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# Cloud Technologies

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# Ancestors (hosting)

- University/Company page/server hosting



# AWS and modern cloud computing

- 2006 - AWS EC2 (Elastic Cloud Compute)
- 2008 - Microsoft Azure

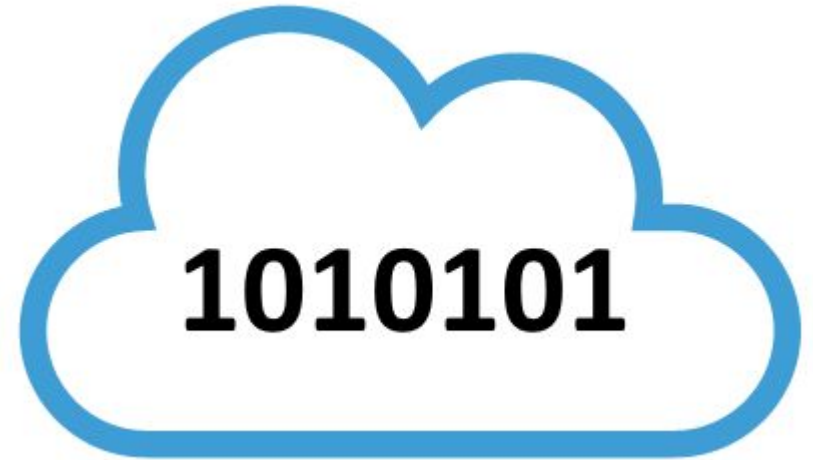
# Misconceptions

**10101**

**10011**

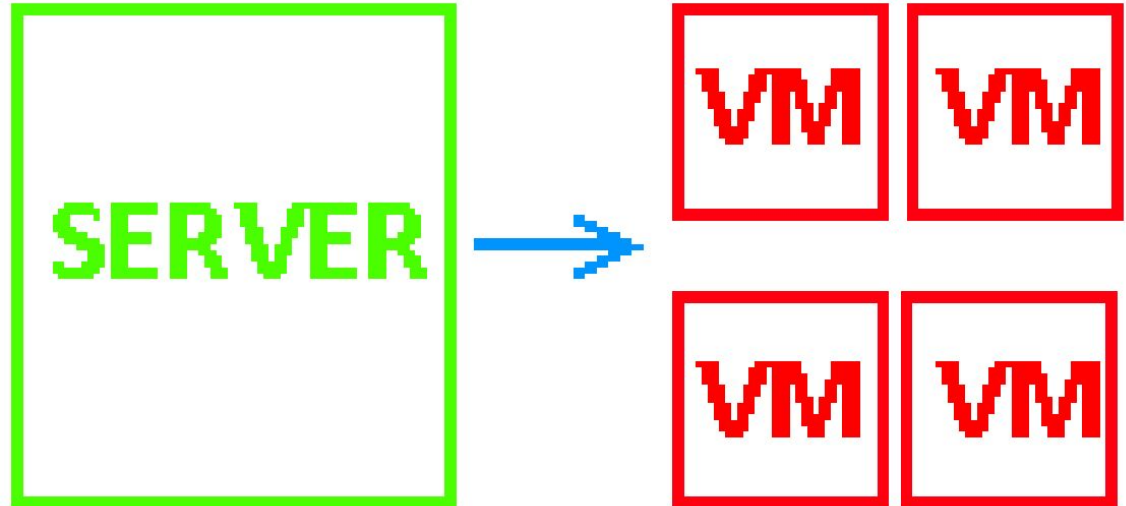
**00000**

**00000**

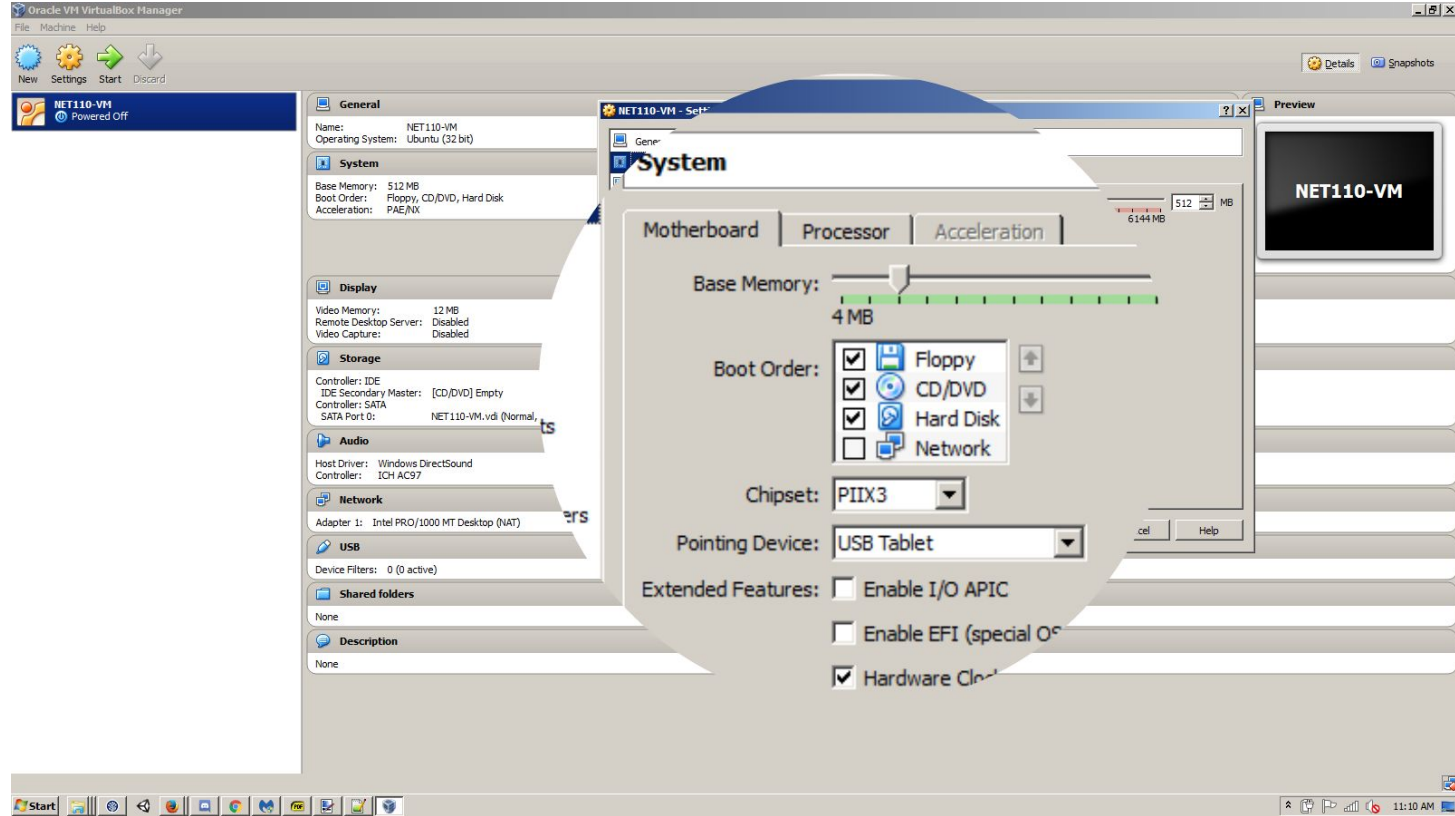


# Hosting

- Dedicated
- Shared



# Virtual Machines



# Virtual Machines (Cloud)

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases 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.

Filter by: All instance types (dropdown) Current generation (dropdown) GiB memory, EBS only (dropdown)

Currently selected	Instance type	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
<input type="checkbox"/>	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
<input checked="" type="checkbox"/>	Memory optimized	t2.micro	1	1	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.small	1	1	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.medium	1	2	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.large	1	2	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.xlarge	4	16	EBS only	-	Moderate
<input type="checkbox"/>	General purpose	t2.2xlarge	8	32	EBS only	-	Moderate
<input type="checkbox"/>	General purpose	m4.large	2	8	EBS only	Yes	Moderate
<input type="checkbox"/>	General purpose	m4.xlarge	4	16	EBS only	Yes	High

Cancel Previous **Review and Launch** Next: Configure Instance Details

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# Premade Templates



Red Hat

Free tier eligible

**Red Hat Enterprise Linux 7.3 (HVM), SSD Volume Type** - ami-6f68cf0f

Red Hat Enterprise Linux version 7.3 (HVM), EBS General Purpose (SSD) Volume Type

Root device type: ebs      Virtualization type: hvm

Select

64-bit



SUSE Linux

Free tier eligible

**SUSE Linux Enterprise Server 12 SP2 (HVM), SSD Volume Type** - ami-e4a30084

SUSE Linux Enterprise Server 12 Service Pack 2 (HVM), EBS General Purpose (SSD) Volume Type. Public Cloud, Advanced Systems Management, Web and Scripting, and Legacy modules enabled.

Root device type: ebs      Virtualization type: hvm

Select

64-bit



Free tier eligible

**Ubuntu Server 16.04 LTS (HVM), SSD Volume Type** - ami-a9d276c9

Ubuntu Server 16.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Root device type: ebs      Virtualization type: hvm

Select

64-bit



Windows

Free tier eligible

**Microsoft Windows Server 2016 Base** - ami-bdb618dd

Microsoft Windows 2016 Datacenter edition. [English]



Root device type: ebs      Virtualization type: hvm

Select

64-bit

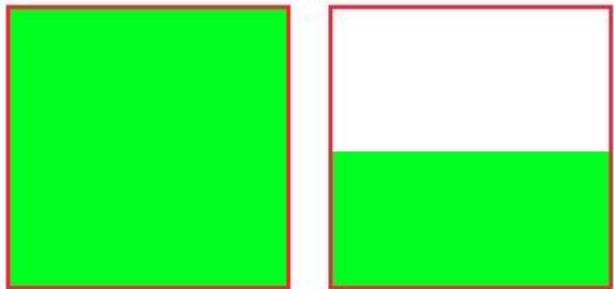


# Scaleable

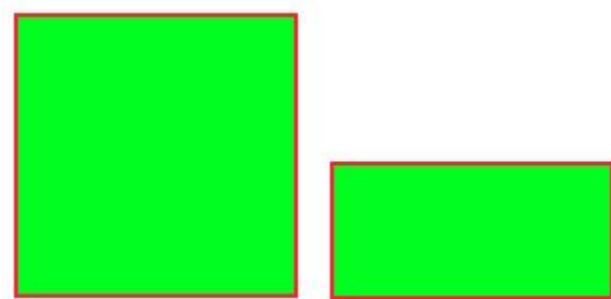
- Needs  = Create Instances
- Needs  = Delete Instances

# Efficient

- Traditional



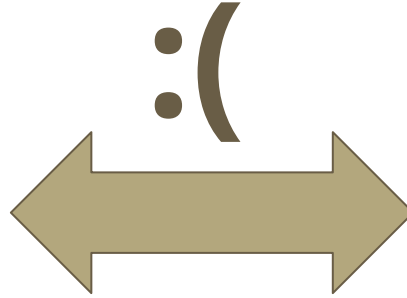
- Cloud



# Reliable

- Uptime guarantees
- Servers @ data centre

# Vendor Lockin



# Long term costs

- Data is expensive

from Americas to EMEA

Compute Engine Network Internet Egress from North America to Western Europe	Feb 1 - Feb 3	YASP	89.772	Mebibytes	0.01
Compute Engine Network Load Balancing: Data Processing Charge in NA	Feb 1 - Feb 6	YASP	5.458	Gibibytes	0.04
Compute Engine Network Load Balancing: Forwarding Rule Minimum Service Charge in Americas	Feb 1 - Feb 6	YASP	141.279	Hours	3.53
Compute Engine Preemptible Highcpu Intel N1 16 VCPU running in Americas	Feb 1 - Feb 8	YASP	0.183	Hours	0.03
Compute Engine Preemptible Highcpu Intel N1 2 VCPU running in Americas	Feb 1 - Feb 29	YASP	10450.967	Hours	209.02
Compute Engine Preemptible Highcpu Intel N1 4 VCPU running in Americas	Feb 1 - Feb 10	YASP	0.6	Hours	0.02
Compute Engine SSD backed PD Capacity	Feb 1 - Feb 29	YASP	2281.727	Gibibyte-months	401.27
Compute Engine Standard Intel N1 1 VCPU running in Americas	Feb 1 - Feb 6	YASP	140.3	Hours	7.02

Amount due in USD:

**\$986.81**

<http://blog.opendota.com/2016/03/20/financials/>

# Data Issues

- Costly
- Stone age internet infrastructure (slow)



# Privacy

- Five Eyes (US, UK, CA, AU, NZ)
- PRISM



# Extraordinary Rendition

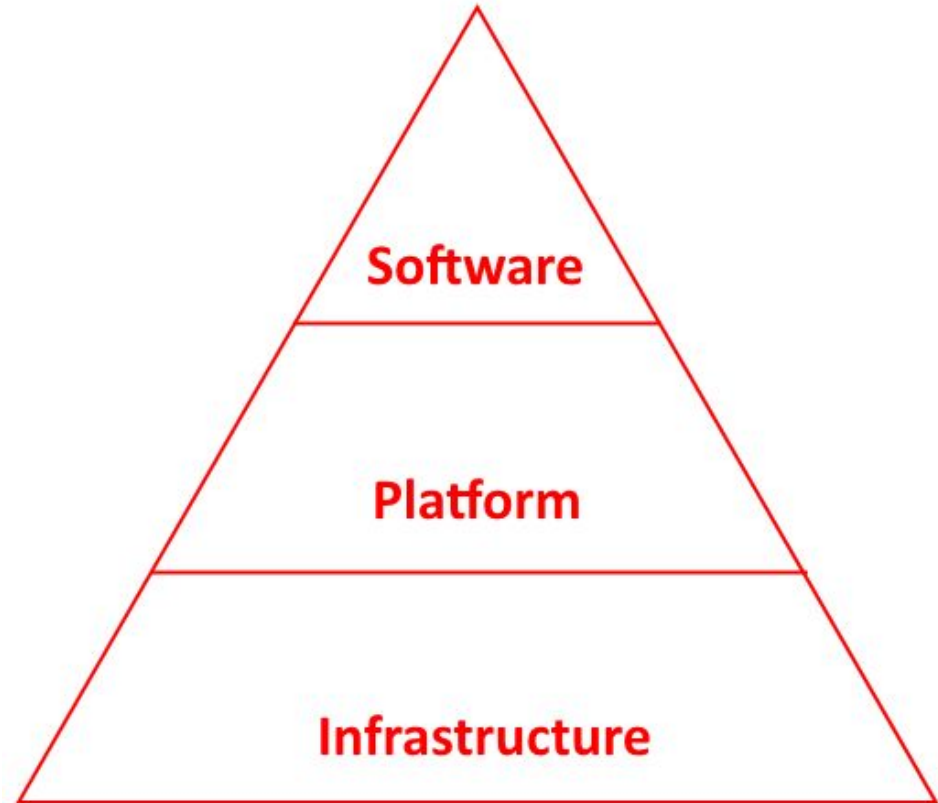


H λ L F - L I F E 2



## ... as a Service

- Different vendors for each stage of stack



# Software as a Service (SaaS)



**NETFLIX**

# Platform as a Service



JavaScript content  
delivery

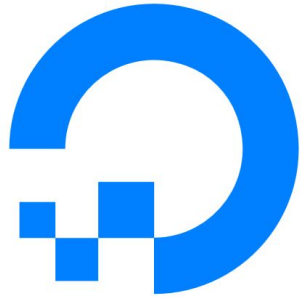
Microsoft Azure

Cloud Compute



Google Compute  
Engine (Cloud  
Compute)

# Infrastructure as a Service (IaaS)



DigitalOcean



Rackspace

# Applications

- **Personal Projects, Students**
- **Startups, Prototypes**
- **Large scale compute tasks**

# Personal Projects



## Amazon EC2

Resizable compute capacity in the Cloud.

[Learn More »](#)

**750 hours** per month of Linux, RHEL, or SLES t2.micro instance usage

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**750 hours** per month of Windows t2.micro instance usage

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For example, run 1 instance x 1 month or 2 instances x half a month

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Expires 12 months after sign-up.



## Amazon S3

Secure, durable, and scalable object storage infrastructure.

[Learn More »](#)

**5 GB** of Standard Storage

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**20,000 Get Requests**

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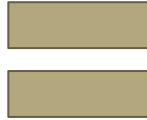
**2,000 Put Requests**

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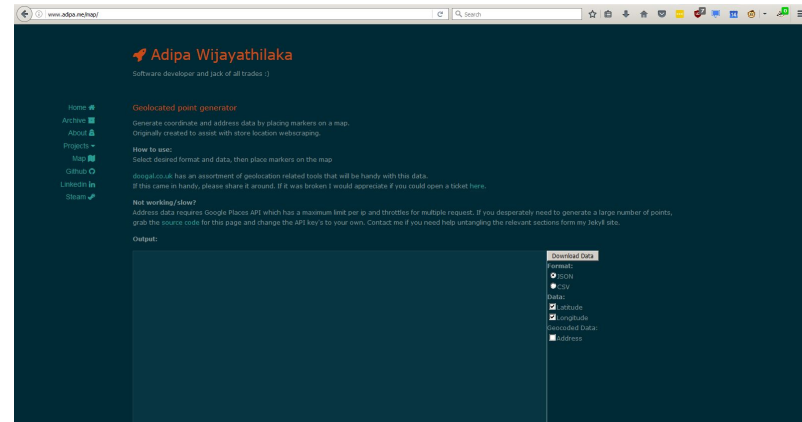
Expires 12 months after sign-up.

# Static Page Hosting

# GitHub Pages



(Free Student Domain)



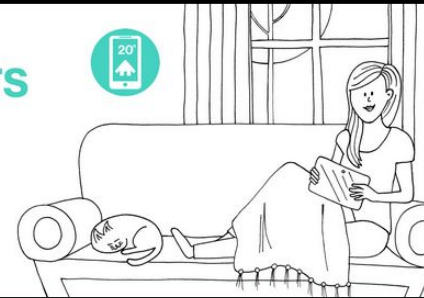
# Home Automation

- “Internet of Things”

[Residential Login](#)[Business Login](#)[FOR HOME](#)[FOR BUSINESS](#)[ELECTRICITY CONSERVATION](#)[POWER OUTAGES](#)[GRID INVESTMENT](#)[CONTACT](#)[Home](#)[Electricity Conservation](#)[Residential Conservation](#)[Smart Thermostat Program](#)[Residential Conservation](#)[Conservation Tips](#)[Coupons](#)[Heating & Cooling Incentive](#)[New Home Construction](#)[Home Assistance Program](#)[Smart Thermostat Program](#)[Home Lighting](#)[peaksaver PLUS](#)[Fridge & Freezer Pick Up](#)[PowerShift](#)[Community Events](#)[PowerLens Energy Calculator](#)[CFL Recycling Program](#)[10 Smart Meter Lane](#)[Summer Conservation](#)[Winter Conservation](#)[Seasonal](#)[Business Conservation](#)[Conservation Tips for Business](#)[Feed In Tariff Program](#)

## SMART THERMOSTATS

Home comfort.  
Automatic savings.



### Meet your new thermostat

**NEW! A Save on Energy program offered in collaboration with Enbridge Gas**  
If you are an Enbridge Gas customer, you may qualify for a \$100 on-bill credit\* when you purchase and install either of these qualifying thermostats. But hurry – offer ends December 31, 2016.



Nest Learning Thermostat  
Model T3007E7  
[YouTube installation video](#)



ecobee3 Wi-Fi Smart Thermostat  
Model EB-STATE3c-02  
[YouTube installation video](#)



Honeywell Lyric 2.0 Thermostat  
Model Retail: RCH9310W/F5011/U  
Trade: TH8732WFH5010/U  
[YouTube installation video](#)



Companies

**NETFLIX**

**UBER**

# Large Scale Compute (“Big Data”)

- Analytics
- Simulations

**Ex:**

**Google BigData/BigQuery**