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# Investigation on Openstack Nova Scheduler for Customizing Enterprise Private Cloud

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**Abstract**— Cloud computing is a concept which includes the disciplines like, business models and technologies together to deliver IT capabilities with minimum effort and easy to manage. Cloud is commonly divided into two types, public cloud and private cloud. This project goal is to build up a customized private cloud using OpenStack for small and mid-sized organizations with cost effective solution. It reduce huge amount of money spending to third party cloud service providers. This paper discusses about implementing private cloud using open source software's and customizing the Openstack Nova scheduler. The private cloud implementation is done using OpenStack in Ubuntu operating system. The Nova scheduler in Openstack is customized according to the requirement of the organization which develop the cloud. The cloud is capable of providing the infrastructure as a service which includes operating systems and middleware environment.

**Keywords**— cloud computing, Nova, OpenStack

## I. INTRODUCTION

Cloud computing is dependent on resources sharing. Infrastructure as a Service is one of the important service provided by cloud computing as a on-demand service. The IT infrastructure basically consists of servers, storage, network and operating systems. OpenStack is a cloud computing platform that provides IaaS (Infrastructure as a Service) and also provides resources like compute, storage and network resources. OpenStack use nova to deliver compute instances and it has responsibilities that include spawning, scheduling and decommissioning of virtual machines on demand. In this paper we have customized the Openstack nova scheduler algorithm to provide the nova efficient throughput.

## II. ARCHITECTURE OF OPENSTACK

OpenStack consists of four main components as illustrated in the fig 2.1. These components are developed to perform various operations. Communication between these compounds is performed through the horizon and keystone through an asynchronous mode.

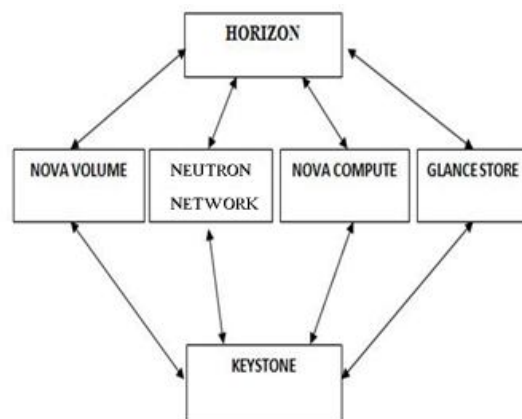


Fig 2.1 architecture of openstack

**A. Horizon:** It provides web-based self-service portal to the user to interact with OpenStack services, like as launching an instance, assigning IP addresses and configuring access controls to the various users

**B. Nova:** Nova helps to manage the compute instances in an OpenStack environment like spawning, scheduling

**C. Neutron:** Neutron provides Networking services for all the OpenStack services. It also provides an API for users to define networks and the attachments

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D. *Keystone*: Keystone is responsible for authentication services for all the OpenStack services.

E. *Glance*: Glance provides image services it stores and retrieves virtual machine disk images during instance provisioning.

### III. OPENSTACK NOVA

Nova is the Computing controller for the OpenStack Cloud. It has the responsible for the life cycle of VM instances. This characteristic makes Nova a Management Platform to manage various compute resources, networking, authorization, and scalability needs of the OpenStack cloud. Nova helps to manage the compute instances in an OpenStack environment like spawning and scheduling.

### IV. OPENSTACK NOVA SCHEDULER OVERVIEW

Openstack Nova uses the nova-scheduler service which selects the compute node to launch the Virtual Machines. The nova-scheduler automatically initializes the placement decision using metrics, such as available compute resources. Nova-scheduler cannot do load-balancing tasks or power management for VMs and nova-scheduler makes decisions based on static information about compute resources it does not consider current utilizations of compute and network resources. The scheduler has a number of configurable options and can be modified in the nova.conf file.

### V. NOVA SCHEDULER FILE STRUCTURE

Openstack nova scheduler file structure consists of filters, client and weight. The nova scheduler algorithm is mainly focus on scheduling the VMs. The bellow diagram illustrates the file structure of the Openstack nova scheduler.

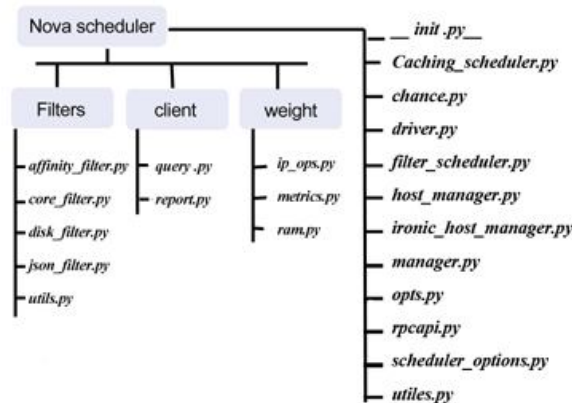


Fig 5.1 Nova scheduler file structure

### VI. SCHEDULER OPTIONS

Openstack Nova scheduler consists of various algorithms for scheduling the VMs. In this paper we customized the Scheduler Options. The Scheduler Option monitors a local .json file for changes and loads it if needed. This file is converted to a data structure and passed into the filtering and weighing functions which can use it for dynamic configuration. Bellow source code represents a part of scheduler option which import the data for scheduling.

```
from nova import flags
from nova import log as logging
from nova.openstack.common import cfg
from nova import utils
scheduler_json_config_location_opt = cfg.StrOpt(
    'scheduler_json_config_location',
    default='',
    help='Absolute path to scheduler configuration JSON file.')
FLAGS = flags.FLAGS
FLAGS.register_opt(scheduler_json_config_location_opt)
LOG = logging.getLogger(__name__)
```

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## VII. CUSTOMIZED SCHEDULER OPTIONS

In Nova scheduling the scheduler option is customized by importing the log data from the oslo\_log files from Openstack library instead of nova files. The flag files are replaced by the oslo\_log configuration files which helps to reduce the execution time of the scheduler option by importing the data from the oslo\_configuration files. The customized scheduler option code is represented bellow.

```
from oslo_config import cfg
from oslo_log import log as logging
from oslo_serialization import jsonutils
from oslo_utils import excutils
from oslo_utils import timeutils
scheduler_json_config_location_opt = cfg.StrOpt(
    'scheduler_json_config_location',
    default="",
    help='Absolute path to scheduler configuration JSON file.')
CONF = cfg.CONF
CONF.register_opt(scheduler_json_config_location_opt)

LOG = logging.getLogger(__name__)

class SchedulerOptions(object):

    def Schedule(self):

        super(SchedulerOptions, self).__init__()

        Schedule_data = { }

        last_Schedule_modified = None

        last_Schedule_checked = None
```

## VIII. CONCLUSION AND FUTURE WORK

Cloud Computing is a powerful and flexible environment. OpenStack helps to deploy the private cloud with cost efficiency. The Openstack core algorithms can be customized according to the need of deployed private cloud. In this paper, we have customized the Nova Scheduler by changing the scheduler options. In future work the performance and throughput of the Openstack nova scheduler's scheduling time for the VMs will be analyzed and evaluated.

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