CAREER COMPASS

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Cloud Computing Models: Technology and Security

Participant Workbook

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Introduction

Objectives:

On completing this course you will be able to:

- Describe various cloud computing models, their benefits and drawbacks, and security implications.
- Understand which model is appropriate, depending on the need and circumstances.

Agenda:

1. Overview of cloud computing services
2. Drawbacks of cloud computing
3. Security implications

Cloud Computing Services

IaaS: **Infrastructure as a Service**	PaaS: **Platform as a Service**	SaaS: **Software as a Service**
A model in which a third-party provider hosts servers, storage and other virtualized compute resources and makes them available to customers over the internet for lease or purchase	A model in which a third-party provider hosts application development platforms and tools on its own infrastructure and makes them available to customers over the internet	A software distribution model in which a third-party provider hosts applications and makes them available to customers over the internet

IaaS: Infrastructure as a Service


Data Warehousing


Networks


Server Farms

In an IaaS service model, a cloud provider hosts the infrastructure components that are traditionally present in an on-premises data center. This includes servers, storage, and networking hardware, as well as the virtualization. Cloud companies like Rackspace, Amazon Web Services, and Alibaba offer these services.

Infrastructure as a Service (IaaS), is made of highly scalable and automated compute resources. It allows businesses to purchase resources on-demand and as-needed instead of having to buy hardware outright.

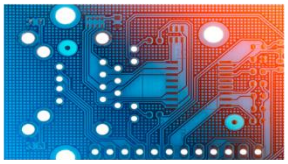
As opposed to SaaS or PaaS, IaaS clients are responsible for managing aspects such as applications, runtime, operating systems, middleware, and data. However, providers of the IaaS manage the servers, hard drives, networking, virtualization, and storage. Some providers offer more services beyond the virtualization layer, such as databases or message queuing.

Benefits and Uses of IaaS:

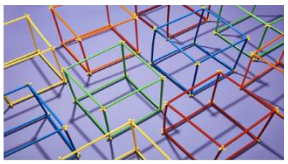
- Flexible cloud computing model
- Easy to automate deployment of storage networking, servers, and processing power
- Hardware purchases can be based on consumption
- Multiple, simultaneous users
- Clients retain complete control of their infrastructure
- Resources can be purchased as-needed, as-a-service
- Highly scalable

PaaS: Platform as a Service

Analytics / Business Intelligence



Operating Systems



Development Tools

Platform as a service (PaaS) is a cloud computing model where a third-party provider delivers hardware and software tools to users over the internet.

Platform as a Service providers build on IaaS but include development tools, operating systems, and databases to build applications.

Usually, these tools are needed for application development. A PaaS provider hosts the hardware and software on its own infrastructure freeing developers from having to install in-house hardware and software to develop or run a new application. Companies like Google App Engine, Oracle Cloud Platform, and Microsoft Azure offer these services.

PaaS enables you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications. You purchase the resources on a pay-as-you-go basis and access them over a secure Internet connection.

Like IaaS, PaaS includes infrastructure—servers, storage, and networking—but also middleware, development tools, business intelligence (BI) services, database management systems, and more. PaaS is designed to support the complete web application lifecycle: building, testing, deploying, managing, and updating.

Benefits and Uses of PaaS:

- Frequently used in the development of mobile applications.
- Create apps that can be used on any device
- Used for DevOpps tools and cloud-based continuous integration
- Automated housekeeping and maintenance tasks
- Reduces the burden of managing scalable infrastructure
- Removes the complexities of load balancing, scaling, and distributing new dependent services Multiple, simultaneous users

SaaS: Software as a Service

Applications, Software

The most familiar cloud model to most people is Software as a service (SaaS). This includes small programs like apps in a browser, or cloud-based email programs, video services and photo storage. For organizations, it might include applicant tracking systems, customer management software, and other more complex software.

Companies like Dropbox, Microsoft Teams, and Salesforce offer these services.

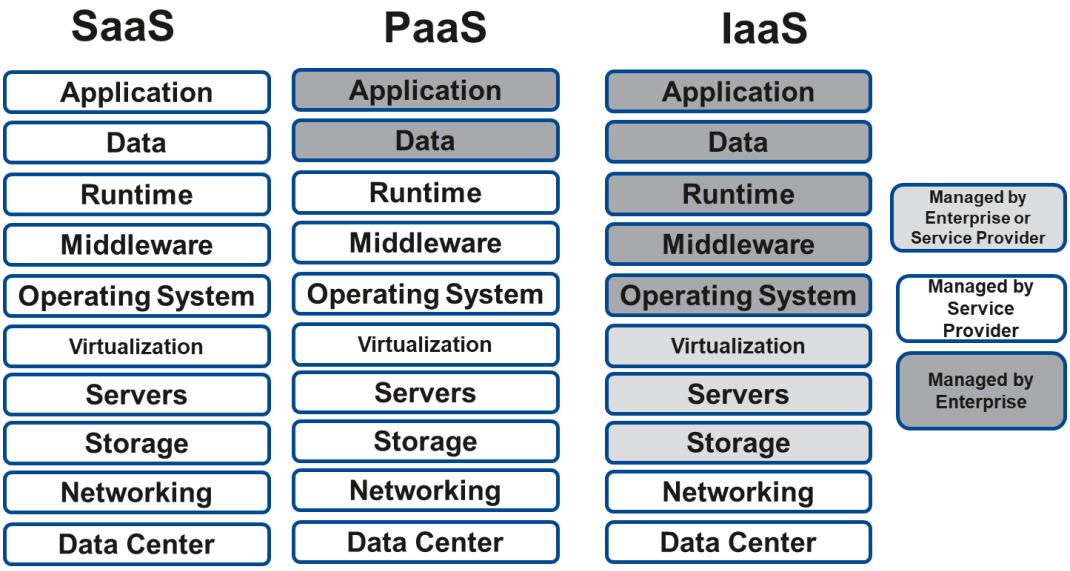
Software as a Service, also known as cloud application services, represents the most commonly utilized option for businesses in the cloud market. SaaS utilizes the internet to deliver applications, which are managed by a third-party vendor, to its users. A majority of SaaS applications run directly through your web browser, which means they do not require any downloads or installations on the client side.

Due to its web delivery model, SaaS eliminates the need to have IT staff download and install applications on each individual computer. With SaaS, vendors manage all potential technical issues, such as data, middleware, servers, and storage, resulting in streamlined maintenance and support for the business.

Benefits and Uses of PaaS:

- Used extensively for eCommerce applications
- Allows quick, easy, and affordable collaboration
- Especially valuable for infrequently used apps
- Powerful software is accessible and affordable
- Quick implementation
- Real-time upgrades
- Low or no maintenance costs

Control Levels: SaaS, PaaS, and IaaS



Choosing a Model

You've inherited a remote team of developers located in 16 states across the country. With limited budget, you're asked to develop several new apps for use on multiple platforms. The need is pressing. You don't have all the hardware or software you need to develop the apps. Acquiring it would be a lengthy and costly process. What might be your best course of action?

- ☐ **Use a SaaS solution**
- ☐ **Use a PaaS solution**
- ☐ **Use an IaaS solution**
- ☐ **Build the necessary capacity in-house**

Why? Use the space provided here to capture your thoughts.

Drawbacks of Cloud Computing

Potential drawbacks of IaaS:

- Security
- Legacy Systems Operability
- Resources and Training

Potential drawbacks of PaaS:

- Data Security
- Integrations
- Vendor Lock-in
- Legacy Systems Integration
- Runtime Issues
- Operational Limitations

Potential drawbacks of SaaS:

- Interoperability
- Vendor Lock-in
- Lack of Integration Support
- Data Security
- Limited or no Customization
- Lack of Control
- Feature Limitations
- Performance and Downtime

Security Concerns of Cloud

Companies save time and resources when they no longer need to invest in expensive servers, deal with outdated software and hardware, and staff IT experts on-site, but cloud servicing comes with risks as well. Storing sensitive customer data or other business data externally raises cybersecurity exposure. Migrating existing data or applications can be expensive and complex to the point that it diminishes any cost advantage that the cloud solution affords. Once you move your processes to one provider, it may be difficult to switch. In addition, hiring staff with cloud expertise has proven difficult for many organizations

Security and related risks remain the most critical cloud concern for many organizations.

Potential Security Concerns of Cloud Computing:

- Data Breaches
- Change Control
- Credentialing/Authentication
- Account Hijacking
- Insider Threats
- Insecure Interfaces/APIs
- Limited Visibility
- Malware and other abuse
- Denial of Service

Managing Security Concerns

To effectively mitigate the security risks brought by cloud usage, organizations should understand the data that is being uploaded and who is uploading the data. Cloud storage and sharing services are here to stay, but organizations must be able to balance the risks.

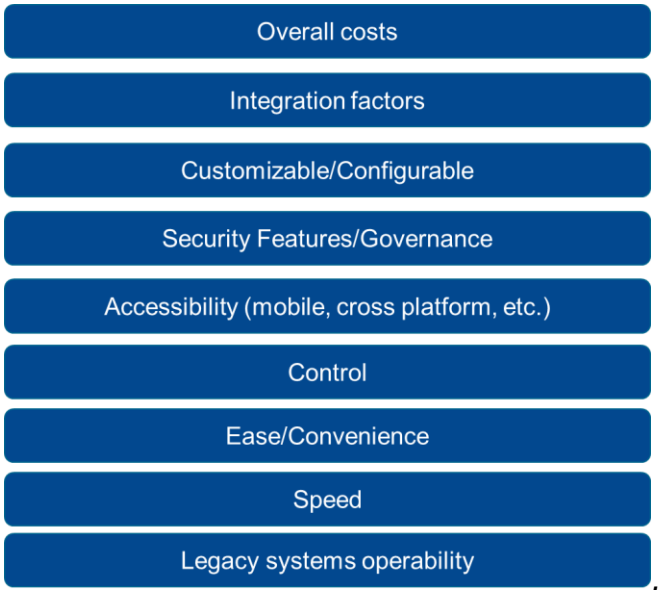
Ways to manage security concerns of the cloud:

- Governance & Compliance
- Assessments
- Audits
- Identities, Access, Roles
- Enforcement
- Physical Infrastructure

Balancing Decision Factors

Suppose you are in charge of determining what cloud service to contract with for the next five years. In what order would you place these nine factors in terms of importance: most important on top, least on the bottom?

There's no right or wrong answer to this question; it depends on your organization and its needs. Think through the benefits, drawbacks and risks of each cloud service we discussed. What is most and least important for your organization? Think about how you would prioritize these factors and write them, in order of most important to least important.



Use the space provided here to capture your response.

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Final Reflection

- What is something new you learned today?
- What is the most important tip you will share with a co-worker that wasn't able to attend today?

Use the space provided to capture your response.

Contact Information

BD17 Contact Information: Write to us! We are always seeking to improve our learning and development products and encourage your feedback. Please email us with your suggestions and we will incorporate them into future work. Additionally, we are available to answer any questions about the content you may have and provide additional resources to support your learning endeavors.

- NAVFACHQTotalForceDevelopment@navy.mil

Development Resources

Career Compass Resource Center: An online source of information that provides NAVFAC civilian employees access to professional growth and development opportunities.

- https://www.navfac.navy.mil/ccrc

To access more content specific to the **Technology and Data Management** competency:

- https://www.navfac.navy.mil/technology-data-management

Career Compass Catalog: an online tool which provides you with information to help you take ownership of your professional development. It identifies options to assist in planning and creating a successful career path within NAVFAC.

- https://www.navfac.navy.mil/ccc

Course Credit

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