SILVER OAK UNIVERSITY

College of Technology

Bachelor of Technology

Information Technology

Course Name: Data Center Management

Course Code:1010103462

Semester:7th

Prerequisite:

Basic understanding of cloud computing and computer networks.

Objective:

1. Understand the Fundamentals and Evolution of Data Centers.
2. Develop Skills in Data Center Virtualization and Resource Management.
3. Apply Data Center Best Practices for Sustainability and Security.

Teaching Scheme:

Teaching Scheme				
L	T	P	Contact Hours	Credit
3	0	2	5	4

Contents:

Unit	Topics	Teaching Hours	Weightage %
1	**Journey to the Cloud:** Definition of Cloud Computing, Characteristics of Cloud computing as per NIST, Cloud Models – Private, Public and Hybrid; Steps involved in transitioning from Classic data center to Cloud computing environment, Cloud Services Iaas, PaaS and SaaS.	5	15
2	**Data Center Challenges:** Reducing data center footprint through server, desktop,network Virtualization, and cloud computing, environmental impact, and power requirements by driving server consolidation.	4	10
3	**Evolution of Data Centre:** The evolution of computing infrastructures and architectures from standalone servers to rack-optimized blade servers and unified computing systems (UCS)	4	10
4	**Enterprise-level Virtualization:** Provision, monitoring, and management of a virtual datacenter and multiple enterprise-level virtual servers and virtual machines through software management interfaces.	5	10
5	**Networking and Storage in Enterprise Virtualized Environments:** Connectivity to the storage area and IP networks from within virtualized environments using industry-standard protocols.	4	10

6	**Virtual Machines & Access Control:** Virtual machine deployment, modification, management. Monitoring and migration methodologies.	7	15
7	**Resource Monitoring:** Physical and virtual machine memory, CPU management, and abstraction techniques using a hypervisor.	4	10
8	**Virtual Machine Data Protection:** Backup and recovery of virtual machines using data recovery techniques	4	10
9	**Scalability:** Scalability features within Enterprise virtualized environments using advanced management applications that enable clustering, distributed network switches for clustering, network and storage expansion; High Availability: Virtualization high availability and redundancy techniques.	5	10

Course Outcomes:

Sr. No.	CO Statement	Unit
CO-1	Understand the concept of cloud computing and its characteristics	1
CO-2	Analyze and justify the need for transition from the classic data center to the virtual data center.	2,3
CO-3	Manage Server Systems and Data Centre Infrastructure Management	4
CO-4	Utilize the Storage, Bandwidth, Efficiency of systems, and other resources for the Datacenter.	5
CO-5	Evaluate the performance of networks and resources.	6,7
CO-6	Design a plan for flexible resource allocation.	8,9

Teaching & Learning Methodology:

1. Problem - based learning
2. Design Thinking
3. Cooperative-based learning

List of Experiments: Total Hours: 28

Sr. No.	Practical Name
1	Monitoring the cluster using Nagios /Ganglia tools.
2	Resource allocation to clients on Cloud/cluster.
3	Implementation of para-virtualization using VM Ware‘s Workstation/ Oracle‘s Virtual Box and Guest O.S.
4	Implementation of SOAP Web services in C#/JAVA Applications.
5	Case Study: PAAS (Facebook, Google App Engine).
6	Case Study: Amazon Web Services.
7	Using Vsphere install 3 Linux machine and access it through other machines.
8	How to secure the Nginx server using fail2ban on centos 7. So up to now, we secure the webserver by using HTTPS and fail2ban. Now we have to host some websites on the server on Nginx and we have to secure it. So install Moodle and orange HRM (You can take any website like Edx)in one machine and secure it by fail2ban and HTTPS. After that, you have to take back up (Data and Database) of both websites. And restore it to another machine to make the replica of the webserver.

9	Use a virtualization platform (e.g., VMware, Hyper-V) to create a full backup of an existing virtual machine. Document the steps involved in performing the backup, including any tools or software used.
10	Configure and perform incremental backups for a virtual machine over a specified period. Demonstrate how to restore the virtual machine to a specific point in time using the incremental backups.

Major Equipment:

1. Linux (Kali/Fedora/centos 7)
2. Network Simulators
3. VMWare Workstation
4. ESXI Server
5. Router
6. Switch
7. Moodle
8. Nginx
9. Fail2ban

Books Recommended:

1. Hwaiyu Geng, “The Data Center Handbook”, Wiley
2. Craig S. Mullins, ”Data Center Approach”, MC Press.
3. Jeroen Mulder, “Data Center Infrastructure Management: Real-World Insights from IT Experts”, Apress
4. Caesar Wu and Rajkumar Buyya, “Cloud Data Centers and Cost Modeling: A Complete Guide To Planning, Designing and Building a Cloud Data Center”, Morgan Kaufmann

List of Open-Source Software/learning website:

1. https://www.tutorialspoint.com/data-center-essentials-general-introduction/index.asp
2. https://www.youtube.com/watch?v=DlA2p5L_osM
3. https://www.youtube.com/watch?v=Amow8BJm5Go

CO-PO-PSO Matrix:

CO. No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	1	1	1	1							2	1	2
CO-2	3	2	3	2	3							1	1	1
CO-3	3	2	2	2	3							1	1	2
CO-4	3	2	1	1	2							2	1	1
CO-5	3	2	2	1	3							2	1	1
CO-6	2	2	1	3	2							1	2	1