Open Stack
Open Source Cloud Computing

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Cloud Computing

Cloud computing allows application software to be operated using internet-enabled devices. Clouds can be classified as public, private, and hybrid.

Distributed computing on internet Or delivery of computing service over the internet.

Cloud computing concept evolved in 1950(IBM) called RJE (Remote Job Entry Process).

In 2006 Amazon provided First public cloud AWS(Amazon Web Service)

It has three components

1.) Client computers - Clients are the device that the end user interact with cloud
2.) Distributed Servers - Often servers are in geographically different places, but server acts as if they are working next to each other.
3.) Datacenters - It is collection of servers where application is placed and is accessed via internet.

Cloud offers a large numbers of service-models

1.) SaaS(Software as a service)
2.) PaaS(Platform as service)
3.) IaaS(Infrastructure as a service)

Open Stack

Open Stack is a free and open-source cloud computing software platform. It is an (IaaS) Infrastructure as a service. Technology consists of a series of interrelated projects that control pools of processing, storage, and networking resources throughout a data center which users manage through a web-based dashboard, command-line tools, or a REST API.

Open Stack is a community of open source developers, participating organizations and users who are building and running the open source cloud operating system.
The OpenStack.org released it under the terms of the Apache License.

Open Stack

It all started as a combined project by NASA and Rackspace.

It provides same feature as of AWS cloud provides with something open source that you can build in your own data centre, thats why open source is a hot trend in cloud computing.

Openstack can be used by anybody who wants their own cloud infrastructure, similar to AWS(Amazon Web Storage).

If u will combined all the components of open stack together it will make a robust cloud like any other commercial cloud (AWS), that too in your datacenter, completely managed and controlled by your team.

Who are involved

OpenStack began in 2010 as a joint project of Rackspace and NASA.Currently, it is managed by the OpenStack Foundation to promote OpenStack software and its community.More than 200 companies have joined the project.

NASA was behind a project called as NOVA(which is very analogous to amazon ec2 and provided computing feature), and Rackspace built another tool called as Swift(a highly scalable object storage solution, very similar to AWS S3). These all are the components of Open Stack now.

Now all top 150 IT companies are backing the open stack project to get a open source cloud as scalable per user deemand.

Releases of Openstack

Openstack follows the ubuntu release cycle, i.e. twice a year. The various releases of Openstack are:

- Austin
- Bexar
- Cactus
- Diablo
- Essax
- Folsom
- Grizzly
- Havana
- Icehouse
- Juno
- Kilo
- Liberty

Open Stack Components

The main components of Open Stack

OpenStack Compute(NOVA)

OpenStack Block Storage(CINDER)

OpenStack Object Storage(SWIFT)

OpenStack dashboard(HORIZON)

OpenStack Networking(NEUTRON)

OpenStack Identity-service(KEYSTONE)

OpenStack Data-Service(SAHARA)

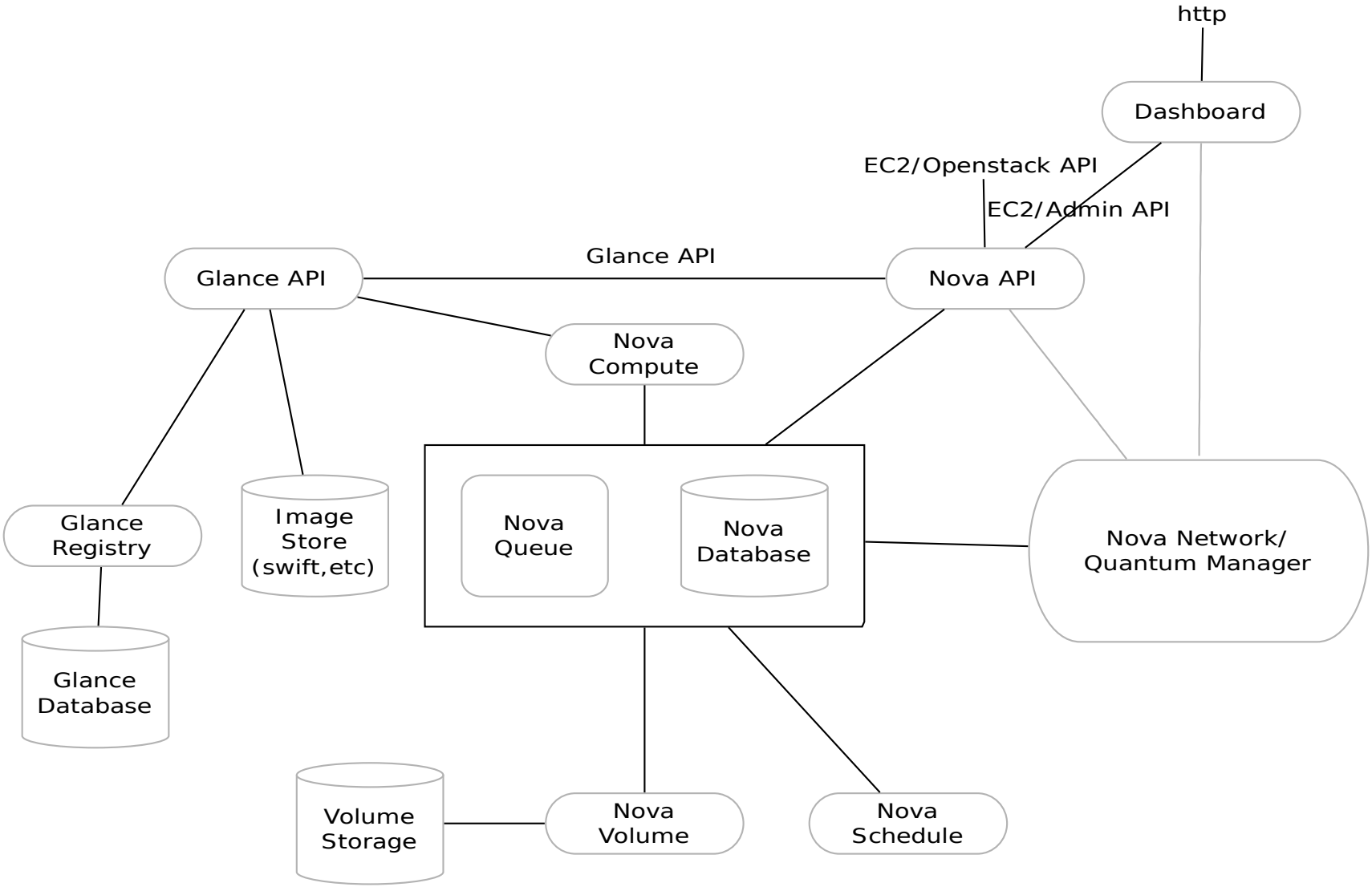
NOVA(Open Stack Compute)

One of the main component of cloud is virtual machines, that can scale without bounds. This need of the cloud in openstack is fulfilled by something called as Nova. Nova is the name of the software component in OpenStack cloud, that offers and manages virtual machines is same as Ec2.

NOVA is a daemon that does the job of creating and terminating VMs.

NOVA does job through VM API calls and libvirt library.

NOVA Architecture



CINDER (Block Storage)

The second major requirement of openstack is storage. There are two different types of storage in the cloud, one is block storage(RAID partition) , or normal disk storage, where your operating system files are installed and other is object storage.

CINDER will work similar to attaching and detaching an external hard drive to your operating system, for its local use. Block storage is useful for database storage, or raw storage for the server(like format it, mount it and use it), or else you can combine several for distributed file system needs

SWIFT (Object Storage)

The object storage full fills the scaling needs, without bounds. You need a storage that can scale without worry. Where your storage need is of static objects. This can be used for storing static large data like backups, archives etc. It can be accessed with its own API, and is replicated cross datacenter, to withstand large disasters.

OpenStack Object storage(Swift): is suitable for storing multimedia content like videos, images, virtual machine images, backups, email storage, archives etc. This type of data needs to grow without any limitation, and needs to be replicated. This is exactly what OpenStack swift is designed to do.

HORIZON(Open Stack Dashboard)

HORIZON is a web interface for users and administrators to interact with your OpenStack cloud. Its basically a Django Web Application implemented in mod_wsgi and Apache. Its primary objective is to interact with the backend API's of other components and execute requests initiated by users. It interacts with keystone authentication service, to authorize requests before doing anything.

A dashboard for end users or administrators to access other backend services.

NEUTRON(Open Stack Networking)

NEUTRON enables network connectivity.Open Stack networking, think of it as something that manages networking for all our virtual hosts(instances), and provide IP address both private and public.

Networking in the cloud has become so matured that you can create your own private networks, access control lists, create routes between them, interconnect different networks, connect to remote network using VPN etc. Almost all of these needs of an enterprise cloud is taken care by openstack networking.

KEYSTONE(Open Stack Identity-service)

KEYSTONE is responsible for managing authentication services for all components. Like a credentials and authorization, and authentication for users.

Similar as AWS Identity And Access Management(IAM)

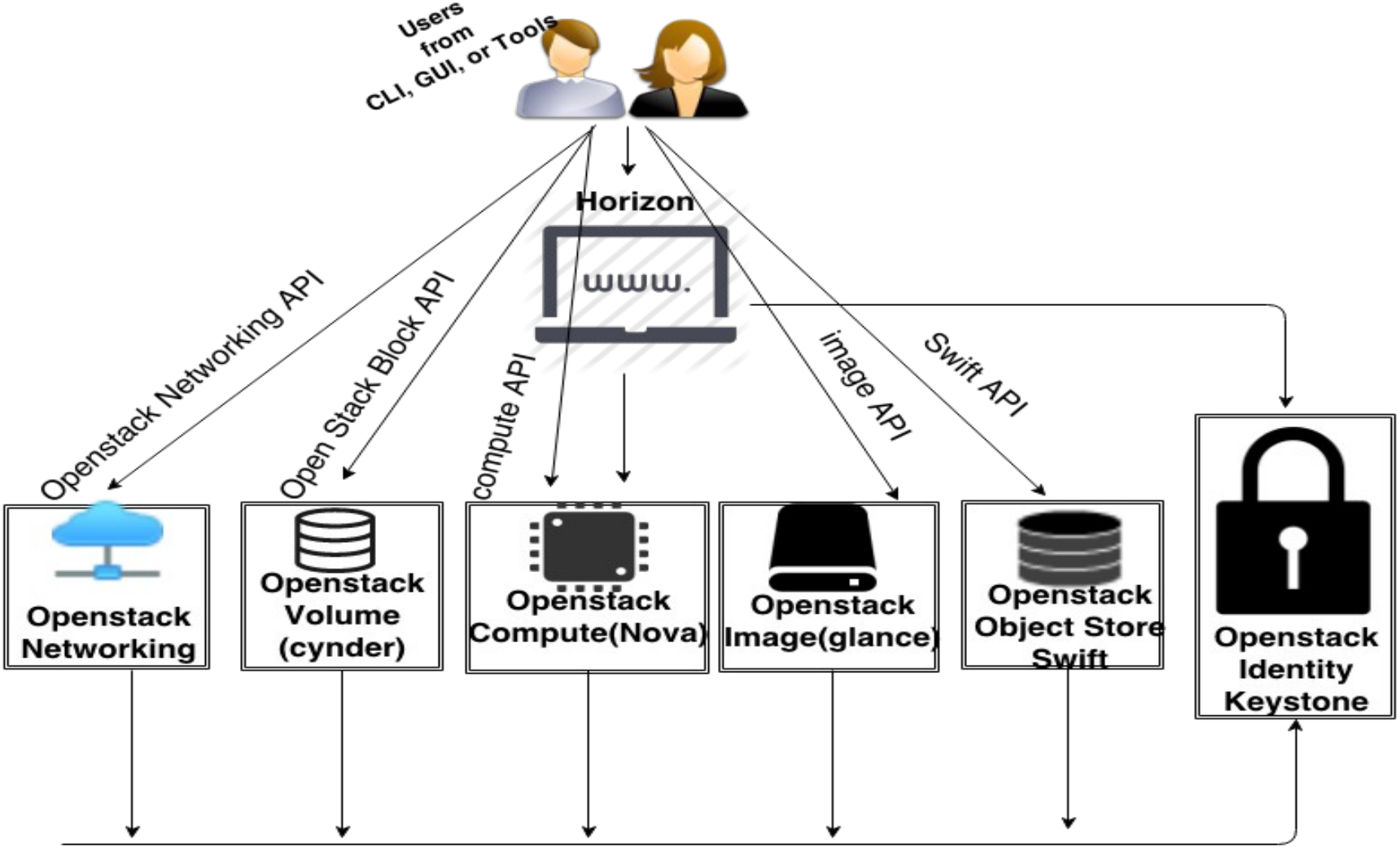
SAHARA(Open Stack Data Service)

SAHARA is a tool for managing databases (Hadoop) in cloud computing.

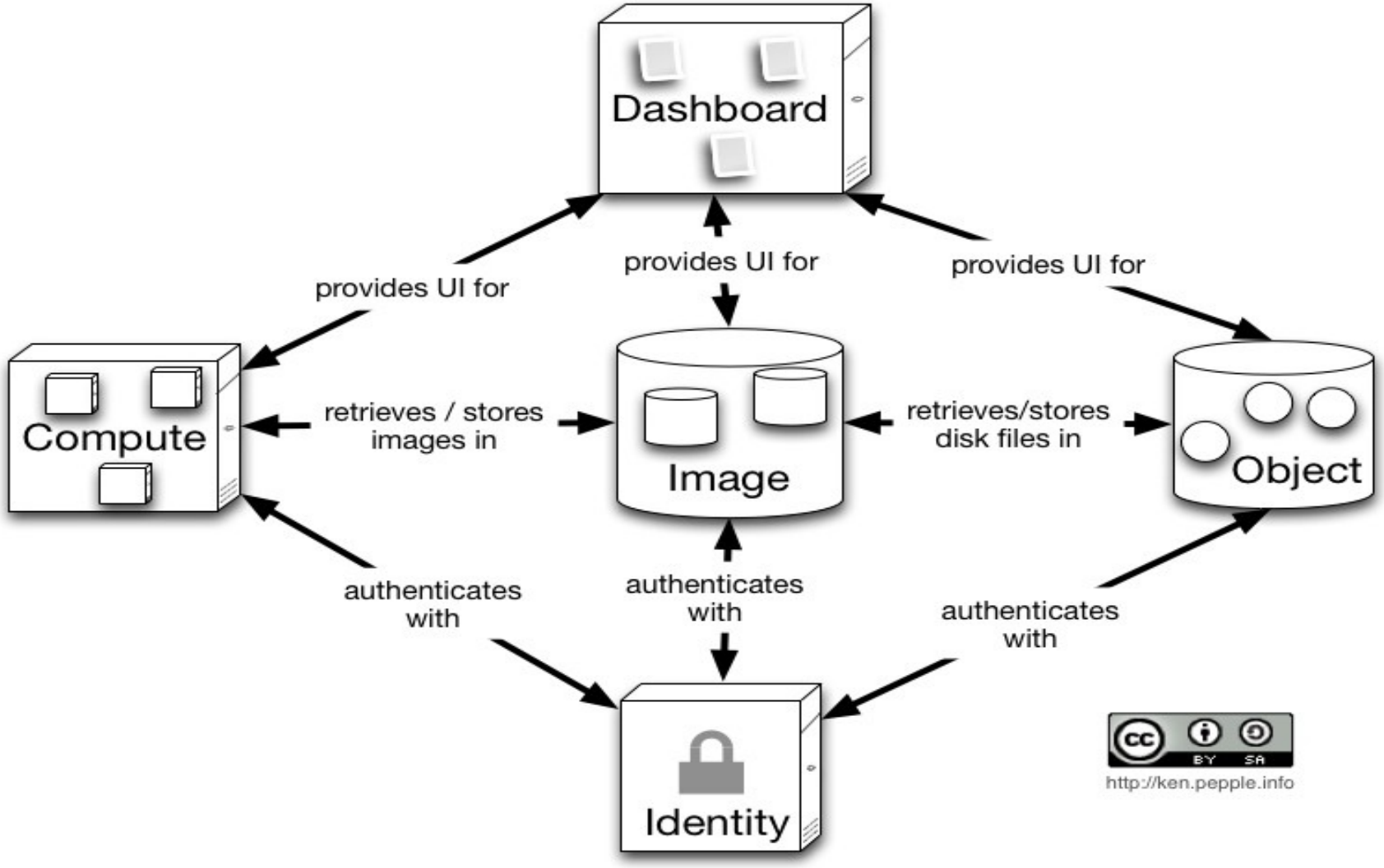
Glance (Open Stack Image Store)

Glance is used for maintaining a catalog for images and is kind of a repository for images.

Basic Architecture of Open Stack



Conceptual Architecture of Open Stack



Why Open Stack

Control and Flexibility - Open source platform means you're never locked to a proprietary vendor, and modular design can integrate with legacy or third-party technologies to meet your business needs. Industry Standard. More than 60 leading companies from over a dozen countries are participating in OpenStack, including Cisco, Citrix, Dell, Intel and Microsoft, and new OpenStack clouds are coming online across the globe.

Proven Software - Run the same software that today powers some of the largest public and private clouds in the world.

Compatible and Connected - Compatibility with public OpenStack clouds means enterprises are prepared for the future making it easy to migrate data and applications to public clouds when conditions are right based on security policies, economics, and other key business criteria.

To use Open Stack in VM devstack is a easy and reliable way to install open stack.

Fir install the git

$ Sudo apt-get install git

Then download the devstack from github

$ git clone https://git.openstack.org/openstack-dev/devstack

Run the script in devstack directory

$ ./stack.sh

The script will show the ip addresses of the dashboard.

Openstack is just an infrastructure base. It gives the liberty to basically run every type of owned software and service on it. The more default value-added services that are provided by openstack project, the easier they are to build and deliver IoT projects.

Usecase:

Comcast has built a private Openstack cloud to support video streaming applications and communication between its network and customer set-top boxes.

There are many other IoT scenarios that could be supported by Openstack such as transportation systems for tracking buses that also correlate with weather data.

In 2011, openstack quantum project was renamed as Neutron. It was started as a dedicated effort within Openstack to provide full Software Defined Networking (SDN) capabilities and as a possible replacement for Nova.

Juno also improved Network Function Virtualization (NFV) in Nova with new multiple interface support.

According to experts, Neutron is stealing some of the attention from Nova right now because it's a newer project within OpenStack and provides more advanced networking capabilities that businesses are demanding, such as automated networking across multiple data centers and clouds.

Thank You