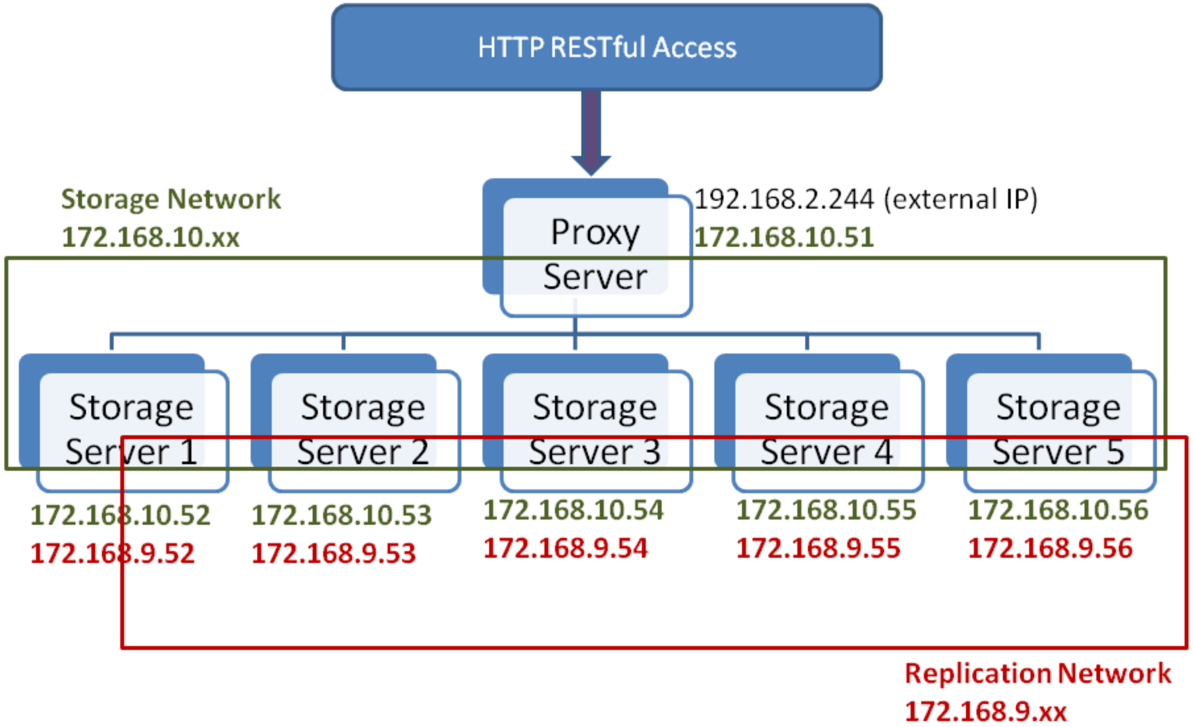
SDC
STORAGE DEVELOPER CONFERENCE
SNIA SANTA CLARA, 2014

How to manage your OpenStack Swift Cluster using Swift Metrics

Sreedhar Varma
Vedams Inc.

What is OpenStack Swift Cluster?

- Cluster of Storage Server Nodes, Proxy Server Nodes and Storage Devices



OpenStack Swift Object Storage Setup

Data Path Software Servers

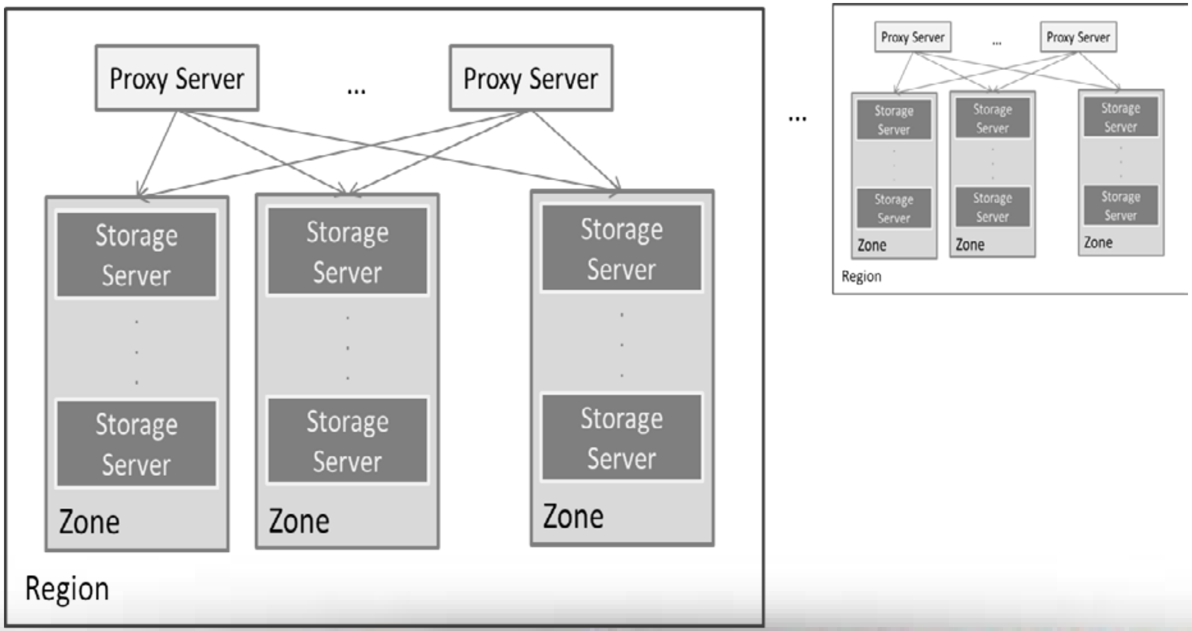
- Data Path consists of 4 software servers
- Proxy Server
  - Responsible for accepting HTTP requests from user
  - Lookup storage server(s) where request needs to be routed
  - Performs read/write affinity – by sending requests to the same region
  - Account for failures – lookup handoff nodes

Data Path Software Servers

- Account Server
  - Tracks the names of containers in a particular account – handles listing of containers
  - SQLite database used to store data
  - Track statistics, but does not have location information about containers
  - Location information determined by proxy server based on ring
- Container Server
  - Deals with Object names in a particular container – handle listing of objects

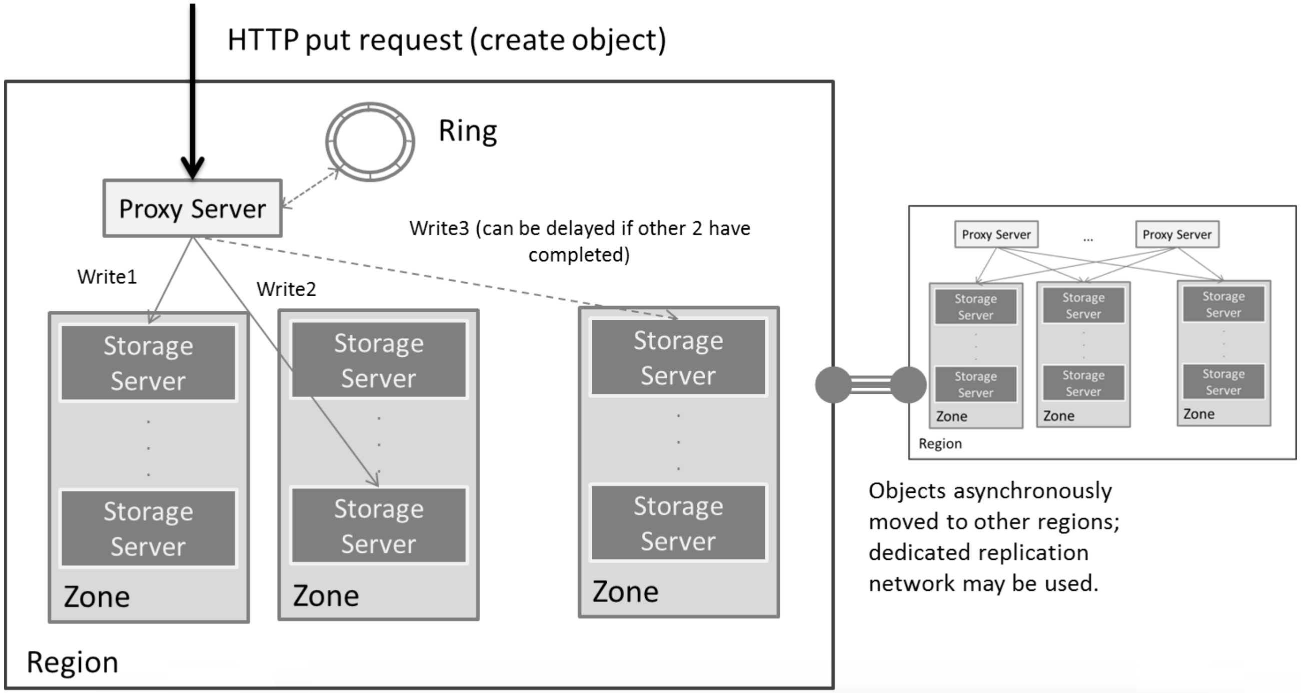
Data Path Software Servers

- Object Server
  - Simply stores, retrieves and deletes objects stored on disk’s filesystems
- Usually account, container and object servers are put on one physical server – storage server
- Servers are distributed across zones and regions



Uploading Objects to Swift Cluster

- Request is sent via an HTTP PUT API call to a proxy server
- Proxy server interacts with the ring to get a list of disks and associated object servers to write data to
- Once a majority of disks acknowledge the write, the operation is returned as being successful



Objects asynchronously moved to other regions; dedicated replication network may be used.

Downloading Objects from Swift Cluster

- Read request is sent via an HTTP GET API call to a proxy server
- Proxy server interacts with the ring to get a list of disks and associated object servers
- Read request is issued to object servers in the same region as the proxy server - read affinity
- Multi-Region: Read object with latest timestamp
  - Proxy servers first request the time-stamp from all the object servers and read from the one with the newest copy
- Similar to the write case, in the case of a failure, handoff devices may be requested

How do you know if your Swift Cluster is healthy?

- Routine management – CPU Utilization, Memory, Disk usage, etc
- Swift stack monitoring – Proxy services, Storage server services, replicator, auditor, etc
- Tools:
  - Swift Recon
  - StatsD
  - Swift Dispersion
  - Swift Informant

Swift Recon

- Middleware software that is configured on the object server node and sits in the data path
- Metrics that are tracked include:
  - Load averages
  - The /proc/meminfo data
  - Mounted filesystems
  - Unmounted drives
  - Socket statistics
  - MD5checksums of account, container, and object ring
  - Replication information
  - Number of quarantined accounts, containers, and objects

Swift Informant

- Middleware software that gives insight into client requests to the proxy server
- Software sits in the proxy server's data path and provides the following metrics to the StatsD server:
  - Status code for requests to account, container, or object
    - GET.200, PUT.201, POST.204, DELETE.204, PUT.404, etc.
  - Duration of the request and time until start_response metric was seen
  - Bytes transferred in the request

Swift StatsD metrics

- Swift services have been instrumented to send statistics (counters and logs) directly to a StatsD server that is configured
- StatsD metrics are provided in real time
- Configuration files containing the following parameters should be set in the Swift configuration files to enable StatsD logging:
  - log_statsd_host
  - log_statsd_port
  - log_statsd_default_sample_rate
  - log_statsd_sample_rate_factor
  - log_statsd_metric_prefix

Real Time Monitoring - Twister

SCREEN USED
TWISTER
Blinking sensors from Dorothy
Screen used by Helen Hunt as "Jo"

Real Time Monitoring - using Swift StatsD metrics

Create/PUT	Read/GET	Update/POST	Delete
account-server. PUT.errors. timing	account-server. GET.errors. timing	account-server. POST.errors. timing	account-server. DELETE.errors. timing
account-server. PUT.timing	account-server. GET.timing	account-server. POST.timing	account-server. DELETE.timing
container-server.PUT. errors.timing	container-server.GET. errors.timing	container-server.POST. errors.timing	container-server.DELETE. errors.timing
container-server.PUT. timing	container-server.GET. timing	container-server.POST. timing	container-server.DELETE. timing
object-server. PUT.errors. timing	object-server. GET.errors. timing	object-server. POST.errors. timing	object-server. DELETE.errors. timing
proxy-server.<type>. <verb>.<status>.Timing	proxy-server.<type>. <verb>.<status>. Xfer	proxy-server.<type>. <verb>.<status>. timing	proxy-server.<type>. <verb>.<status>. Xfer

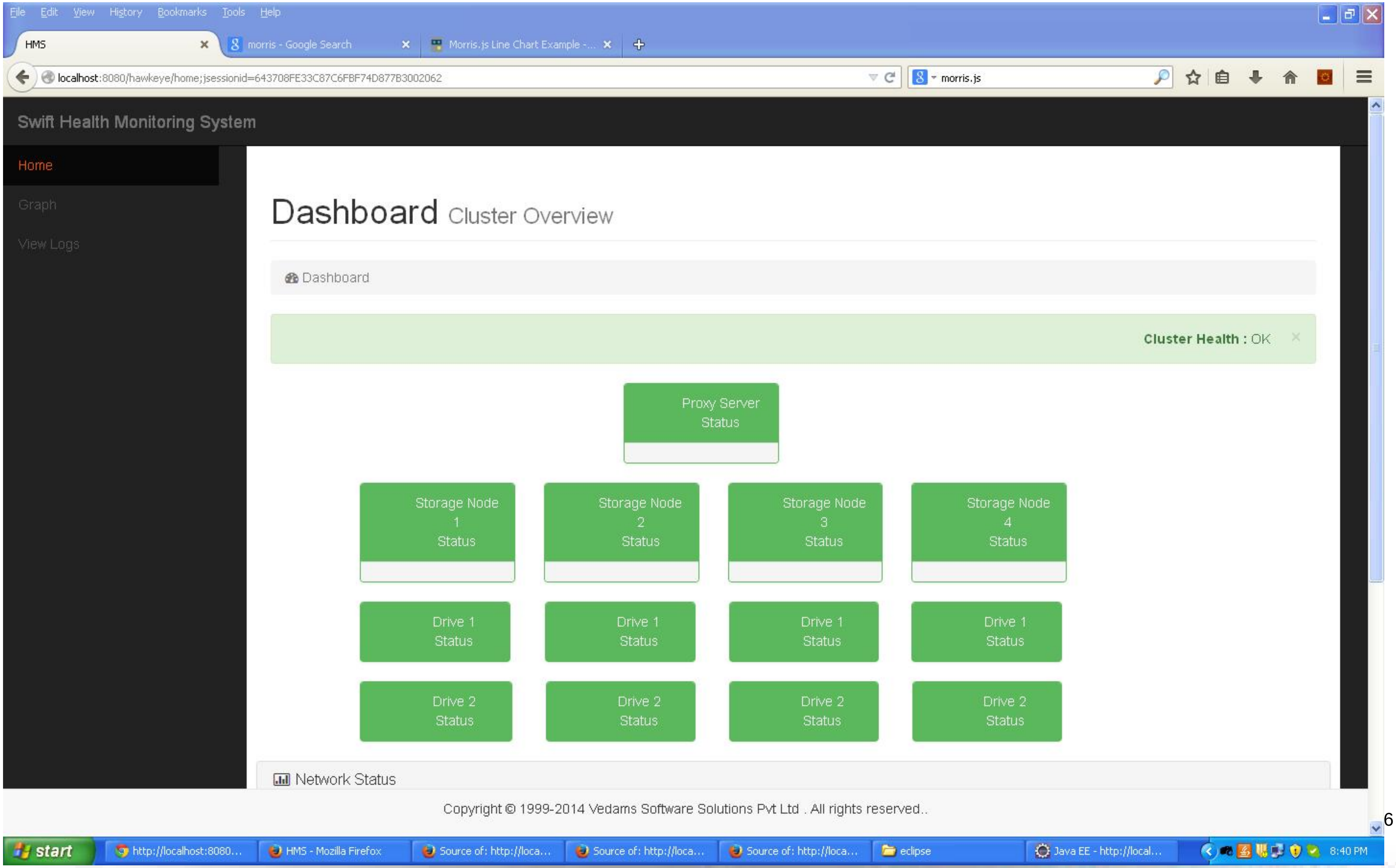
Swift StatsD metrics Processing Engine

- StatsD Engine is configured in the Swift Cluster to receive Swift metrics and process them
- Various Algorithms used to learn Swift cluster behavior and predict failures
- Anomalies detected in the Swift Cluster reported as alerts to Administrator
- Administrator takes action and resets the alert to indicate that the problem is fixed
- Engine continues to track and predict Swift Cluster health

Swift StatsD metrics Processing Engine/UI

- Dynamically determine and map the Swift cluster components to UI
- Report Warnings, Errors in real time
- Pin point failures
  - Drive Failures
  - Swift Services Failures
  - Performance degradation with Upload/Download
- Bandwidth monitoring
- Dynamic Graphs

Swift Cluster – Good Health



File Edit View History Bookmarks Tools Help
HMS
morris - Google Search
Morris.js Line Chart Example -...
localhost:8080/hawkeye/home;jsessionid=643708FE33C87C6FBF74D877B3002062
morris.js

Swift Health Monitoring System

Dashboard Cluster Overview

Dashboard

Cluster Health : OK

Proxy Server Status

Storage Node 1 Status

Storage Node 2 Status

Storage Node 3 Status

Storage Node 4 Status

Drive 1 Status | Drive 1 Status | Drive 1 Status | Drive 1 Status

Drive 2 Status | Drive 2 Status | Drive 2 Status | Drive 2 Status

Network Status

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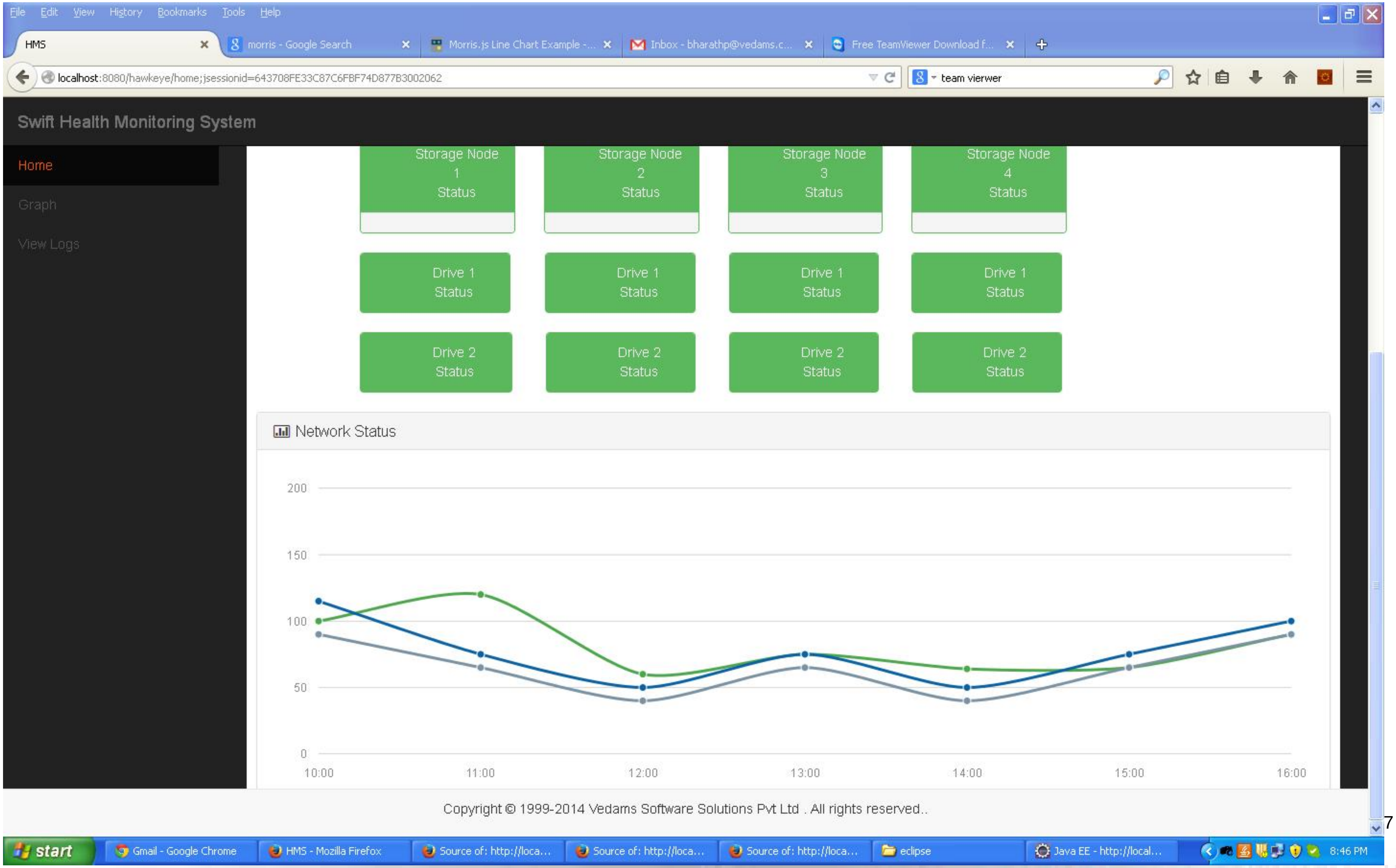
start
http://localhost:8080...
HMS - Mozilla Firefox
Source of: http://loca...
Source of: http://loca...
Source of: http://loca...
eclipse
Java EE - http://local...
8:40 PM

Swift Cluster – I/O Bandwidth Monitoring



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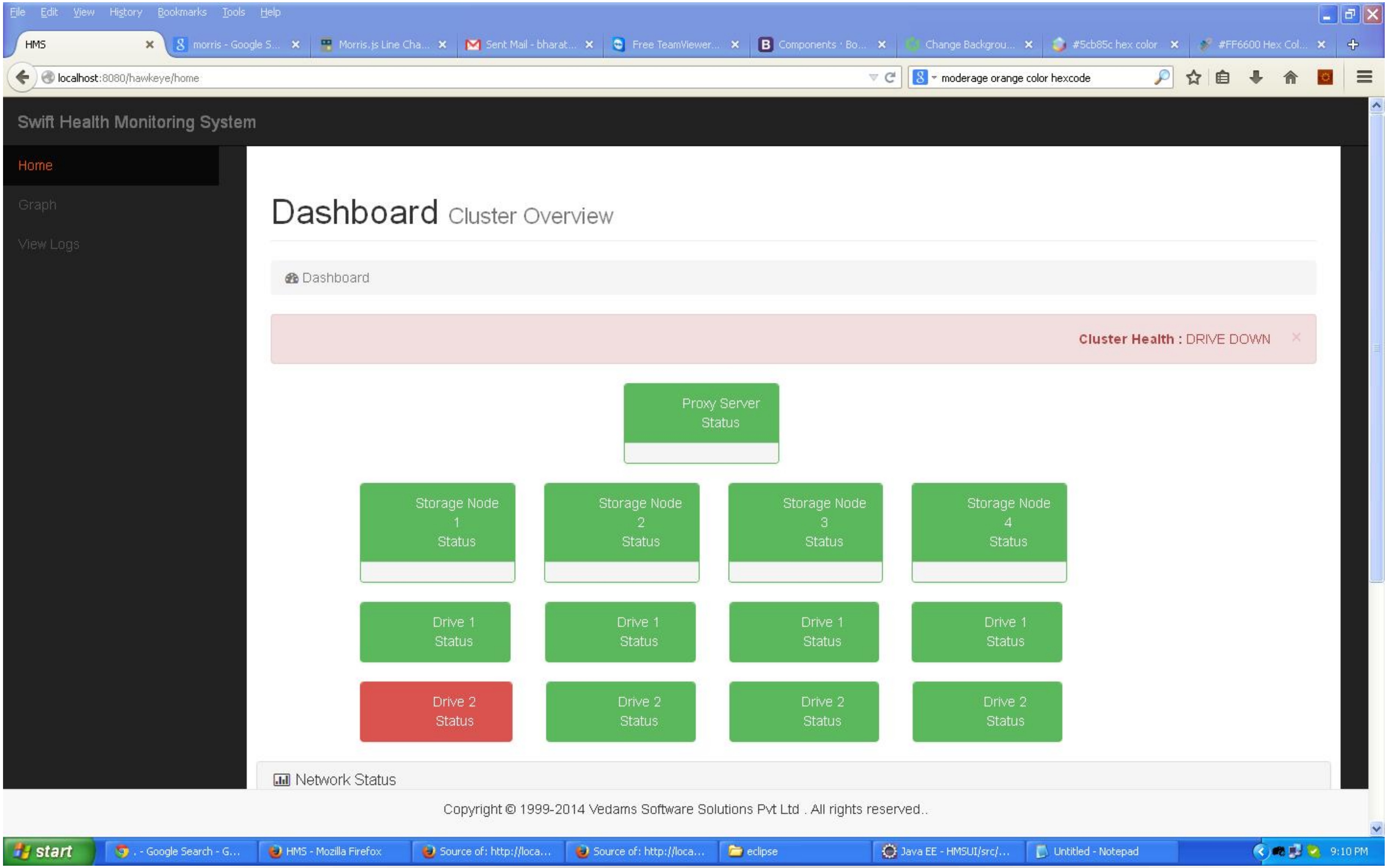
Swift Cluster – Drive Failure



Cluster Health : DRIVE DOWN

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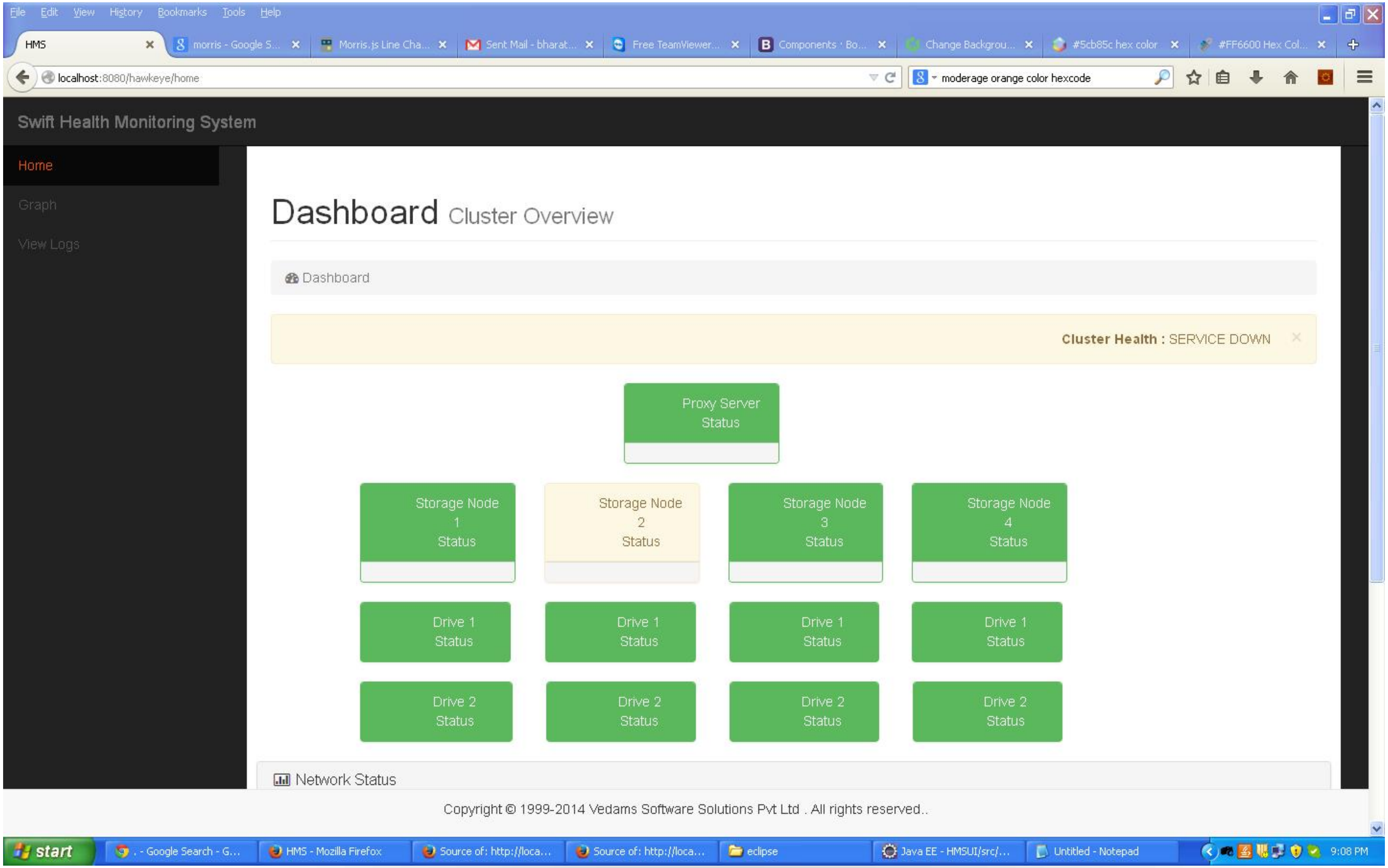
Swift Cluster – Swift Service Down



Swift Health Monitoring System

Dashboard Cluster Overview

Dashboard

Cluster Health : SERVICE DOWN

Proxy Server Status

Storage Node 1 Status

Storage Node 2 Status

Storage Node 3 Status

Storage Node 4 Status

Drive 1 Status | Drive 1 Status | Drive 1 Status | Drive 1 Status

Drive 2 Status | Drive 2 Status | Drive 2 Status | Drive 2 Status

Network Status

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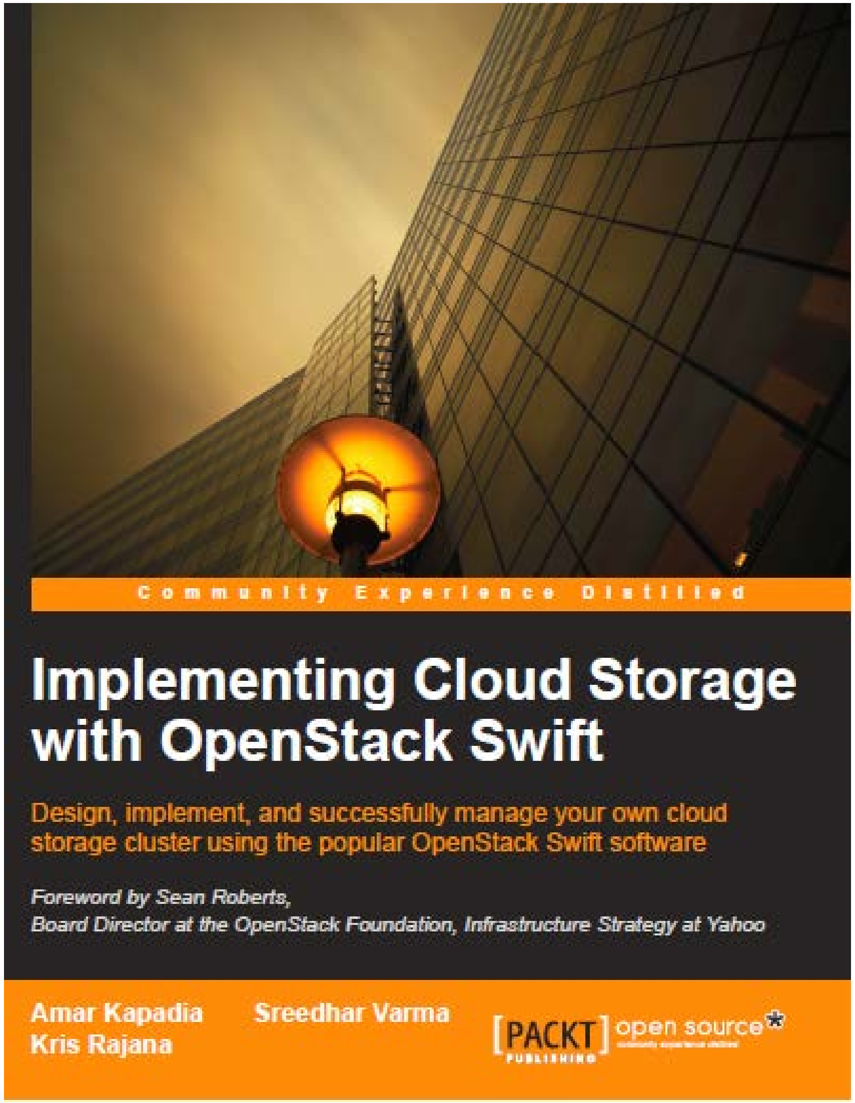
Implementing Cloud Storage With OpenStack Swift

- Chapter 5 – Managing Swift



Community Experience Distilled

Implementing Cloud Storage with OpenStack Swift

Design, implement, and successfully manage your own cloud storage cluster using the popular OpenStack Swift software

Foreword by Sean Roberts,
Board Director at the OpenStack Foundation, Infrastructure Strategy at Yahoo

Amar Kapadia
Kris Rajana

Sreedhar Varma

[PACKT] open source
PUBLISHING

Thank You

Questions ?