

Linux Server Virtualization

INTRODUCTION TO VIRTUALIZATION



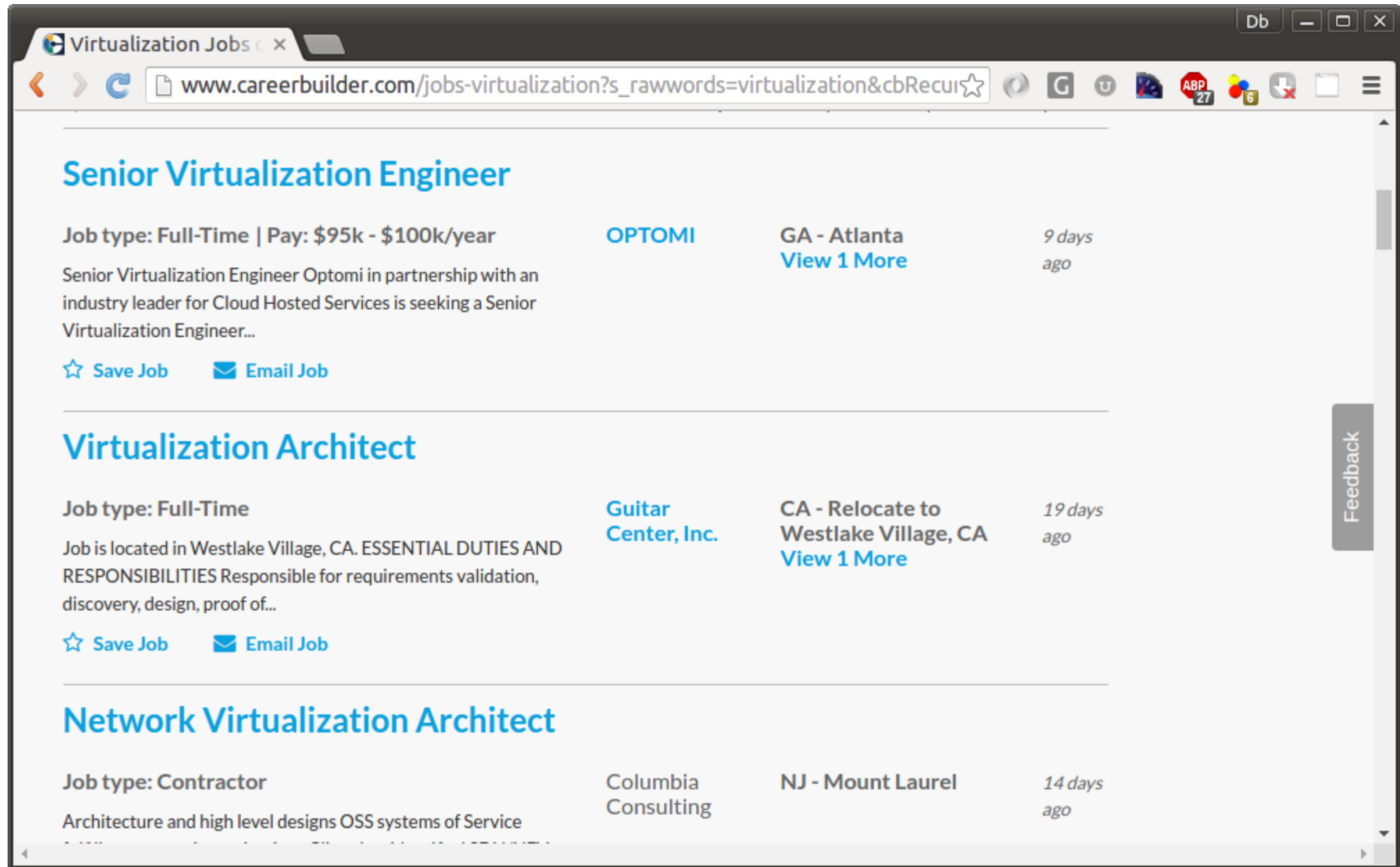
David Clinton

LINUX SYSTEM ADMINISTRATOR

@davidbclinton | bootstrap-it.com | linkedin.com/in/dbclinton/

Introduction to Virtualization

Virtualization Jobs



The screenshot shows a web browser window with the CareerBuilder website. The address bar shows the URL: www.careerbuilder.com/jobs-virtualization?s_rawwords=virtualization&cbRecu. The page displays three job listings for virtualization roles. Each listing includes the job title, job type, pay, company name, location, and a 'View 1 More' link. There are also 'Save Job' and 'Email Job' buttons for each listing. The browser's taskbar at the top shows various icons, including a clock, a search bar, and several application icons. A 'Feedback' button is visible on the right side of the page.

Job Title	Job Type	Pay	Company	Location	Posted
Senior Virtualization Engineer	Full-Time	\$95k - \$100k/year	OPTOMI	GA - Atlanta	9 days ago
Virtualization Architect	Full-Time		Guitar Center, Inc.	CA - Relocate to Westlake Village, CA	19 days ago
Network Virtualization Architect	Contractor		Columbia Consulting	NJ - Mount Laurel	14 days ago

Virtualization
Platforms

Hypervisor Platforms:

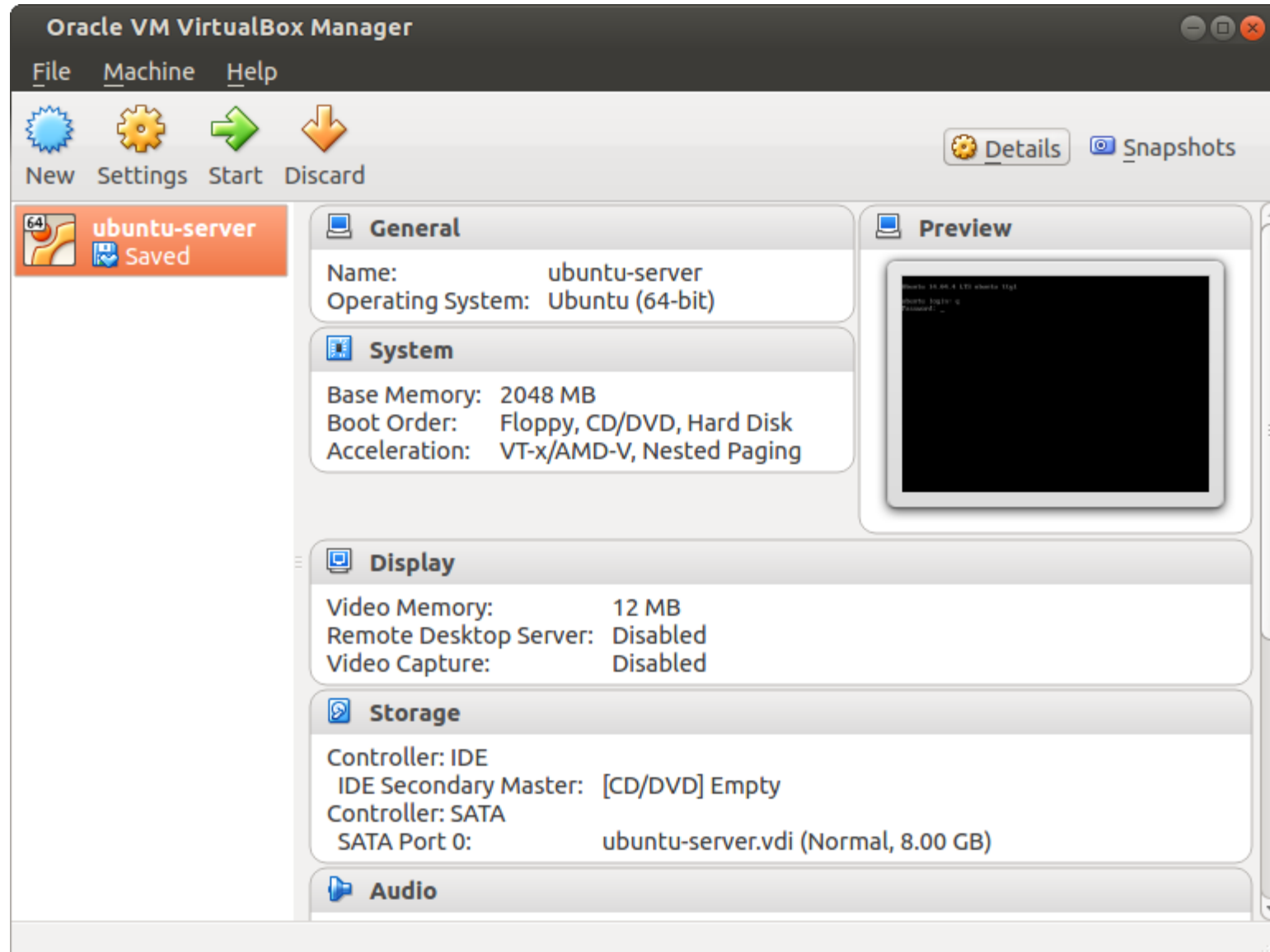
libvirt

Xen

KVM

Container Technologies:

VirtualBox



Virtualization
Platforms

Hypervisor Platforms:

libvirt

Xen

KVM

Container Technologies:

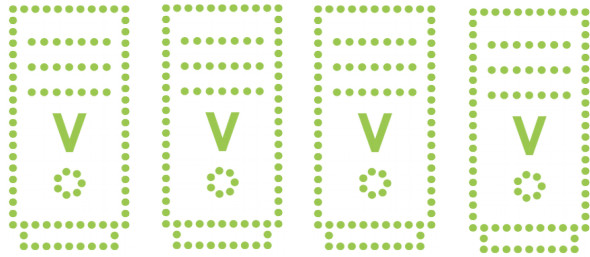
OpenVZ

LXC

Docker

VirtualBox

IT
Demand
Load
(September)



Student Enrollment Servers

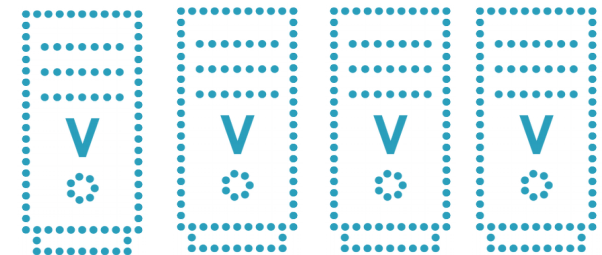


Moodle LMS Server

IT
Demand
Load
(April)



Student Enrollment Server



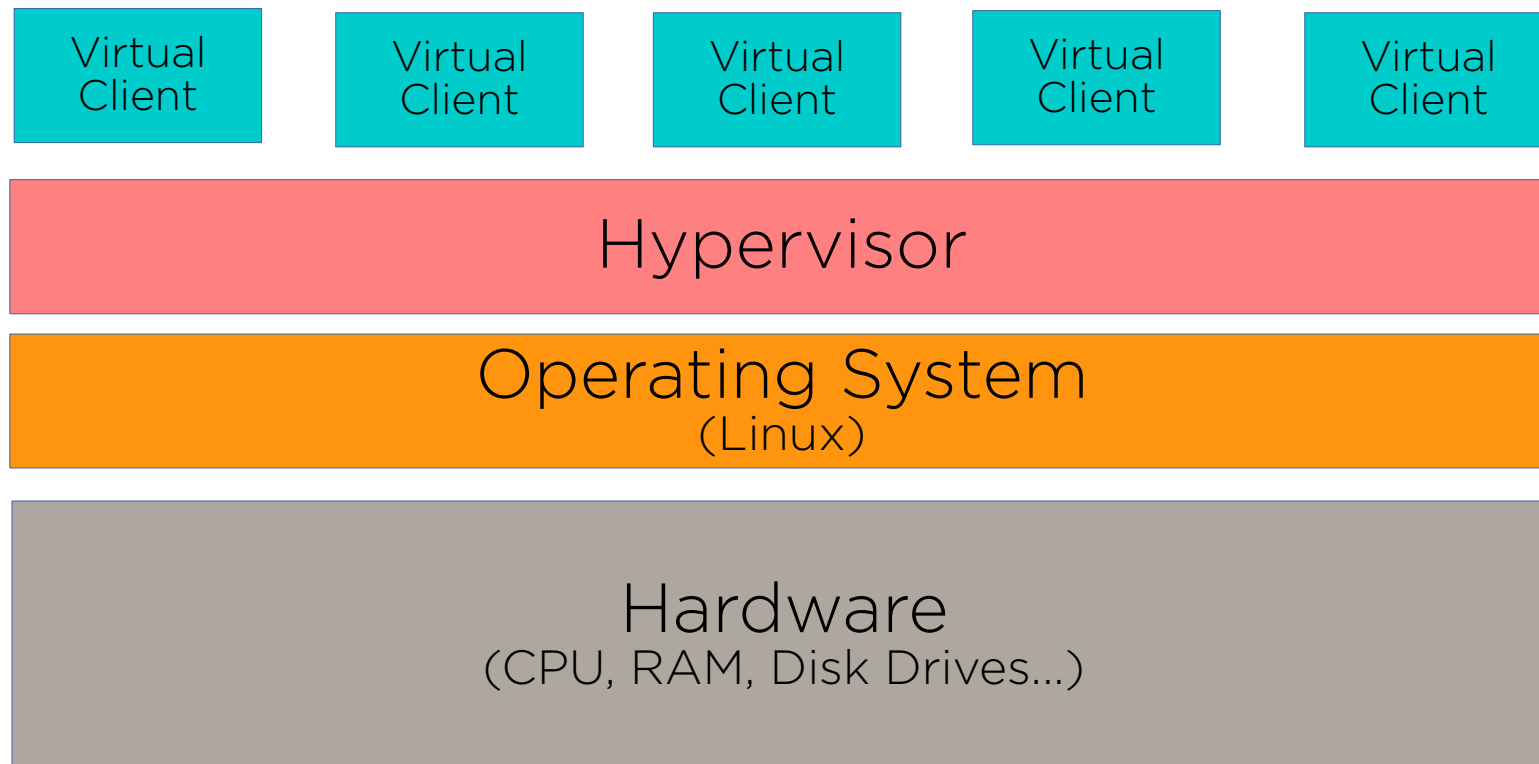
Moodle LMS Servers

Try
everything
yourself!

```
dbclinton@DCWorkStation: /
File Edit View Search Terminal Help
dbclinton@DCWorkStation:/$ ls
bin    dev    initrd.img    lib32    media    proc    sbin    tmp    vmlinuz
boot   etc    initrd.img.old  lib64    mnt      root    srv     usr    vmlinuz.old
cdrom  home  lib           lost+found  opt      run     sys     var
```

Hypervisors

Hypervisor Architecture



Design
Considerations

- Fault isolation

Design
Considerations

- Fault isolation
- Performance isolation

Design
Considerations

- Fault isolation
- Performance isolation
- Consistency

Design
Considerations

- Fault isolation
- Performance isolation
- Consistency
- Server sprawl control

Hypervisor
Categories:

Type-1

Type-2

Hypervisor
Categories:

Type-1

"Bare-metal"

Xen

ESXi (vSphere)

Type-2

Hypervisor
Categories:

Type-1

"Bare-metal"

Xen

ESXi (vSphere)

Type-2

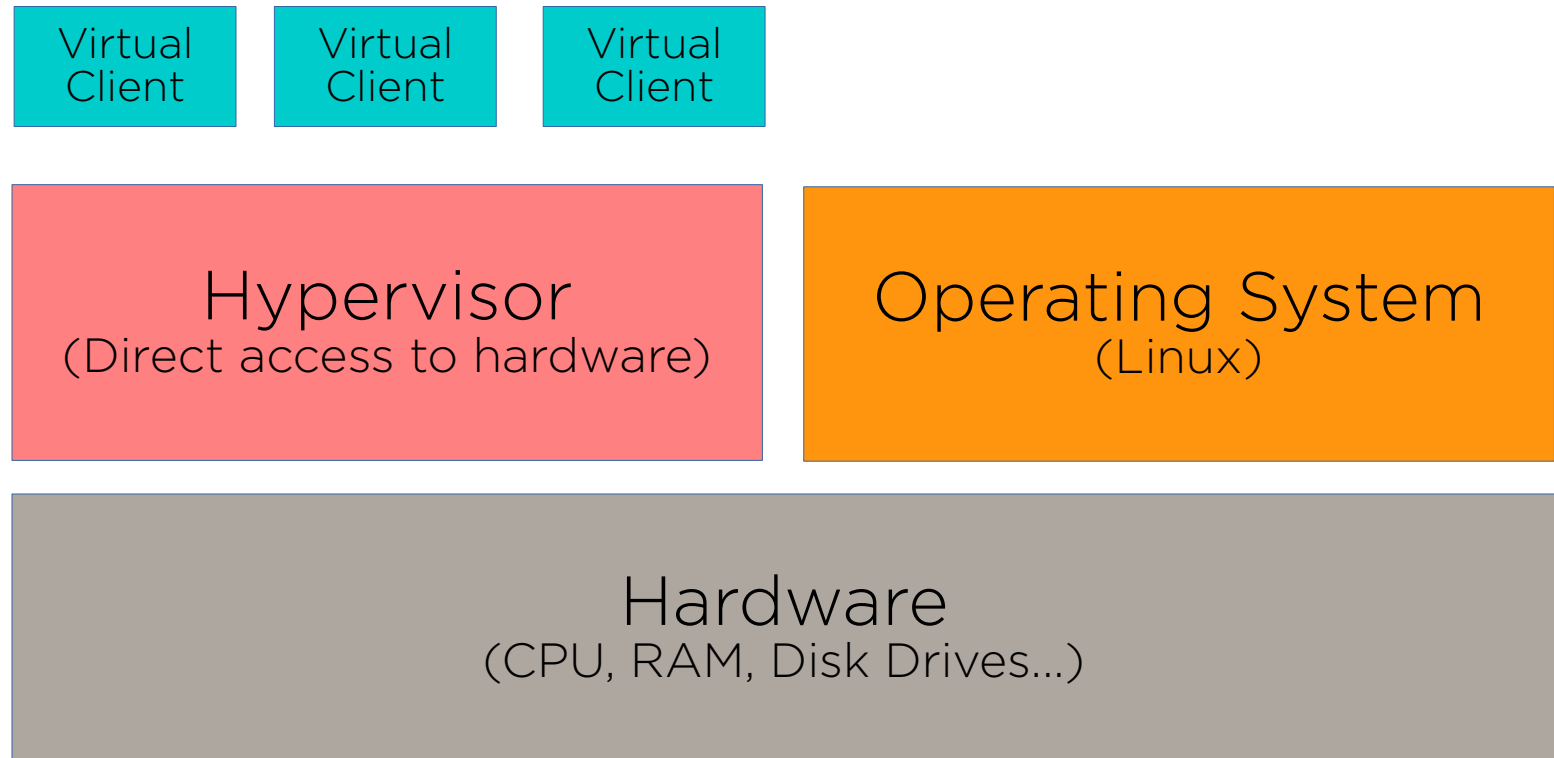
System processes

VirtualBox

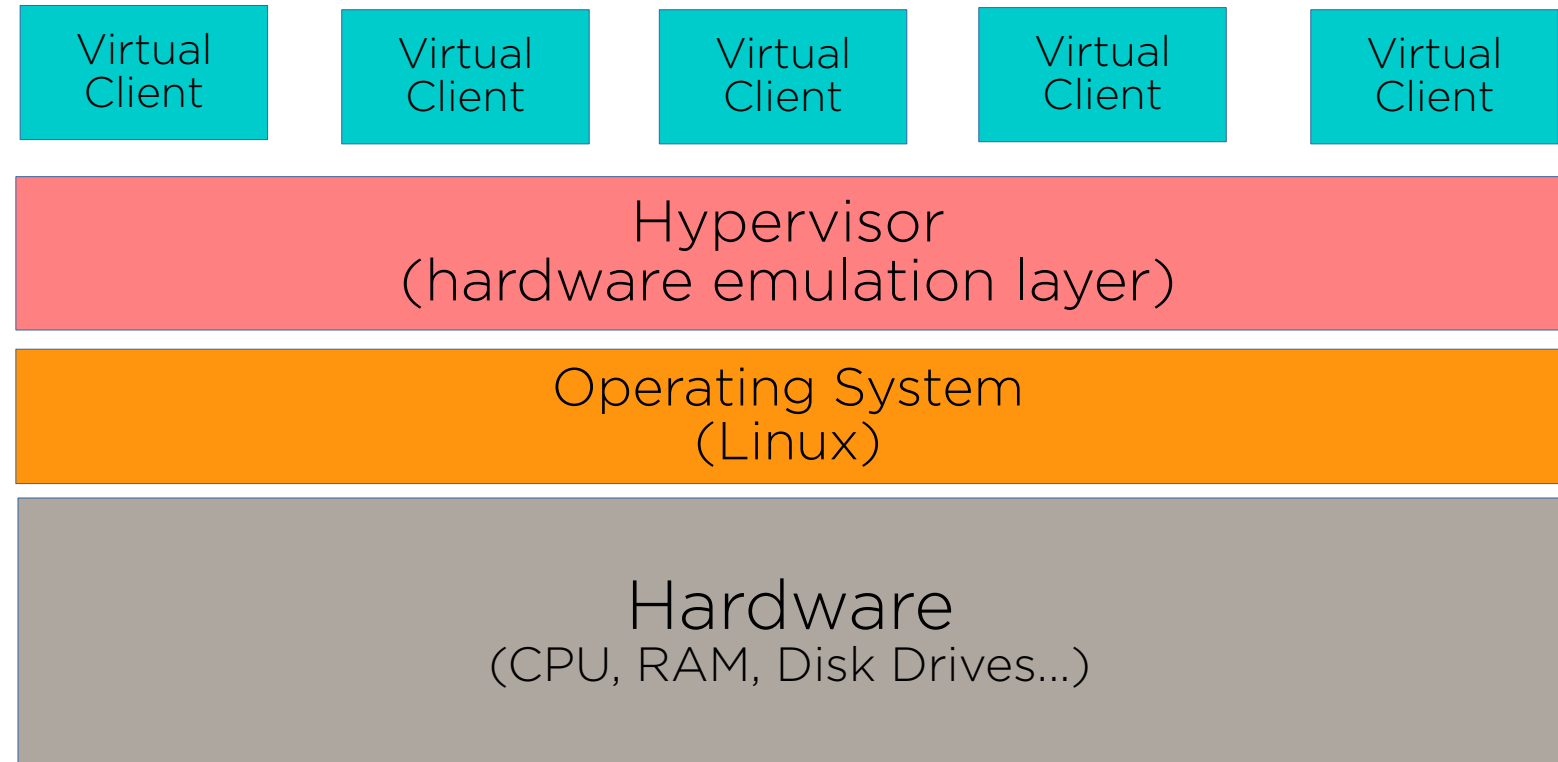
QEMU

Paravirtual (PV) vs Hardware Virtual Machines (HVM)

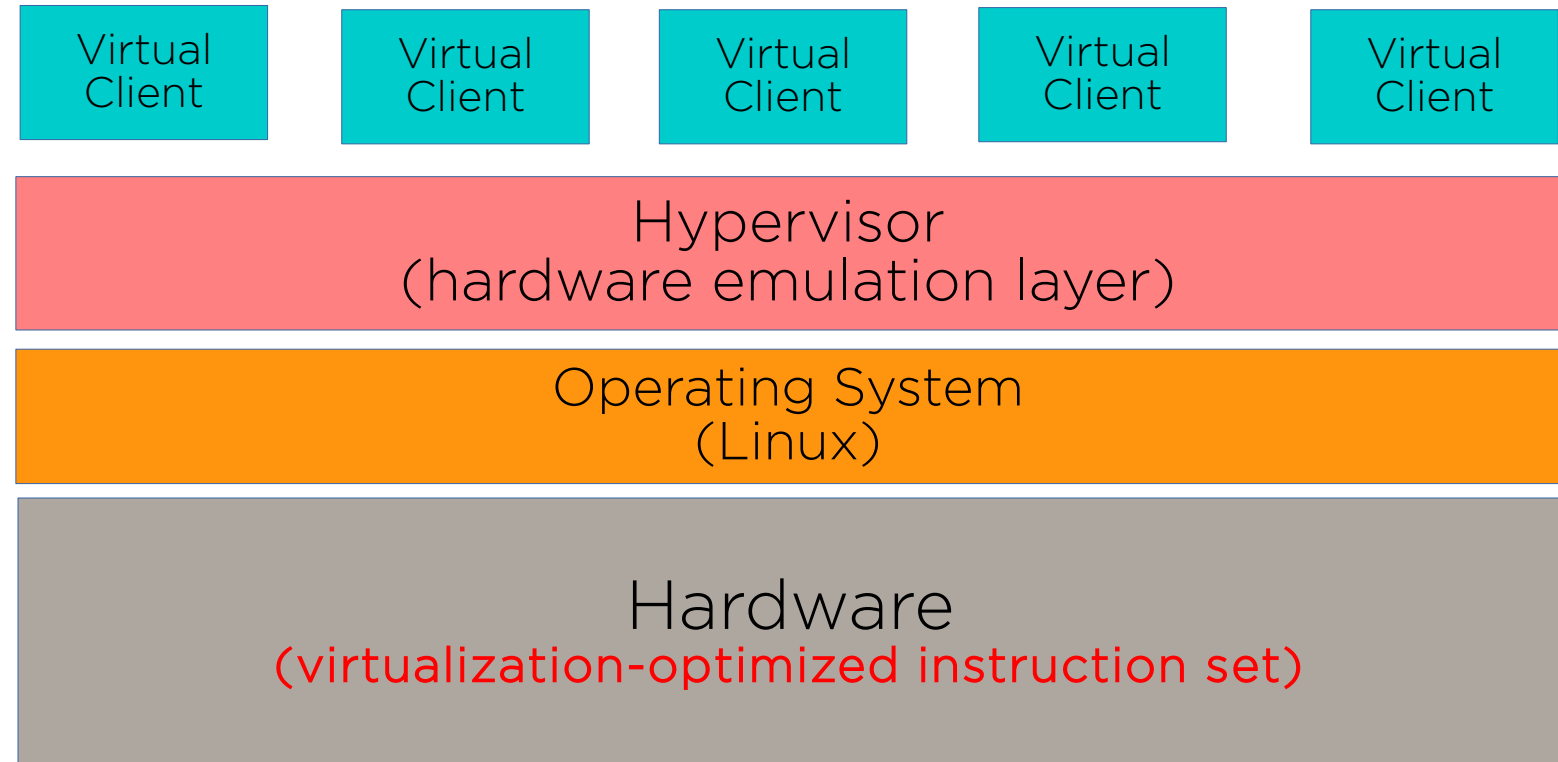
ParaVirtual
(PV)



Hardware
Virtual
Machines
(HVM)

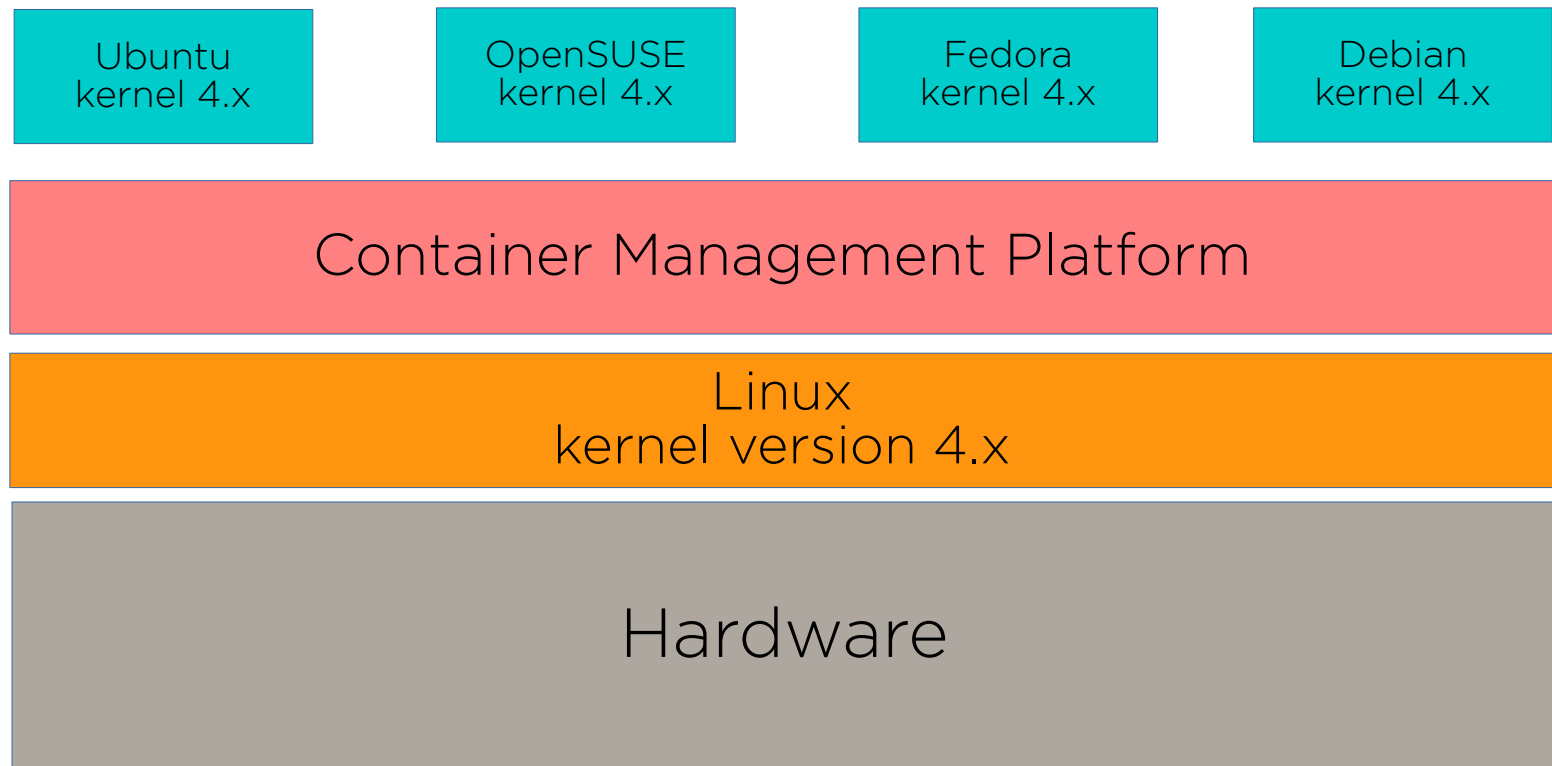


Hardware
Virtual
Machines
(HVM)

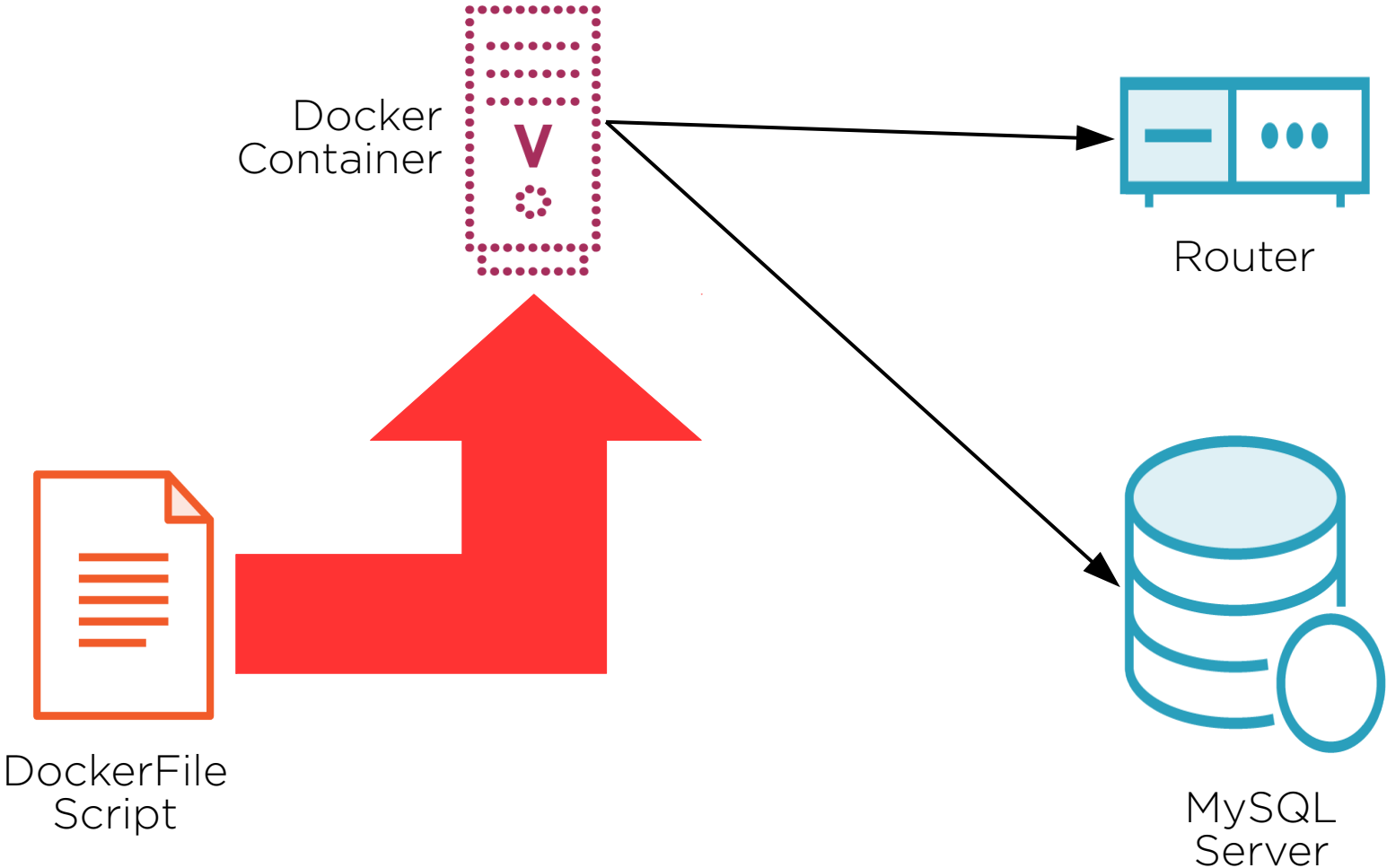


Containers

Kernel-dependent
containers



DockerFiles



Cloud Computing Models

Cloud Compute Characteristics



- Virtualized servers

Cloud Compute Characteristics

- Virtualized servers
- (Nearly) no capital expenses

Cloud Compute Characteristics

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- On-demand resources
self-service

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- Pay-per-use

Cloud Compute Characteristics

- Virtualized servers
- (Nearly) no capital expenses
- On-demand resources
self-service
- Pay-per-use
- Instant automated scaling

Virtual servers:

- Pre-loaded with the OS image of your choice
- Design your own virtual networking environment
- Set your own security policies

PaaS:
Platform as a
Service

- Fully managed infrastructure
- Controlled through scripts or templates
- You only need to add your code or design

Cloud
Compute
Models

IaaS (Infrastructure as a Service)

AWS EC2

Azure Virtual Machines

Google Compute Engine

Cloud
Compute
Models

IaaS (Infrastructure as a Service)

AWS EC2

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Google Compute Engine

PaaS (Platform as a Service)

AWS Elastic Beanstalk

Google App Engine

Cloud Foundry

Heroku

Cloud
Compute
Models

IaaS (Infrastructure as a Service)

AWS EC2

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PaaS (Platform as a Service)

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SaaS (Software as a Service)

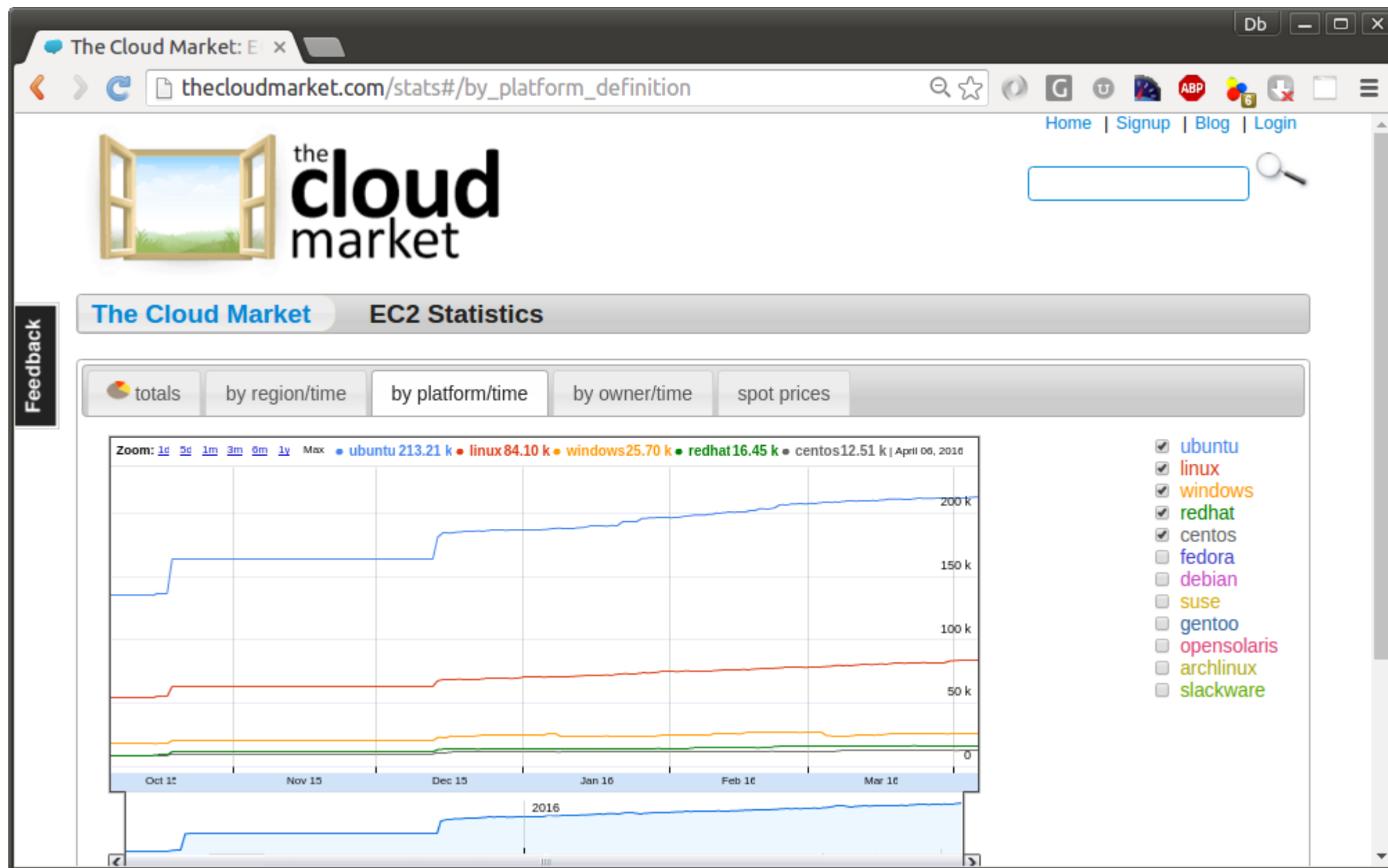
Google Apps

Salesforce

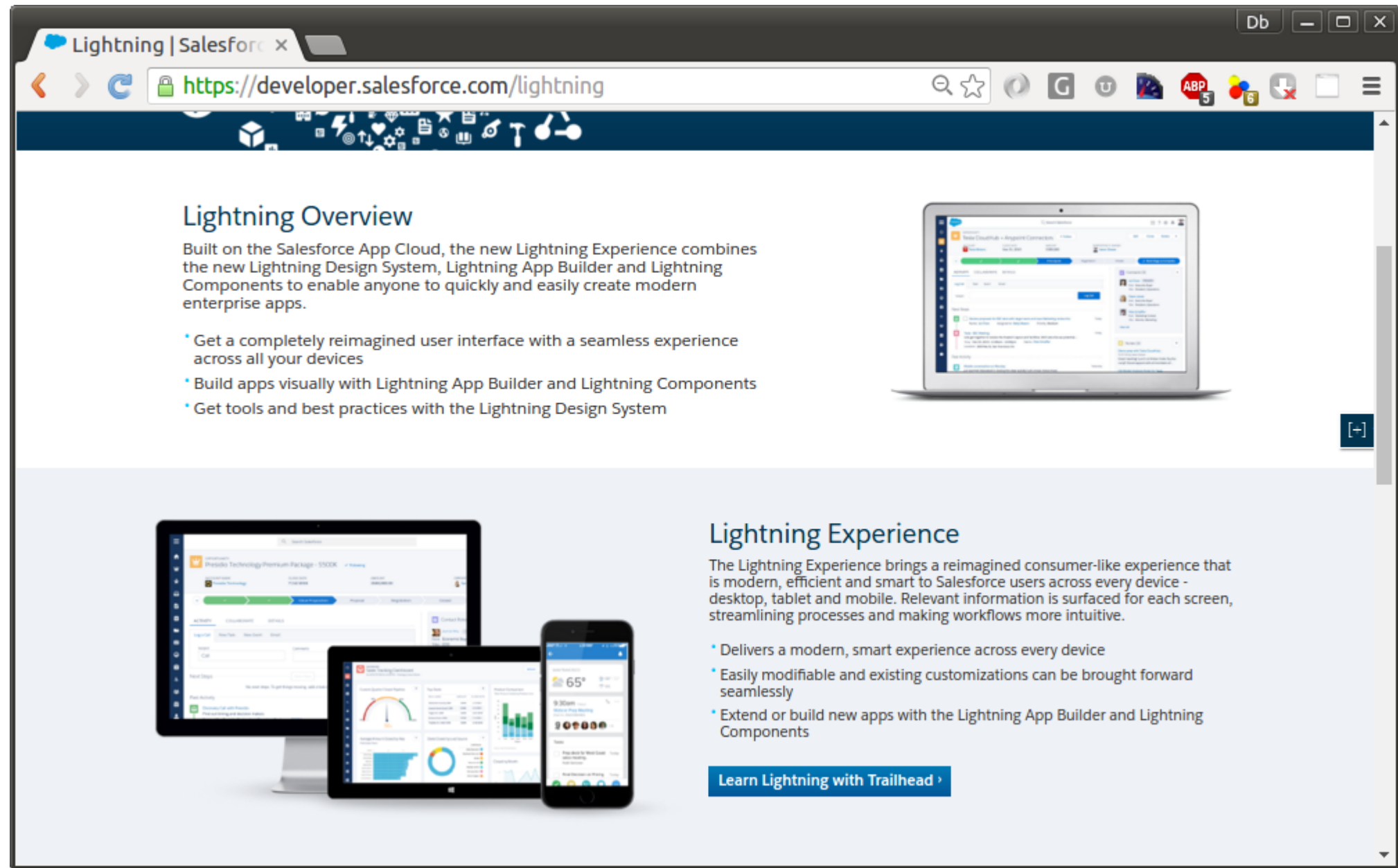
Dropbox

WordPress.com

Cloud
platform
market
share



User-
facing
PaaS
services




The screenshot shows a web browser window with the address bar displaying <https://developer.salesforce.com/lightning>. The page title is "Lightning | Salesforce". The main content area features a "Lightning Overview" section with a sub-header "Built on the Salesforce App Cloud, the new Lightning Experience combines the new Lightning Design System, Lightning App Builder and Lightning Components to enable anyone to quickly and easily create modern enterprise apps." Below this, there are three bullet points: "Get a completely reimagined user interface with a seamless experience across all your devices", "Build apps visually with Lightning App Builder and Lightning Components", and "Get tools and best practices with the Lightning Design System". To the right of the text is an image of a laptop displaying a Salesforce Lightning interface. Below the "Lightning Overview" section is a "Lightning Experience" section with a sub-header "The Lightning Experience brings a reimagined consumer-like experience that is modern, efficient and smart to Salesforce users across every device - desktop, tablet and mobile. Relevant information is surfaced for each screen, streamlining processes and making workflows more intuitive." Below this, there are three bullet points: "Delivers a modern, smart experience across every device", "Easily modifiable and existing customizations can be brought forward seamlessly", and "Extend or build new apps with the Lightning App Builder and Lightning Components". At the bottom right of the page is a blue button labeled "Learn Lightning with Trailhead".

Lightning Overview

Built on the Salesforce App Cloud, the new Lightning Experience combines the new Lightning Design System, Lightning App Builder and Lightning Components to enable anyone to quickly and easily create modern enterprise apps.

- Get a completely reimagined user interface with a seamless experience across all your devices
- Build apps visually with Lightning App Builder and Lightning Components
- Get tools and best practices with the Lightning Design System



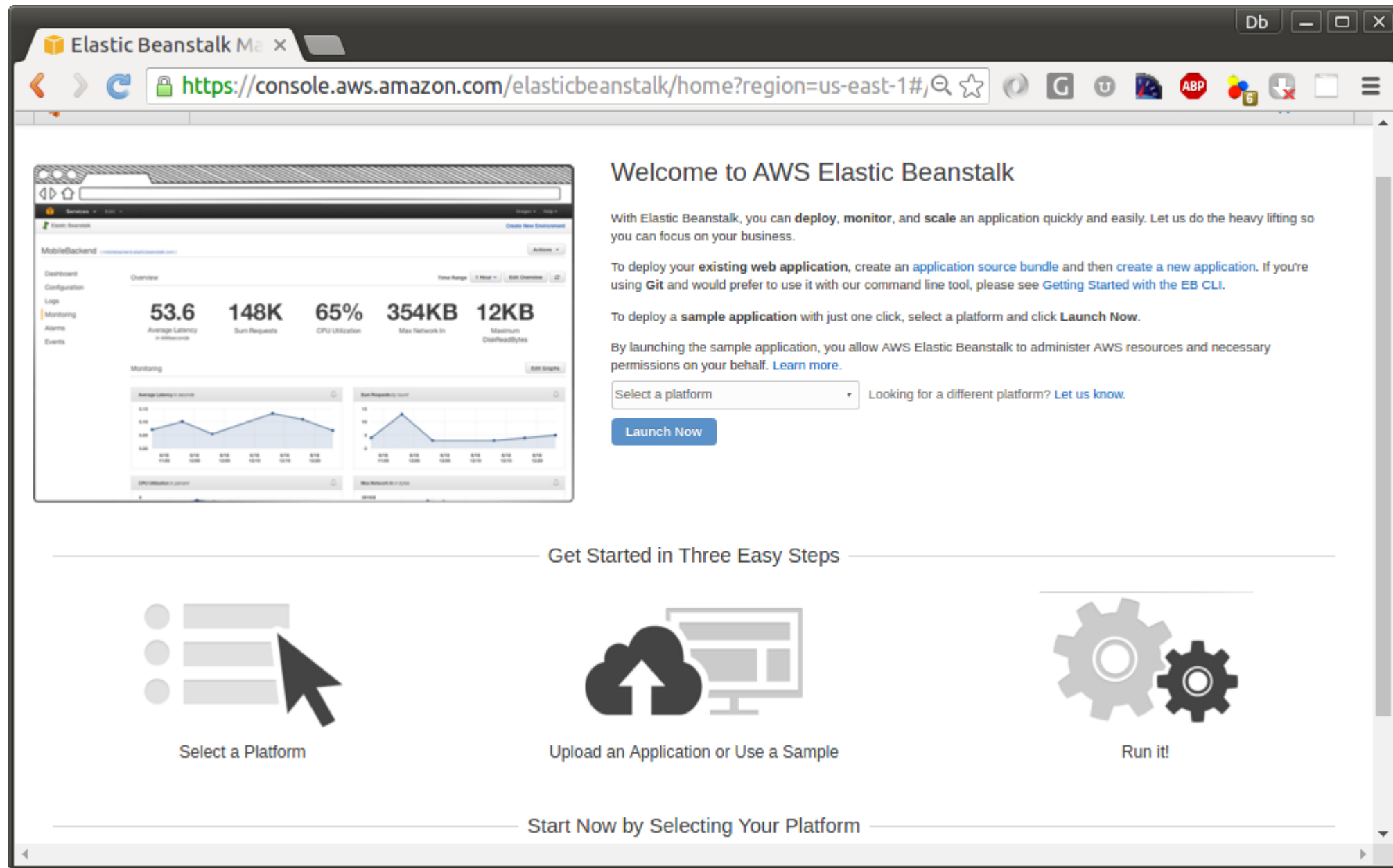
Lightning Experience

The Lightning Experience brings a reimagined consumer-like experience that is modern, efficient and smart to Salesforce users across every device - desktop, tablet and mobile. Relevant information is surfaced for each screen, streamlining processes and making workflows more intuitive.

- Delivers a modern, smart experience across every device
- Easily modifiable and existing customizations can be brought forward seamlessly
- Extend or build new apps with the Lightning App Builder and Lightning Components

[Learn Lightning with Trailhead](#)

Back-end PaaS services



The screenshot shows the AWS Elastic Beanstalk console interface. At the top, the browser address bar displays the URL <https://console.aws.amazon.com/elasticbeanstalk/home?region=us-east-1#>. The main heading is "Welcome to AWS Elastic Beanstalk". Below this, a paragraph explains that Elastic Beanstalk allows users to **deploy, monitor, and scale** an application quickly and easily. It provides instructions for deploying an existing web application by creating an application source bundle and a new application, and mentions the EB CLI for Git users. A "Launch Now" button is prominently displayed. Below the button, a "Get Started in Three Easy Steps" section is shown, with icons and text for: 1. "Select a Platform" (represented by a list icon), 2. "Upload an Application or Use a Sample" (represented by a cloud and monitor icon), and 3. "Run it!" (represented by gear icons). At the bottom, a banner reads "Start Now by Selecting Your Platform".

Welcome to AWS Elastic Beanstalk

With Elastic Beanstalk, you can **deploy, monitor, and scale** an application quickly and easily. Let us do the heavy lifting so you can focus on your business.

To deploy your **existing web application**, create an [application source bundle](#) and then [create a new application](#). If you're using **Git** and would prefer to use it with our command line tool, please see [Getting Started with the EB CLI](#).




To deploy a **sample application** with just one click, select a platform and click **Launch Now**.

By launching the sample application, you allow AWS Elastic Beanstalk to administer AWS resources and necessary permissions on your behalf. [Learn more](#).

Select a platform Looking for a different platform? [Let us know](#).

Launch Now

Get Started in Three Easy Steps

-  Select a Platform
-  Upload an Application or Use a Sample
-  Run it!

Start Now by Selecting Your Platform

Hardware Compatibility

Review

Type 1 Hypervisor (Xen, ESXi)

Type 2 Hypervisor (VirtualBox, QEMU)

Container virtualization (LXC, Docker)

IaaS (AWS EC2, Azure Virtual Machines)

PaaS (AWS Elastic Beanstalk, Salesforce.com)

SaaS (Gmail, WordPress.com)

```
cat /proc/cpuinfo | grep flags
```

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