Satellite Ads, Inc.

Auto-Scaling Satellite Control System

D085:CKM2

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Version 1.0

# Introduction of Solution

# Purpose

With the release of their newest generation of space marketing satellites, Satellites Ads Inc. anticipates a spike in advertising demand, which this document aims to address by providing a solution for scaling with increased advertising demand.

# Goals and Objectives

Satellites Ads Inc. must achieve two goals and objectives. The first is an automated scaling solution for deploying satellite clusters as demand dictates. Four servers that can manage advertisements for up to 300 satellites make up these clusters. Satellite Ads may use up to 60 clusters to meet advertisement capacity during peak demand. The second requirement is monitoring the systems and using elastic services to scale the number of clusters required based on need.

# Scope

The proposed AWS Auto-Scaling Groups will monitor cluster metrics to determine when to scale up or scale down. First, the actual demand for core systems plus 10% and 10% core systems should always be available. Second, when the cluster reaches 300 satellites, a new scaled cluster is created to meet the demand. Furthermore, at least one scaled cluster should always be available. Third, as satellite demand declines, automation will decommission the clusters. Finally, whenever clusters are scaled up or down or errors occur, the system should email helpdesk@satelliteads.com.

# Description of Functionality

Scaling up this method will necessitate the usage of a few different tools. Initially, the Automation Station will execute The Chef cookbooks. After the initial cluster is live, the EC2 instances will be enabled as members of the AWS Auto-Scaling Group and CloudWatch rules. For tracking and informational purposes, alerts will be provided to the support desk for any problems and scale events.

# Visual Representation

Graphical user interface

Description automatically generated

1. The Automation Station is deployed with Chef and Vagrant installed to deploy the initial cluster and scale automatically as demand increases.
2. The Email Ticketing system is created to properly route messages for scaling actions and errors.
3. The kitchen.yml file on the Automation Station has been configured to deploy all servers in the clusters and will be implemented with the kitchen create and kitchen converge commands.
4. For the initial cluster, these servers are created:
   1. Satellite Terminal Server
   2. Master Time Server
   3. Web Server
   4. Database Server
5. A message is passed to the Automation Station and the email ticketing system with a status update.
6. The Automation Station deploys satellite control cluster and these servers are created:
   1. Scaled Satellite Terminal Server
   2. Scaled Master Time Server
   3. Scaled Web Server
   4. Scaled Database Server
7. After 300 Satellites are deployed, a message is sent to the Automation Station to scale up another cluster as in step 6.

# Automation Script

***# Ryan Peterson Student ID: 000980429***

**---**

***# Developed locally using Vagrant driver***

driver:

name: vagrant

***# Using Chef Zero as an in-memory Chef server for testing purposes***

provisioner:

name: chef\_zero

product\_name: chef

product\_version: 14.12**.**9

***# Using Chef InSpec as the automated testing framework***

verifier:

name: inspec

***# Operating System that will be used by the virtual machines***

platforms:

**-** name: centos**-**7

***# For testing purposes, all servers will be built with the learn\_chef\_httpd***

***# cookbook sourced from GitHub at: https://github.com/chef/learn\_chef\_httpd***

suites:

***# Satellite Terminal Server***

**-** name: satellite\_terminal\_server

driver:

vm\_hostname: terminal**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Master Time Server***

**-** name: master\_time\_server

driver:

vm\_hostname: time**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Web Server***

**-** name: web\_server

driver:

vm\_hostname: web**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Database Server***

**-** name: database\_server

driver:

vm\_hostname: database**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Scaled Satellite Terminal Server***

**-** name: scaled\_satellite\_terminal\_server

driver:

vm\_hostname: scaled**-**terminal**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Scaled Web Server***

**-** name: scaled\_web\_server

driver:

vm\_hostname: scaled**-**web**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Scaled Time Server***

**-** name: scaled\_time\_server

driver:

vm\_hostname: scaled**-**time**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

***# Scaled Database Server***

**-** name: scaled\_database\_server

driver:

vm\_hostname: scaled**-**database**.**satelliteads**.**local

run\_list:

**-** recipe**[**learn\_chef\_httpd**::**default**]**

attributes:

# Diagnosis Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
|  |  | One cluster = 8:28  200 clusters = 28:13:20 | kitchen list  kitchen create  kitchen converge | [kitchen-list.png](https://drive.google.com/file/d/1Hye42EhsF2OZlu2ybvW3JrMnYxUcRe3x/view?usp=sharing)    [kitchen-create-full.png](https://drive.google.com/file/d/1ky_nm70yQ730dzTmhYVO4pxOTPAOCPfB/view?usp=sharing)  [kitchen-create-reduced.png](https://drive.google.com/file/d/1tN8svaEp1w5mxSX2rCbMjpYFP5Tt5n35/view?usp=sharing)    [kitchen-converge-full.png](https://drive.google.com/file/d/1g1vS9EHAGXCZ5BDZEUTr9Q0Rt_B480kH/view?usp=sharing)  [kitchen-converge-reduced.png](https://drive.google.com/file/d/1NOoDBzOgnwvhE0-0O1P0XjJ0pZYGCW9y/view?usp=sharing) |
|  |  | One cluster = 00:00:44 | kitchen destroy | [kitchen-destroy.png](https://drive.google.com/file/d/1ZViCMyFN1CfGYXQjs3LIK11rCPlzeCQ3/view?usp=sharing) |
|  |  | load average: 0.00, 0.01, 0.05 | kitchen exec satellite-terminal-server-centos-7 -c 'top' | [kitchen-exec-top.png](https://drive.google.com/file/d/1zQ4HM_BjnwZptOESBBBEYyxFe7syvrVb/view?usp=sharing) |
|  |  | 1073741824 bytes (1.1 GB) copied, 35.5089 s, 30.2 MB/s | kitchen exec satellite-terminal-server-centos-7 -c 'dd if=/dev/zero of=testWriteSpeed.txt bs=1G count=1' | [kitchen-exec-dd.png](https://drive.google.com/file/d/1DXpeskJepmG5lZaMerAxyD4qcWw-kCYo/view?usp=sharing) |
|  |  | One cluster = 8:28 | kitchen list  kitchen create  kitchen converge | [kitchen-list.png](https://drive.google.com/file/d/1Hye42EhsF2OZlu2ybvW3JrMnYxUcRe3x/view?usp=sharing)    [kitchen-create-full.png](https://drive.google.com/file/d/1ky_nm70yQ730dzTmhYVO4pxOTPAOCPfB/view?usp=sharing)  [kitchen-create-reduced.png](https://drive.google.com/file/d/1tN8svaEp1w5mxSX2rCbMjpYFP5Tt5n35/view?usp=sharing)    [kitchen-converge-full.png](https://drive.google.com/file/d/1g1vS9EHAGXCZ5BDZEUTr9Q0Rt_B480kH/view?usp=sharing)  [kitchen-converge-reduced.png](https://drive.google.com/file/d/1NOoDBzOgnwvhE0-0O1P0XjJ0pZYGCW9y/view?usp=sharing) |
|  |  | N/A | N/A | N/A |
|  |  | rtt min/avg/max/mdev = 16.673/17.933/19.118/0.895 ms | kitchen exec master-time-server-centos-7 -c 'ping -c 5 google.com' | [kitchen-exec-time.png](https://drive.google.com/file/d/1VsH7puk8OJDbxUUuuVznfEkEmOZ8xD_A/view?usp=sharing) |
|  |  | rtt min/avg/max/mdev = 0.032/0.049/0.094/0.025 ms | kitchen exec master-time-server-centos-7 -c 'ping -c 5 localhost' | [kitchen-exec-ping.png](https://drive.google.com/file/d/1brmsEW-2BTi05YFxpy4NQvRLQePKlfwy/view?usp=sharing) |
|  |  | rtt min/avg/max/mdev = 16.673/17.933/19.118/0.895 ms | kitchen exec master-time-server-centos-7 -c 'ping -c 5 google.com' | [kitchen-exec-time.png](https://drive.google.com/file/d/1VsH7puk8OJDbxUUuuVznfEkEmOZ8xD_A/view?usp=sharing) |
|  |  | load average: 0.00, 0.01, 0.05 | kitchen exec satellite-terminal-server-centos-7 -c 'top' | [kitchen-exec-top.png](https://drive.google.com/file/d/1zQ4HM_BjnwZptOESBBBEYyxFe7syvrVb/view?usp=sharing) |
|  |  | N/A | N/A | N/A |
|  |  | rtt min/avg/max/mdev = 14.553/16.411/18.780/1.478 ms | kitchen exec scaled-time-server-centos-7 -c 'ping -c 5 google.com' | [kitchen-exec-scaled.png](https://drive.google.com/file/d/1fVQ4nAAIWPLfQTC_RBhL6T1kbq0uXIn0/view?usp=sharing) |
|  |  | rtt min/avg/max/mdev = 14.553/16.411/18.780/1.478 ms | kitchen exec scaled-time-server-centos-7 -c 'ping -c 5 google.com' | [kitchen-exec-scaled.png](https://drive.google.com/file/d/1fVQ4nAAIWPLfQTC_RBhL6T1kbq0uXIn0/view?usp=sharing) |
|  |  | rtt min/avg/max/mdev = 14.553/16.411/18.780/1.478 ms | kitchen exec scaled-time-server-centos-7 -c 'ping -c 5 google.com' | [kitchen-exec-scaled.png](https://drive.google.com/file/d/1fVQ4nAAIWPLfQTC_RBhL6T1kbq0uXIn0/view?usp=sharing) |
|  |  | One cluster = 8:28 | kitchen list  kitchen create  kitchen converge | [kitchen-list.png](https://drive.google.com/file/d/1Hye42EhsF2OZlu2ybvW3JrMnYxUcRe3x/view?usp=sharing)    [kitchen-create-full.png](https://drive.google.com/file/d/1ky_nm70yQ730dzTmhYVO4pxOTPAOCPfB/view?usp=sharing)  [kitchen-create-reduced.png](https://drive.google.com/file/d/1tN8svaEp1w5mxSX2rCbMjpYFP5Tt5n35/view?usp=sharing)    [kitchen-converge-full.png](https://drive.google.com/file/d/1g1vS9EHAGXCZ5BDZEUTr9Q0Rt_B480kH/view?usp=sharing)  [kitchen-converge-reduced.png](https://drive.google.com/file/d/1NOoDBzOgnwvhE0-0O1P0XjJ0pZYGCW9y/view?usp=sharing) |

# Web Sources

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*ping(8) - Linux manual page*. (n.d.). Ping(8) - Linux Manual Page; man7.org. Retrieved April 22, 2022, from https://man7.org/linux/man-pages/man8/ping.8.html

*kitchen (executable)*. (2022, February 24). Kitchen (Executable); docs.chef.io. https://docs.chef.io/workstation/ctl\_kitchen/#kitchen-exec

# Sources

No other sources were used other than web sources above