



Cloud Computing

COMP / ECPE 293A

Introduction



Introductions

- **Introduce yourself**
 - Name
 - Undergrad major
 - Interests
 - Hardware – which area?
 - Software – which area?

Cloud Computing

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Looking at pictures of
clouds with computers









Cloud Computing

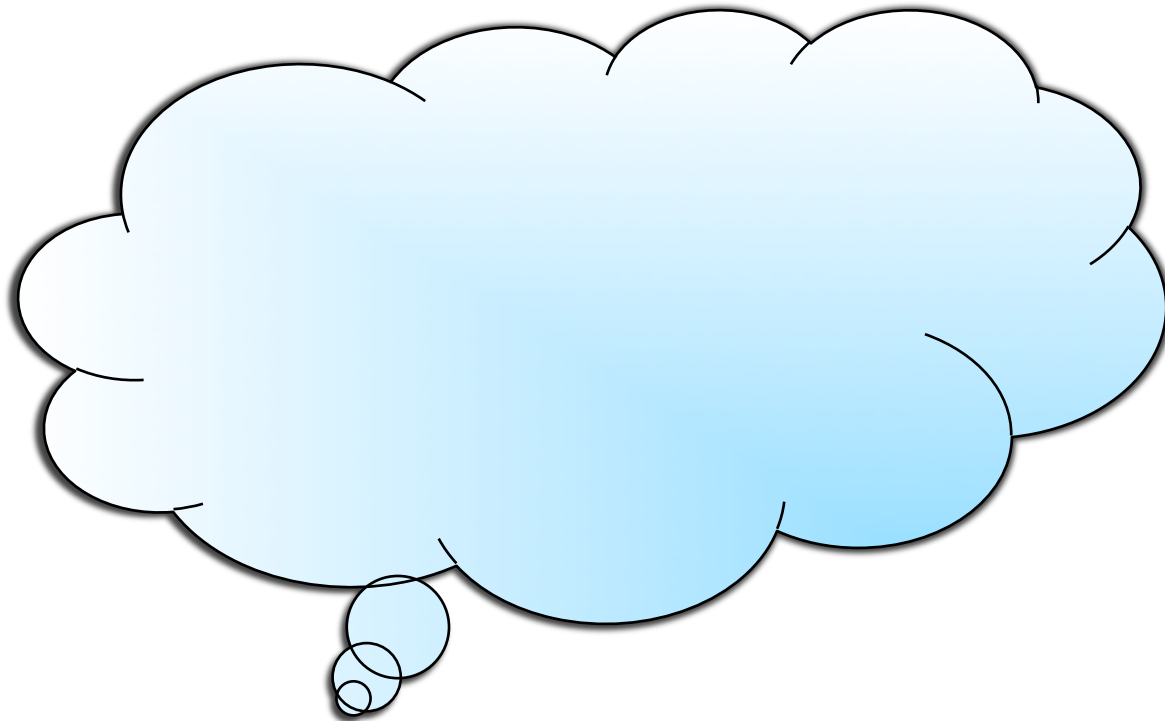
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Looking at pictures of
clouds with computers

Cloud Computing

- **What do you know about cloud computing?**
- **What do you want to know about cloud computing?**

Cloud = The Internet



Cloud Computing

- Cloud computing is a computing paradigm where you outsource your data, computation, or both
- Features
 - Resource **scalability** (“infinite”!)
 - On demand / “**just-in-time**” provisioning
 - No upfront cost ... **pay-as-you-go**

Cloud Computing

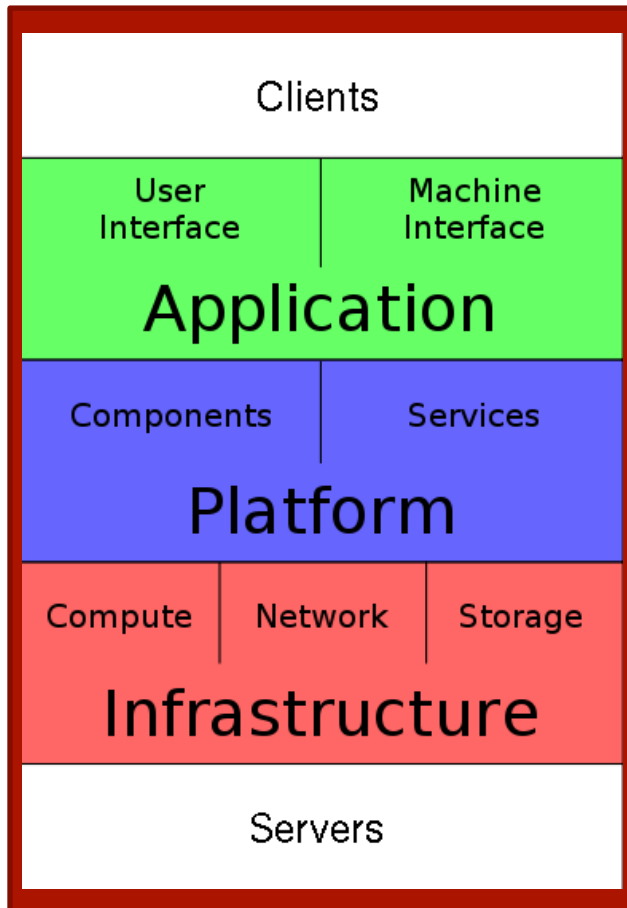
- Economic benefits for customers:
 - No upfront commitment in buying/leasing hardware
 - Can scale usage according to demand
 - Barriers to entry lowered for startups

- Economic benefits for providers:
 - Increased utilization of datacenter resources

Cloud Computing

- Selling “X as a Service”
 - **IaaS:** Infrastructure as a Service
 - Selling virtualized hardware
 - **PaaS:** Platform as a service
 - Selling access to a configurable platform/API
 - **SaaS:** Software as a service
 - Selling software that a user directly interacts with

Cloud Computing Architecture



e.g., Web browser

SaaS , e.g., Google Docs

PaaS, e.g., Google AppEngine

IaaS, e.g., Amazon EC2

Course Mechanics



Course Goals

1. Understand the architecture *behind* modern cloud computing infrastructure
 - *“How is the infrastructure built?”*
 - Accomplished by: **reading/discussing research papers**
2. Gain **hands-on experience** with modern cloud computing systems
 - *“How do I use the infrastructure provided?”*
 - Accomplished by: **programming projects**

Course Expectations

- This is not an undergraduate class
- I have higher expectations for you
- **Independence** – You get to select research papers, project topics, and implementation strategies
 - Take advantage of this **flexibility** to focus the course in a specific area that interests you!

Research Papers – Discussion Leader

- During this semester, you will present 2 (or 3) research papers to the class
- Job of discussion leader
 - Pick a paper (and email me for approval / posting)
 - Read it thoroughly (twice!)
 - Prepare a 20-minute PowerPoint presentation
 - *As if you had done this work and were presenting it at a conference*
 - Do not use existing work on the web! (OK to re-use figures)
 - Lead a group discussion for the remaining class period

Research Papers – Audience Members

- When you are not presenting a paper, you will be an audience member
- Job of audience members
 - ~~Skim the paper 5 minutes before the start of class~~
 - If only 1 person has read the paper, class discussions will be unproductive (and agonizing!)

Research Papers – Audience Members

- Read the paper thoroughly
 - **2+ hours** for a good understanding
 - *I'm a speed reader, but these technical papers are **dense!***
 - A little faster as you get up to speed in the field?

- Bring to class (for credit) a 1-2 page document
 - Summary of paper
 - Two strengths
 - Two weaknesses
 - Three questions for the presenter or other audience members

Projects

- Two programming projects, 6 weeks each
- **Project 1** – Large scale data processing
 - Dataset: CommonCrawl
 - Infrastructure: MapReduce
 - Application: Up to you!
- **Project 2** – Reliability / scalability in the cloud

Honor Code

- You are welcome to talk with your classmates about your projects
 - *Everyone should have a different project focus, anyway...*

- You are welcome use resources online (source code, tutorials, mailing lists, etc...)
 - Must **document and disclose** all of your sources in your project report

Grading

- **Exams – None!**
- **Quizzes – None!**
- **Paper Discussions as *Leader* – 20%**
- **Paper Discussions as *Audience Member* – 30%**
- **Programing Project 1 – 25%**
- **Programing Project 2 – 25%**

Computers

- **Who has a laptop they can bring to class?**
- View research paper PDFs instead of printing them out
- Do in-class tutorials instead of using slow lab computers

Upcoming Schedule – This Week

- Wednesday 11th – What is Cloud Computing?
 - **Your Homework 1:** Read Berkeley report
 - *This is not a technical paper and should be a fast read. Just skim it...*
 - **No summary required** for this paper (only!)
- Friday 13th – What is Cloud Computing?
 - Continuation of Wednesday's discussion
 - **Your Homework 2:** Pick 2-3 papers from the approved reading list that you could present and **email me**

Upcoming Schedule – Next Week

- Monday 16th – **No class** (MLK day)
- Wednesday 18th – First paper presentation
 - Presenter: Dr. Shafer (*use an an example*)
 - MapReduce paper (*used for your first project*)
 - **Your Homework 3:** Audience members role
 - Read paper and prepare summary document
- Friday 20th – First student paper presentation
 - **Who volunteers to get a paper out of the way early before the semester gets busy?**

Upcoming Schedule

- The question that you should always be asking yourself is: “What paper should I read **before** the next class?”
 - Check schedule on website

Websites

Main website
(syllabus, schedule, papers, ...)

- <http://ecs-network.serv.pacific.edu/ecpe-293a>

Sakai website
(projects, gradebook)

- <http://pacific.rsmart.com/>

Website Tour

- Where to find:
 - List of papers to select from
 - Requirements for presenter
 - Requirements for audience members
 - Grading rubrics