ITEC 2210 3.0 A System Administration - Fall 2023

Instructor: Jamon Camisso – jamon@yorku.ca

Lecture Location: ACE 003

Lecture Time: Wednesdays 19:00-22:00

Lab Location: At end of class / online

Course site: https://eclass.yorku.ca/

Course Chat: https://mattermost.itec2210.ca

Office Hours: I will be available most evenings via Mattermost.

Course Description

Effective System Administration requires familiarity with a broad range of topics in computing. This course will explore some of the main areas of responsibility and underlying architectures that you will typically encounter in a System Administrator role. While the syllabus outline may at first appear to cover a diverse set of topics, the techniques that will be taught in this course apply to every area and every operating system, and will provide a unifying approach to studying the material.

Objectives

This course is intended to provide an overview of the research, design, problem solving, and analysis techniques with which a System Administrator should be familiar. It is not intended to be comprehensive in any one area, nor will it focus on any one particular technology, tool, or software vendor. Rather, the aim is to explore each weekly topic using the required readings for a base of information, to sufficient depth that when said area is encountered in the workplace, you will know the correct questions to ask, and where to look to find more information about a topic. As an example: after covering troubleshooting techniques, by the end of the course if an undiagnosed problem were to be encountered on a live system, you will be

able to investigate, research, and resolve the issue despite not being familiar with the particular application, architecture, or network configuration in question.

Lecture Topics

Week	Topic
Week 1, Sept 6	Introduction: course outline, syllabus review, important dates, troubleshooting
Week 2, Sept 13	Launching a new service: planning, readiness review
Week 3, Sept 20	Virtualization: application and OS virtualization, containers, Kubernetes
Week 4, Sept 27	TCP/IP and the OSI model: what is this Internet thing anyway?
Week 5, Oct 4	Namespaces: naming things is harder than you think
Week 6, Oct 11	Reading Week, assignment 1 due
Week 7, Oct 18	Midterm
Week 7, Oct 25	Backups and recovery strategies: what to do when disaster strikes
Week 8, Nov 1	Encryption
Week 9, Nov 8	Monitoring: real-time, historical, proactive, reactive
Week 10, Nov 15	Infrastructure as Code, Configuration Management
Week 11, Nov 22	Security best practices: encryption, firewalls, defence in depth
Week 12, Nov 29	Kubernetes
Exam	Dec 7-21, date/format to be determined

Required readings

1. Limoncelli, T., Hogan, C., & Chalup, S. (2017). *The practice of system and network administration (3rd ed.)*. Boston: Addison-Wesley.

The bookstore should have copies, and though it is large, it is worth purchasing a copy for future reference. Will refer to the text as “PSNA”, e.g.

PSNA 3,5 for chapters 3 and 5, PSNA 16(p283-291) for chapter 16, pages 283-291.

2. Beyer, B., Jones, C., Petoff, J., & Murphy, N. (2016). *Site Reliability Engineering*. Sebastopol, CA: OReilly Media.

Available free online at https://sre.google/sre-book/table-of-contents/. Will refer to as "SRE", e.g. SRE 1,2 for chapters 1 and 2.

Reading schedule

Week	Topic
Week 1	SRE chapter 12 - Effective Troubleshooting PSNA chapter 29 - Debugging
Week 2	PSNA chapter 19 - Service Launch: Fundamentals
Week 3	PSNA 13, section 13.3 (p227-235) Chapter 3, *Selecting a Service Platform* from: Limoncelli, T., Chalup, S. R., Hogan, C. J., & Limoncelli, T. (2015). *The practice of cloud system administration: designing and operating large distributed systems*. Upper Saddle River, NJ: Addison-Wesley. Available via forthcoming Moodle link
Week 4	PSNA chapter 23 Network Architecture p399-401 OSI model p404 VLAN Myths p408-422 Sections 23.5-23.8 inclusive P425-430 Sections 23.10-23.12 inclusive
Week 5	PSNA Chapter 39/40 - sections: 39-39.3 39.5-39.8

	40-40.2
Week 6	N/A Reading week
Week 7	Midterm
Week 8	PSNA chapter 44 - “Everyone hates backups”
Week 9	Chapter 1 of Menezes, A. J., C., V. O., & Vanstone, S. A. (2001). *Handbook of applied cryptography*. Boca Raton: CRC Press. Available free: https://cacr.uwaterloo.ca/hac/)
Week 10	SRE - Monitoring Distributed Systems PSNA Chapter 38 – Service Monitoring
Week 11	PSNA Chapter 4 – Infrastructure as Code
Week 12	OWASP Top 10 Application Security Risks IAD’s Top 10 Information Assurance Mitigation Strategies
Week 13	Kubernetes docs
Exam	Cumulative, focus on 2nd half of the course

Assignments

You are free to collaborate on assignments, but ultimately you will derive the most benefit from completing exercises yourself instead of copying from others. Assignments (there are three) will comprise 15% of your overall mark. **If you do not complete an assignment, that portion of the mark will be subtracted from the weight of your final exam. For example, if you do not hand in Assignment 1, your final exam will be worth 50% of your mark instead of 55%.**

This policy is designed to encourage you to attempt assignments. We will devote a considerable amount of class time to collaborating on the assignments, and by just following along you will be able to earn full marks.

Assignment 1: technical task of setting up a cloud based virtual machine and installing a ticketing system.

Assignment 2: create a Certificate Authority and sign a provided CSR.

Assignment 3: install Mattermost server of your own in your virtual machine.

Exams

Midterm: covering material since the beginning of the course. Will take place via eClass server instead of a lecture. Worth 30% of your final grade.

Final exam: covering material from the beginning to the end of the course. 55% of your final grade.

Useful Tips

Even if you decide not to take this course, here are a few helpful pieces of advice:

1. Logs logs logs. There is a log file somewhere. When you're troubleshooting, your first task should be to locate the relevant log file(s). If there aren't any, turn logging on, and then start troubleshooting. Logs are your best and most useful system administration friends.

2. Practice Rubber Duck Debugging

3. File bug reports using the EAR template: expected behaviour, actual behaviour, reproduction steps. Explain what you wanted to happen, what happened, and how you made it happen. Your colleagues will appreciate it, as will people to whom you report issues like 3rd party software vendors.

Useful Linux Tools

Navigating filesystems: cd, ls, pwd

Testing HTTP requests: curl, wget, netcat/nc (same tool), elinks

Viewing files: cat, less, view, head, tail

Examining processes: ps, pstree, top, pidof

Network debugging: netcat/nc, tcpdump, netstat, ip/ifconfig, ping, traceroute, whois, dig, nslookup, iptables