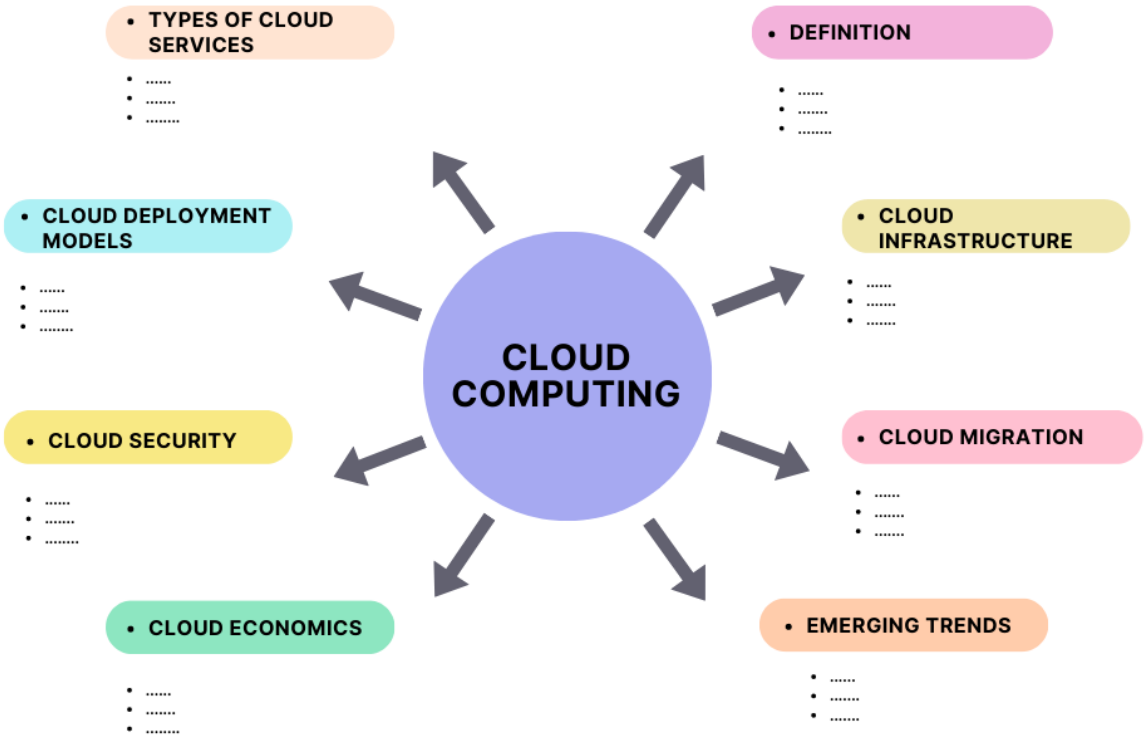
UNIT 6
CLOUD COMPUTING AND INFRASTRUCTURE

Connect to the topic

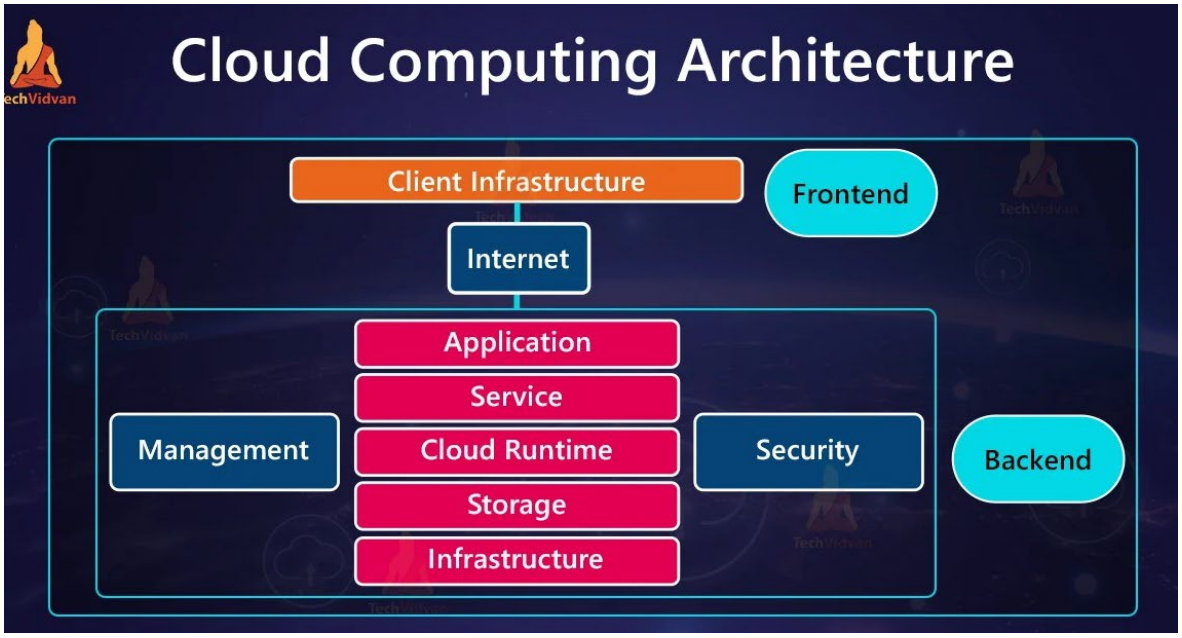
1. Look at the picture. How does it describe cloud computing?
2. What do you think is the difference between traditional computing and cloud computing?
3. How do you think cloud computing has changed the way we work and communicate?

LEAD-IN

Task 1. BRAINSTORM. Work with a partner. Brainstorm what you know about cloud computing and infrastructure. Share your ideas with the class.



Task 2. ANALYZE. Take a look at the diagram of the Cloud Computing Architecture provided. Can you identify the different components and their functions? In particular, can you distinguish between the front-end and back-end aspects of the architecture? Once you've identified the modules, try to describe their roles and how they work together to provide cloud computing services.



(adapted from https://techvidvan.com/tutorials/cloud-computing-architecture/)

READING AND VOCABULARY 1

Task 3. READ FOR MAIN IDEAS. Read the text and choose the primary focus of it.

A. Understanding the fundamental concepts of cloud computing and its relevance in the modern digital landscape.
B. Exploring the benefits and drawbacks of IaaS, PaaS, and SaaS in the context of cloud service models.
C. Analyzing the security concerns related to cloud computing and data privacy issues.
D. Discussing emerging trends in cloud infrastructure, such as serverless computing and edge computing.

Three Pillars of Cloud Services

In today's digital landscape, the adoption of cloud computing has become a ubiquitous phenomenon, changing how businesses and individuals access and manage their data and applications. At the heart of this transformation lie three fundamental cloud service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Each model caters to specific needs, providing unique advantages and limitations. In this article, we will explore the distinctions between these cloud services, empowering you with a comprehensive understanding.

At the core of cloud computing, Infrastructure as a Service (IaaS) delivers virtualized computing resources over the internet, removing the need for physical hardware on-premises. IaaS providers offer a vast pool of computing resources, including virtual machines, storage, and networking components, which users can access and manage remotely.

The key characteristic of IaaS is scalability, allowing businesses to easily adjust resources based on demand. This flexibility ensures cost-efficiency and enables rapid response to changing needs.

Additionally, IaaS promotes cost savings, as users only pay for the resources they consume, eliminating the need for substantial upfront investments in hardware.

For example, Amazon Web Services (AWS) Elastic Compute Cloud (EC2) offers a wide range of scalable virtual machine instances to cater to varying workloads. This allows businesses to scale their infrastructure effortlessly during peak periods, such as seasonal sales or sudden traffic spikes.

However, IaaS requires a certain level of IT expertise, as users are responsible for managing and maintaining their virtual infrastructure. While this empowers businesses with more control over their environment, it also demands specialized skills and resources to ensure optimal performance and security.

Platform as a Service (PaaS) offers a higher level of abstraction compared to IaaS. With PaaS, developers gain access to a development and deployment environment in the cloud, allowing them to focus on building and deploying applications without worrying about managing the underlying infrastructure.

The key characteristic of PaaS is rapid development. By providing pre-configured development frameworks, PaaS platforms streamline the application development process, accelerating time-to-market for new software solutions. Additionally, PaaS offers automatic scalability, dynamically allocating resources based on user demand, ensuring optimal performance for applications.

For instance, Google App Engine is a popular PaaS platform that enables developers to create web applications without worrying about managing servers. It automatically handles tasks like load balancing and server provisioning, simplifying the development process.

Despite its advantages, PaaS comes with some limitations. Users have less control over the underlying infrastructure, which can be restrictive for applications with unique requirements or specific configurations. Moreover, migrating PaaS applications to another provider might be challenging due to platform-specific dependencies, potentially leading to vendor lock-in.

Software as a Service (SaaS) represents the user-friendly, end-user application layer of cloud services. With SaaS, users can access software applications over the internet, eliminating the need for local installations and reducing hardware dependency.

The key characteristic of SaaS is accessibility. SaaS applications can be accessed from any internet-connected device, enabling remote collaboration and seamless integration across teams and locations. Additionally, SaaS providers handle software updates and maintenance, ensuring that users always have access to the latest features and security patches without any manual intervention.

For example, Microsoft Office 365 offers a suite of productivity applications, such as Word, Excel, and PowerPoint, accessible through a web browser. Users can work on documents, spreadsheets, and presentations collaboratively, irrespective of their physical location.

Despite its convenience, SaaS may have limitations concerning customization. Since these applications are designed to cater to a broad user base, they might not address highly specialized requirements of certain businesses. Additionally, storing sensitive data on third-party servers raises data security and compliance concerns, requiring robust encryption and data protection measures.

Task 4. READ FOR DETAILS. Read the text again and answer the questions.

Which cloud service model …

1. allows businesses to easily adjust resources based on demand, ensuring cost-efficiency and rapid response to changing needs?
2. represents the user-friendly, end-user application layer of cloud services, eliminating the need for local installations?
3. provides a vast pool of computing resources, including virtual machines, storage, and networking components, that users can access and manage remotely?

4. offers a higher level of abstraction, allowing developers to focus on building and deploying applications without managing the underlying infrastructure?
5. automatically handles tasks like load balancing and server provisioning, simplifying the application development process for developers?
6. allows users to access software applications over the internet, promoting remote collaboration and seamless integration across teams?
7. requires a certain level of IT expertise as users are responsible for managing and maintaining their virtual infrastructure?
8. offers pre-configured development frameworks, streamlining the application development process and accelerating time-to-market for new software solutions?
9. ensures that users always have access to the latest features and security patches without manual intervention, as software updates and maintenance are handled by the providers?
10. may have limitations concerning customization, as applications are designed to cater to a broad user base?

A) IaaS

B) PaaS

C) SaaS

Task 5. ANALYZE. Study the table of public, private, hybrid, and community cloud models and answer the questions below.

Cloud Type	Description	Key Characteristics
Public Cloud	● Services offered to the general public over the internet. ● Operated by third-party cloud service providers. ● Ideal for individuals, small businesses, and startups. ● Examples: AWS, Microsoft Azure, Google Cloud.	● Shared infrastructure and resources among multiple users. ● Cost-effective, as users pay only for what they consume. ● Scalable and flexible, accommodating changing demands. ● Outsourced maintenance and updates.
Private Cloud	● Cloud infrastructure exclusively used by a single organization. ● Located on-premises or hosted by a third-party service provider. ● Ideal for organizations with strict security and compliance requirements. ● Offers greater customization and integration options.	● Dedicated resources for enhanced security and control. ● Customizable to meet specific organizational needs. ● Better control over data and applications. ● Potentially higher upfront costs and maintenance responsibilities.
Hybrid Cloud	● Combination of public and private cloud models. ● Offers the flexibility to host sensitive data on a private cloud and less sensitive data on a public cloud.	● Allows data and applications to move between clouds. ● Scalable and cost-effective for varying workloads. ● Efficient utilization of resources, optimizing performance.

	• Enables businesses to maintain control over critical data while leveraging the benefits of public cloud services. • Ideal for organizations with dynamic and fluctuating workloads. • Offers seamless integration between clouds for enhanced performance.	• Potential complexity in managing multiple environments.
Community Cloud	• Shared cloud infrastructure and services for a specific community of organizations or users. • May be managed and operated by one or more organizations within the community or a third-party provider. • Designed to meet the industry-specific or compliance-related requirements of the community members. • Ideal for government agencies, research institutions, or organizations with common interests and objectives. • Offers economies of scale and collaborative innovation.	• Built and customized to serve the unique needs of the community. • Shared costs among community members, reducing expenses. • Enhanced security, as the community shares similar concerns and standards. • Potential data isolation from other cloud models for added privacy. • Limited to the specific community, potentially reducing available features and services from broader cloud offerings.

1. What are the main differences between a public cloud and a private cloud?
2. Which cloud model is the best choice for an organization with strict security and compliance requirements? Why?
3. What are the advantages of adopting a hybrid cloud model for businesses with dynamic and fluctuating workloads?
4. In what scenarios would a community cloud model be more beneficial than a public or private cloud model?
5. Which cloud model allows users to have greater control over their data and applications? How does this impact customization options?

Task 6. ANALYZE. Read and analyze various scenarios to determine which cloud model (public, private, hybrid, or community) would be the most suitable for each situation. Justify your choice of cloud model based on the specific needs and requirements outlined in the scenario.

Scenario 1. Start-up Tech Company

A new tech company is looking to launch a web-based application with a growing user base. The company wants to minimize upfront costs and focus on rapid development and deployment. They also need the flexibility to scale their resources as the user demand increases.

Scenario 2. Healthcare Institution

A healthcare institution, handling sensitive patient data, needs a secure and compliant cloud solution. They require a high level of data privacy and control over their infrastructure to comply with strict industry regulations.

Scenario 3. E-commerce Retailer

An e-commerce retailer experiences seasonal spikes in website traffic during sales events. They need a cloud solution that can handle high traffic volumes during peak periods but can also scale down during quieter times to optimize costs.

Scenario 4. Government Agency Collaboration

Multiple government agencies need to collaborate and share resources while ensuring data confidentiality and security. They also want to reduce costs by pooling resources and sharing common applications.

Scenario 5. Research and Development Project

A research and development team is working on a new project that requires extensive computational resources for simulations. The project also involves sensitive intellectual property that must be protected.

Scenario 6: Non-profit Organization

A non-profit organization requires a cost-effective cloud solution for hosting their website, email services, and collaboration tools. The organization values sustainability and social responsibility.

Task 7. WORK WITH WORDS. Look at words and phrases on the left and match them with their definitions on the right.

1. Elasticity	a) Cloud system's capacity to handle increasing users, data, and workloads seamlessly without performance degradation.
2. Extensibility	b) Distributing network traffic and workloads across multiple cloud resources for efficient resource utilization.
3. Virtualization	c) Automated coordination of cloud resources, apps, and services for smooth workflow execution and resource efficiency.
4. Hypervisor	d) Cloud architecture serving multiple users on one infrastructure with isolated data and shared physical resources.
5. Scalability	e) Software/hardware enabling virtualization, allowing multiple virtual machines (VMs) on a single physical server in the cloud.
6. Multi-tenancy	f) Dependency on a specific cloud provider, making switching challenging and costly due to compatibility and data migration issues.
7. Cloud migration	g) Cloud system's ability to automatically adjust computing resources based on changing workloads for optimal performance and cost-efficiency.
8. Serverless computing	h) Centralized and scalable repository for storing and managing large volumes of structured and unstructured data in the cloud.
9. Load balancing	i) Transferring data, apps, and workloads from on-premises to cloud infrastructure to leverage cloud benefits.
10. Vendor lock-in	j) Cloud platform's capability to be easily customized to meet specific user requirements and integrate with external services.
11. Data lake	k) Creating virtual versions of computing resources (servers, storage, networks) for efficient hardware use and flexibility in the cloud.
12. Orchestration	l) Cloud model enabling developers to run code without managing infrastructure, focusing solely on code deployment.

Task 8. WORK WITH WORDS. Fill in the missing words in the sentences.

hypervisor	serverless computing	load balancing	orchestration
multi-tenancy	vendor lock-in	cloud migration	elasticity
virtualization	scalability	data lake	extensibility

1. With_____, developers focused solely on coding, while the cloud provider handled infrastructure management, reducing development time and effort.
2. _____ simplified the management of resources, allowing businesses to efficiently utilize hardware and quickly deploy new virtual machines in the cloud.
3. The cloud _____ system streamlined the deployment process, automating the provisioning and configuration of virtual machines and applications for efficient workflows.
4. The successful _____allowed the company to transfer their entire data center to the cloud, reducing operational costs and improving accessibility.
5. The organization faced challenges due to_____, making it difficult to switch to a different cloud provider without significant changes to their applications and data.
6. The cloud system's _____ allowed it to seamlessly allocate additional computing resources during peak hours, ensuring a smooth user experience.
7. The company's cloud infrastructure demonstrated exceptional_____, accommodating rapid business growth without compromising performance.
8. _____ in the cloud environment ensured that different organizations securely shared the same physical resources while keeping their data isolated from one another.
9. The organization stored large volumes of raw data in a _____ for future analysis and business intelligence purposes.
10. The cloud platform's _____ facilitated easy integration with third-party services, enhancing the application's functionality.
11. The _____ efficiently managed the virtualization of servers, enabling multiple virtual machines to run concurrently on a single physical server.
12. _____ efficiently distributed incoming requests, ensuring uniform resource utilization across cloud servers.

Task 9. WORK WITH WORDS. Look at abbreviations and acronyms on the left and match them with the phrases on the right.

1. CSP	Content Delivery Network
2. IDE	Single Point of Failure
3. BaaS	Integrated Development Environment
4. CMP	Virtual Desktop Infrastructure
5. CDN	Virtual Private Server
6. VDI	Cloud Service Provider
7. DRaaS	Service Level Agreement
8. SLA	Disaster Recovery as a Service
9. SPOF	Cloud Management Platform
10. VPS	Backend as a Service

Now match abbreviations and acronyms with their definitions.

1. Software used to manage and orchestrate cloud resources, ensuring efficient cloud infrastructure management and optimization.
2. Cloud-based service providing data backup, recovery, and business continuity solutions in the event of a disaster or data loss.

3. A software suite that provides comprehensive tools and features to facilitate software development, testing, and debugging.
4. A component, system, or process that, if it fails, can cause the entire system or application to malfunction or become unavailable.
5. A distributed network of servers strategically placed to deliver web content, like images and videos, to users from nearby locations, reducing latency and improving website performance.
6. A virtualized server within a physical server, offering users the isolation and control of a dedicated server at a lower cost.
7. A contractual agreement between a service provider and a customer, specifying the level of service and performance metrics that the provider guarantees to meet.
8. A company or organization that offers cloud computing services and resources to customers over the internet.
9. A virtualization technology that enables users to access a desktop operating system and applications from a remote server or cloud.
10. A cloud computing service that provides backend infrastructure and services, allowing developers to focus on front-end development and application functionality

Task 10. COMMUNICATE. Work in groups. Discuss the questions below.

1. What role do CSPs play in the industry?
2. In cloud computing, how does BaaS simplify the development process for application developers?
3. What is the function of a CMP and how it helps businesses efficiently manage their cloud resources and infrastructure.
4. How does a CDN enhance the performance and user experience of web applications in cloud computing?
5. What is the importance of DRaaS in cloud-based business continuity planning. How does it ensure data resilience in the event of a disaster or data loss?

SPEAKING 1

Task 11. COLLABORATE. Work in small groups. Study a set of requirements and constraints for TechWise Solutions, and choose the cloud model that aligns best with the company's needs. Explain your choices and reasoning, taking into consideration factors like security, scalability, and cost-effectiveness.

Cloud Model Selection

TechWise Solutions is a fast-growing technology start-up that offers innovative software solutions to clients worldwide. The company's success has led to increased demands on its IT infrastructure. The management team is now considering adopting cloud computing to enhance their operations. As the cloud architect, you have been tasked with selecting the most appropriate cloud model for TechWise Solutions.

Requirements

Scalability. The chosen cloud model should be able to handle sudden increases in website traffic during product launches and promotional events without compromising performance.

Data Security. As TechWise Solutions deals with sensitive customer data, the selected cloud model should have robust security measures to protect data from unauthorized access and cyber threats.

Cost-Effectiveness. The company aims to optimize costs and wants a cloud model that allows them to pay only for the resources they use without any upfront investments in hardware.

Development Flexibility. The development team requires the ability to rapidly develop and deploy new software solutions without worrying about managing the underlying infrastructure.

Compliance. TechWise Solutions must adhere to industry-specific regulations and data privacy requirements in all its operations.
High Availability. The cloud model should ensure a minimum downtime and high availability for critical applications to avoid any disruptions to business operations.

Task 12. ROLE PLAY. Role play the situations below.

Cloud Solution Proposal

The manufacturing company is considering adopting cloud computing to streamline its operations and enhance efficiency.
Student A: You are a Cloud Consultant from a reputable cloud service provider. You goal is to understand TechMania Solutions' business processes and IT requirements. You should propose a suitable cloud solution, considering factors like data security, scalability, and cost-effectiveness.
Student B: You are the IT Manager of a manufacturing company called "TechMania Solutions." You are responsible for managing your company's IT infrastructure and ensuring smooth operations. You should provide information about our current IT setup, challenges faced, and the company's goals for cloud adoption.
Student A conducts a meeting with Student B to gather information about TechMania Solutions' IT infrastructure, business processes, and specific challenges. Based on this information, Student A proposes a tailored cloud solution, explaining the benefits of using IaaS, PaaS, or SaaS for different aspects of the company's operations. Student B evaluates the proposal and asks questions to better understand how the proposed cloud solution can address the company's needs.

Cloud Migration Decision

The advertising agency is considering migrating its IT infrastructure to the cloud to improve collaboration among employees and enhance data security.
Student A: You are the CEO of a small advertising agency called "Creative Solutions". You are interested in understanding the potential benefits and challenges of migrating our IT infrastructure to the cloud. You need to make an informed decision for our company's future.
Student B: You are a Cloud Migration Specialist from a reputable cloud service provider. You should provide guidance and expertise to Creative Solutions regarding the cloud migration process. You should address the CEO's concerns and offer insights into how different cloud service models can impact their business.
Student B presents a detailed overview of cloud computing and the various cloud service models (IaaS, PaaS, and SaaS) to the CEO (Student A). The specialist explains the potential benefits of cloud migration, including improved data access, scalability, and cost savings. The CEO asks questions about data security, data backup, and the timeline for the migration process. Together, they discuss the best cloud model that aligns with Creative Solutions' business needs and goals.

LISTENING

Task 13. LISTEN FOR MAIN IDEA. You are going to listen to a podcast about cloud storage. Scan the QR code and listen to the podcast, then choose the best title for it.

A. The Impact of Cloud Computing on the Environment
B. How to Store Data Without Using the Internet
C. Understanding Cloud Storage: Public, Private and Hybrid Models

Task 14. LISTEN FOR DETAILS. Listen to the podcast again, read the script and fill in the missing words.

Put simply, the cloud means services delivered 1) _____ a network, like the internet. Cloud storage is a service model in which data is backed up, managed and 2) _____ remotely, usually over the internet. Users typically pay for their cloud data storage on a per gigabyte 3) _____ rate. So the more data you have, the more you'll have to pay to keep it 4) _____ in the cloud, and vice versa. Consumers are probably familiar with cloud services like Dropbox or Google Drive, typically for photos and documents. For 5) _____, cloud storage is most often used for data backup, 6) _____ recovery, 7) _____ and DevOps projects. There are three main cloud based storage 8) _____ models, public, private and hybrid. Public cloud storage services provide a multi 9) _____ storage environment that is most suited for unstructured data. This market is 10) _____ by Amazon Glacier, Google Cloud and Microsoft Azure. Private cloud storage provides a dedicated environment protected behind an organization's 11) _____, appropriate for users who need 12) _____ and control over data. Hybrid cloud is a mix of private cloud and 13) _____ party public cloud services with 14) _____ between the platforms for management, offering businesses flexibility and more data 15) _____ options.

LANGUAGE FOCUS 1

Task 15. STUDY AND ANALYZE. Look at the information about time sequence.

Time Sequence

Events do not simply occur in isolation, they occur either before, during or after other events. Time sequence can be chronological, logical or causal. The tables below show examples of time relaters.

Before given time references:

	Time relaters		
Adjectives	earlier	preceding	
	former	previous	
Adverbials	already	earlier	previously
	prior	first	so far
	before	formerly	yet
	before that	originally	in the beginning
	before then	up to now/then	(long) ago
	back	until now/then	

Examples:

1. The company's **earlier** approach to IT infrastructure management involved on-premises servers, but they have now embraced cloud computing for its scalability and flexibility.
2. In its **previous** setup, the organization faced limitations in resource allocation, but after transitioning to the cloud, they can easily scale their computing power as needed.
3. **Up to now**, the company managed its own data centers, but they are planning to migrate to the cloud to streamline operations and reduce maintenance overheads.

Simultaneous with given time references:

	Time relaters	
Adjectives	contemporary	simultaneous
Adverbials	at present	meantime
	at this point	meanwhile

	now/then	in the meantime
	today	when
	for the time being	at the same time
	at the moment	throughout
	at that time	

Examples:

1. **At the same time**, the cloud service provider was updating its data centers to improve overall system performance and security.
2. **Throughout** the process, they focused on optimizing costs and maintaining high availability.
3. **When** expanding their business to new regions, the company needed to deploy additional cloud resources.

After given time-references.

	Time relaters		
Adjectives	following	later	next
Adverbials	afterwards	since	by the end
	after that	by the time	soon
	eventually		next

Examples:

1. In the **following** weeks, the IT department will begin the migration process for their primary services.
2. **Next**, the company intends to explore the benefits of serverless computing to further optimize their application development process.
3. **By the end** of the year, they aim to establish cloud data centers in strategic locations.

Sample paragraph:

Cloud computing deployment is a multifaceted process that involves careful planning and execution. **Initially**, companies assess their existing IT infrastructure and determine the scope of cloud integration. **First**, they identify which applications and services are suitable for migration and formulate a detailed deployment strategy. **Following this**, they begin the migration process, starting with less critical workloads. **Throughout** the deployment, companies continuously monitor and optimize their cloud resources. **Meanwhile**, the IT team collaborates with cloud service providers to address any challenges and ensure seamless integration. **Simultaneously**, they train employees to adapt to the new cloud environment and leverage its capabilities effectively. **While** cloud adoption progresses, organizations witness significant improvements in scalability, cost-efficiency, and data accessibility. **As** time passes, more applications are shifted to the cloud, and by the end of the deployment journey, the entire IT infrastructure is transformed. **Eventually**, companies reap the benefits of cloud computing, experiencing enhanced performance, innovation, and competitive advantage. **Up to now**, cloud computing has become an indispensable pillar in modern businesses, driving digital transformation and shaping the future of the IT landscape.

Task 16. ANALYZE. Read the following sentences, underline th time relaters and indicate whether they refer to before, during, or after the given time reference.

1. For the time being, the organization has opted for a hybrid cloud model to gradually transition their on-premises applications to the cloud.

2. By the time they completed the cloud migration, the company witnessed significant cost savings and enhanced data accessibility.
3. Since adopting SaaS, the company has experienced improved collaboration among teams and increased productivity.
4. When the company decided to adopt a hybrid cloud model, they needed to carefully manage data synchronization between their on-premises servers and the cloud service provider's infrastructure.
5. The cloud service provider offers a range of software applications that were formerly available only as locally installed programs.
6. At that time, cloud computing was a relatively new concept, and businesses were hesitant to adopt it due to security concerns.
7. Now, organizations can access a wide range of cloud-based software applications that were not available a few years ago.
8. They recognized the need for cloud-based disaster recovery. Soon, they invested in a Disaster Recovery as a Service solution to safeguard critical data.
9. The company experienced a surge in website traffic during a product launch. Simultaneously, the CDN ensured quick content delivery to users across the globe.
10. Until now, the organization has relied on traditional IT infrastructure, but they are now exploring the benefits of IaaS for cost optimization.
11. During the migration of their data to the cloud, the company experienced a temporary interruption in services; meanwhile, they ensured a simultaneous backup process to avoid any data loss.
12. Originally, the company had concerns about data security in the cloud, but they have since implemented robust encryption and access controls.

Task 17. PRACTICE. Use the time relaters from the box to fill in the gaps in the sentences.

following	previously	before	eventually	the time being
contemporary	meantime	beginning	simultaneous	
at the same time	former	throughout		

1. _____, data backups were stored on physical tapes, but now, they are securely stored in cloud-based data lakes.
2. The organization started with a small cloud deployment, and_____, they scaled up their resources as the demand for their services increased.
3. The company first migrated its non-critical applications to the cloud. _____ that successful transition, they proceeded to move their mission-critical systems.
4. The development team was working on implementing new features for the software. In the_____, the operations team was testing the application's performance throughout the process.
5. The _____ trend of serverless computing allows applications to scale automatically and handle multiple requests simultaneously without managing the underlying infrastructure.
6. The company's IT infrastructure allows for _____ access to data and applications from various locations, enhancing remote collaboration.
7. In the_____, the company relied on traditional on-premises servers, but up to now, they have transitioned most of their infrastructure to the cloud.
8. _____ that, the organization faced scalability issues and increased maintenance costs, but after adopting cloud computing, they experienced significant improvements in resource allocation and cost-effectiveness.

9. The company implemented a new cloud-based CRM system, and_____, they optimized their sales processes to drive customer engagement.
10. The _____ approach to application development involved lengthy manual testing, whereas now, automated testing is adopted for faster releases.
11. _____ the cloud migration process, the IT team worked closely with the cloud service provider to ensure data security and compliance.
12. For_____, the organization has decided to use a hybrid cloud model while they evaluate the feasibility of a full cloud migration.

WATCHING

Task 18. WATCH FOR MAIN IDEAS. Scan the QR code and watch the video "Cloud Computing". Put the topics the video shows in the correct order as they go in it.

Types of deployment models: public, private, hybrid cloud.
Contrasts between on-premise and cloud computing.
Major cloud service models: IaaS, PaaS, SaaS.
Cloud computing models: deployment and service.
Scaling challenges for a small software firm.
Introduction to pay-as-you-go cloud computing.

Task 19. WATCH FOR DETAILS. Watch the video again and decide if the statements below are True or False.

1. In cloud computing, the pay-as-you-go model allows users to pay a fixed monthly fee regardless of their actual resource usage. True / False
2. On-premise systems offer better data security compared to cloud computing systems. True / False
3. In a hybrid cloud, the entire cloud infrastructure is exclusively operated by a single organization. True / False
4. Cloud computing service models require organizations to handle all aspects of maintenance, including hardware and software, on their own. True / False
5. Cloud computing allows businesses to avoid the costs and hassles of owning any IT equipment, regardless of the service model they choose. True / False
6. With on-premise systems, scaling down resources is as easy and cost-effective as scaling up. True / False
7. Scaling down resources in on-premise systems can lead to heavy losses in terms of infrastructure and maintenance costs. True / False
8. Infrastructure as a Service (IaaS) is a cloud service model where users get access to basic computing infrastructure, while the cloud providers handle the rest of the components. True / False
9. Platform as a Service (PaaS) provides cloud platforms and runtime environments for developing, testing, and managing applications, reducing the need for acquiring and managing related architecture. True / False
10. Cloud computing service models reduce the burden of maintenance as cloud service providers manage and maintain the infrastructure. True / False

SPEAKING 2

Task 20. COLLABORATE. Work in pairs. Look at the statistics about cloud computing. Discuss it with your partner. What data looks predictable, surprising or appalling?

- All companies use at least one public or private cloud.

- By 2025, 85% of organizations will be “cloud first.”
- Over 60% of all corporate data is in cloud storage.
- 75% of tech leaders are building all new products and features in the cloud.
- Nearly 50% of organizations are cloud-native or fully cloud-enabled.
- Globally, there are nearly 12 million buyers of cloud infrastructure.
- 4 out of 5 enterprises plan to increase their cloud investment despite economic uncertainties.
- More than half of IT leaders say they’ll consider moving some of their sensitive consumer data (59%) or corporate financial data (52%) to the cloud.
- 41% of IT decision-makers need support from cloud vendors for security expertise, and 40% need help managing their cloud better.
- Over 40% of companies have fully achieved the expected benefits, such as improved service levels (43%), business enablement (45%), and business continuity (42%) from cloud adoption.
- Cloud reduces downtime by about 57%.
- More than 50% of firms that migrated to the cloud note better end-user experience from apps running on the cloud.
- 60% of companies note easier IT operations and management due to migrating to the cloud.
- The 8 largest cloud infrastructure providers control over 80% of the cloud market.
- These top three cloud providers - AWS, Microsoft, and Google - also control 71% of the public cloud market.
- AWS is the leader in cloud infrastructure, with a 34% market share. This share exceeds the combined market share of its two largest competitors, Microsoft Azure and Google Cloud.

Task 21. COMMUNICATE. Look at the statistical data on cloud computing again and answer the questions.

1. What statistical data do you consider the most important? Why?
2. Should we care about statistics or nothing can be changed?
3. Despite the numerous benefits of cloud computing, why do you think some organizations have not fully embraced it yet? Discuss the potential challenges or concerns they might face.
4. The statistics show that over 60% of corporate data is in cloud storage. What are the advantages and disadvantages of storing such a large amount of sensitive data in the cloud? How can organizations ensure data security and compliance?
5. More than 50% of firms that migrated to the cloud reported a better end-user experience from apps running on the cloud. How can the cloud improve application performance and user experience? Share examples of successful cloud-based applications.
6. The 8 largest cloud infrastructure providers control over 80% of the cloud market. What implications does this concentration of market share have on competition and innovation in the cloud industry?
7. Cloud adoption has led to benefits such as improved service levels, business enablement, and business continuity. Can you think of specific scenarios where cloud computing played a crucial role in achieving these benefits? How can cloud technology continue to drive business growth and innovation in the future?

PROJECT WORK

Task 22. SEARCH THE WEB. You are going to use the Internet to research and compare different cloud service providers. Work in teams. Choose one provider: WS, Microsoft Azure, Google Cloud, etc.

Cloud Service Provider Comparison

You should explore and gather information on the following key areas:

Market share	Analyze market reports and statistics to determine the provider's position in the cloud computing industry compared to its competitors.
Features and services	Examine the range of services offered by the cloud provider, such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), storage options, machine learning capabilities, and more.
Security measures	Investigate the security protocols, encryption standards, access controls, and compliance certifications provided by the cloud provider to ensure data protection.
Customer reviews and feedback	Search for customer reviews, testimonials, and case studies to understand the experiences of businesses and organizations using the cloud services.

After presentation of the each group's findings have a class discussion to compare and contrast the different cloud service providers. Share the insights, and discuss which provider you believe would be the most suitable for specific use cases.

READING AND VOCABULARY 2

Task 23. COMMUNICATE. You are going to read a text about one more aspect of cloud computing. Before you start reading discuss the questions below with your partner.

- Have you heard about cloud migration before? If so, what do you know about it?
- Are you aware of different cloud migration options available to organizations? If yes, which ones do you know about, and what do you think their benefits might be?

Cloud Migration

Cloud migration is the process of moving applications and their supporting technologies out of an organization's on-premises data center and into a cloud provider's data center. This can mean moving an on-premises application along with supporting databases and development platforms onto the cloud provider's servers, storage, and networking infrastructure. It can also mean moving to a cloud application, such as an ERP, CRM, or human capital management (HCM) application delivered as software as a service, and shutting down the legacy version.

In all the models (SaaS, PaaS, IaaS), cloud migrations shift workloads into a cloud provider's data center where tasks such as backups, security patching, and new feature releases are generally a regular part of the service. Using cloud services is usually less expensive compared with running a data center because you only pay for what you use. As migrations have become more common, companies have discovered another benefit: Migrating frees skilled employees from the mundane work of "keeping the lights on" in the data center and allows them to focus on supporting new business opportunities.

Cloud migration is a single term that covers a wide array of business-technology strategies. Here is a list of six cloud migration options and why you might choose them.

1. **Rehosting** sometimes goes by the name "lift and shift." In this process, you move an application to a cloud provider's data center with as few alterations as possible. A lift-and-shift application continues to deliver the same capabilities to your employees or customers; ideally they never even know it moved. The difference is instead of being hosted in an on-premises data center it's now hosted in a cloud data center, so it's running atop the latest hardware technology, which is maintained by the provider, not your IT staff.
2. **Replatforming** also takes an on-premises application and moves it to a cloud provider's infrastructure. In the replatforming process, however, the application is updated to take

advantage of new technology or services available from the provider. For example, when moving an HCM application from your own data center infrastructure to the cloud, you might replace a labor-intensive and older data management environment with an autonomous database that does automatic updates and offers built-in machine learning models.

3. **Repurchasing** replaces an application running in your on-premises data center with a cloud-based, provider-created SaaS application that employees access via a browser. For example, you might move from a licensed, on-premises ERP application to an enterprise ERP cloud service that you pay for by subscription and that is automatically updated several times a year with new features. While this sounds simple, it takes time and planning to map the new application's functionality to the processes you use to do business. It may require organizational change to get your team to adopt what are considered industry best practices built into the cloud applications. Cloud providers offer tools to help you map the conversion.
4. **Refactoring** is the process of moving an application to the cloud with the intention of modernizing its architecture to take advantage of cloud native features. For example, a monolithic application built over time by your organization might still do the job it was built to do, but it may be too hard to add new features to address evolving customer needs or go after new opportunities. By refactoring the application, you can introduce a microservices architecture that makes it much easier to develop, test, and launch new features to such an app. Or you might add in-database analytics that make it easier to run analytics without moving data around your environment and help you get more value from your data.
5. **Retaining** means you've looked closely at what it will take to move an application to the cloud and have determined that, for now, a move doesn't make sense. There can be a lot of reasons for this. Maybe your application has low latency requirements that favor an on-premises model, or you need to follow data residency rules that make you wary of moving to a cloud provider's data center. Or perhaps, after doing your homework, you realize the cost and effort of the migration outweigh the benefits—at least for now. Whatever your reason for deciding not to move to the cloud, it's still wise to revisit the idea from time to time. Cloud providers continue to build data centers in regions around the world, add new models that address data control, and improve the efficiency of the migration process.
6. **Retiring** happens when you look closely at an on-premises application and realize its functionality is hardly used or no longer needed. Saying goodbye to these apps can deliver a big win from the cloud migration process because you're eliminating redundancy or vestigial processes that cost you money but no longer deliver value. Retiring an application does take time and planning because there can be dependencies with other applications that need to be addressed before you turn it off.

To sum up, embracing cloud migration is not just an adoption of new technology; it's a strategic decision that unlocks uncharted realms of growth and propels businesses towards a future of enhanced competitiveness and success. As cloud providers continue to evolve their offerings and data centers, the power of cloud migration will only intensify, cementing its position as a driving force behind business transformation in the digital era.

(adapted from https://www.oracle.com/cloud/cloud-migration)

Task 24. READ FOR DETAILS. Read the text and choose the correct answer A, B, C or D to the questions.

1. Which of the following is NOT an example of cloud migration?
   A. Moving an on-premises application along with supporting databases to the cloud provider's servers.
   B. Transitioning to a cloud application like ERP or CRM delivered as software as a service.
   C. Shutting down the legacy version of a cloud application.

D. Transferring data from cloud servers back to on-premises data center.

2. What advantage does cloud migration offer in terms of cost?
   A. Cloud migration is usually more expensive than running a data center.
   B. Cloud migration eliminates the need to pay for cloud services.
   C. Cloud services are generally cheaper compared to running a data center because you only pay for what you use.
   D. Cloud migration has no impact on cost as it remains constant.
3. Which cloud migration option involves moving an application to the cloud with minimal alterations, ensuring it continues to deliver the same capabilities to users?
   A. Rehosting
   B. Replatforming
   C. Repurchasing
   D. Refactoring
4. Refactoring in cloud migration refers to …
   A. Moving an application to the cloud without any updates or changes.
   B. Replacing an application running on-premises with a cloud-based SaaS application.
   C. Introducing a microservices architecture to enhance the application's development and features.
   D. Retiring an application that is no longer needed.
5. When might an organization choose the "Retaining" cloud migration option?
   A. When an application requires low latency and data residency restrictions.
   B. When moving to the cloud would significantly reduce costs.
   C. When a cloud provider offers additional features that are not available on-premises.
   D. When an application is fully compatible with the cloud infrastructure.
6. What is the primary benefit of retiring an application during the cloud migration process?
   A. It reduces the need for data backups.
   B. It eliminates redundant processes and reduces costs.
   C. It allows the application to function offline.
   D. It speeds up the migration process.
7. Cloud migration allows skilled employees to focus on supporting new business opportunities because …
   A. Cloud providers handle all backups and security patching tasks.
   B. Migrating to the cloud increases the workload for IT staff.
   C. Companies no longer need skilled employees after cloud migration.
   D. The cloud provider's data center requires constant monitoring.
8. Which cloud migration option involves updating an on-premises application to take advantage of new technology or services available from the cloud provider?
   A. Rehosting
   B. Replatforming
   C. Repurchasing
   D. Refactoring
9. Cloud migration has become more common over the years because:
   A. Companies found it less expensive to run their own data centers.
   B. Cloud providers offered limited infrastructure options.
   C. Cloud services were initially not secure enough for critical applications.
   D. Startups and new applications primarily used cloud environments.
10. What type of cloud migration option involves moving an application to the cloud and shutting down the legacy version?
    A. Rehosting
    B. Replatforming

C. Repurchasing
D. Retiring

Task 25. WORK WITH WORDS, Read the text and choose the correct variants for missing words.

Application Architecture and Design in the Cloud

Application architecture and design determine the efficiency, reliability, and 1) _____ of cloud-based applications. Cloud environments require a well-thought-out architecture to fully 2) _____ the benefits of scalability, cost-effectiveness, and high availability.

When designing applications for the cloud, 3) _____ must consider various factors, such as microservices, serverless computing, and containerization. Microservices architecture breaks down applications into smaller, loosely coupled services, enabling easier 4) _____, updates, and scalability. Serverless computing abstracts infrastructure management, allowing developers to 5) _____solely on code, resulting in faster development and reduced 6) _____ costs. Containerization 7) _____applications and their dependencies, ensuring consistent 8) _____ across various environments.

Furthermore, cloud-native design principles encourage leveraging cloud services like databases, storage, and artificial intelligence to 9) _____ application capabilities. It's essential to consider data security, 10) _____, and data sovereignty while architecting cloud applications.

1.	A) adaptability	B) strength	C) flexibility	D) weakness
2.	A) leverage	B) implement	C) exploit	D) misuse
3.	A) architects	B) planners	C) sculptors	D) contractors
4.	A) restoration	B) maintenance	C) repair	D) preservation
5.	A) attend	B) fix	C) direct	D) focus
6.	A) functional	B) operational	C) deployment	D) minimal
7.	A) adds	B) limits	C) encapsulates	D) isolates
8.	A) deployment	B) deactivation	C) removal	D) classification
9.	A) upgrade	B) complement	C) enhance	D) decrease
10.	A) difference	B) agreement	C) consent	D) compliance

SPEAKING 3

Task 25. COLLABORATE. Divide into 2 teams and have a group discussion. Discuss the questions below.

Cloud Security and Privacy

1. How can organizations ensure the privacy of sensitive data when using cloud-based applications and services?
2. What are the benefits and drawbacks of encrypting data stored in the cloud? How does encryption impact performance and usability?
3. In light of recent data breaches, what are the implications of cloud security breaches for businesses and individuals?
4. How do government regulations and compliance requirements affect cloud security and privacy practices?
5. What are some emerging technologies or approaches in cloud security, such as multi-factor authentication or zero-trust security models?
6. How can organizations foster a culture of security awareness and responsibility among employees to prevent data breaches and privacy violations?

7. When considering cloud adoption, what criteria should businesses evaluate in selecting a trustworthy and secure cloud service provider?

Task 26. ANALYZE. Read the case studies, identify a problem and provide solutions.

Target Data Breach (2013)

In one of the most significant data breaches in history, hackers gained access to Target's network through a third-party HVAC contractor. The attackers stole the credit card information of over 40 million customers and personal data of approximately 70 million individuals. The incident highlighted the importance of securing third-party access to cloud systems and the need for robust authentication and access controls.

Capital One Data Breach (2019)

A former employee of a cloud service provider exploited a misconfigured web application firewall to gain unauthorized access to Capital One's cloud storage. The breach resulted in the exposure of personal information of over 100 million customers. This case underscored the significance of proper configuration management and continuous monitoring of cloud environments.

Facebook-Cambridge Analytica Scandal (2018)

Cambridge Analytica, a data analytics firm, accessed and collected the personal data of millions of Facebook users without their consent. The incident raised concerns about data privacy on social media platforms and emphasized the need for transparent data sharing practices and user consent mechanisms.

WATCHING

Task 27. WATCH FOR MAIN IDEAS. Scan the QR code and watch the video "Serverless Database". Choose the correct summary of the video.

A. The video explains the concept of a serverless database and how it can be used for e-commerce websites. A serverless database allows for faster loading times and better user experience. It also provides real-time data analysis and helps businesses make informed decisions. With a serverless database, businesses can easily scale up or down depending on their needs. It is a cost-effective solution that can help businesses save money while providing better services to their customers.

A. The video explains the concept of a serverless database, but it is actually a more complex and expensive option than a traditional database. A serverless database requires a lot of operational overhead and is not as flexible as a traditional database. It does not provide any additional benefits that cannot be achieved with a traditional database. Serverless databases are not the future and will not become the norm in the industry.

B. The video explains the concept of a serverless database, which combines the features of a traditional database with the flexibility of serverless architecture. A serverless database provides automated scaling, resilience, and transactional consistency with very little operational overhead. It also allows for consumption-based billing and provides ACID-compliant transactional guarantees without sacrificing speed. Serverless databases are easy to use and make life easier for developers.

Task 28. WATCH FOR DETAILS. Watch to the video again, then read the key ideas and fill in the missing words.

1. A serverless database facilitates automated scaling, _____, and transactional consistency, requiring minimal operational effort.

2. The billing model allows setting _____limits, ensuring that expenses align with actual resource usage.
3. The dynamic scaling extends to completely deactivating when the database remains idle and promptly reactivates when a _____comes in.
4. A serverless database should possess the capability to scale geographically, efficiently distributing data worldwide to reduce _____and ensure a uniform, rapid user experience across the globe.
5. A serverless database must be equipped to withstand node and zone failures, allowing it to execute software updates and online schema changes seamlessly, all without requiring any scheduled_____.
6. A serverless database streamlines processes for all users, offering _____initiation, fully managed operations, REST APIs, and SQL.
7. You should only be charged for the _____and computing resources you actively use.
8. _____should not be sacrificed, even as you scale your operations.

LANGUAGE FOCUS 2

Task 29. STUDY AND ANALYSE. Look at the rule about gerund and infinitive, study in what situations they are used.

Gerund and Infinitive

Verb+-ing

Use verb+-ing after:

Admit, adore, advocate, appreciate, avoid, can't help, carry on, compare, consider, delay, deny, detest, discuss, dislike, enjoy, escape, face, fancy, feel like, finish, foresee, give up, include, involve, justify, keep (on), mean, mention, mind, miss, postpone, practice, put off, recommend, resist, risk, start, suggest, etc.	Many IT professionals adore **utilizing** cloud computing for simplifying complex infrastructures and enhancing data accessibility. Although some detest **storing** sensitive data in the cloud, proper security measures can mitigate risks. It's best not to put off **implementing** cloud security measures; the risks are too great.
Verbs followed by prepositions e.g. give up, prevent from, etc.	Don't give up **using** cloud computing just because of initial challenges; the long-term benefits are worth it. The success of cloud-based applications heavily relies on **having** robust security measures to protect sensitive data from cyber threats.
Prepositions	Evaluate the potential risks and rewards before **taking** the plunge into cloud computing. By **keeping** on top of cloud security updates, businesses can reduce the risk of data breaches.

Verb+object+-ing

Use verb+object+-ing after:

Catch, feel, find, hear, notice, observe, overhear, see, smell, watch, etc.	While monitoring network traffic, we caught hackers **having** the unauthorized access attempt to a cloud-based database.

Verb+full Infinitive

Use verb+full Infinitive after:

afford, agree, aim, appear, apply, arrange, attempt, cease, choose, claim, dare, decide, demand, expect, fail, happen, help, hope, need, offer, prepare, pretend, promise, refuse, seem, tend, etc.	With cloud computing, businesses can afford **to scale** their operations without investing heavily in physical infrastructure. Cloud services appear **to be** the most practical solution for handling large-scale data processing tasks.

Verb+object+full Infinitive

Use verb+object+full Infinitive after:

Advise, allow, ask, assign, assist, cause, challenge, command, convince, decide, empower, enable, encourage, expect, force, help, inspire, instruct, order, permit, persuade, prompt, recommend, remind, etc.	The manager asked the IT team **to research** the best cloud service provider for their needs.

Verb+object+bare Infinitive

Use verb+object+bare Infinitive after:

Help, let, make, feel, hear, notice, overhear, see, watch, etc.	The manager let the development team **experiment** with different cloud technologies.

Verb+(object)+Infinitive or –ing form with a change in meaning.

Use verb+(object)+Infinitive or –ing form with a change in meaning after:

Consider, imagine, forget, go on, like mean, regret, remember, stop, try.	Unfortunately, some users forget **to review** the security settings of their cloud accounts regularly. I can't forget **having** my first cloud migration attempt.

Task 30. PRACTICE. Circle the correct word or phrase.

1. As we walked by the IT department, we saw them **watch / watching** a cloud computing webinar.
2. The IT team is responsible for **manage /managing** cloud resources and **ensure / ensuring** optimal performance.
3. The IT support team helped **troubleshoot / troubleshooting** cloud connectivity issues for the employees.
4. A reminder was sent to all employees **to update / updating** their cloud account passwords.
5. The IT department recommended **to use / using** a multi-cloud approach to mitigate risks.
6. The sales team persuaded the management **to invest / investing** in a cloud-based CRM system.
7. Our IT consultant advised **to implement / implementing** a hybrid cloud solution for better data management.
8. The cloud provider permits us **to customize / customizing** our service plan based on our requirements.
9. I suggest **to explore / exploring** different cloud providers to find the best fit for our needs.

10. Due to unforeseen circumstances, we may postpone **to migrate / migrating** to the cloud until next month.
11. Mind the data privacy regulations when to store / storing customer information in the cloud.
12. While discussing the project, we overheard the team lead **mention / mentioning** cloud storage options.
13. Due to budget constraints, the company was forced **to explore / exploring** cost-effective cloud options.
14. We couldn't foresee **to increase / increasing** in user traffic which caused challenges in maintaining cloud performance.
15. The management encouraged employees **to utilize /utilizing** cloud storage for document sharing.

Task 31. PRACTICE. Complete the sentences using the words from the box in the correct form.

work	scale	adopt	offer	access	switch
evaluate	be	migrate	rush		

1. I appreciate _____critical data from anywhere at any time with cloud computing.
2. Let's discuss the potential benefits and challenges of _____cloud computing for our organization.
3. The decision _____to a cloud-based CRM system has already shown positive results.
4. The cloud service provider claims _____robust security measures to protect sensitive data.
5. After _____various options, we decided that a hybrid cloud approach best suits our needs.
6. Despite the pressure, we refuse _____the cloud migration.
7. Cloud computing seems _____ the best fit for our organization's long-term IT strategy.
8. Cloud computing allows _____ business operations seamlessly during peak times.
9. The IT department was assigned the task of _____ all applications to the cloud.
10. Cloud-based collaboration tools enable remote teams _____ efficiently together.

Task 32. PRACTICE. Continue the sentences using Gerund or Infinitive.

1. It's not fair to make the IT department ….
2. It's very important that cloud architects …
3. Don't tell me you've forgotten …
4. Being in a cloud migration team involves …
5. Cloud computing experts usually recommend …
6. Cloud administrators who have been accused of …
7. The cloud provider has undertaken ...
8. Being in charge of DevOps team means …
9. Cloud support specialist caught him …
10. The cloud compliance specialist insisted on …

WRITING

Task 33. WRITE. Write an announcement letter. Study the Writing Template at the end of the textbook.

Announcement Letter for Cloud Migration

You are working as a communication specialist for a company called "Vista Solutions". The company has made a strategic decision to migrate its operations to the cloud to enhance efficiency, security, and innovation. As the communication specialist, your task is to write an announcement letter to inform employees about this significant cloud-related transformation.

Your letter should include the following elements:

- **Greeting**. Begin the letter with a warm and professional greeting, addressing the employees.
- **Introduction**. In the opening paragraph, express enthusiasm about the decision and briefly mention the benefits of migrating to the cloud.
- **Benefits of Cloud Migration.** In the subsequent paragraphs, elaborate on the advantages of cloud computing for the company, such as enhanced efficiency, advanced security measures, increased innovation, flexible scalability, and seamless collaboration.
- **Addressing Concerns.** Acknowledge that such a transformation may raise questions or uncertainties and assure the recipients that a comprehensive plan is in place to ensure a smooth transition. Mention any upcoming training sessions to familiarize everyone with the cloud-based tools.
- **Appreciation**. Express gratitude to employees for their ongoing support during this transition.
- **Contact Information.** Provide contact details (email and phone number) of a designated person in the IT department for recipients to reach out if they have any questions.
- **Closing**. End the letter on a positive note, expressing excitement about the positive changes the cloud migration will bring to the company.

Aim for a letter length of approximately 250-300 words.