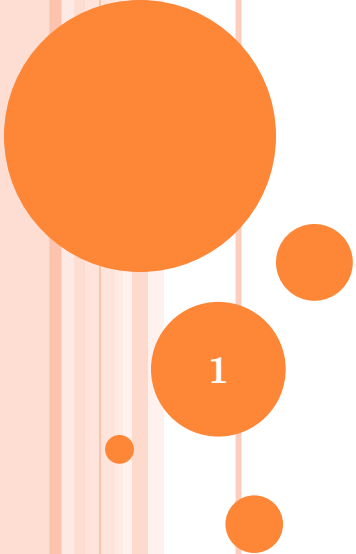




EE4221: CLOUD COMPUTING:

PUBLIC CLOUD SERVICES

Dr Eric Wong

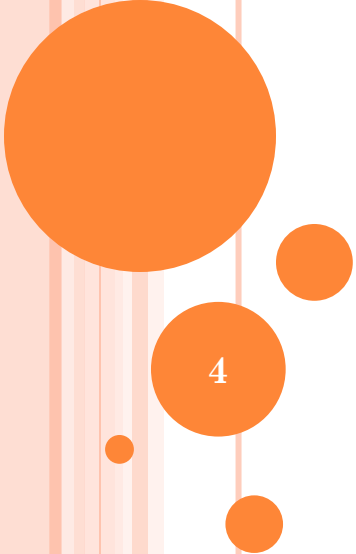
1

DO YOU REMEMBER THE FUNDAMENTAL
IDEA OF THE CLOUD?

**Why do it yourself if you can
find/pay someone to do it for
you?**

CLOUD SERVICE PROVIDERS

- Amazon Web Services
 - Elastic Compute Cloud (EC2)
 - Simple Storage Service (S3)
 - Amazon CloudFront
 - ...
- Google's Cloud Solutions
 - Google Compute
 - Google App Engine
 - Google Cloud Storage
 - Google Apps
 - ...



AMAZON WEB SERVICES (AWS)

4

CLOUD SERVICES PROVIDED BY AMAZON

- Learn the benefits of Cloud Computing with AWS*
- Compute & Networking: Elastic Compute Cloud (Amazon EC2)
- Storage & CDN:
 - Amazon Simple Storage Service (Amazon S3)
 - Amazon CloudFront
- Database:
 - Amazon Relational Database Service (MySQL, Oracle or Microsoft SQL Server database)
 - Amazon DynamoDB (NoSQL database)

*http://www.youtube.com/watch?v=jOhbTAU4OPI&feature=player_embedded

AMAZON EC2

- A web service that provides resizable compute capacity in the cloud.
- Make web-scale computing easier for developers.
- Reduce the time required to obtain and boot new server instances to minutes, allowing you to quickly scale capacity, both up and down, as your computing requirements change.
- Change the economics of computing by allowing you to pay only for capacity that you actually use.
- Provide developers the tools to build failure resilient applications and isolate themselves from common failure scenarios.

Source: <http://aws.amazon.com>

AMAZON EC2: SERVICE HIGHLIGHTS

- **Elastic** – Amazon EC2 enables you to increase or decrease capacity within minutes, not hours or days.
- **Completely Controlled** – You have complete control of your instances.
- **Flexible** – You have the choice of operating systems, software packages, memory, CPU, etc.
- **Reliable** – Amazon EC2 offers a highly reliable environment. The Amazon EC2 Service Level Agreement commitment is 99.95% availability.
- **Inexpensive** – You pay a very low rate for the compute capacity you actually consume.

Source: <http://aws.amazon.com>

AMAZON EC2 DETAILS

○ Amazon EC2 Pricing

- Pay only for what you use.
- No minimum fee.
- Estimate your monthly bill using AWS Simple Monthly Calculator.
- The prices listed are based on the Region in which your instance is running.

○ Service Level Agreement

- Service Level Agreement commitment is 99.95% availability. In the event Amazon EC2 does not meet the Service Commitment, you will be eligible to receive a Service Credit.

AMAZON EC2 DETAILS (CONT'D)

○ Service Credits

Monthly Uptime Percentage	Service Credit Percentage
Equal to or greater than 99% but less than 99.9%	10%
less than 99%	25%

AMAZON EC2 FEATURES

- Elastic Block Store
- Amazon CloudWatch
- Auto Scaling
- Elastic Load Balancing
- High Performance Computing

AMAZON ELASTIC BLOCK STORE (EBS)

- Provide block level storage volumes for use with Amazon EC2 instances.
- Provide highly available, highly reliable, predictable storage volumes that can be
 - attached to a running Amazon EC2 instance and
 - exposed as a device within the instance.
- Is particularly suited for applications that require a database, file system, or access to raw block level storage.

AMAZON CLOUDWATCH

- Amazon CloudWatch provides monitoring for AWS cloud resources and the applications customers run on AWS.
- Developers and system administrators can use it to collect and track metrics, gain insight, and react immediately to keep their applications and businesses running smoothly.

AUTO SCALING

- Allow you to scale your Amazon EC2 capacity up or down automatically according to conditions you define.
- Is particularly well suited for applications that experience hourly, daily, or weekly variability in usage.

ELASTIC LOAD BALANCING

- Automatically distribute incoming application traffic across multiple Amazon EC2 instances.
- Detects unhealthy instances within a pool and automatically reroutes traffic to healthy instances until the unhealthy instances have been restored.

HIGH PERFORMANCE COMPUTING (HPC)

- Allow scientists and engineers to solve complex science, engineering and business problems using applications that require high bandwidth, low latency networking, and very high compute capabilities.
- Typically, scientists and engineers must wait in long queues to access shared clusters or acquire expensive hardware systems. Using Amazon EC2 Cluster instances, customers can expedite their HPC workloads on elastic resources as needed and save money by choosing from low-cost pricing models that match utilization needs.
- Academic researchers use Amazon to perform research in physics, chemistry, biology, computer science, and materials science.

BIG DATA ON AWS

- “Big Data” refers to a collection of tools, techniques and technologies for working with data productively, at any scale.
- The tools are to support data collection, computation along with collaboration and sharing.
- See how AWS helps NASA do their job:

<https://www.youtube.com/embed/GZrc93DKY6Y?rel=0;hd=1;autoplay=1>

Source: <http://aws.amazon.com>

SCALABLE STORAGE IN CLOUD: AMAZON SIMPLE STORAGE SERVICE (AMAZON S3)

- Is storage for the Internet.
- Designed to make web-scale computing easier for developers.
- Provide a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web.
- Give any developer access to the same highly scalable, reliable, secure, fast, inexpensive Amazon's infrastructure
- Aim to maximize benefits of scale and to pass those benefits on to developers.

Source: <http://aws.amazon.com>

GLOBAL CONTENT DELIVERY NETWORK

AMAZON CLOUDFRONT

- Is a web service for content delivery.
- Integrate with other Amazon Web Services to give developers and businesses an easy way to distribute content to end users with low latency, high data transfer speeds, and no commitments.
- Deliver your entire website, including dynamic, static and, streaming, and interactive content using a global network of edge locations.
- Requests for your content are automatically routed to the nearest edge location, so content is delivered with the best possible performance.
- Customer Story:
<http://d28s7bjoq3pvor.cloudfront.net/earth-networks-case-study-video-41.html?rel=0;hd=1;autoplay=1>

Source: <http://aws.amazon.com>

AMAZON RELATIONAL DATABASE SERVICE (AMAZON RDS)

- Is a web service that makes it easy to set up, operate, and scale a relational database in the cloud.
- Provide cost-efficient and resizable capacity while managing time-consuming database administration tasks, freeing you up to focus on your applications and business.
- Give you access to the capabilities of a familiar MySQL, Oracle or Microsoft SQL Server database engine.

APPLICATION SERVICES: AMAZON CLOUDSEARCH

- Is a fully-managed service in the AWS Cloud that makes it easy to set up, manage, and scale a **search solution** for your website or application.
- Enable you to search large collections of data such as web pages, document files, forum posts, or product information.
- Enable you to quickly add search capabilities to your website without having to become a search expert or worry about hardware provisioning, setup, and maintenance.

<https://www.youtube.com/embed/eOVRt46RwT8?rel=0&hd=1;autoplay=1>

Source: <http://aws.amazon.com>

APPLICATION SERVICES: AMAZON CLOUDSEARCH (CONT'D)

- How its customers talk about their successful stories with Amazon CloudSearch?
 - SmugMug (Online Photo Album):
<http://www.youtube.com/embed/Lgl7EKaFv1Y??rel=0&hd=1;autoplay=1>
 - Ziplist (Online Recipe Box and Shopping List Tool):
<http://www.youtube.com/embed/ZOELg8zDPR0?rel=0&hd=1;autoplay=1>

START-UPS ON AWS

- Amazon Web Services provides startups with low cost, easy to use infrastructure needed to scale and grow any size business.
- Some of the world's hottest startups including Pinterest, Instagram, and Dropbox have leveraged the power of AWS to easily get started and quickly scale.
- **Pinterest** (a content sharing service that allows members to "pin" images, videos and other objects to their pinboard) talking about AWS:
<http://aws.amazon.com/start-ups/?navclick=true>

Source: <http://aws.amazon.com>

AWS'S CALCULATOR TO COMPARE THE COST OF RUNNING YOUR WEB APPLICATIONS ON- PREMISES TO THE COSTS WITH AWS

You can try it yourself:

<http://aws.amazon.com/tco-calculator/>

Source: <http://aws.amazon.com>

ENTERPRISE ON AWS

- Enterprise firms use Cloud Computing from AWS for IT innovation while reducing costs.
- Extending Your IT Infrastructure to the AWS Cloud:

http://www.youtube.com/watch?v=CsGqu5L_PFI

GOOGLE'S CLOUD SOLUTIONS

- **Google Compute Engine** - an infrastructure as a service that lets you run your large-scale computing workloads on Linux virtual machines hosted on Google's infrastructure.
- **Google App Engine** - a platform as a service that uses familiar technologies to build and host applications on the same infrastructure used at Google.
- **Google Cloud Storage** - Store, access and manage your data on Google's storage infrastructure. Take advantage of the scale and efficiency we have built over the years.

Source: <http://cloud.google.com>

GOOGLE'S CLOUD SOLUTIONS (CONT'D)

- **Google BigQuery** - Analyze Big Data in the cloud using SQL and get real-time business insights in seconds using Google BigQuery.
- **Google Cloud SQL** - Run MySQL databases in Google's cloud. Use a fully managed service to maintain and administer your databases, so you can focus more on building your applications and worry less about database management.
- **Google Cloud Datastore** - Google Cloud Datastore is a fully managed, NoSQL, schemaless database for storing non-relational data.

Source: <http://cloud.google.com>

GOOGLE APPS

- **Gmail** - Email with Google-powered search, up to 30GB of storage, offline support, custom email addresses, and much more.
- **Calendar** - Easily schedule meetings at times that work for everyone, get meeting reminders, and share calendars.
- **Drive** - Google Drive allows you to store your files in the cloud, share them, and have access to them from anywhere.
- **Docs** - Create, share and work on documents with your whole team in real-time.
- **Sheets** - Manage spreadsheet data faster with click-to-edit charts and discussion style comments.
- **Slides** - Create presentations together, embed videos, and never press save again.

Q&A