CSCE 489-599: Special Topics: Cloud Computing  
(web-only offering for Fall’17)

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TA Office Hours
  Wednesdays, 10:30am-12:30pm; or by appointment

Introductory Video
A short video introducing the syllabus will be available on eCampus by 8/28

Time/Location
This course will be taught as a web-only course offering (session 599). Most of the course is delivered online, except for midterm/final exam and two mandatory sessions as follows:
- One lecture session in September:  
  In the week of 9/11. The specific date will be defined during the first week of classes, based on input from the students;
- Midterm in October:  
  The midterm will be in the week of 10/9. The specific date will be defined during the first week of classes, based on input from the students;
- One session towards the end of the course:  
  The specific date will be defined during the first week of classes, based on input from the students;
- Final exam:  
  The final can be scheduled for Wednesday 12/6 or in the official slot specified by the university or our class. The specific date will be defined during the first week of classes, based on input from the students;

These sessions and exams meet at ETB 2005.

Description
This course introduces students to the fundamental concepts and technologies in cloud computing. Students will gain an understanding of the system software stack that underpins the cloud platform offerings available in industry today. They also learn about the main open challenges in the field and current approaches pursued by the research community to address these problems. Our objective is to enable students to develop the knowledge and skills needed to deploy applications on cloud computing platforms while having an in-depth understanding of the efficiency, availability, and security trade-offs of adopting cloud-based solutions.
The course will cover topics from the operating system and distributed systems fields that form the basis of cloud computing such as virtualization, key-value store solutions, failure detection, datacenter infrastructure, resource management, and scalability. Popular frameworks such as MapReduce/HDFS/Apache Hadoop and cases studies on failure determination are also covered.

**Learning Outcomes**

At the conclusion of this course, students should be able to:

- demonstrate understanding of the key research results that enabled the development of the computing industry and being familiar with the classic papers in this new area;
- demonstrate knowledge of the basic technology components that enable offerings such as Amazon AWS, Microsoft Azure, and OpenStack;
- analyze cloud configuration offerings and assess fitness for specific application domains;
- configure software stacks for cloud deployment and automate develop-deploy cycles;
- identify weaknesses and strengths of cloud offering configurations;
- characterize expected performance, availability, and reliability of common multi-tier application when deployed on cloud platforms.

**Prerequisites**

CSCE 315 or CSCE 313 or CSCE 410

**Textbook or Resource Material**

The course materials are extracted from various research articles published in ACM and IEEE journals/conferences and technical reports on the topics described in the course description. We will also use white papers and documentation from cloud solution providers. The instructors will provide references to the course materials online prior to covering each topic.

**Communication**

For information exchange, we use Piazza. Our Piazza repository is [https://piazza.com/class/j6sf4jfltqy2fj](https://piazza.com/class/j6sf4jfltqy2fj). You should check it often (as in, every weekday!) If you have a project or lecture question, post it to Piazza. If you have found a useful link you want to share, post to Piazza. Basically, Piazza should be your best, first choice medium for all class-related concerns. All class announcements are made through Piazza.

In this class, communication will work as with a large team in a company: everyone has an obligation to chime in and help others by providing information.

We will use e-mail only for student-sensitive concerns. For any other e-mails, we will reply asking that you post your question on Piazza.

We hope you will feel comfortable interacting with us through Piazza or e-mail (for sensitive concerns only). If you want to provide anonymous feedback on the course or ask questions (e.g., this is too slow, this is too hard, what is XYZ), you can text 929-256-2951 (received only by Dr. Da Silva.)

**Grading**

The grade computation formula is described on page 5 of this document.

**Expectations**

The class is designed assuming that you will watch all required videos, read all required documents, and do all programming assignments and activities. The instructors aim at facilitating your learning. Ask for help when you need it, provide ongoing feedback about how to make the course more useful to you.

**Course Content:**

All content for the course, i.e., lecture videos, assignments, quizzes, and activities will be posted on [ecampus.tamu.edu](http://ecampus.tamu.edu)
Schedule
The following is the expected schedule for Fall’17:

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Topic</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/28 – 9/1</td>
<td>Virtualization</td>
<td>P0 available on 8/28; due on 9/8</td>
</tr>
<tr>
<td>9/4-9/8</td>
<td>Datacenters</td>
<td>P0 due on 9/8; quiz</td>
</tr>
<tr>
<td>9/11-9/15</td>
<td>Introduction to Distributed Computing; NoSQL</td>
<td>P1 available on 9/15 and due on 10/6; attend lecture session</td>
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<tr>
<td>9/18-9/22</td>
<td>mongodb, memcached, redis</td>
<td>quiz</td>
</tr>
<tr>
<td>9/25-9/29</td>
<td>mongodb, memcached, redis (continued)</td>
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</tr>
<tr>
<td>10/2-10/6</td>
<td>Peer-to-peer; CAP Theorem</td>
<td>P1 due 10/6;</td>
</tr>
<tr>
<td>10/9-10/13</td>
<td>MapReduce</td>
<td>P2 available 10/9; due 10/16; Midterm (specific day/time to be defined based on student input)</td>
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<tr>
<td>10/16-10/20</td>
<td>HDFS / Apache Hadoop</td>
<td>P2 due 10/16; P3 available 10/16, due on 10/27; quiz</td>
</tr>
<tr>
<td>10/23-10/27</td>
<td>Cloud resource management</td>
<td>P3 due on 10/27; P4 available on 10/29, due on 12/4</td>
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<tr>
<td>10/30-11/3</td>
<td>Cloud resource management (continued)</td>
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<tr>
<td>11/6-11/10</td>
<td>Cloud storage; Cloud offerings</td>
<td>quiz</td>
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<tr>
<td>11/13-11/17</td>
<td>Cloud Outages; Cloud monitoring; Problem determination</td>
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<tr>
<td>11/20-11/24</td>
<td>Catching-up week</td>
<td>Thanksgiving week</td>
</tr>
<tr>
<td>11/27-12/1</td>
<td>Review</td>
<td>attend lecture session; quiz</td>
</tr>
<tr>
<td>12/4-12/8</td>
<td></td>
<td>P4 due on 12/4; Final exam: Wednesday 12/6 7-9pm in ETB 2005</td>
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<tr>
<td>12/11-12/15</td>
<td><em>Alternative only available for students with official university activity during scheduled final exam time</em></td>
<td>Final exam: Wednesday 12/13 6:30-8:30pm in ETB 2005</td>
</tr>
</tbody>
</table>

Reading Assignment Guidance
The course expects the students to use the perusall.com platform to carry out their reading. The tool allows the students to comment on the text and point out passages where they may need help to better understand the material. Some of the reading assignments are technical white papers introducing technological ideas or discussing use cases. Other reading material are scholar work that had impact in the cloud computing field and were published as papers in conferences.

Keep the following observation in mind when carrying out your reading:

- The reading assignments are not about memorizing information as they appear in the text. When learning new concepts or ideas, expressing them using your own words leads to more effective learning than simple memorization;
- The reading assignments may assume knowledge that you do not currently have. Often the text will mention techniques, concepts, or systems that will be covered later on in this course. As you read, add comments to indicate concepts or terms that you do not understand yet;
• There may be terms or concepts that you remember learning in a previous course, but you do not recall it well enough to be useful now. Indicate those terms in your annotations so that the instructors may provide additional background information;
• Some topics of interested may be covered very quickly in the text. Add comments to indicate things you would like to learn more about;
• Annotate the text to identify ideas that you do not agree with;
• Annotate the text to indicate things you found very cool, so that the instructors may provide other sources of information on those topics;
• The computing field changes very fast. Annotate the text to indicate passages that you believe may be outdated;
• Keep a list of key idea/concepts that you learned. Highlight passages related to those ideas so that you can revisit them when preparing for exams.

Absences
University excused absences will be handled consistent with Student Rule 7 (http://student-rules.tamu.edu/rule07). Students missing a timed individual or team event for an excused reason will either be given the opportunity to make up the event at a future time, or will not have the base score for that period used in their grade calculation. For the individual problems that students do on their own time, it is expected that students will work on these problems throughout the period of time they are assigned, so that any absences of less than 2 days should not affect the student’s ability to complete the problem on time. If the student has an excused absence of more than 2 days during the period for which the problems are assigned, the student will be given a number of days equal to the length of the excused absence, less two days, following the original due date or the student’s return (whichever is later). For example, a student who is sick for 4 days during a week would have the deadline for individual problems extended by 2 days.

Academic Honesty:
The Aggie Honor Code is: “An Aggie does not lie, cheat, or steal, or tolerate those who do.” Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/
For this course, a significant amount of work will require solving problems for which a solution or test data might be available or posted online. Unless otherwise specified, students are not allowed to seek out or examine code/data for these problems on their own, prior to turning in their own solutions. Doing so will be considered a violation of the honor code, and students caught doing so will be referred to the honor council, regardless of whether the actual code is copied or not.

ADA Statement:
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information, visit http://disability.tamu.edu.
489-599 cloud
Fall’17 Grading

EXAMS
- Midterm (15 %) – date to be determined based on input from students
- Final (20%) – 12/6 7-9pm at ETB 2005 (alternative only available for students with official university activity at this time: 12/13 6:30-8:30pm)

35%

The Midterm and Final exams are closed-book.

QUIZZES
We will have five online quizzes.

5%

CLASS PARTICIPATION
Requirements:
- Attendance of the two lecture sessions;
- Active participation in Piazza, with at least 5 meaningful posts (e.g. asking a question, answering a question, pointing out related interesting material)

5%

READINGS
White papers and book material will be available at the perusall.com platform, which will assign students a grade based on the level of engagement in the reading as reflected by the comments

10%

PROJECT
We have 5 projects, accounting in your final grade as follows: P0 – 5%, P1 – 10%, P2 – 5%, P3 – 5%, P4 – 20%

Policy for Late Submissions: you start the mini-semester with 4 free days that can be used towards any projects this semester. When you run out of free days, a late assignment will be accepted up to 24 hours after the deadline with a penalty of 30%.

You are required to develop your project using a private repository at github.tamu.edu that you will share with instructor(s) and with grader(s). Your repository is a documentation of your development process. You are required to have clear commit messages that document the bugs you identified, corresponding fixes, addition of test cases, etc. Your github usage will impact your grade. For example, having all the code added to the repository and submitted within a short period of time (the magic of going from no code to a working solution quickly) will result in a very low grade.