

ASSIGNMENT 1 BRIEF

Qualification	BTEC Level 5 HND Diploma in Computing		
Unit number	Unit 16: Cloud computing		
Assignment title	Cloud Computing Solutions		
Academic Year	2019 – 2020		
Unit Tutor	Nguyen Ngoc Tu		
Issue date		Submission date	20 October 2020
IV name and date			

Submission Format:

Format: The submission is in the form of 1 document. You must use font *Calibri* size 12, set number of the pages and use multiple line spacing at 1.3.

Margins must be: left: 1.25 cm; right: 1 cm; top: 1 cm and bottom: 1 cm. The reference follows Harvard referencing system.

Submission: Students are compulsory to submit the assignment in due date and in a way requested by the Tutors. The form of submission will be a **soft copy** posted on <http://cms.greenwich.edu.vn/>

Note: The Assignment *must* be your own work, and not copied by or from another student or from books etc. If you use ideas, quotes or data (such as diagrams) from books, journals or other sources, you must reference your sources, using the Harvard style. Make sure that you know how to reference properly, and that understand the guidelines on plagiarism. *If you do not, you definitely get failed.*

Unit Learning Outcomes:

LO1 Demonstrate an understanding of the fundamentals of Cloud Computing and its architectures.

LO2 Evaluate the deployment models, service models and technological drivers of Cloud Computing and validate their use.

Assignment Brief and Guidance:

Scenario: ATN is a Vietnamese company which is selling toys to teenagers in many provinces all over Vietnam. The company has the revenue over 500.000 dollars/year. Currently each shop has its own database to store transactions for that shop only. Each shop has to send the sale data to the board director monthly and the board director need lots of time to summarize the data collected from all the shops. Besides the board can't see the stock information update in real time.

The table of contents in your technical report should be as follows:

1. Explain to the board director the fundamentals of cloud computing and how it is popular nowadays (500 words)
2. Persuade the board director to use Cloud Computing in ATN (300 words)
3. Proposed solution (higher level solution description – around 200 words).
4. Explain the appropriateness of the solution for the scenario (350 words with images and diagrams).
5. Architectural design (architectural diagram and description).
6. Detailed design:
 - a. Deployment model (discussion on why that model was chosen).
 - b. Service model (discussion on why that model was chosen).
 - c. Programming language/ webserver/database server chosen.
7. Summary.

Learning Outcomes and Assessment Criteria		
Pass	Merit	Distinction
LO1 Demonstrate an understanding of the fundamentals of Cloud Computing and its architectures		LO1 & 2 D1 Justify the tools chosen to realize a Cloud Computing solution.
P1 Analyse the evolution and fundamental concepts of Cloud Computing. P2 Design an appropriate architectural Cloud Computing framework for a given scenario.	M1 Discuss why an organisation should migrate to a Cloud Computing solution.	
LO2 Evaluate the deployment models, service models and technological drivers of Cloud Computing and validate their use		
P3 Define an appropriate deployment model for a given scenario. P4 Compare the service models for choosing an adequate model for a given scenario.	M2 Demonstrate these deployment models with real world examples.	

Table of Contents

ASSIGNMENT 1 BRIEF	1
ASSIGNMENT 1 ANSWERS	7
Introduction.....	7
1. The fundamental concepts of Cloud Computing and its evolution	8
1.1. Fundamentals concepts.....	8
1.2. Cloud evolution and popularity.....	9
1.3. Advantage or benefit of cloud computing	10
2. Cloud solution for ATN company	10
2.1. The reason using cloud solution.....	10
2.2. The tools are chosen to realize a Cloud Computing solution	11
3. Detailed design	13
3.1. Overviews about cloud architecture and cloud ecosystem	13
3.2. Overviews deployment model	14
3.3. Compare four deployment model of cloud computing.....	16
3.4. Choose one deployment model and explain	17
3.5. Overviews service model.....	17
3.6. Compare three service model of cloud computing	19
3.7. Choose one service for ATN company and explain	19
3.8. Demonstrates these deployment models with real-world examples	20
3.9. Diagram public model and service IaaS for ATN company.....	23
3.10. Explain each layer model diagram of ATN company	23
Summary	25
References.....	26

Table of Figures

Figure 1: Cloud Computing	7
Figure 2: Fundamentals Concepts	8
Figure 3: Cloud Computing Trends in 2020	9
Figure 4: Advantages or Benefits of Cloud Computing.....	10
Figure 5: The Reason Using Cloud Solution	10
Figure 6: Step 1 - Create Document in Visual Studio Code.....	11
Figure 7: Step 2 - Create GIT Repository at GitHub	12
Figure 8: Step 3 - Create and Connect Heroku with GIT	12
Figure 9: Step 4 - Commit document Visual Studio Code to up GIT and run in Heroku....	12
Figure 10: Cloud Ecosystem	13
Figure 15: Deployment Model	14
Figure 16: Public Cloud	14
Figure 17: Private Cloud.....	15
Figure 18: Hybrid Cloud	15
Figure 19: Community Clouds.....	16
Figure 20: Service Model of Cloud Computing	17
Figure 21: Public Service for ANT Company	20
Figure 22: Heroku.....	20
Figure 23: Google Drive	21
Figure 24: Office 365.....	21
Figure 25: Docker	22
Figure 26: Ubuntu	22
Figure 27: Fujitsuis	22
Figure 11: Diagram for ATN Company	23

Figure 12: User	23
Figure 13: Cloud	24
Figure 14: Data	24

Table of Tables

No table of figures entries found.

ASSIGNMENT 1 ANSWERS

Introduction



Figure 1: Cloud Computing

"The cloud" refers to servers that are accessed over the Internet, and the software and databases that run on those servers. Cloud computing also known as virtual server computing - is a computing model that uses computer technologies and develops based on the "Internet". In this computing model, all possibilities related to information technology are provided as "Services". It allows users to access technology services from a certain provider in the cloud without the knowledge or experience of that technology, and no need to pay attention to the infrastructure that serves the technology. Cloud servers are located in data centers all over the world. By using cloud computing, users and companies don't have to manage physical servers themselves or run software applications on their own machines. For example, the Google App Engine service provides common online business applications, accessible from a web browser, and software and data stored on servers.

This report will analyze the evolution and fundamental concepts of Cloud Computing. From that, given the reason why should use a Cloud Computing solution. Next, justify the tools chosen to realize a Cloud Computing solution. After that, compare, define, and design model for solution above. Finally, demonstrates these deployment models with real-world examples.

1. The fundamental concepts of Cloud Computing and its evolution

1.1. Fundamentals concepts

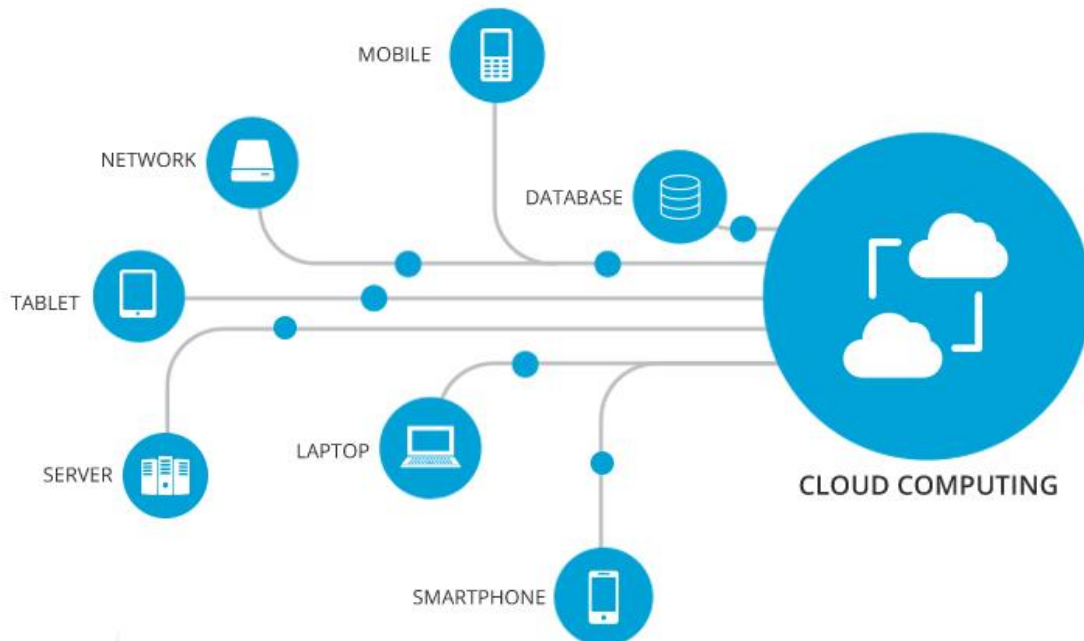


Figure 2: Fundamentals Concepts

Cloud computing is a model for enabling unique-units convenient on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. In essence, it's a geographical change in the location of data from a personal computer to a centralized server or 'cloud'. This cloud model is composed of five essential characteristics (On-demand self-service, Broad network access, Elastic resource pooling, Rapid elasticity, and Measured service), three service models (cloud SaaS, cloud PaaS, and cloud IaaS), and four deployment models (Private cloud, Public cloud, Community cloud, and Hybrid cloud). Cloud computing is possible because of a technology called virtualization. Virtualization allows for the creation of a simulated, digital-only "virtual" computer that behaves as if it were a physical computer with its own hardware. The technical term for such a computer is a virtual machine. When properly implemented, virtual machines on the same host machine are sandboxed from one another, so they don't interact with each other at all, the files and applications from one virtual machine aren't visible to the other virtual machines even though they're on the same physical machine. Cloud computing can be done anywhere, anytime, and by any device.

1.2. Cloud evolution and popularity



Figure 3: Cloud Computing Trends in 2020

The development of the cloud industry is moving at a rate that can be said to be "insane" and so difficult to predict. But some main tendencies characteristic for each year still will be focused, even as the technologies have completed then the vendors still make them seem constantly changing and easily break. Among these new cloud computing trends are many comes from the industry entering the stage of standardization and increased compatibility, a sign of maturity in any field of technology. Cloud computing infrastructure public, colocation, and on-premise increasingly reduce isolation, allowing workloads can easily be move and data flow to become more flexible. That standardization, in large part due to the shift to open source, allows for the shifting of the centralization onto the stack, with new roles emerging to support application-level processes, from enabling kernel intelligence. From enabling artificial intelligence (AI) and high-performance calculate (HPC), to provide new SaaS Ops and application development services. Some trend new cloud computing as Multi-Cloud become Omni-Cloud, Kubernetes break and make blur cloud barriers, Kubernetes' companions create new silos, unify Kubernetes, and more security acquisitions. Besides, Private Cloud's recovery is real, all SaaS become Intelligent SaaS and SaaS Ops is emerging too. Other way, from concentration switch to on application distribution and from HPC to cloud. Finding and adopting the latest trends in cloud computing is crucial for organizations at all levels.

1.3. Advantage or benefit of cloud computing

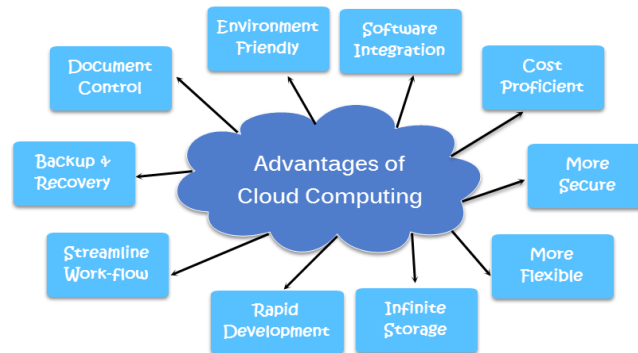


Figure 4: Advantages or Benefits of Cloud Computing

Cloud computing store and operate on cloud infrastructure helps the system operate stably to 99.99%. Everything set up redundantly, and automatically replaced when broken to ensure normal operation so information system is always safe and available 24/7. Data is backed up regularly and action stable. Expand/reduce resources with unlimited capacity. Easily reset/copy server configuration in a short period of time.

2. Cloud solution for ATN company

2.1. The reason using cloud solution

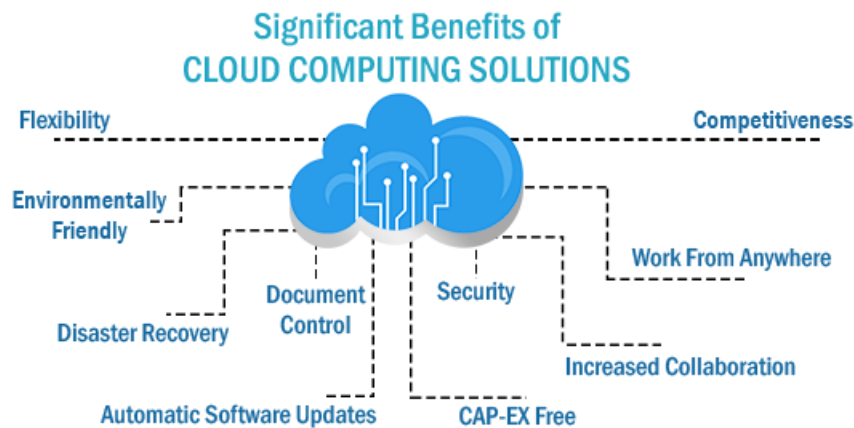


Figure 5: The Reason Using Cloud Solution

Using Cloud Computing help cost savings because can completely cut down on the initial investment because there is no need for on-site data centers. Besides, the power used in server operation and cooling has decreased, contributing to increased environmental friendliness. Next, can instantly access anytime anywhere as long as still connected to the internet. Besides, all updates are done automatically, thus saving a lot of time and effort to maintain the system, significantly reducing the workload for the IT team. Next, have the ability to transform endlessly and adaptation. For example,

businesses may choose to increase the amount of website support from 2,000 to 10,000 people a day during the promotion. Next, sustainable cooperation and no disturbance (files are centrally and consistently stored, accessed anywhere, creating a virtual space where people directly discuss, share a file, and get feedback instantly). Next, all operations on the cloud will be regularly monitored and audited by third parties to ensure that safety standards are met. Finally, stand out with the modern trend (small and medium enterprises or multinational enterprises, are in the need of using and transferring to cloud computing).

2.2. The tools are chosen to realize a Cloud Computing solution

In the current technology era, there are many technologies or software that help use the cloud easily. Visual Studio Code, GitHub, and Heroku are three tools chosen to realize a Cloud Computing solution in this scenario (note: in the implementation process, can using MongoDB replace for Heroku. Another way is also can submit direct up Heroku through Heroku GIT replace for GitHub).

Visual Studio Code is a free source-code editor made by Microsoft for Windows, Linux, and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality.

GitHub is a web-based Git source repository service for software development projects, it offers both free and paid versions for accounts. Open source projects will be provided with free repositories.

Heroku is a PaaS that sits on top of AWS (IaaS provider). This platform is specially designed to make it easier for application developers to use. It supports programming languages like Java, Node.js, Scala, Clojure, Python, PHP, and Go,...etc.

For example: How to submit at Heroku

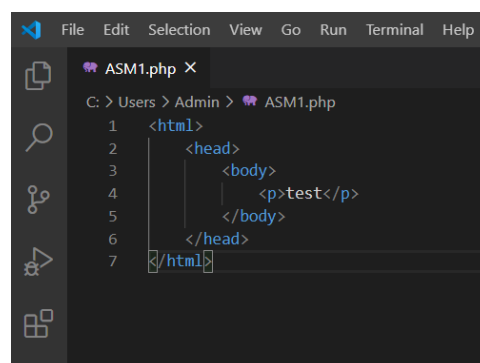


Figure 6: Step 1 - Create Document in Visual Studio Code

Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere?
[Import a repository.](#)

Owner * TrinhThiDieuHuyen / Repository name * CLOUD-ASM1 ✓

Great repository names are short and CLOUD-ASM1 is available. ration? How about **cautious-guacamole**?

Description (optional)

☒ **Public**
Anyone on the internet can see this repository. You choose who can commit.

☐ **Private**
You choose who can see and commit to this repository.

Initialize this repository with:
Skip this step if you're importing an existing repository.

☐ **Add a README file**
This is where you can write a long description for your project. [Learn more.](#)


☐ **Add .gitignore**
Choose which files not to track from a list of templates. [Learn more.](#)


☐ **Choose a license**
A license tells others what they can and can't do with your code. [Learn more.](#)

[Create repository](#)


Figure 7: Step 2 - Create GIT Repository at GitHub


Add this app to a stage in a pipeline to enable additional features


 Pipelines let you connect multiple apps together and **promote code** between them. [Learn more.](#)

 Pipelines connected to GitHub can enable **review apps**, and create apps for new pull requests. [Learn more.](#)

Choose a pipeline

 Heroku Git
Use Heroku CLI

 GitHub
Connected

 Container Registry
Use Heroku CLI

Connected to [TrinhThiDieuHuyen/CLOUD-ASM1](#) by [TrinhThiDieuHuyen](#) [Disconnect...](#)

Releases in the [activity feed](#) link to GitHub to view commit diffs

Figure 8: Step 3 - Create and Connect Heroku with GIT

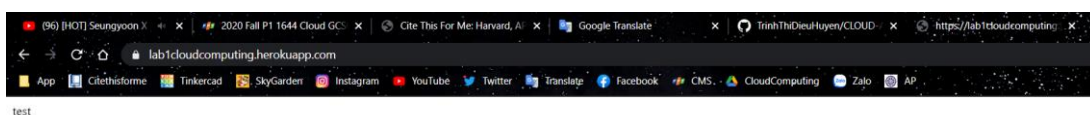


Figure 9: Step 4 - Commit document Visual Studio Code to up GIT and run in Heroku

(Link: <https://lab1cloudcomputing.herokuapp.com/>)

3. Detailed design

3.1. Overviews about cloud architecture and cloud ecosystem

Cloud architecture consists of a hierarchical set of components that collectively describe the way the cloud works. Cloud technology architectures formalize functional domains within cloud environments by establishing well-defined solutions comprised of interactions, behaviors, and distinct combinations of cloud computing mechanisms and other specialized cloud technology components. Technology architecture within the realm of cloud computing introduces requirements and considerations that manifest themselves in broadly scoped architectural layers and numerous distinct architectural models. In a cloud computing architecture, all applications are controlled, managed, and served by a cloud server. Its data is replicated and preserved remotely as part of the cloud configuration. A well-integrated cloud system can create nearly limitless efficiencies and possibilities. The cloud architecture can be divided into four layers (User/Client Layer; Network Layer; Cloud Management Layer; Hardware Resource Layer) based on the access of the cloud by the user. In addition, still have some other layer such as Virtualization Semi-Layer, Scalable Cluster Layer (SCL),...etc.

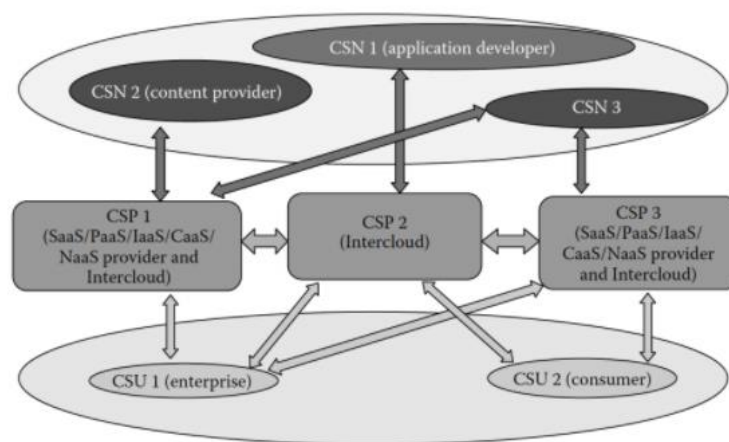


Figure 10: Cloud Ecosystem

A cloud ecosystem is a complex system of interdependent components that all work together to enable cloud services. In cloud computing, the ecosystem consists of hardware and software as well as cloud customers, cloud engineers, consultants, integrators, and partners. Say more detail, cloud service users (CSUs) is a consumer (an individual/person), enterprise (including enterprise administrator), and/or government/public institution or organization that consumes delivered cloud services. CSPs is an organization that provides or delivers and maintains or manages cloud services, that is, provider of SaaS, PaaS, IaaS, or any allied computing infrastructure

other. Cloud service partners (CSNs) is a person or organization (e.g., application developer; content, software, hardware, and/or equipment provider; system integrator; and/or auditor) that provides support to the building of a service offered by a CSP (e.g., service integration).

3.2. Overviews deployment model

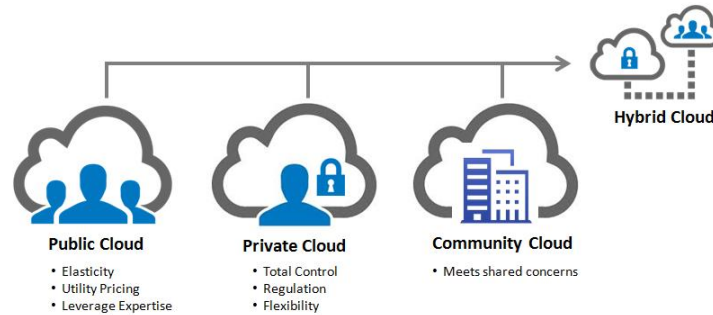


Figure 11: Deployment Model

There are four cloud deployment models that are public cloud, private cloud, community cloud, and hybrid cloud. Each deployment model is defined according to where the infrastructure for the environment is located. Enterprises can choose to deploy applications on Public, Private, or Hybrid Cloud depending on specific needs. Each model has its strengths and weaknesses. Businesses must consider the Cloud Computing models they choose. And they can use many models to solve different problems. The need for a temporary application can be deployed on the Public Cloud because it helps avoid the need to purchase additional equipment to address a temporary need. Similarly, the need for a permanent application or an application with specific requirements on the quality of the service or the location of the data should be deployed on a Private or Hybrid Cloud.

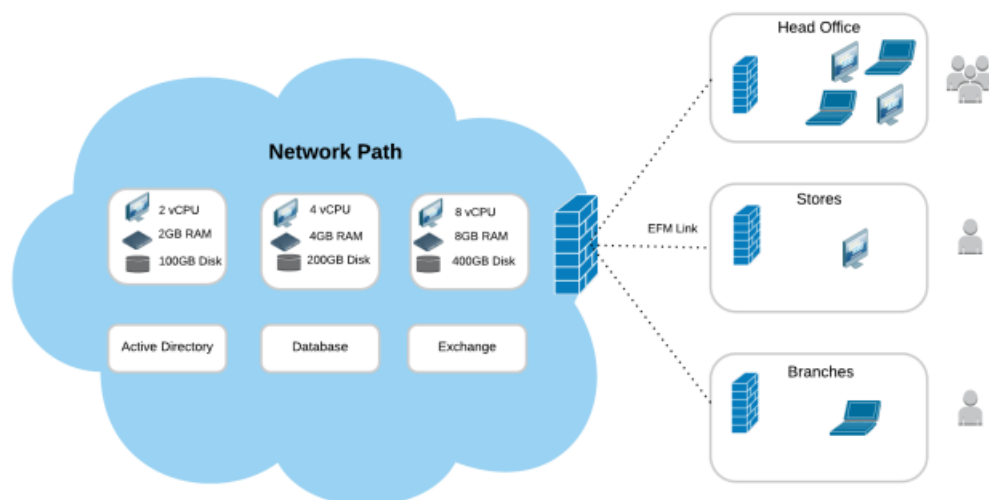


Figure 12: Public Cloud

Public clouds are services on the Cloud Computing platform that are rented to individuals/organizations and share the same resources. Is services provided by a third party (seller) and exist outside the company's firewall, are managed by the cloud provider, and are built for public use (users will register with the supplier and pay a fee based on the provider's pricing policy). The public cloud is the most commonly used deployment model of cloud computing.



Figure 13: Private Cloud

Private cloud is the cloud computing services provided in businesses. These "clouds" exist within corporate firewalls and are directly managed by businesses. This is an inevitable trend for businesses to optimize information technology infrastructure.

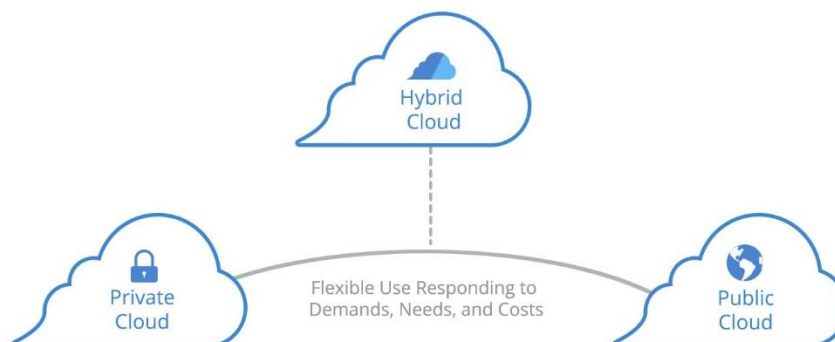


Figure 14: Hybrid Cloud

The Hybrid Cloud is a combination of a private cloud and a public cloud. Allows us to exploit the strengths of each model as well as offer optimal usage methods for users. These "clouds" are usually created by the enterprise and the management will be split between the enterprise and the public cloud provider.

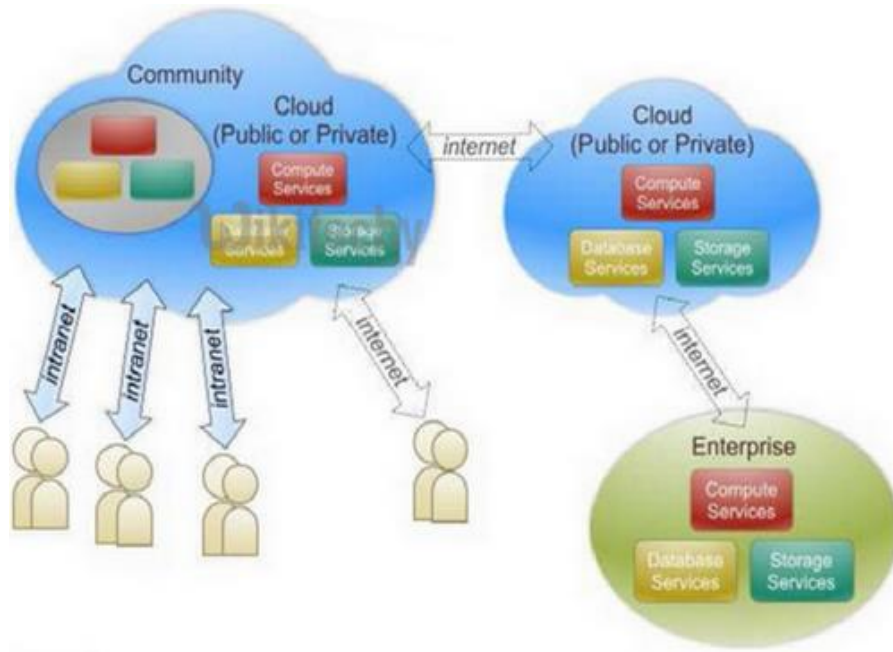


Figure 15: Community Clouds

Community clouds are a hybrid form of private clouds built and operated specifically that provides a cloud computing solution to a limited number of individuals or organizations that are governed, managed, and secured commonly by all the participating organizations or a third-party managed service provider.

3.3. Compare four deployment model of cloud computing

Public cloud has target users including users outside the internet. The object of management is the service provider. Other way, its advantages are to serve more users, not limited by space or time and saving server systems, electricity, or labor for businesses. However, it also disadvantages are suppliers-dependent businesses, do not have full management rights, and having difficulty storing internal documents or information. Next, the private cloud has target users is internal use and management by the enterprise. Its advantages are actively using, upgrading, managing, reducing costs, and good security,...etc. This cloud also has disadvantages is difficulties in technology deployment and the cost of system maintenance. Besides, it restricting internal use within the enterprise, and external users cannot use it. Next, the hybrid cloud has target users is enterprise and supplier managed by agreement. Users can use the service provider and their own business services. Its advantages are enterprises can use many services at the same time without limitations, still disadvantages are difficult to deploy/manage and cost a lot of money. Finally is the community cloud, this cloud has target users is all people use service internet. Its advantages are a controlled level of security/privacy, configuration, and management

are more controlled. Though, it still has some disadvantages are pretty complex, remote access may be limited, and slow technology integration/upgrade. So, it needs to increased IT staff and start-up costs. In summary, both four clouds have advantages and disadvantages should depending on the case we will apply for suitable.

3.4. Choose one deployment model and explain

One of the most affordable models to build for ATN is the Public cloud because it can serve more users. Besides, ATN is a toy company and with the income mentioned before is 500.000 dollars/year, then they cannot build a private cloud because it is very expensive and not suitable for all ATN's needs. However, when using the public cloud then they can cost savings by significantly reducing the cost of purchasing, managing, and maintaining hardware kernel infrastructure tablets and on-premises applications, this service is very cheap because cloud service providers will be responsible for these issues. Public cloud services often use a paid model so that users can access the resources they want whenever they need it and only pay for what you use to help you don't waste resources like previous services. In addition, the public cloud not bound by time and place. This is one of the great advantages of this service, public cloud services are created thanks to the internet connection, so only devices connected to the Internet can access it. Regardless of time or location. This makes it possible to work remotely without the company, you can work and share documents or exchange online to make your work easier and more efficient.

3.5. Overviews service model

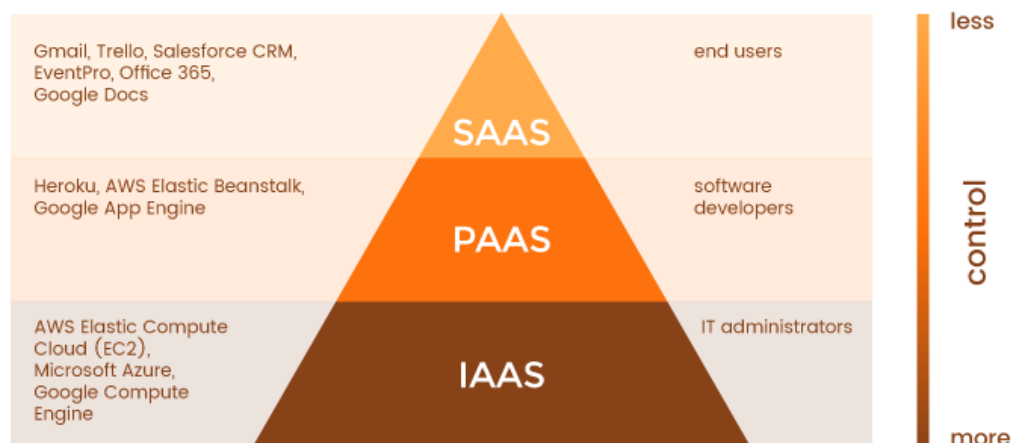


Figure 16: Service Model of Cloud Computing

Cloud Computing has three services are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Typical features of cloud computing services provide are infrastructure, platforms, and software as virtual server services which can be provided as a rental service in usage how much is paid to the user.

First, Infrastructure-as-a-Service (IaaS) provides users with raw infrastructure (usually in the form of virtual machines) as a service. Stacking virtual architectures is an example of a trend where everything is served and has something in common. Rather than a server for rent, centralized storage space or network equipment, workstations instead of investing to buy all, you can rent full external services. These services are typically costed on the basis of functional calculations and the number of resources used will reflect the level of activity. This is the development of web hosting solutions and virtual personal servers. Example IaaS will provide (rent to you) infrastructure like server rentals. Instead of paying large sums of money, customers can rent an IaaS website and pay a monthly usage fee, so it will be much more economical. A specific example I have used is MacinCloud.

Second, Platform-as-a-Service (PaaS) provides API for application development on an abstract platform (a computing platform, and a set of multi-layer solutions). It supports application deployment regardless of the cost or complexity of equipping and managing the underlying hardware and software layers, providing all the features needed to support the cycle live fully by building, delivering an Internet-ready application, and web service without any download or installation of software for developers, IT managers, or end-users. It is also known by another name as cloud ware. Example online web development sites such as c9.io, nitrous.io,...etc.

Finally, Software-as-a-Service (SaaS) Provides remote execution software services. Software service (SaaS) is an application deployment model in which the provider allows users to use the service on demand. SaaS providers can host the application on their servers or download the application to client devices, disabling it after the end of the term. The requested functionality can be controlled internally to share the copyright of a third-party application provider. The provision of platform services (SaaS) includes the conditions for application design, development, testing, deployment, and storage of valuable applications such as application services such as team collaboration and assembly web service integration and integration, database integration, security, scalability, state management, application version, benefits to the developer and application research community. These services are prepared as a web-based integration solution. For example, SaaS uses the web to host applications for one or more customers to use. Suppose, you usually have an electronic invoice management software and users who want to install then must download the .exe file after that set up the configuration to run.

3.6. Compare three service model of cloud computing

IaaS being the most flexible of cloud models gives the best option when it comes to IT hardware infrastructure. It is the right option if you need control over the hardware infrastructure such as in managing and customizing according to your requirements whether you are running a startup or a large enterprise. IaaS allows access to computing resources without the need to invest in them separately. However, the IaaS is much costlier than SaaS or PaaS cloud models.

PaaS is the preferred option if your project involves multiple developers and vendors. With PaaS, it is easy to create customized applications as it leases all the essential computing and networking resources. PaaS simplifies the app development process that minimizes your organizational costs. In addition, it is flexible and delivers the necessary speed in the process, which will rapidly improve your development times. A typical disadvantage of PaaS is you will have less control over the data processing because it is built based on virtualized technology. However, it is still less flexible compared to the IaaS cloud model.

With SaaS, communication, transferring of content, and scheduling meetings are made easy. SaaS is the ideal choice for small-scale businesses that do not have the necessary budget and resources to deploy on-premise hardware. Besides, companies that require frequent collaboration on their projects will find SaaS platforms useful. But, it also has disadvantages since it leaves you no control over the hardware allotted as only the vendor can manage the software.

Summarizing, SaaS would suit your business well if you need a cloud-based software like email, CRM, and productivity tools. IaaS is the perfect option if you require a complete virtual computing platform with powerful resources. If your requirement is a platform to develop and test your software and applications, then it is better to opt for PaaS.

3.7. Choose one service for ATN company and explain

Choose infrastructure as a service for ATN company because IaaS is online services that provide high-level APIs that are used to eliminate various low-level details of basic network infrastructure such as physical computing resources, location, data partitioning, scaling, security, backups, etc. It helps ATN companies save cost money and easy to use. Besides, it providing resources in the form of services including servers, network equipment, memory, CPU, hard disk space, and data center devices. Other way, it has flexible scalability, cost varies according to reality, and many tenants

can share the same resource. At the enterprise-level it beneficial to the company by integrated computing resources.

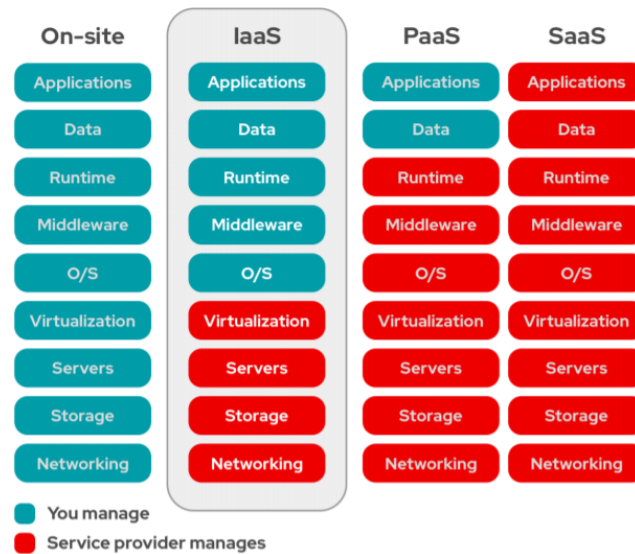


Figure 17: Public Service for ANT Company

3.8. Demonstrates these deployment models with real-world examples

The Public Cloud, also known as the public cloud, is a service model that depends on the cloud computing platform (Cloud Computing), created by third parties for users via the public internet. Some the vendor for the public model is Heroku, Google drive, and Office 365,...etc.

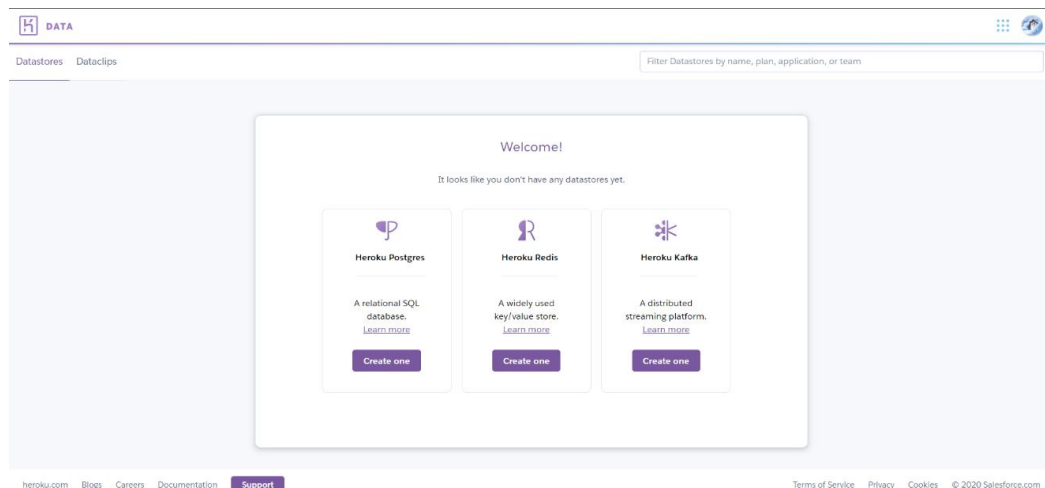


Figure 18: Heroku

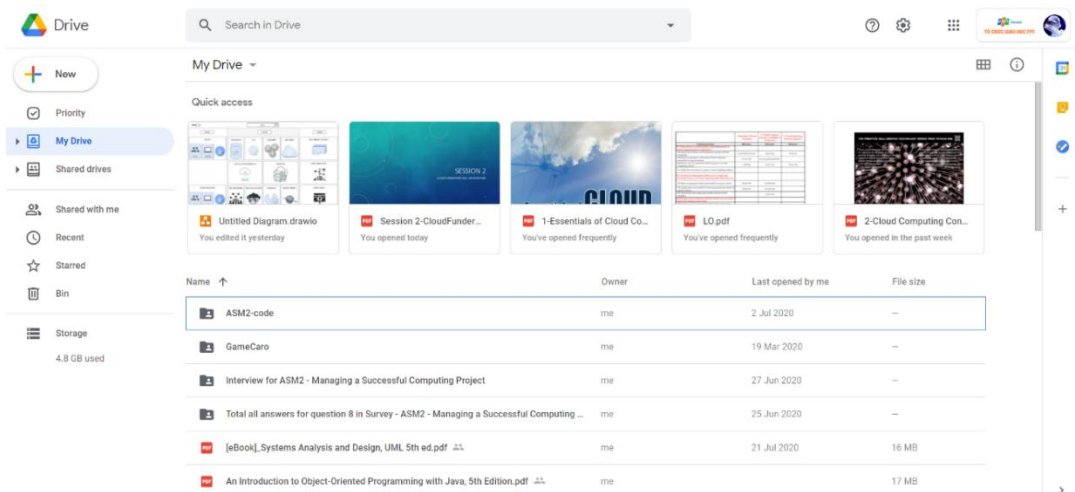


Figure 19: Google Drive

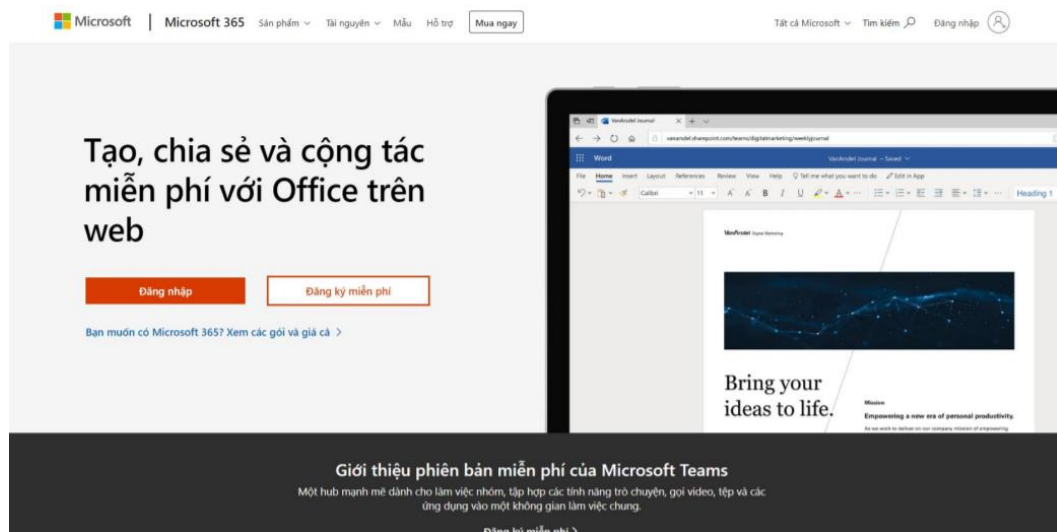


Figure 20: Office 365

Private cloud is the cloud computing services provided in businesses. These "clouds" exist within corporate firewalls and are directly managed by businesses. This is an inevitable trend for businesses to optimize information technology infrastructure. Some of the vendors for private cloud as Docker (this is the tool) and Ubuntu (this is virtual you can use it for Linux and use the command line).

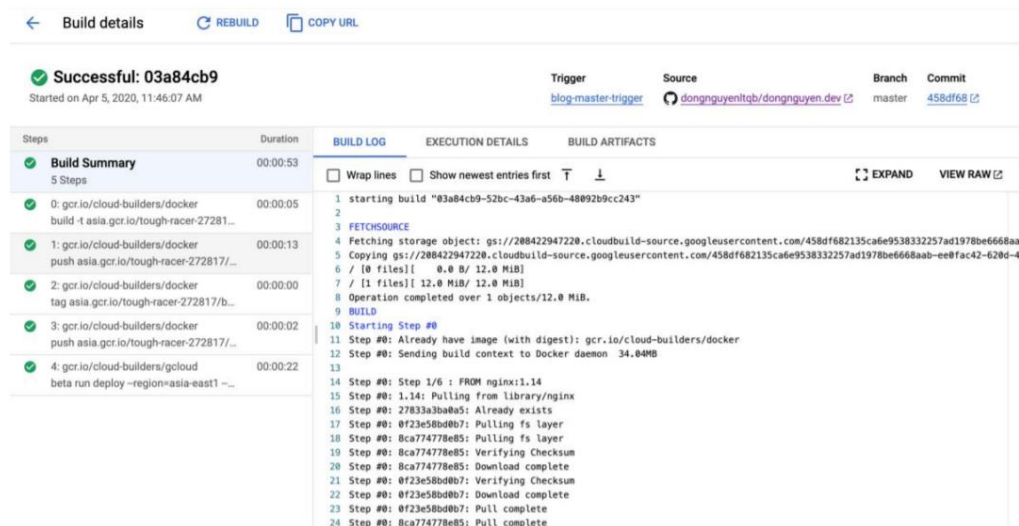


Figure 21: Docker

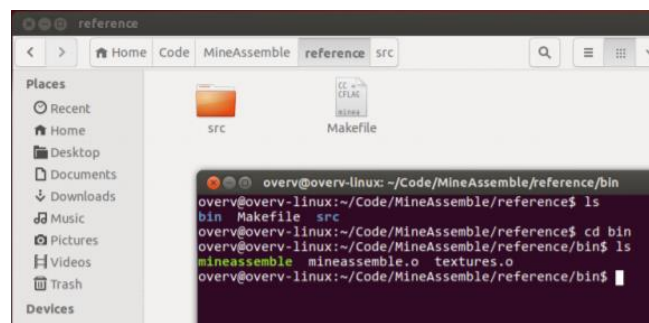


Figure 22: Ubuntu

A hybrid cloud is a combination of a private cloud and a public cloud. Allows us to exploit the strengths of each model as well as offer optimal usage methods for users. These "clouds" are usually created by the enterprise and the management will be split between the enterprise and the public cloud provider. For example, "Fujitsu" another hybrid cloud provider built on another vendor's offering -- in this case Microsoft Azure.

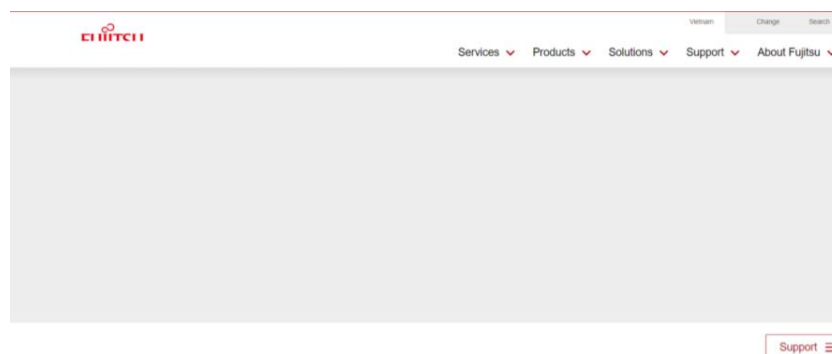


Figure 23: Fujitsu's

About community cloud, multiple governmental departments that perform transactions with one another can have their processing systems on shared infrastructure. This setup makes it cost-effective to the tenants, and can also reduce their data traffic. For example, reality has at federal agencies in the United States. Government entities in the U.S. that share similar requirements related to security levels, audit and privacy can use Community Cloud. As it is community-based, users are confident enough to invest in the platform for their projects. Multiple companies may need a particular system or application hosted on cloud services. The cloud provider can allow various users to connect to the same environment and segment their sessions logically.

3.9. Diagram public model and service IaaS for ATN company

ATN is a Vietnamese company which is selling toys to teenagers in many provinces all over Vietnam. The company has revenue of over 500.000 dollars/year. Now, each shop has its own database to store transactions for that shop only. Each shop has to send the sale data to the board director monthly and the board director needs lots of time to summarize the data collected from all the shops. In addition, the board can't see the stock information update in real-time.

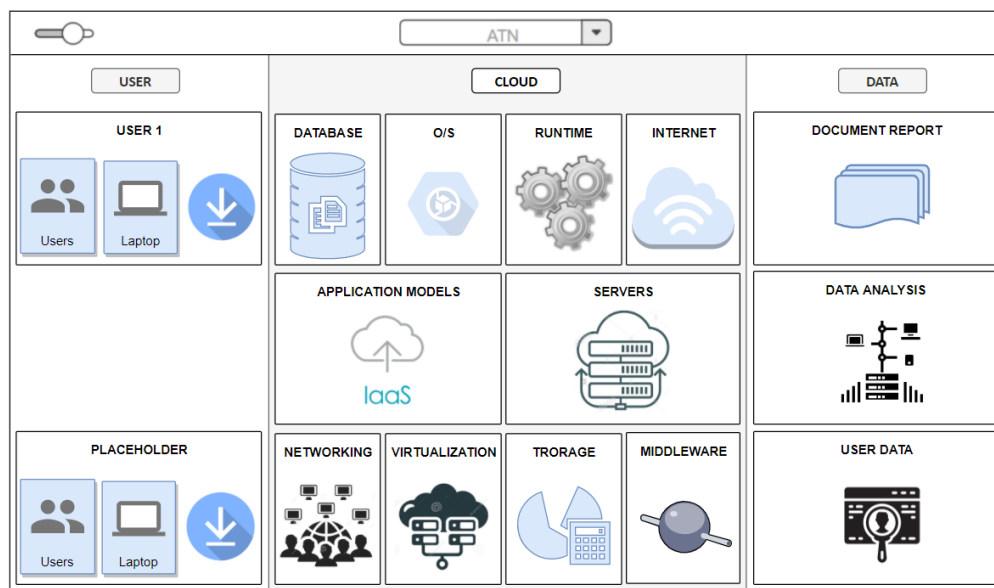


Figure 24: Diagram for ATN Company

3.10. Explain each layer model diagram of ATN company



Figure 25: User

The image above has the device, user, IaaS (icon: install). Users are the people who visit the store and see the product. They go here for a variety of purposes like buy shoes, consult prices, have a good reference (maybe they didn't want to buy it but still want to see it), or simply come in and take a seat-tired leg. If can sell goods then need to convert that user into a buyer.

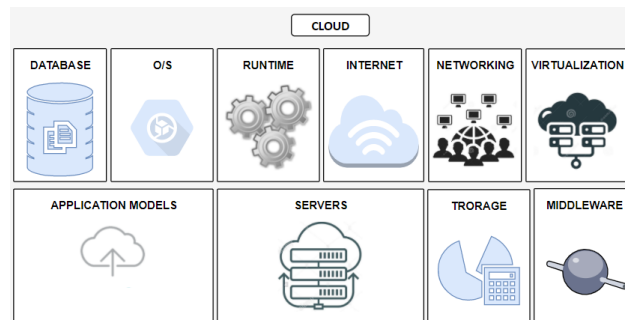


Figure 26: Cloud

This is cloud ATN include the Internet, Database, Runtime, Application models, O/S, Virtualization, Server, Storage, Middleware, and Networking. In this computing model, all possibilities related to information technology are provided as "services", allowing users to access technology services from a certain provider "in the cloud "without the knowledge and experience of that technology, and without the need to care about the infrastructure that serves that technology.

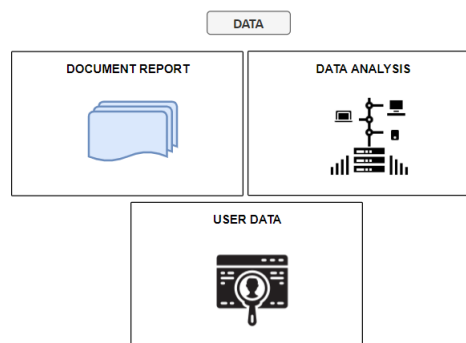


Figure 27: Data

In this section, there is the document, data analysis, and user data. Data includes clauses that reflect reality. A large classification of proposals that are important in practice is the measurement or observation of a change. Such clauses may include numbers, words, or images. Computing devices are classified according to the means they use to represent data. An analog computer displays data in terms of voltage, distance, position, or other physical quantities.

Summary

Have determined to use the Cloud Computing solution for ATN company and explained the reason why choose this solution. The evolution and fundamental concepts of Cloud Computing are already analyzed. Also, shown the benefits of using the cloud and the disadvantages of the local server. There are a lot of tools available for using the cloud but just given out the tools best popularity used nowadays, each example is especially successful. Is already given the concepts about the models, show what the models do and the examples it. Have pointed out the weaknesses and strengths of each model, too. Created a public cloud for ATN company, because this model cloud very saves cost many. Is already to given services, presented the concepts, functions of each service, and compares the pros and cons of it. In addition, in cloud services, there is always a vendor after that. So, have listed vendors for each service and specific example like google drive, heroku, office 365...etc. Finally, is already design architecture diagram and explains for each section in that.

References

- [1] Sloan Freda, 2020. *Earn Profit From Cloud Mining With Crypto-Mining*. [online] Medium. Available at: <<https://medium.com/@carolynwebster1534/earn-profit-from-cloud-mining-with-crypto-mining-9969bd206d39>> [Accessed 17 October 2020].
- [2] Admin, 2020. *What Is The Cloud? | Cloud Definition*. [online] cloudflare.com. Available at: <<https://www.cloudflare.com/learning/cloud/what-is-the-cloud/>> [Accessed 17 October 2020].
- [3] K. Chandrasekaran, 2014. *Essentials of Cloud Computing*. [ebook] Available at: <https://keyhannet.com/wp-content/uploads/2018/11/K.-Chandrasekaran-Essentials-of-Cloud-Computing-2014-Chapman-and-Hall_CRC.pdf> [Accessed 17 October 2020].
- [4] Van Hoang, 2020. *10 Xu Hướng Cloud Computing Mới Cần Quan Sát Trong Năm 2020*. [online] Blog | TheGioiMayChu. Available at: <<https://www.thegioimaychu.vn/blog/tong-hop/10-xu-huong-cloud-computing-moi-can-quan-sat-trong-nam-2020-p3239/>> [Accessed 17 October 2020].
- [5] Admin, 2020. *What Is Cloud Computing? A Beginner'S Guide | Microsoft Azure*. [online] Azure.microsoft.com. Available at: <<https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/>> [Accessed 17 October 2020].
- [6] Uschie, 2019. *History & Evolution Of Cloud Computing : What To Expect In 2019*. [online] Seasia Infotech Blog. Available at: <<https://www.seasiainfotech.com/blog/history-and-evolution-cloud-computing/>> [Accessed 17 October 2020].
- [7] En.wikipedia.org. 2020. *Visual Studio Code*. [online] Available at: <https://en.wikipedia.org/wiki/Visual_Studio_Code> [Accessed 17 October 2020].
- [8] Quach, C., 2019. *Heroku Là Gì ? Tổng Quan Về Nền Tảng Đám Mây Heroku - Technology Diver*. [online] Technology Diver. Available at: <<https://cuongquach.com/heroku-la-gi.html>> [Accessed 17 October 2020].
- [9] Sudhi Seshachala, 2015. *Cloud Computing Architecture: An Overview*. [online] Cloud Academy. Available at: <<https://cloudacademy.com/blog/cloud-computing-architecture-an-overview/>> [Accessed 17 October 2020].
- [10] Margaret Rouse, 2018. *What Is Cloud Ecosystem? - Definition From Whatis.Com*. [online] SearchITChannel. Available at: <<https://searchitchannel.techtarget.com/definition/cloud-ecosystem#:~:text=A%20cloud%20ecosystem%20is%20a,are%20connected%20and%20work%20together.>> [Accessed 17 October 2020].
- [11] Friedman-Nixon-Wong Enterprises, 2015. *The Layers Of Cloud Computing*. [online] Petitecloud.org. Available at: <<http://www.petitecloud.org/layers.jsp>> [Accessed 17 October 2020].

- [12] Admin, 2020. *What Is A Public Cloud - Definition | Microsoft Azure*. [online] Azure.microsoft.com. Available at: <<https://azure.microsoft.com/en-us/overview/what-is-a-public-cloud/>> [Accessed 17 October 2020].
- [13] Admin, 2017. *What Is A Community Cloud? - Definition From Techopedia*. [online] Techopedia.com. Available at: <<https://www.techopedia.com/definition/26559/community-cloud>> [Accessed 17 October 2020].
- [14] Admin, 2019. *Pros And Cons Between Public, Private And Community Cloud*. [online] Sectorlink.com. Available at: <<https://www.sectorlink.com/article/pros-and-cons-between-public-private-and-community-cloud?PageName=pros-and-cons-between-public,-private-and-community-cloud>> [Accessed 17 October 2020].
- [15] Vinod Saratchandran, 2018. *Cloud Service Models Saas, Iaas, Paas - Choose The Right One For Your Business | Fingent Blog*. [online] Fingent Technology. Available at: <<https://www.fingent.com/blog/cloud-service-models-saas-iaas-paas-choose-the-right-one-for-your-business/>> [Accessed 17 October 2020].
- [16] Dejan Tucakov, 2020. *What Is The Community Cloud? Benefits & Examples*. [online] PhoenixNAP Global IT Services. Available at: <<https://phoenixnap.com/blog/community-cloud>> [Accessed 17 October 2020].