Introduction to Cloud Computing & Openstack

GZ Kabir <gzkabir@office.bdcom.com>
Muhammad Moinur Rahman <bofh@FreeBSD.org>
Suman Saha <suman@amberit.com.bd>
Sumon Ahmed Sabir <sumon@fiberathome.com>
Yoshinobu Matsuzaki <maz@iij.ad.jp>

What is Cloud?

Technology model

- virtualization of compute, network, storage

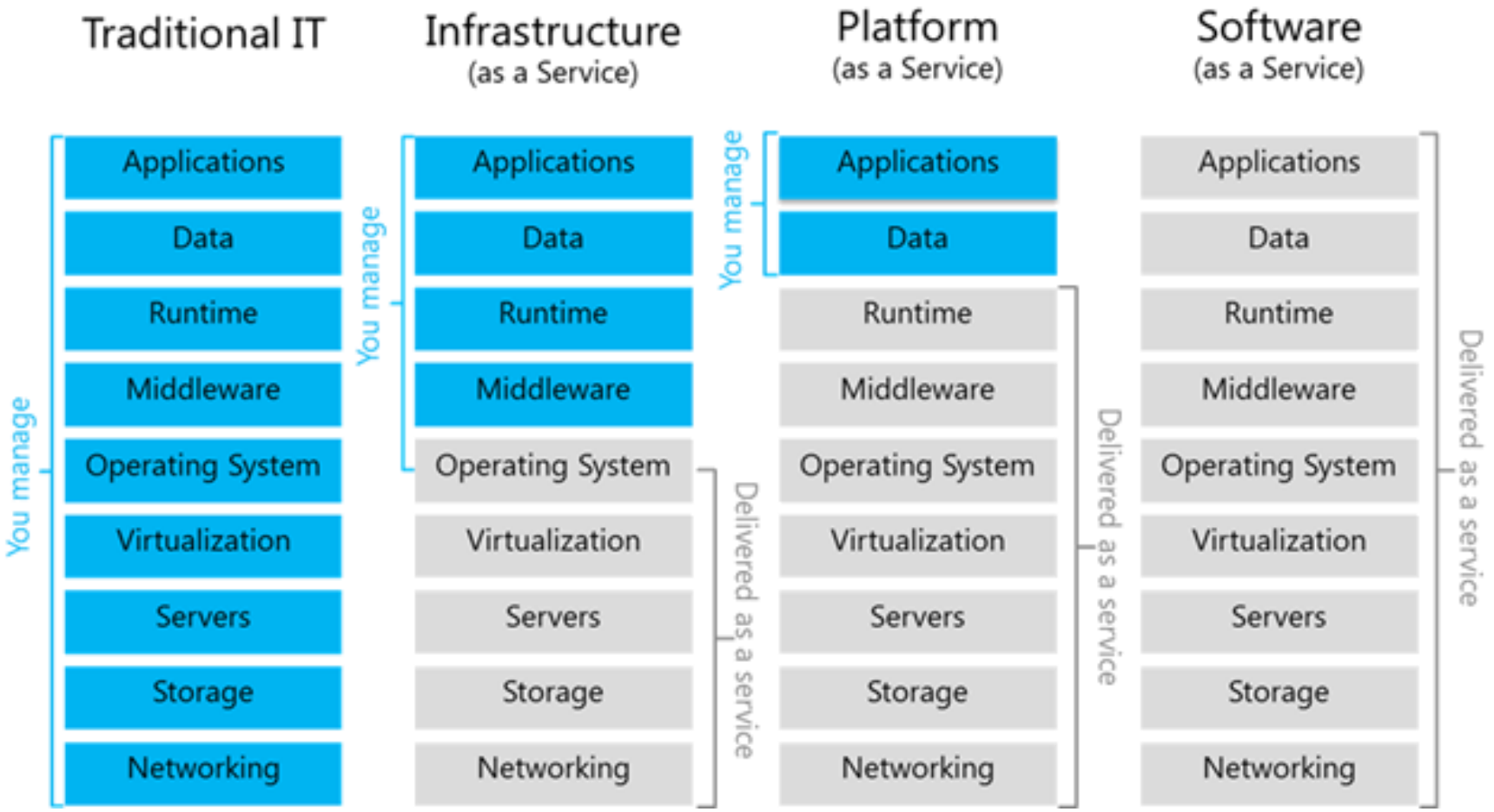
Operational model

- run your services in a certain way

Consumption model

- “don’t make me talk to IT”
- delivered instantly* over the wire, variable price

What is IaaS?


Traditional IT
Infrastructure (as a Service)
Platform (as a Service)
Software (as a Service)
Applications
Data
Runtime
Middleware
Operating System
Virtualization
Servers
Storage
Networking
You manage
Delivered as a service

Private Cloud Software

OpenStack, an open source cloud project http://openstack.org

- ATLAS and CMS High Level Trigger clouds
- HEP Clouds at BNL, IN2P3, NECTaR, FutureGrid, …
- Clouds at HP, IBM, Rackspace, eBay, PayPal, Yahoo!, Comcast, Bloomberg, Fidelity, NSA, CloudWatt, Numergy, Intel, Cisco …

What is OpenStack?

A collection of open source technologies delivering a scalable cloud operating system.

History

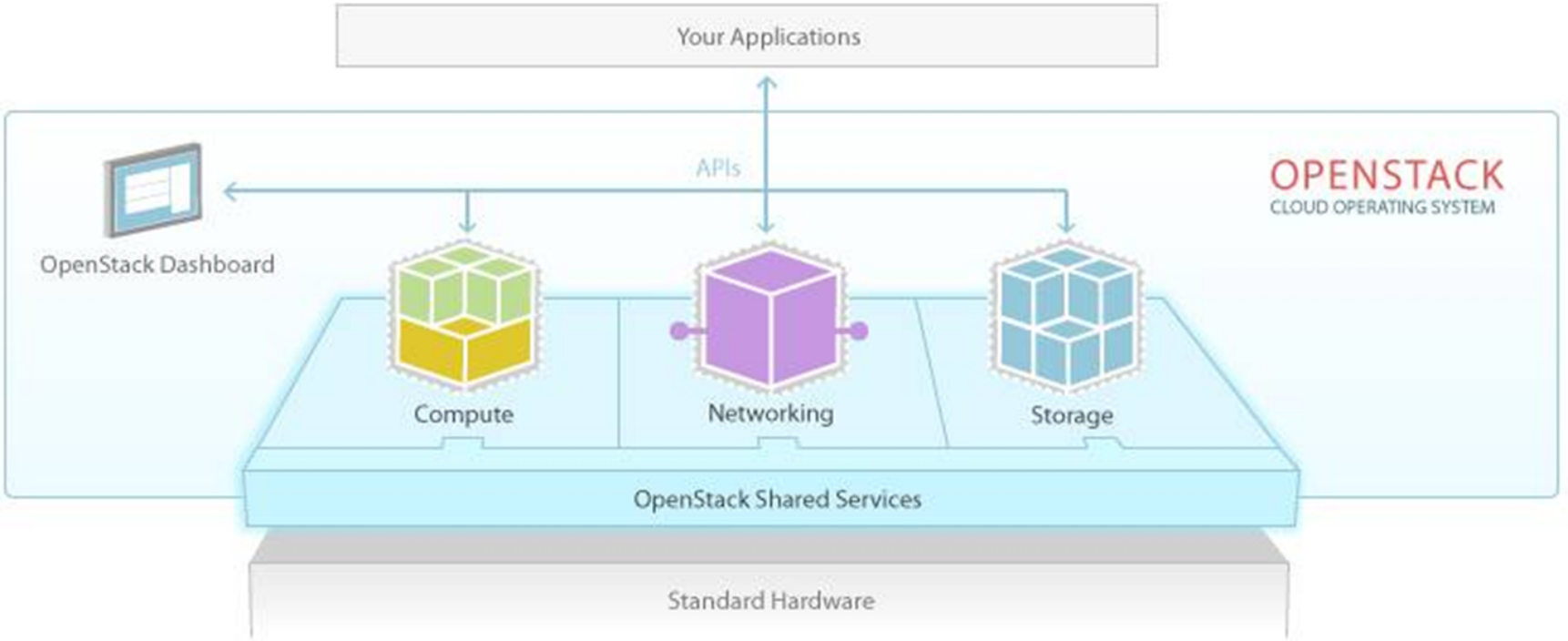
July 2010 – NASA and Rackspace announce OpenStack release Austin

The back story

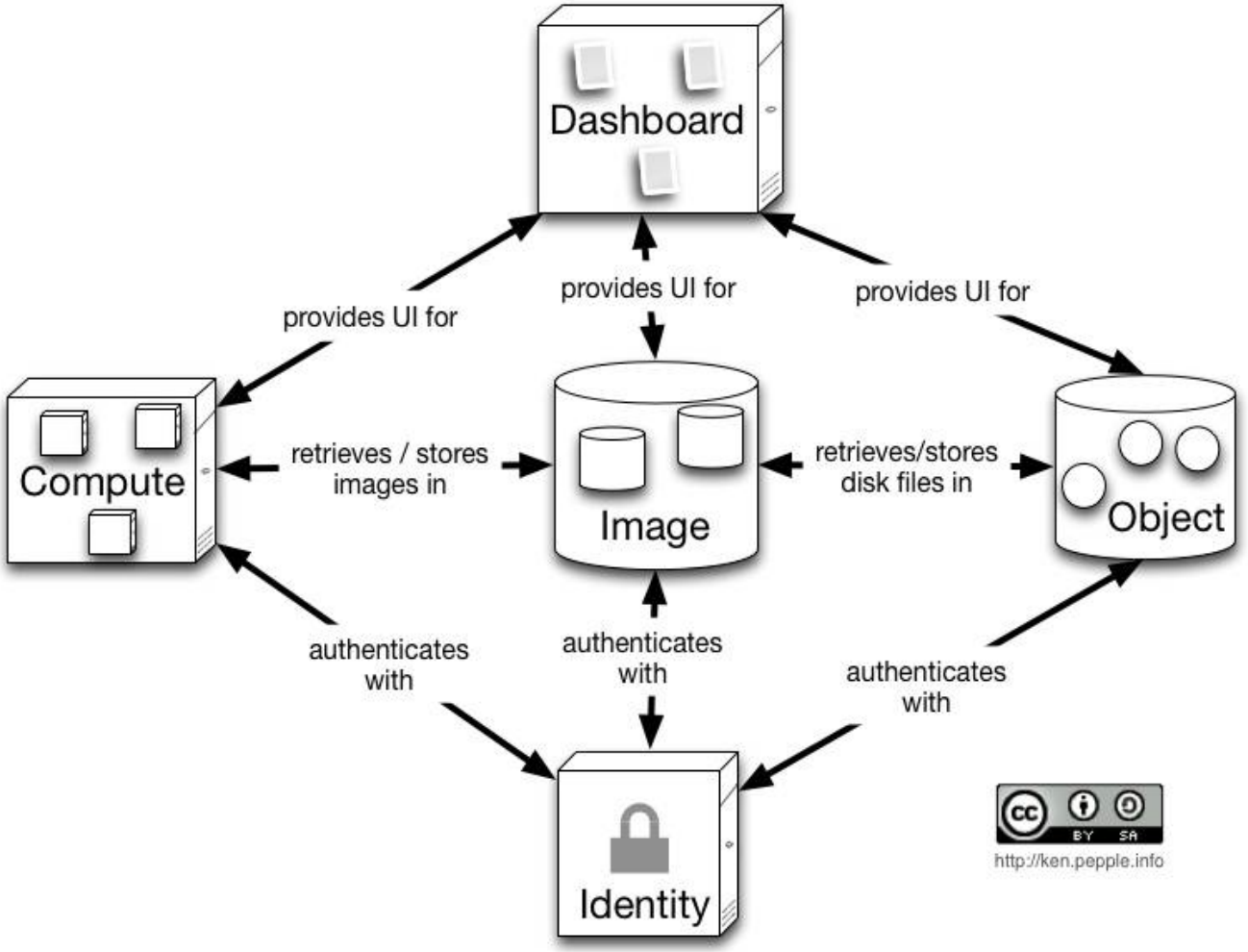
- Early summer 2010 “Apache-Licensed Cloud Computing, in Python. It’s live, it’s buggy, it’s beta. Check it out.”
- Rackspace begins parallel development
- NASA and Rackspace meet for Thai food
- Working at the Rainbow Mansion
- 5 weeks later . . . NASA administrators agree to release everything under the Apache license

June 2012, NASA moves its compute architecture to Amazon

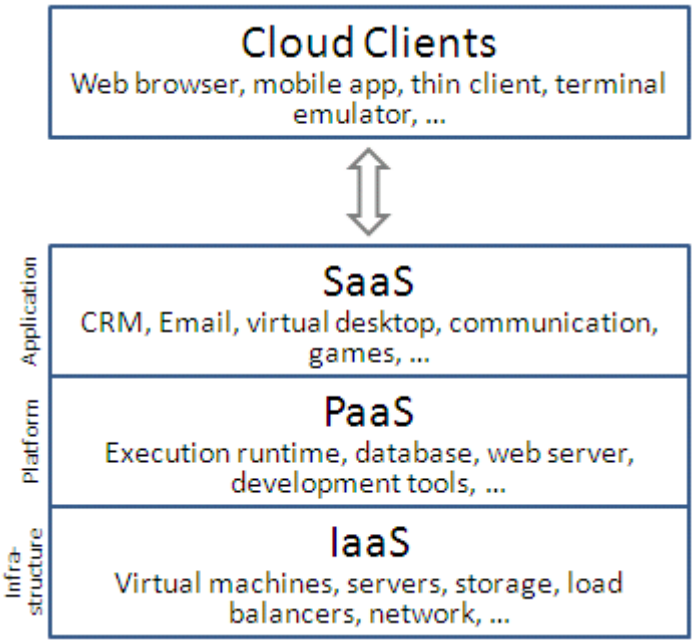
Architecture



Workflow


Dashboard
provides UI for
provides UI for
provides UI for
Compute
retrieves / stores
images in
Image
retrieves/stores
disk files in
Object
authenticates
with
authenticates
with
authenticates
with
Identity
http://ken.pepple.info

Service Model



Why OpenStack?

Cloud is commodity
Cloud is not portable
Open Source Clouds are not service provider ready
Need STACKS of the cloud

Openstack Philosophy : Open

- Open Source
  - Apache 2.0 Licensed
  - No Enterprise version
- Open Community
  - Foundation in 2012
  - 190+ Companies, 3000+developers, 11000+ members
- Open Development
  - GitHUB/Launchpad
- Open Design
  - Open Design Summit
  - Anyone is able to design new core architecture

Openstack Philosophy : Design

Scalability & elasticity
Everything should be asynchronous
Shared-nothing architectures
Accept eventual consistency
Test everything

Modules

Compute (Nova)
Image (Glance)
Object Storage (Swift)
Identity (Keystone)
Networking (Neutron)
Block Storage (Cinder)

OpenStack : Nova

Written in Python
HTTP/ReST API (multiple)
Instances, Networking, Volumes
Working on service provider scale now
More at: http://nova.openstack.org/

OpenStack : Glance

Written in Python
HTTP/ReST API
Image service for Nova
More at: http://glance.openstack.org/

OpenStack : Swift

A highly scalable, redundant, unstructured data store designed to store large amounts of data cheaply

- Written in Python
- HTTP/ReST API
- Accounts, containers, and objects
- CDN Integration
- No single point of failure
- Last write wins
- More at: http://swift.openstack.org/

OpenStack : Keystone

Provides an authentication and authorization service for other OpenStack services. Provides a catalog of endpoints for all OpenStack services.

OpenStack : Neutron

Enables network connectivity as a service for other OpenStack services, such as OpenStack Compute. Provides an API for users to define networks and the attachments into them. Has a pluggable architecture that supports many popular networking vendors and technologies.

OpenStack : Cinder

Stores and retrieves arbitrary unstructured data objects via a RESTful, HTTP based API. It is highly fault tolerant with its data replication and scale out architecture. Its implementation is not like a file server with mountable directories.

OpenStack : Salts

Dashboard (Horizon)
Database (Trove)
Elastic Map Reduce (Sahara)
Orchestration (Heat)
Telemetry (Ceilometer)
Messaging Service (Zaqar)
Bare-Metal Provisioning (Ironic)
Key Management (Barbican)
DNS Service (Designate)