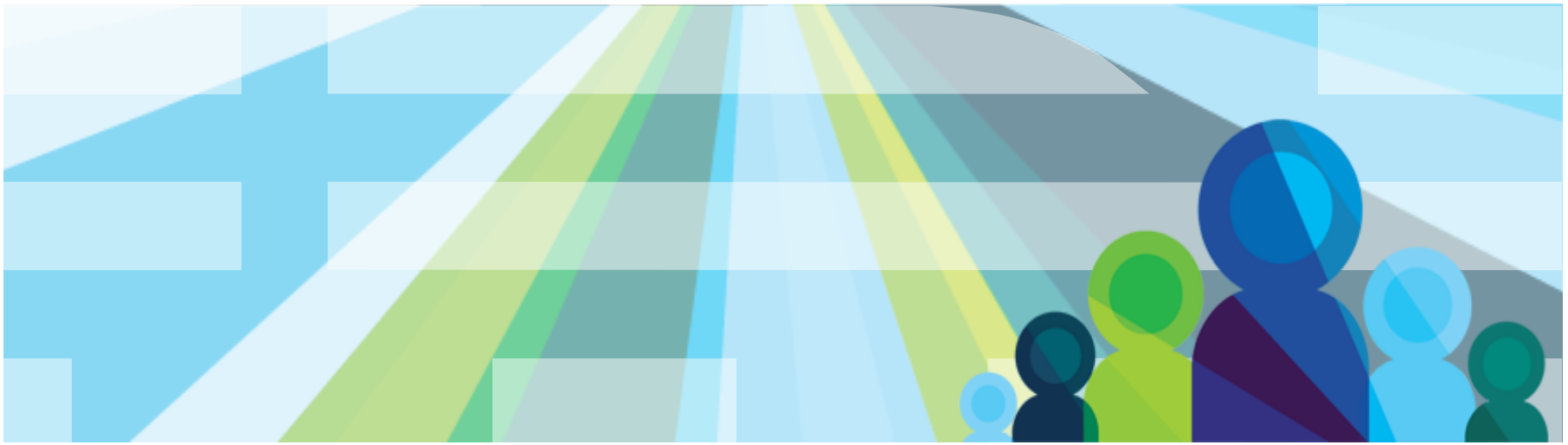
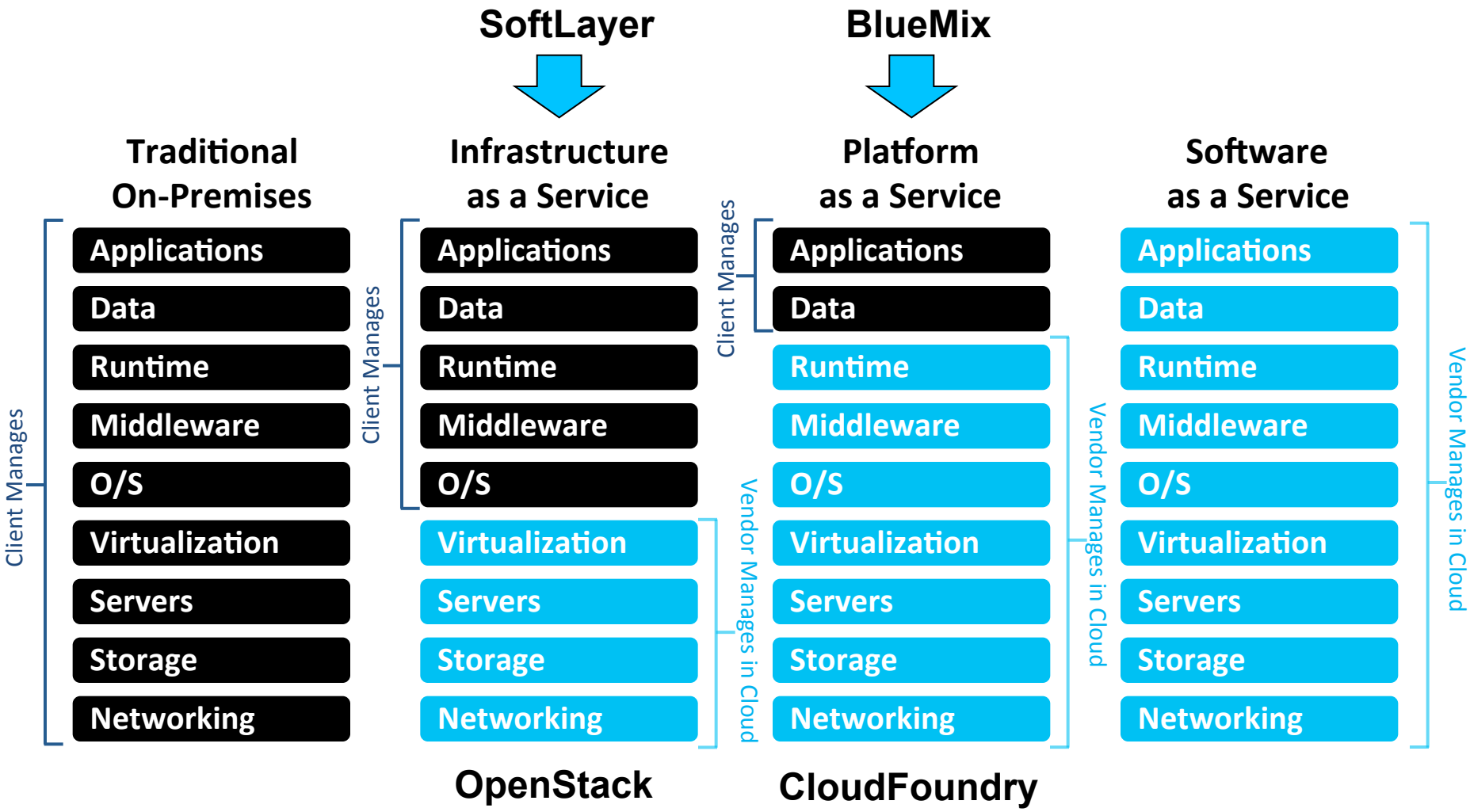
Lesson 1:
BlueMix Overview & UI Dashboard



Cloud Service Models



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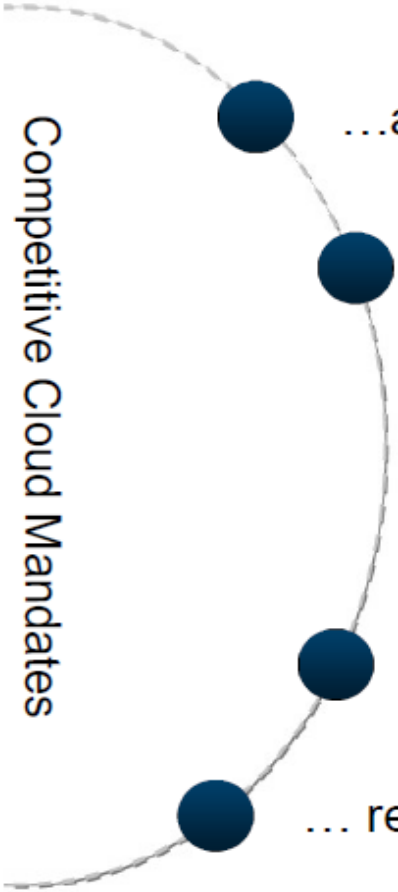
SoftLayer's Infrastructure changes the definition of cloud



…all resources are **virtualized**.

…all resources are **shared,** at every granular level.

Think Differently ….

With SoftLayer, neither is mandated, opening up cloud computing to new applications and use cases

… **virtualization** is a choice with a flexible set of options.

… resources can be **shared**, **dedicated**, or **mixed**.

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SoftLayer IaaS – More than virtual machines

- Virtual Machines
  - Public (Shared Hardware)
  - Private (Dedicated Hardware)
- Bare Metal (Physical) Machines
  - Built to specification
  - Standard Builds
- Private Cloud
  - Dedicated hardware
  - Customer Managed Hypervisor
- Networking
  - Firewalls
  - VPNs
  - Routers
  - Load Balancers
- Storage
  - Local
  - Network-Attached Storage
  - iSCSI Storage Area Network
  - Dedicated iSCSI
  - Build-Your-Own
  - ObjectStorage (OpenStack)

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Evolution of BlueMix

Business Problems

- “I am losing talented developers because they don’t have access to the tools they want to use”
- “It’s not that my developers lack the skills to manage infrastructure, it’s that I don’t want them to. I need them writing code for the business”
- “I am nervous we are spending time and money integrating things that should naturally fit together”
- “My average developer has 250 open change requests from the business. That is a lot of business value we need to deliver”
- “I am not confident that the platform is secure as I integrate into existing systems”

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Evolution of BlueMix (continued)

Developer Problems

- Spending time installing middleware keeps me from coding
- Sifting through pages of docs diminishes desire to use a new technology.
- Accessing data between different apps often requires writing custom data layers and routines to share, sync, and manage data.
- Creating API integrations is difficult when working with on-premise data.
- Setting up a productive development for a developer

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Evolution of BlueMix (continued)

- **Inefficiency and delay** in managing the application development process in disparate, heterogeneous environments
- **Limited adaptability** in managing disparate infrastructures to handle multiple application developments across the lifecycle
- **Lack of predictability and scaling** for the future, when transitioning from individual development environments to QA and production

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BlueMix Value to Developers

- <2 Mins: from idea to search to coding via Integrated developer tools.
  E.g. Polling app in 2 mins
- Everything you need to write modern mobile apps are pre-integrated and preconfigured
- Self service to start, scale and make money!

Simplicity & Speed

- BlueMix Framework and Services are built based on Open standard
- Use what you already use: MongoDB, NodeJS
- Need something more, find it in Marketplace!

Open & Flexible

- Best in class security, support and reliability, loved by Fortune 500 companies.
- Reuse your existing business services to create new composable apps integrating with what you already have.

Brand trust & integration

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Why BlueMix?

- Speed – Time-to-Value
  - A. Fast—increase velocity of IT service contribution to business from application development to infrastructure deployment and monitoring
  - B. Improved—deploy high value-generating applications quickly instead of spending excessive time in scripting and debugging
- Agility – Operational Efficiency
  - A. Adaptable—scale environments elastically based on business demand
  - B. Extensible—embrace and transform legacy environments to a platform approach
- Predictability – Reduced Risk and Cost
  - A. Improve application performance and availability
  - B. De-risk and separate concerns of application development and operations

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Why BlueMix? (Cont'd)

- BlueMix is a composable environment built on open standards
- BlueMix is an open, integrated and flexible cloud-centric platform
- BlueMix changes the way developers work - Move quickly, see results fast.
- BlueMix leverages API's and SDK's that can quickly and easily be incorporated with the latest technology
- BlueMix Supports fit-for-purpose programming models (polyglot) and services.
- BlueMix Embeds manageability of services and applications.
- BlueMix Provides optimized and elastic workloads.
- BlueMix Enable continuous availability.

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We’re just getting started.

Register at: http://www.bluemix.net

Please put
‘**BlueMixDays**’
in the reason field when registering.

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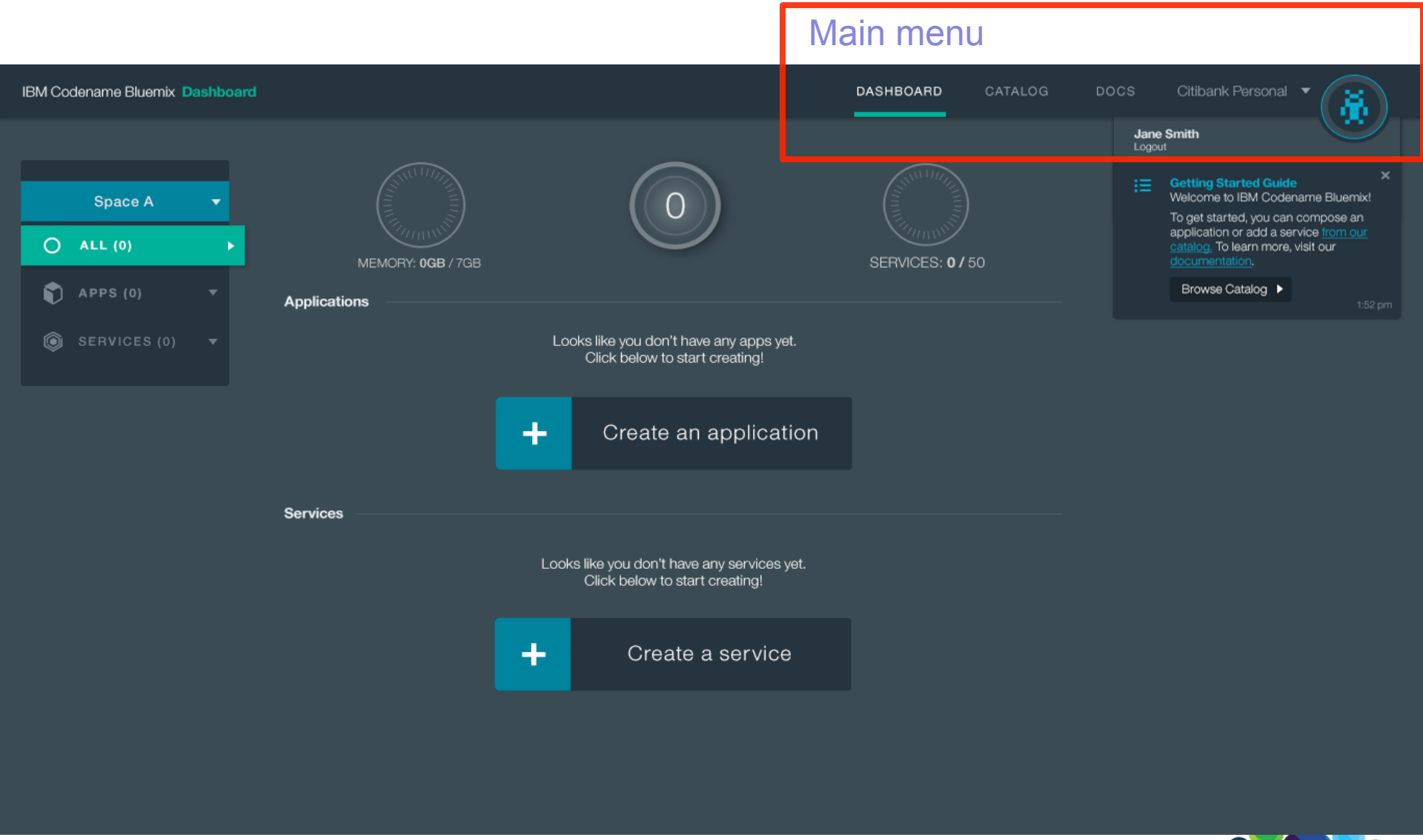
BlueMix UI Dashboard



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Catalog - Delivering Composable Services for building an environment

Run Your Apps

The developer can chose any language runtime or bring their own. Just upload your code and go.

DevOps

Development, monitoring, deployment and logging tools allow the developer to run the entire application

APIs and Services

A catalog of open source, IBM and third party APIs services allow a developer to stitch together an application in minutes.

Cloud Integration

Build hybrid environments. Connect to on-premises systems of record plus other public and private clouds. Expose your own APIs to your developers.

Extend SaaS Apps

Drop in SaaS App SDKs and extend to new use cases (e.g,. Mobile, Analytics, Web)

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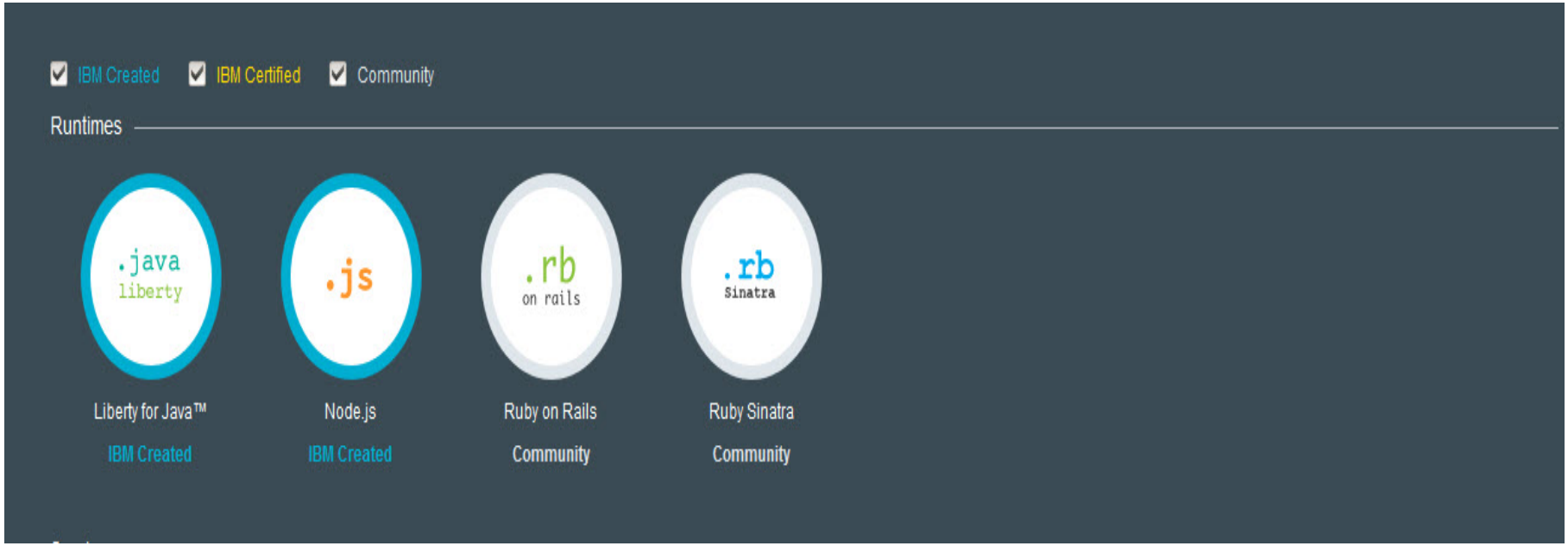
App Runtimes

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.



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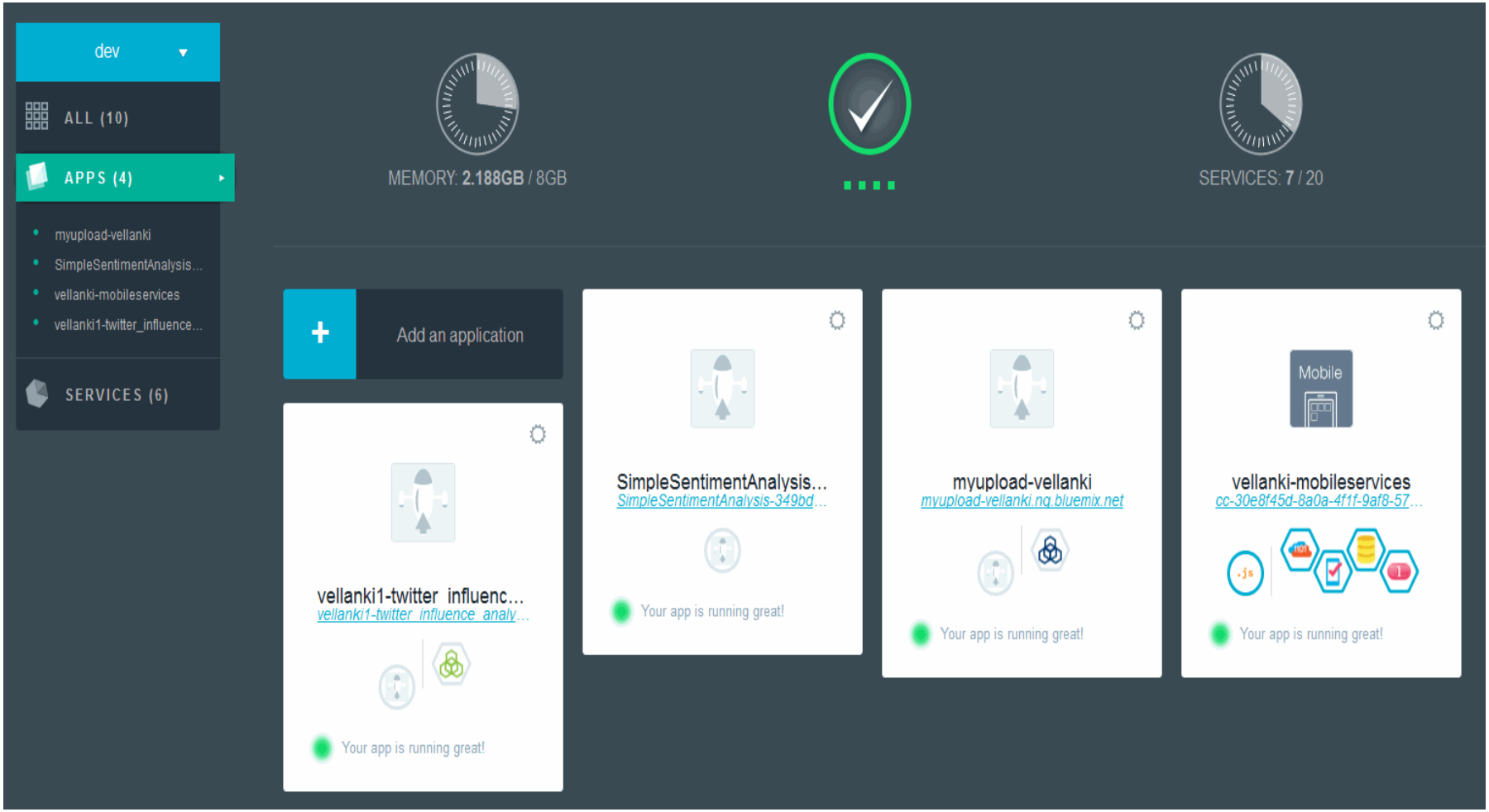
Services

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 pre-defined services

that can you can use directly

Applications on your dashboard



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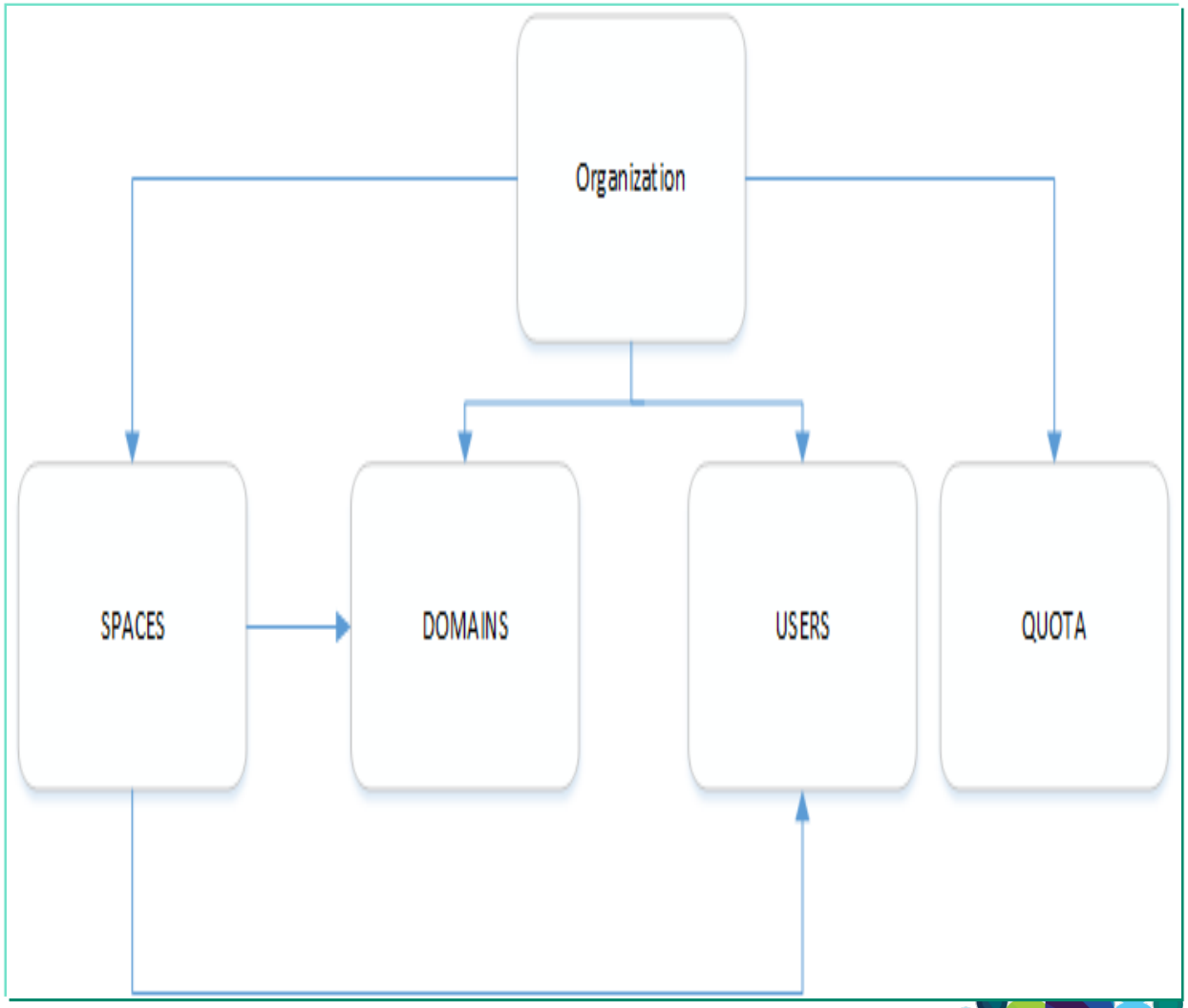
Organizations, Spaces , Users and Domains

- **Organizations**
  - **Users**
  - **Domains**
  - **Spaces**
  - **Quota**



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Organizations

An organization is defined by the following items:

Spaces -

Spaces provide a mechanism to collect related applications, services, and the users that can collaborate on the resources. An organization can contain multiple spaces. All application and service creation within BlueMix must be associated with a space.

Users -

A user must be assigned to an organization to be granted permission to the spaces within the organization.

Domains -

Domains provide the route on the Internet that is allocated to the organization. A route has a sub-domain and a domain. A sub-domain is typically the application name. A domain might be a system domain, or a custom domain that is the personally registered for your application.

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Quota -

Quota represents the resource limits for the organization. Quota defines the number of services and the amount of memory that can be allocated for use by the organization. Any application or service in a space of the organization contributes to the usage of the quota. The quota is assigned when organizations are created.

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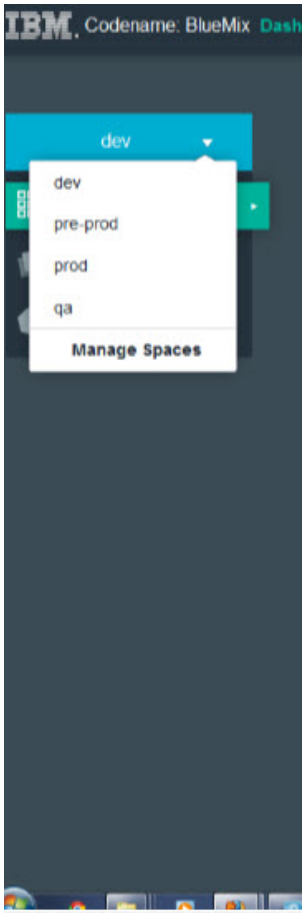
Spaces



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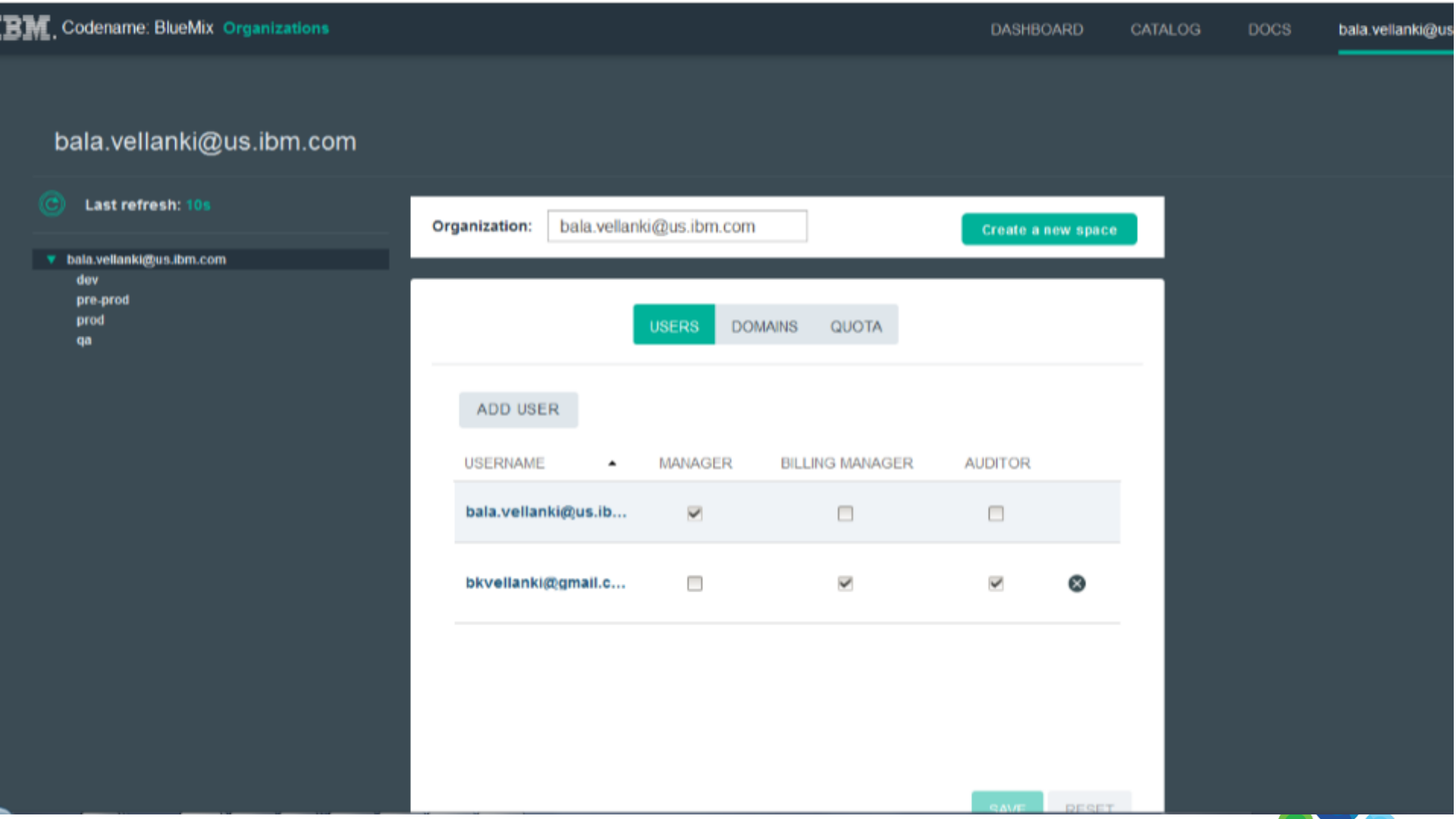
Users



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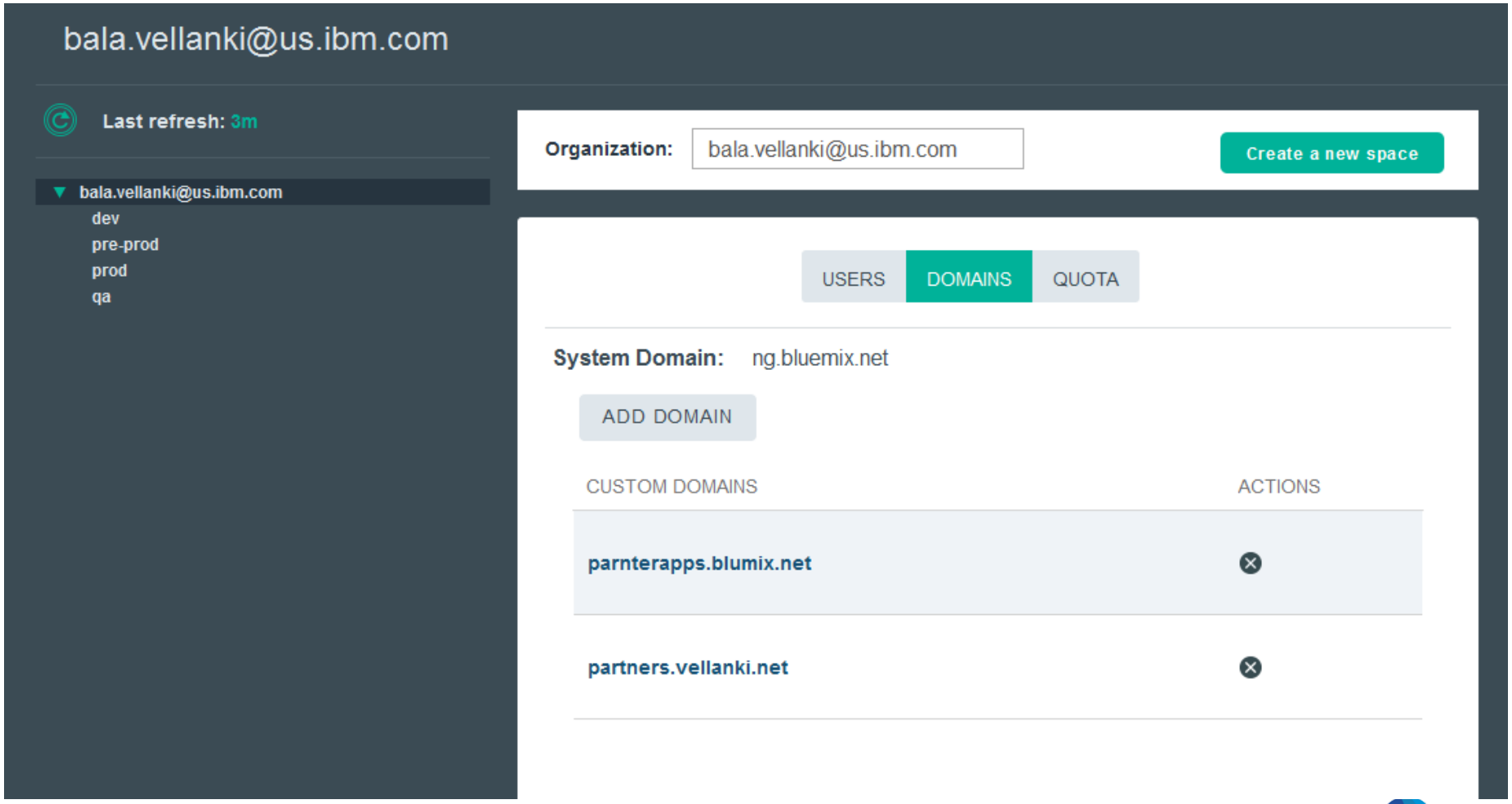
Domains



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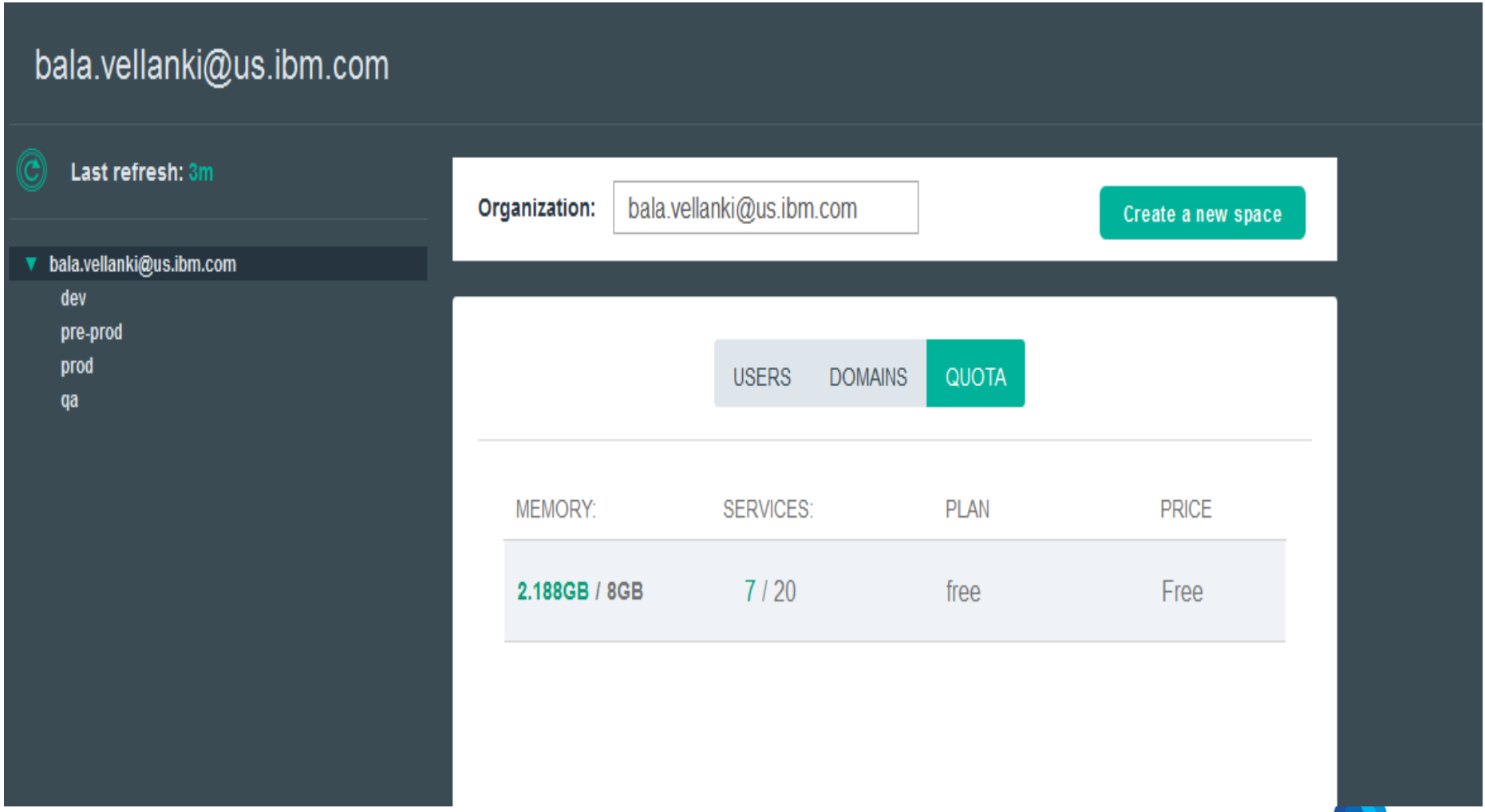
Quota



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Buildpacks

- A buildpack is a collection of scripts responsible for preparing your code for execution on the target PaaS. A buildpack can gather the framework and runtime dependencies of an application, and package them with the application into a droplet that can be deployed to the cloud.
- IBM created buildpacks in BlueMix
  - Liberty Built-in
  - Node.js Built-in

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Buildpacks – Cont'd

External buildpacks

- There are also external buildpacks that are provided by the Cloud Foundry community. For detailed information of external buildpacks,.
- If you want to use the built-in Cloud Foundry buildpacks to overwrite the IBM built-in buildpacks, you must specify the URL with the *-b* option on the cf push command. For example, use the Cloud Foundry built-in Java buildpack with cf push *my_app* -b https://github.com/cloudfoundry/java-buildpack, and use the Cloud Foundry built-in Node.js buildpack with $ cf push *my_app* -b https://github.com/cloudfoundry/heroku-buildpack-nodejs.git.
- External buildpacks are not supported by IBM, and you might need to contact the Cloud Foundry community for support.

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BuildPack	Description	Preinstalled?	Runtime	Version(s) *->default	Frameworks
IBM Node.js	IBM's hardened, supported version of Node	Y	Node.js		
IBM Liberty Buildpack	IBM's Java Buildpack	Y	Liberty Web		
CF Ruby	Ruby Buildpack		Ruby	1.8.7 1.9.2 1.9.3* 2.0	Rack, Rails, Sinatra
CF Java	Java Buildpack		Java	OpenJDK 1.6, 1.7*, 1.8	
			Groovy	1.5-.x>2.1.x*	
			Tomcat	6.0.x-7.0.x*	
			Spring Boot	0.5	
			Play	0.7.1	
CF Node	Node.js			Many 0.4.7-0.10.6 0.10.latest*	npm
Other community Buildpacks	There are many buildpacks available on github. Some are widely used and maintained and others are very limited		Go, Clojure, PHP, ,Net		

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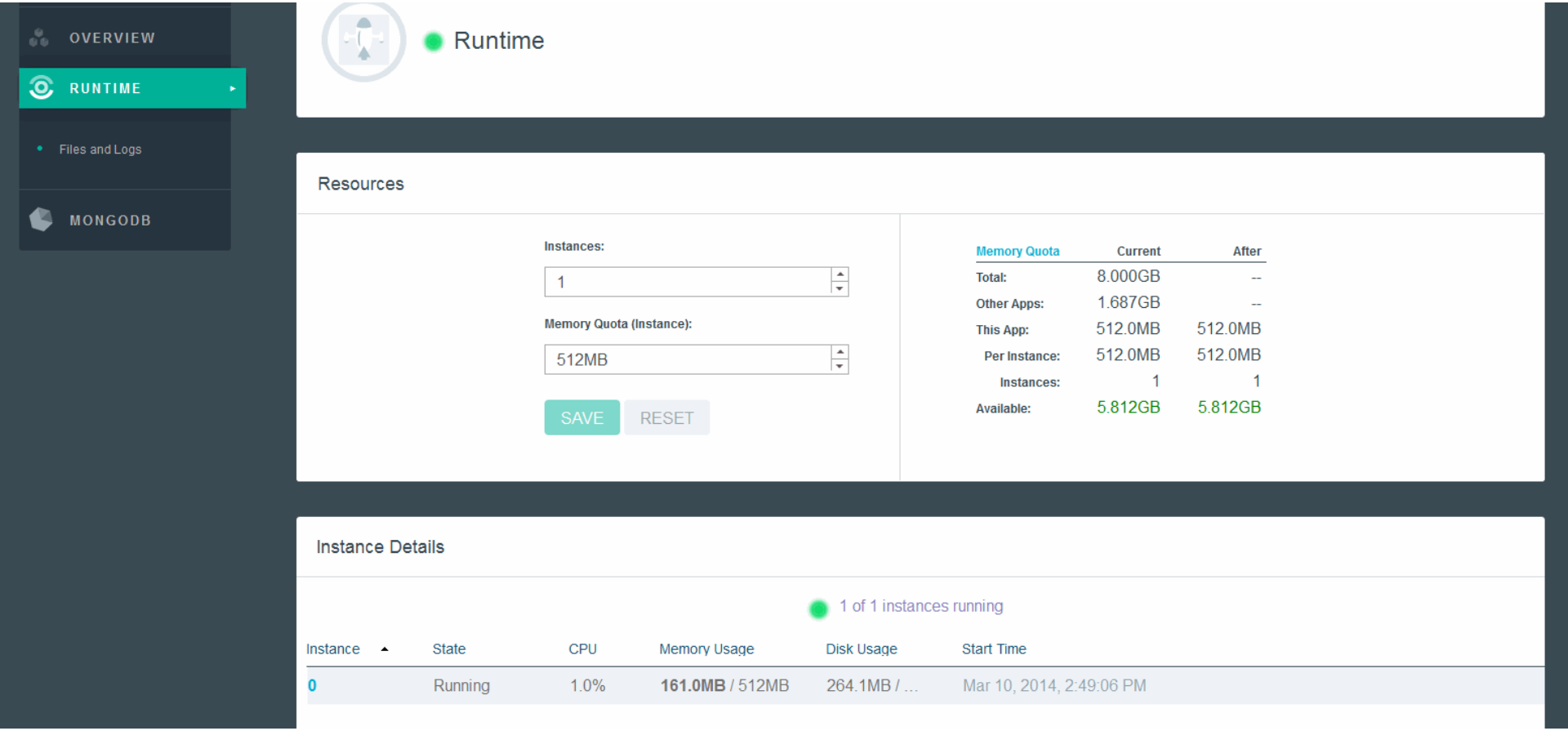
Monitoring and Logs



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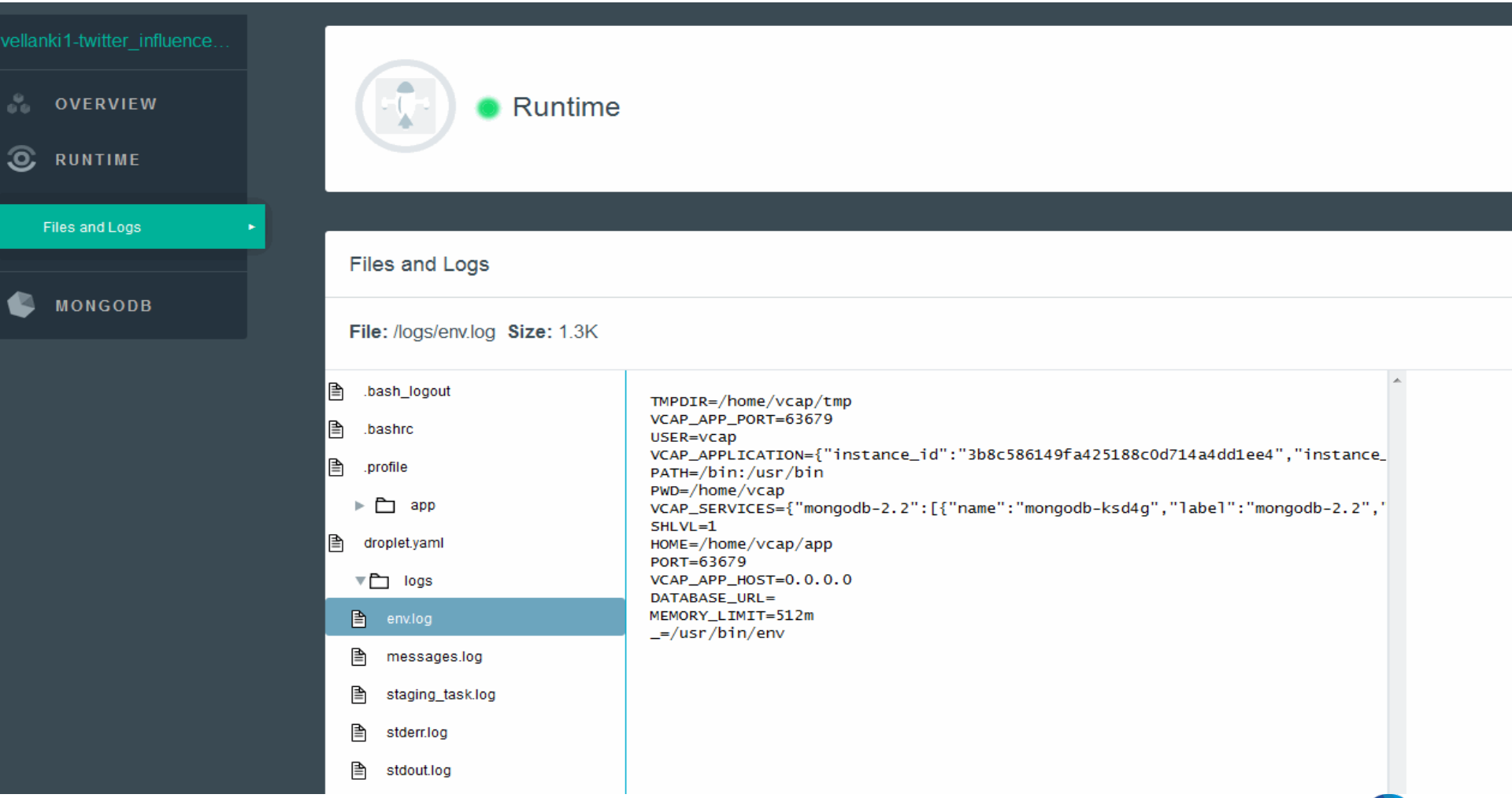
Monitoring and Logs



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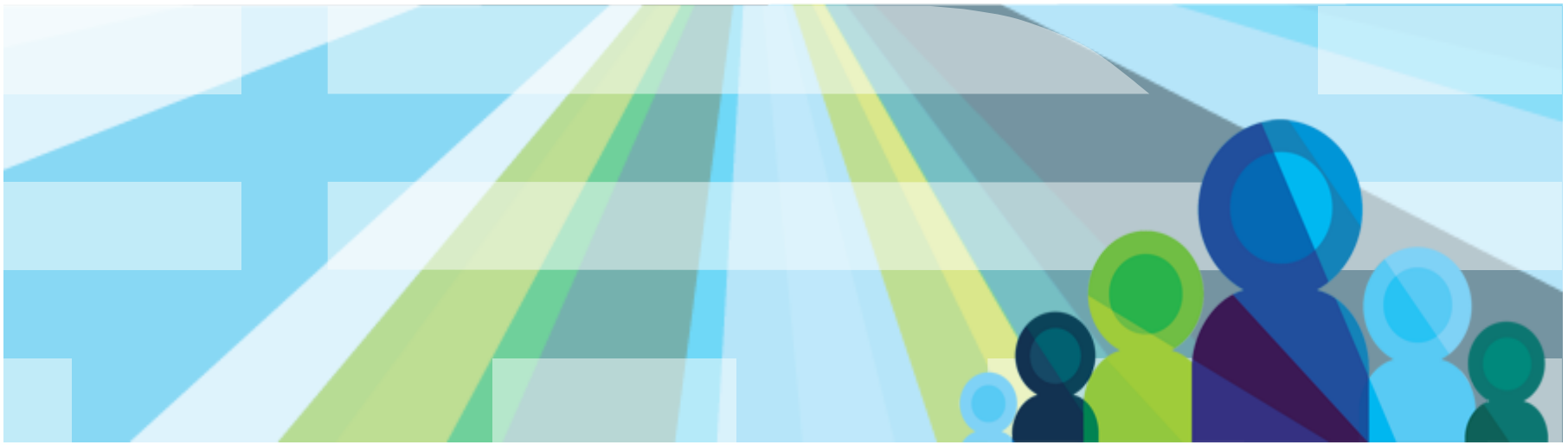
Lesson 2:BlueMix Architecture



Lesson 2 - BlueMix Architecture

What is Blue Mix?

1. BlueMix is an implementation of IBM's Open Cloud Architecture, leveraging Cloud Foundry to enable developers to rapidly build, deploy, and manage their cloud applications, while tapping a growing ecosystem of available services and runtime frameworks.

2. IBM will provide services and runtimes into the ecosystem based on our extensive software portfolio.

3. For developers, this meant that we wanted a system that would significantly reduce the time needed to create the application, to provision it, allow for flexible capacity in terms of storage, but also bandwidth and processing power, and which would handle the back-end infrastructure needs without requiring the developer to spend their valuable time doing so.

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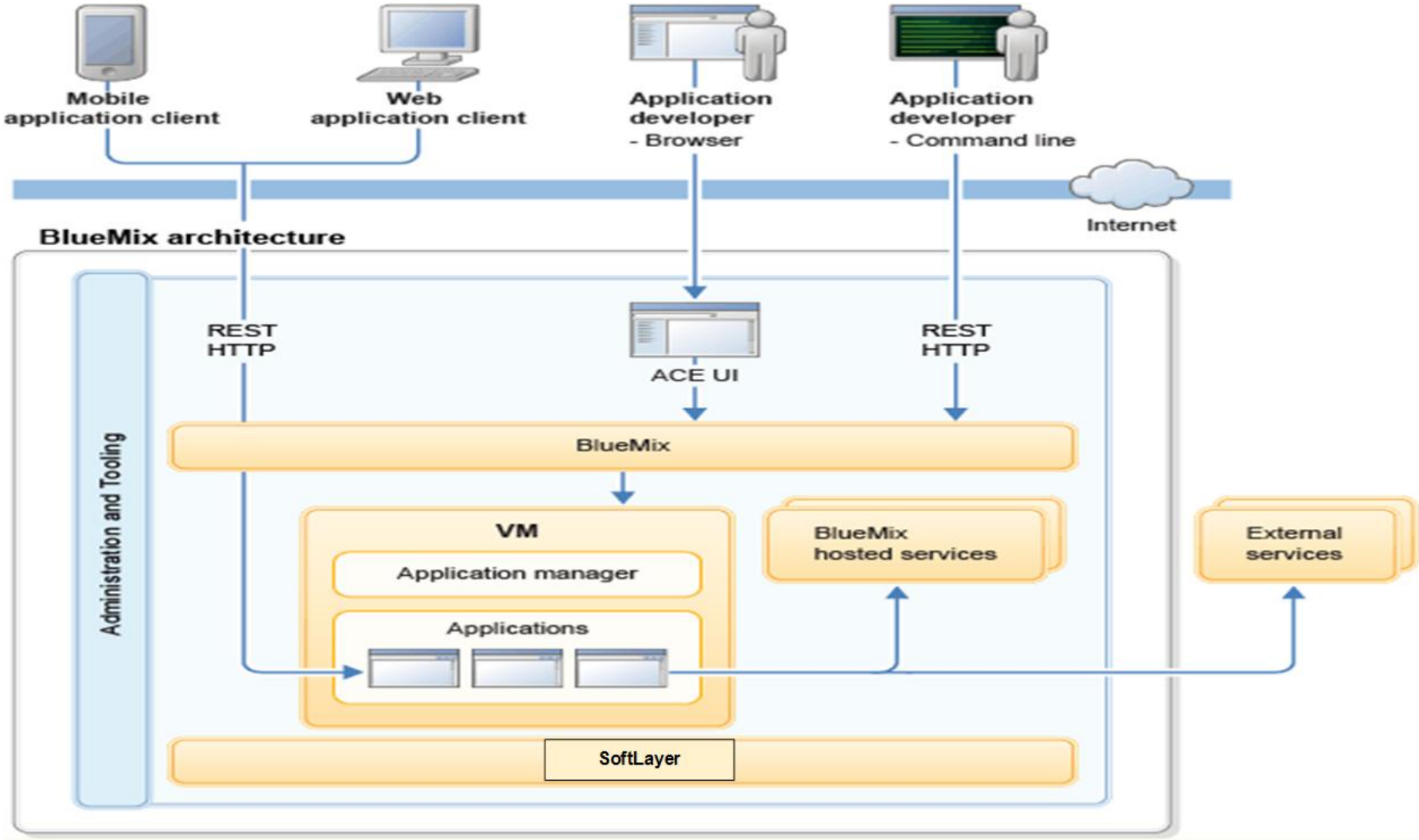
BlueMix Architecture – High Level



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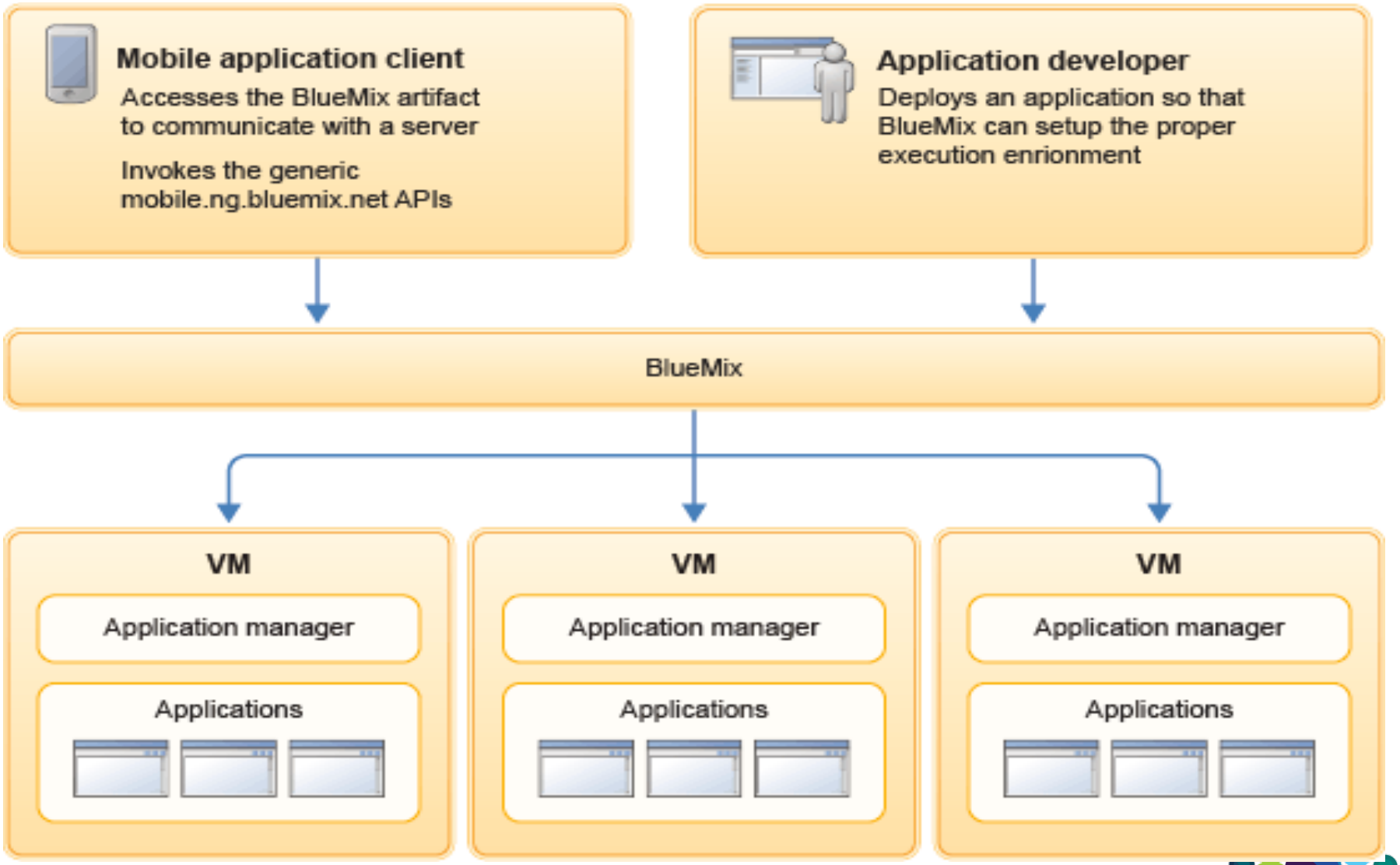
BlueMix Architecture – How it works



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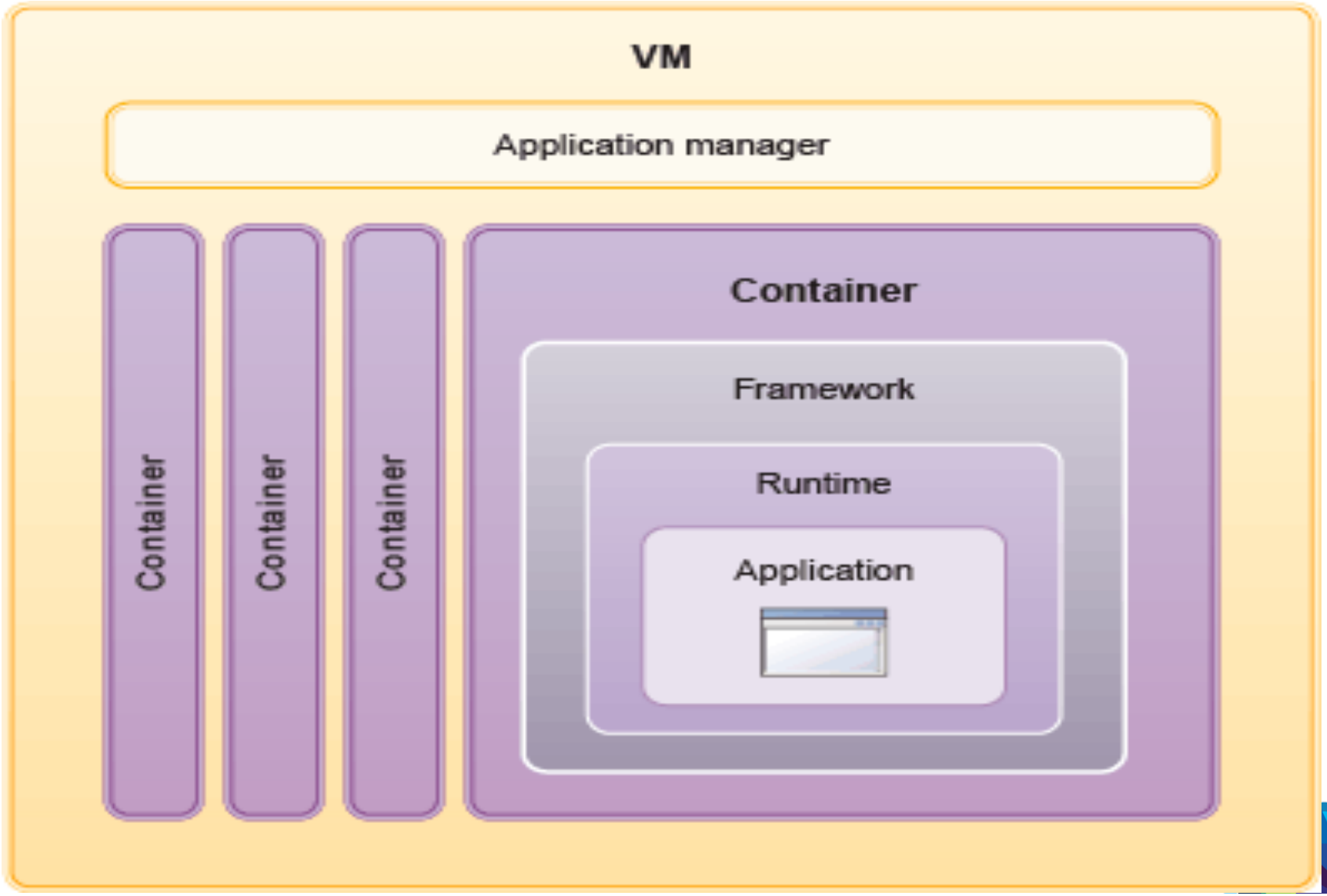
BlueMix Architecture – How it works (Cont'd)



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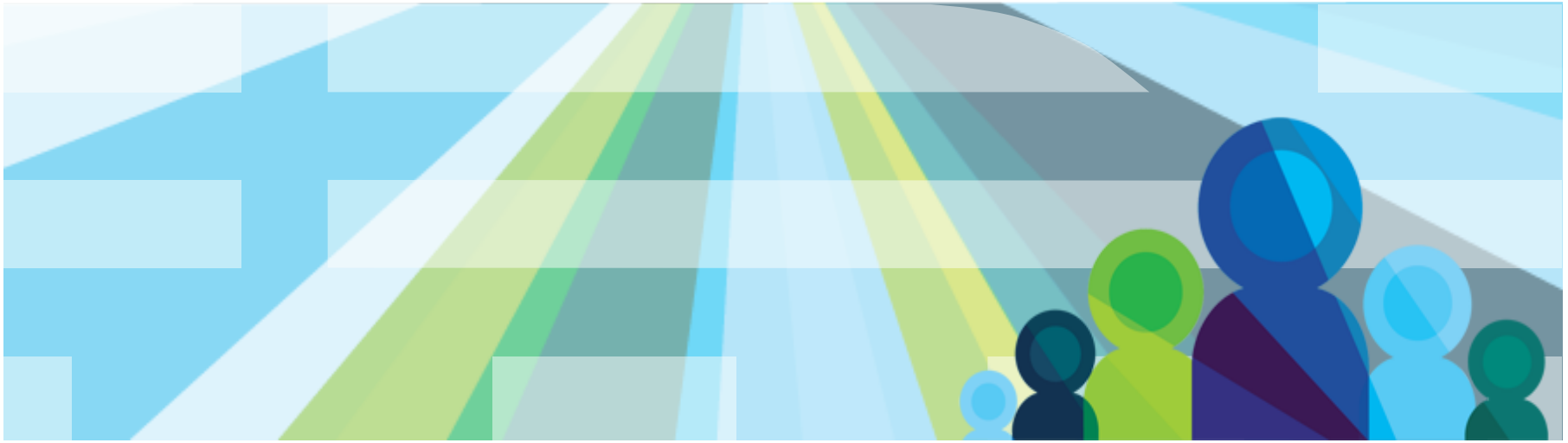
Lesson 3: DevOps Services for BlueMix



What is DevOps Services for BlueMix?

DevOps Services for BlueMix is an end-to-end solution in the cloud providing an open, integrated rapid development experience that scales.

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DevOps Services for BlueMix is an end-to-end solution in the cloud providing an open, integrated rapid development experience that scales.

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IBM BlueMix DevOps Services

An Open, Integrated Rapid Development Experience that Scales

1. **A Premier DevOps Service for IBM Cloud Platform**

   A. Promotes incremental frictionless adoption of DevOps Services for BlueMix

2. **An Integrated Developer Experience**

   A. End-to-end DevOps Solution in the cloud for developing applications.

   B. Integrated task tracking, agile planning, source control with auto deploy

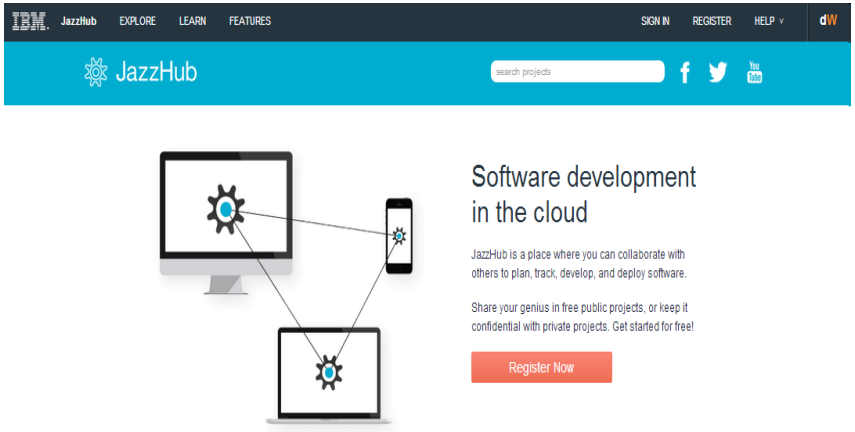
   C. Complementary mobile quality and application performance monitoring

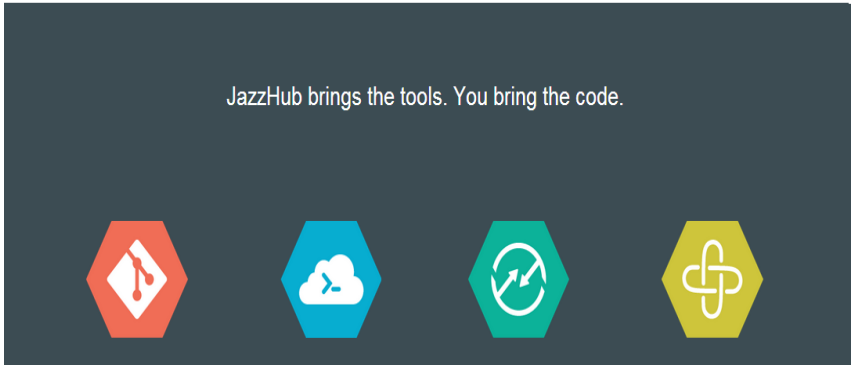
   D. Use your favorite tools or work from the Web IDE

   E. Free public and fee-based private projects (free for now now)

3. **Scalable, secure, enterprise-ready**

   A. Runs on SoftLayer Infrastructure





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DevOps Services available today

Mobile Quality Assurance

Instrument apps to capture tester and live-user experiences, including context-aware crash log and in-app bug reports, in-app user feedback and insightful and streamlined quality metrics.

Git Hosting

Integrated Git hosting, with deployment via Git push and auto deployment from Git repositories.

Deployment Automation

Single stage Continuous Deployment

Monitoring and Analytics

Application Performance Monitoring and Management

Web IDE

Web IDE — scripted languages. Eclipse - Simplified client setup

Agile Development

Adds IBM tooling and service for agile planning and tracking with the cloud platform.

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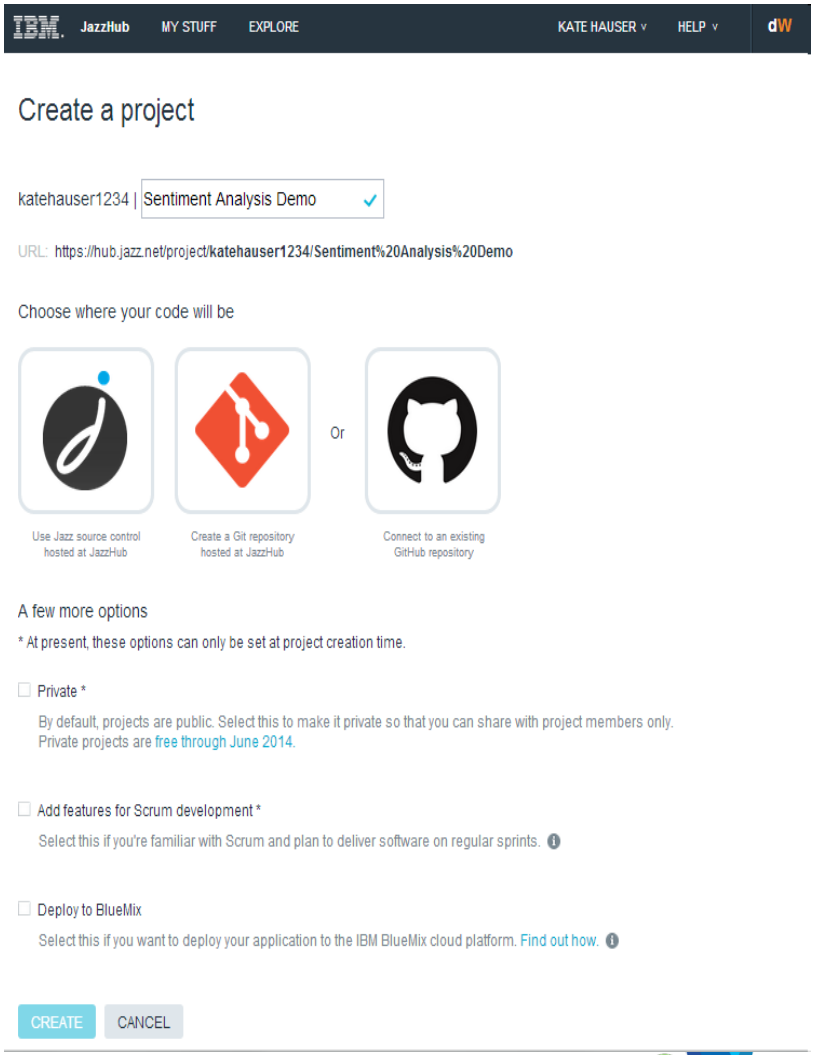
Get productive with BlueMix DevOps Services in minutes

1. **Register at www.jazzhub.com**
2. **Answer a few questions**
   A. Which SCM (Git, GitHub, Jazz SCM)?
   B. Do you want your project to be public or private?
   C. Do you want to practice agile software development?
   D. Do you want to deploy on IBM BlueMix?
3. **Start coding**



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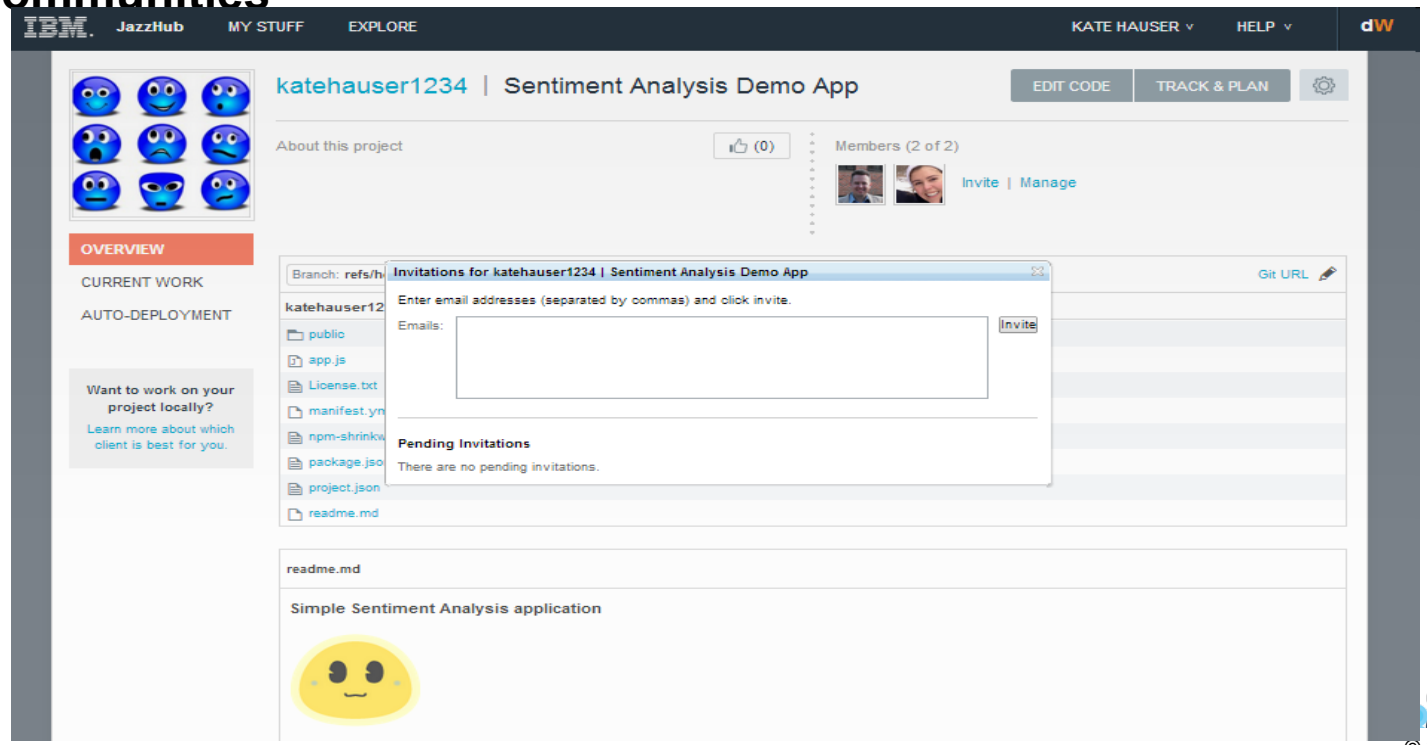
Collaborate seamlessly on public or private projects

1. **Easily invite team members**
2. **Access from anywhere**
3. **Built for collaboration from the ground up**
4. **Choose who sees your project, and how you engage with broader communities**



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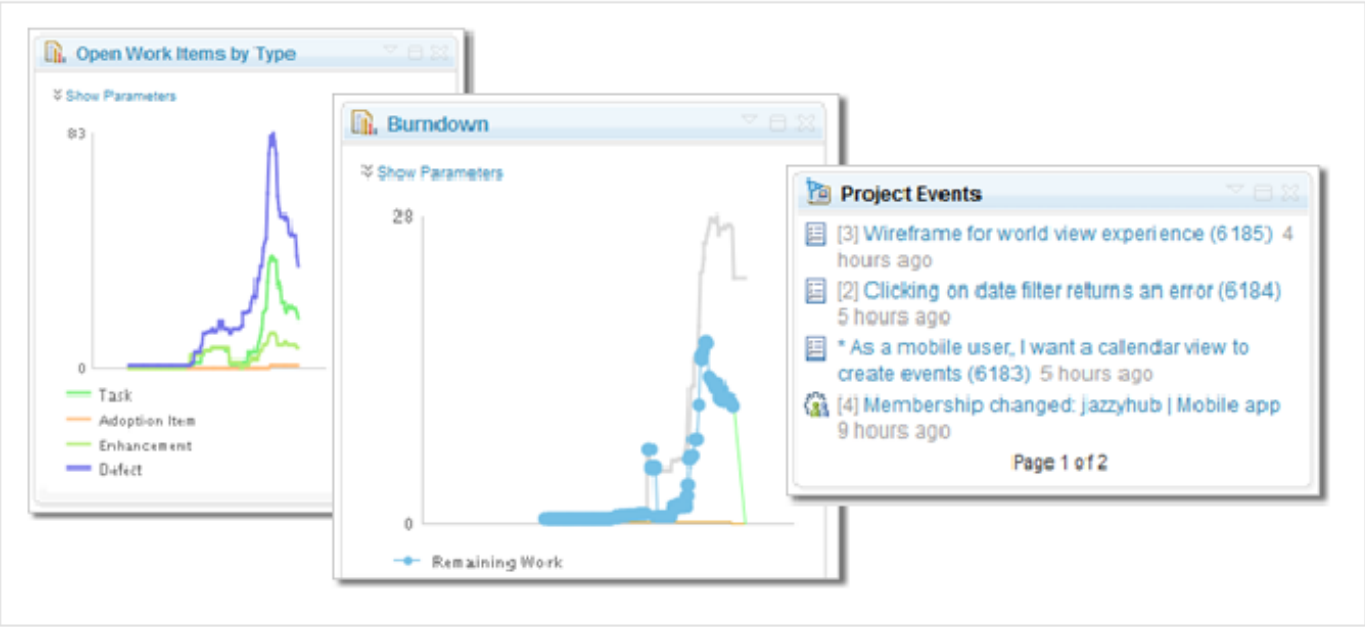
Agile development in the Cloud is easy with BlueMix DevOps Services for BlueMix

1. **Built-in agile process support**
2. **Work items to track and plan project activities**
3. **Agile tools for the product backlog, releases, and sprints.**
4. **Dashboard charts for project status**



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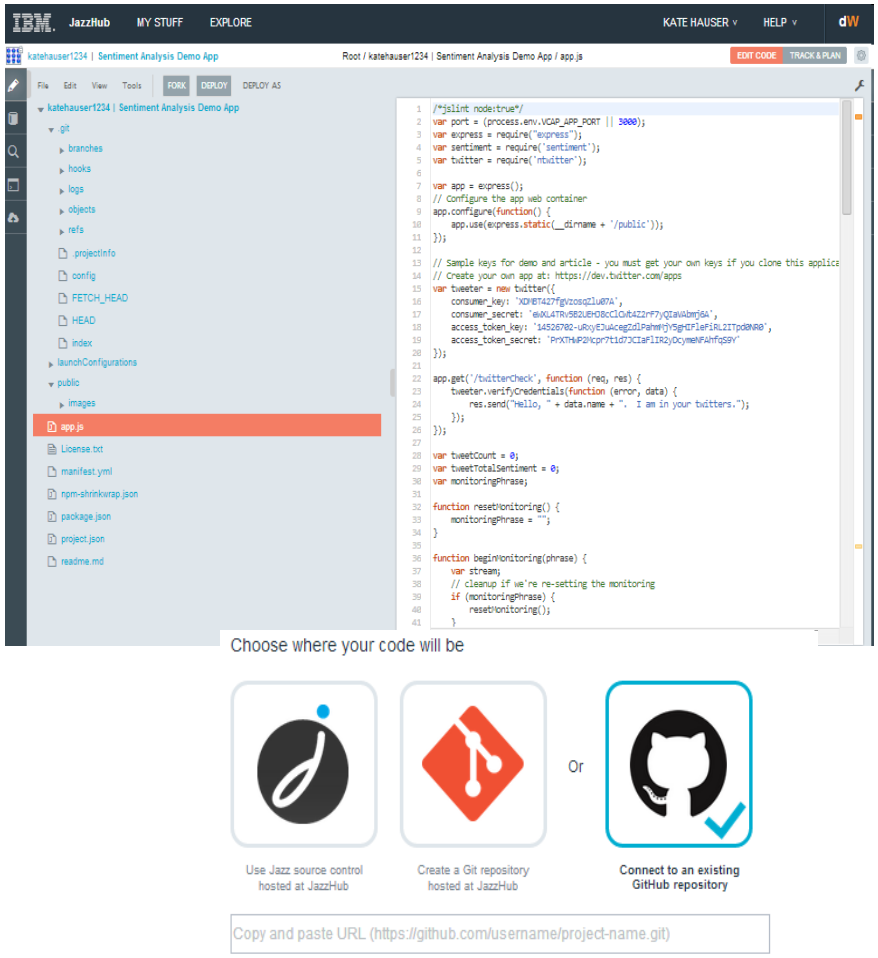
Choose how you code with BlueMix DevOps Services

1. **Browser-based Integrated Development Environment**
2. **Full support for local development with Eclipse or Visual Studio**
3. **Built-in support for Jazz Source Control**
4. **Hosted Git repository**
5. **Got GitHub? No problem**



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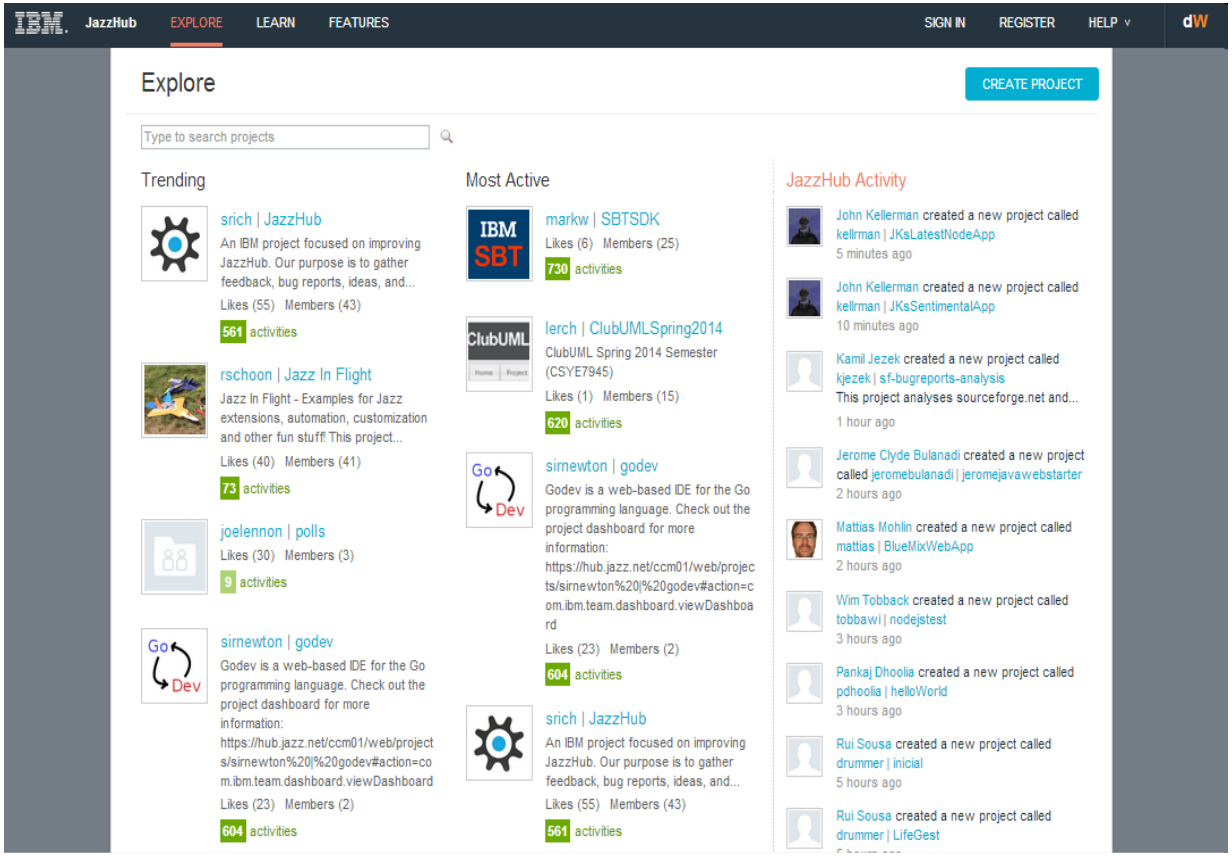
Leverage the power of social coding. With public projects, it's easy to learn and share work with a broader audience.



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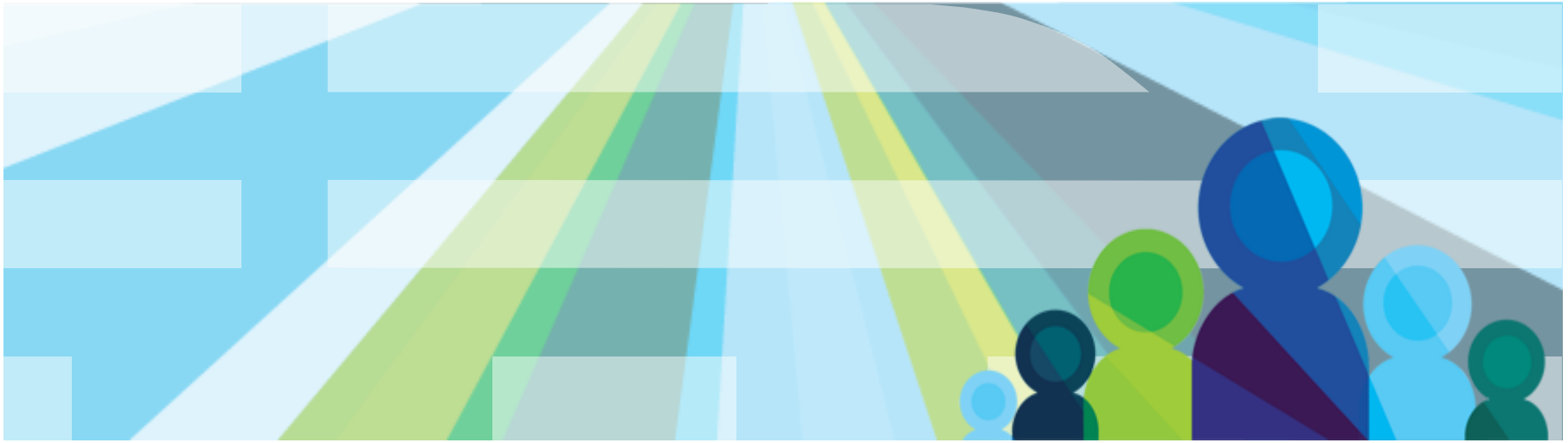
Lesson 4: Register a Service in BlueMix



Lesson 4 - Registering Services in BlueMix

WORK IN PROGRESS…

Why Register a Services?

1. BlueMix offers pay-as-you-go *cloud services* for cloud platform *services.*
2. BlueMix helps service providers go to market more quickly, efficiently, and effectively.
3. BlueMix assists service providers by providing cloud monetization strategies and actionable business and technology planning

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Registering Services in BlueMix

1. To register a service with BlueMix, you must define service metadata, create service image assets, and issue the command line utility cloud-cli.
2. Two types of service can be registered with BlueMix, a regular Bluemix service that exists within Bluemix, and a 'User Provided' service that is provisioned outside of Bluemix.

Service Metadata

There are two parts to the metadata defined for a service: metadata that is used to define the BlueMix service, and metadata specific to the UI.

- **BlueMix service metadata**
  - BlueMix Service metadata is defined in a JSON file.
- **BlueMix user interface service metadata**
  - The UI specific metadata is specified under the 'metadata' attribute. This metadata affects the display of the service in the BlueMix user interface

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BlueMix User Provided Service Instance - Service metadata

The following example shows the BlueMix metadata for the Sample service. In this example, the Sample service is classified as being of service type "sample", and it is categorized under a hierarchy of "Sample" → "Foundation Services" → "Services“

For 'User Provided' services, there can be only one plan. The 'url' value must be a valid URL, but it is never referenced, so it can be anything. The 'token' and 'timeout' values are not used.

```
{
    "label" : "Sample Service",
    "provider" : "ace",
    "url" : "http://1.2.3.4",
    "description" : "A sample hello world service. Instructional use only, not for use in
production.",
    "version" : "0.1",
    "info_url" : "http://www.ibm.com",
    "token"    : "MySampleService",
    "timeout" : 57,
    "plans" : [ {
        "name" : "free",
        "free" : true,
        "public" : false,
        "description" : "This is a free service plan for the Sample service",
        "visibilities" : [ {"organization_name" : "MyOrganizationName"} ]
        }
    ]
}
```

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BlueMix User Provided Service Instance - User Interface service metadata

```
{
  ---
  "metadata": {
    "featuredDescription": "A user provided service. Instructional use only, not for use in
production.",
    "isFeatured": false,
    "docURL": "http://www.yourserver.com:7080/doc/Sample/RESTApi.html",
    "userDefinedService" :
    {
        "parameters" : [

        {
            "name": "host",
            "type" : "text",
            "value" : "example.com",
            "readonly": true,
            "hidden": true
        },
        {
            "name": "userid",
            "displayname" : "User id",
            "type" : "text",
            "description": "The user id that will be used to access the service.",
            "invalidmessage" : "Not a vaild email address" ,
            "pattern" : "^[_A-Za-z0-9-\\+]+(\\.[_A-Za-z0-9-]+)*@[A-Za-z0-9-]+(\\.[A-Za-z0-9]+)*
(\\.[A-Za-z]{2,})$",
            "placeholder" : "email@example.com"
        },
        {"name": "password", "type" : "password"},
        {"name": "description"}
     ]
    }
  }
}
```

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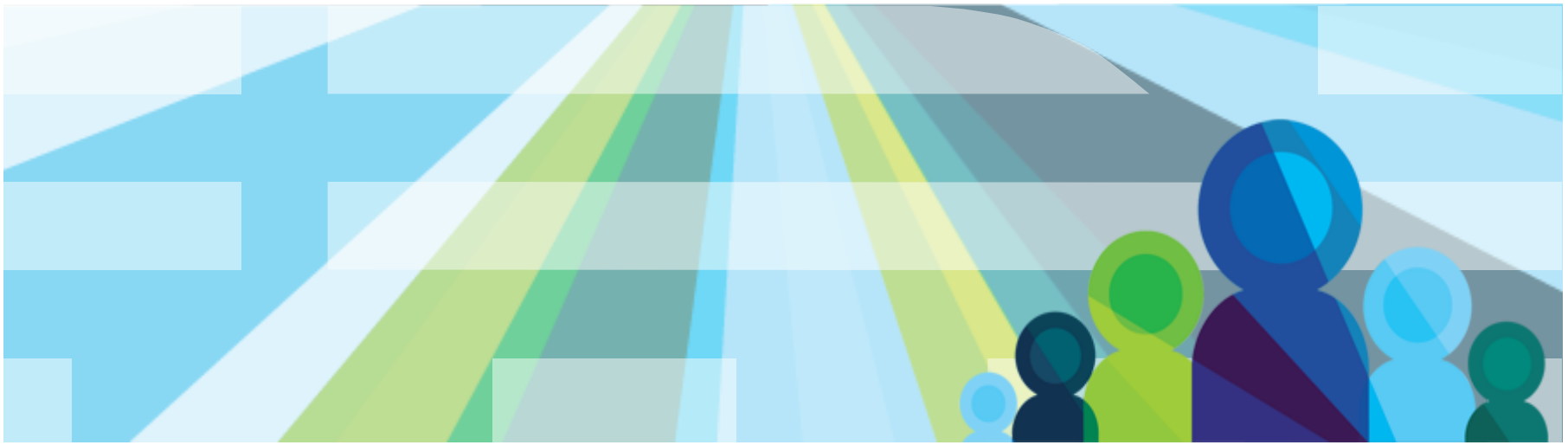
Lesson 5:
Cloud Foundry



Lesson 5 – Cloud Foundry

This lesson provides an overview of the PaaS, Open PaaS, & Cloud Foundry

Topics in this lesson include:

- What is Cloud Foundry?
- Cloud Foundry Architecture and Application Staging
- Cloud Foundry CLI

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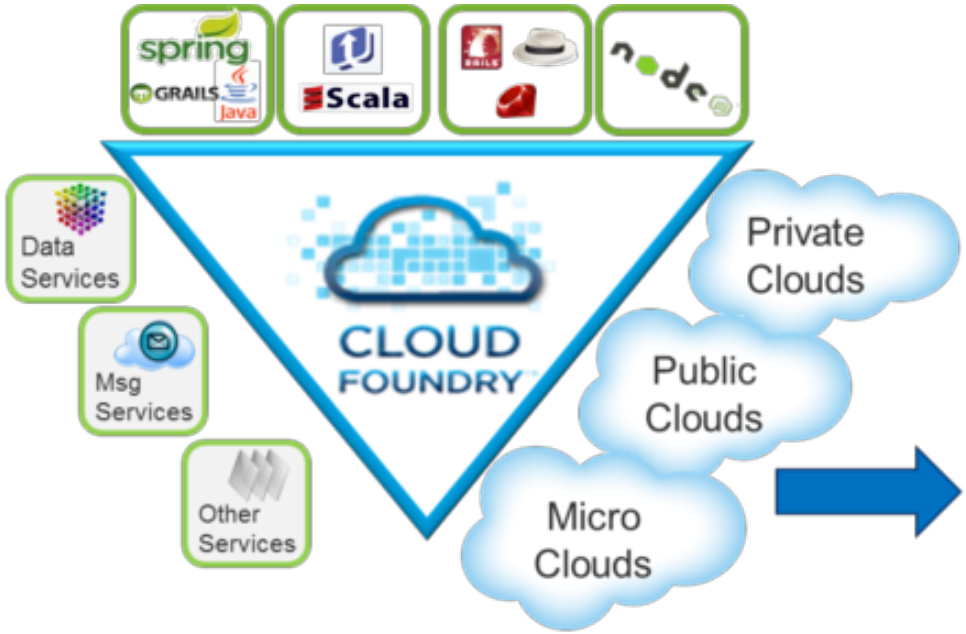
What's Cloud Foundry?

*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

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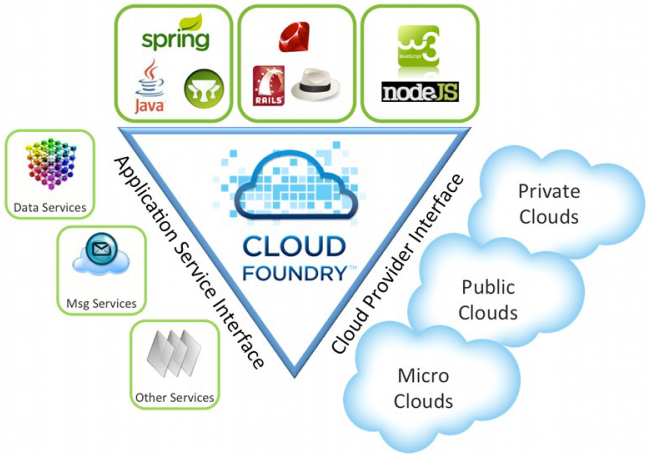
Languages/Frameworks/Service

Multi-Language

Ruby, Java, Scala, Node.js, Erlang, Python, PHP..

Multi-Framework

Rails, Sinatra, Spring, Grails, Express, Lift



Multi-Services

MySQL, Postgres, MongoDB, Redis, RabbitMQ

Multi-Cloud, Multi-IaaS

Public Cloud, MicroCloud, Private Cloud

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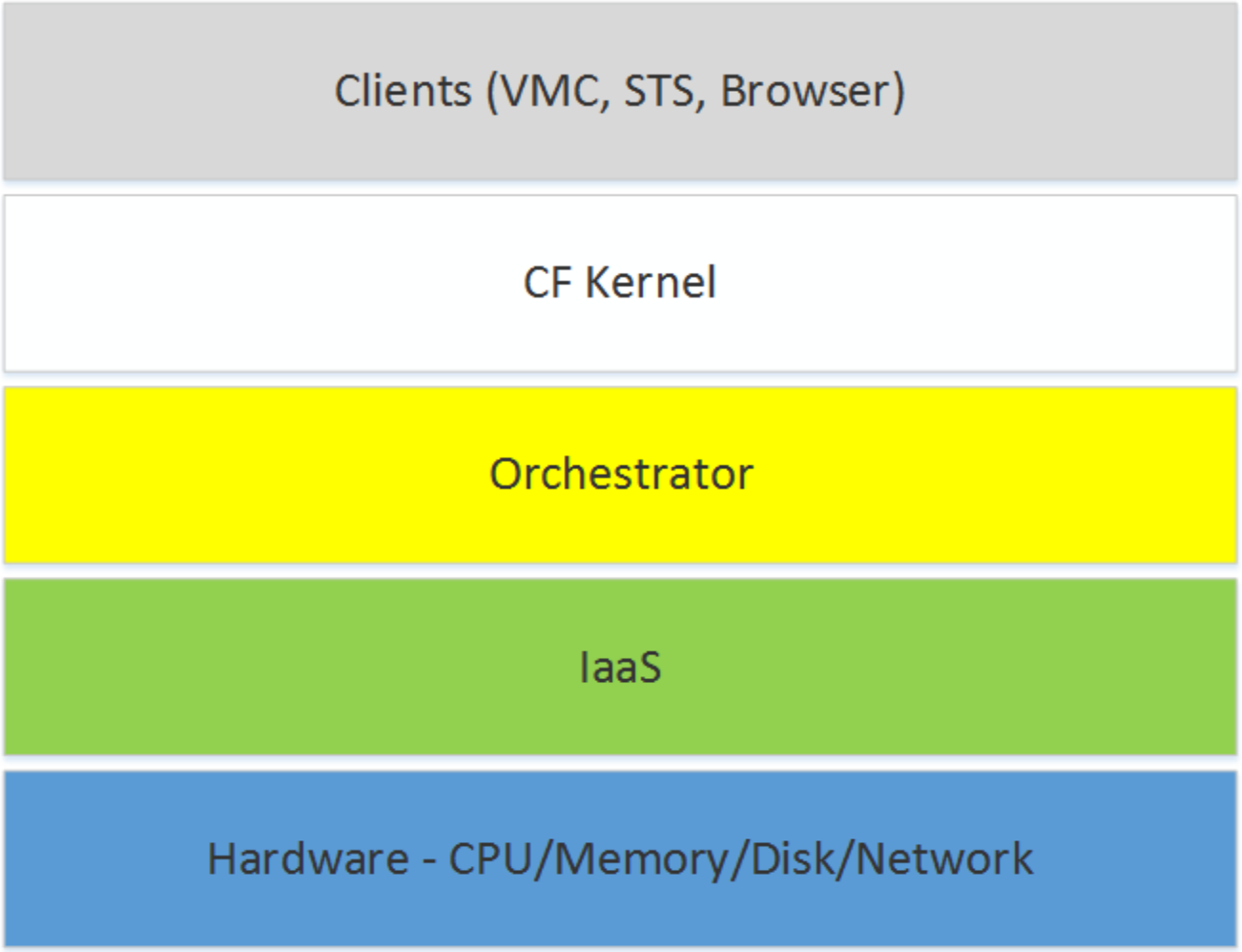
Cloud Foundry Architecture - High Level

High Level



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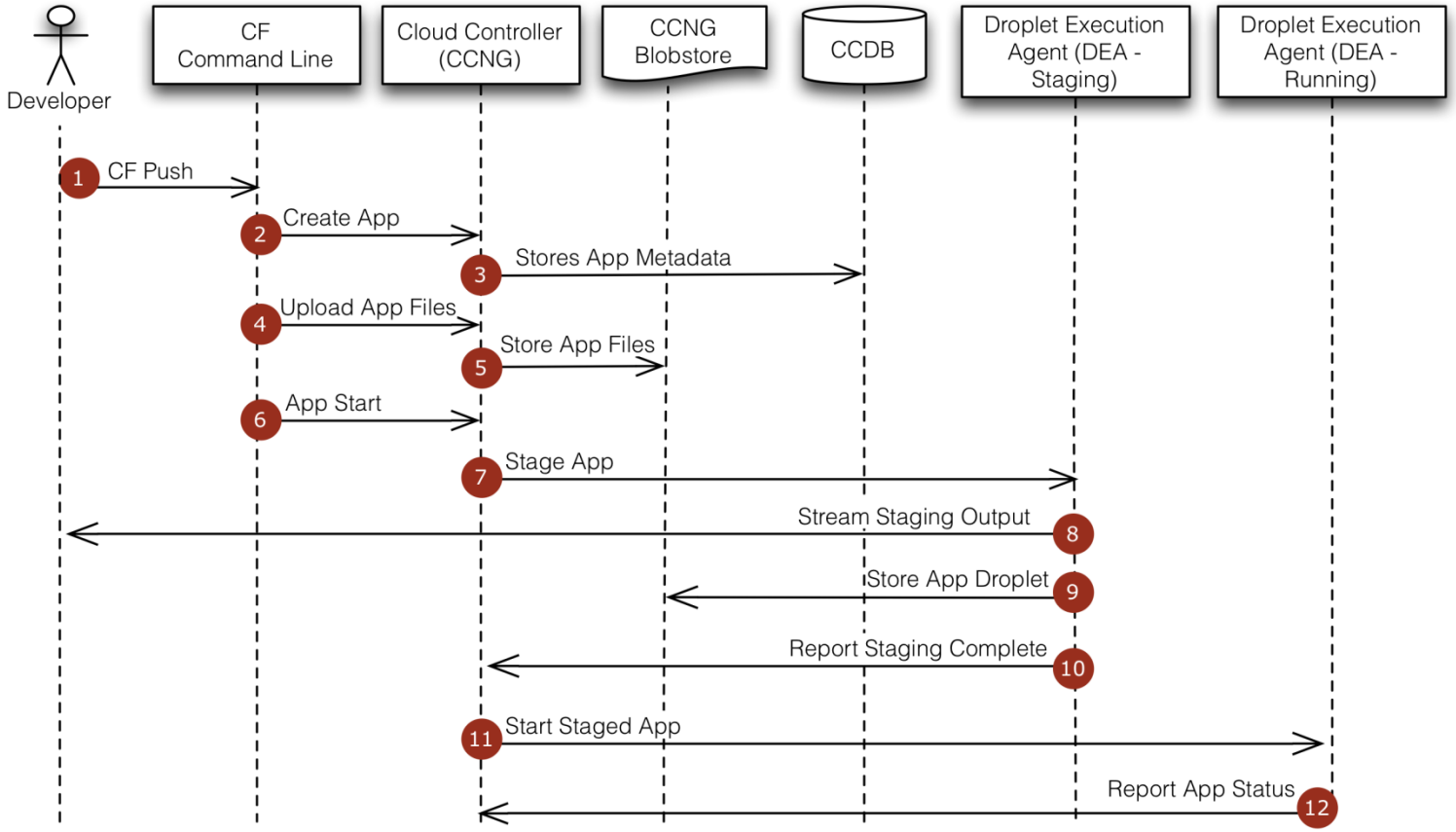
Cloud Foundry - Application Staging



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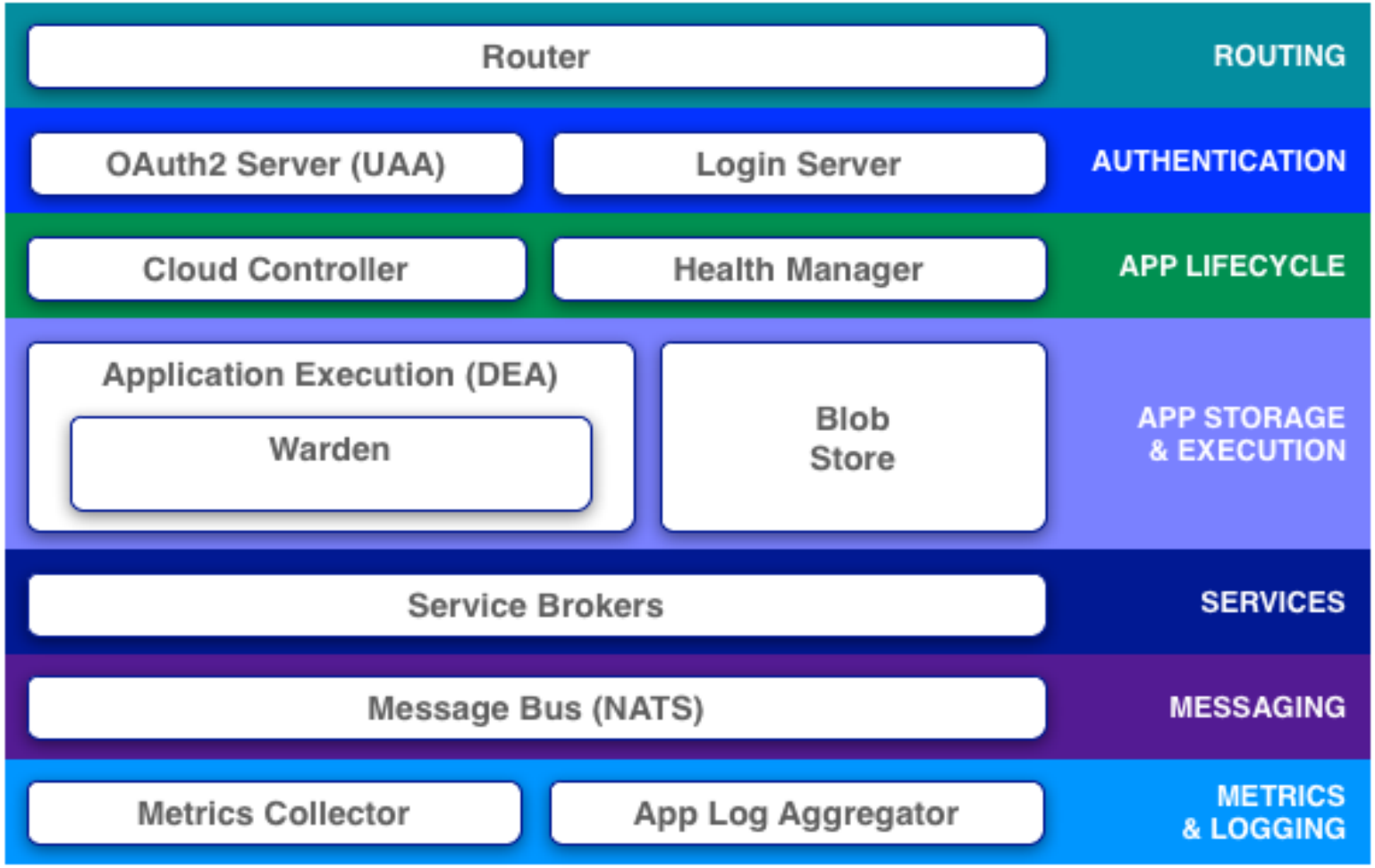
Cloud Foundry Architecture – CF Kernel Internal



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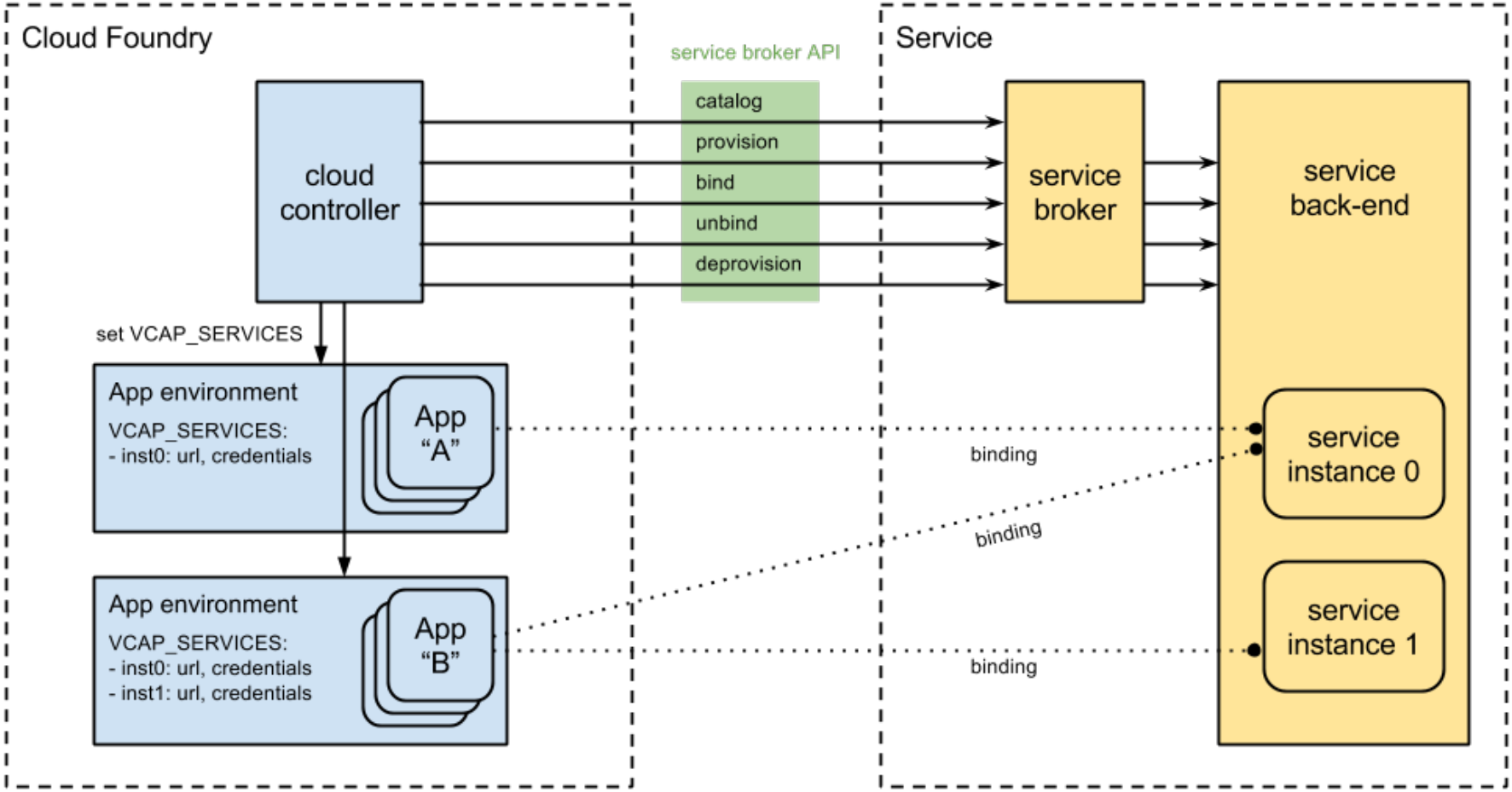
Cloud Foundry - Services



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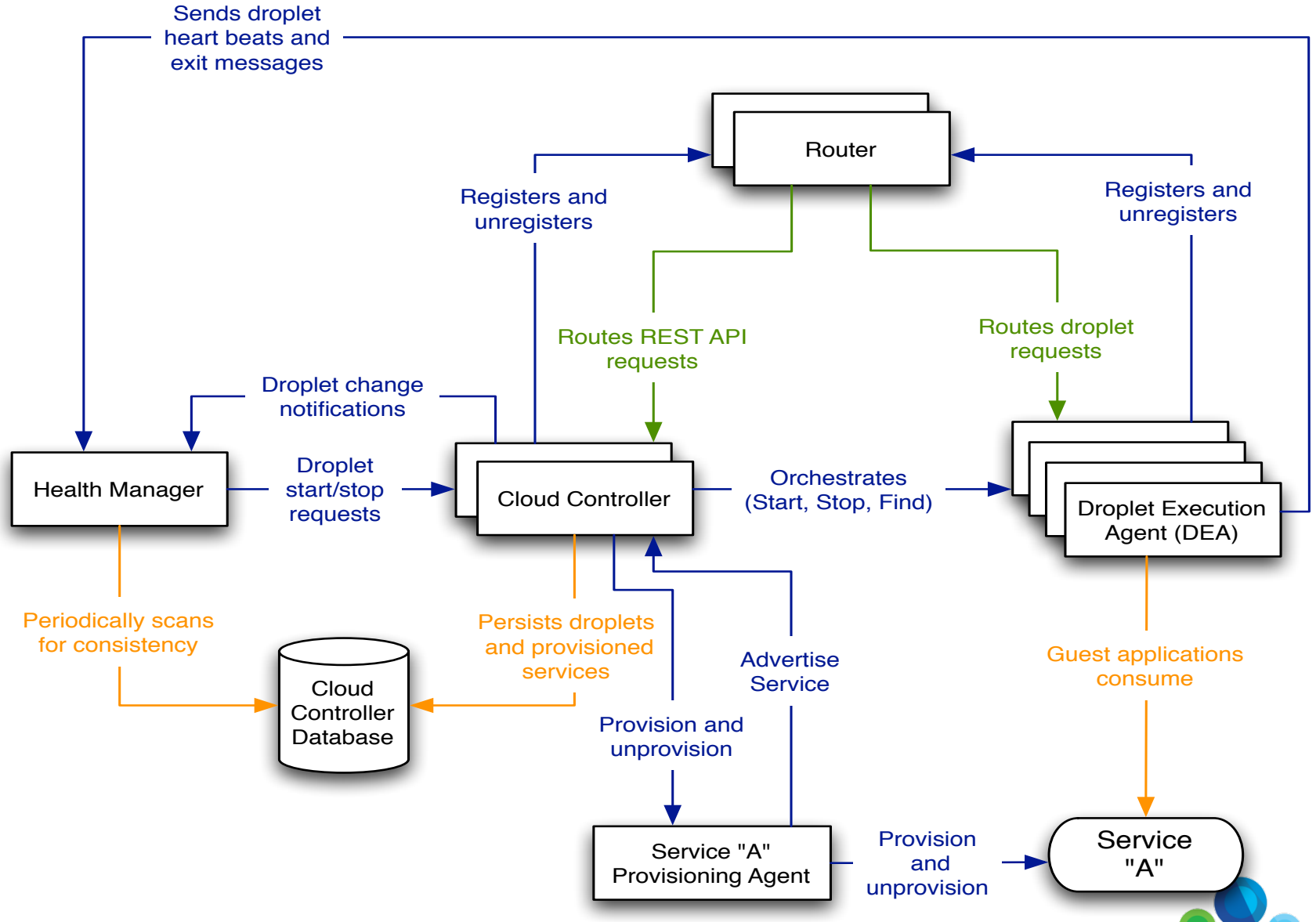
CF Flow



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BlueMix - Cloud Foundry CLI (Command Line Interface)

- cf is Cloud Foundry's command line interface.
- Used to deploy and manage applications running on most Cloud Foundry based environments
- cf go binary for your OS in github

Important CF CLI Calls

- cf login user-id
- cf push my-new-app
- cf create-service my-service
- cf bind-service my-service my-new-app

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Is BlueMix, Cloud Foundry?

BlueMix is based on the Cloud Foundry open source paas, it is more than just a hosted Cloud Foundry offering. IBM is embracing the open source and extending with additional capabilities such as GUI and services that represent the breadth of the IBM portfolio.

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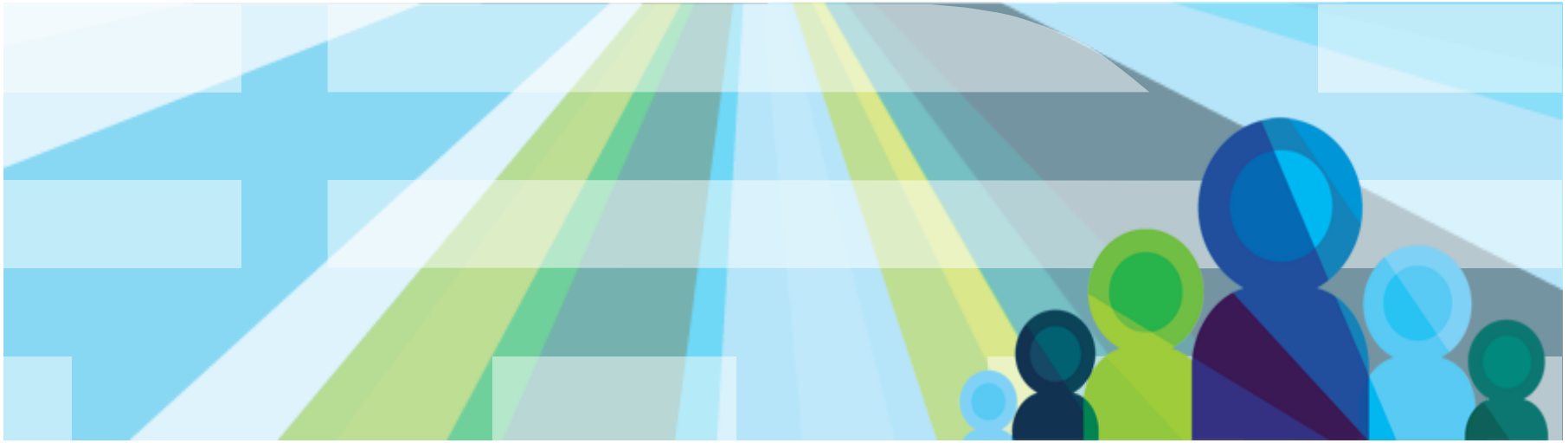
Lesson 6:
Maximize BlueMix



BlueMix Services Scope

Dec Beta 1
Feb Beta 2
June GA+
* = 3rd party

- Web
  - Java (IBM Liberty)
  - Ruby (CF*)
  - PHP (CF*, Zend PHP*)
  - JavaScript (JS*, Node.js)
  - Tomcat (CF*)
  - Redis (CF*)
  - Caching (IBM eXtreme Scale)

- Mobile
  - Data API (IBM NoSQL with SDK)
  - Push Notification (IBM)
  - Cloud Scripts (IBM)
  - Mobile Application Management (IBM)
  - Mobile Data Sync (IBM)
  - Mobile Quality Management (IBM)

- Data management
  - MongoDB (CF*)
  - MySQL (CF*)
  - SQL (IBM DB2)
  - Data API (IBM NoSQL with SDK)
  - PostgreSQL (CF*)
  - NoSQL (IBM NoSQL)
  - Object Store (IBM/SL)
  - Data Snapshot, Backup, Recovery (IBM)
  - Cloudant*

- Application Services
  - Rabbit MQ (CF*)
  - Log Analytics (IBM 20/20)
  - Application Performance (IBM Application Performance Management)
  - Messaging (IBM Elastic Messaging)
  - Source Control Repo (Git & JazzHub)
  - Integration Service (IBM Cast Iron)
  - Workflow Service (IBM BPM)
  - Rules Service (IBM Decision Mgmt)
  - SendGrid*
  - Flow*

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BlueMix Future Content

- Marketing
  - Commerce (EZCommerce)
  - Digital Marketing & Analytics (Tealeaf, Coremetrics, Xtify, Unica)
- Security
  - Secure Transactions (Trusteer)
  - Access (IBM Access Management)
  - AppScan (IBM AppScan)
- Watson
  - Watson Q&A
- Social
  - Workforce Management (Kenexa)
  - Social Analytics, Integration, & Content
- Dev & Test
  - Agile Project Management (JazzHub)
  - Team Collaboration (JazzHub)
  - Continuous Delivery (UrbanCode)
  - Quality/Testing
- Big Data & Analytics
  - Hadoop*
  - BigInsights
  - Streams
  - Reporting & Charting (Cognos)
  - Predictive Analytics (SPSS)
- M2M
  - MessageSight
  - Internet of Things
- Media
  - Object Store (SoftLayer)
  - Media Transcoding
  - Content Delivery Network (SoftLayer)
- Smart Infrastructure
  - Asset Management (IBM Maximo)

* = 3rd party

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Differentiators

Differentiate BlueMix from Amazon Web Services, Microsoft Azure, Heroku, Openshift?

1. BlueMix has the whole package: scalability, performance, and wide range of services, including 37 services
2. Open platform with IBM services and third party services built on top of open source
3. Proven IBM on premise solutions available as service
4. IBM unique services: such as Decision Services (business rules), and Watson (future)
5. IBM leading services: such as DevOps, Monitoring and Analytics
6. High performance and scalability with SoftLayer
7. Full support and consultation

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BlueMix Support

BlueMix developerWorks Community - https://www.ibmdw.net/bluemix/

Need Help? Use the BlueMix developerWorks Forum - https://www.ibmdw.net/answers/?community=bluemix

BlueMix Events - https://www.ibmdw.net/bluemix/events/

BlueMix DevOps Services – https://www.jazzhub.com

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Lesson 7: Security

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SOFTLAYER® an IBM Company

Complying with industry and regulatory standards

In this topic, you will learn about SoftLayer's industry and regulatory compliance.

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Industry and regulatory compliance

- Service Organization Control (SOC) 2
  - SoftLayer have an unqualified SOC 2 Type II report for all data centers.
  - Audits security, availability, process integrity, privacy and confidentiality.
  - Report available to customers and their auditors via NDA.

- Safe Harbor
  - Certification demonstrates that SoftLayer provides adequate privacy protection as defined by the Directive.

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Industry and regulatory compliance (cont.)

- Payment Card Industry Data Security Standard (PCI-DSS)
  - SoftLayer is a PCI Level 3 compliant merchant for its handling of PCI regulated data.
  - This certification is not transferable to customer workloads.

- Federal Information Security Management Act (FISMA)
  - SoftLayer is working towards FISMA compliance in select data centers.

- Health Insurance Portability and Accountability Act (HIPAA)

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Industry and regulatory compliance (cont.)

- Cloud Security Alliance (CSA)
  - SoftLayer have published a self-assessment in the CSA Security, Trust and Assurance Registry (STAR).
- SoftLayer expects to be eligible for CSA-STAR Certification and Attestation since they have an existing SOC 2 Type II assessment from a third party.
- CSA-STAR Continuous certificate is still under development by CSA.

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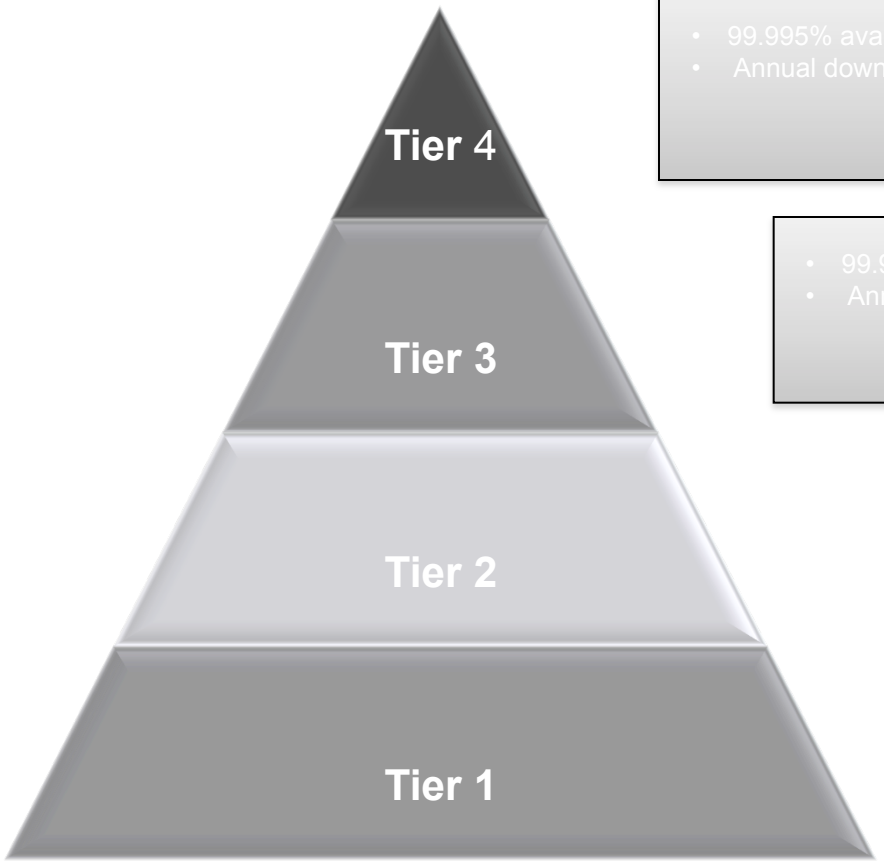
Securing the data centers

SoftLayer data centers are Tier 3 data centers.



- 99.995% availability
- Annual downtime .04 hours
- Two independent utility path
- Fully redundant (2N+1)
- Sustain 96-hour power outage

- 99.982% availability
- Annual downtime 1.6 hours
- Multi power and cooling paths
- Fault tolerant (N+1)
- Sustain 72-hour power outage

- 99.749% availability
- Annual downtime 22.0 hours
- One path of power and cooling
- Some redundancy in power

- 99.671% availability
- Annual downtime 28.8 hours
- Single path power and cooling
- No redundant components

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Securing the data centers (cont.)

Data center and server room security

- Data centers located only in facilities with controlled access and 24- hour security.
- No server room doors are public-facing.
- Server rooms are staffed 24 x 7.
- Unmarked entry and exit doors into server rooms.
- Digital security video surveillance is used in the data center and server rooms
- Biometric security systems are used throughout the data center.
- Server room access strictly limited to SoftLayer employees and escorted contractors or visitors.
- Barcode-only identification on hardware; no customer markings of any type on the servers themselves.

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Securing the data centers (cont.)

Operational security

- Engineers and technicians trained on internal industry standard policies and procedures, and audited yearly.
- Geographic redundancy for all core systems for disaster recovery and business continuity.
- Two-factor authentication for Customer Portal access adds greater server security.
- All data removed from re-provisioned machines with drive wipe software approved by the US Department of Defense.
- Ongoing PCI DSS compliance for SoftLayer's own handling of credit card information.
- Current SSAE 16 SOC1 report, with no exceptions noted.

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Questions?

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