City University of Hong Kong

Information on a Course
offered by Department of Computer Science
with effect from Semester A in 2013 / 2014

Part I

Course Title: Cloud Computing: Theory and Practice

Course Code: CS5296

Course Duration: One Semester

No. of Credit Units: 3

Level: P5

Medium of Instruction: English

Prerequisites: Nil

Precursors: CS5222 Computer Networks and Internets

Equivalent Courses: Nil

Exclusive Courses:

Part II

Course Aims:

This course aims to examine the critical technology trends of cloud computing, in particular, the architecture and design of existing deployments, the services and applications that cloud computing can offer, and the challenges that need to be addressed to help cloud computing reach its full potential. In addition to understanding the core technologies in cloud computing, students are expected to apply this knowledge in a critical evaluation of emerging cloud computing platforms and services and to acquire an appreciation of cloud management tools through hands on laboratory exercises.

Course Intended Learning Outcomes (CILOs)
Upon successful completion of this course, students should be able to:

No.	CILOs	Weighting (if applicable)
1.	Explain the overall concepts and underlying technologies of cloud computing applications including the essential characteristics and service models.	20%

2.	Describe the key cloud computing models including Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).	15%
3.	Describe the underlying principles of different virtualization technologies and their application to the virtualization of clusters and data centers.	20%
4.	Identify the security issues in both private and public cloud computing systems and evaluate the merit of proposed solutions.	25%
5.	Analyze and evaluate the trends and problems of modern cloud computing services such as Amazon EC2, Google AppEngine and Windows Azure.	20%

Teaching and learning Activities (TLAs)

(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

Teaching pattern:
Suggested lecture/laboratory mix: 2 hrs. lecture; 1 hr. tutorial.

TLA	Remarks	ILOs to be addressed
Lecture	Lectures will cover the essential concept, common platforms and core technologies in mobile application development.	1, 2, 3, 4, 5
Tutorial / Laboratory exercises	Tutorials will be in the form of case studies, analytical questions and answers, and hands on laboratory exercises. Case studies and analytical questions are designed to review the material covered in the lectures, widen students' exposure on the related topics and creatively apply concepts learned to new scenarios. Laboratory exercises provide an opportunity for students to use cloud management tools for resources provisioning as well as security and performance monitoring.	1, 2, 3, 4, 5
Written assignments	Written assignments will test students' understanding of the key technical issues. The questions will be designed such that students are required to apply their knowledge creatively to arrive at the solutions.	1, 2, 3, 4
Case study	Students need to perform a case study in which they evaluate the effectiveness of a cloud computing platform or service in supporting a particular user application or service requirement.	5

Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs.
Final details will be provided to students in their first week of attendance in this course)

CILO No.	Type of Assessment Tasks/Activities	Weighting (if applicable)	Remarks
CILO 1	**Written assignment / Quiz/ Examination** Clarity and correctness in describing and identifying the main concepts and the key technical drivers for the emerging of the cloud computing paradigm will be the measurement of this CILO.	20%	
CILO 2	**Written assignment / Quiz/ Examination** Students are expected to be able to delineate the key characteristics, benefits and limitations of the key cloud computing model to achieve this CILO.	15%	
CILO 3	**Written assignment / Quiz/ Examination** Clarity and correctness in describing and identifying the various technologies used in virtualization and their application to cluster and data center virtualization will be the key requirement for this CILO.	20%	
CILO 4	**Written Assignment /Quiz/ Examination** Students are expected to demonstrate solid knowledge in assessment of the security issues in various cloud computing systems as well as the trade-offs among different approaches in addressing these issues.	25%	
CILO 5	**Case Study/ Examination** The ability to critically evaluate and compare different cloud platforms and their suitability for meeting the service requirements of different applications will be the measurement of this CILO.	20%	

Grading of Student Achievement:

Examination duration: 2 hours
Percentage of coursework, examination, etc.: 40% CW; 60% Exam
Grading pattern: Standard (A+AA-…F)
For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Part III

Keyword Syllabus:

On-demand self-service and resource pooling; rapid elasticity; measured service; Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS); virtualization technologies: hypervisor and virtual machines, full vs paravirtualization; cloud storage architecture; data deduplication; cloud security issues: storage outsourcing versus storage auditing, data encryption versus computing over encrypted data, resource virtualization versus side channel or covert channel attacks; case studies of current cloud computing platforms: Azure, EC2.

Recommended Reading:

Text(s):

Guide to Cloud Computing: Principles and Practice, Richard Hill, Laura Hirsch, Peter Lake and Siavash Moshiri, Springer, 2013.

Cloud Computing: Concepts, Technology & Architecture, Thomas Erl, Ricardo Puttini, Zaigham Mahmood, Prentice Hall, 2013.

Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra and Geoffrey C. Fox, Morgan Kaufmann, 2011.

Security Challenges for the Public Cloud, Kui Ren, Cong Wang, Qian Wang, IEEE Internet Computing 16(1): 69-73 (2012)

Security and Privacy Challenges in Cloud Computing Environments, Hassan Takabi, James B. D. Joshi, Gail-Joon Ahn IEEE Security & Privacy 8(6): 24-31 (2010)