



Cloud... NDT... A Good Mix?

Abstract

Is cloud and NDT a good mix? NDT has its own specificity. Clouds can truly simplify the file management, but is any cloud solution adapted for the NDT? For example, Dropbox may not work right out of the box for our market. This presentation highlights different avenues about clouds (IaaS, PaaS, and SaaS); and highlights NDT critical requirements (constraints and needs). A list of different levels of cloud services (component, option, security, ...) will be defined. It is important to remember that private and public servers are 2 possible avenues. NDT was an early user of private servers even before it was called a cloud. Overall the main idea is to optimize the operation process to reduce OPEX and to increase availability and accuracy of data.

Agenda



- Cloud, a general term
- Types of clouds (IaaS, SaaS, PaaS)
- Private vs public vs hybrid
- Security
- Types of services
- NDT available services (Pacses, Box, Azure)
- Rules and regulations
- DICONDE (ASTM E2339)
- Reliability

Cloud



“Cloud computing” can be easier to understand with the term “Internet computing.” The Internet is commonly viewed as clouds; hence the term “cloud computing” for computation done through the Internet or remotely.

Myth



There are 2 repellant feelings that come to mind:

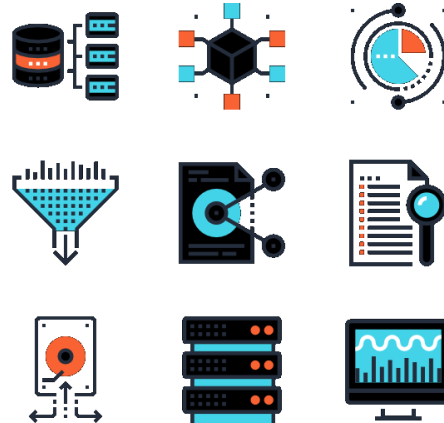
- Not owning the data
- Security

Who are Dealing with Clouds?... Everyone!

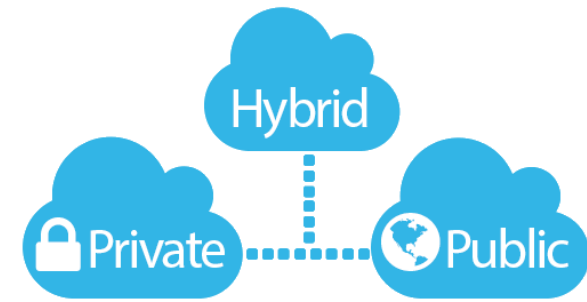


NDT tasks related to data that are potentially cloud dependent:

- Generate data
- Sort data
- Manage data
- Find data
- Read data
- Visualize data
- Automate data interpretation
- Detect defect on data
- Report defect

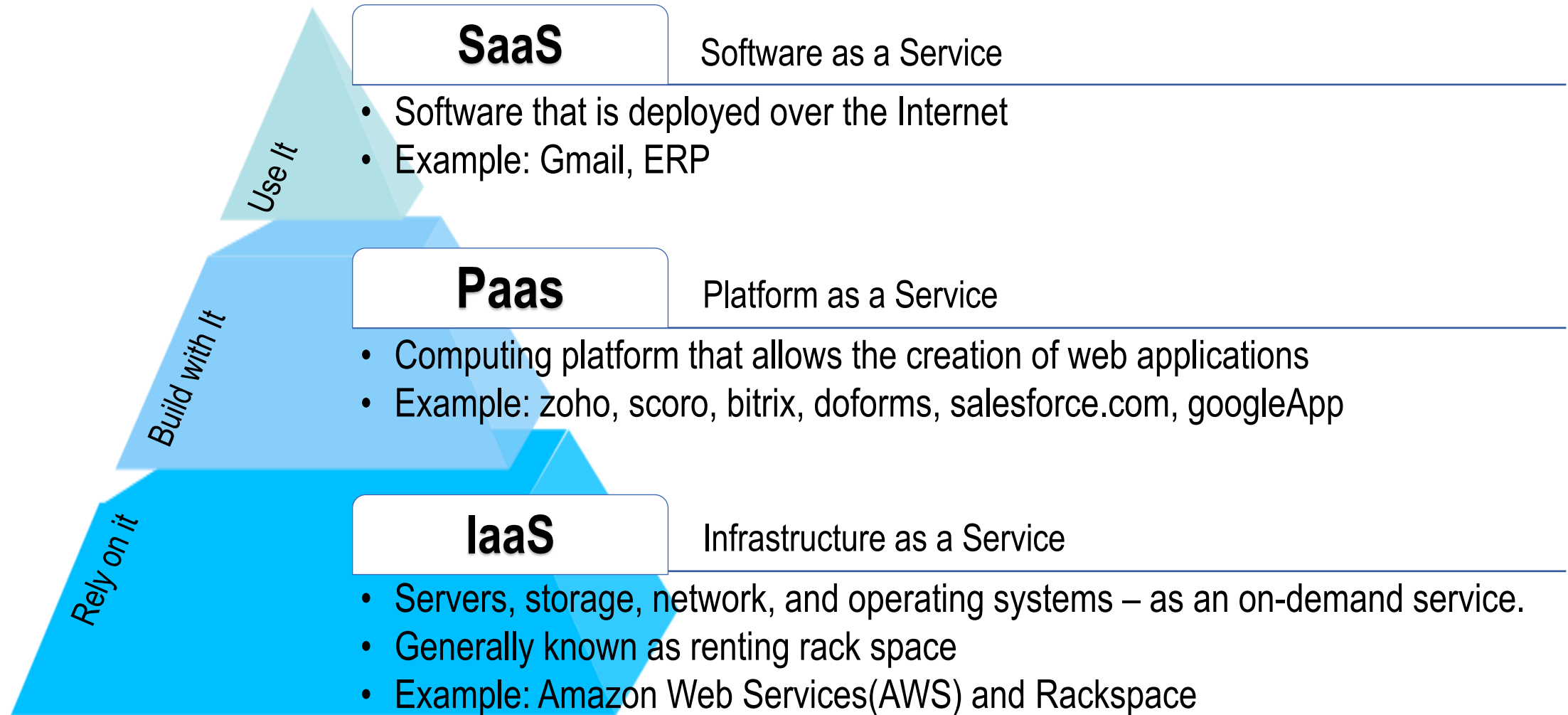


Private vs Public vs Hybrid

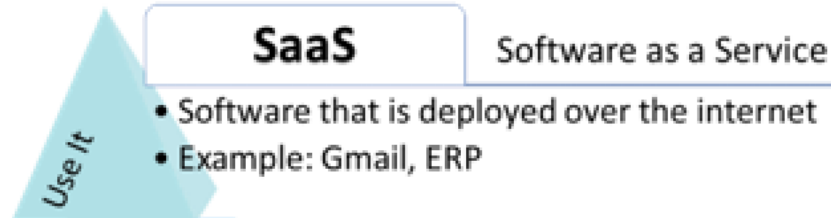


- Data and infrastructures in a public or private space. Hybrid is a combination of traditional dedicated hosting combined with public and/or private cloud networks.
- Example:
 - Use the infrastructure but store your data elsewhere.
 - Use a public solution backed up on a private infrastructure.

Types of Cloud or the Cloud Computing Stack

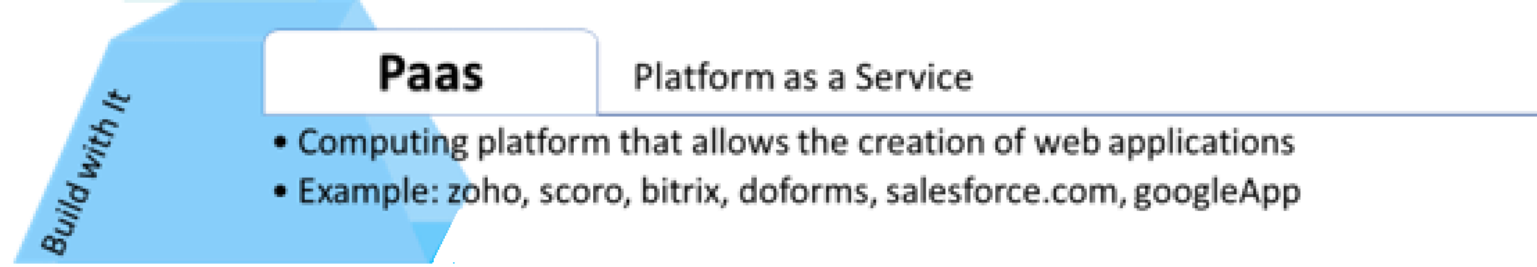


SaaS



- Software that is deployed over the Internet. With SaaS, a provider licenses an application to customers either as a service on demand, through a subscription, in a “pay-as-you-go” model, or (increasingly) at no charge when there is opportunity to generate revenue from streams other than the user, such as from advertisement or user sale list.
- Example: Gmail client, ERP
- Applicable for:
 - Software delivered in a “one to many” model
 - Applications that have a significant need for web or mobile access
- Not applicable for:
 - Applications where legislation or other regulations do not permit data being hosted externally.

PaaS



- PaaS can be defined as a computing platform that allows the creation of web applications quickly and easily and without the complexity of buying and maintaining the software and infrastructure underneath it. Rather than being software delivered over the web, it is a platform for the creation of software, delivered over the web.
- Example: zoho, scorio, bitrix, doforms, salesforce.com, googleApp,
- Applicable for:
 - Client/server application where development, mostly agile, is on a centralized server.
 - Whatever the software technology is used for development.
 - Sources of data are or can be hosted on the web
- Not applicable for:
 - Where application performance requires customization of the underlying hardware and software.

IaaS

Rely on it

IaaS

Infrastructure as a Service

- Servers, storage, network and operating systems – as an on-demand service.
- Generally known as renting rack space
- Example: Amazon Web Services(AWS) and Rackspace

- Infrastructure as a Service (IaaS) is the used to deliver cloud computing infrastructure – servers, storage, network, and operating systems – as an ondemand service. Rather than purchasing servers, software, datacenter space, or network equipment, these will be rented. Generally known as renting rack space. Additionally, some hosting providers are beginning to offer a combination of traditional dedicated hosting combined with public and/or private cloud networks. This combination approach is generally called “hybrid cloud”.
- Example: Amazon Web Services(AWS) and Rackspace
- Applicable for:
 - Rapid scaling of the needs
 - Limiting capital expenses
- Not applicable for:
 - Where application performance requires customization of the underlying hardware and software.

Key Characteristics



- Characteristics that will determine if your application and needs are meant for a particular cloud:
 - Cost
 - Location independence
 - Multi-tenancy
 - Reliability
 - Capability
 - Scalability
 - Availability
 - Security
 - Rules, regulations, and contract requirements
 - DICONDE (ASTM E2339)
 - The 3 levels of services (SaaS, PaaS, IaaS)
 - Generic or dedicated to NDT



Cost

- Energy required to convert, copy, sort data in the new solution
- Training of the operation team on the new tool
- Increase in monthly Internet bandwidth usage
- Direct fees of the solution, price based on the following attributes:
 - Number of users
 - Number of API call per month
 - Storage size

Typical Cost Today



- BOX 500\$/month (Paas)
- 100 MAUs (users)
- 175,000 API calls per month
- 125 GB storage
- 125 GB bandwidth per month

- BOX 20\$/month (SaaS)
- Unlimited storage
- 5 GB file upload



Capability

- Is the platform capable to meet your needs? Review the exact use cases and scenarios where the expected solution will be implemented. Think about the bottleneck and the path the data will follow. Think about the following pitfalls:
 - Batch transfer capability
 - Multiple file operations
 - Do you need to transfer the file each time you need them (this can bring delays) or are they locally synchronized?
 - Search and sort capability



Security

- Confidentiality is part of many contract in NDT, each public cloud solution has its own security mechanism to keep copies and data history. You may want to:
 - Look for DOD level 5 approbation
 - Look for VPC (virtual private cloud) allowing a certain level of isolation between the different organizations mostly for IaaS type of service. The level of security of this mechanism is mostly equal to a VPN (virtual private network) commonly used by organisations.
 - Read about “Big data security”, a place to start: “10 Best Practices for Securing Big Data” (refer to Bibliography).

Rules, Regulations, and Contract Requirements



- Read your contract, search for these words:
 - Storage and public storage
 - Geographical location of data
 - Perenity or life cycle of data
 - Security, privacy, and confidentiality of data

Generic or Dedicated to NDT



The generics generally provide file management services as a software, while the dedicated solutions are about the NDT process requirements and handles:

- Process management
- Asset management
- Inspector management
- Inspection schedule
- Integrate file viewer
- Project management
- Analysis
- Reporting

Main NDT Players



Generic

- DropBox (SaaS)
- Box (SaaS)
- AWS (PaaS and IaaS)
- Azure (PaaS and IaaS)

Dedicated

- Aycan (SaaS)
- Workpad (SaaS)
- InpectionBank (SaaS)

Startups

- TheNDTcloud
- NDTVault

DICONDE (ASTM E2339)



The move to digital imaging and archiving in NDT became official back in 2004 when the American Society for Testing and Materials (ASTM) E07.11 subcommittee made DICONDE (Digital Imaging and Communication for Non-Destructive Evaluation) the standard (E2339-11) for NDT imaging. Based on DICOM (Digital Imaging and Communications in Medicine), a proven imaging and archiving standard since 1993, DICONDE is an imaging and archiving technology standard that defines all image attributes and elements in a universal format. Since the adoption of DICONDE as a standard in NDT, digital converts have been realizing the benefits of digital archiving and workflow.

It describes and covers:

- Data structures for images and image-related data
- Network-oriented services and transmission (Part 10)
- Formats for data media exchange
- Storage

DICONDE Lately



- It mainly covers radiography but extra work has been invested by the committee to manage UT (ultrasound), PAUT (phased array ultrasound) and Eddy current data.
- New Information modules or attributes describing metadata and an NDE Geometry module (part scanner, coordinate system).

Disadvantages



- Often limited or no technical support available
- Canned solutions, may not be full-featured or too task oriented
- When there are technical issues, you may lose access to your data or application.
- No control
- You must have an Internet connection.
- If the company hosting the application goes out of business, you may lose access to your data or application permanently.

Advantages



- Scalability to quickly meet changing users' demands
- Pay per use
- Task oriented
- Virtually no maintenance due to dynamic infrastructure software.
- Independence of application and operating system
- Faster time-to-market to develop a web-based applications that run in the cloud.
- Large integration: location of infrastructure in areas with lower costs of real estate and electricity.
- Sharing of peak-load capacity among a large pool of users, improving overall utilization.
- Not having to purchase assets for one time or infrequent computing tasks.
- Ability to use external assets to handle peak loads.



WHEN are YOU moving to cloud?



n u b i t u s . c o m

Brings the files where you want them