Syllabus

COEN 241 Introduction to Cloud Computing
Department of Computer Engineering
Santa Clara University

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Course website: http://www.cse.scu.edu/~m1wang/cloud/
Office Hours: Tuesday & Thursday 9:30pm-10:00pm & Saturday 11-11:30am via Zoom

Course Description

Introduction to cloud computing, cloud architecture and service models, the economics of cloud computing, parallel and distributed computing, cluster/grid computing, peer-to-peer networks and computing, internet of things, virtualization, OpenStack, service oriented architecture, high availability, horizontal/vertical scaling, thin client, disaster recovery, free cloud services and open source software, example commercial cloud services, and federation/presence/identity/privacy in cloud computing.

Prerequisites

Basic programming experience (COEN 12), Operating Systems (COEN 283) and Computer Networks (COEN 146)

Required Textbooks

1. “Distributed and Cloud Computing: From Parallel Processing to the Internet of Things”, by Kai Hwang, Jack Dongarra, Geoffrey C. Fox, ISBN: 978-0123858801, Morgan Kaufmann 2011

References

1. "Microservices and Containers", by Parminder Singh Kocher, ISBN: ISBN-13: 978-0134598383, Addison-Wesley 2018
2. “Cloud Computing for Machine Learning and Cognitive Applications” by Kai Hwang, ISBN: 978-0262036412, MIT Press 2017
3. "Cloud Computing for Science and Engineering", by Ian Foster, Dennis B. Gannon, Rich Wolski, Stig Telfer, ISBN: 978-0262037242, MIT Press 2017
4. "Mastering Bitcoin: Programming the Open Blockchain, 2nd Edition", by Andreas M. Antonopoulos, ISBN: 978-1491954386, O'Reilly 2017
5. “OpenStack in Action”, by V.K. Cody Bumgardner, ISBN: 978-1617292163, Manning Publications 2016
6. “Amazon Web Service in Action”, by Andreas Wittig, Michael Wittig, ISBN: 978-1617292880, Manning Publications 2015
7. “Building Microservices: Designing Fine-Grained Systems” by Sam Newman, ISBN: 978-1491950358, O’Reilly 2015
8. “Docker: Up & Running”, by Karl Matthias, Sean P. Kane, ISBN: 978-1491917572, O’Reilly, 2015
9. "OpenStack Cloud Computing Cookbook, 3rd Edition", by Kevin Jackson, Cody Bunch, Eagle Singler, ISBN: 978-1782174783, Packt Publishing 2015
10. "The Practice of Cloud System Administration: Designing and Operating Large Distributed Systems, Volume 2" by Thomas A. Limoncelli, Strata R. Chalup, Christina J. Hogan, ISBN: 978-0321943187, Addison-Wesley, 2014
11. “OpenStack Swift: Using, Administering, and Developing for Swift Object Storage”, by Joe Arnold, ISBN: 978-1491900826, O’Reilly, 2014
12. Cloud Computing: Concepts, Technology & Architecture”, by Thomas Erl , Ricardo Puttini, Zaigham Mahmood, ISBN: 978-0133387520, Pearson 2013
13. “Securing the Cloud: Cloud Computer Security Techniques and Tactics”, by Vic J.R. Winkler, ISBN: 978-1597495929, Syngress, 2011
14. “Erlang Programming”, by Francesco Cesarini, Simon Thompson, ISBN: 978-0596518189, O’Reilly 2009
15. “SOA in Practice: The Art of Distributed System Design (Theory in Practice)”, by Nicolai M. Josuttis, ISBN: 978-0596529550, O’Reilly 2007
16. “Virtual Machines: Versatile Platforms for Systems and Processes” by Jim Smith, Ravi Nair, ISBN: 978-1558609105, Morgan Kaufmann 2005
17. “Grid Computing”, by Joshy Joseph, Craig Fellenstein, ISBN: 978-8129705273, IBM Press 2004
18. “Building Clustered Linux Systems”, by Robert W. Lucke, ISBN: 978-0131448537, Prentice Hall, 2004

Course Objectives

1. To learn advanced and cutting edge state-of-the-art knowledge and implementation in cloud computing.
2. To read and understand research publications in the technical area of cloud computing, beyond that of the traditional textbook level.
3. To conduct group project and to equip for scholarly research in cloud computing.
4. To explore the next generation of cloud computing architectures, models, tools, etc. and other advanced topics if time permits.

Expected Learning Outcomes

1. Demonstrate the knowledge of cloud computing (including cloud architecture and service models, the economics of cloud computing, parallel and distributed computing, cluster/grid computing, peer-to-peer networks and computing, internet of things, virtualization, OpenStack, service oriented architecture, high availability, horizontal/vertical scaling, thin client, disaster recovery, free cloud services and open source software, example commercial cloud services, and federation/presence/identity/privacy in cloud computing).
2. Build example web applications of cloud services using open source cloud computing tools/systems.
3. Read current research papers and implement an example research project in cloud computing.

Grading Policy

Course grade is determined based on the total score (maximum 1100 points + up to 200 optional bonus points for extra work) from:

1. Mid-term and final exams of 200 points each (close book with one A4 note, no sitting together, no wireless connection.) Makeup exams (must have a very good reason) are much more difficult than normal exams.
2. Two programming assignments of 200 points each (late penalty: 40 points/day.) Makeups are more difficult too. You can email to ECCLabMonitors@scu.edu or techdesk@scu.edu, or call 408/554-5700 for setup account or IT support, and ssh linux.dc.engr.scu.edu to work remotely.
3. A group (2-3 people in a team) programming term project of 300 points (late penalty: 60 points/day.) No makeup is allowed.
4. Bonus assignments will be assigned at each week with 20 points each. Due the midnight before next lecture begin by uploading them to Camino with the title "coen241 b*N*" (where *N* can be 2, 3, …, 10). The solution for bonus assignments will be posted on my protected web page. Please read solutions of bonus assignments before asking questions. No late work accepted for bonus assignments. 75-80% of exam questions are similar to bonus assignments.
5. Class average targeted at **A-**.

Table 1: Grade-score table and triple 1/3 rule

1000 - 1300	950 - 999	900 - 949	850 - 899	800 - 849	750 - 799	700 - 749	650 - 699	0 - 649
A	A-	B+	B	B-	C+	C	C-	F

Course Schedule (Tuesday & Thursday 7:40pm-9:30pm)

Table 2: Course Schedule

#	Week	Readings	Remarks
1	1/7 1/9	introduction	submit due 1/9
2	1/14 1/16	cloud architecture, service models, economics,	
3	1/21 1/23	parallel/distributed	program #1 due 1/19
4	1/28 1/30	virtualization	
5	2/4 2/6	research procedure	program #2 due 2/2 problem due 2/4 mid-term exam 2/6 group & topic due 2/7
6	2/11 2/13	cluster/grid computing	paper presentation 2/11 2/13
7	2/18 2/20	peer-to-peer	proposal due 2/18 last day to withdraw 2/21
8	2/25 2/27	distributed consensus, Internet of Things	
9	3/4 3/6	Openstack, SOA, reactive microservices	
10	3/11 3/13	containers, serverless, cloud security	final 3/13
11	3/18	review	project defense 3/18

Reminder

- No cheating, and no register complaint without talking to me first.
- No incomplete. No sit-in or audit the class except formally registered.
- Read files under /home/m1wang/tips for help.
- Handouts, assignments, and solutions will be posted on the web. You should check the class web site at least once a week (and don't forget to refresh the webpage to get the latest versions). You are responsible for printing and bringing the handout to the class if you prefer printed pages though we prefer paperless to reduce global warming.
- Office hours: Tuesday & Thursday 9:30pm-10:00pm in classroom and Saturday 11-11:30am via Zoom meeting.

Honor Code

All students taking course in the school of engineering agree, individually and collectively, they will neither give nor receive unpermitted aid in examinations or other course work that is to be used by the instructor as a basis of grading.

Disability Accommodation Policy:

To request academic accommodations for a disability, students must contact Disability Resources located in The Drahmann Center in Benson, room 214, (408) 554-4111; TTY (408) 554-5445. Students must provide documentation of a disability to Disability Resources prior to receiving accommodations.