GUJARAT TECHNOLOGICAL UNIVERSITY

COMPUTER ENGINEERING (SYSTEMS & NETWORK SECURITY)(56)
CLOUD SECURITY
SUBJECT CODE: 2735603
M.E. 3rd SEMESTER

Type of course: Elective IV

Prerequisite: Information and Network security, Distributed Systems

Rationale: This course will help to understand the security considerations that are needed to be addressed by the information security professionals that are attached to organization that uses cloud computing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA(M)	PA (V)		PA(I)		
						PA	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Content:

Sr. No	Topics	Teaching Hrs.	Module Weightage
1	**Introduction to Cloud Computing:** The Evolution of Cloud Computing, What is Cloud computing? , SPI framework of Cloud Computing, Traditional Software Model, Cloud Service Delivery model, Cloud Deployment Models, Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise.	5	15%
2	**Security Fundamentals and Risk Issues in the Cloud:** Cloud Information Security Objectives, Cloud Security Services, Cloud Security Design Principles, Secure Cloud Software Requirements, Security Policy Implementation and decomposition, Cloud Computing and Business Continuity/Disaster Recovery, CIA triad, Privacy and compliance risk.	4	10%
3	**Infrastructure Security:** Infrastructure Security: The Network Level, Infrastructure Security: The Host Level, Infrastructure Security: The Application Level	4	15%
4	**Data Security and Storage:** Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security	4	10%

5	**Identity and Access Management:** Trust Boundaries and IAM, Why IAM? , IAM Challenges, IAM Definitions, IAM Architecture and Practice, Getting Ready for the Cloud, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud. Cloud Authorization Management, Cloud Service Provider IAM Practice	6	20%
6	**Security Management in the Cloud:** Security Management Standards, Security Management in the Cloud, Availability Management, SaaS Availability Management, PaaS Availability Management, IaaS Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management	8	20%
7	**Examples of Cloud Service Providers:** Amazon Web Services (IaaS), Google (SaaS, PaaS), Microsoft Azure Services Platform (PaaS), Proofpoint (SaaS, IaaS), RightScale (IaaS), Salesforce.com (SaaS, PaaS), Sun Open Cloud Platform, Workday (SaaS)	4	10%

Reference Books:

1. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy, O'Reilly.
2. Raghu Yeluri and Enrique Castro-Leon, Building the Infrastructure for Cloud Security A Solutions view, Apress open.
3. Ronald L. Krutz and Russell Dean Vines, Cloud Security A Comprehensive Guide to Secure Cloud Computing, Wiley

Course Outcome:

After successful completion of the course, student will be able to

1. Evaluate the various layers of cloud infrastructure
2. Integrate encryption and identity management services in a cloud environment
3. Perform vulnerability assessments in a cloud environment
4. Develop a cloud disaster recovery and business continuity plan

List of Experiments:

1. Build a threat model for migrating to cloud.
2. Create a basic cloud instance on public cloud infrastructure and a security baseline
3. Encrypt public cloud data: learn about cloud storage options and encrypt the data for the public cloud deployment.
4. Identity Management for the cloud: Create a basic federated identity infrastructure to support their cloud application and learn additional details on standards like SAML and Oauth.
5. Private Cloud Analysis Risk
6. Create and Secure Private Cloud.

Design based Problems (DP)/Open Ended Problem:

1. Amazon Web Services (IaaS)

2. Google (SaaS, PaaS)
3. Microsoft Azure Services Platform (PaaS)
4. Proofpoint (SaaS, IaaS)
5. RightScale (IaaS)
6. Salesforce.com (SaaS, PaaS)
7. Sun Open Cloud Platform
8. Workday (SaaS)

Major Equipments:

Latest PC with required software

List of Open Source Software/learning website:

- Open Web Application Security Project (OWASP) www.owasp.org
- Open Grid Forum (OGF) http://www.ogf.org
- Cloud Security Alliance http://www.cloudsecurityalliance.org/
- Open Cloud Consortium (OCC) opencloudconsortium.org/

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.