CLOUDS, SERVICES AND BLUEMIX
Readings


3. *Bluemix Overview*. 
WHAT IS CLOUD COMPUTING?
Cloud computing is the delivery of shared computing resources, software or data — as a service and on-demand through the Internet.
5 Essential Characteristics of Cloud Computing

Ref: The NIST Definition of Cloud Computing

On-demand self-service
Ubiquitous network access
Location transparent resource pooling
Rapid elasticity
Measured service with pay per use

Source: http://aka.ms/532
Virtualization

• **Virtualization** is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources.

• Virtualization software (eg VMWare, Zen) is a key enabler of cloud computing
Flavours of Virtualization

Virtual Machines

Containers
Business Models for Cloud Computing

SaaS • Software

Consume It!

PaaS • Platform

Build On It!

IaaS • Infrastructure

Migrate To It!
SaaS vs PaaS vs IaaS
SERVICES COMPUTING
Services Computing

• Computing architecture that packages functionality as a suite of interoperable routines.
• Requires loose coupling of services with operating systems and other underlying technologies.
• Functions are separated into distinct self-describing and autonomous units, or services.
• Services are accessible via pre-defined interfaces over a network.
• Services communicate by passing data in a well-defined, shared format.
Web Services

• The dominant implementation of services computing.

• Two flavours:
  – SOAP Based (WS-*) Web Services
  – REST style Web services
WS-* Web Services

- **SOAP** – Simple Object Access Protocol
- **WSDL** – Web Service Description Language
- **UDDI** - Universal Description, Discovery and Integration
RESTful Web Services

- **REpresentational State Transfer**
- The web has *addressable resources*.
  - Each resource has a Uniform Resource Identifier (URI).
  - REST is *resource-based* as opposed to action-based (like SOAP)
- The web has a *uniform and constrained interface*.
  - Eg. HTTP, has a small number of methods. Use these to manipulate resources.
- The web is *representation oriented*
  - Can interact with a resource using different representations
- The web may be used to *communicate statelessly* – providing scalability
- *Hypermedia* is used as the engine of application state change.
Protocol Stack

OSI Model

Application
Presentation
Session
Transport
Network
Data Link
Physical

TCP/IP

Application
Transport
Internetwork
Link and Physical
Uniform Constrained Interface

- Most commonly uses HTTP operations
  - GET - read from the resource
  - PUT – modify (insert or update) the state of the resource
  - POST – may modify the state of the resource; request and response may contain additional information
  - DELETE – modify (delete) the state of the resource.
SOAP vs REST Interactions
Overview of IBM Cloud Offering

BLUEMIX
What is Bluemix?

- **Bluemix** is an *open-standards, cloud-based PaaS* for building, running, and managing applications
What is Bluemix? (cont)

Compute
Choose the level of **infrastructure abstraction** based on your app’s architectural needs.

Dev Tooling
From editors to source code management to continuous delivery, you can use Bluemix’ **powerful tooling** or easily bring your own.

Location
Deploy apps to Bluemix **Public** (in a growing number of geos), your own **dedicated cloud** Bluemix, or one that runs within your data center (Local*).

Services
Pick from a catalog of **IBM, third party, open source, or your own** services to extend your apps.

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1. Compute
2. Dev Tooling
3. Location
4. Services
How does Bluemix work?

Bluemix is underlined by three key open compute technologies: **Cloud Foundry**, **Docker**, and **OpenStack**. It extends each of these with a of **services**, robust **DevOps tooling**, and **integration** capabilities.
Key Technologies

• **Cloud Foundry**
  – Cloud Foundry is an open-source PaaS for developers to run their applications in the cloud
  – Developers only push their (web) applications and everything else - from the hardware up to the application servers - is provided by the platform.
Key Technologies

• **Docker**
  – Docker is an open-source container technology to package full application stacks so that these containers can easily be run in different environments.
  – Portability is achieved by packaging the core applications along with the complete underlying stack you need to run applications including application servers, Java runtimes, configuration and other dependencies.
Key Technologies

- **Openstack**
  - OpenStack is a set of open-source IaaS software tools for building and managing cloud computing platforms for public and private clouds.
  - Allows users to deploy VMs and instances on the fly and to dynamically scale running applications.
Key Technologies

• *SoftLayer*
  – SoftLayer is an IBM-owned company
  – IaaS provider that has data centers around the world
Bluemix Architecture
Bluemix Services

Watson
Build cognitive apps that help enhance, scale, and accelerate human expertise.

- Archemy API
- Concept Expansion
- Concept Insights
- Dialog
- Document Conversion
- Language Translation
- Natural Language Classifier
- Personality Insights
- Relationship Extraction
- Retrieve and Rank
- Speech To Text
- Text to Speech
- Tone Analyzer
- Tradeoff Analytics
- Visual Recognition
- Cognitive Commerce
- Cognitive Graph
- Cognitive Insights
WHAT’S COMING UP IN THE COURSE
• **Week 2 – Sept 19 - 23**
  – Lectures – RDBMS implementation issues

• **Week 3 – Sept 26 - 30**
  – Lectures – RDBMS implementation issues, RDBMS architectures

• **Week 4 – Oct 3 – 7**
  – Assignment 1 due Oct 4
  – Bluemix tutorial Oct 4
  – Lectures – RDBMS architectures