Course Syllabus

Instructor: Prof. Renato J. Figueiredo (renato@acis.ufl.edu)
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Office Hours: TBD, please refer to my online schedule at **http://byron.acis.ufl.edu (http://byron.acis.ufl.edu/)**

Text: "Virtual Machines", James E. Smith and Ravi Nair (Morgan Kaufmann), ISBN 1558609105, April 2005. Readings will also be based on a collection of relevant technical papers.

Web page: UF's Canvas E-learning – you need to log in with your Gatorlink account

Topics Covered: Virtualization technologies allow the decoupling of the user-perceived behavior of hardware/software systems from their physical implementation. Techniques to virtualize the basic functionality of today's typical computing systems – processing, networking, and data storage – are becoming pervasive in industry and form a foundation for the Infrastructure-as-a-Service (Iaas) cloud computing model. The combination of virtualization technologies and ubiquitous network connectivity allows for the creation of virtual computers where processing, data and communication are distributed and decoupled from physical resources. This class will cover the basic mechanisms and techniques involved in resource virtualization, from individual machines to virtualized networked infrastructures.

Prerequisites: Principles of Computer Systems Design (EEL 5737), Computer architecture (EEL5764 or equivalent) and operating systems principles (COP5615 or equivalent) or instructor approval. Knowledge of TCP/IP networking and C/C++ programming.

Computer usage: You will use virtual machines for assignments. Detailed instructions will be given in class.

Assignments: Homeworks and a project will be assigned in this class. The project entails an exploration of a topic related to virtual computers. Solid knowledge of high-level/scripting languages (e.g. C, C++, C#, Java, Python) and proficiency in programming are expected from students.

Exams: There will be 2 midterms and one final exam in this class, to be scheduled.

Grade: The grade will be based on assignments, and exams. A tentative breakdown of the final grade is: 30% assignments, 40% midterm exams, 30% final exam. Refer to this site for University grading policies: http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html

Course topics:

Virtual machines (approximately 70% of the material)

- Taxonomy and basic principles

- Classic virtual machines; VMware, KVM

- Application-level and para-virtualized virtual machines; Xen

- Processor extensions in support of virtualization; Intel VT

- Hardware-based virtual machines and binary translation

- O/S containers

- VM migration

- VM security

- VM high-availability

Virtual networking (approximately 20% of the material)

- Virtual adapters, links, switches

- Tunneling

- Software-defined networking (SDN)

- Applications in distributed systems: grid and cloud computing

Virtual storage (approximately 10% of the material)

- Basic principles

- Centralized and distributed file systems

- Virtual file systems

- VM file systems

Course Summary:

Date	Details