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**Cloud Computing and Autonomic Computing: Pioneering the Future of IT**

**History of Cloud Computing**

**Early Origins** - Back in the 1960s, people started sharing a single computer among multiple users. This was like taking turns using the same computer, which laid the groundwork for the idea of sharing computing resources remotely.

**Internet and Web Development** - In the 1990s, the internet became widely accessible, and the World Wide Web was created. This allowed services and applications to be delivered over the internet, making it easier for people to use software and access information online.

**Virtualization** - In the late 1990s, virtualization technology was developed. It enabled a single physical computer to run multiple operating systems at the same time. This technology became important for cloud computing because it allowed better use of computer resources.

**Amazon Web Services** - In 2006, Amazon launched AWS. They offered services that allowed people to use computing resources like storage and processing power over the internet. This was a big step in making cloud computing popular.

**Public Cloud Providers** - Following Amazon's lead, companies like Google with Google Cloud Platform (2008) and Microsoft with Azure (2010) entered the market, offering their cloud services. These providers offered various computing resources, such as storage, processing power, and software applications.

**Growth and Adoption** - Cloud computing became popular because it was flexible, scalable, and cost-effective. Many businesses started using cloud services instead of maintaining their own computer infrastructure.

**Service Models** - Cloud computing evolved into different service models:

* **Infrastructure as a Service** (IaaS) provided virtualized computing resources, such as servers and storage.
* **Platform as a Service** (PaaS) offered a development and deployment platform for building and managing applications.
* **Software as a Service** (SaaS) provided ready-to-use software applications accessible over the internet.

**Hybrid and Multi-Cloud** - People started combining public and private cloud environments, which is called a hybrid cloud. They also began using multiple cloud providers at the same time, which is called a multi-cloud. These approaches gave more options and flexibility to businesses.

**Ongoing Innovation** - Cloud computing continues to get better with new technologies. For example, containerization and serverless computing allow applications to run more efficiently and make better use of resources.

**Pros and Cons of Autonomic Computing**

**Pros**

**Self-management** - Autonomic systems can take care of routine tasks on their own, like monitoring performance and fixing problems, without humans having to do it all the time. This saves time and effort for people who can focus on more important things.

**Efficiency** - Autonomic systems can use resources, like energy and computing power, in the best possible way. They can adjust their settings based on what they need, which helps them work faster and use less energy, making them more efficient.

**Reliability** - Autonomic systems are good at finding and fixing problems before they cause big issues. They can keep an eye on themselves and make sure everything is running smoothly, which means less downtime and more reliable performance.

**Scalability** - Autonomic systems can adapt to changes in workload. They can handle more or less work depending on what's needed. This helps systems work well even when demands change, making them flexible and able to handle different situations.

**Cons**

**Complexity** - Building autonomic systems is not easy. It requires advanced knowledge and skills because it's a complicated process. This complexity can make it harder to create and maintain these systems, which might cost more time and money.

**Decision-making limitations** - Autonomic systems follow specific rules and instructions to make decisions. But when faced with new or complex situations, they may struggle to make the best choices without human help. This means they might not always know what to do in every situation.

**Security concerns** - Autonomic systems need access to different parts and data to manage themselves. This access can create security risks, as bad actors might try to exploit vulnerabilities in the system. It's important to protect these systems from unauthorized access and attacks.

**Lack of user control** - Autonomic systems make decisions automatically, so users might feel like they have less control over the system. They may not fully understand how the system works or be able to control its behavior, which can be frustrating for some people.

**LITERATURE REVIEW**

**Observations**

* Scalability and Flexibility: AWS is known for its ability to scale resources up or down based on demand, allowing businesses to easily accommodate changing needs and avoid overprovisioning or underutilization of resources.
* Broad Service Portfolio: AWS provides a vast array of services, enabling users to build and deploy applications, store and analyze data, and implement various technologies within a single ecosystem.
* Global Infrastructure: AWS operates data centers across the globe, offering a geographically distributed infrastructure that allows users to host their applications closer to their target audience, resulting in reduced latency and improved performance.
* Security and Compliance: AWS has robust security measures in place, including data encryption, access controls, and compliance certifications, ensuring the protection of customer data and adherence to industry regulations.
* Continuous Innovation: AWS consistently introduces new services and features, staying at the forefront of technological advancements and enabling customers to leverage the latest technologies without significant upfront investments.

**E. AWS EC2 Instances**

It can serve as an unlimited set of virtual machines (VMs). Amazon offers a variety of scenarios with different CPU configurations, memory, storage, and communication resources to suit users' needs. Each type is available in a variety of sizes to meet specific workload requirements. Circumstances created from Amazon Machine Images (AMI). Machine images are like templates. They are activated by the operating system (OS) and other software, which determines the user's work environment. Users can choose AMI provided by AWS, the user community, or through the AWS Marketplace.

**Types of EC2 models:**

1. **Normal Purpose** - A common goal is for example a VM designed to handle a lot of work. Typical objective conditions are developed to have a higher number of CPU cores, much needed and memory. Other common uses for common purposes include web server hosting and software development and testing.
2. **The Calculation is Set** - Advanced computer environments are used to run large data applications that require greater processing power and memory in the AWS cloud. These scenarios are designed and optimized to use computational and data applications that require fast network performance, wide availability, and high input/output (I / O) per second (IOPS) functionality. Examples of types of applications include scientific and financial modeling and simulation, machine learning, business data storage, and business intelligence.
3. **Graphics Processing Unit (GPU)** - These scenarios provide a way to use applications that take pictures faster than standard EC2 scenarios. Systems that rely on GPUs include games and design work.

**F. Methodology Design**

* Open amazon EC2 console and Launch instances
* Choose an Amazon Machine Image (AMI): choose Select.
* Configure Instance Details choose Network.
* Configure Security Group
* Choose Review and Launch then choose Launch.