CS15-319 / 15-619
Cloud Computing

Recitation 1
Course Overview and Introduction
September 1 & 3, 2015

http://www.cs.cmu.edu/~msakr/15619-f15/
Outline

• What is the course about?
• What is an online course?
• Administrivia
• A couple of demos
So What is Cloud Computing?
Data and Decision Making

• Analyzing data reflects reality

• Walmart: hurricane warning
  – Stock beer and strawberry pop-tarts
  – 7x increase in sales during large storms

• Government: resource allocation decisions
  – Data mining in Maryland ➔ crime hotspots
  – Shuffle resource allocation, more to hotspots
    • violent crime down by 25%
    • $20 million saved in the city of Baltimore
Data Science

• Extraction of knowledge from data
• Employs statistical, machine learning and data mining techniques
  – Look for trends, patterns or anomalies in the data
• Affects research in many domains
  – Business, Economics and Finance
  – Biological Sciences and Bioinformatics
  – Social Sciences and Humanities
  – …
An Increase in Data Capture

• Physical Sensors and Sensor Networks
  – Environmental, safety, transportation
• Social Media Interactions
  – Facebook, Twitter, Instagram
• Public Video and Image Capture
  – Surveillance, mobile phones, ...
• Customer Spending Habits
  – Loyalty programs and purchase data
What Happens in an Internet Minute?

- 639,800 GB of global IP data transferred
- 20 new victims of identity theft
- 47,000 app downloads
- 61,141 hours of music
- 20 million photo views
- 20 million photo uploads
- 135 botnet infections
- 1,300 new mobile users
- 100 new LinkedIn accounts
- $83,000 in sales
- 204 million emails sent
- 320 new Twitter accounts
- 100,000 new tweets
- 277,000 logins
- 6 million Facebook views
- 2+ million search queries
- 30 hours of video uploaded
- 1.3 million video views

And Future Growth is Staggering

Today, the number of networked devices = the global population
By 2015, the number of networked devices = 2x the global population
In 2015, it would take you 5 years to view all video crossing IP networks each second

Source: IntelFreePress
What is Big Data?

• Big Data
  – Volume, Velocity, Variety, Veracity
  – Data of next year >> data of this year

• Many Challenges
  – Store, share, analyze, search, transfer, visualize, and secure
  – Traditional IT systems are insufficient

we need...
Large Scale Systems
Large Scale System Challenges

- Lengthy procurement cycles
- Lengthy deployment effort
- Costly power and cooling
- Costly systems administration
- Low utilization
- Costly disaster recovery
“Cloud Computing is the transformation of IT from a product to a service”
Evolution of Electricity

Innovation
New Disruptive Technology

Product
Buy and Maintain the Technology

Service
Electric Grid, pay for what you use
A Cloud is ...

- Datacenter hardware and software that the vendors use to offer the computing resources and services
The Cloud

The “Cloud”
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 metered service over a network.
Enabled by Maturing Technologies
So... how would you transform information technology into a Service?
How to Transform IT to a Service?

• Connectivity
  – For moving data around

• Interactivity
  – Seamless interfaces

• Reliability
  – Failure will affect many

• Performance
  – Should not be slower

• Pay-as-you-Go
  – No upfront fee

• Ease of Programmability
  – Ease of development of complex services

• Manage Big Data

• Efficiency
  – Cost
  – Power

• Scalability & Elasticity
  – Flexible and rapid response to changing user needs
How to Transform IT to a Service?

- **Connectivity**  
  - For moving data around

- **Interactivity**  
  - Seamless interfaces

- **Reliability**  
  - Failure will affect many

- **Performance**  
  - Should not be slower

- **Pay-as-you-Go**  
  - No upfront fee

- **Ease of Programmability**  
  - Ease of development of complex services

- **Manage Big Data**

- **Efficiency**  
  - Cost
  - Power

- **Scalability & Elasticity**  
  - Flexible and rapid response to changing user needs
Cloud Building Blocks

Cloud services are available in various forms, corresponding to the layer of abstraction desired by the user

- **Software as a Service (SaaS)**
- **Platform as a Service (PaaS)**
- **Infrastructure as a Service (IaaS)**
Software as a Service (SaaS)

• Software is delivered through the internet over a browser or mobile application
• Replace desktop software with cloud-based versions
• Webmail, Productivity Software, ERP, CRM etc.
• Centrally managed, globally available, automatically updated
Platform as a Service (PaaS)

- Tools and APIs to develop and deploy cloud-based applications
- Create customized SaaS in the form of Web or mobile applications
Infrastructure as a Service (IaaS)

- Compute, storage and network resources bundled in the form of virtual machines
- Fully flexible in terms of software and environment
Benefits of Cloud Computing

- Pay-as-You-Go economic model
- Simplified IT management
- Elasticity Scale quickly & effortlessly
- Customization Flexible options
- Carbon Footprint decreased
Risks and Challenges

- Migration
- Security & Privacy
- Vendor Lock-In
- Legal
- Internet Dependence
Service Level Agreements and Objectives (SLA/SLO)

• SLA: Contract between cloud providers and users to define expected service
  – Service availability and delivery
  – Payment terms, bonuses and penalties for service

• SLO: Individual performance/service metrics regarding service delivery defined in the SLA

• Auditing: monitor resources to enforce SLOs and SLAs
Cloud Use Cases: Start-ups

- Infrastructure on demand
- Save money on data center real estate, servers, power and cooling
- Saving in capital expenditure which could be used to drive other areas of business growth
- Scale infrastructure as the business grows
- Levels the infrastructure playing field with established companies
Cloud Computing

• Applications
• Development Platforms
• Elasticity
  – APIs to enable automation, Alarms, protocols, triggers, etc...
• Sharing mechanisms
  – Virtualization, SDX, ...
• Distributed systems
  – Programming models
  – Storage
• Data centers
What is this course about?

- Applied aspects of cloud computing
  - Between systems and services

Cloud Systems and Infrastructures

- 1.0 Introduction to Cloud Computing
  - Service and deployment models, economics and use cases

- 2.0 Data Centers
  - Components, design considerations and power

- 3.0 Resource Sharing
  - CPU, memory and I/O Virtualization

- 4.0 Cloud Storage
  - Distributed File Systems and Distributed Databases

- 5.0 Programming Models
  - MapReduce, Spark and GraphLab

Cloud Services and Applications

- Big Data
- Programmming Models
- Cloud Service
- Cloud Storage
- Scaling & Elasticity
- Projects on AWS

Online content on OLI

- 1.0 Introduction to Cloud Computing
- 2.0 Data Centers
- 3.0 Resource Sharing
- 4.0 Cloud Storage
- 5.0 Programming Models
Course Objectives

Students will learn:

• the fundamental ideas behind **Cloud Computing**;
• the basic ideas and principles in **data center** design and management; cloud software stack and cloud
• the resource sharing and **virtualization** techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage (SDS);
• about **cloud storage** technologies and relevant distributed file systems, NoSQL databases and object storage;
• the variety of **programming models** and develop working experience in three of them.
## Units on OLI

<table>
<thead>
<tr>
<th>Unit #</th>
<th>Title</th>
<th>Modules and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Data centers</td>
<td>Historical Perspective of Data Centers Datacenter Components: IT Equipment and Facilities Design Considerations: Requirements, Power, Efficiency, &amp; Redundancy Power Calculations and PUE Challenges in Cloud Data Centers Cloud Management and Software Deployment Considerations</td>
</tr>
<tr>
<td>3</td>
<td>Virtualization</td>
<td>Virtualization (CPU, Memory, I/O) Case Study: Amazon EC2 Software Defined Networks (SDN) Software Defined Storage (SDS)</td>
</tr>
<tr>
<td>6</td>
<td>Programming Models</td>
<td>Distributed Programming for the Cloud Data-Parallel Analytics with Hadoop MapReduce (YARN) Iterative Data-Parallel Analytics with Apache Spark Graph-Parallel Analytics with GraphLab 2.0 (PowerGraph)</td>
</tr>
</tbody>
</table>
Projects

• Four Individual Projects (all students):
  0. Primers and P0 (Due Sunday, September 6, 2015)
  1. Big Data Analytics
  2. Scalability, Elasticity and Failure
  3. Cloud Storage
  4. Analytics Engines for the Cloud

• One Team Project, Twitter Analytics Web Service (15-619 students, extra 3-units)
  – One multi-week team project to build a complete web service
What this course is *not* about

- Building Cloud Stack Modules
  - OpenStack
- Cloud Software Development
  - SaaS software engineering
- Distributed Systems
  - Synchronization, Consistency, ...
- Operating Systems
  - Developing a hypervisor
- Networks
  - Routing and switching protocols
Outline

- What is the course about?
- **What is an online course?**
- Administrivia
# Carnegie Mellon Global Course

### Locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Sections</th>
<th>Students</th>
<th>Teaching Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMU Pittsburgh</td>
<td>A &amp; B</td>
<td>293</td>
<td>22</td>
</tr>
<tr>
<td>CMU Silicon Valley</td>
<td>C</td>
<td>84</td>
<td>7</td>
</tr>
<tr>
<td>CMU Adelaide</td>
<td>E</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

[Map of Carnegie Mellon University](#)
Online Course Engagement Model

Piazza
Feedback & questions

Cloud platform to implement all projects

Open Learning Initiative
Access learning content, quizzes and checkpoints

Weekly, in-class recitations
**Tuesdays**: Videotaped
**Thursdays**: Video conf. to SV

Video Conf.
Expectations

- Real world practical experience
  - Learn on your own
    - Languages, API, debugging
  - Overcome challenges
  - Deal with uncertainty
- Self paced learning
- Using experimental tools
  - Bleeding edge comes with risks
Outline

• What is the course about?
• What is an online course?
• Administrivia
Target Audience

• Technical Majors
• Undergraduate Juniors / Seniors
  – Pre-requisites:
    • 15213 – Introduction to Computer Systems
• Graduate Students
  – Experience:
    • Unix, scripting, python, & java
Course Organization

Course Units

Course Projects

Weekly Recitations

Office Hours

Discussions on Piazza
Getting Help

• TAs in Adelaide, Pittsburgh & Silicon Valley
• Piazza
  – Email does not scale
  – Discussion forum to support each other
• Recitations
  – Tuesdays (recorded)
    • At 8AM in GHC 4307 (GHC 4401 for first few weeks)
  – Thursdays (video conferenced to SV)
    • At 4:30PM in GHC 4307 (1:30PM in SV 212)
• Office Hours
  – Check Piazza for Office Hour schedule
Teaching Staff

• Majd Sakr
  – GHC 7006
  – msakr@cs.cmu.edu
  – Office Hours
    • Tuesdays, 3-4pm (Pittsburgh)
Pittsburgh: Teaching Assistants

• Aaron Hsu
Pittsburgh: Teaching Assistants

• Chao Zhang
Pittsburgh: Teaching Assistants

• Daryl Zhang
Pittsburgh: Teaching Assistants

• Diane Zhang
Pittsburgh: Teaching Assistants

• Eryue Chen
Pittsburgh: Teaching Assistants

• Haoliang Quan
Pittsburgh: Teaching Assistants

- Jingbang Liu
Pittsburgh: Teaching Assistants

• Lee Yu
Pittsburgh: Teaching Assistants

• Mengyu Yang (Rainy)
Pittsburgh: Teaching Assistants

• Mrigesh Kalvani
Pittsburgh: Teaching Assistants

• Prajwal Yadapadithaya
Pittsburgh: Teaching Assistants

• Rohit Upadhyaya
Pittsburgh: Teaching Assistants

• Ru Jia
Pittsburgh: Teaching Assistants

• Samarth Jain
Pittsburgh: Teaching Assistants

• Suhail Rehman
Pittsburgh: Teaching Assistants

• Tianqi Wen
Pittsburgh: Teaching Assistants

• Vikram Nair
Pittsburgh: Teaching Assistants

• Walid Baruni
Pittsburgh: Teaching Assistants

- Wei Luo
Pittsburgh: Teaching Assistants

- Yiming Zang
Pittsburgh: Teaching Assistants

- Yao Zhou
Pittsburgh: Teaching Assistants

- Zichang Feng
Silicon Valley: Teaching Assistant

• Abhishek Shivanna
Silicon Valley: Teaching Assistants

- Anshima Gupta
Silicon Valley: Teaching Assistant

• Chrysanthi Vandera
Silicon Valley: Teaching Assistants

• Mayank Singh Shishodia
Silicon Valley: Teaching Assistant

• Ozan Okumusog
Silicon Valley: Teaching Assistant

- Simba Tien
Silicon Valley: Teaching Assistant

• Yang Pan
Adelaide: Teaching Assistant

• Lewis William Daly
Online Course Content - OLI

Course content is on the Open Learning Initiative:

- Students are automatically registered
- Access to OLI is through Blackboard
  - blackboard.andrew.cmu.edu
- Check if Flash is installed
- Provide feedback on OLI
  - Bottom of each page
  - End of each module
- Do not copy or share content

<table>
<thead>
<tr>
<th>Syllabus</th>
<th>Roster</th>
<th>Gradebook</th>
<th>Unscored Activities</th>
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<tbody>
<tr>
<td><strong>Instructor</strong>: Majid Saki</td>
<td><strong>Email</strong>: <a href="mailto:insaki@ANDREW.CMU.EDU">insaki@ANDREW.CMU.EDU</a></td>
<td></td>
<td></td>
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</tbody>
</table>

- Before you begin, Test and Configure your system for use with this course.

- **Cloud Computing**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Status</th>
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<tbody>
<tr>
<td><strong>UNIT 1: Introduction to Cloud Computing</strong></td>
<td></td>
</tr>
<tr>
<td>Module 1: Cloud Computing Overview</td>
<td></td>
</tr>
<tr>
<td>Module 2: Economics, Benefits, Risks, Challenges and Solutions</td>
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</tr>
<tr>
<td>Quiz 1: Introduction to Cloud Computing</td>
<td>Checkpoint</td>
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<tr>
<td><strong>UNIT 2: Cloud Infrastructure</strong></td>
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<tr>
<td>Module 3: Data Center Trends</td>
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<tr>
<td>Module 4: Data Center Components</td>
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<tr>
<td>Quiz 2: Data Centers - Infrastructure, Facilities and Components</td>
<td>Checkpoint</td>
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<tr>
<td>Module 5: Cloud Management</td>
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<tr>
<td>Module 6: Cloud Software Deployment Considerations</td>
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<tr>
<td>Quiz 3: Data Center Software Stack and Programming</td>
<td>Checkpoint</td>
</tr>
<tr>
<td><strong>UNIT 3: Virtualizing Resources for the Cloud</strong></td>
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<tr>
<td>Module 7: Introduction and Motivation</td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>
TheProject.Zone

Course projects are on https://TheProject.Zone:

• Learn through repetitive attempts and feedback
• Students are automatically registered
• Access through browser
  – Not mobile friendly yet
• Work in progress
  – We will encounter bugs
  – Provide feedback on Piazza
  – Please be patient
Syllabus

• Updated on webpage
• Provides details on:
  – Course Objectives
  – Learning Outcomes
  – Policies
  – Grading
  – Tentative Schedule

15-319/15619: CLOUD COMPUTING
COURSE DESCRIPTION & SYLLABUS
CARNEGIE MELLON UNIVERSITY
FALL 2015

1. OVERVIEW

Title: Cloud Computing
Units: 15-319 is 9 units and 15-619 is 12 units.
Pre-requisites for undergraduate students: A "C" or better in 15-213.
Pre-requisites for graduate students: Knowledge of computer systems, programming and
debugging, with a strong competency in at least one language (such as Java/Python), and the ability
to pick up other languages as needed.

OL Course: http://oli.cmu.edu (accessed through https://blackboard.andrew.cmu.edu)
The Project Zone: https://TheProjectZone
Piazza: http://piazza.com/cmu/fa2015/1531915619/home

Recitation:
1. Tuesday, 8:00 AM – 8:50 AM, GHC 4307 (Videotaped)
2. Thursday, 4:30 PM – 5:20 PM, GHC 4307

Teaching Staff:
Prof. Moid E. Saker
msaker@cs.cmu.edu
GHC 7006, +1-412-268-1161
Office hours: Tuesday, 3-4pm (Pitchohgh)

TAs in Pittsburgh typically hold office hours in GHC 5th
Floor Teaching Commons. The TA office hours are posted on
Piazza:
  – Waled Baruni <wbaruni@andrew.cmu.edu>
  – Erik Chen <erychen@andrew.cmu.edu>
  – Louis William <lwilliam@andrew.cmu.edu>
  – Zichang Feng <zfeng@andrew.cmu.edu>
  – Aaron Hsu <ahsu@andrew.cmu.edu>
  – Samarth Jain <samarthj@andrew.cmu.edu>
  – Mitosh Kalwani <mkalwani@andrew.cmu.edu>
  – Jingbang Li <jingbang@andrew.cmu.edu>
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  – Vikram Nair <vnair@andrew.cmu.edu>
  – Ozan Okumusoglu <oilmusoglu@andrew.cmu.edu>
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• Mohammed Suhail Rehman <msrehman@andrew.cmu.edu>
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• Rahkit Upadhaya <rupadhye@andrew.cmu.edu>
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• Tingyi Wei <twe@andrew.cmu.edu>
• Pranay Vadapathira <pvadapathira@andrew.cmu.edu>
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• Yiming Zhang <yimingz@andrew.cmu.edu>
• Chao Zhang <czhang@andrew.cmu.edu>
• Diane Zhang <diane@andrew.cmu.edu>
• Ying Zhang <yingz@andrew.cmu.edu>
• Yifan Zhou <yifanz@andrew.cmu.edu>

Tentative Schedule

- **Schedules:**
  - Quizzes on OLI
  - Projects on TheProject.Zone

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>OLI Content</th>
<th>Projects</th>
<th>15-619 Project</th>
<th>Quizzes</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>8/31/2015</td>
<td>Unit 1, Module 1</td>
<td>Primers/P0 (Sep 6)</td>
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<td>2</td>
<td>9/7/2015</td>
<td>Unit 1, Module 2</td>
<td>P1.1 (Sep 13)</td>
<td>Q1 (Sep 11)</td>
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<td>P1.2 (Sep 20)</td>
<td>Q2 (Sep 18)</td>
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<td>P2.1 (Sep 27)</td>
<td>Q3 (Sep 25)</td>
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<td>P2.2 (Oct 4)</td>
<td>Q4 (Oct 2)</td>
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<td>6</td>
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<td>Unit 3, Module 10, 11, 12</td>
<td>P2.3 (Oct 11)</td>
<td>Q5 (Oct 9)</td>
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<td>7</td>
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<td>Unit 3, Module 13</td>
<td>P3.1 (Oct 18)</td>
<td>Project Out (Oct 12)</td>
<td>Q6 (Oct 16)</td>
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<td>8</td>
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<td>Unit 4, Module 14</td>
<td>P3.2 (Oct 25)</td>
<td>Q7 (Oct 22)</td>
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<td>9</td>
<td>10/26/2015</td>
<td>Unit 4, Module 15</td>
<td>P3.3 (Nov 1)</td>
<td>Phase 1 Due (Oct 28)</td>
<td>Q8 (Oct 30)</td>
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<td>10</td>
<td>11/2/2015</td>
<td>Unit 4, Module 16, 17</td>
<td>P3.4 (Nov 8)</td>
<td>Q9 (Nov 6)</td>
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<td>11</td>
<td>11/9/2015</td>
<td>Unit 5, Module 18</td>
<td>P3.5 (Nov 15)</td>
<td>Phase 2 Due (Nov 11)</td>
<td>Q10 (Nov 13)</td>
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<td>Unit 5, Module 19</td>
<td>P4.1 (Nov 22)</td>
<td>Q11 (Nov 20)</td>
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<td>13</td>
<td>11/23/2015</td>
<td>Thanksgiving</td>
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<td>14</td>
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<td>Unit 5, Module 20, 21</td>
<td>P4.2 (Dec 6)</td>
<td>Phase 3 Due (Dec 2)</td>
<td>Q12 (Dec 4)</td>
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<td>12/7/2015</td>
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<td>P4.3 (Dec 11)</td>
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</table>
Projects: Timeline and Dependencies

Project 1.1: Introduction to Big Data Analytics, Sequential Analysis
Project 1.2: Introduction to Big Data Analytics, Elastic MapReduce

Project 2.1: Introduction to Auto Scaling and Load Balancing
Project 2.2: Advanced Resource Scaling
Project 2.3: Scaling and Caching for Web Services

Project 3.1: Files vs. Databases, Scaling in Databases
Project 3.2: Replication & Partitioning (Sharding)
Project 3.3: Consistency in Distributed Key-Value Stores
Project 3.4: Social Timeline with DBaaS (RDS, Hbase, DynamoDB)
Project 3.5: OLAP with Data Warehousing

Project 4.1: Input Text Predictor: Language Model and User Interface
Project 4.2: Iterative Computation
Project 4.3: Graph Computation

15619 Project: Phase 1
15619 Project: Phase 2
15619 Project: Phase 3
Grading

- All projects are equal weight
  - 18.75% for 15-319
  - 15% for 15-619
- Weekly quizzes (12 in total) are equal weight
  - ~2% for each quiz

<table>
<thead>
<tr>
<th>Course Elements</th>
<th>#</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Projects</td>
<td>4 or 5</td>
<td>75%</td>
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<tr>
<td>OLI Unit Checkpoint Quizzes</td>
<td>12</td>
<td>25%</td>
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</tbody>
</table>
Academic Integrity

It is the responsibility of each student to produce her/his own original academic work.

• Individual work:
  – Weekly Project Modules
  – Unit Checkpoint Quizzes

• Team work:
  – 15-619 Project

Read the university policy on Academic Integrity.
The Penalties are Severe

• Cheating leads to several students being dismissed from the university every semester

LET IT NOT BE YOU!
What is Cheating

• Sharing code or other electronic files either by copying, retyping, looking at, or supplying a copy of any file.
  – Other students, github, stackoverflow, anywhere on the internet,…
• Copying answers to any checkpoint quiz from another individual, published or unpublished written sources, and electronic sources.
• Collaborating with another student or another individual on Unit Checkpoint Quizzes or Project Modules.
• Sharing written work, looking at, copying, or supplying work from another individual, published or unpublished written sources, and electronic sources.
• Collaboration in team projects is strictly limited to the members of the team.
• ...(read the syllabus and the university policy)
Minimum Cheating Penalty

• Must be worse than not submitting anything
  – Example impact of a -100% penalty on a project

<table>
<thead>
<tr>
<th></th>
<th>Perfect Score</th>
<th>Not submitting one</th>
<th>Cheating on one</th>
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</thead>
<tbody>
<tr>
<td>Assessment #1</td>
<td>20%</td>
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<td>Assessment #2</td>
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<td>Assessment #4</td>
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<tr>
<td>Assessment #5</td>
<td>20%</td>
<td>0%</td>
<td>-20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>80%</strong></td>
<td><strong>60%</strong></td>
</tr>
</tbody>
</table>
Course Administration

• Students are automatically registered on OLI through blackboard.andrew.cmu.edu

• A *single* Piazza course page is created
  – We manually register students to Piazza

• Schedule of units and quizzes is on OLI
  – Content weekly quizzes are due on Fridays

• Schedule of weekly projects is on TheProject.Zone
  • Weekly project modules are due on Sundays
Special Note on Amazon EC2

• Paid Cloud Service – billed by the hour
• Start a resource only when you need it
• To explore, use a micro instance
  – You can keep one micro instance running 24x7
• Terminate all other resources as soon as you are done with them
• Students will be penalized for over usage
  – We have a fixed budget, do not abuse the resources!
  – Intentional or unintentional abuse ➔ grade penalties
  – Resources need to be tagged, otherwise ➔ penalties
This Week

• Become familiar with content on OLI
  – Start reading Unit 1, Module 1
  – Quiz 1: Unit 1, Module 1 & 2, Friday, September 11th, 2015

• Projects on TheProject.Zone
  – Primer and P0, due Sunday, September 6th, 2015

• Check that you were enrolled on Piazza

• Create an account on AWS and Azure (ASAP)
  – Submit your AWS account info using the link provided in the primers on TheProject.Zone
Questions?