

Advancement through Innovation

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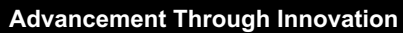
First Experience with Antelope Cloud Processing

Sizing, Licensing, etc.

AUG MEETING – CALGARY, ALBERTA

Stefan Radman & Mathias Franke

September 16 - 18, 2019

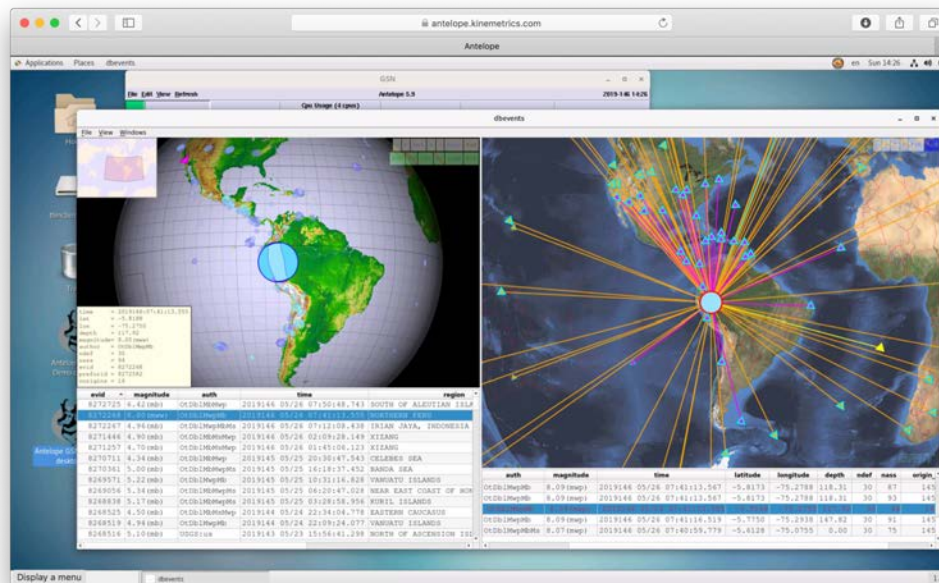


Antelope Virtualization

History

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- Most new Antelope instances installed by Kinometrics are virtual nowadays.
- Trend to virtualize existing installations.
- Primarily on shared private hardware.
- VMware vSphere most popular but others emerging (Proxmox, Nutanix, Xen, etc.).
- Next logical step: Antelope in the Cloud

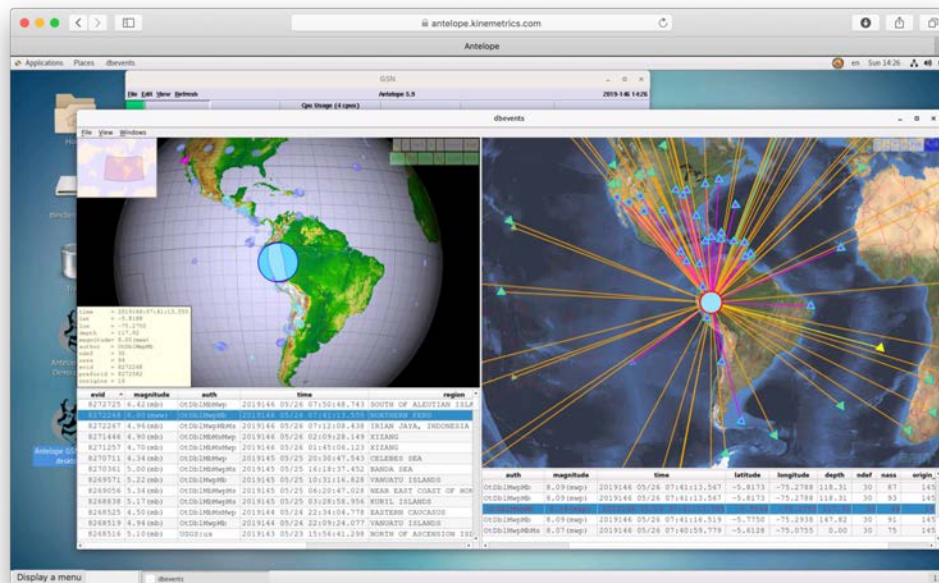


Antelope Cloud Processing

Motivations

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- Reliable infrastructure
- Low TCO
- Availability
- Growing market

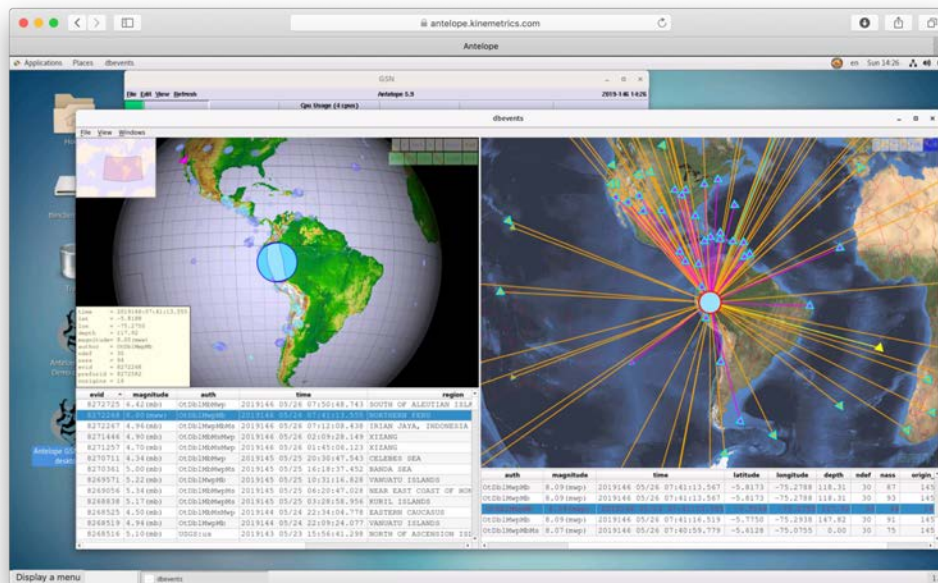


Antelope Cloud Demo

Objective

5

- Live demo
- Fully operational
- Real-time data processing
- Accessible from the Internet
- Low bandwidth requirement
- Secure



Antelope Cloud Demo

Virtual Hardware Specifications

6

- Amazon EC2
- Region: Oregon
- EC2 instance type: **m4.xlarge**
 - M4 = Intel Xeon E5
 - 4 vCPU, 16GB RAM
 - Balanced
- No traditional text or GUI console

```
smr — rt@antelope:~ — ssh rt@antelope.kinemetrics.com — 80×25

[|||||] 50.6% Tasks: 190, 636 thr; 2 running
[|||||] 35.1% Load average: 3.05 2.20 1.68
[|||||] 48.4% Uptime: 9 days, 08:18:08
[|||||] 37.7%
[|||||] 9.17G/15.5G
[|||||] 18.2M/4.00G

USER      PRI  NI  VIRT  RES  SHR  S  CPU%  MEM%  TIME+  Command
setrouble 20   0   374M 66328 11544 S 51.1  0.4  0:00.78 /usr/bin/pyt
polkitd   20   0   605M 18068 4812  S  9.8  0.1 11:31.73 /usr/lib/pol
rt        20   0   8108M 550M 382M  S  6.5  3.5 2:26.55 /opt/antelop
rt        20   0   3749M 264M 56964 S  5.9  1.7 4:08.64 /usr/bin/gno
setrouble 20   0   374M 66328 11544 S  5.9  0.4 0:00.09 /usr/bin/pyt
rt        20   0   460M 97592 6076  S  3.3  0.6 6h30:18 /opt/antelop
rt        20   0   119M 2520 1496  R  3.3  0.0 0:00.47 htop
dbus      20   0   70076 3828 1888  S  2.6  0.0 6:12.60 /usr/bin/dbu
root      20   0   387M 4564 3224  S  2.0  0.0 2:22.54 /usr/libexec
rt        20   0   412M 112M 7748  S  2.0  0.7 1h44:33 /opt/antelop
root      20   0   170M 21792 5344  S  2.0  0.1 0:24.29 /usr/sbin/xr
polkitd   20   0   605M 18068 4812  S  2.0  0.1 3:10.58 /usr/lib/pol
rt        20   0   273M 13264 6736  S  2.0  0.1 1:02.86 /opt/antelop
root      20   0   387M 4564 3224  S  1.3  0.0 1:22.79 /usr/libexec
rt        20   0   63804 5736 3528  S  1.3  0.0 1h29:16 orb2ringserv

p F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10
```

Software Specifications

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- ```

● 🏠 smr — rt@antelope:~ — ssh rt@antelope:~ — 80x25

[|||||] 50.6% Tasks: 190, 636 thr; 2 running
[|||||] 35.1% Load average: 3.05 2.20 1.68
[|||||] 48.4% Uptime: 9 days, 08:18:08
[|||||] 37.7%
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[|] 18.2M/4.00G

USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
setrouble 20 0 374M 66328 11544 S 51.1 0.4 0:00.78 /usr/bin/pyt
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rt 20 0 8108M 550M 382M S 6.5 3.5 2:26.55 /opt/antelo
rt 20 0 3749M 264M 5696 S 5.9 1.7 4:08.64 /usr/bin/gno
setrouble 20 0 374M 66328 11544 S 5.9 0.4 0:00.09 /usr/bin/pyt
rt 20 0 460M 97592 6076 S 3.3 0.6 6h30:18 /opt/antelo
rt 20 0 119M 2520 1496 R 3.3 0.0 0:00.47 http
dbus 20 0 70076 3828 1888 S 2.6 0.0 6:12.60 /usr/bin/dbu
root 20 0 387M 4564 3224 S 2.0 0.0 2:22.54 /usr/libexec
rt 20 0 412M 112M 7748 S 2.0 0.7 1h44:33 /opt/antelo
root 20 0 170M 21792 5344 S 2.0 0.1 0:24.29 /usr/sbin/xr
polkitd 20 0 605M 18068 4812 S 2.0 0.1 3:10.58 /usr/lib/pol
rt 20 0 273M 13264 6736 S 2.0 0.1 1:02.86 /opt/antelo
root 20 0 387M 4564 3224 S 1.3 0.0 1:22.79 /usr/libexec
rt 20 0 63804 5736 3528 S 1.3 0.0 1h29:16 orb2ringserv

p F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10

```

# Amazon Cloud

## Overview & Glossary

- AWS = Amazon Web Services
- EC2 = Elastic Cloud 2
- Instance = Virtual Machine
- AMI = Amazon Machine Image
- HVM = Hardware Virtual Machine (Xen)
- Region = Geographical region
- Availability Zones = Datacenters

Amazon Virtualization is based on the Xen Hypervisor but recently moving to KVM



<https://www.infrastructure.aws>

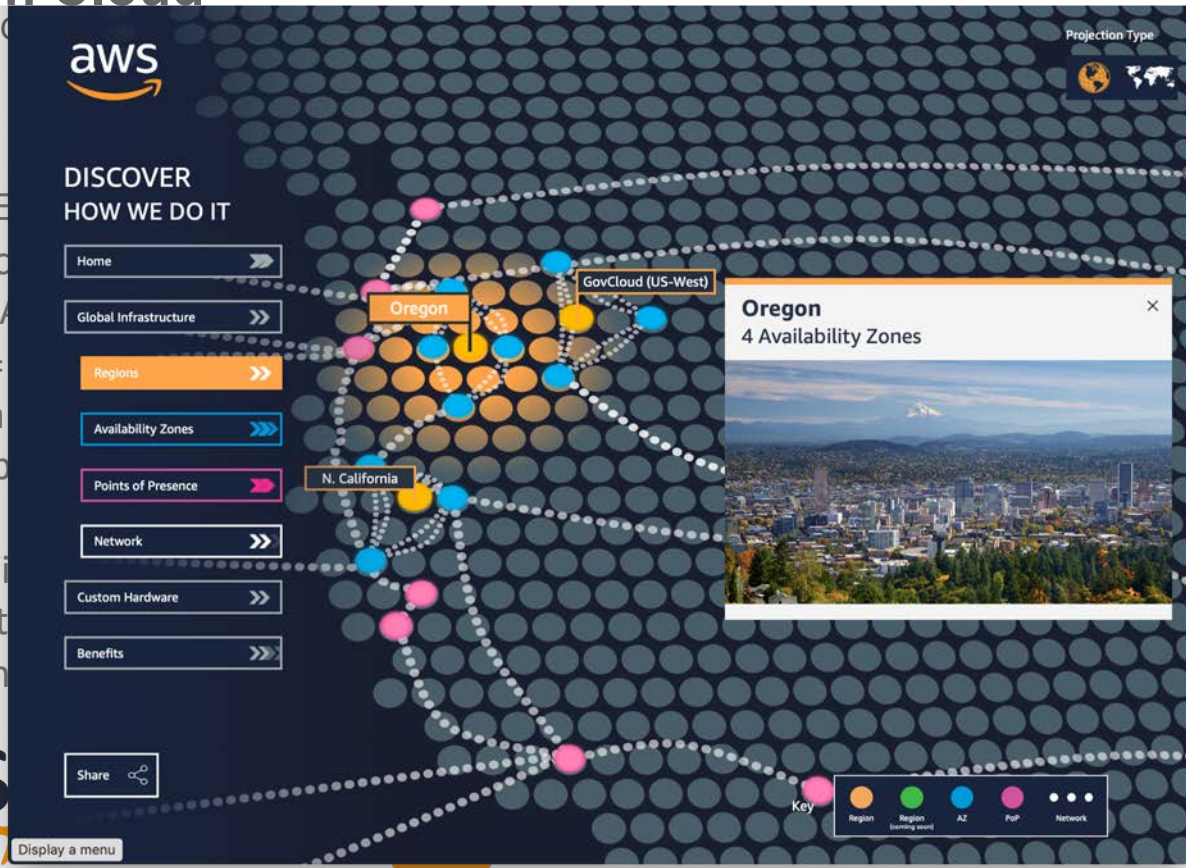


# Amazon Cloud

Overview & C

- AWS =
- EC2 = E
- Instance
- AMI = A
- HVM =
- Region
- Availab

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structure.aws

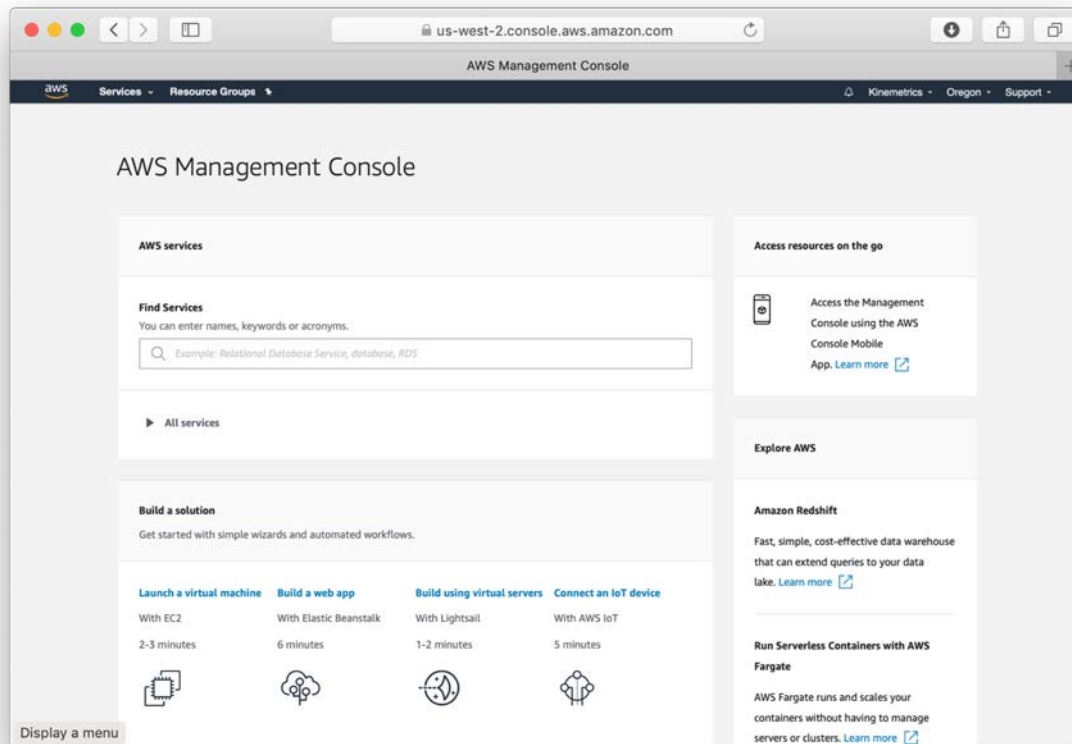


# AWS Management Console

## Installation and Management

10

- Not a system console (terminal) in the common sense
- Web based
- Solution driven
- Wizards

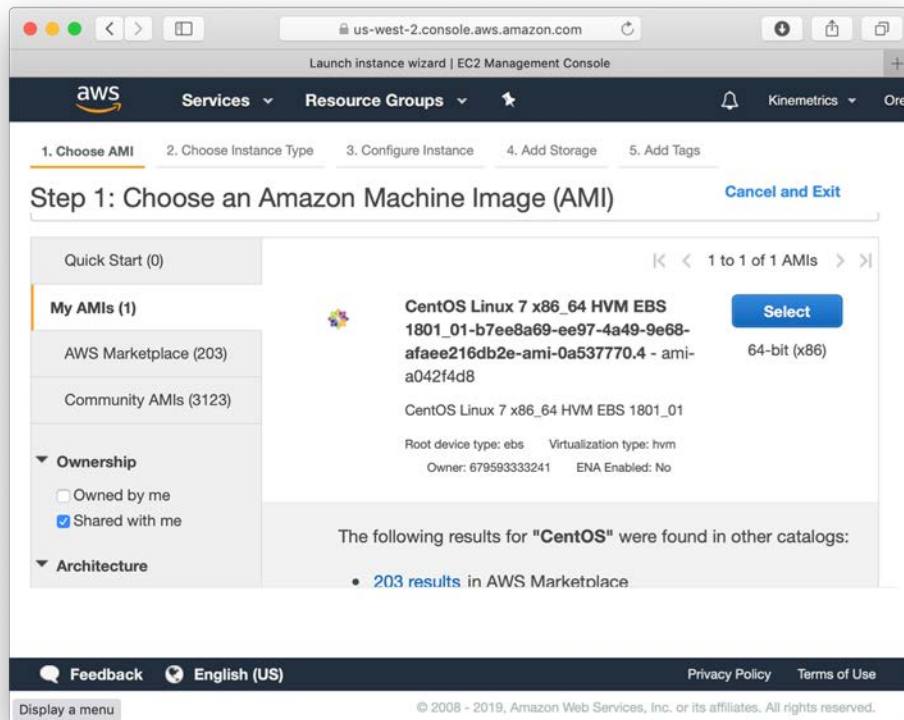


# Installation

## Operating System selection

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- Virtual Machine Image
- Ready to start
- RHEL7 or CentOS7
- No traditional installation
- No console GUI or terminal



# Installation

## Instance Type selection

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- Hundreds of instances types
- For different workloads in
- 5 Groups
  - General Purpose
  - Memory Optimized
  - Accelerated Computing
  - Storage Optimized
- Differ by
  - Processor type
  - # vCPUs
  - Memory
  - I/O bandwidth

us-west-2.console.aws.amazon.com

Launch instance wizard | EC2 Management Console

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types Current generation Show/Hide Columns

Currently selected: m4.xlarge (13 ECUs, 4 vCPUs, 2.4 GHz, Intel Xeon E5-2676v3, 16 GiB memory, EBS only)

|                          | Family          | Type                           | vCPUs | Clock Speed | Memory (GiB) | Network Performance |
|--------------------------|-----------------|--------------------------------|-------|-------------|--------------|---------------------|
| <input type="checkbox"/> | General purpose | t2.nano                        | 1     | 2.4 GHz     | 0.5          | Low to Moderate     |
| <input type="checkbox"/> | General purpose | t2.micro<br>Free tier eligible | 1     | 2.5 GHz     | 1            | Low to Moderate     |
| <input type="checkbox"/> | General purpose | t2.small                       | 1     | 2.5 GHz     | 2            | Low to Moderate     |
| <input type="checkbox"/> | General purpose | t2.medium                      | 2     | 2.3 GHz     | 4            | Low to Moderate     |
| <input type="checkbox"/> | General purpose | t2.large                       | 2     | 2.3 GHz     | 8            | Low to Moderate     |

Cancel Previous Review and Launch Next: Configure Instance Details

Display a menu ck English (US) © 2008 - 2019, Amazon Web Services, Inc. or its affiliates. All rights reserved. Privacy Policy Terms of Use

# Installation

## Instance Type selection

- M4 = Balanced performance
- Up to 64 vCPU & 256G Mem
- Similar to proven hardware used by Kinometrics
- Reasonable pricing

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## General Purpose

| A1                                                                                                                       | T3    | T3a       | T2       | M5                             | M5a                 | M4 |  |
|--------------------------------------------------------------------------------------------------------------------------|-------|-----------|----------|--------------------------------|---------------------|----|--|
| M4 instances provide a balance of compute, memory, and network resources, and it is a good choice for many applications. |       |           |          |                                |                     |    |  |
| <b>Features:</b>                                                                                                         |       |           |          |                                |                     |    |  |
| ◦ 2.3 GHz Intel Xeon® E5-2686 v4 (Broadwell) processors or 2.4 GHz Intel Xeon® E5-2676 v3 (Haswell) processors           |       |           |          |                                |                     |    |  |
| ◦ EBS-optimized by default at no additional cost                                                                         |       |           |          |                                |                     |    |  |
| ◦ Support for Enhanced Networking                                                                                        |       |           |          |                                |                     |    |  |
| ◦ Balance of compute, memory, and network resources                                                                      |       |           |          |                                |                     |    |  |
| Model                                                                                                                    | vCPU* | Mem (GiB) | Storage  | Dedicated EBS Bandwidth (Mbps) | Network Performance |    |  |
| m4.large                                                                                                                 | 2     | 8         | EBS-only | 450                            | Moderate            |    |  |
| m4.xlarge                                                                                                                | 4     | 16        | EBS-only | 750                            | High                |    |  |
| m4.2xlarge                                                                                                               | 8     | 32        | EBS-only | 1,000                          | High                |    |  |
| m4.4xlarge                                                                                                               | 16    | 64        | EBS-only | 2,000                          | High                |    |  |
| m4.10xlarge                                                                                                              | 40    | 160       | EBS-only | 4,000                          | 10 Gigabit          |    |  |
| m4.16xlarge                                                                                                              | 64    | 256       | EBS-only | 10,000                         | 25 Gigabit          |    |  |

# Installation

## Instance Type selection

- M4 = Balanced performance
- Up to 64 vCPU & 256G Mem
- Similar to proven hardware used by Kinemetrics
- Reasonable pricing

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### General Purpose



# AWS Management Console

## Instances

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The screenshot shows the AWS Management Console interface for the 'us-west-2' region. The top navigation bar includes the AWS logo, 'Services', 'Resource Groups', and a search icon. The main header indicates 'Instances | EC2 Management Console'. The left sidebar contains navigation links for 'EC2 Dashboard', 'Events', 'Tags', 'Reports', 'Limits', 'INSTANCES', 'Launch Templates', 'Spot Requests', 'Reserved Instances', 'Dedicated Hosts', 'Scheduled Instances', 'Capacity Reservations', 'IMAGES', 'AMIs', and 'Bundle Tasks'. The main content area displays a table of instances with columns: Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, and Public DNS (IPv4). One instance, 'Antelope Demo', is selected. Below the table, the details for this instance are shown, including its ID, Elastic IP, and various tabs for Description, Status Checks, Monitoring, Tags, and Usage Instructions. The footer of the console displays 'Display a menu', 'English (US)', and copyright information for Amazon Web Services, Inc. or its affiliates.

| Name          | Instance ID     | Instance Type | Availability Zone | Instance State | Status Checks     | Alarm Status | Public DNS (IPv4)        |
|---------------|-----------------|---------------|-------------------|----------------|-------------------|--------------|--------------------------|
| Antelope Demo | i-09358a6b8e... | m4.xlarge     | us-west-2c        | running        | 2/2 checks passed | None         | ec2-54-70-42-80.us-we... |

Instance: **i-09358a6b8ed0d7d19 (Antelope Demo)** Elastic IP: 54.70.42.80

**Description** | Status Checks | Monitoring | Tags | Usage Instructions

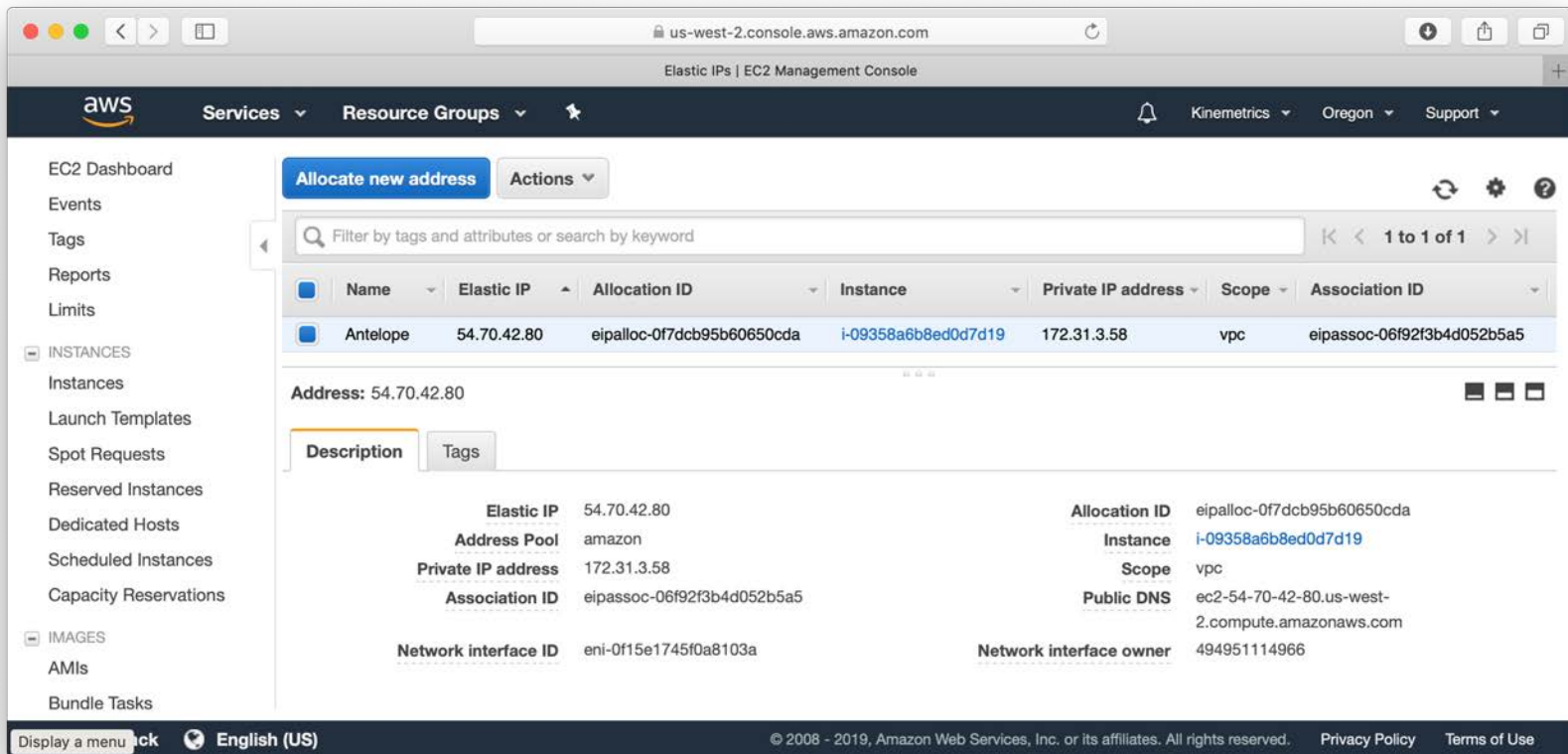
Instance ID: i-09358a6b8ed0d7d19

Public DNS (IPv4): ec2-54-70-42-80.us-west-2.compute.amazonaws.com

# AWS Management Console

## Elastic IP

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us-west-2.console.aws.amazon.com

Elastic IPs | EC2 Management Console

Services Resource Groups

EC2 Dashboard  
Events  
Tags  
Reports  
Limits

INSTANCES

Instances  
Launch Templates  
Spot Requests  
Reserved Instances  
Dedicated Hosts  
Scheduled Instances  
Capacity Reservations

IMAGES

AMIs  
Bundle Tasks

**Allocate new address** Actions

Filter by tags and attributes or search by keyword

1 to 1 of 1

| Name     | Elastic IP  | Allocation ID              | Instance            | Private IP address | Scope | Association ID             |
|----------|-------------|----------------------------|---------------------|--------------------|-------|----------------------------|
| Antelope | 54.70.42.80 | eipalloc-0f7dcb95b60650cda | i-09358a6b8ed0d7d19 | 172.31.3.58        | vpc   | eipassoc-06f92f3b4d052b5a5 |

Address: 54.70.42.80

Description Tags

|                      |                            |                         |                                                 |
|----------------------|----------------------------|-------------------------|-------------------------------------------------|
| Elastic IP           | 54.70.42.80                | Allocation ID           | eipalloc-0f7dcb95b60650cda                      |
| Address Pool         | amazon                     | Instance                | i-09358a6b8ed0d7d19                             |
| Private IP address   | 172.31.3.58                | Scope                   | vpc                                             |
| Association ID       | eipassoc-06f92f3b4d052b5a5 | Public DNS              | ec2-54-70-42-80.us-west-2.compute.amazonaws.com |
| Network interface ID | eni-0f15e1745f0a8103a      | Network interface owner | 494951114966                                    |

Display a menu back English (US)

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# AWS Management Console

## Elastic IP

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- Private IP = configured on VM
- Elastic IP = Assigned Public IP
- Needed for Antelope IP license
- One Elastic IP / Instance = included
- No need for ald\_proxy

The screenshot shows the AWS Management Console interface for the 'us-west-2' region. The left sidebar contains navigation links for EC2 Dashboard, Events, Tags, Reports, Limits, INSTANCES, IMAGES, and Bundle Tasks. The main content area displays the 'Elastic IPs' page with a table of allocated addresses. One address is listed for the instance 'Antelope' with a public IP of 54.70.42.80. Below the table, the 'Description' tab is active, showing details for the selected Elastic IP.

| Name     | Elastic IP  | Allocation ID              | Instance   |
|----------|-------------|----------------------------|------------|
| Antelope | 54.70.42.80 | eipalloc-0f7dcb95b60650cda | i-09358a6b |

Address: 54.70.42.80

**Description**

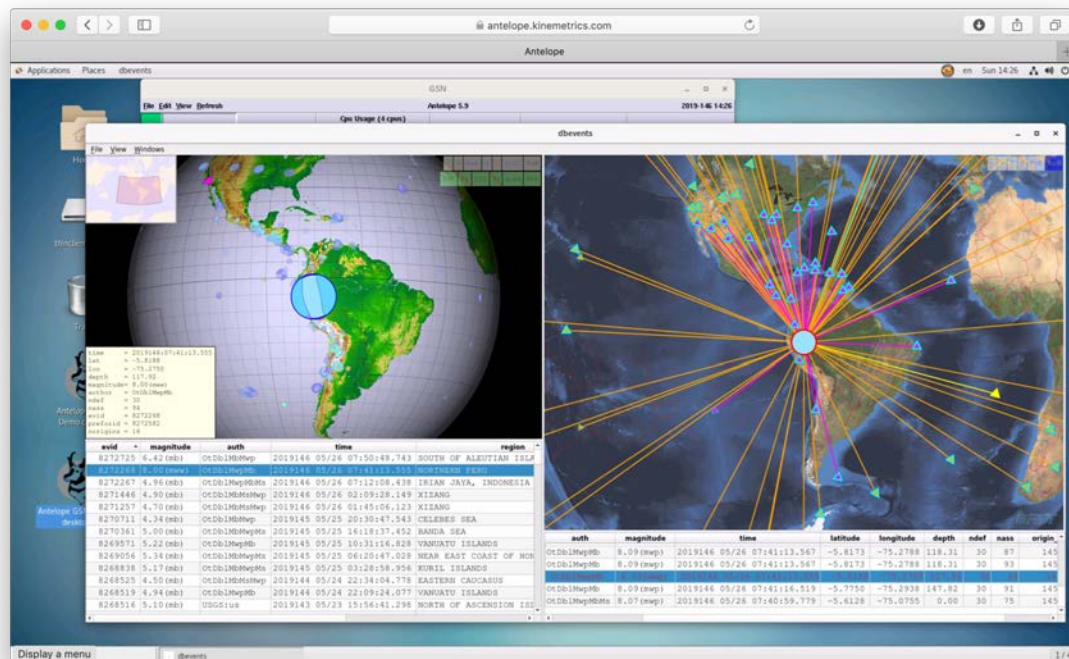
|                      |                            |
|----------------------|----------------------------|
| Elastic IP           | 54.70.42.80                |
| Address Pool         | amazon                     |
| Private IP address   | 172.31.3.58                |
| Association ID       | eipassoc-06f92f3b4d052b5a5 |
| Network interface ID | eni-0f15e1745f0a8103a      |

# Antelope Cloud Demo

Antelope Real-time Systems

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- Started June 21, 2018
- Installed Antelope 5.8
  - GSN Demo
  - ANZA Demo
- Running automatically
- Daily reports
  - rtsys
  - rtreport
- Upgraded to 5.9 in May 2019

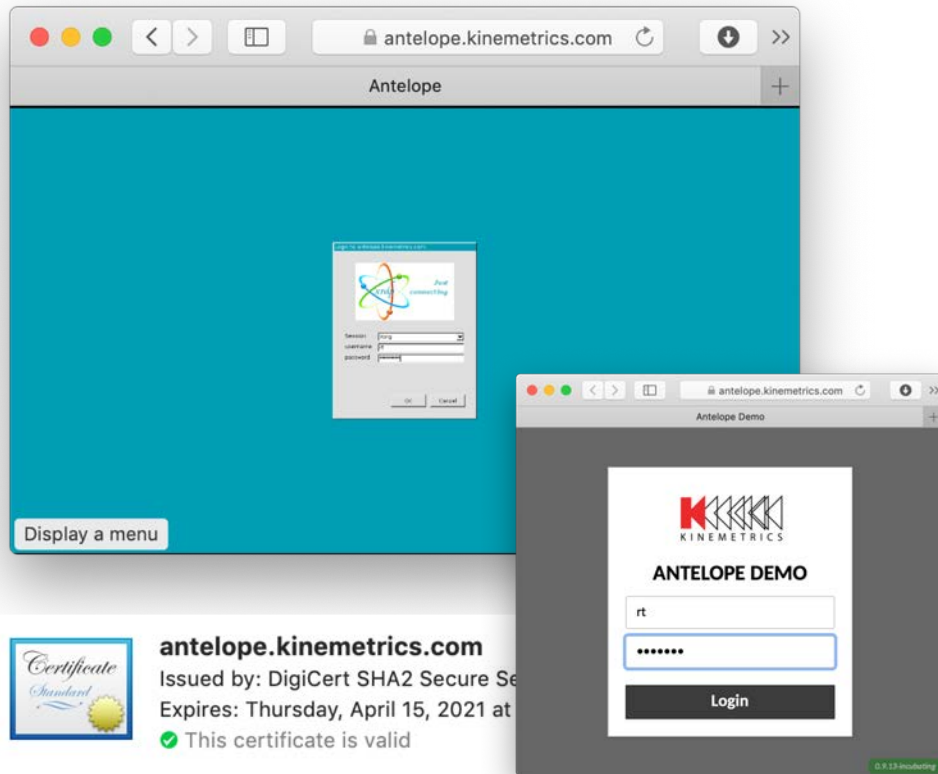


# Antelope Cloud Demo

## Remote Access

- Remote desktop (RDP protocol)
- Based on xrdp from EPEL7
- Clients for Windows, Mac & Linux
- HTTP frontend Guacamole
- Official Kinemetrics DNS name
- Only using HTTPS
- Official certificate from DigiCert

19

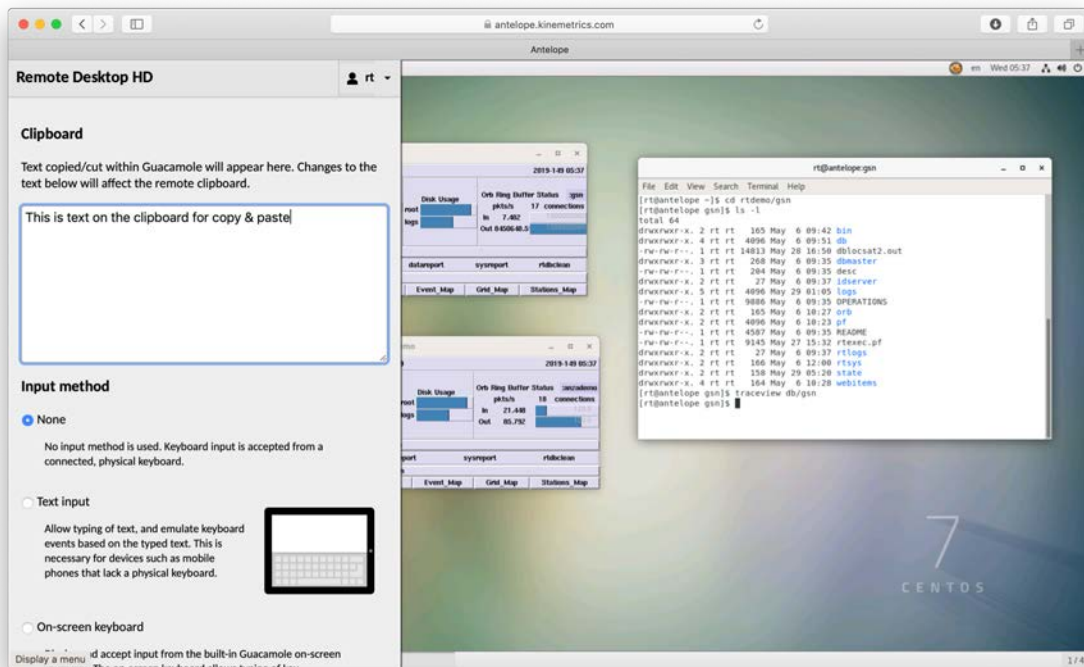


# Antelope Cloud Demo

## Guacamole

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- Apache Guacamole
- Clientless remote desktop gateway
- HTML5 web application
- Support for VNC, RDP and SSH

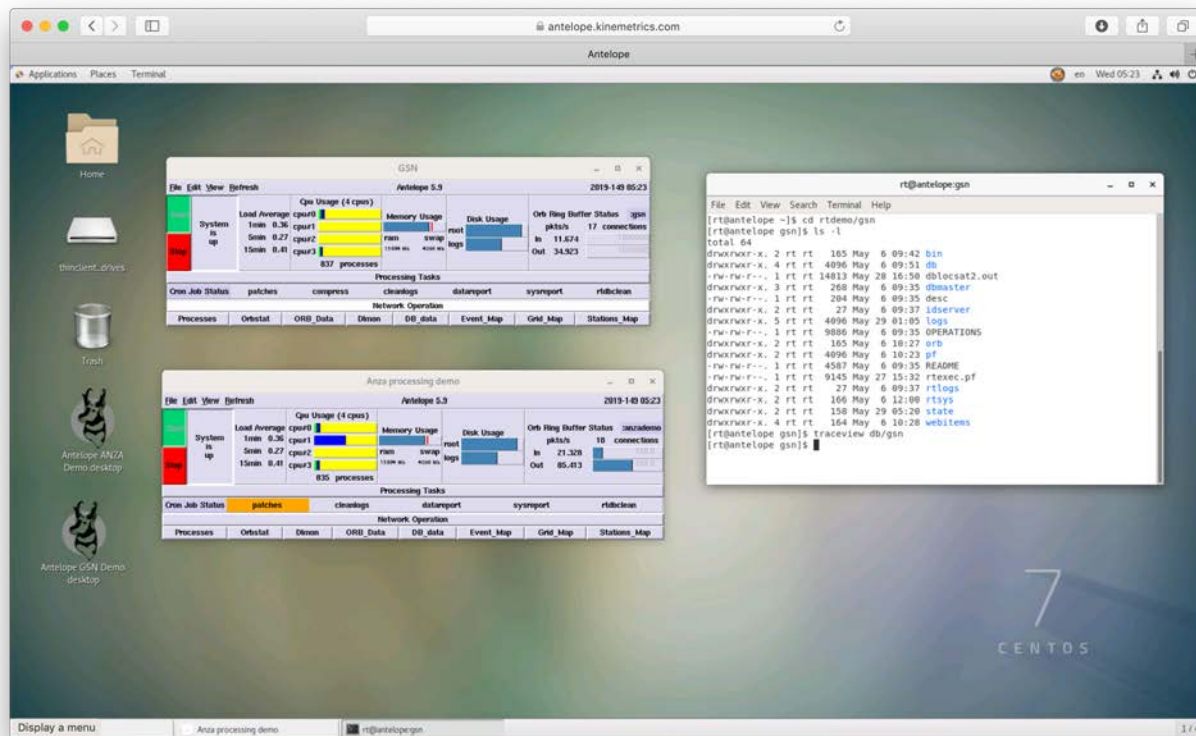


# Antelope Cloud Demo

## Virtual Desktop

21

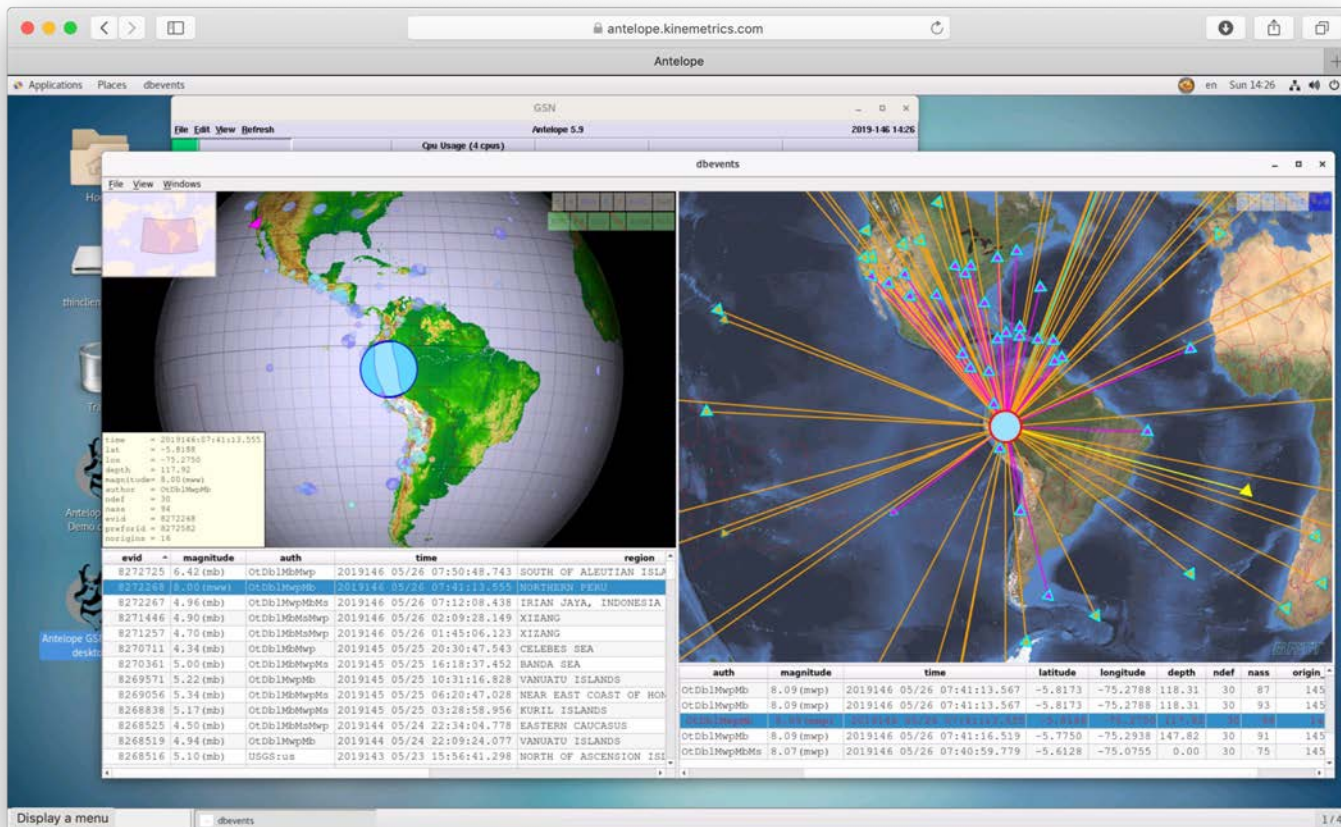
- GNOME Desktop
- Custom Icons



# Antelope Cloud Demo

## Automatic processing

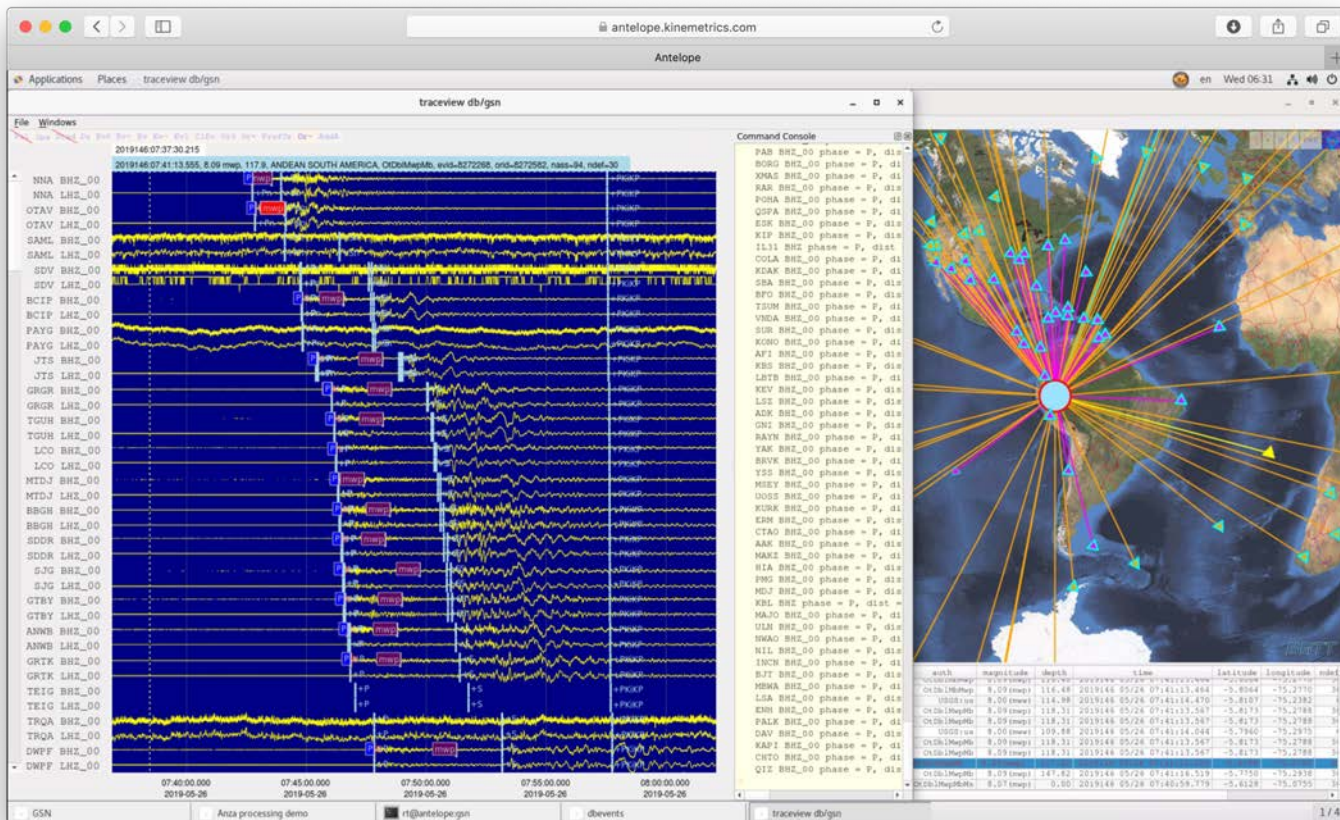
22



# Antelope Cloud Demo

## Automatic processing

23

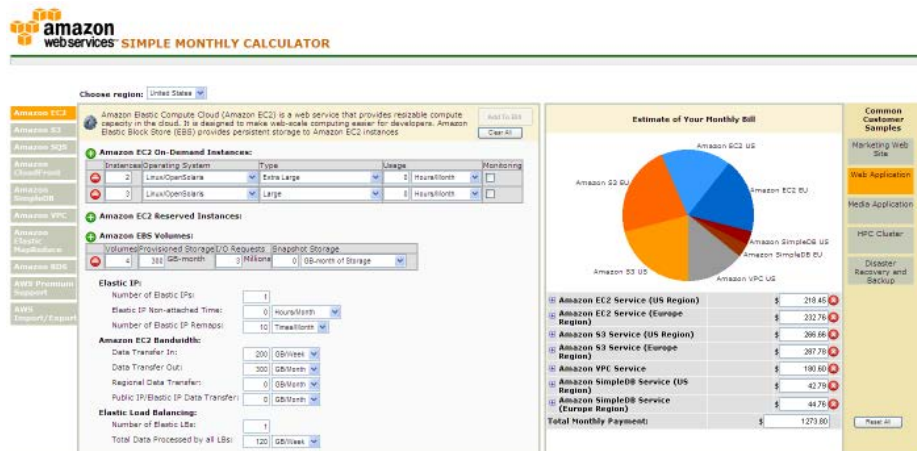


# Cost control

## Planning

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- Simple Monthly Calculator
- Estimate for operational cost
- On-demand pricing
- Reserved instances

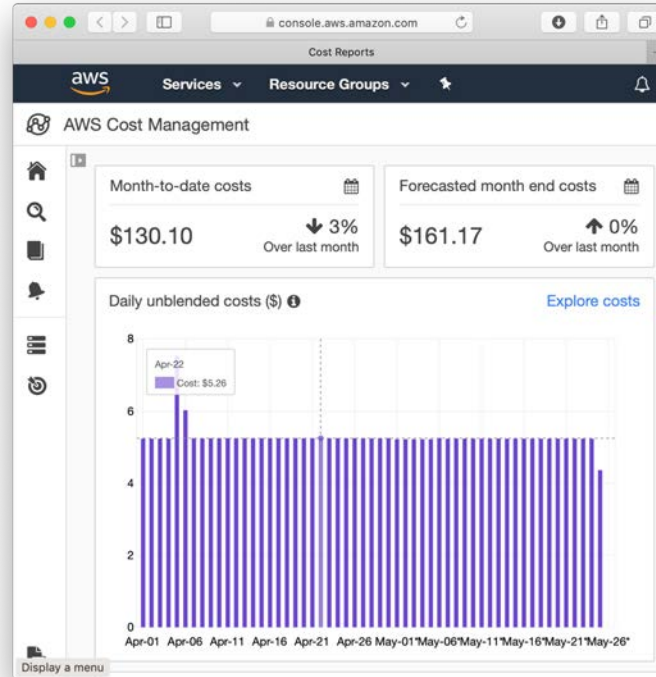


# Cost control

## Operational costs

25

- AWS Cost Explorer
- Current cost
- Monthly/Daily cost
- History
- Trend/Forecast



# Antelope Cloud Processing

## Security

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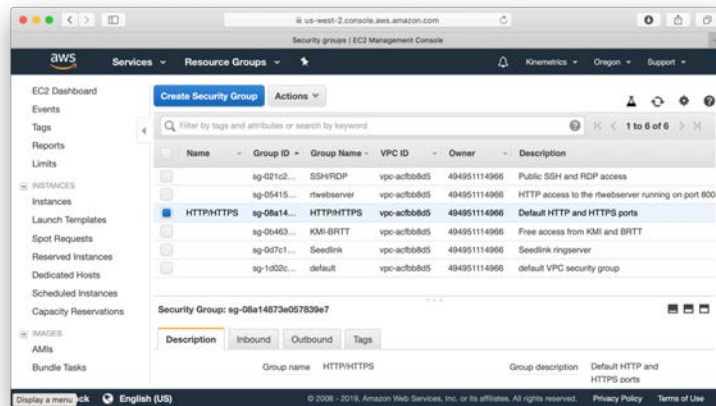
- AWS security measures
- EC2 Security Groups
- Linux firewalled
- SELinux (Security Enhanced Linux)
- Secure SSL configuration
- Software updates!
- Open Source Tripwire®
- Monitoring (Zabbix)
- SSH Public Key Authentication



SELinux



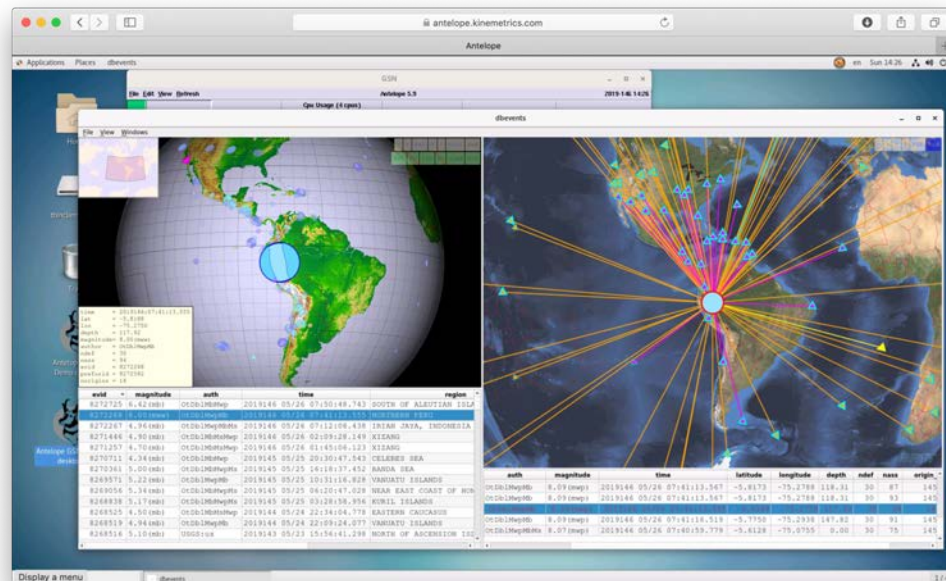
Open Source Tripwire®



# Antelope Cloud Processing Challenges

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- Credit Card required
- Cost control
- Network bandwidth
- Resource hungry GUI
- Traditional storage model
- Remote access integration
- Security



```
smr:~ smr$ ssh root@antelope.kinematics.com
Last failed login: Sun May 26 12:22:58 UTC 2019 from 218.92.0.209 on ssh:notty
There were 91256 failed login attempts since the last successful login.
Last login: Mon May 20 11:31:36 2019 from 213-225-1-165.nat.highway.a1.net
[root@antelope ~]#
```

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# Antelope Cloud Demo

## Links and References

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- Antelope Cloud Demo <https://antelope.kinematics.com>
- Amazon Web Services (AWS) <https://aws.amazon.com>
- xrdp <http://www.xrdp.org>
- Apache Guacamole <http://guacamole.apache.org>
- Zabbix <https://www.zabbix.com>
- Open Source Tripwire <https://github.com/Tripwire/tripwire-open-source>