


IBM Bluemix: Cloud Computing, But Not Just for Computer Science


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What is Bluemix?

- IBM offering for professional app developers
- Cloud computing: Resources provided flexibly as needed over the network
- Platform as a Service (PaaS): Infrastructure that users can build on
- Includes mix of open-source and IBM proprietary products
- Supports web and mobile app development, databases, big data analytics, and cognitive computing
- 30-day free trial available to all
- Extended free access available to educators and students through the IBM Academic Initiative


Bluemix logo from Wikimedia Commons by Avibrazil (CC BY-SA 4.0). Cloud computing image from openclipart.org by gspagrios (public domain).



Big Data Analytics: Hadoop


- Open-source framework for distributed storage and processing of very large data sets
- Operates on a cluster of commodity hardware
- Developed by Yahoo! engineers based on work at Google
- MapReduce algorithm: Massively parallel processing for certain kinds of problems
- Bluemix provided virtual cluster plus optional IBM BigSheets spreadsheet-like interface
- Bluemix offering is currently in flux; new version expected soon

Hadoop logo copyright 2016 by Apache Software Foundation (Apache License 2.0)



Big Data Analytics: Weather and NYC 311 Calls

Data on New York City 311 non-emergency service requests downloaded from NYC OpenData site (approximately 20 million calls).
Precipitation data downloaded from National Climatic Data Center of US National Oceanic and Atmospheric Association (NOAA): Global Historical Climate Network Daily Summaries.
Correlation analysis performed using Hadoop and BigSheets on IBM Bluemix platform. Adapted from Big Data for Social Good Example Demo created by IBM Bluemix team at <http://ibmhadoo.devpost.com>



Coding and App Development

- Web and mobile apps
- Code in Java, Node.js (JavaScript), Go, PHP, Python, Ruby, and Swift
- Bluemix DevOps Services provides built-in Web Integrated Development Environment (IDE)
- Can also use Eclipse, Visual Studio, or other tools
- Can start from scratch, use IBM-provided boilerplates, or fork an existing app


Screenshot from IBM Bluemix services catalog.

Java Web App with SQL Database

Boilerplate web app in Java using a SQL database
Manages a simple to-do list with add, delete, and edit capabilities

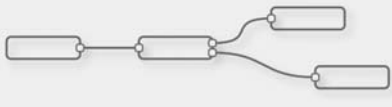
Publicly accessible at
<http://java-test.mybluemix.net/>

Code (Java, HTML, and JavaScript) editable through DevOps Services Web IDE




Node-RED

A visual tool for wiring the Internet of Things



Graphical Development and Internet of Things

- Open-source tool for easily connecting hardware devices, application programming interfaces (APIs), and online services
- Construct data flows via drag-and-drop
- Huge library of pre-built nodes: Input, Output, Function, Social, Storage, and Analysis
- Nodes can be created or edited with simple coding
- Connect to social media streams, mobile devices, and IoT sensors/actuators



Node-RED "Hello World" Application


HTTP input node gets input from `http://<appname>.mybluemix.net/hello`

Function node extracts the value of the name parameter from the URL

Template node puts "Hello" in front of the name

HTTP output node displays result on web page

Cognitive Computing: Watson




- Text/image analysis
- Concept expansion (euphemisms or colloquialisms)
- Concept associations
- Natural-language conversations
- Language translation
- Natural-language classification
- Relationship extraction (parts of speech in sentences)
- Machine learning
- Speech-to-text and text-to-speech
- Tone analysis
- Visual recognition

Still frame from television game show Jeopardy! from Wikimedia Commons (presumed fair use)

Personality Insights Analysis

Analysis of President Obama's statement announcing nomination of Judge Garland to the US Supreme Court



Getting Started with Bluemix



- Get a 30-day trial account at <http://www.ibm.com/cloud-computing/bluemix/>
- Join the IBM Academic Initiative at <https://developer.ibm.com/academic/>
- Nominate your course to participate in the IBM Academic Cloud
- Receive promotional codes for yourself and your students to extend your access
- Have fun exploring cloud computing with Bluemix!

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