SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

VI SEMESTER

1904603 – GRID AND CLOUD COMPUTING

Regulation – 2019

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SUBJECT   : 1904603 – GRID AND CLOUD COMPUTING

SEM/YEAR : VI/III

	UNIT I INTRODUCTION			
	Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers – Grid computing Infrastructures – Introduction to Grid Architecture and standards – Elements of Grid –Overview of Grid Architecture			
	PART-A			
Q.No	**Questions**		**BT Level**	**Competence**
1	**Show** the evolutionary trend towards parallel distributed and cloud computing.		BTL-3	Apply
2	**What** is Grid Computing?		BTL-1	Remember
3	**Give** the applications of grid computing.		BTL-2	Understand
4	**Tabulate** the differences between High performance Computing and High throughput computing.		BTL-5	Evaluate
5	**Define** Parallel Computing.		BTL-1	Remember
6	**State** Cluster Computing.		BTL-1	Remember
7	**List** the grid simulation tools.		BTL-1	Remember
8	**Draw** the Hype Cycle of new technologies.		BTL-1	Remember
9	**Analyze** the working of GPUs.		BTL-4	Analyze
10	**Classify** the primitive operations of virtual machines.		BTL-3	Apply
11	**List** out the advantages of cluster design.		BTL-1	Remember
12	**Differentiate** computational and data grid		BTL-2	Understand
13	**Why** the web services are key enabler in grid computing.		BTL-3	Apply
14	**Give** the basic operations of a VM.		BTL-2	Understand
15	**Differentiate** grid computing and cloud computing.		BTL-4	Analyze
16	**Formulate** the features of data grid.		BTL-6	Create
17	**Summarize** the technologies available in grid standards.		BTL-4	Analyze
18	Bring out the **differences** between private cloud and public cloud		BTL-2	Understand
19	**Highlight** the importance of the term "cloud computing"		BTL-3	Apply
20	**Analyze** the features of grid FTP.		BTL-4	Analyze
21	**Name** the standards in WSRF.		BTL-2	Understand
22	**Describe** the standards related to web service.		BTL-5	Evaluate

23	"Grid inherits features of P2P and Cluster Computing System". Is the statement true? **Validate** your answer.		BTL-5	Evaluate
24	**Generalize** the layers in grid architecture.		BTL-6	Create
	PART-B			
1	**Identify** and explain in detail about the age of internet computing with suitable diagrams.	13	BTL-1	Remember
2	i) **Summarize** in detail about the typical view of grid environment. ii) **Discuss** the application of high performance and high throughput system.	6 7	BTL-2	Understand
3	**Illustrate** the infrastructure requirement for grid computing.	13	BTL-3	Apply
4.	Write short notes on i) Multicore CPU ii) Multithreading Technologies	7 6	BTL-2	Understand
5	**Explain** the scalable computing trends and new paradigms	13	BTL-1	Remember
6	**Illustrate** the grid architecture in detail.	13	BTL-3	Apply
7	**Evaluate** virtual machine and virtualization middleware in network-based system.	13	BTL-5	Evaluate
8	**Generalize** the ideas of i) Peer to Peer Network Families. ii) Client Server Architecture.	7 6	BTL-3	Apply
9	What are the data and functional requirements of grid computing?	13	BTL-2	Understand
10	i) **Explain** in detail about the grid standards. ii) **Compare** the features of grid versus cloud.	7 6	BTL-6	Create
11	**Differentiate** and Analyse computational, data grid with P2P grids.	13	BTL-4	Analyze
12	**Brief** the interaction between the GPU and CPU in performing parallel execution of operations.	13	BTL-5	Evaluate
13	**Describe** the architecture of virtual machine and about its operations.	13	BTL-4	Analyze
14	**Explain** in detail about the elements of grid.	13	BTL-1	Remember
15	**Explain** the memory, storage and wide area networking technology in network based system.	13	BTL-1	Remember
16	**Describe** layered grid architecture. How does it map onto internet protocol architecture?	13	BTL-4	Analyze
17	**Describe** the clusters of cooperative computers with suitable llustrations.	13	BTL-2	Understand
	PART C			
1	**Develop** a narration in detail comparing the various Grid Standards and discuss the Grid Architecture with a neat diagram.	15	BTL-6	Create
2	Compare the following Five Micro-architectures for Modern Processors in terms of Architecture Characteristics, Advantages/ Shortcomings and Representative Processors. • Single-threaded	15	BTL-5	Evaluate

	• Superscalar Fine-grain Multithreading • Coarse-grain Multithreading • Simultaneous Multithreading (SMT) • Multicore Chip Multiprocessor (CMP)			
3	**Point out** the similarities and differences between traditional computing clusters/grids and the computing clouds launched in recent years. Also discuss the possible convergence of the two computing paradigms in the future.	15	BTL-5	Evaluate
4	Consider a multicore processor with four heterogeneous cores labeled A, B, C, and D. Assume cores A and D have the same speed. Core B runs twice as fast as core A, and core C runs three times faster than core A. Assume that all four cores start executing the following application at the same time and no cache misses are encountered in all core operations. Suppose an application needs to compute the square of each element of an array of 256 elements. Assume 1 unit time for core A or D to compute the square of an element. Thus, core B takes 1/2 unit time and core C takes 1/3 unit times to compute the square of an element. Given the following division of labor in four cores: Core A 32 elements Core B 28 elements Core C 64 elements Core D 32 elements		BTL-6	Create
	i) a.Compute the total execution time (in time units) for using the four-core processor to compute the squares of 256 elements in parallel. The four cores have different speeds. Some faster cores finish the job and may become idle, while others are still busy computing until all squares are computed. b.Calculate the processor utilization rate, which is the total amount of time the cores are busy (not idle) divided by the total execution time they are using all cores in the processor to execute the above application.	10		
	ii).Explain in detail about multicore CPU	5		
5	Explain some of the grid application and their usage patterns.	15	BTL-5	Evaluate
	UNIT II CLOUD ENABLING TECHNOLOGIES			
	Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish☐Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU –Memory – I/O Devices – Virtualization Support and Disaster Recovery.			
	PART A			
1	**What** are the major roles within SOA?		BTL-1	Remember
2	**What** is mean by Virtualization?		BTL-1	Remember
3	**Draw** the Layered architecture for web services and the grids.		BTL-2	Understand
4	**Give** the levels of virtualization.		BTL-2	Understand

5	**Compare** Grids versus Clouds		BTL-4	Analyze
6	**Show** the importance of Web services.		BTL-3	Apply
7	**Define** virtual machine monitor.		BTL-1	Remember
8	**What** are the Performance metrics needed to measure various distributed systems?		BTL-1	Remember
9	**Comment** on REST Architectural Elements.		BTL-6	Create
10	**Give** the sample REST Request-Response for creating a S3 Bucket.		BTL-2	Understand
11	**List** some core WS-Specification areas.		BTL-5	Evaluate
12	**Mention** the several classes of VM architectures.		BTL-4	Analyze
13	**Analyze** the relative merits of virtualization at various levels.		BTL-4	Analyze
14	**Differentiate** full virtualization and para-virtualization.		BTL-4	Analyze
15	**Define** memory virtualization.		BTL-1	Remember
16	How will you **implement** storage virtualization at the server level?		BTL-6	Create
17	**Show** the benefits of CPU virtualization.		BTL-3	Apply
18	**Show** the requirements of VMM.		BTL-3	Apply
19	**Write** a short note about desktop virtualization.		BTL-2	Understand
20	**Show** operating system level of virtualization.		BTL-3	Apply
21	**State** the responsibilities of VMM.		BTL-5	Evaluate
22	**State** hardware abstraction level of virtualization.		BTL-5	Evaluate
23	**What** is mean by I/O virtualization?		BTL-1	Remember
24	**Give the** host based virtualization.		BTL-2	Understand
	PART-B			
1	**Explain** in detail about the characteristics and features of SOA.	13	BTL-1	Remember
2	**Draw and explain** the Layered Architecture for Web Services and Grids	13	BTL-2	Apply
3	**Analyze** the web services interaction reference scenario.	13	BTL-4	Analyze
4	**Analyze** a simple REST interaction between user and server in HTTP specification.	13	BTL-4	Analyze
5	**Describe** in detail about the REST a software architecture style for distributed systems	13	BTL-2	Understand
6	i. Mention about virtual machine manager. **ii. Illustrate** the three major components of virtualized environment.	7 6	BTL-3	Apply
7	Explain the architecture of a computer system before and after virtualization	13	BTL-5	Apply
8	**Explain** the different phenomenon that has gained an interest towards virtualization technologies.	13	BTL-5	Analyze
9	**Analyze** the pros and cons of virtualization in detail.	13	BTL-4	Analyze
10	**Discuss** in detail about the taxonomy of virtualization techniques.	13	BTL-2	Understand
11	**Formulate** the different implementation levels of virtualization in details with neat diagram**.**	13	BTL-6	Create

12	**Describe** the several classes of VM architectures	13	BTL-3	Apply
13	**Describe** in detail the tools and mechanisms for virtualization.	13	BTL-1	Remember
14	i. **Describe** the different types of virtualization. ii. What is server virtualization? Explain parallel processing.	7 6	BTL-1	Remember
15	**Illustrate** the following Virtualization in detail i. CPU virtualization ii. Memory Virtualization iii. I/O Devices	 5 4 4	BTL-3	Apply
16	Describe the following in detail i.Para Virtualization ii.Full Virtualization	 7 6	BTL-1	Remember
17	i. Express desktop virtualization. ii **Discuss** in detail about it with appropriate example	3 10	BTL-2	Understand
PART C				
1	Highlight the key points and identify the distinctions in different approaches of virtualization levels. Discuss their relative advantages, shortcomings and limitations. Also **identify** example systems implemented at each level	15	BTL-6	Create
2	**Explain** the differences between hypervisor and para-virtualization and give one example VMM (virtual machine monitor), that was built in each of the two categories.	15	BTL-5	Evaluate
3	**Explain** the differences between virtualization of CPU, memory, and I/O devices with hardware supoort architecures in detail.	15	BTL-5	Evaluate
4	What is the difference between recovery time objective and recovery point objective? How do they depend on each other? **Justify** your answer with appropriate examples.	15	BTL-5	Evaluate
5	Explain the about Virtualization for Linux and Windows and NT Platform. **Design** the process of Live Migration of VM from one host to another.	15	BTL-6	Create
UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE				
Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.				
PART-A				
1	**State** the types of clouds with proper examples.		BTL-2	Understand
2	**Define** short notes on Community cloud		BTL-1	Remember
3	Differentiate Public cloud and Private cloud.		BTL-4	Analyze
4	**Tabulate** differences between classical and Cloud computing.		BTL-1	Remember
5	**List** out the characteristics of SaaS.		BTL-1	Remember
6	**Tabulate examples** provided by platform as a service.		BTL-1	Remember
7	**Highlights** six design objectives for cloud computing.		BTL-5	Evaluate
8	**Why** does one choose public cloud over private cloud? **Analyze.**		BTL-4	Analyze

9	**Point ou**t the role of cloud auditor in cloud.		BTL-4	Analyze
10	**Define** the advantages of using the cloud storage.		BTL-1	Remember
11	**Differentiate** cloud consumer and provider		BTL-2	Understand
12	**Compare** service aggregation and service arbitrage		BTL-5	Evaluate
13	**Show** the interaction between the Actors in the cloud computing		BTL-3	Apply
14	**Draw** the diagram for conceptual reference model for cloud		BTL-6	Create
15	**Demonstrate** the types of cloud storage.		BTL-3	Apply
16	Develop the major activities of cloud provider		BTL-3	Apply
17	**Identify** the key features of S3.		BTL-6	Create
18	**Express** the characteristics of private cloud		BTL-2	Understand
19	**Give** any three features of IaaS		BTL-2	Understand
20	**Summarize** the benefits and drawbacks of using "Platform as a Service"		BTL-5	Evaluate
21	**Define** cloud storage.		BTL-1	Remember
22	**Give** the benefits and drawbacks of using "Infrastructure as a Service"		BTL-2	Understand
23	**List** Cloud offerings of IaaS.		BTL-4	Analyze
24	**Draw** S3 bucket.		BTL-3	Apply
	PART-B			
1	i. **Describe the** NIST cloud computing reference architecture. ii. List the Pros and Cons of cloud computing.	9 4	BTL-1	Remember
2	**Explain** the various Layered Cloud Architectural Development design for effective cloud computing environment.	13	BTL-4	Analyze
3	**Draw and explain** the Standard data-center networking for the cloud to access the Internet.	13	BTL-3	Apply
4	**Explain** the Public, private, and hybrid clouds illustrated by functional architecture.	13	BTL-5	Evaluate
5	i. Give the diagram Cloud Computing Reference Architecture. ii. **Illustrate** in detail about The Conceptual Reference Model of cloud	3 10	BTL-3	Apply
6	List and **discuss** the principles for designing Public cloud, private cloud and Hybrid cloud.	13	BTL-2	Understand
7	**Describe** Cloud deployment models with neat diagrams.	13	BTL-1	Remember
8	**Explain** the Computing economics between traditional IT users and cloud users	13	BTL-2	Understand
9	Briefly **discuss** the architectural design challenges of the cloud.	13	BTL-2	Understand
10	Analyse Google App Engine for PaaS Applications	13	BTL-4	Analyze
11	**i. Discuss** the features of Infrastructure as a service. ii. Describe in detail about IaaS with example	5 8	BTL-2	Understand
12	i. **Point out** the features of Platform as a Service ii. Discuss in detail about PaaS with example.	5 8	BTL-4	Analyze
13	**Describe** in detail about the cloud Storage in detail with example.	13	BTL-1	Remember
14	**i. Explain** the features of software as a Service. ii. Discuss in detail about SaaS with example	7 6	BTL-5	Evaluate
15	**Compare:** Public. Private and Hybrid clouds.	13	BTL-6	Create

16	i. **List** out the Cloud Storage Providers. ii. Explain in detail about Amazon Simple Storage Service (S3).	4 9	BTL-1	Remember
17	**Demonstrate** the architectural design of compute and storage clouds.	13	BTL-3	Apply
	PART C			
1	I am starting a new company to analyze videos. I'll need a lot of storage as videos consume quite a bit of disk. Additionally, I'll need ample computational power, possibly running applications concurrently. I have discovered some very good tools to facilitate development in Windows but the deployment will be more efficiently handled in the Linux environment. All the pointers say that I need to move to cloud. I have found that SaaS is the most attractive service, followed by PaaS and IaaS, in that order. Given the above information, which service do you **recommend**? Why?	15	BTL-6	Create
2	Under what circumstances should you prefer to use PaaS over IaaS? **Formulate** it with an example.	15	BTL-6	Create
3	**Draw** and describe the IaaS, PaaS, and SaaS cloud service models at different service levels.	15	BTL-6	Create
4	There are various companies which are offering different applications and services. How the services/applications help a user for business? **Explain** the economical and operational benefits.	15	BTL-5	Evaluate

5	**Describe** the following techniques or terminologies used in cloud computing and cloud services .Use a concrete example cloud or case study to explain the addressed technology.
	  i. Green information Technology
	  ii. Multitenent technique
		15	BTL-5	Evaluate

	UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD			
	Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.			
	PART-A			
1	**List** the three resource-provisioning methods.		BTL-1	Remember
2	**What** are the security challenges in cloud computing?		BTL-1	Remember
3	**List** the security issues in cloud.		BTL-1	Remember
4	**Give** the different security threats in implementing SAAS.		BTL-2	Understand
5	**Define** security governance.		BTL-5	Evaluate
6	**State** the third party risk management.		BTL-4	Analyze
7	**Point out** the layers in security architecture design.		BTL-4	Analyze
8	**Discuss** change management.		BTL-2	Understand
9	**Define** VM security.		BTL-1	Remember
10	**Analyze** the security awareness in cloud.		BTL-4	Analyze
11	**Explain** data privacy.		BTL-4	Analyze
12	**Show** the uses of application security.		BTL-3	Apply
13	**Identify** the phases of SecSDLC.		BTL-6	Create
14	**Illustrate** the security images.		BTL-3	Apply
15	**What** is 24/7/365 monitoring?		BTL-1	Remember

16	**Identify** the services across all technology layers.		BTL-3	Apply
17	**Illustrate** anything as a service.		BTL-3	Apply
18	**List** the results of IDC survey ranking security challenges.		BTL-2	Understand
19	**Design** a suitable security architecture for cloud.		BTL-6	Create
20	**Express** security monitoring.		BTL-2	Understand
21	**Summarize** password assurance testing.		BTL-5	Evaluate
22	**Explain** the issues in providing virtual machine security.		BTL-5	Evaluate
23	**What** is mean by vulnerability assessment?		BTL-1	Remember
24	**Give** the diagram for evolution of cloud services.		BTL-2	Understand
	PART-B			
1	**Describe** in detail with neat diagram in detail about inter cloud resource management.	13	BTL-1	Remember
2	**Draw and explain** the stack of six layers of cloud services and their providers.	13	BTL-1	Remember
3	i. What is resource provisioning? ii. **Discuss** different types of resource provisioning.	2 11	BTL-2	Understand
4	**Illustrate** the following in detail i. Demand-Driven Resource Provisioning ii. Event-Driven Resource Provisioning iii. Popularity-Driven Resource Provisioning	 5 5 3	BTL-3	Apply
5	**Explain** Cloud resource deployment using an IGG (intergrid gateway) to allocate the VMs from a Local cluster to interact with the IGG of a public cloud provider.	13	BTL-3	Apply
6	i. What are the cloud security challenges? Explain. ii. **Explain** in detail about security monitoring and incident response.	5 8	BTL-4	Analyze
7	List and explain Gartners seven security issues which one should discuss with a cloud-computing vendor.	13	BTL-4	Analyze
8	**Summarize** the following i. Security governance ii. Security monitoring iii. Risk management	 5 5 3	BTL-5	Evaluate
9	**Describe** the Secure Software Development Life Cycle with neat diagram.	13	BTL-1	Remember
10	**Discuss** in detail about the security architecture of cloud.	13	BTL-2	Understand
11	i. Define Application security and its use. ii. **Illustrate** the application security in detail.	3 10	BTL-3	Apply
12	**Analyze** the methods for providing data security and virtual machine security in cloud.	13	BTL-4	Analyze
13	i. List the different types of services offered by cloud. ii. **Describe** in detail about Extended Cloud Computing Services	4 9	BTL-1	Remember
14	**Recommend** a model to provide resource management among multiple cloud providers	13	BTL-6	Create

15	**Discuss** Virtual Machine Creation and Management in detail with suitable diagram	13	BTL-2	Understand
16	**Explain** in detail about Global Exchange of Cloud Resources	13	BTL-5	Evaluate
17	**Describe** the following in detail i. Data security ii. Application security iii.Virtual machine security	4 5 4	BTL-2	Understand
	PART C			
1	Explain the security architecture design of a cloud environment and **relate** how it can be made possible to include such measures in a typical banking scenario.	15	BTL-6	Create
2	**Compare and Contrast** the Key privacy issues in Cloud and explain the steps to overcome the issues with necessary examples.	15	BTL-5	Evaluate
3	**Assess** in detail the Cloud Infrastructure Security at Network, Host and application Level by discussing their pros and cons.	15	BTL-6	Create
4	Explain the baseline Identity and access Management(IAM) factors to be practiced by the stakeholders of cloud services and common key privacy issues likely to happen in the environment	15	BTL-5	Evaluate
5	Explain the data governance framework which should describe who can take what actions with what information and when, under what circumstances, and using what methods?	15	BTL-5	Evaluate
	UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS			
	Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack of – Four Levels of Federation – Federated Services and Applications – Future of Federation			
	PART-A			
1	**Outline** the main services that are offered by google.		BTL-1	Remember
2	**What** is VirtualBox, and how does it facilitate virtualization?		BTL-1	Remember
3	**Give** some of the Applications of GAE.		BTL-2	Understand
4	**List** the functional models of GAE.		BTL-1	Remember
5	**Name** the different modules in Hadoop framework.		BTL-1	Remember
6	**Define** Map Function.		BTL-2	Understand
7	**Analyze Amazon Simple Storage Service (S3).**		BTL-4	Analyze
8	**Point out** the use Amazon elastic block store.		BTL-2	Understand
9	**Define** trusted federation.		BTL-1	Remember
10	**Differentiate** name node with data node in hadoop file system.		BTL-4	Analyze
11	**Analyze** the open stack components		BTL-4	Analyze
12	**Define** Extensible Messaging and Presence Protocol (XMPP) and its advantages.		BTL-1	Remember
13	**List** four basic types of federation.		BTL-4	Analyze
14	**How** Encrypted Federation Differs from Trusted Federation		BTL-3	Apply
15	State and **discover** the core components of AppEngine.		BTL-3	Apply

16	**Identify** the development technologies currently supported by AppEngine.		BTL-6	Create
17	**Show** the advantages and disadvantages of using VirtualBox for virtualization compared to other virtualization solutions.		BTL-3	Apply
18	**Illustrate** the use of virtual box.		BTL-3	Apply
19	**Create** a DataStore. What type of data can be stored in it?		BTL-6	Create
20	**Envision** a future scenario where federated architectures are predominant		BTL-2	Understand
21	**Explain** the compute services offered by AppEngine.		BTL-5	Evaluate
22	**Assess** the role of Heat in OpenStack for orchestration and automation**.**		BTL-5	Evaluate
23	**List** different Perspectives of cloud Providers, Vendors, and Users		BTL-5	Evaluate
24	**Give** the diagram for Google cloud platform and its major building blocks.		BTL-2	Understand
	PART-B			
1	**Discuss** in detail about the working process of Google App Engine.	13	BTL-2	Understand
2	**Describe** the following in detail i. Google Cloud Infrastructure ii. GAE Architecture	7 6	BTL-1	Remember
3	i. Write the functional Modules of GAE ii. **Discuss** in detail about GAE Applications	7 6	BTL-2	Understand
4	**Draw and explain** Programming environment for Google AppEngine.	13	BTL-2	Understand
5	**Illustrate** the following in detail. i)How encrypted federation differs from trusted federation. ii)Federated services, applications and future of federation.	6 7	BTL-3	Apply
6	**Draw and explain** the architecture of MapReduce in Hadoop	13	BTL-3	Apply
7	**List** the four levels of cloud federation and **explain** in detail.	13	BTL-4	Analyze
8	**Explain** Cloud federation, benefits and implementation with neat diagram.	13	BTL-5	Evaluate
9	**Compare and contrast** Google App Engine and Amazon AWS	13	BTL-4	Analyze
10	**Describe** in detail about it Map Reduce technique.	13	BTL-1	Remember
11	**Summarize** the distinct steps of the MapReduce framework	13	BTL-4	Analyze
12	**Explain** the open source software environment –Hadoop in detail with appropriate diagram	13	BTL-1	Remember
13	**Depict** the data flow of running a MapReduce job in Hadoop	13	BTL-5	Evaluate
14	**Describe** in detail about the Hadoop Core.	13	BTL-1	Remember
15	**Elaborate** HDFS concepts with suitable illustrations.	13	BTL-2	Understand
16	i) **Discuss** mapreduce with suitable diagrams. ii) **Express** in detail about the phases of map and reduce.	8 5	BTL-6	Create
17	What are the programming supports of Google App Engine? **Illustrate** in detail about the Google File system	13	BTL-3	Apply
	PART C			

1	**Combine** the role of a distributed file system in a job execution environment such as MapReduce in a large-scale cloud system and explain in detail.	15	BTL-6	Create
2	**Pointout** the basic file system operations in hadoop and **Tabulate** the hadoop file system in detail.	15	BTL-5	Evaluate
3	**MapReduce framework and** explain the data flow of a word-count problem using the MapReduce functions (Map, Sort, Group and Reduce) in a cascade operations.	15	BTL-5	Evaluate
4	**Explain** in detail about how to set up a private cloud for an academic university using any one of the cloud environments	15	BTL-5	Evaluate
5	**Integrate** Map and Reduce functions, and explain how Input Splitting can be perfomed in Hadoop Framework.	15	BTL-6	Create