #IAA2015

Prince Everald  
@PrinceEverald  
Follow

DANCEHALL ...  
@dancehallink  
Follow

Preethi Baskar  
@preethi\_baskar  
Follow

What's happening?

**Application** @app\_watson · now  
Watson is not confident on this question

**User** @user\_watson · now  
@app\_watson When is the rainy season in Bangalore?#travel

**Application** @app\_watson · now  
xiste des traitements qui peuvent aider les gens vivent plus longtemps, la vie saine. % Confidence=98

**Application** @app\_watson · now  
VIH virus de l'immunodéficience humaine est pour. C'est le virus qui provoque

Firefox automatically sends some data to Mozilla so that we can improve your experience.

Choose What I Share

7:53 PM  
9/14/2015