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at
Sathyabama Institute of Science and Technology
(Deemed to be University)

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in Computer Science and Engineering

By
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **K.ROJAR BENNY (Reg. No: 39120097)** who carried out the project entitled **"COMMUNITY AND HYBRID CLOUD"** under my supervision from June 2021 to November 2021.

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Submitted for Viva voce Examination held on _____

InternalExaminer

ExternalExaminer

DECLARATION

I, **ROJAR BENNY.K** hereby declare that the project report entitled **Case Study of Community and Hybrid Cloud** done by me under the guidance of **Dr.V.NIRMALRANI** is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology Degree in Information Technology.

DATE:

PLACE:

SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management** of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T. Sasikala M.E., Ph.D**, Dean, School of Computing, **Dr. R.Subhashini M.E., Ph.D. Head of the Department of Information Technology** for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr.V.NIRMALRANI, M.E., Ph.D.**, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Information Technology** who were helpful in many ways for the completion of the project.



Award of Completion

Rojar Benny K

Has Successfully Completed

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Donald William

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GLOBAL CERTIFICATIONS



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ABSTRACT:

The term “cloud computing” is a recent buzzword in the IT world. Behind this fancy poetic phrase there lies a true picture of the future of computing for both in technical perspective and social perspective. Though the term “Cloud Computing” is recent but the idea of centralizing computation and storage in distributed data centers maintained by third party companies is not new but it came in way back in 1990s along with distributed computing approaches like grid computing. Cloud computing is aimed at providing IT as a service to the cloud users on-demand basis with greater flexibility, availability, reliability and scalability with utility computing model. This new paradigm of computing has an immense potential in it to be used in the field of e-governance and in rural development perspective in developing countries like India.

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INTRODUCTION:

Cloud computing overview:

Cloud Computing is the delivery of computing services such as servers, storage, databases, networking, software, analytics, intelligence, and more, over the Cloud (Internet).

In brief cloud is essentially a bunch of commodity computers networked together in same or different geographical locations, operating together to serve a number of customers with different need and workload on demand basis with the help of virtualization. Cloud services are provided to the cloud users as utility services like water, electricity, telephone using pay-as-you-use business model.

These

utility services are generally described as XaaS (X as a Service) where X can be Software or Platform or Infrastructure etc. Cloud users use these services provided by the cloud providers and build their applications in the internet and thus deliver them to their end users. So the cloud users don't have to worry about installing, maintaining hardware and software needed. And they also can afford these services as they have to pay as much they use. So the cloud users can reduce their expenditure and effort in the field of IT using cloud services instead of establishing IT infrastructure themselves

Cloud computing provides a modern alternative to the traditional on-premises datacenter. Public cloud vendors provide and manage all computing infrastructure and the underlying management software. These vendors provide a wide variety of cloud services. A cloud service in this case might be a virtual machine, a web server, or cloud-hosted database engine. As a cloud provider customer, you lease these cloud services on an as-needed basis. In doing so, you convert the capital expense

of hardware maintenance into an operational expense.

A cloud service also provides these benefits:

- Rapid deployment of large compute environments
- Rapid deallocation of systems that are no longer required
- Easy deployment of traditionally complex systems like load balancers
- Ability to provide flexible compute capacity or scale when needed
- More cost-effective computing environments
- Access from anywhere with a web-based portal or programmatic automation
- Cloud-based services to meet most compute and application need



Fig 1.1

AIM :

To submit a Casestudy about Community and Hybrid Cloud, their pros and cons and also comparision between all 4 cloud models.

TYPES OF CLOUD:

There are the following 4 types of cloud that you can deploy according to the organization's needs-

- Public Cloud
- Private Cloud
- Hybrid Cloud
- Community Cloud

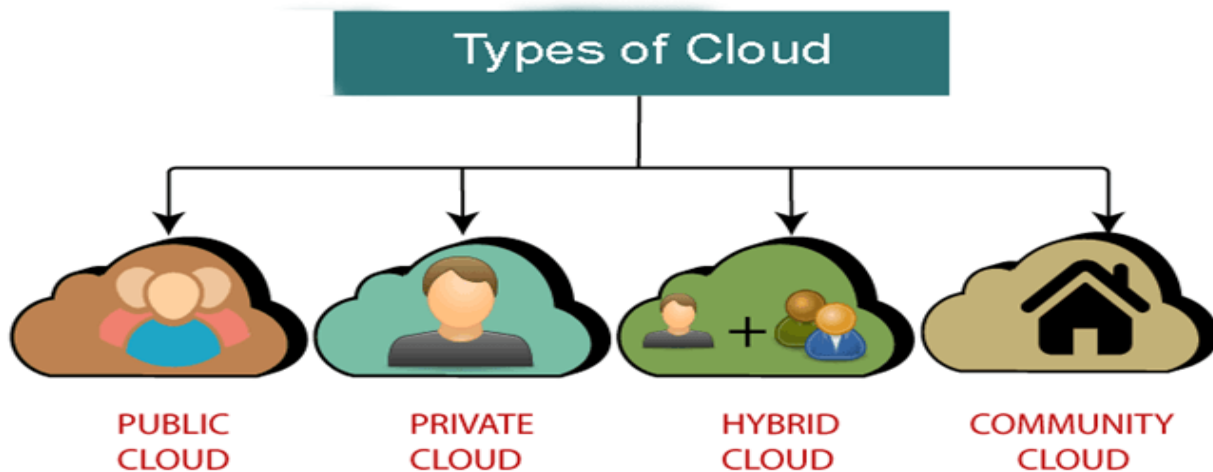


Fig 2.1

Public Cloud:

Public cloud is **open to all** to store and access information via the Internet using the pay-per-usage method.

In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP).

Private Cloud:

Private cloud is also known as an **internal cloud** or **corporate cloud**. It is used by organizations to build and manage their own data centers internally or by the third party. It can be deployed using Opensource tools such as Openstack and Eucalyptus. Based on the location and management, National Institute of Standards and Technology (NIST) divide private cloud into the following two parts-

- On-premise private cloud
- Outsourced private cloud

Hybrid Cloud:

Hybrid Cloud is a combination of the public cloud and the private cloud. we can say:

Hybrid Cloud = Public Cloud + Private Cloud

Hybrid cloud is partially secure because the services which are running on the public cloud can be accessed by anyone, while the services which are running on a private cloud can be accessed only by the organization's users.

Example: Google Application Suite (Gmail, Google Apps, and Google Drive), Office 365 (MS Office on the Web and One Drive), Amazon Web Services.

Community Cloud:

Community cloud allows systems and services to be accessible by a group of several organizations to share the information between the organization and a specific

community. It is owned, managed, and operated by one or more organizations in the community, a third party, or a combination of them.

CLOUD COMPUTING MODELS:

Cloud Providers offer services that can be grouped into three categories.

1. Software as a Service (SaaS): In this model, a complete application is offered to the customer, as a service on demand. A single instance of the service runs on the cloud & multiple end users are serviced. On the customers' side, there is no need for upfront investment in servers or software licenses, while for the provider, the costs are lowered, since only a single application needs to be hosted & maintained. Today SaaS is offered by companies such as Google, Salesforce, Microsoft, Zoho, etc.

2. Platform as a Service (PaaS): Here, a layer of software, or development environment is encapsulated & offered as a service, upon which other higher levels of service can be built. The customer has the freedom to build his own applications, which run on the provider's infrastructure. To meet manageability and scalability requirements of the applications, PaaS providers offer a predefined combination of OS and application servers, such as LAMP platform (Linux, Apache, MySQL and PHP), restricted J2EE, Ruby etc. Google's App Engine, Force.com, etc are some of the popular PaaS examples.

3. Infrastructure as a Service (IaaS): IaaS provides basic storage and computing capabilities as standardized services over the network. Servers, storage systems, networking equipment, data centre space etc. are pooled and made available to handle workloads. The customer would typically deploy his own software on the

infrastructure. Some common examples are Amazon, GoGrid, 3 Tera, etc.

COMMUNITY CLOUD:

Community Cloud is a hybrid form of private cloud. They are multi-tenant platforms that enable different organizations to work on a shared platform.

A community cloud in computing is a collaborative effort in which infrastructure is shared between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally. This is controlled and used by a group of organizations that have shared interest. The costs are spread over fewer users than a public cloud (but more than a private cloud), so only some of the cost savings potential of cloud computing are realized.

The community cloud is provisioned for use by a group of consumers from different organisations who shares same concerns (e.g., application, security, policy, and efficiency demands).



Fig 3.1

Community Cloud Challenges:

The biggest concerns regarding Community Cloud are cloud security considerations and trust. No standard cloud model exists for defining best practices and identifying security liabilities of the data and applications which would reside on these servers. Since this type of cloud is relatively new and still evolving, users may hesitate to go into the whole dilemma of abandoning the current approach.

Community Cloud Architecture

Members of a community cloud are organizations that have common business requirements. These requirements are usually driven by the need for shared data, shared services, or shared industry regulations. This means they're typically organizations in the same industry or departments of the same organizational body. In other words, a community cloud is an integrated setup that combines the features and benefits of multiple clouds to address the needs of a specific industry.

To set up a community cloud, organizations can choose to host their own data centers and split the cost and responsibilities. This may be on-premise in the existing infrastructure of a member or even at peer facilities. Alternatively, they can also

consider hybrid cloud providers.

Community clouds are more expensive than public clouds but also more secure. Each member of the cloud is allocated a fixed amount of data storage and bandwidth, making scalability somewhat more difficult than with private and public clouds. Public clouds are perfect for fledgling companies, while private clouds are a good fit for large enterprises. Community clouds are a great solution for growing organizations in the health, financial, legal, and educational sectors. This is because these industries are the most bound by various regulations.

The implementation of a community cloud is more complicated than other types of clouds. This is because of the number of players involved. Decisions are no longer standalone, and, as a result, a handbook needs to be established at the outset, which must cover:

1. Mission statements
2. Ownership of services and resources
3. An economic model of shared cloud and services
4. Resource allocation and maintenance
5. Industry regulations binding each organization

Despite the startup costs and inevitable teething problems, as per industry estimates, the community cloud market is estimated to reach \$12.8 billion by 2027 from \$2.6 billion in 2020. This is because the benefits of a community cloud currently outweigh the challenges.

Key Components of Community Cloud Architecture

A community cloud is a distributed architecture—each unit comprises services from similar or different clouds under the same domain. Typically, all community clouds consist of the following components:

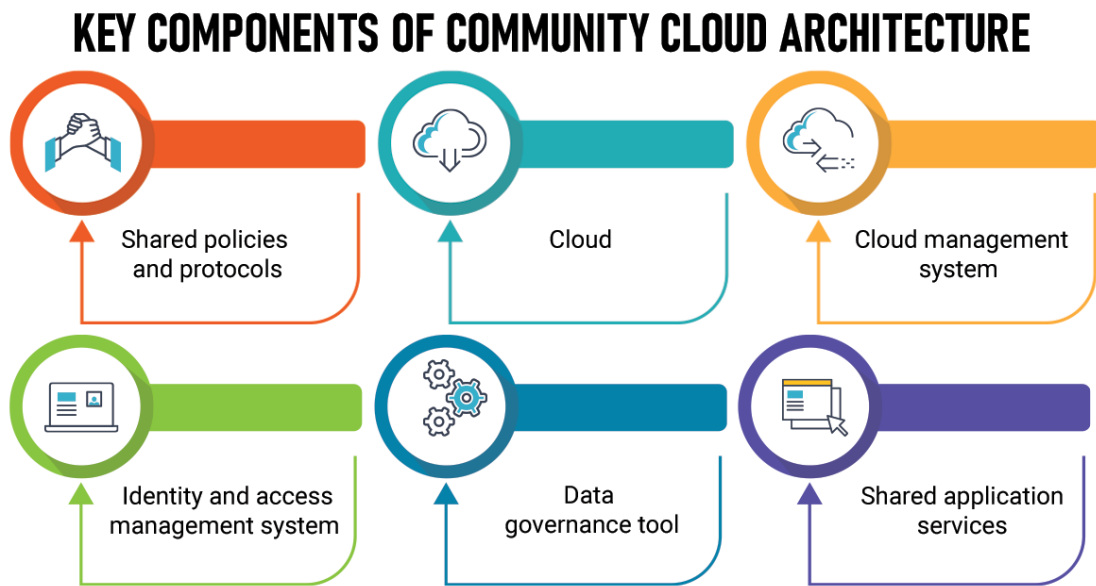


Fig 3.2

Components of Community Cloud Architecture

1. Shared policies and protocols

A community cloud is a long-term commitment with other organizations to build, operate, and maintain the system. All members need to come together to create

1. **Governance policies:** Well-designed community clouds are always shaped by the governance model decided by the members. The process of creating governance policies allows for fewer requirements to be overlooked by the many players involved.
2. **Security protocols:** For the cloud to be compliant, regulations must be analyzed, interpreted, and adhered to. This is most often in the form of security protocols. For example, HIPAA requires email encryption as a matter of compliance.
3. **Access policies:** Just like community gardens either provide patches of land to each person or allow a single piece of land to be shared across many gardeners, member organizations must have access policies tailored to their

requirements and SLAs in a community cloud. These are usually handled by identity and access management (IAM) solutions.

- 4. Allocation policies:** Many questions need to be addressed while setting up a community cloud. Who is the owner of the cloud? How are resources going to be allocated? Who is going to maintain this common entity? If a member suddenly needs to withdraw due to changing requirements or monetary concerns, how is the uninterrupted continuity of the cloud ensured? Who gets what percentage of data and bandwidth? All these need to be determined before the actual implementation starts.

SLAs between members and the cloud provider specifically laying out the terms of cost and maintenance are a very important first step before even implementing a community cloud.

2. Cloud

An important component of a community cloud is the cloud itself. A community cloud is usually built from scratch on top of a private cloud. There are also off-the-shelf community cloud options packaged with the regulatory specifics of particular industries. One such example is the ‘government cloud’ that we saw in the examples above. The pandemic has accelerated the availability of more ready-to-use, industry-friendly clouds.

3. Cloud management system

Like every other cloud, a single pane management system is crucial for ease of operations and an up-to-date overview of systems at any point in time. A community cloud requires more specific controls for resource allocation, security protocols, and app & data management. If not a single management platform, at least application programming interface (API) standards must be agreed upon.

4. Identity and access management system

Multiple users from different organizations handle the applications, services, and data in a community cloud. This makes IAM a crucial part of community cloud architecture. An audit trail is required for compliance and for any incident response activity that takes place.

5. Data governance tool

This is an important component for community clouds that focus on data as a service (DaaS). Data governance tools track the creation, updating, and deletion of data based on premeditated data policies. This becomes especially important in a scenario where users from different organizations are involved, and data sharing is the main mission of community cloud.

6. Shared application services

This is another vital component for community clouds that focus on accessing common applications and services. These are usually clouds that different departments of the same organization use.

All these components come prepackaged by the cloud vendor. Resource allocation is one of the key steps in building a community cloud, and, as such, the specifics of storage and bandwidth must be carefully considered while implementing one.

Security Considerations:

Multiple organizations will access and control the infrastructure in a Community Cloud, requiring specialized security configurations:

- Every participant in the community has authorized access to the data. Therefore, organizations must make sure they do not share restricted data.

- Rules and regulations related to compliance within a Community Cloud can be confusing. The systems of one organization may have to adhere to the rules and regulations of other organizations involved in the community as well.

- Agreements among the member organizations in a Community Cloud are vital. For example, just because all the organizations have shared access to audit logs does not mean that every organization has to go through them. Having an agreement on who performs such tasks will not only save time and workforce needs but also help to avoid ambiguity.

The security concerns regarding Community Clouds are not unique to them but apply to any other type of Public Cloud as well. As such, it is safe to say that Community Cloud solutions offer a unique opportunity to organizations that wish to work on joint projects.

PROS OF COMMUNITY CLOUD:



Fig 3.3

Cost effective:

It is cost-effective as it used and shared between several organizations and the community.

Scalable and flexible:

A community cloud is compatible with every user and is flexible and scalable. It lets users modify the documents according to their needs and requirement.

Security and Compliance:

A community cloud is less secure than a private cloud but more secure than a public

cloud. Users can configure various levels of security for their data.

Sharing infrastructure:

Community cloud lets users share infrastructure, resources and other aspects within various organizations. Community clouds are open systems that remove the dependency organizations have on cloud service providers. With shared infrastructure, organizations can avoid the advantages and disadvantages of private and public clouds.

Availability and reliability:

Community clouds secure data as any other cloud service as it replicates data and application to multiple secure locations and protects them from any damage or harm. It offers availability and reliability that are critical concerns for any cloud solution.

Convenience and Control:

As community cloud is a shared resource there are no conflicts to convenience and control. It offers the facility to share and own infrastructure to the tenants who can make decisions together. It lets tenants have their data closer to them whilst avoiding complexities related to a private cloud.

CONS OF COMMUNITY CLOUD:

Disadvantages of Community Cloud



This slide is 100% editable. Adapt it to your needs and capture your audience's attention.



Fig 3.4

With all its advantages, there are disadvantages to using a community cloud too.

Not customised to all organization:

Community cloud may not be a good choice for all organizations, especially because of confidentiality issues.

Adapting to data:

Community cloud adapts to data very slowly making it a time-consuming process

Limited amount of storage:

With a fixed and limited amount of data storage and bandwidth, it becomes difficult for many organizations to use it.

Costlier than other options:

Community cloud is certainly costlier than public cloud

Sharing :

It is difficult to share responsibilities within a community cloud among organizations.

Security Considerations:

With multiple organizations accessing and controlling the infrastructure in a Community Cloud, it requires specialised security configurations.

HYBRID CLOUD:

Hybrid cloud combines and unifies public cloud, private cloud and on-premises infrastructure to create a single, flexible, cost-optimal IT infrastructure.

Hybrid cloud integrates public cloud services, private cloud services and on-premises infrastructure and provides orchestration, management and application portability across all three. The result is a single, unified and flexible distributed computing environment where an organization can run and scale its traditional or cloud-native workloads on the most appropriate computing model.

Hybrid multicloud is hybrid cloud that includes public cloud services from more than one cloud service provider.

By enabling a company to

- combine best-of-breed cloud services and functionality from multiple cloud computing vendors

- choose the optimal cloud computing environment for each workload, and
- move workloads freely between public and private cloud as circumstances change

hybrid cloud - and particularly hybrid multicloud - helps a company achieve its technical and business objectives more effectively and cost-efficiently than public cloud or private cloud alone. In fact, according to one recent study, companies derive up to 2.5x the value from hybrid cloud than from a single-cloud, single-vendor approach.

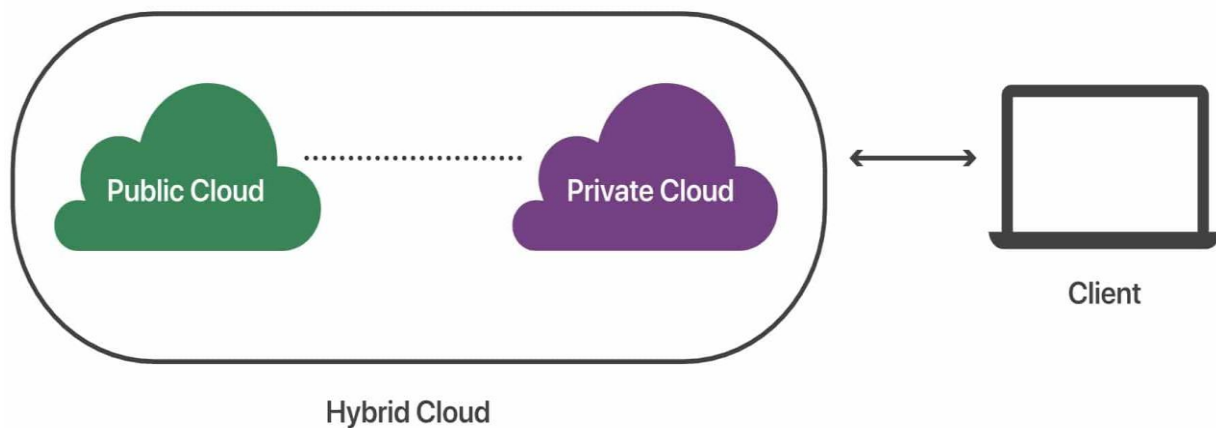


fig 3.5

HOW DO HYBRID CLOUD WORKS?

In a hybrid cloud model, enterprises deploy workloads in private IT environments or public clouds and move between them as computing needs and costs change. This gives a business greater flexibility and more data deployment options. A hybrid cloud workload includes the network, hosting and web service features of an application.

While the terms are sometimes discussed interchangeably, there are key differences between hybrid and multi-cloud models. A hybrid cloud creates a single environment in which to operate on-premises, private resources and in public cloud resources - such as those offered by AWS, Microsoft and Google. A multi-cloud environment consists of two or more public cloud providers but does not require a private or on-

premises component.

TYPES OF ENVIRONMENTS FOUND IN HYBRID CLOUD:

The combination of any two of the environments listed below can be considered "hybrid cloud":

- ***Public cloud:** A public cloud is a cloud service run by an external vendor that may include servers in one or multiple data centers. Public clouds are shared by multiple organizations. Using virtual machines, individual servers may be shared by different companies, a situation that is called "multitenancy" because multiple companies are renting server space within the same physical server.
- ****On-premises private cloud:** A private cloud is a data center wholly dedicated to one company. The servers in a private cloud aren't shared by anyone else's software, files, or data. On-premises private clouds are maintained and secured by the organizations themselves, not an external vendor.
- **Hosted private cloud:** This is just like an on-premises private cloud in that the servers are dedicated wholly to one organization. However, the cloud servers in a hosted private cloud are not located in an organization's offices – rather, a third-party provider hosts and maintains the cloud servers in one or more remote data centers, and the organization accesses the cloud over the Internet instead of an internal network. But unlike a public cloud, there is no multitenancy; the cloud servers are not shared with other organizations.

- **On-premises (legacy):** On-premises or legacy deployments don't use cloud technology at all. Instead, organizations using this model follow the classic practice of purchasing software licenses, installing and maintaining hardware on their premises, and installing software locally on employee computers. In other words, instead of working in Google Docs (for example), employees would use Microsoft Word, or some other program installed and running on their computers.

PROS OF HYBRID CLOUD:

Scalability and resilience – Workload traffic spikes can be unpredictable, and even predictable traffic spikes demand affordable capacity. A hybrid cloud strategy allows an organization to detect a surge, and scale up using public cloud infrastructure quickly, cheaply, and possibly even automatically. When the peak has passed, the team can scale down—and all of this takes place without affecting other workloads on the private cloud.

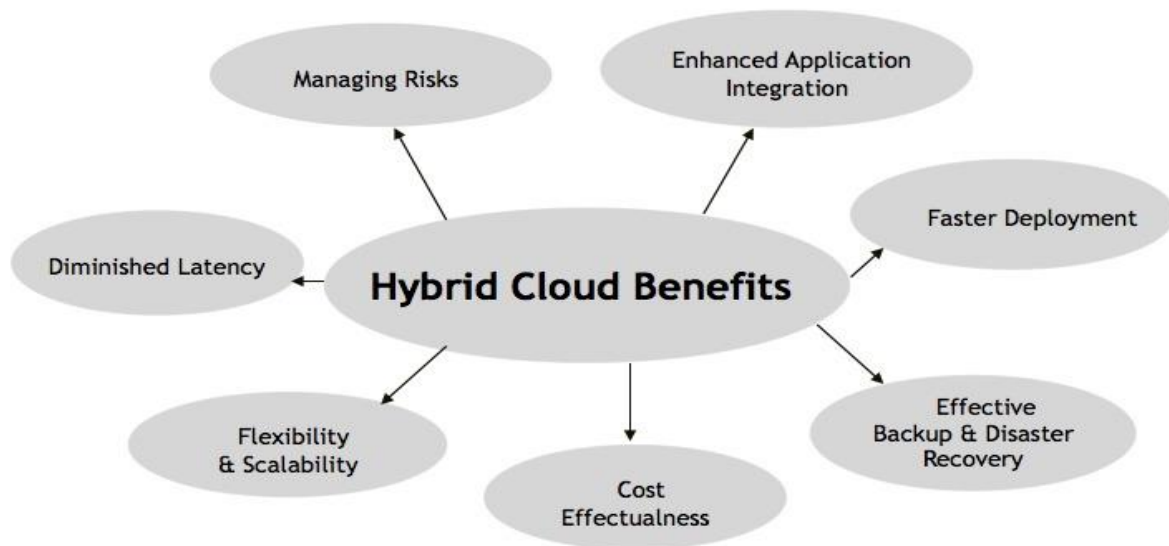
Hybrid cloud security and compliance - Hybrid cloud solutions enable organizations to retain the private cloud for deploying sensitive or highly regulated workloads, while using public cloud services for less-sensitive workloads.

Resource optimization and cost saving - A hybrid cloud environment provides the IT team with increased flexibility and more options for maximizing infrastructure budget and resources as they deploy workloads. It also offers more responsiveness to new opportunities and changing workloads.

Flexibility- Companies work with various types of data in disparate environments and adjust their infrastructure. A hybrid cloud setup uses traditional systems as well as the latest cloud technology, without a full commitment to a vendor. Organizations can migrate workloads to and from their traditional infrastructure and a vendor's public cloud whenever necessary.

Cost management- With a private cloud, organizations own and operate the data center infrastructure, which requires significant capital expense and fixed costs. Alternatively, public cloud resources and services are accounted as variable and operational expenses. Hybrid cloud users can choose to run workloads in whichever environment is more cost-effective.

Resiliency and interoperability- A business can run workloads redundantly in both private and public environments. Components of one workload can also run in both environments and interoperate.



CONS OF HYBRID CLOUD:

Despite these advantages, it also has its share of faults. See below some key disadvantages of a hybrid cloud.

Difficult to Implement

It can indeed be complex to implement and difficult to maintain. For example, setting up a private cloud can be a remarkably difficult project in itself since it requires a strong demand for local infrastructures, such as servers, storage, and network capabilities.

In-house Expenses

It actually has the disadvantage of being much more expensive than the public cloud. The cost that accompanies the installation and the maintenance of servers is high.

Security Concerns due to 3rd Party Involvement

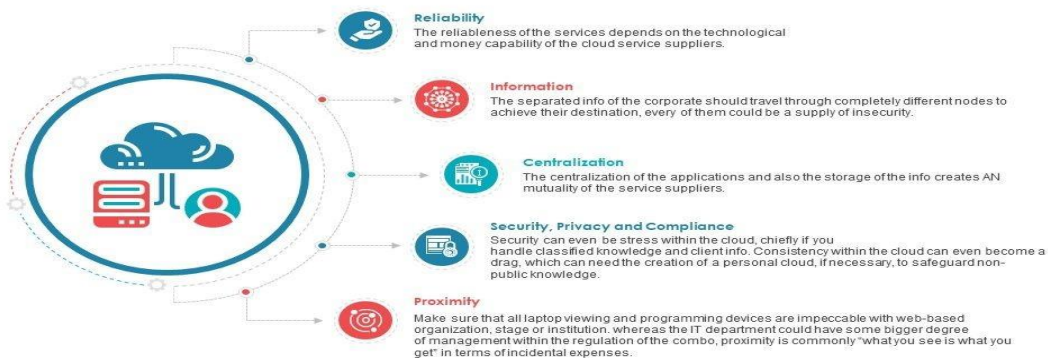
As the hybrid cloud is a combination of both public and private clouds. There is no risk of intrusion between neighbors on a public network, but misuse of the infrastructure contracted by another company can put yours at risk as a successful attack on the main server opens a breach for each client's system

Visibility

With your resources and information placed across private and public-based cloud network, you sometimes tend to lose sight of the wholesome view of all the This can get much more complicated if you're using multiple 3rd party cloud providers.

After going through, both the pros and cons of the hybrid cloud, I'm sure you must have got some idea as to whether or not it suits your need.

Disadvantages of Hybrid Cloud



COMPARISION OF TYPES OF CLOUD:

	Public	Private	Community	Hybrid
Ease of setup	Very easy to set up, the provider does most of the work	Very hard to set up as your team creates the system	Easy to set up because of community practices	Very hard to set up due to interconnected systems
Ease of use	Very easy to use	Complex and requires an in house team	Relatively easy to use as members help solve problems and establish protocols	Difficult to use if the system was not set up properly
Data control	Low, the provider has all control	Very high as you own the system	High (if members collaborate)	Very high (with the right setup)

Table 3.1

	Public	Private	Community	Hybrid
Reliability	Prone to failures and outages	High (with the right team)	Depends on the community	High (with the right setup)
Scalability	Low, most providers offer limited resources	Very high as there are no other system tenants	Fixed capacity limits scalability	High (with the right setup)
Security and privacy	Very low, not a good fit for sensitive data	Very high, ideal for corporate data	High (if members collaborate on security policies)	Very high as you keep the data on a private cloud

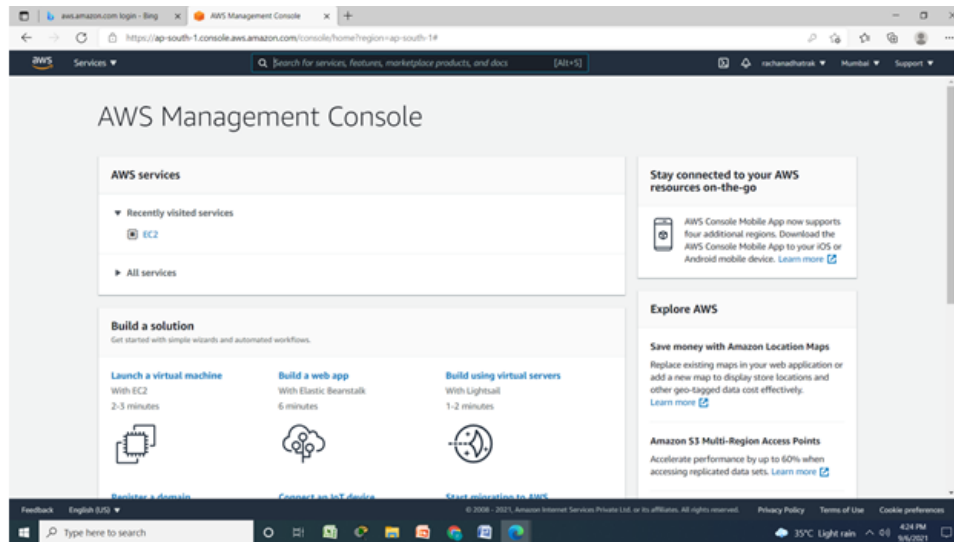
Table 3.2

	Public	Private	Community	Hybrid
Setup flexibility	Very high as you keep the data on a private cloud	Very flexible	Little flexibility, setups are usually predefined to an extent	Very flexible
Cost	Very Inexpensive	Very expensive	Members share the costs	Cheaper than a private model, pricier than a public one
Demand for in House hardware	No	In-house hardware is not a must but is preferable	In-house hardware is not a must but is preferable	No

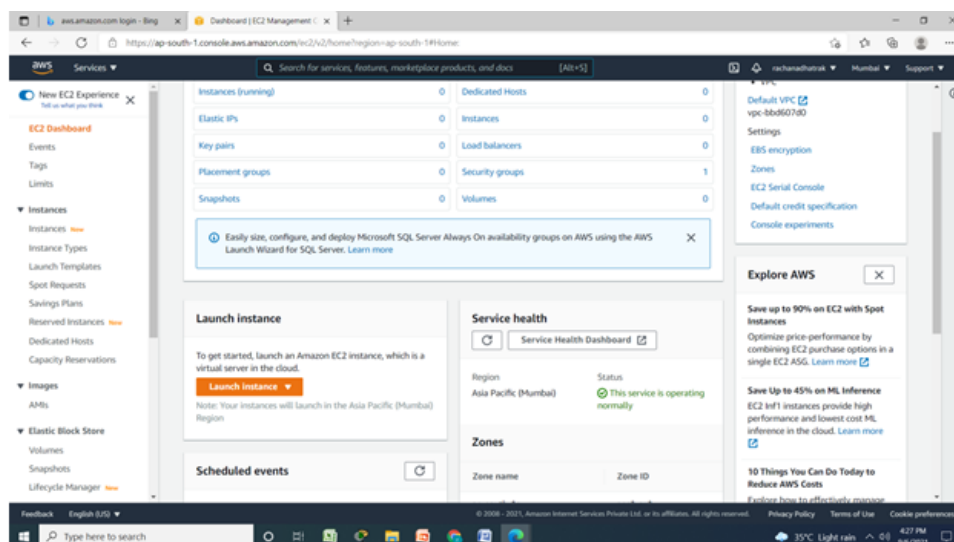
Table 3.3

To create ec2 instance(windows server) in aws

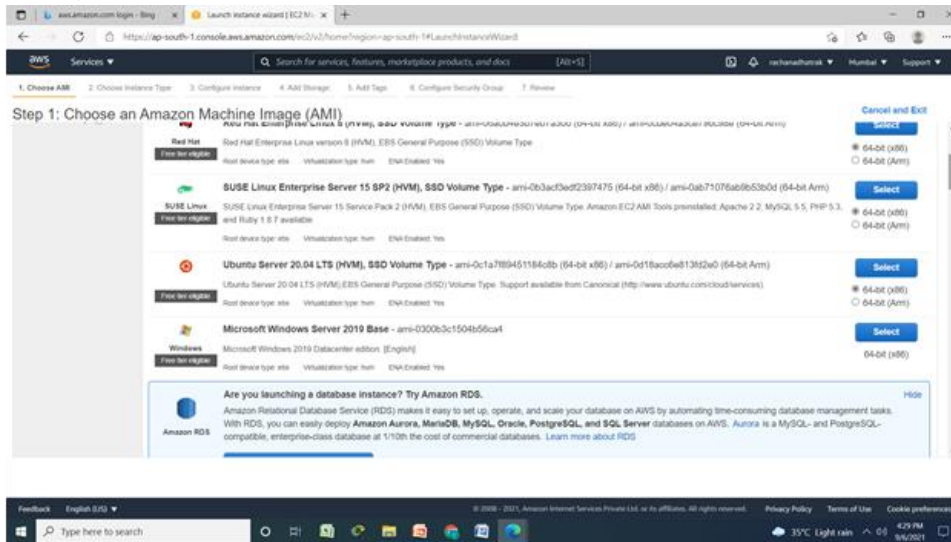
Step1- click ec2 from services tab



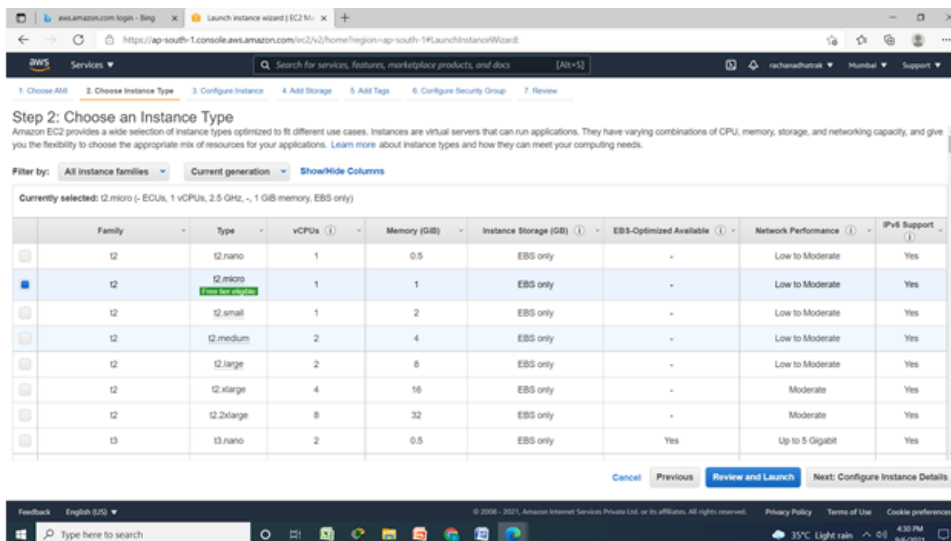
Step2- click launch instance



Step 3- In AMI select windows server 2019



Step4-choose instance type



Step5-configure instance details

The screenshot shows the 'Step 3: Configure Instance Details' page in the AWS Management Console. The page is part of the 'Launch Instance Wizard' for an EC2 instance. The progress bar at the top indicates the current step is 'Configure Instance', with previous steps being 'Choose AMI', 'Choose Instance Type', and 'Add Storage'. The page title is 'Step 3: Configure Instance Details'. Below the title, there is a brief instruction: 'Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.' The main configuration area contains several sections: 'Number of instances' (set to 1), 'Purchasing option' (with a checkbox for 'Request Spot instances'), 'Network' (with dropdowns for 'vpc-bb0607d0 (default)' and 'Subnet' set to 'No preference'), 'Auto-assign Public IP' (set to 'Use subnet setting (Enable)'), 'Placement group' (checkbox for 'Add instance to placement group'), 'Capacity Reservation' (set to 'Open'), 'Domain join directory' (set to 'No directory'), 'IAM role' (set to 'None'), 'Shutdown behavior' (set to 'Stop'), 'Stop - Hibernate behavior' (checkbox for 'Enable hibernation as an additional stop behavior'), 'Enable termination protection' (checkbox for 'Protect against accidental termination'), and 'Monitoring' (checkbox for 'Enable CloudWatch detailed monitoring'). At the bottom right, there are buttons for 'Cancel', 'Previous', 'Review and Launch', and 'Next: Add Storage'. The footer of the console shows the date and time as 4:31 PM on 8/4/2021.

Step6- add storage

The screenshot shows the 'Step 4: Add Storage' page in the AWS Management Console. The page is part of the 'Launch Instance Wizard' for an EC2 instance. The progress bar at the top indicates the current step is 'Add Storage', with previous steps being 'Choose AMI', 'Choose Instance Type', 'Configure Instance', and 'Add Storage'. The page title is 'Step 4: Add Storage'. Below the title, there is a brief instruction: 'Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. Learn more about storage options in Amazon EC2.' The main configuration area is a table with columns: 'Volume Type', 'Device', 'Snapshot', 'Size (GiB)', 'Volume Type', 'IOPS', 'Throughput (MiB/s)', 'Delete on Termination', and 'Encryption'. The table contains one row for the 'Root' volume, with 'Device' set to '/dev/sda1', 'Snapshot' set to 'snap-06b7225287b5b7e73', 'Size (GiB)' set to '30', 'Volume Type' set to 'General Purpose SSD (gp2)', 'IOPS' set to '100 / 3000', 'Throughput (MiB/s)' set to 'N/A', 'Delete on Termination' checked, and 'Encryption' set to 'Not Encrypted'. Below the table, there is a button 'Add New Volume'. A blue box contains a note: 'Free tier eligible customers can get up to 30 GiB of EBS General Purpose (SSD) or Magnetic storage. Learn more about free usage tier eligibility and usage restrictions.' At the bottom right, there are buttons for 'Cancel', 'Previous', 'Review and Launch', and 'Next: Add Tags'. The footer of the console shows the date and time as 4:32 PM on 8/4/2021.

Step7-add tags

The screenshot shows the AWS Management Console's 'Launch Instance Wizard' for an EC2 instance. The 'Add Tags' step is active, showing a table with columns for Key, Value, Instances, Volumes, and Network Interfaces. A message states: 'This resource currently has no tags. Choose the Add tag button or click to add a Name tag. Make sure your IAM policy includes permissions to create tags.' Below the table is an 'Add Tag' button with a note '(up to 50 tags maximum)'. At the bottom, navigation buttons include 'Cancel', 'Previous', 'Review and Launch', and 'Next: Configure Security Group'.

Key (128 characters maximum)	Value (256 characters maximum)	Instances (1)	Volumes (1)	Network Interfaces (1)
This resource currently has no tags. Choose the Add tag button or click to add a Name tag. Make sure your IAM policy includes permissions to create tags.				

Add Tag (up to 50 tags maximum)

Cancel Previous Review and Launch Next: Configure Security Group

Step8-configure security group

The screenshot shows the 'Configure Security Group' step of the EC2 Launch Wizard. It includes a description of security groups and options to either create a new security group or select an existing one. The 'Create a new security group' option is selected. Below, a table lists the configured rules for the security group.

Assign a security group: ☒ Create a new security group
☐ Select an existing security group

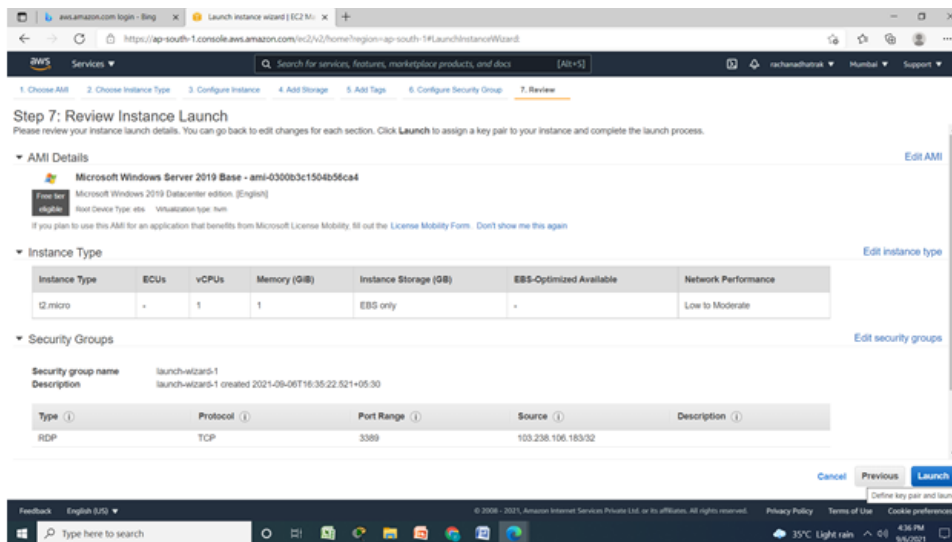
Security group name:
Description:

Type (1)	Protocol (1)	Port Range (1)	Source (1)	Description (1)
RDP	TCP	3389	My IP 103.238.106.183/32	E.g. SSH for Admin Desktop

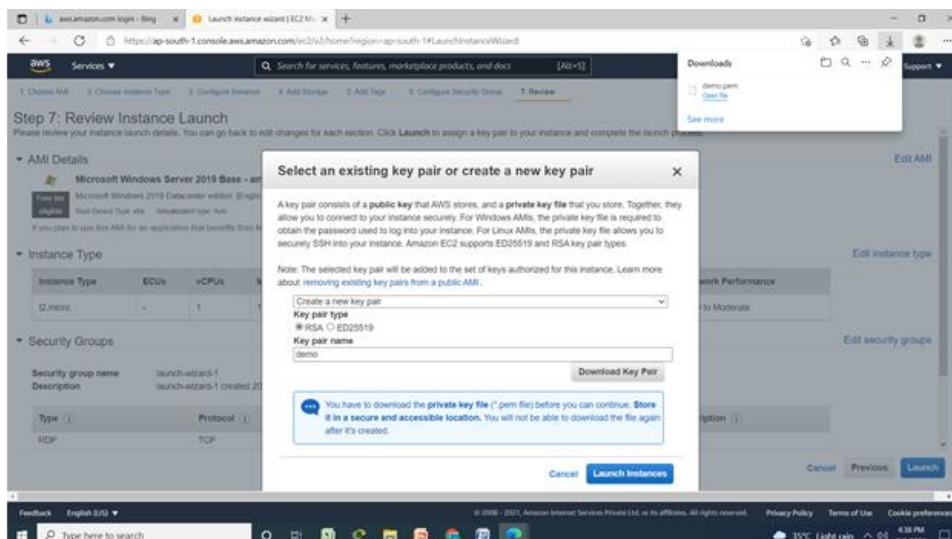
Add Rule

Cancel Previous Review and Launch

Step9 –launch



Step 10 – select key pair



Step 11- key pair is downloaded then launch instances

Step 12- view instances

Step 13- wait till status check of instances is passed

Step 14- now goto connect option from instances

Step 15 – Goto RDP client and download remote desktop file

Step 16- browse the key file decrypt password

Copy the same

Step 17- open downloaded remote desktop file

Connect and enter decrypted password

Connect to system

CONCLUSION:

Cloud computing is a newly developing paradigm of distributed computing.

Virtualization in combination with utility computing model can make a difference in the IT industry and as well as in social perspective. Though cloud computing is still in its infancy but its clearly gaining momentum. Organizations like Google,

Yahoo, Amazon are already providing cloud services. The products like Google App-Engine, Amazon EC2, Windows Azure are capturing the market with their ease of use, availability aspects and utility computing model. Users don't have to be worried about the hinges of distributed programming as they are taken care of by the cloud providers. They can devote more on their own domain work rather than these administrative works. Business organizations are also showing increasing interest to indulge themselves into using cloud services. There are many open research issues in this domain like security aspect in the cloud, virtual machine migration, dealing with large data for analysis purposes etc. In developing countries like India cloud computing can be applied in the e-governance and rural development with great success. Although as we have seen there are some crucial issues to be solved to successfully deploy cloud computing for these social purposes. But they can be addressed by detailed study in the subject.

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