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RESEARCH ARTICLE

CLOUD COMPUTING: CREATION OF ENVIRONMENTS FOR SYSTEM DEVELOPMENT USING IAAS

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Abstract

Cloud computing technology has been expanding and refined over time, but organizations working in the field of information technology have a certain prejudice with this technology, not relying on the security proposed bythe same. This article, shows in a practical way, the construction of a secure, high-performance cloud infrastructure developed in VS Code using the Terraform platform tool, applied to the AWS cloud.

Introduction:-

Cloud computing has become a vast and complex ecosystem of technology, products and services. Where it has been giving rise to a pleasant economy, where many providers are vying for a position in the ever-growing cloud market. In early 2013, the pubof Law 12,965 that creates the Legal Framework of Cloud Computing, became a milestone in the history of computing, as it brought the requirement for analysis and quality certifications to all companies operating in the sector.

As of the law, no company can use private cloud solutions without proper administration. Cloud computing is a globally known term that refers to a form of service delivery in which programs, data, and computing services are stored on internet, and offices or homes synchronize data, pointing to a shared network. But there are still obstacles that this technology can face, in particular the lack of confidence of organizations in terms of data protection.

This article aimsto explain how this technology can be secure, as far as, an on-premises computing infrastructure, showing how cloud computing has the potential to leverage system development interactions in an easier, faster and low-end way, when compared to that offered by other technologies for the same purpose and, for this reason, many organizations have done analyses to understand whether it can be applied in their joint operations.

Theoretical Reference

Defined the theme of this article, this module aims to consist of information related to cloud computing and the TERRAFORM tool by tainting companies that still have doubts about the security and benefits that this technology canhave.

Cloud Computing

Cloud computing has been innovating and gaining a high notoriety in the technology market. It changed how to store, access, and share data, as well as collaborate and manage computing resources. Since the rise of the internet, cloud computing has opened up new alternatives to conduct ing a business. And it allowed companies to go beyond the traditional IT infrastructure that sits in physical locations.

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According to ZDNet, "Cloud computing refers to and delivers compute services on demand, including applications, processing, and storage – typically via the Internet or via pay-as-you-go basis." In short, the cloud is the internet, if organizations use virtual data centers to store information or access applications using an internet connection, rather than using a hard drive from the device or on-premises IT infrastructure, it means they are being operated in the cloud.

Features, Services And Models Of Cloud Computing

These services can be easily manned and released with minimal effort of management or interaction with service providers from five essential characteristics (Table I), three models of serviço (Table II) and four implementation models (Table III).

Table I:- Essential Features.

1	Access to the service by the user is on demand and there is no interference from the provider (self-service);
2	Access to the service is through an extensive data network;
3	Existence of a pool of resources that must be garnished and allocated to each client according to demand;
4	Service should have a high flexibility, that is, it should allow to increase and decrease its capabilities in an easy and fast way; 5);
5	Service must be measured and charged per use.

Cast out: Mell e Grace (2011), Sultan (2013), **Birje et al. (2017)**

Table II:- Service Models.

1	SaaS (Software as a Service), which is a service where software applications are offered through a data network such as the Internet; 2) PaaS (Plataform as a Service), when an entire infrastructure is offered to support development cycles of astema;
2	PaaS (Plataform as a Service), when an entire infrastructure is offered to support a system's development cycles;
3	Infrastructure as a Service (IaaS), when a service provides resources such as processing, storage, networking, or other technological fundamentals for the customer to deploy operating systems and applications;

Fonte: Mell e Grace (2011), Sultan (2013), **Birje et al. (2017)**

Table III:- Implementation Models.

1	Public cloud: Service offered by vendors through their own IT framework;
2	Private Cloud: Computational structure built and managed within the consumer company of services;
3	Hybrid Cloud: Using public cloud services to address the limitations of a private cloud;
4	Community Cloud: Cloud infrastructure made available for exclusive use of a specific organization communitythat has shared concerns

Fonte: Mell e Grace (2011), Sultan (2013), **Birje et al. (2017)**

Through these characteristics we can observe that cloud computing can be used in various situations and segments diverse by different organizations(Cegielski et al. 2012).

Cloud Computing And Its Potential

Cloud computing has the potential to leverage system development interactions more easily, quickly, and inexpensively than other technologies, and for this reason, many organizations have conducted analytics to understand whether it can beleveraged in their joint operations. As Ramalho points out, in Brazil specifically, the most applied cloud computing services are still common, such as email, website hosting, spreadsheets and word processors and data storage. Thismeans that when companies adopt technologies such as cloud computing, it is difficult to scale due to different levels of maturity. In this same study conducted in more than 90 organizations, the authors find that the use of cloud computing services, despite the general acceptance, is considered essential for the strategic reach of large companies. This strategic importance stems from the advantages of the concept as well as from the possibility of facilitating communication between companies of differentsizes.

Terraform

TERRAFORM is one of the examples of tools that are able to offer cloud computing services, it is able to create, change and create infrastructure versions safely and efficiently. TERRAFORM can assist multiplenuvens in a single workflow. The infrastructure that is managed by this tool can be hosted in public clouds such as Amazon Web

Services, Microsoft Azure, and Google Cloud Platform, or on-premises, in private clouds, with VMWare, Vsphere, Open Stack, or CloudStack.

Cloud Computing Challenges

While cloud computing can bring significant benefits, the intent to adoption of this technology still faces many barriers it presents to organizations. Birje et al. (2017) and Cao et al. (2017) cite that, even today, one of the main obstacles to convincing a company to adopt cloud computing is the concern with data security. Brender and Markov (2013) point out that a computational structure (server) installed dentro of the boundaries of an organization is not necessarily safer than an external one. This is because the structure is connected to the internet and therefore there is a probability of possible external attacks. Cloud computing providers, on the other hand,can experience security activities. Zissis and Lekkas (2012) thus propose a solution to most security issues in a cloud based on the use of encryption, which can ensure data integrity.

Materials And Methods:-

Materials:-

To achieve the objectives of this study, bibliographic research was initially carried out to understand the concepts, evolution and importance of cloud computing. According to Pereira (2018, p.28) the methodology of scientificstudy is a systematic process, looking for answers to the related agenda, it is the direction that needs to go to build the formulation of a scientific theory. It is a cautious process, which runs through a systematic path.

The process of creatingambiente was done through terraform, which is able to manage an infrastructure across multiple cloud platforms, the configuration language is readable and helps you write infrastructure code quickly. The terraform state allows you totrack resource iterations across all deployments made, and you can confirm the settings in version control to securely collaborate on the infrastructure. Terraform plugins allow it to interact with cloud platforms and other servicesthrough that of its application programming interfaces (APis).

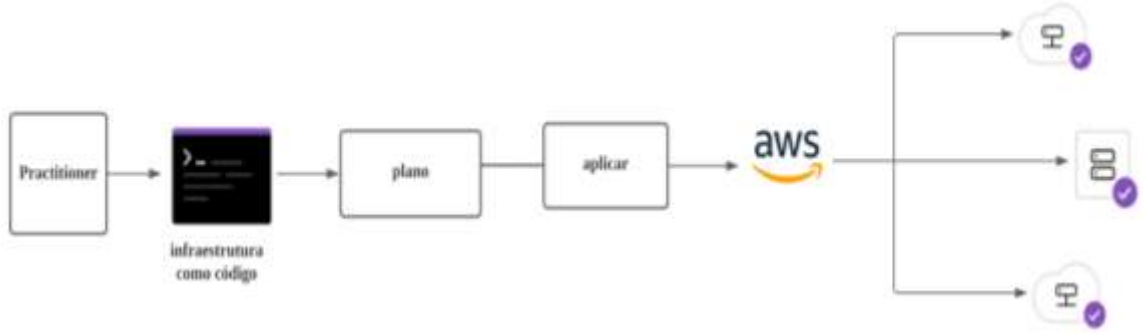
The following tools were used:

1. The Terraform CLI (1.2.0+), so you can use the terraform on the command line.
2. AWS CLI is a unified tool for managing yourAWS p rodutos, a unified tool for managing your AWS products.
3. Visual Studio and terraform plug-ins, to set the properties of instances.
4. AWS account and associated credentials that allow you to create resources.

Methods:-

Practitioners define individual infrastructure units, for example, compute instances or private networks as resources. And you can compute resources from different providers into reusable Terraform configurations called mobiles and manage them with a language and handle them with a consistent workflow, as shown in Image I.

Image I:-

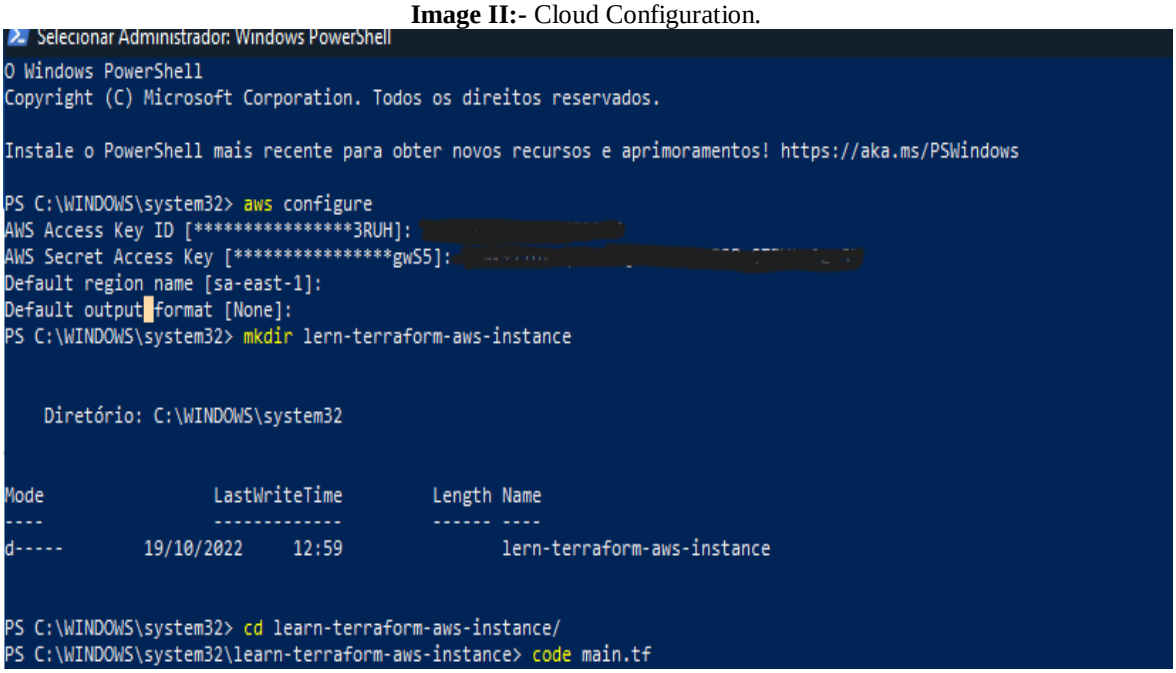


Source: Own Authorship (2022)

The Terraform configuration language is declarative, that is, it describes the desired final state for your infrastructure, even procedural programming languages that require step-by-step instructions to accomplish tasks. Terraform Practitioners automatically calculate the dependencies between them to create or destroy them in the straight colorfashion.

As shown in Image II, the "AWS Configure" command was given to start aws CLI settings, after which the command was used to create a new directory and then open it, after that was created the main.tf where the characteristicswill be defined for this infrastructure.

Image II:- Cloud Configuration.



Source: Own Authorship (2022).

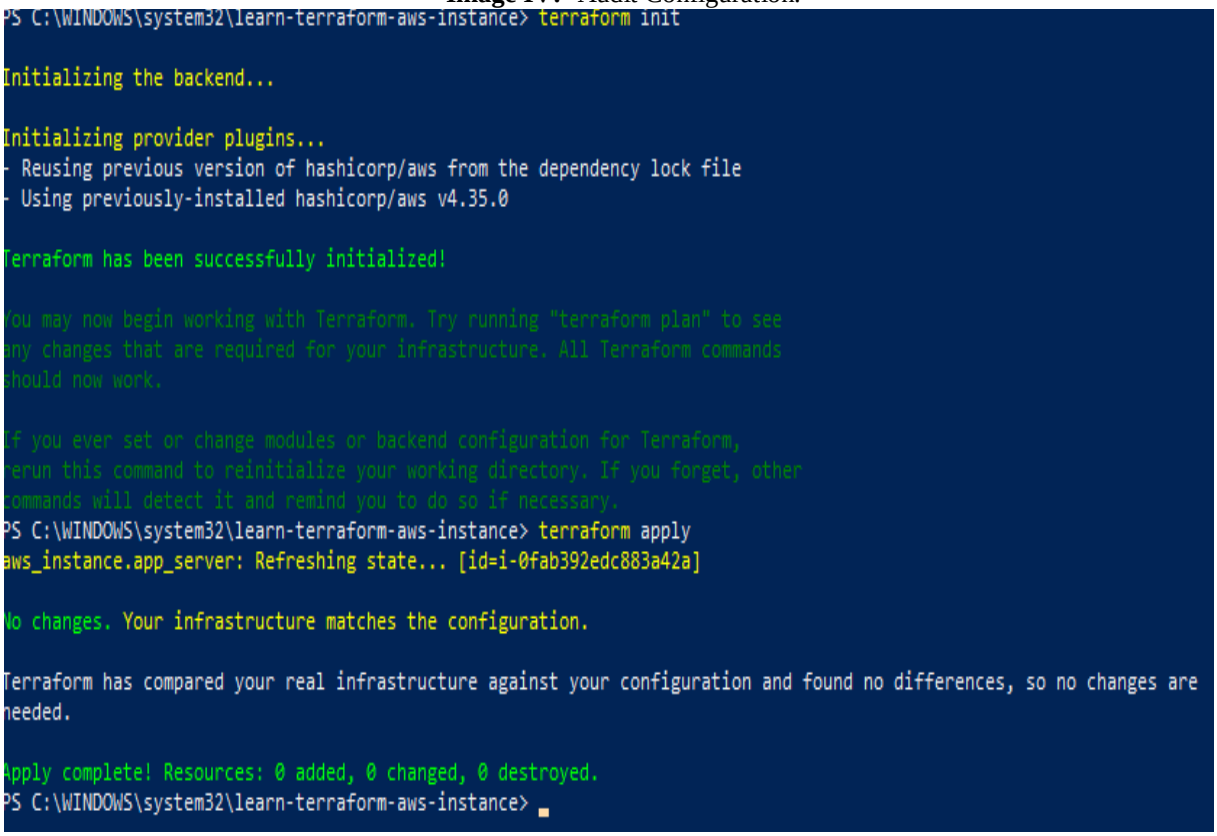
Given the initial commands, the process moved to Visual Studio where, through the code provided by hashicorp, we will have automatized process of creating instances and here we define which provider will be used, in this case it was AWS, and this process can be seen in Image III. In this step, version restrictions can be set for each provider defined in the block. The attribute is optional, but it is recommended to use it to restrict the provider version so that terraform does not install a version incompatible with the provedor version.

Image III:- Instance Creation Process.

Source: Own Authorship (2022).

In Image IV, you can see how to start an audit process for cloud settings, where to create a new configuration or verify a configuration already in versioncontrol, the directory must be initialized with the command "terraform init". Where once the configuration directory has been initialized, it should be downloaded and installed the provider defined in the configuration, which in this case is awsprovider.

Image IV:- Audit Configuration.



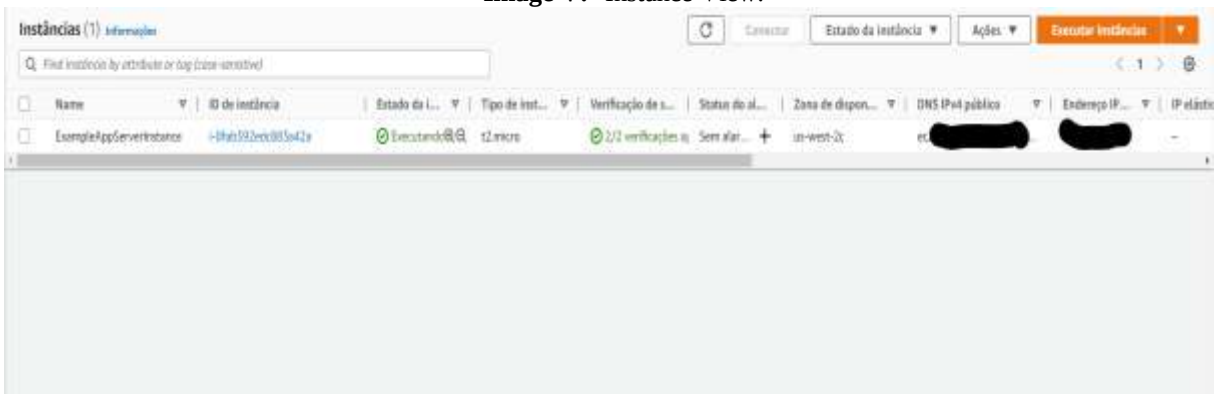
Source: Own Authorship (2022)

Terraform will download awsprovider and install it in a hidden subdirectory of its current working directory called. terraform. The terraform init command will list which version of the provider has been installed. Terraform also creates a lock file called terraform-lock-hcl that specifies the exact versions of providers, so you can control when you want to update the providers used for your project.

Resultados:-

After all the procedure done, we can see that the instance was successfully created (Image V) and is running (Image VI) and ready to serve its purpose, AWS allows the hosting of sites, AD servers and storage, offering more options for the client, in addition to being able to be used as a remote environment for activities such as infrastructure development and management, as shown in the image below:

Image V:- Instance View.



Source: Own Authorship (2022).

Image VI:- Environment Running.

Source: Own Authorship (2022).

This will allow the construction and fluidity of a fully cloud and secure network infrastructure, with high scalability and availability, such as various applications of operational resources, offering highperformance and performance improvement, as shown inTable IV, being possible, to be performed auditing in the instances, and logical management of network access credentials. Being suitable for the virtualization of cloud computing, and serving as a facilitating environment for software development and testing.

Table IV:- Comparison Between A Local And Cloud Network.

ITEMS	LOCAL	AWS
MONTHLY COST	Monthly cost reaches R$416.47 BRL in more basic equipment;	Initial monthly initial cost is $120.47 USD in the basic usage plan;
ENERGY AND EQUIPMENT	Generates energy and equipment costs against abrupt falls;	Does not generate energy and equipment costs against abrupt falls;
MAINTENANCE	Generates expenses with maintenance and replacement of parts;	Does not generate expenses with maintenance and replacement of parts;
LICENSES	License expenses can reach up to R$ 2,000.00;	Licenses included according to your plan;
BACKUP	Backup server expenses can reach	Automatic backup and included in the

	more than R$6,000.00/annual;	plan;
OTHER EXPENSES	Scrapping and losing value over the years.	Additional expenses when exceeding the established limit.

Final Considerations

With the project finalized, it was shown that it was possible to develop a development environment, in a simple way, through a cloud infrastructure. For this, the Terraform tool was used, in which it was the one that best met the expectationsof applicability for the project. And even if the greatest fear of companies when using a cloud server, is the security factor, this article shows that the cloud infrastructure is as secure as the on-premises infrastructure, since both are dandpending the security settings so that they are considered "secure", having as the biggest differential between them, only the medium to which they are aswerded, and the cloud infrastructure, is still more efficient, if you take into account the factor of maintenance and continuity of service.

It is considered that, with this project, it is possible to introduce in a practical and simple way, a cloud infrastructure, that is safe, cost-effective, that reduces physical expenses in organizations, andalso hurts a technological solution, for optimization of organizational processes.

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