Cloud Computing

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Cloud Computing

"Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet)."
--Wikipedia

- Web Apps, Data Storage, Virtual Machines
- Software as Service
  - Google Apps
- Platform as Service
  - Heroko
- Infrastructure as Service
  - Amazon EC2
The origin of "the cloud"

- The term "cloud" was first used by telecommunication companies.
  - A drawing of a cloud was used to represent a telephone network.
- It came from the advent of virtual private network (VPN) services in the early 1990's, where previously peer-to-peer (P2P) services were the standard.
  - VPN services primarily use public infrastructure, such as the internet to allow users to remotely access information.
  - P2P services connect one user directly to another to allow information transfer. Modern examples are Napster and IRC.
A brief history of cloud computing

- The concept of cloud computing dates back to the 1950's, where Herb Grosch proposed that a number of large data centers would power many "dumb" terminals.
- One of the earliest commercial success with cloud computing happened in 1999, when Salesforce started delivering applications to enterprises through the web.
- Amazon was a major force in bringing cloud computing the to public after the dot-com bubble.
  - They had a huge computing resource, but often used only %10 capacity. This was to leave room for spikes in usage.
  - Amazon Web Service (AWS) was launched in 2002, but only became widely available to the public in 2006.
Services

Cloud Computing makes computer infrastructure and services available on needed basis.

Computing Infrastructure:
- Hard disk
- Development Platform
- Database
- Computing Power
- Software

A few ways it's used
- Client-side: technology (application, browser, OS) that requires cloud computing.
- Application: running an app on cloud tech keeps the user from needing to install it locally.
Services

- Amazon Cloud - 5GB free online storage with Amazon account. Can store songs purchased on Amazon MP3.
- Ubuntu One - The service enables users to store files online and sync them between computers and mobile devices, as well as stream audio and music from cloud to mobile devices.
- Dropbox - website and application, 2GB free. Can share folders with other users, or make files public. Works offline with the last online update.
- Rackspace - more business-oriented, offers managed, cloud, and hybrid hosting. Claim to fame is that they serve over half the Fortune 100.
- Google App Engine - for hosting web apps. Free up to a certain amount of resources used.
Google App Engine: What you need to know

- It supports only Java and JVM-compatible languages such as JRuby, Scala, and Groovy
  - Even then, it limits you to a JRE white list.
  - But luckily, there is a plugin for Eclipse.
- It also supports Python, but not 2.6 (yet), or C Python modules.
  - If you want to develop for Ruby, Clojure, or PHP, Heroku supports these.
- There is experimental support for "Go".
- In neither case does Google App Engine support any operations that involve writing to a disk, or direct network communications.
Google App Engine: What you need to know

- The free version allows for up to ten applications.
- Applications are limited by how long requests can take to execute, but not by the number of simultaneous requests.
- Two classes of data storage:
  - Basic model includes one master data center and many slave data centers. If the master data center fails or begins maintenance, data can't be stored.
  - High replication version allows reading/writing data to multiple data centers. Costs more due to the higher read/write rate, but is more consistent.
- Cost is determined by stored data, outgoing bandwidth, and other data transfer statistics. Paid apps have a minimum $2.10/week, but you can add a max "daily budget".
Amazon Web Services

- Computing
- Networking
- Database
- Storage
- Development & Management
- Messaging
- Monitoring
Amazon Web Services

- Amazon Elastic Compute Cloud (EC2)
- Amazon Virtual Private Cloud
- Amazon Relational Database
- Amazon Cloud Drive
- Amazon Elastic Beanstalk (Beta)
- Amazon Simple Notification Service
- Amazon Cloud Watch
Potential

- Empowerment & Flexibility
  - access to huge resources with low start up
- Security
  - decentralization of the physical data
- Reliability
  - centralization of various computing needs through a capable larger company
- Scalability
  - huge
- Cost
  - able to build data centers en masse
  - computing charged more as a utility, per usage

... and Difficulty

- Disempowerment & Inflexibility
  - changes what once was an autonomous function to a service provided by others
- Insecurity
  - centralization of the physical data in terms of company ownership
  - ownership of data can be unclear
  - cloud company can go out of business
- Outsourced accountability
- Diminished Privacy
  - Legal/government requests for access to data
  - Security flaws in large providers
Political Implications

- Google lost a legal battle to protect the data of Jacob Appelbaum, WikiLeaks volunteer and Tor developer, and was forced to hand over private data to the government, *even though the government had no warrant*
  - Google had to fight an extra legal battle even to be allowed to make this public
- Amazon Web Services also shut down service to wikileaks, citing violation of terms of service
  - Terms of service agreements provide notably weaker protections for users than constitutionally protections for general expressions, like free speech
- On the other hand, Google Docs, blogger, Twitter, and other cloud-related services have been hugely helpful to international activists.
Pionen Data Center in Sweden
Proposed Facebook Data Center in Iceland
Pirate Bay Servers

...in a secret cave in Sweden (seriously)
Modular Data Center in Norway