Building a DevOps PaaS with Docker, CoreOS, Kubernetes and Apache Stratos

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About Me

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Agenda

Presentation

- Technical overview of Apache Stratos

Demo with Apache Stratos 4.1.0-M2 developer Preview

- Setup with 3 node CoreOS cluster, Discovery service, Kubernetes master and 3 minions and flannel
- Configure Stratos
- Register Kubernetes-CoreOS host cluster to Stratos
- Deploy Docker based PHP Cartridge
- Deploy PHP application using PHP Cartridge
- Automated artifact updates
- Manual Scaling
- Autoscaling based on load avarage

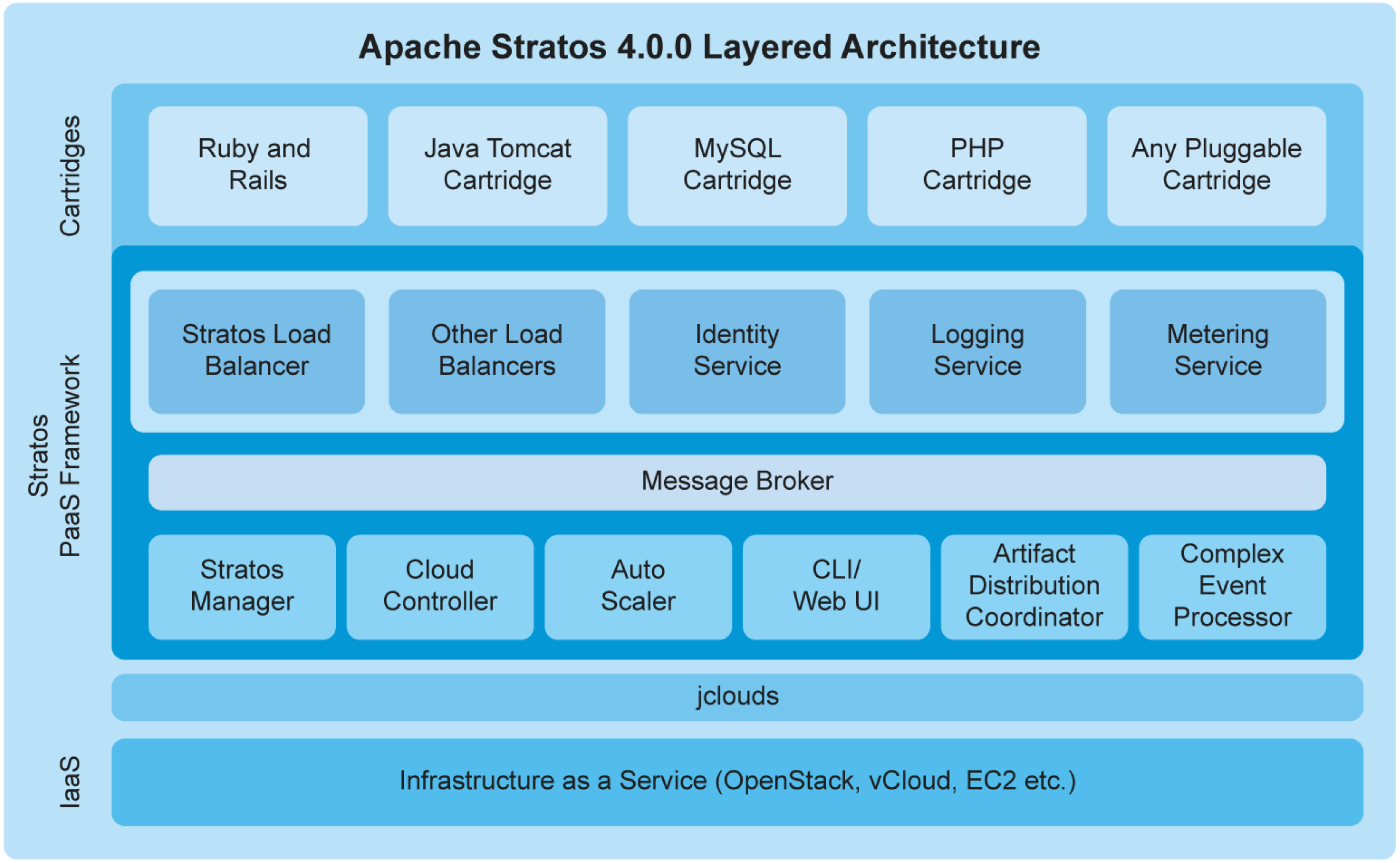
Apache Stratos

- Apache Stratos is a highly-extensible Platform-as-a-Service (PaaS) framework that helps run Apache Tomcat, PHP, and MySQL applications and can be extended to support many more environments on all major cloud infrastructures

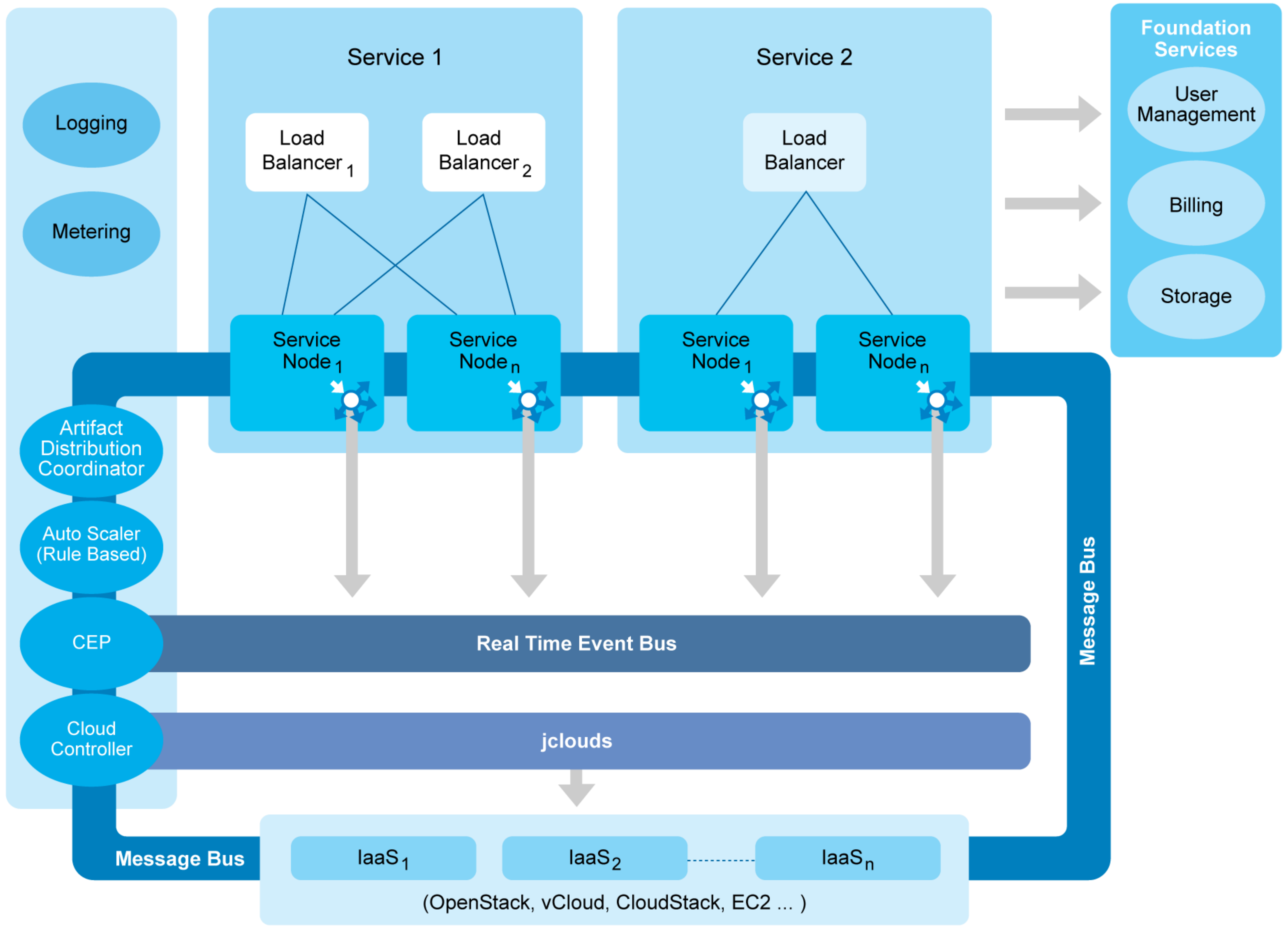
- Stratos initially develop by WSO2 and last year donated to Apache Software Foundation

- After successfully complete the incubating process Stratos now graduated as Top Level Project

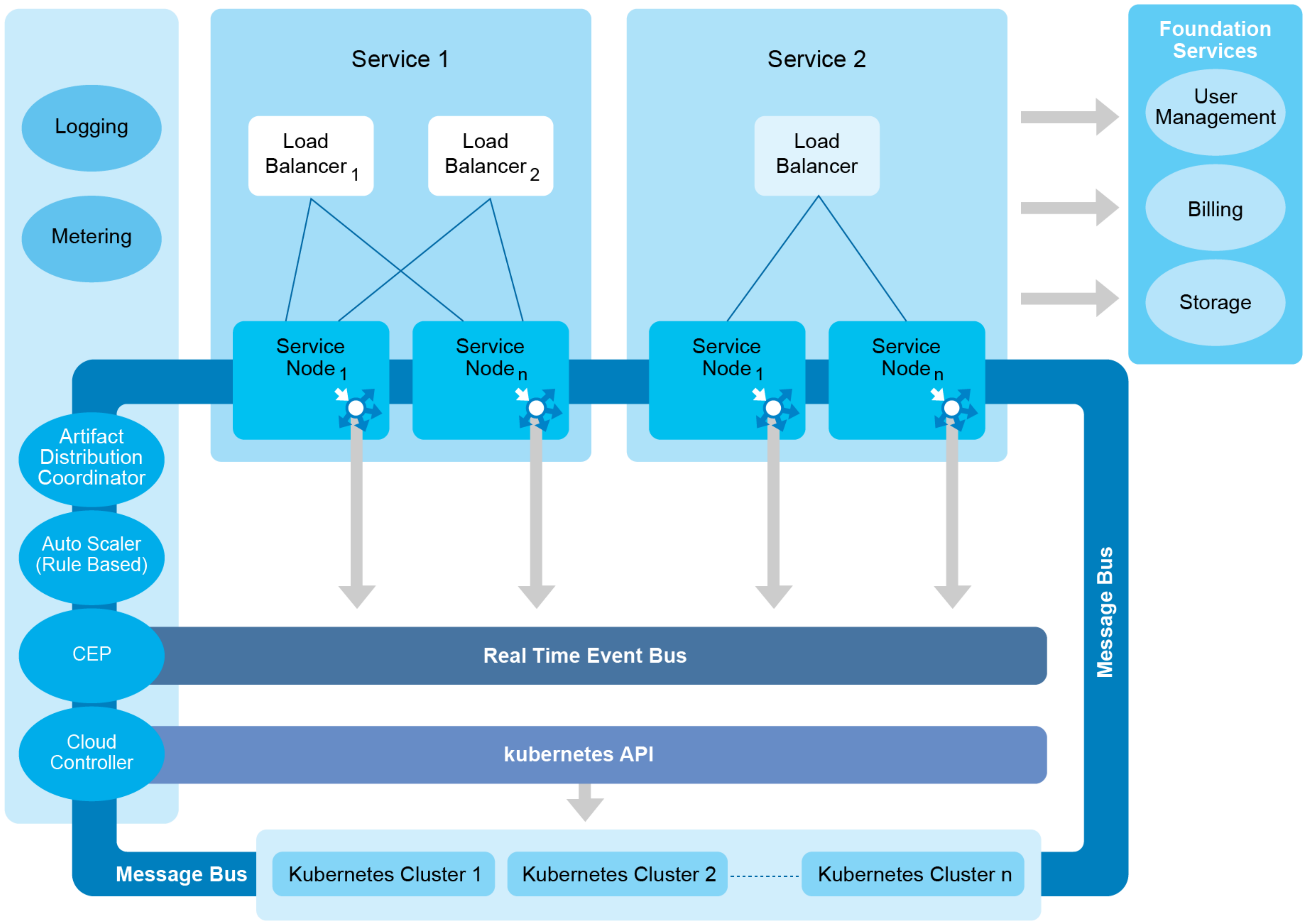
Apache Stratos 4.0 Layered Architecture



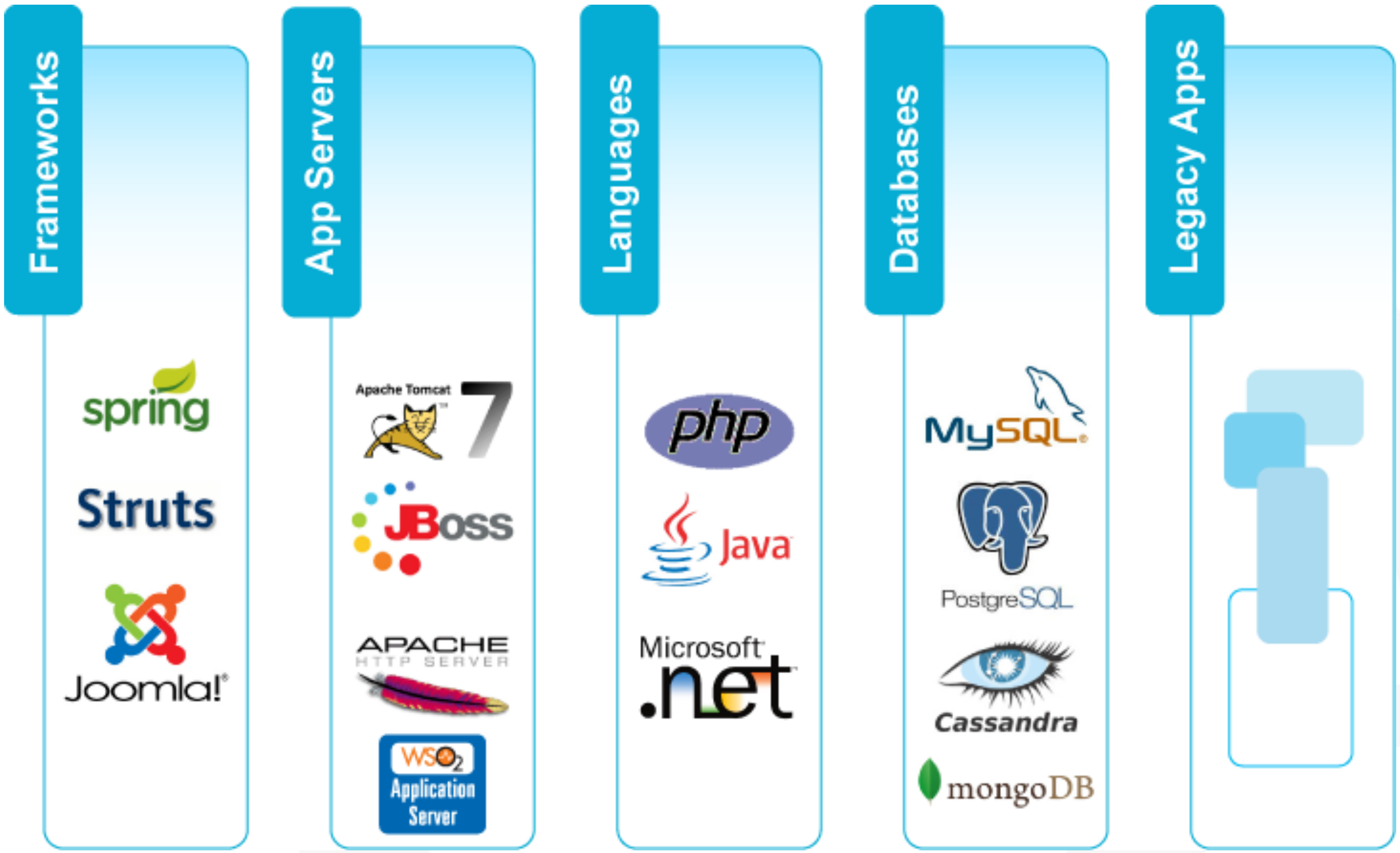
Apache Stratos L1 Architecture for VM based Cartridges



Apache Stratos L1 Architecture for Docker based Cartridges



Apache Stratos Cartridges



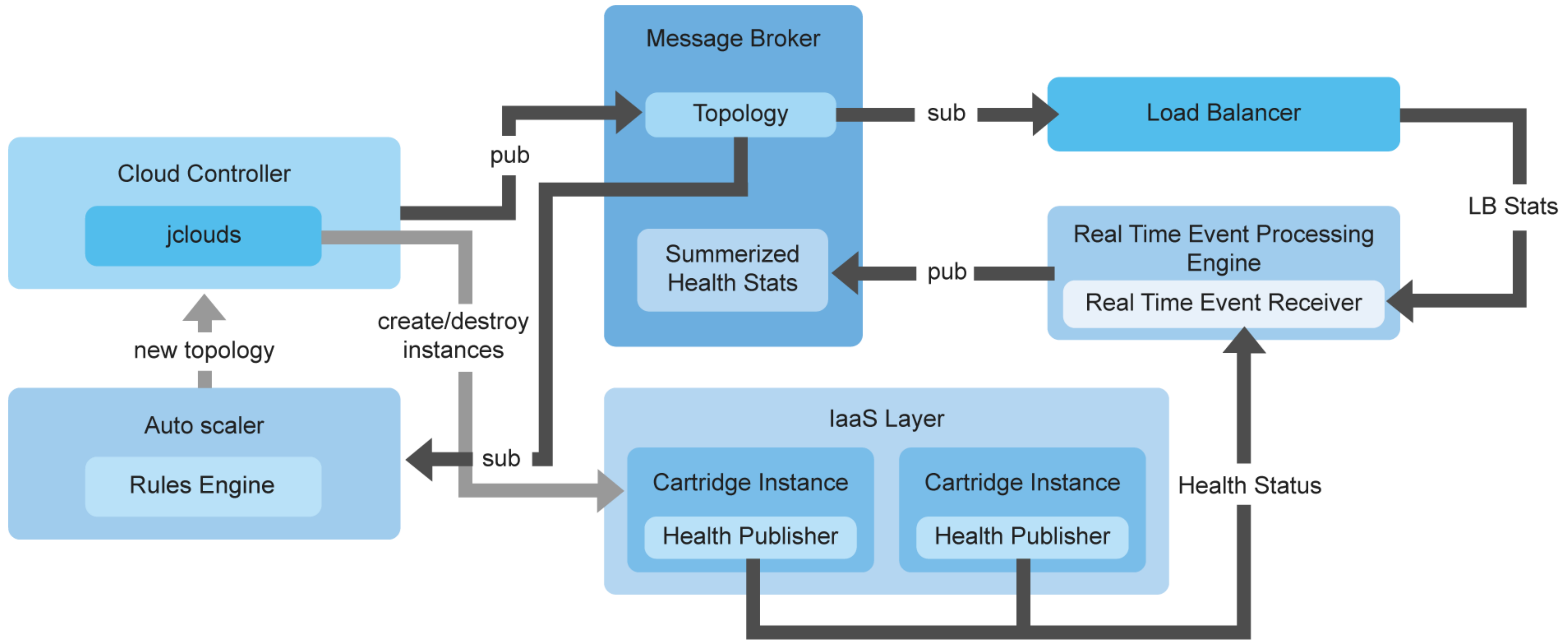
True Flexibility for Custom Cartridges

- In most cases, you have to make-do with what’s available and work your solution around it
- With the Apache Stratos cartridge model, you can create a custom service without having to deal with any limitations or boundaries.
  - Cartridge can be fully configured (installed all software, configuration, etc.) or
  - zero configured (enable cartridge user to install and configure what they want) or
  - something in-between
- This will allow you to customize your PaaS to be in sync with your current business workflows

Multi-factored Auto Scaling

What is it?

- Scaling algorithm can use multiple factors. such as
  - Load average of the instance
  - Memory consumption of the instance
  - In-flight request count in LB



Multi-factored Auto Scaling...

- Capable of predicting future load
  - Real time analysis of current load status using CEP integration
  - Predict immediate future load based on CEP resulting streams
  - Predicting equation $s=ut + \frac{1}{2} at^2$
  - s=predicted load, u=first derivative of current average load, t= time interval , a=second derivative of current load

Why should one care?

- Maximise resource utilization
- Easy to do capacity planning
- Dynamic load based resource provisioning
- Optimizing across multiple clouds

Scalable and Dynamic Load Balancing

How Scalable it is?

- In theory infinite
  - horizontal scaling
  - limited by resource (instance capacity) availability

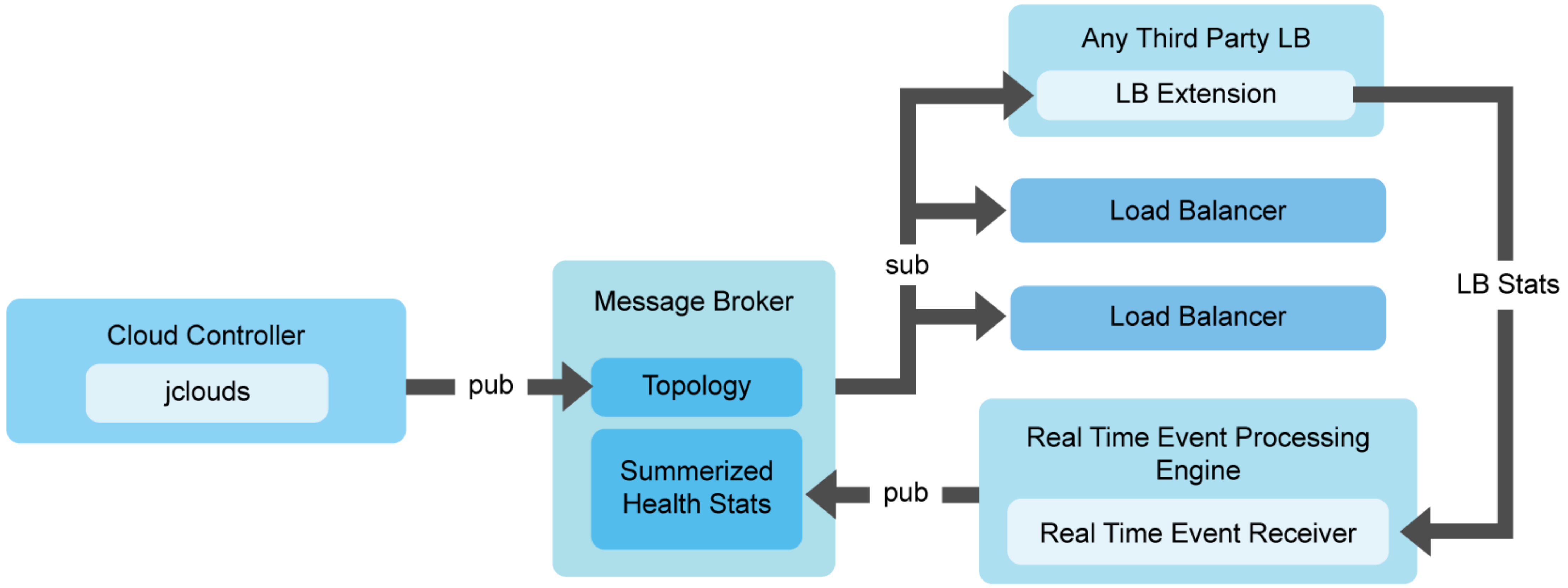
How Dynamic it is?

- Load Balancers are spawned dynamically
  - LB too is a cartridge
- In case of multi-cloud, multi-region, LB can scale per cloud/region
- Per service cluster LB

Scalable and Dynamic Load Balancing..

What is unique about Stratos

- Cartridge based LB model
- Can bring any third-party LB
  - HAProxy, nginx, AWS ELB
  - As easy as plugging into LB extension API



Smart Policies

What are the smart policies?

- Auto scaling
- Deployment

Auto scaling policy

- Define thresholds values pertaining scale up/down decision
- Auto Scaler refer this policy
- Defined by DevOps

Deployment policy

- Defined how and where to spawn cartridge instances
- Defined min and max instances in a selected service cluster
- Defined by DevOps based on deployment patterns

Smart Policies

Why should one care?

- Can provide cloud SLA

What are the advantages?

- Make DevOps life easy
  - help keep to SLA
- Make SaaS app delivery life easy
  - do not have to worry about availability in application layer

Multi-tenancy

What MT model does it support?

- Container MT
  - virtual Machine, LXC, Docker
- In-container MT
  - within VM/LXC/Docker tenancy

What is unique?

- Can have high tenant density

What are the advantage of this model?

- Optimizing resource utilization
  - by sharing resource such as CPU, memory across tenants
  - low footprint, based on utilization/usage of the tenants app
- No need dedicated resource allocation for tenants

Cloud Bursting

What is it?

- Expanding/provisioning application into another cloud to handle peak load.

Why Should one care?

- Resource peak time can be off-loaded to third party clouds/resources

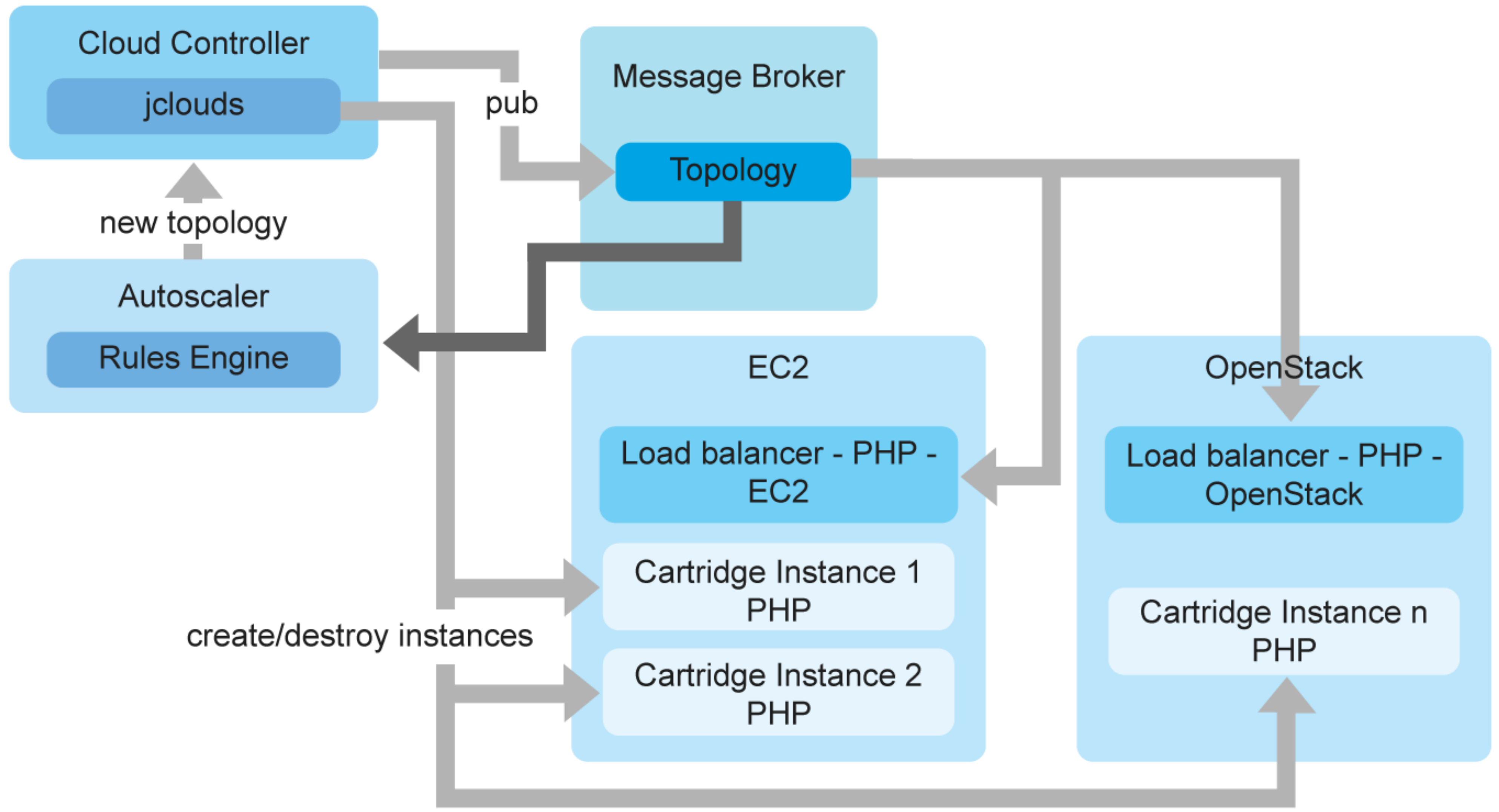
What is unique about it?

- Can off-load to any cloud
  - Private, Public and Hybrid
- Easy to managed with the model of LB per busting cloud

Cloud Bursting...

What are the advantages?

- Make DevOps life easy
- Low TCO, and higher utilization existing dedicated resources



Logging, Metering and Monitoring

What details are?

- Instance up/down time
- Each and every instances health status
  - application health, load average, memory consumption
- Application logs

Why should one care?

- Centralize view for all logging, metering and monitoring

What are the advantages?

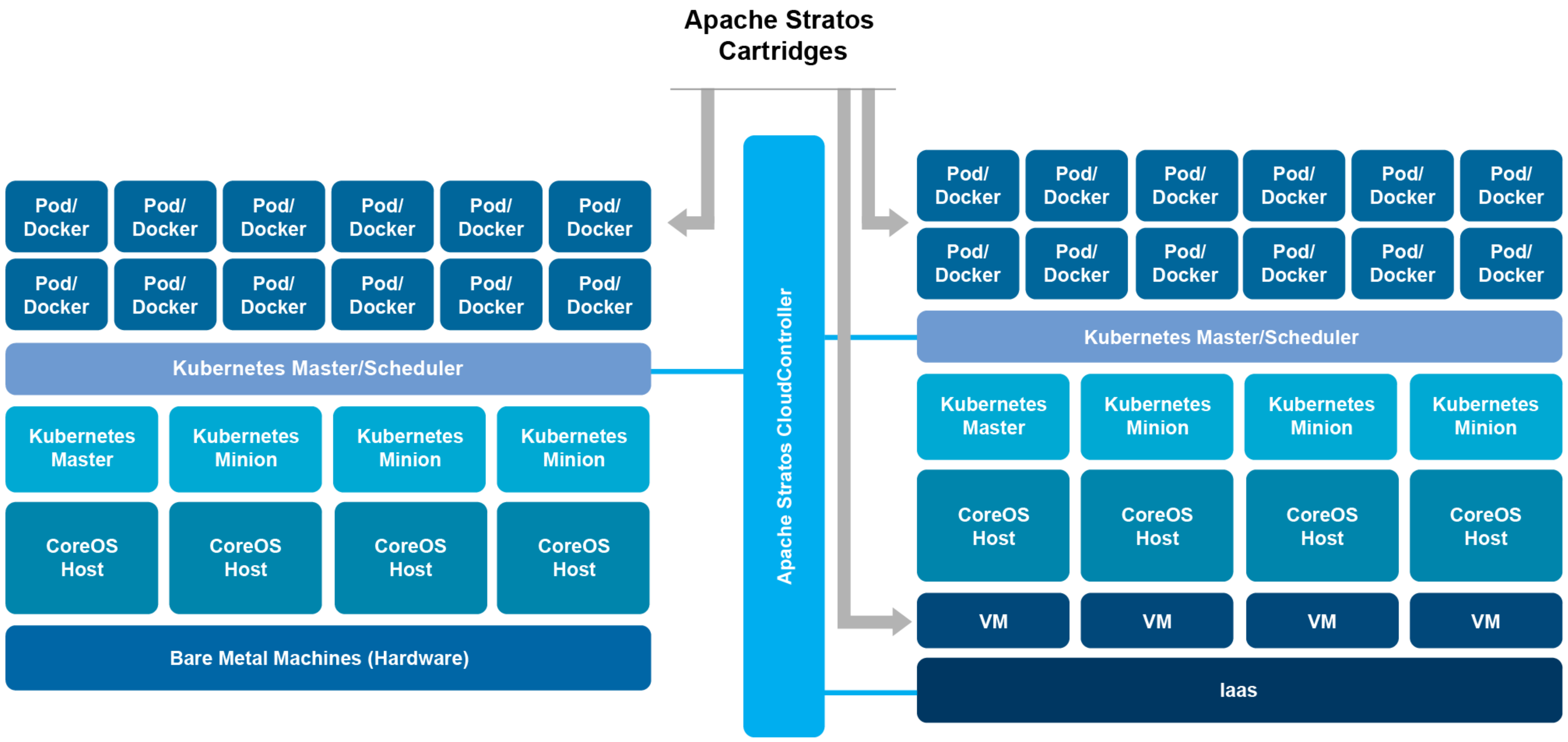
- DevOps life easy
  - centralize log viewer
  - centralize dashboard
- Easy to throttling

Docker support.

- Apache Stratos next release is mainly into
  - Docker based cartridge support
  - integration with CoreOS
  - integration with Kubernetes
  - integration with flannel
  - integration with discovery service and build in docker registry support

- Support docker top of VM
  - provide two level of scalability
  - support for integrated with any existing IaaS

Stratos Architecture with Docker Support


Apache Stratos Cartridges
Pod/ Docker
Kubernetes Master/Scheduler
Kubernetes Master
Kubernetes Minion
CoreOS Host
Bare Metal Machines (Hardware)
Apache Stratos CloudController
VM
Iaas

Demo

Using Apache Stratos 4.1.0-m2 developer preview

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More Information !

- Apache Stratos
  http://stratos.apache.org/

- Apache Stratos 4.1.0-m2 developer preview
  https://cwiki.apache.org/confluence/display/STRATOS/4.1.0+Stratos+M2+Developer+Preview

- Why Apache Stratos is the preferred choice in the PaaS Space
  http://wso2.com/library/articles/2014/05/why-apache-stratos-is-the-preferred-choice-in-the-paas-space/

- Sneak peak into Apache Stratos 4.0.0
  http://lakmalsview.blogspot.com/2013/12/sneak-peek-into-apache-stratos.html

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Cisco, ATC, Acuity Group, American Family Insurance, Children's Hospital Boston, CAA, SAIC, Institut national de santé publique Québec, MEMC, Concur click. done., Trimble, UMUC, U.S. Army, JPMorganChase, Prudential, VERIO, AAA, Blue Cross of Idaho, BNY Mellon, dg, Intermountain Healthcare, Front Porch Digital, imshealth, Boeing, StubHub!, Kaiser Permanente, UBS, Noel Group, Expedia, Tractor Supply Co, ebay, Flexera, Regions, barclaycard, NATO OTAN, neustar, west, Spectrum Health, GSA, Capital Group Companies, intel, GE, Rakuten Global Market, Front Porch Digital

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Middle East and Asia-Pacific

Commercial Credit, Sri Lanka Telecom Mobitel, Cognizant, ICTA ideas actioned, ODEL, Dialog, Sapura, plc, onesteel, Australian Government Department of Health and Ageing, Jiesai, VIB

South America

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