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SRM Institute of Science and Technology College of Engineering and Technology School of Computing

SET A

DEPARTMENT OF COMPUTING TECHNOLOGIES

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2022-2023 (EVEN)

Test: CLAT-3 Date: 05.05.2023

Course Code & Title: 18CSE360T-Information Storage and Management Duration: 8.00 am to 9.40am

Year & Sem: III/ VI Max. Marks: 50

Course Articulation Matrix:

Sl.No	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
1	CO1	2	-	-	-	-	-	-	-	-	-	2	-
2	CO2	2	2	2	-	-	-	-	-	-	-	-	-
3	CO3	2	2	2	-	-	-	-	-	-	-	-	-
4	CO4	2	2	1	-	-	-	-	-	-	-	-	-
5	CO5	1	2	-	-	-	-	-	-	-	-	-	-
6	CO6	2	-	-	-	-	-	-	-	-	-	2	-

	Part - A (10 x 1 = 10 Marks)					
Answer Q. No	· all Questions Question	Mark	BL	СО	РО	PI Code
1	Which of the following refers to a situation in which any existing security threat in the cloud spreads more rapidly in cloud infrastructures. a. Velocity of Function c. Data privacy b. Information assurance d. Data protection	1	2	4	2	2.5.2
2	A Single point of security failure for all the VMs running on the cloud infrastructure will happen in	1	2	4	2	2.5.2
3	Which of the following is not a cloud enabling technology? a. Grid Computing c. Virtualization b. Utility Computing d. Edge Computing	1	2	4	2	2.5.2
4	Redundancy has to be implemented at the architectural level for effective results in cloud computing. a. Lower b. Higher c. Middle d. Poor Performances	1	1	4	2	2.5.2
5	Which of the following protocol is used for discovering and retrieving objects from a cloud? a. OCCI b. SMTP c. HTTP d. TCP/IP	1	2	4	2	2.5.2
6	Which of the following is the correct statement about cloud types? a. Cloud Square Model is meant to show is that the traditional notion of a network boundary being the network's firewall no longer applies in cloud computing b. A deployment model defines the purpose of the cloud and thenature of how the cloud is located. c. Service model defines the purpose of the cloud and the nature of how the cloud is located. d. Cloud services modules.	1	2	5	1	1.5.1

7	In which one of the following, a strategy record or Document is created respectively to the events, conditions a user may face while applying cloud computing mode. a. Cloud Computing Value Proposition b. Cloud Computing Strategy Planning c. Planning Phase d. Business Architecture Development	1	2	5	1	1.5.1
8	Which is referred to the amount of time and effort required to exploit an attack vector? a. Attack surface c. Attack vector b. Work factor d. DOS	1	2	5	2	2.7.1
9	A control mechanism on the switches that segments the networkin to specific paths to be used for data traffic is called a. LNU c. Zoning b. ACL d. Role based control access	1	1	5	2	2.7.1
10	What type of computing technology refers to services and applications that typically run on a distributed network through virtualized resources? a. Cloud Computing b. Parallel Computing d. Distributed Computing	1	2	6	1	1.7.1
Answei	Part – B (4 x 5 = 20 Marks)	L				
11	Elaborate storage security domain and threats in each	5	3	4	2	2.5.2
	domain.					
	Storage Security Domains					
	Application Access Backup, Replication, and Archive Network Secondary Storage Data Storage					
	EMC Proven Profession/Copyrige © 2012 LMC Corporation, All Rights Reserved . Modular 16 Securing the Storage Influentrative 12					
	Securing the Application Access Domain Common threats Spoofing administrator's identity Elevating administrative privileges Network snooping and DoS Available controls Authentication, authorization, and management access control Private management network Disable unnecessary network services Encryption of management traffic Securing Backup, Replication, and Archive Domain Common threats Spoofing DR site identity					

12	Compare active and passive attacks with examples Attacks can be classified as passive or active	5	2	4	2	2.5.2
	a. Passive attacks					
	i. Attempt to gain unauthorized access into					
	the system					
	ii. Attempt to threat the confidentiality of					
	information b. Active attacks					
	i. Attempt data modification, Denial of					
	Service (DoS), and repudiation attacks					
	ii. Attempt to threat data					
	integrity, availability, and accountability					
13	Containers create an isolation boundary at the application level					
	rather than at the server level. If anything goes wrong in that single container - for example, excessive consumption of	5	4	5	2	2.5.2
	resources by a process, in such cases elaborate how the	3		3	2	2.3.2
	containers will handle the situation write up with a solution.					
	The key thing to recognize with cloud containers is that					
	they are designed to virtualize a single application. For					
	example, you have a MySQL container, and that's all it					
	does it provides a virtual instance of that application.					
	Containers create an isolation boundary at the application					
	level rather than at the server level. This isolation means					
	that, if anything goes wrong in that single container for					
	example, excessive consumption of resources by a process					
	it only affects that individual container and not the whole VM or whole server. It also eliminates compatibility					
	problems between containerized applications that reside on					
	the same OS. Major cloud vendors offer containers-as-a-					
	service products, including Amazon Elastic Container					
	Service, AWS Fargate, Google Kubernetes Engine,					
	Microsoft Azure Container Instances, Azure Kubernetes					
	Service and IBM Cloud Kubernetes Service. Containers					
	can also be deployed on public or private cloud					
	infrastructure without the use of dedicated products from a					
	cloud vendor.					
	There are still key questions that need answers: How					
	exactly do containers differ					
	from traditional hypervisor- based VMs? And, just					
	because containers are so					
	popular, does it mean they					
	are better? Cloud containers					
	vs. VMs					
	The key differentiator with containers is the minimalist					
	nature of their deployment. Unlike VMs, they don't need a					
	full OS to be installed within the container, and they don't					
	need a virtual copy of the host server's hardware.					
	Containers can operate with a minimum amount of					
	resources to perform the task they were designed for this					
<u> </u>	can mean just a few pieces of software, libraries and the					

basics of an OS. This results in being able to deploy two to three times as many containers on a server than VMs, and they can be spun up much faster than VMs.

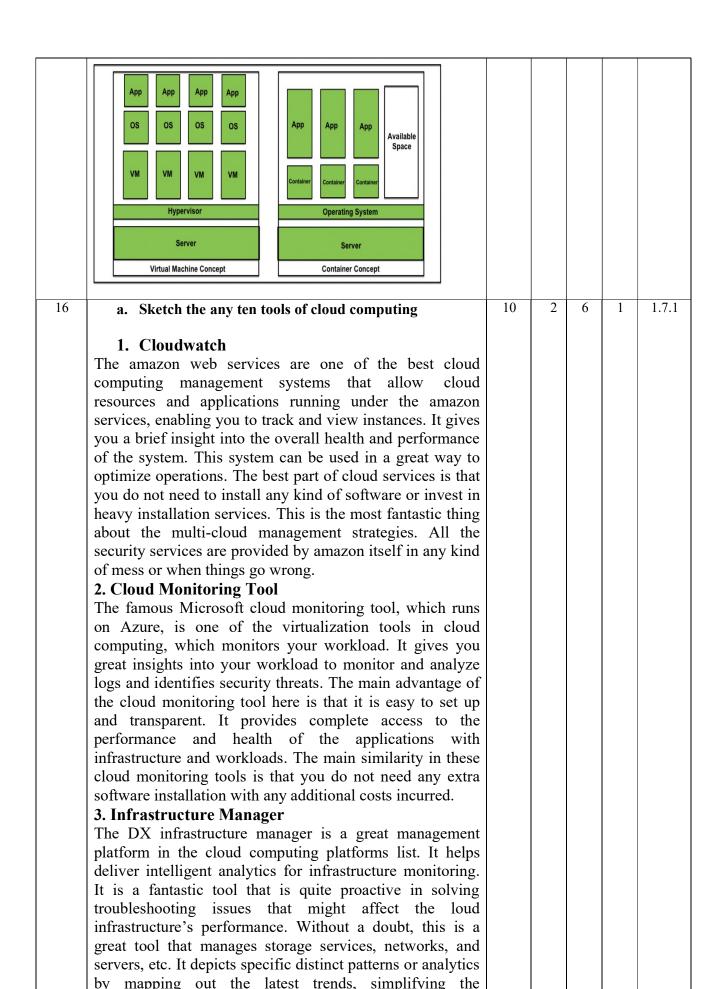
Cloud containers are also portable. Once a container has been created, it can easily be deployed to different servers. From a software lifecycle perspective, this is great, as containers can quickly be copied to create environments for development, testing, integration and production. From a software and security testing perspective, this is advantageous because it ensures the underlying OS is not causing a difference in the test results. Containers also offer a more dynamic environment as IT can scale up and down more quickly based on demand, keeping resources in check.

One downside of containers is the problem of splitting your virtualization into lots of smaller chunks. When there are just a few containers involved, it's an advantage because you know exactly what configuration you're deploying and where. However, if you fully invest in containers, it's quite possible to soon have so many containers that they become difficult to manage. Just imagine deploying patches to hundreds of different containers. If a specific library needs updating inside a container because of a security vulnerability, do you have an easy way to do this? Problems of container management are a common complaint, even with container management systems, such as Docker, that aim to provide easier orchestration for IT.

Containers are deployed in two ways: either by creating an image to run in a container or by downloading a precreated image, such as from Docker Hub. Although Docker is by far the largest and most popular container platform, there are alternatives. However, Docker has become synonymous with containerization. Originally built on LXC, Docker has become the predominant force in the world of containers.

	Virtual machines versus containers VIRTUAL MACHINES VMI VM2 VMD ABD ABD ABD Guiett OS Docker Engine Host operating system Host hardware Host hardware Host hardware					
14	Discuss in detail about the enabling technologies of the cloudcomputing. > Virtualization > Service-Oriented Architecture (SOA) > Grid Computing > Utility Computing	5	2	6	1	1.7.1
A maxway	Part – C ($2 \times 10 = 20 \text{ Marks}$) All the Questions					
15	a. Explain the process of security implementation in SAN.	10	2	6	1	1.7.1
	Storage networking environments are a potential target for unauthorized access, theft, and misuse because of the vastness and complexity of these environments. Therefore, security strategies are based on the defense in depth concept, which recommends multiple integrated layers of security. This ensures that the failure of one security control will not compromise the assets under protection. Figure illustrates various levels (zones) of a storage networking environment that must be secured and the security measures that can be deployed. FC SANs not only suffer from certain risks and vulnerabilities that are unique, but also share common security problems associated with physical security and remote administrative access. In addition to implementing SAN-specific security measures, organizations must simultaneously leverage other security implementations in the enterprise. For example, two-factor authentication is implemented widely; in a simple implementation it requires the use of a username/password and an additional security component such as a smart card for authentication.					

LUN masking and zoning					
Security Zone B Firewell Security Zone C Security Zone E Security Zone G Secu					
OR					
b.Elaborate how containers are built on virtualization techniqueand How they offer an alternative to virtual machines.	10	3	4	2	2.5.2
To answer how containers enable virtualization let us discuss in detail what is virtualization and how containers come into play with this concept.					
Virtualization is a technique, which essentially creates an illusion of a resource such as a desktop, storage, network or an operating system. Devices, applications and human users possess the capability of interacting with these resources. This illusion also called virtualization expands the capabilities of traditional systems, which are limited by their own physical resources.					
Now, containers enable this virtualization for applications that are deployed in them. Applications in containers run independently, isolated from any physical resource. Containers virtualize the OS, CPU, memory, storage and network resources there by providing a controlled environment that can be scaled up or down as required. A container also packages the application along with its dependencies and necessary files, which enables the application to be deployed on any environment without having to configure the server, hardware or software					
This still sounds similar to virtualization implemented through virtual machines right? So before we get into what more containers can do let us clear up how containers differ from virtual machines					
A virtual machine is a form of hardware virtualization. The hardware is logically separated from the other resources. The hardware can be any system such as a desktop (with hardware and its own OS) called the host machine, on which several virtual machines or guest machines can run, each with their own separate operating systems. This is made possible by a firmware called the hypervisor.					



troubleshooting process, and reporting various activities. It

is a user-friendly platform with customizable dashboards to enhance visualization. It monitors every aspect of the cloud eco-system. It also features turning the DX IM into a useful incident management tool that improves monitoring capabilities.

4. AppDynamics

AppDynamics, acquired by cisco in 2017, is one of the excellent cloud development tools which provides a cloud-based monitoring system for accelerating application performance. It allows the users to learn the real state of the cloud applications and help with business operational and coding levels. This is quite an environmentally adaptable system with magnificent capabilities. This tool is quite useful in cloud performance monitoring.

5. Relic

The New Relic is one of the cloud computing software tools which is quite efficient in managing complex and ever-changing applications. It helps the servers running real-time and also gives an insight into the issues and resolves them quickly. It also allows you to scale your operations with the usage. It considers various processes and optimization of the apps, whether it is either mobile or web-based applications. It helps to place all the data in one place in the dashboard, which gives you a clear picture of every part of the cloud. These are many top-notch companies using this cloud structure.

6. True Sight Pulse

The BMC true sight pulse is again one of the cloud-based monitoring tools that helps you to boost performance and manage operations along with cost management structure. It gives you an end-user performance experience to detect problems and monitor resources. It provides a fair chance to develop cloud operations management tools. It also allows you to control costs, optimize, and manage the right resources at cost-effective prices. It helps to breakdown the cost, which businesses can later use and invest in business needs.

7. Solar Winds

This cloud computing monitoring tool provides cloud monitoring services and networking and database solutions. This cloud management platform allows you to monitor applications, servers, and virtual machines' performance and health. It is encrypted with the infrastructure management tool, which can monitor cloud environments.

8. Retrace

It is again one of the cloud-based tools designed for developers and designers helping with code and design development. This is considered top in the cloud computing tools list. It helps in tracking execution and ensure the developers to create advanced coding at all

times. The idea is to make the developers more productive					
with fewer complications and make the developer and					
designer much more manageable with much faster work. It					
fits small and medium businesses with an affordable price					
range.					
9. Exoprice					
The SaaS monitoring tool or service offers you security					
and optimization of the services, enabling the cloud app up					
and running. These tool applications such as dropbox,					
salesforce, etc., watch and manage all the tools with					
troubleshooting and fixing problems that can directly or					
indirectly impact your business—the central business and					
company platforms such as Starbucks, PayPal, and P&G.					
10. Sematext					
It is again one of the useful cloud computing tools which					
collectively manages performance and solutions available					
in the cloud and on-premises. It enables the users to					
efficiently diagnose and solve performance issues and the					
latest trends for an ultimate user experience.					
11. Aternity					
This cloud is specially designed for the end-user					
experience. It ranks in the virtual screen system with the					
mobile end-user experience. Various tests are performed to					
manage such a system and look into the proper					
functionality. It detects the page loading time along with					
any traffic problems. It also optimizes user interaction. It					
offers an extensive list of tools that enhance the user					
experience in the most effective way.					
OR h Develop a sheeliket for auditing the grounity of a					
b. Develop a checklist for auditing the security of a storage environment with SAN, NAS, and iSCSI					
implementations. Explain how you will perform the	10	3	4	2	2.5.2
audit. Assume that you discover at least five security					
loopholes during the audit process. List them and					
provide control mechanisms that should be					
implemented to eliminate them.					
SAN, NAS, iSCSI					
Servers (Production, management, backup, third party, NAS)					
 What data or object was accessed /attempted to access? 					
What action was performed?When was executed?					
When was executed:Who authorized and performed the action?					
NFS/CIFS access (shared files)					
• Fabric/ IP network					
 Physical and logical access 					
• Switches					
 Physical and logical access 					
o Zoning					
• Storage					
 Which volume was accessed /attempted to 					
access?					

- What action was performed?
- When was executed?
- Who authorized and performed the action?
- LUN masking
- Provisioning
- Upgrade/replacement
- Handling of physical media

Process

Collect log and correlate

- Analyze access and change control
 - Production and DR site
 - Backup and replication
 - Third party service
- Check alerting mechanism
- Check security controls
 - Physical
 - Administrative
 - Technological
- Identify security gap

Five security loopholes

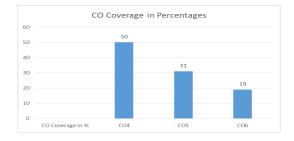
- 1. Authentication allows multiple login
- 2. No firewall
- 3. No authentication at the switch level
- 4. No encryption for in-flight data
- 5. Poor physical security at the data center

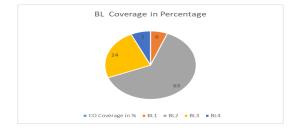
Control

Restriction in number of login attempt, two part password

- 1. Implement firewall to block inappropriate or dangerous traffic
- Authenticate users/administrators of FC switches using RADIUS (Remote Authentication Dial In User Service), DH-CHAP (Diffie-Hellman Challenge Handshake Authentication Protocol), etc.
- 3. Encrypting the traffic in transit
 - Increase security manpower and implement biometricsecurity

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions







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SET B

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Course Articulation Matrix:

Sl.No	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
1	CO1	2	-	-	-	-	-	-	-	-	-	2	-
2	CO2	2	2	2	-	1	-	-	-	-	-	-	-
3	CO3	2	2	2	-	-	-	-	-	-	-	-	-
4	CO4	2	2	1	-	-	-	-	-	-	-	-	-
5	CO5	1	2	-	-	•	-	-	-	-	-	-	-
6	CO6	2	-	-	-	-	-	-	-	-	-	2	_

Angua	Part – A $(10 \times 1 = 10 \text{ Marks})$					
Q. No	all Questions Question	Mark	BL	СО	PO	PI Code
1	How many types of security domains are there?					
	a. 2 b. 3 c. 4 d. 5	1	2	4	2	2.5.2
2	What is ACL?					
	a. Access Control list					
	b. Accountability Control List	1	2	4	2	2.5.2
	c. Access confidentiality list					
	d. Access Control Layer					
3	Cloud consumers that install or lease virtual servers can					
	customize their environments independently from other cloud					
	consumers that may be using hosted by the same	1	1	4	2	2.5.2
	underlying physicalserver. a. Ready-Made Environment c. Cloud Storage Device					
	b. Virtual servers d. Resource Replication					
4	The major storage infrastructure components that should be					
7	managed are					
	a. Storage Arrays c. Redundant Fabrics	1	2	4	1	1.4.1
	b. Multipathing software d. RAID sets					
5	is the feature of cloud computing that allows the					
	service to change in size or volume in order to meet a user's					
	needs.	1	1	5	2	2.5.2
	a. Scalability c. Virtualization					
	b. Security d. Cost-savings					
6	Which of the following is the most refined and restrictive cloud					
	service model?	1	2	5	2	2.5.2
	a. SaaS c. IaaS	1	_		_	2.3.2
	b. PaaS d. CaaS					
7	Which of the following is the most common way to approach the					
	problem of interoperability by vendors?					
	a. Cloud Maintances	1	_	_	_	2.5.2
	b. create scalable websites for different devices	1	2	5	2	2.5.2
	c. create reliable websites for different devices					
	d. create individual sites within a Web site for					
	differentdevices					

8	Logical Unit Number masking prevents data corruption on the storage array by restricting host access to a defined set of logical devices a. Data security c. Data redundancy b. Data reduplication d. Data corruption	1	2	5	2	2.5.2
9	Which of the following is not a cloud infrastructure mechanisms? a. Logical Network Perimeter c. Cloud Usage Monitor b. Flexible scaling d. Virtual server	1	2	5	2	2.5.2
10	An application that provides for transaction overflow in a reservation system is an example of a. Cloud Bursting b. Cloud Services c. Cloud Prevising d. Cloud Orchestrate	1	2	6	1	1.7.1
Answei	Part – B (4 x 5 = 20 Marks) r All the Questions					
11	Describe the Risk Triad in information storage.	5	3	4	2	2.5.2
12	* Defines risk in terms of threats, assets, and vulnerabilities **Risk Triad** **Threat Agent** **Univerabilities** **Vulnerabilities** **Paths that provide access to information are vulnerable to potential attacks **Requires implementation of "defense in depth" **Factors to consider when assessing the extent to which an environment is vulnerable: **Attack surface** **Attack surface** **Attack vectors** **Work factor** **Managing vulnerabilities** **Minimize the attack surface and maximize the work factor** **Install controls (or countermeasures)* **A performance problem has been reported on a database.**	5	3	4	2	2.5.2
15	A performance problem has been reported on a database. Monitoringconfirms that at 12:00 a.m., a problem surfaced, and access to thedatabase is severely affected until 3:00 p.m. every day. This time slotis critical for business operations and an investigation has beenlaunched. A reporting process that starts at 12:00 p.m. contends fordatabase resources and constrains the environment. What monitoringand management procedures,	5	4	4	2	2.7.1

tools, and alerts would you establish toensure accessibility, capacity, performance, and security in this environment					
 Setting up monitoring and reporting for accessibility, capacity, performance and security on production and replication data Monitoring and management tools such as ECC Performance manager need to be deploy to gather all performance statistics data (historical data) Performance analysis – performance constraint is because of the resource 					
Management:					
 Requirement: Database need to be replicate for reporting process Based on requirement and infrastructure chosen replication software need to be deploy Provision storage capacity for replication Configure the environment for accessing replicated data (need configuration at host, network and storage) Configure adequate capacity based on policy on data retention and change Configure security for replicated data 					
Enumerate the characteristics and benefits of cloud computing.	5	3	6	1	1.7.1
Faster time to market. You can spin up new instances or retire them in seconds, allowing developers to accelerate development with quick deployments Scalability and flexibility Cost savings Better collaboration Advanced security Data loss prevention.		J		•	
on-demand self-service,					
broad network access, being very elastic and scalable.					
Part – C ($2 \times 10 = 20 \text{ Marks}$)					
	10				1.7.1
infrastructure.	10	2	6	1	1.7.1
All the management tasks in a storage infrastructure can be broadly categorized into, – availability management					
	capacity, performance and security on production and replication data • Monitoring and management tools such as ECC Performance manager need to be deploy to gather all performance statistics data (historical data) • Performance analysis – performance constraint is because of the resource Management: • Requirement: Database need to be replicate for reporting process Based on requirement and infrastructure chosen replication software need to be deploy • Provision storage capacity for replication • Configure the environment for accessing replicated data (need configuration at host, network and storage) • Configure adequate capacity based on policy on data retention and change Configure security for replicated data Enumerate the characteristics and benefits of cloud computing. Benefits of Cloud Computing Faster time to market. 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You can spin up new instances or retire them in seconds, allowing developers to accelerate development with quick deployments Scalability and flexibility, Cost savings Better collaboration Advanced security Data loss prevention. Characteristics on-demand self-service, broad network access, being very elastic and scalable. Part - C (2 x 10 = 20 Marks) All the Questions a. List out and explain the management tasks in a storage

						1
	– Servers, databases and applications					
	– Network ((SAN) and IP Networks (switches, routers,					
	bridges))					
	Storage Arrays					
	OR					
	b. Outline the cloud service models and also analyze		_	_		
	thebenefits of cloud computing.	10	3	6	1	1.7.1
	1 8					
	Cloud Service Models					
	According to NIST, cloud service offerings are classified					
	primarily into three models:					
	1. Infrastructure-as-a-Service (IaaS)					
	2. Platform-as-a-Service (PaaS)					
	3. Software-as-a-Service (SaaS)					
16	a. Enumerate the cloud infrastructure mechanisms, explain any three of the mechanisms in detail.	10	3	5	2	2.5.2
	Cloud infrastructure mechanisms					
	Cloud infrastructure mechanisms are foundational building blocks of cloud environments that establish primary artefacts to form the basis of fundamental cloud technology architecture					
	Cloud infrastructure mechanisms are,					
	1. Logical Network Perimeter					
					I	
	2. Virtual Server					
	2. Virtual Server3. Cloud Storage Device					
	2. Virtual Server3. Cloud Storage Device4. Cloud Usage Monitor					
	2. Virtual Server3. Cloud Storage Device4. Cloud Usage Monitor5. Resource Replication					
	2. Virtual Server3. Cloud Storage Device4. Cloud Usage Monitor					
	2. Virtual Server3. Cloud Storage Device4. Cloud Usage Monitor5. Resource Replication					
	 Virtual Server Cloud Storage Device Cloud Usage Monitor Resource Replication Ready-Made Environment 	10	3	6	1	1.7.1

