



Building Next-Generation Cognitive Applications

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Jeffrey Liu

Developer

Robot Enthusiast

Runner



@jeffffrey

By **2030** over 2 billion jobs will not exist anymore, which is about **50%** of all jobs on the planet.

Innovation is the new currency

“Two guys in a Starbucks can have access to the same computing power as a Fortune 500 company.”

Jim Deters

Founder, Galvanize



The next billion
dollar idea starts
with a single
developer.

That developer
starts with a single
line of code



KEY AREA TO EXPLORE IN COGNITIVE ERA

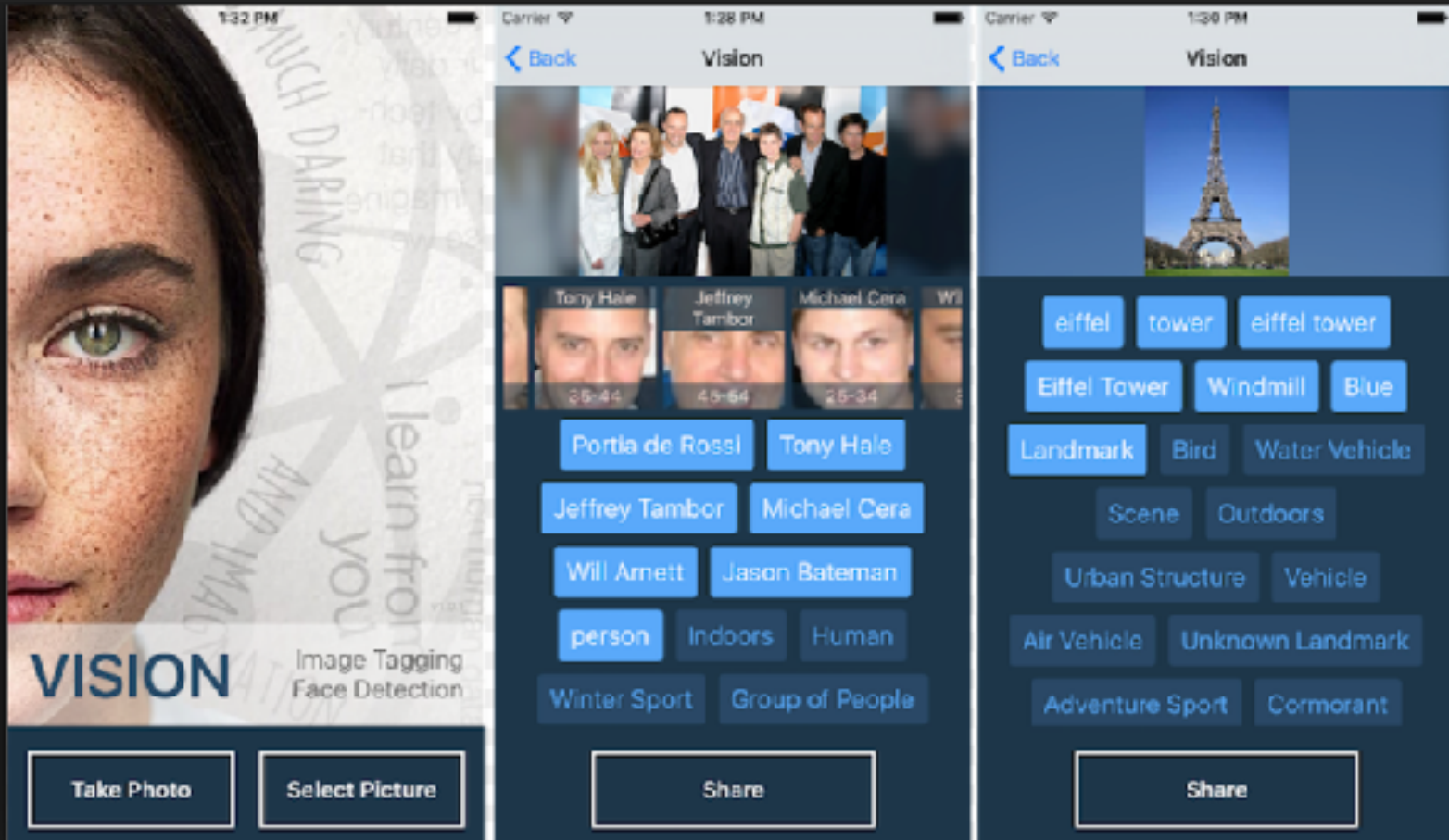
Natural Language Processing & Reasoning & Natural Language Generation















<https://www.youtube.com/watch?v=bMXPYkYY0u8>

KEY AREA TO EXPLORE IN COGNITIVE ERA

Machine Vision



Machine Vision - turn picture into description

<p>A dark brown horse with a white stripe wearing a black studded harness.</p>	<p>A white horse carrying a man.</p>	<p>A dark horse carrying a woman.</p>	<p>A woman on the dark horse.</p>
			
<p>The giraffe behind the zebra that is looking up.</p>	<p>The giraffe with its back to the camera.</p>	<p>The giraffe on the right.</p>	<p>A zebra.</p>
			
<p>A skier with a black helmet, light blue and black jacket, backpack, and light grey pants standing.</p>	<p>The man in black.</p>	<p>The man in red.</p>	<p>The skis.</p>
			

KEY AREA TO EXPLORE IN COGNITIVE ERA

Acoustic Analytics



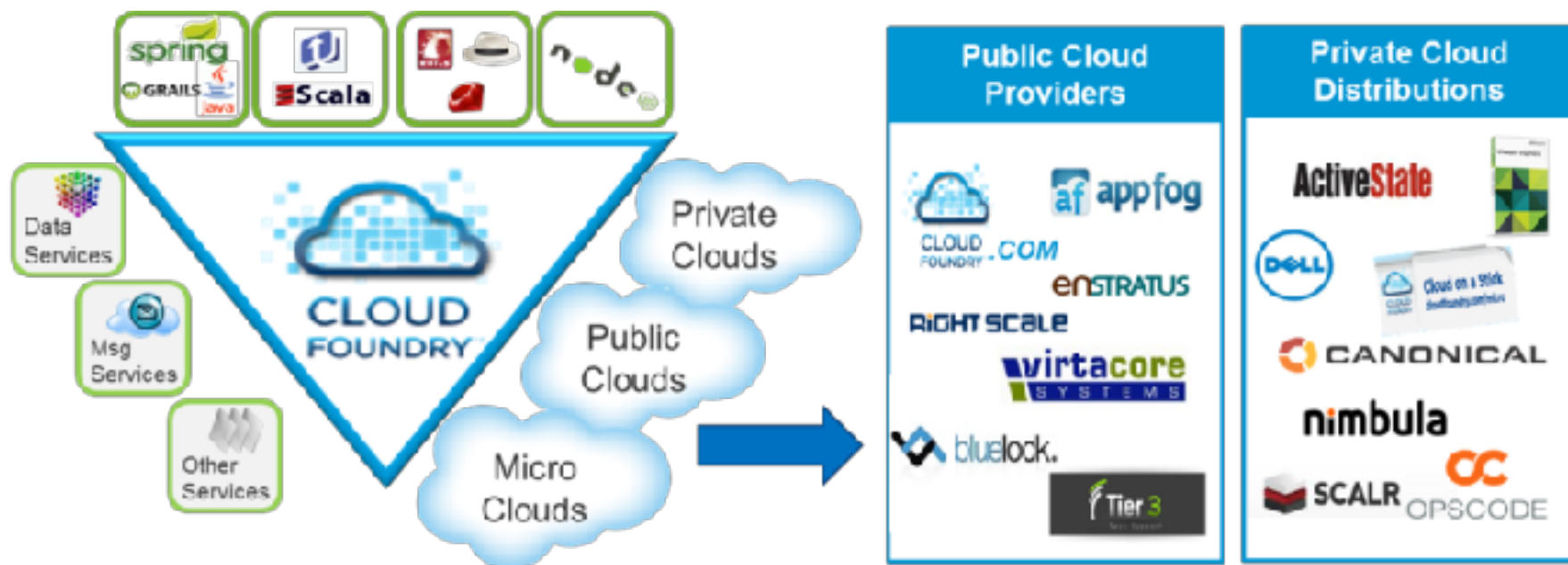
ROBOT WITH DEEP LEARNING



https://www.youtube.com/watch?v=jkaRO8J_1XI

What's Cloud Foundry?

An open platform-as-a-service (**PaaS**). The system supports **multiple** frameworks, **multiple** application infrastructure services and deployment to **multiple** clouds.



Making Multi-Cloud a Reality

What is Bluemix? How it works?

DevOps Tooling

A vertical stack of icons representing various DevOps tools: Jenkins, GitLab, GitHub, Docker, and IBM Cloud Foundry. At the bottom is a plus sign icon.

Your Own Hosted Apps / Services



Catalog of Services that Extend Apps' Functionality

A horizontal row of service icons with labels below them: Web (Open Source), Data (Open Source), Mobile (Third Party), Cognitive (Third Party), Analytics (Open Source), IoT (IBM), Security (IBM), and Yours. A plus sign icon is on the right.

Flexible Compute Options to Run Apps / Services

Three boxes representing compute options: Instant Runtimes (Cloud Foundry icon), Containers (Docker icon), and Virtual Machines (OpenStack icon). Each box has a plus sign on the right.

Platform Deployment Options that Meet Your Workload Requirements

Three deployment options: Bluemix Public (cloud icon), Bluemix Dedicated (server icon), and Bluemix Local* (server rack icon). Each option includes a list of supported locations and logos for OpenStack, VMware, and Bluebox.

Powered by IBM SoftLayer | You Data Center

Integration and API Mgmt

A vertical stack of icons representing integration and API management: a padlock with a checkmark, an API key, an API gateway, an API proxy, and an API management icon. At the bottom is a plus sign icon.

Create apps quickly with prebuilt services

A full range of capabilities to suit any great idea.

Choice

- Runtimes, services, and tooling up to you

Industry Leading IBM Capabilities

- Services leveraging the depth of IBM software
- Full range of capabilities

Completeness

- Open source platform and services
- Third party to enable key use cases



Search items ↑ ☰

All Applications (6)

Create Application ➔

Cloud Foundry Applications 4.600 GB/8 GB Used

NAME	ROUTE	MEMORY (MB)	INSTANCES	RUNNING	STATE	ACTIONS
defect36251		64	1	0	● Stopped	⋮
Humix-Sophia-Think	humix-sophia-think.mybluemix.net	256	1	0	● Stopped	🗑️ ⋮
lot-html5-phone-luch-B...	lot-html5-phone-luch-8.38.mybluemix.net	128	1	0	● Stopped	🗑️ ⋮
passport-service-api	passport-service-api.mybluemix.net	128	1	0	● Stopped	🗑️ ⋮

IBM Bluemix Catalog

261 Catalog Support Account

Search Filter

- Storage
- Network
- Security
- Apps
- Boilerplates
- Cloud Foundry Runtimes
- Containers
- OpenWhisk
- Mobile
- Services
 - Data & Analytics
 - Watson
 - Internet of Things
 - APIs
 - DevOps
 - Application Services
 - Integrals
 - Network
 - Storage
 - Security

AlchemyAPI
An AlchemyAPI service that analyzes your unstructured text and image content.
IBM

Conversation
Add a natural language interface to your application to automate interactions with users.
IBM

Document Conversion
Converts a HTML, PDF, or Microsoft Word™ document into a normalized HTML document.
IBM

Language Translation
Translate text from one language to another for specific domains.
IBM Depreciated

Language Translator
Translate text from one language to another for specific domains.
IBM

Natural Language Classifier
Natural Language Classifier performs natural language classification on queries.
IBM

Personality Insights
The Watson Personality Insights derives insights from transactional and social data.
IBM

Retrieve and Rank
Add machine learning enhanced search capabilities to your application.
IBM

Speech to Text
Low-latency, streaming transcription.
IBM

Text to Speech
Generate natural-sounding speech from text.
IBM

Tone Analyzer
Tone Analyzer uses linguistic analysis to identify the tone of text.
IBM

Tradeoff Analytics
Helps make better choices under multiple constraints.
IBM

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

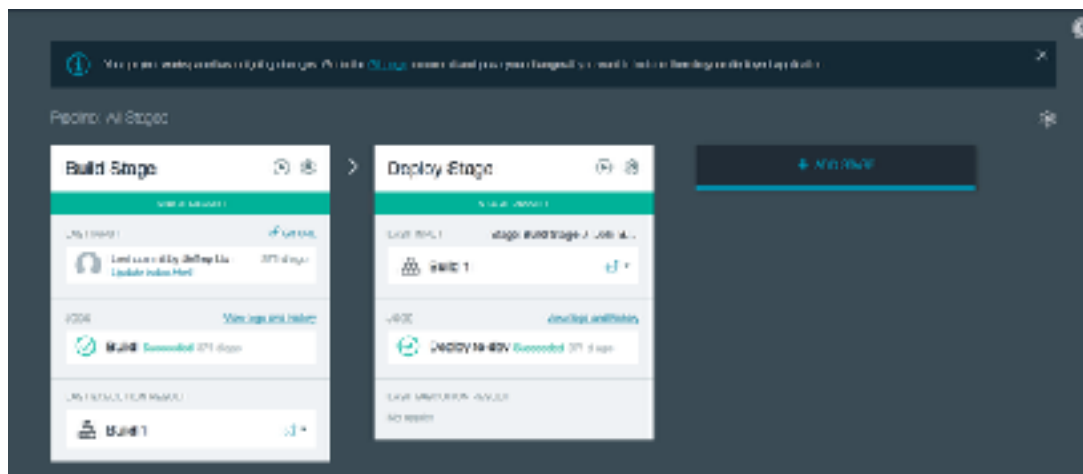
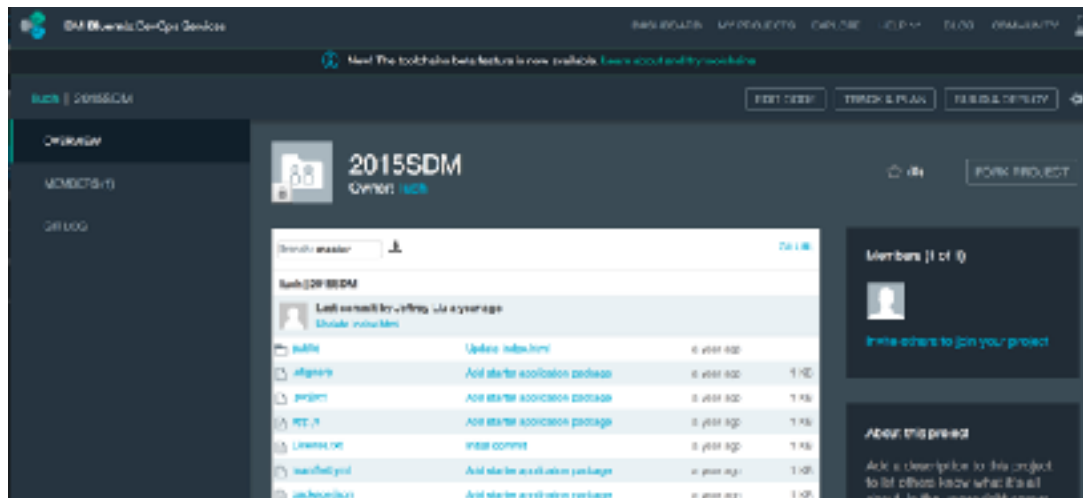
Runtimes in the BlueMix represent different buildpacks that are provided. Each runtime is an application with a starter application code deployed, and a starter application is a template so that you can use it directly with the existing buildpack from BlueMix user interface.

The screenshot displays the IBM Bluemix Catalog interface. The top navigation bar includes the user name 'Jeffrey Lark', account type 'Account', region 'US South', and environment 'Test@Bluemix: dev'. The main content area is titled 'IBM Bluemix Catalog' and features a search bar and a 'Filter' button. A left-hand navigation menu lists categories such as Storage, Network, Security, Apps, and Services. The 'Apps' section is expanded, showing 'Cloud Foundry Runtimes' as the selected category. The main area displays a grid of runtime options, each with a logo, title, description, and a status tag (IBM or Community).

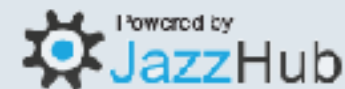
Runtime	Logo	Description	Status
Liberty for Java™	java liberty	Develop, deploy, and scale Java web apps with ease. IBM WebSphere Liberty Profile.	IBM
SDK for Node.js™	.js	Develop, deploy, and scale server-side JavaScript® apps with ease. The IBM...	IBM
ASP.NET Core	.net	Develop, deploy, and scale ASP.NET Core web apps with ease.	IBM
Runtime for Swift	.swift	A Kitura-based server application that you can use as a starting point to get your...	IBM
XPages	.xsp	Develop, deploy, and scale IBM XPages applications with ease. The IBM XPage...	IBM
Go	-go	Develop, deploy, and scale Go web apps with ease.	Community
PHP	.php	Develop, deploy, and scale PHP web apps with ease.	Community
Python	.py	Develop, deploy, and scale Python web apps with ease.	Community
Ruby	.rb	Develop, deploy, and scale Ruby web apps with ease.	Community
Tomcat	.tomcat	Develop, deploy, and scale Tomcat web apps with ease.	Community

A service is a piece of code that BlueMix hosts. And the service offers a piece of functionality for applications to use. BlueMix provides a set of predefined services that can you can use directly

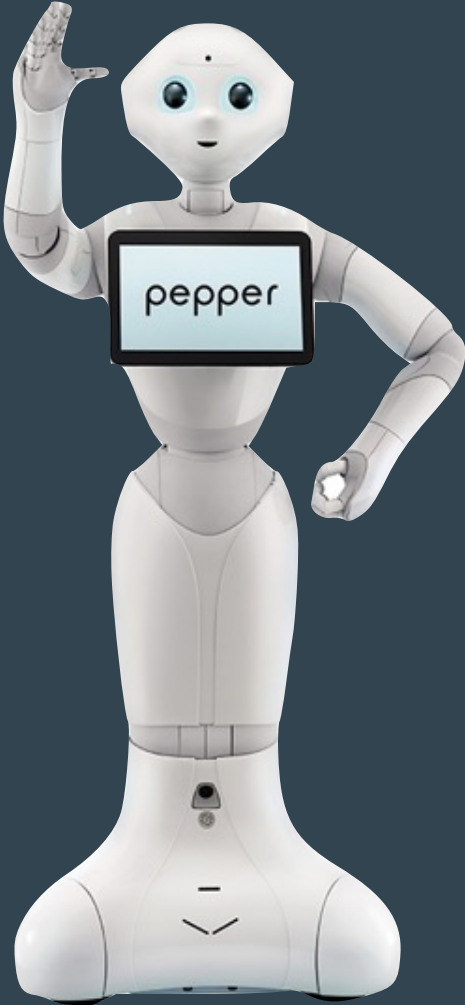
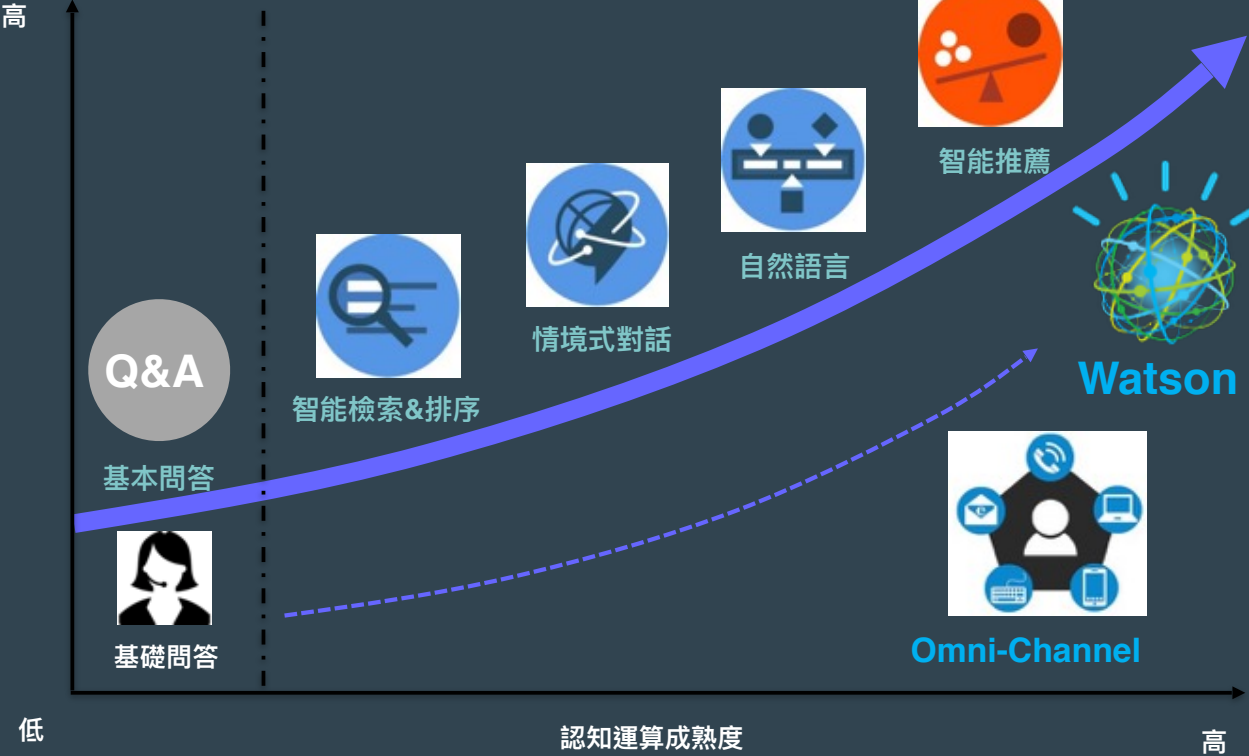
The screenshot displays the IBM Bluemix Catalog interface. At the top, there is a navigation bar with the user's name 'Jeffrey Liu's Account', location 'US South', and email 'tuch@bluemix.com'. The main header includes the 'IBM Bluemix Catalog' logo, a search bar, and navigation links for '261', 'Catalog', 'Support', and 'Account'. A left-hand navigation menu lists categories such as Storage, Network, Security, Apps, and Services. The 'Services' section is expanded, showing a grid of service cards. Each card includes an icon, a title, a brief description, and the IBM logo. The services shown are: Apache Spark, BigInsights for Apache Hadoop, Cloudant NoSQL DB, Compose for Elasticsearch, Compose for etcd, Compose for MongoDB, Compose for PostgreSQL, Compose for RabbitMQ, and Compose for Redis. The 'Compose for PostgreSQL' card is highlighted with a light blue background.



- DevOps Solution in the cloud for building mobile and cloud applications
- Optimized for use with BlueMix
- Integrated task tracking, agile planning, source control with auto deploy
- Use your favorite tools or work from the Web IDE
- Hosted Jazz SCM or Git or link to GitHub
- Public and private projects
- Continuous Integration and Deployment with Jenkins
- Mobile quality and application performance monitoring (coming)



Watson Enabled Cognitive Computing



Personality Insights

What is it?

Improved understanding of people's preferences to help engage users on their own terms

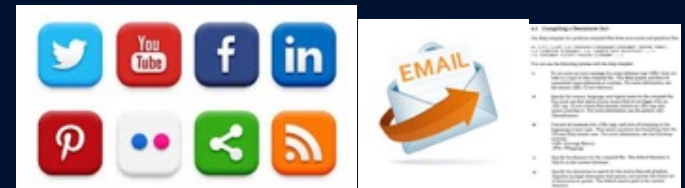
How does it work?

The IBM Watson Personality Insights service uses linguistic analytics to extract cognitive and social characteristics, including Big Five, Values, and Needs, from communications that the user makes available, such as email, text messages, tweets, forum posts, and more. By deriving cognitive and social preferences, the service helps users to understand, connect to, and communicate with other people on a more personalized level.

Use Cases-

The service can analyze text based on a customer's twitter stream to help a travel agency decide between leading with a budget or luxury trip offer

Anywhere improving a customer engagement can help create an organization differentiate itself.



http://en.wikipedia.org/wiki/Big_Five_personality_traits

Personality Insights 應用

Input Text

We need a minimum of 3500 words and ideally 6000 words or more to compute statistically significant results. See [the science behind the service](#).

Ideally, the text should contain words we use in every day life relating to personal experiences, thoughts and responses. See [usage guidance](#) for details.

Choose Language: English Spanish

Mr. Vice President, my old colleague from Massachusetts and your new Speaker, John McCormack, Members of the 87th Congress, ladies and gentlemen:

This week we begin anew our joint and separate efforts to build the American future. But, sadly, we build without a man who linked a long past with the

6437 words

Clear

Analyze

Your Personality*

You are inner-directed, restrained and rational.

You are empathetic: you feel what others feel and are compassionate towards them. You are self-controlled: you have control over your desires, which are not particularly intense. And you are calm-seeking: you prefer activities that are quiet, calm, and safe.

Your choices are driven by a desire for prestige.

You consider helping others to guide a large part of what you do: you think it is important to take care of the people around you. You are relatively unconcerned with tradition: you care more about making your own path than following what others have done.

**Compared to most people who participated in our surveys.*



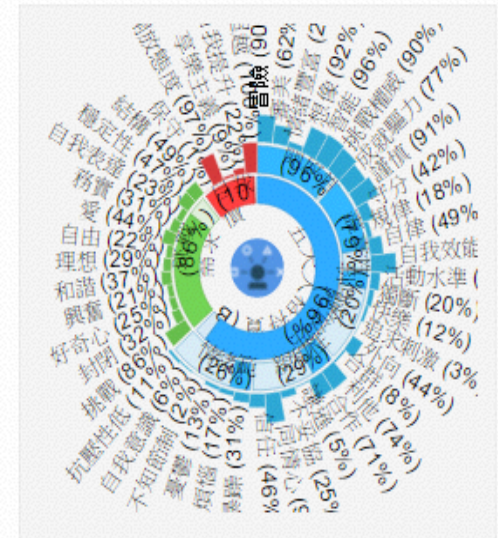
Personality Insights

The IBM Watson Personality Insights service uses linguistic analytics to extract a spectrum of cognitive and social characteristics from the text data that a person generates through blogs, tweets, forum posts, and more.

Data Behind Your Personality

Name	Value
五大人格特質 (Big 5)	
開放性	96%
冒險	90%
審美	62%
情緒豐富	19%
想像	91%
智能	96%
挑戰權威	89%
盡責性	79%
成就驅力	77%
謹慎	90%
守分	42%
規律	18%
自律	49%
自我效能	92%

Visualization of Personality Data



Speech to Text

What is it?

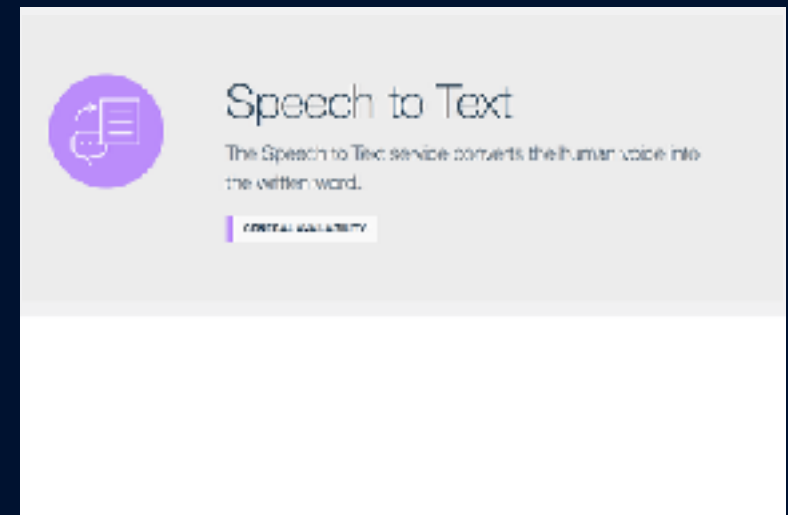
Automatic recognition of the words that are being spoken in a live audio stream, and presents the highest-scoring textual representation of that message.

How does it work?

In addition to converting a raw audio signal into a best-guess of the words that are being spoken, intelligence about the relevant grammar / how language is used within a specific context is incorporated to generate a more accurate transcription.

Example Use Cases

- A new integration paradigm for mobile apps.
- Voice-control of applications / embedded devices.
- Transcription of meetings and conference calls. Dictation of emails.
- Critical building block for “Speech-to-Speech” translation.



Text to Speech

What is it?

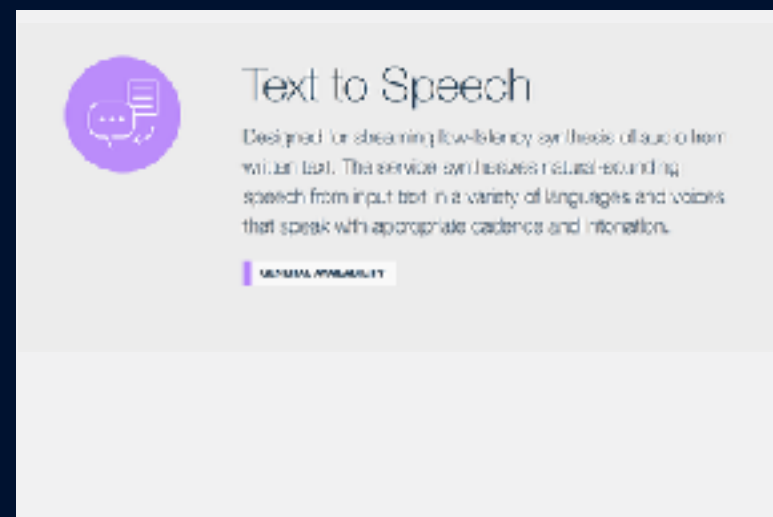
Generates an audio file that has a verbal representation of the input text - complete with appropriate cadence and intonation, and, in the future, the ability to customize the pronunciation of specific words.

How does it work?

Generates an audio file that has a verbal representation of the input text - complete with appropriate cadence and intonation.

Example Use Cases

- Enable a new interaction paradigm for mobile apps.
- Assistance tools for the vision-impaired.
- Read texts / emails aloud.
- Critical building block for enable “Speech-to-Speech Translation”



Natural Language Classifier

What is it?

Natural Language Classifier service uses machine learning algorithms which can help your application understand the language of short texts and make predictions about how to handle them.

How does it work?

The Natural Language Classifier analyzes a string of text and assigns predefined categories to it by applying deep learning technology. Deep learning is a relatively recent set of approaches that use algorithms with similarities to the way the human brain works. Deep Learning algorithms offer state of the art approaches in image and speech recognition, and the Natural Language Classifier now applies them to text classification.

Use Cases-

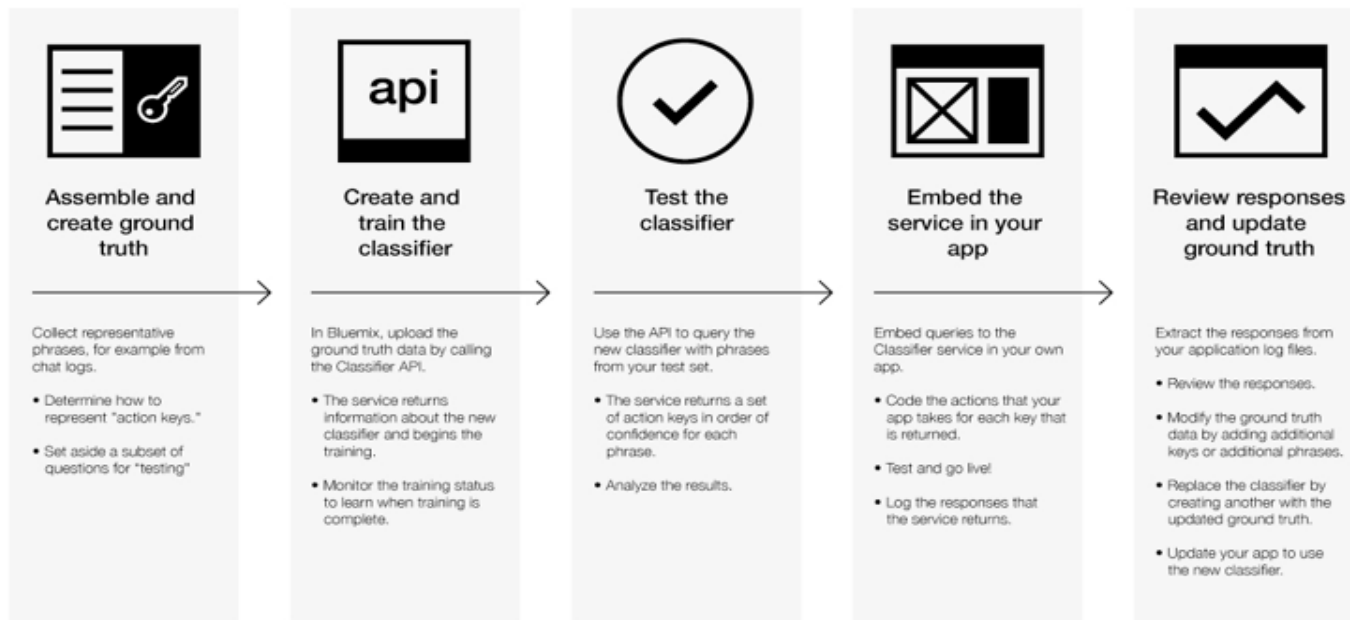
- Classify tweets into a set of classes, such as events, news, or opinions.
- Analyze text messages into categories, such as Personal, Work, or Promotions.
- Sentiment analysis on text from social media or other sources and identify whether it relates positively or negatively to an offering or service.

Natural Language Classifier

Natural Language Classifier



Using the Service



Tradeoff Analytics

What is it?

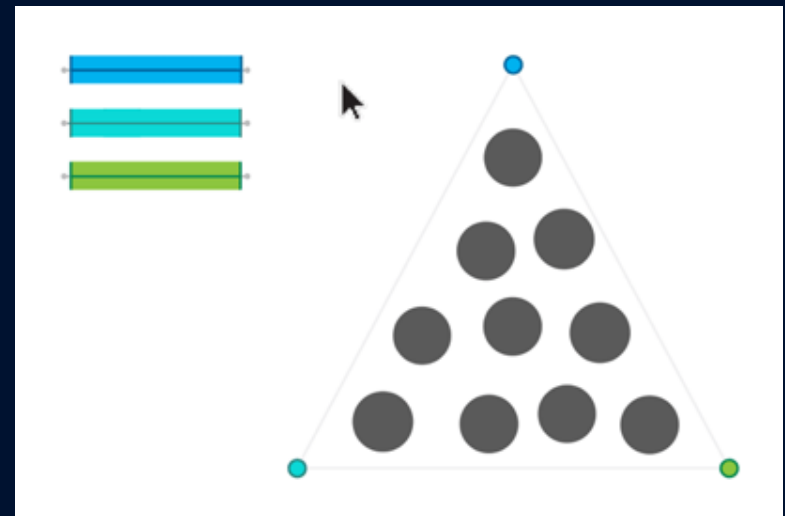
Helps make better choices under multiple conflicting goals. Combines smart visualizations and analytical recommendations for tradeoff exploration.

How does it work?

Tradeoff Analytics helps people make better choices when multiple conflicting goals come into play. Tradeoff Analytics uses Pareto filtering techniques in order to surface out only the optimal alternatives across multiple criteria. It then help the decision maker analyze the tradeoffs within the optimal set of alternatives helping them select the option that best meets their preferences and priorities.

Use Cases

- Wealth management using the technology to help choose mutual funds



Tradeoff Analytics 應用



Tradeoff Analytics NodeJS Starter Application

The Tradeoff Analytics service helps find the best available options for you. It helps users make better decisions under multiple conflicting goals.

Try the service

Select a scenario to find the best options in the scenario:

Finance [Link your own data \(CSV format\)](#)

[Analyze Sample Data](#)

Advanced

The list of options to analyze:

Id	Name	YTD	Short Term (1 Yr)	Mid Term (3 Yr)	Long Term (10 Yr)	Risk (Beta)	Net Expense	Morningstar Rating	Manager Tenure	Assets
0	OBOIX	8.24	27.74	31.22	13.08	0.94	0.76	4	9	8111.66
1	OSPHX	12.69	40.09	24.55	12.81	0.89	0.77	4	5	5863.63
2	OSAFX	10.52	39.57	21.83	13.06	0.85	0.87	4	2	426.31
3	OPHAX	11.78	32.3	20.49	12.61	0.77	0.82	4	1	1659.58
4	OBMPX	0.34	22.6	20.16	10.77	1.17	0.81	5	1	865.91
5	OSRFX	-3.85	18.07	18.92	12.41	0.99	0.83	4	4	855.24
6	OSCSX	-0.13	28.58	18.79	13.19	1.15	0.79	5	5	3149.56
7	OSRFX	12.36	37.28	18.55	13.39	1.05	0.85	4	2	598.17
8	OSHOX	1.5	6.42	18.2	9.33	1.25	0.81	2	2	335.79
9	OSVLX	1.33	13.85	17.89	-5.56	0.98	0.85	3	2	182.3
10	OBSOX	-3.11	22.96	17.85	13.16	1.23	0.84	5	5	1193.62
11	OSDAX	1.46	26.87	17.61	12.63	0.95	0.81	4	2	897.41
12	OSCPX	0.42	19.5	17.14	8.78	1.09	0.82	3	2	885.83
13	OLCSX	5.67	22.93	17.07	8.88	1.13	0.85	4	9	2950.25
14	OSPCX	2.41	18.68	16.45	5.24	1.12	0.83	4	0	410.67
15	OSCHX	6.55	25.98	16.41	15.86	1.38	0.81	5	4	1651.79
16	ODLSX	0.76	20.77	16.3	11.18	1.13	0.82	3	0	539.66

Watson Tradeoff Analytics User Interface – Version 2

Refine by: [Filters]

Select Candidates

Best Candidates (21/21) | All Candidates (115/115)

21 Best Candidates out of 115

OSUTX
OSRFX
OSPHX
OSNGX
OSENX
OSELX
OSDPX
OSDX
OSCSX
OSCHX
OSAFX

YOUR SELECTED CANDIDATES

Add your favorite candidates to compare them in detail in the next step

Visual Recognition

What is it?

Understand the contents of images. Trainable for custom content.

How does it work?

Visual Recognition allows users to understand the contents of an image or video frame, answering the question: “What is in this image?” Submit an image, and the service returns scores for relevant classifiers representing things such as objects, events and settings.

Use Cases-

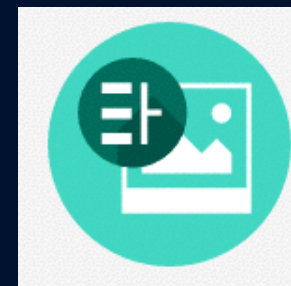
- You can organize image libraries, understand an individual image.
- Train the robot to know image sense
- Doors Security & Web Cam Application

Try out Train Test


Select an Image

[Select an image](#) or drag from your computer

Paste image URL here



Results

	<u>Classifier</u>	<u>Confidence Score</u>
	Tiger	77%
	Wild_Cat	76%
	Brown	69%
	Indoors	64%
	Cat	63%

Watson Conversation

combines a number of cognitive techniques to help you build and train a bot - defining intents and entities and crafting dialog to simulate conversation.



Conversation

Add a natural language interface to your application to automate interactions with your end users. Common applications include virtual agents and chat bots that can integrate and communicate on any channel or device.

GENERAL AVAILABILITY

Watson Conversation (Live Demo)

The screenshot displays the IBM Watson Conversation interface, divided into two main sections: a dialog flow editor on the left and a live chat demo on the right.

Dialog Flow Editor (Left):

- Test Conversation:** The main header.
- Intents:** A tab for managing intents.
- Entities:** A tab for managing entities.
- Dialog:** The active tab showing the flow of the conversation.
 - #AskWeather:** The root intent.
 - #AskWeather_CHT:** A child intent with the prompt "你想問什麼地點?".
 - Enter a condition:** A node with a text input field and the prompt "Watson says".
 - @location_cht:** An entity node with the prompt "謝謝提供地點, 這裡天氣還不錯".
- Anything else:** A catch-all intent.
- Show help:** A button at the bottom.

Live Chat Demo (Right):

- Try it out:** The header for the demo.
- Clear:** A button to reset the chat.
- Messages:**
 - System: "Sorry, I don't know"
 - User: "今天天氣如何?"
 - System: "#AskWeather_CHT"
 - User: "你想問什麼地點?"
 - System: "台北"
 - System: "#AskWeather_CHT" @location_cht:台北
 - User: "謝謝提供地點, 這裡天氣還不錯"
- Input:** "Enter something to test your service"



IBM **Bluemix IOT**

Instrument – Interconnect - Intelligent



Internet of Things

IDM



Internet of Things Fou...

IRM



IBM Analytics for Had...

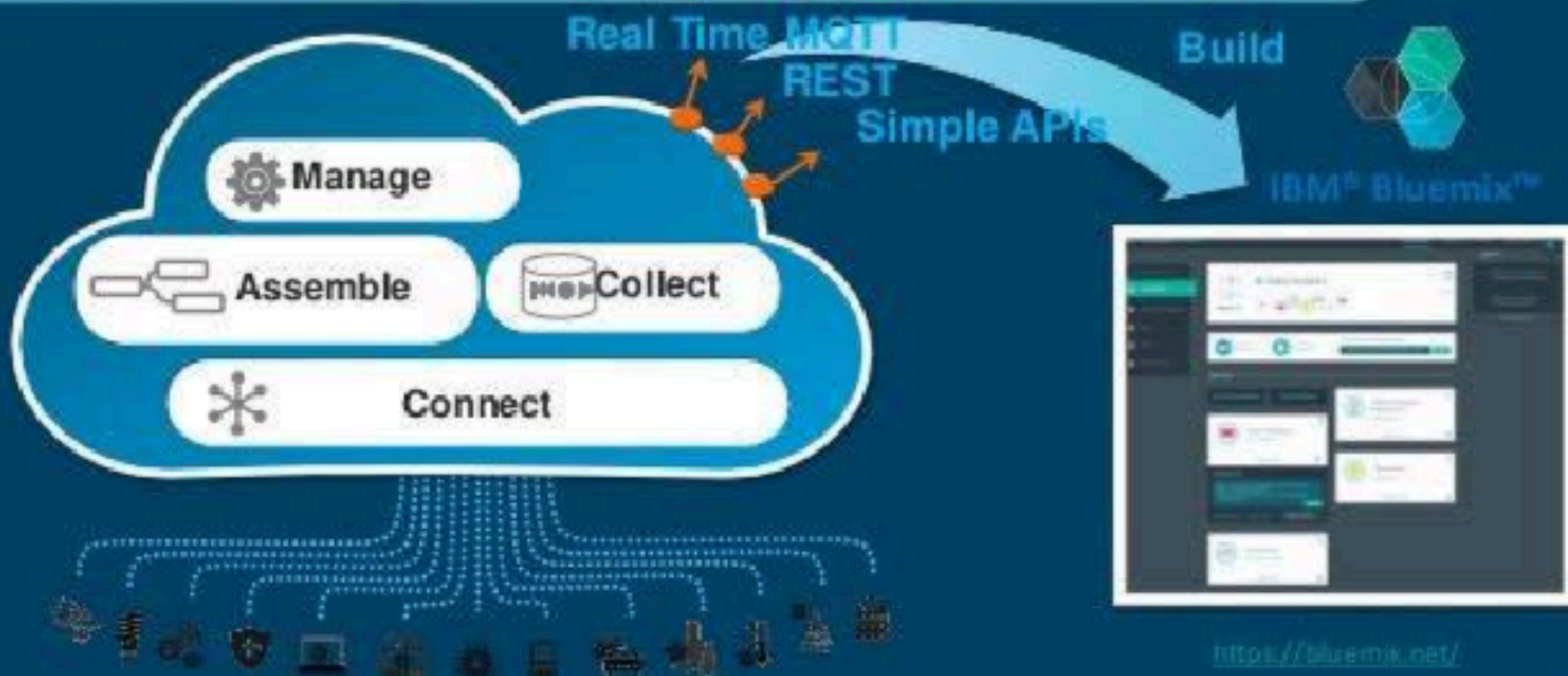
IBM BETA



IBM Bluemix IoT

Internet of Things Foundation

A fully managed, cloud-hosted service that makes it simple to Internet of Things (IoT) solutions



IOT Recipe Catalog



Texas Instruments Energia with I-W4CT254 Connected LAUNCHPAD

By VRM Fareson
May 11, 2015

Use the Energia Rapid Prototyping Environment to connect to the IBM Internet of Things Fe...

153 views 1 like 0 shares



Connect an Intel Galileo to the Internet of Things Foundation

By YOUNG HUBBARD
May 23, 2015

Use an Intel Galileo to connect to the IBM Internet of Things Foundation and visualize...

205 views 0 likes 0 shares



MQTT Client Over IBM Bluemix

By nicolaio
May 16, 2015

Using Nicolaio PTC System with STU10F207 Arduino

95 views 0 likes 0 shares



NEXCOM NIO100/NIO100Y
Bluetooth connectivity tutorial

By Nexcom
June 10, 2015

Use IoT Media Gateway Builder to create data path and send data to IBM Bluemix

28 views 1 like 0 shares



u-blox Cellular IoT Starter Kit

By nicolaio
July 3, 2015

Use an u-blox G22 cellular starter kit to connect to the IBM Internet of Things Fe...

49 views 3 likes 0 shares



Intel Edison IoT Recipe

By migog
July 15, 2015

Connect your Intel Edison to the IBM Internet of Things Foundation and visualize your d...

172 views 3 likes 0 shares



Connect a SimpleLink Wi-Fi CC3200 LaunchPad to IoT with Energia

By EdProsser
July 16, 2015

Connecting a simplelink CC3200 Launchpad to the Internet of Things Foundation Service

148 views 1 like 0 shares



TI Sensor Tag and Raspberry Pi

By AlanFarula
In this tutorial, you will learn how to use Bluetooth to connect and get sensor readings...

90 views 0 likes 0 shares



How to Connect a Device to the Cloud

By loked
July 17, 2015

Use a thing to connect to the cloud? Learn how to connect the device or "thing" to the...

204 views 1 like 0 shares



Connect an Arduino Uno device to the IBM Internet of Things Foundation

By EdProsser
Tutorial that shows how to connect an Arduino Uno to the IoT service in Bluemix

175 views 2 likes 0 shares



ARM mbed IoT Starter Kit (Part 1)

By EdProsser
Connect an ARM mbed IoT starter kit to the Internet of Things Foundation, visualize the c...

334 views 2 likes 0 shares



ARM mbed IoT Starter Kit (Part 2)

By EdProsser
July 20, 2015
Connect your ARM mbed device and application to the IBM Bluemix Service, and send command...

151 views 0 likes 0 shares



Connecting an ARM mbed NXP LPC 1114 to the Internet of Things

By EdProsser
Use an ARM mbed microcontroller to connect to the IBM Internet of Things Foundation. Then you...

246 views 0 likes 0 shares

Connect and view the data

IBM Internet of Things Foundation

Register | Customer | Service Status | Login | IBM

Welcome | **Data Dashboard**

Viewing live data

01/20/22 10:01:30

Device [Change device](#)

Device status: OK 10:01:30 PM

What's next?

[Start up](#)

Sign up provides the option of a free trial through IBM Bluemix on the IBM Marketplace.

Once signed up you can:

- Communicate securely with your devices
- Access historical as well as real-time device data
- Send commands to your devices

Already signed up for IoT Foundation?

[Log in to add IOT devices](#)

TIRIF Sensor Tag bc:6a:29:0:0:ab:ab:ba

II CC2541 Sensor tag

Object Temperature

Timestamp	Object Temperature
10:25:00 PM	0
10:25:30 PM	-1
10:26:00 PM	-2
10:26:30 PM	-3
10:27:00 PM	-2
10:27:30 PM	-1
10:28:00 PM	-1
10:28:30 PM	1
10:29:00 PM	0
10:29:30 PM	0
10:30:00 PM	0
10:30:30 PM	1
10:31:00 PM	-1
10:31:30 PM	0
10:32:00 PM	-20
10:32:30 PM	-10
10:33:00 PM	0
10:33:30 PM	1

Timestamp

[Overview](#) [Chartview](#)

[Overview](#) **[Chartview](#)**

	Sensor	Reading	Sparkline
<input type="radio"/>	Acceleration X	0 g	
<input type="radio"/>	Acceleration Y	0.1 g	
<input type="radio"/>	Acceleration Z	1 g	
<input type="radio"/>	Ambient Temperature	25 °C	
<input type="radio"/>	Gyroscope X	-1.3 °/s	
<input type="radio"/>	Gyroscope Y	0.9 °/s	
<input type="radio"/>	Gyroscope Z	-1 °/s	
<input type="radio"/>	Humidity	63.7 %	
<input type="radio"/>	Magnetic X	-35.0 μT	
<input type="radio"/>	Magnetic Y	3.6 μT	
<input type="radio"/>	Magnetic Z	82.3 μT	
<input checked="" type="radio"/>	Object Temperature	18.2 °C	
<input type="radio"/>	Pressure	1,016.2 mbar	
<input type="radio"/>	Temperature	25.0 °C	



DEMO TIME

The
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SPECIAL REPORT
TECH STARTUPS
January 18th 2014



A Cambrian moment

- IBM cloud marketplace
<http://www.ibm.com/cloud>
- IBM BlueMix
<https://ace.ng.bluemix.net/>
- IBM BlueMix introduction
https://www.ibm.com/developerworks/cloud/blueprint/html/ibm_bluemix_intro.html
- Getting started with BlueMix and JazzHub
<https://hub.jazz.net/tutorials/jazzeditor>