CS450/IT394 Distributed Application Development

Course Description

Purpose
The purpose of this course is to introduce cadets to the concepts underlying distributed systems. Building on the foundations of algorithm implementation, data representation, web development, and basic networking, this course focuses on the principles of constructing a distributed application. Cadets study the principles, construction, and interaction of user interface, network, web server, and database components to produce an effective distributed application. Cadets will learn new tools and skills working as a team to analyze, design, and implement a system that solves a given problem.

Scope
The course introduces the following topics:

1. Foundations of Cloud Computing, Parallel and Distributed Systems.
2. Design and Development of SaaS applications. Including: use of a framework, software development tools, techniques, and procedures that support behavioral driven design (BDD) and test driven development (TDD); application deployment and documentation (user, operator, and deployment).
3. Distributed Architectures.

Course Objectives
At the end of the course cadets will:

1. Be able to recognize, describe, define and differentiate the major concepts in a discussion of a distributed system.
2. Be able to compare and contrast different methods of providing distributed systems.
3. Have an understanding of the key mechanisms of distributed systems and the choices that must be considered in the design, selection and employment of a distributed system.
4. Have an expanded understanding of how distributed systems concepts are implemented in several different distributed systems.

Administration
Instructor
Maj Mark E. DeYoung, USAF; Office: TH1120; e-mail: mark.deyoung@usma.edu

Time & Place
C, I & J Hours, TH172.

Textbook
Cloud Computing: Theory and Practice Dan C. Marinescu
http://techbus.safaribooksonline.com/book/operating-systems-and-server-administration/virtualization/9780124046276

Prerequisites
CS393/CS350 *Database Design and Implementation* is a mandatory prerequisite. This course uses relational database systems and extends data modeling concepts into object oriented concepts.

Evaluation
There will be a multi-phased Project that involves open ended design problems, limited design problems and implementation of major distributed systems concepts. Design problems will require specification, modeling and test development. There are also multiple Homework assignments, Presentations, a Written Partial Review, and an Instructor Grade.

Homework (combined)	200
Project (combined)	500
Presentations (combined)	100
WPR	150
Instructor Grade	50
Total	1,000

Letter Grade Cut-Off

The following describes the meaning of assigned grades.

Earned Score	Letter Grade	Definition
>= 97 %	A+	Beyond Course Expectations
>= 93 %	A	Dominates the Material
>= 90 %	A-	Mastery
>= 87 %	B+	Good Understanding with Flashes of Stellar Work
>= 83 %	B	Good Understanding
>= 80 %	B-	On the Right Track
>= 77 %	C+	Can Build on this Foundation
>= 73 %	C	Adequate
>= 70 %	C-	Short Range Understanding
>= 65 %	D	Probably Failed to Demonstrate
>= 0 %	F	Definitely Failed to Demonstrate

Policies

Lesson Preparation

You are expected to actively complete reading assignments before class. **Taking notes while reading and annotating your readings is highly recommended.** Reading with classmates and checking each other's understanding of the material by paraphrasing, summarizing and teaching each other is also recommended. You are encouraged to form reading groups where you can read aloud to each other and check your understanding of the material. You are encouraged to seek additional resources relevant to lesson objectives (see Additional Resources).

Lesson Participation

The expected level of participation is that you will be able to brief, summarize, paraphrase, and teach your fellow cadets each lesson. **If you are not prepared to brief, summarize, and teach your classmates then you are not fully ready for class. You are expected to take notes during class.**

Documentation of Academic Work

Documentation will clearly state exactly what, when, how, and from whom the help and/or collaboration came. You will be required to resubmit work with incomplete and/or ambiguous documentation (with late penalties). The instructions in Documentation of Academic Work (DAW), current version, will be followed.

Reliance on the Work of Others

For this course the following items are considered common knowledge:

- Ideas from the course texts
- Ideas from your instructor
- Ideas discussed in class with the participation of your instructor (i.e., not private conversations between individuals or teams)
- Anything discussed during the course of additional instruction

If you use verbatim copy or near verbatim copy of any material (including common knowledge) you must reference the material.

Each cadet (or cadet team) must personally enter all work submitted under his/her name. Submission of work that you did not create and subsequently manually or electronically copied - while permitted - does not provide for learning. If such copying and/or collaboration takes place it must be documented in accordance with DAW.

If submitted work is inadequately researched, leans too heavily on a single source or sources, employs an excessive degree of verbatim or paraphrased use of another's work, has been written by another person, is improperly documented, is a solution copied from another person's work, or merely repeats, without evidence of original thought, ideas and data gained from any source, the grade may be cut at the discretion of the instructor. Such a cut would be based primarily on indications of insufficient reflection of individual thinking in the submitted work.

Assignment Completion

Course assignments are designed to help cadets explore and perform certain aspects of distributed systems design and implementation. Assignments that require the development and implementation of a program/system should function correctly (i.e. programs must be syntactically correct and semantically complete). Any submission that is not functional will not be accepted for grading without written justification by the submitter(s).

Late Submission

Cadets are encouraged to complete and submit assignments early when possible. Cadets are expected to complete and submit assignments on the date and at the time they are due. If they are late they will receive a reduced grade in accordance with Dean's policy. Up to a full letter grade cut may be imposed for every 24 hours (includes weekends and holidays) that an assignment is late. After 96 hours as few as zero points may be awarded and the cadet may be subject to disciplinary procedures. Regardless of the timing – ALL ASSIGNMENTS MUST BE COMPLETED AND TURNED IN.

Up to 24 hours late	as much as 1 letter grade reduction
24-48 hours late	as much as 2 letter grade reduction
48-72 hours late	as much as 3 letter grade reduction
72-96 hours late	F grade with some points
More than 96 hours late	F grade and as few as 0 points

Additional Instruction

Cadets are encouraged to seek additional instruction (AI) whenever they have difficulty mastering the materials. Please attempt to schedule AI in advance. Cadets can also ask for *ad hoc* AI; however, other demands may preclude spontaneous AI, so scheduling an appointment is usually the better method. **Be prepared for AI with your annotated readings and your class notes.**

Additional Resources

You are expected to seek out and use high quality resources to support your course work. Two starting points to locate acceptable resources are listed below:

- Safari Books Online, which is available from the DoD MWR Libraries through your AKO account, has several useful texts.
- The ACM Digital Library, IEEE Xplore, Computer & Applied Sciences Complete and several other electronic collections are available via the USMA Library at http://usma.libguides.com/DEECS.