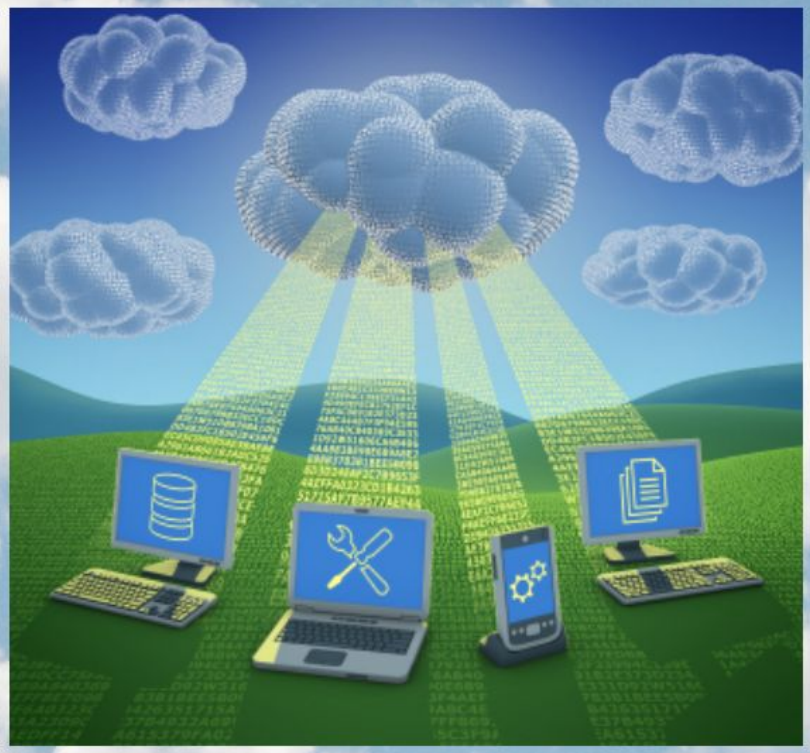
What Is Cloud Computing?

- Generally speaking, cloud computing can be thought of as anything that involves delivering hosted services over the Internet.
- According to NIST Cloud computing is a model for enabling ubiquitous, 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. (Special Publication 800-145)



What It Provides

- Cloud computing provides shared services as opposed to local servers or storage resources
- Enables access to information from most web-enabled hardware
- Allows for cost savings – reduced facility, hardware/software investments, support

Essential Characteristics

- *On-demand self-service*

  A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

- *Broad network access*

  Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).

Source: NIST Special Publication 800-145

Characteristics

- *Resource pooling*

  The provider's computing resources are pooled to serve multiple consumers

  Resources can be dynamically assigned and reassigned according to customer demand

  Customer generally may not care where the resources are physically located but should be aware of risks if they are located offshore

Source: NIST Special Publication 800-145

Characteristics

- *Rapid elasticity*

  Capabilities can be expanded or released automatically (i.e., more cpu power, or ability to handle additional users)

  To the customer this appears seamless, limitless, and responsive to their changing requirements

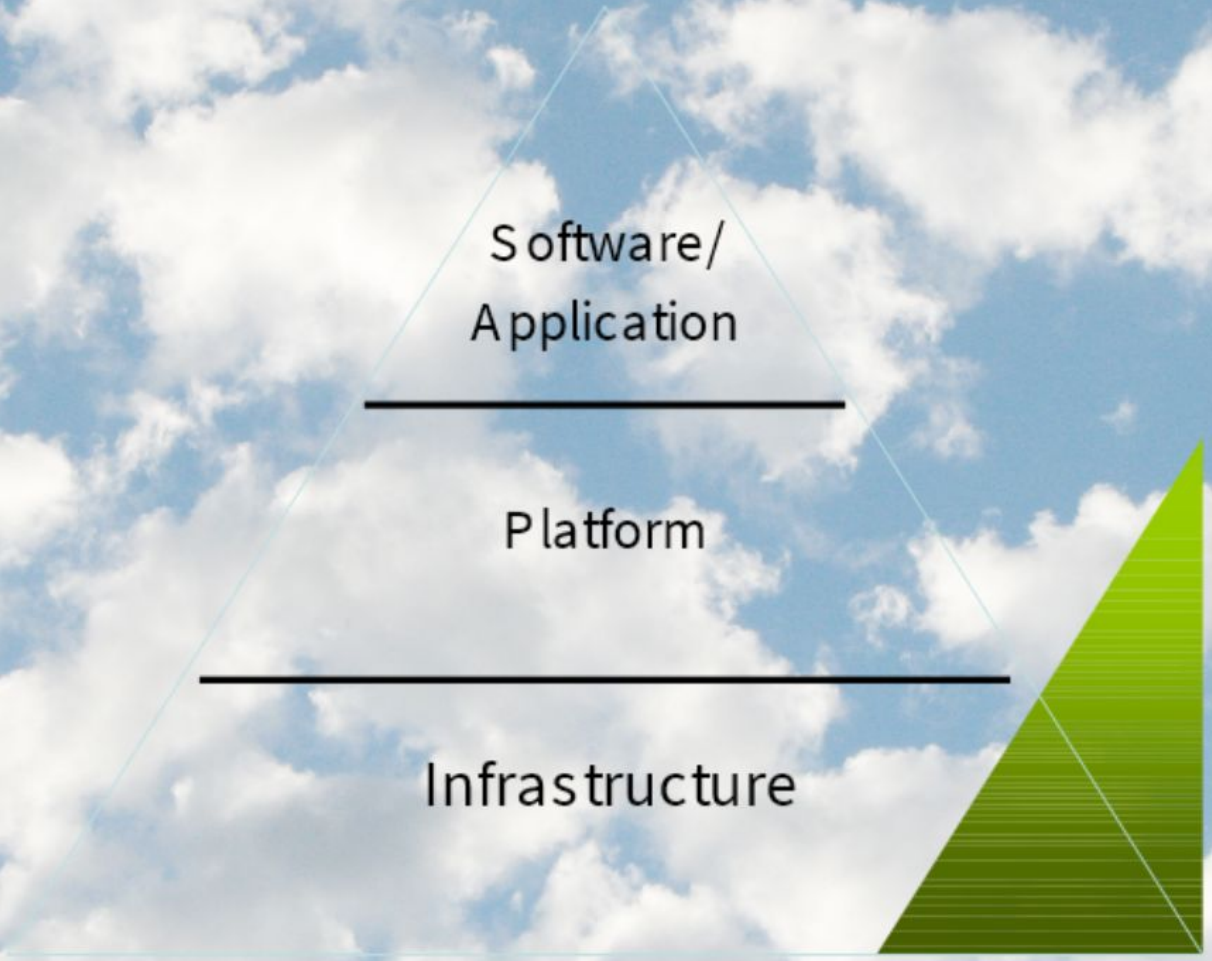
- *Measured service*

  Customers are charged for the services they use and the amounts

  There is a metering concept where customer resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service

Source: NIST Special Publication 800-145

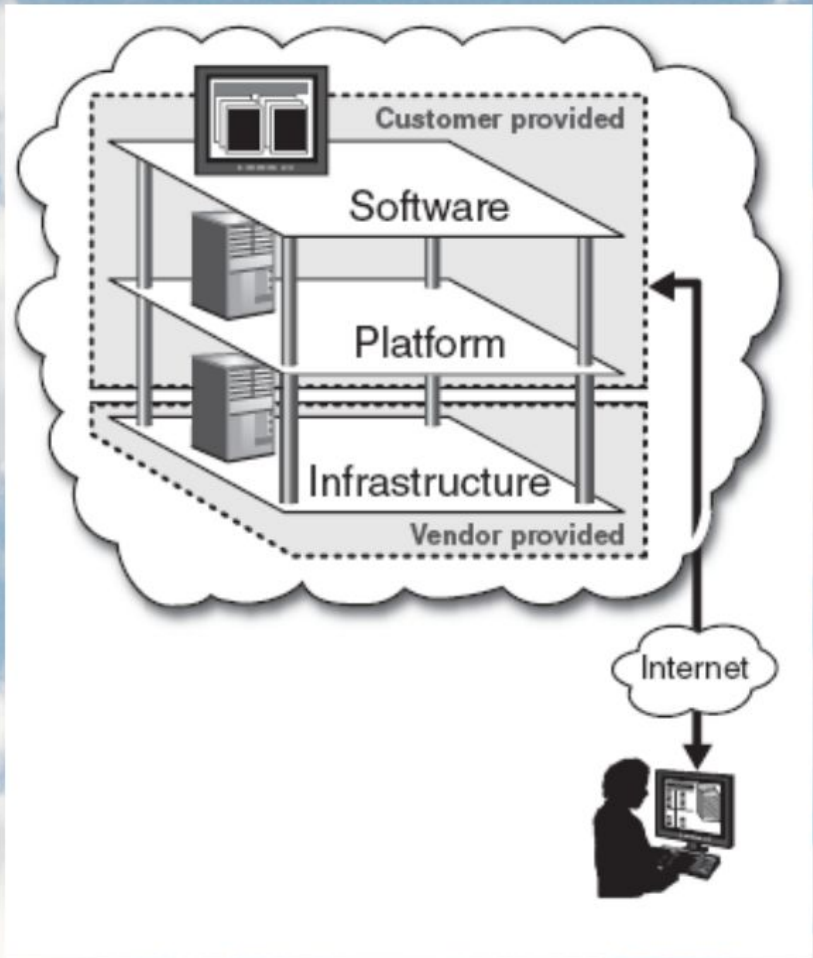
Service Models



Service Models

Infrastructure-as-a-Service (IaaS)

- A service model that involves outsourcing the basic infrastructure used to support operations--including storage, hardware, servers, and networking components.



- The service provider owns the infrastructure equipment and is responsible for housing, running, and maintaining it. The customer typically pays on a per-use basis.

- **The customer uses their own platform (Windows, Unix), and applications**

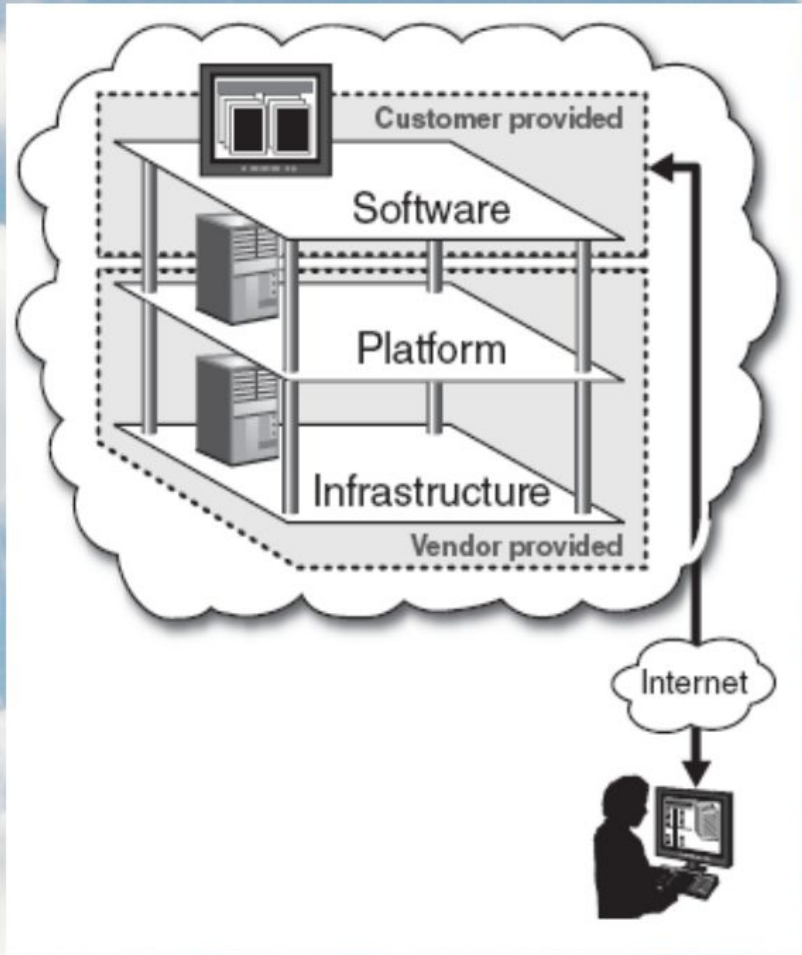
Service Models

Platform-as-a-Service (PaaS)

- A service model that involves outsourcing the basic infrastructure and platform (Windows, Unix)

- PaaS facilitates deploying applications without the cost and complexity of buying and managing the underlying hardware and software where the applications are hosted.

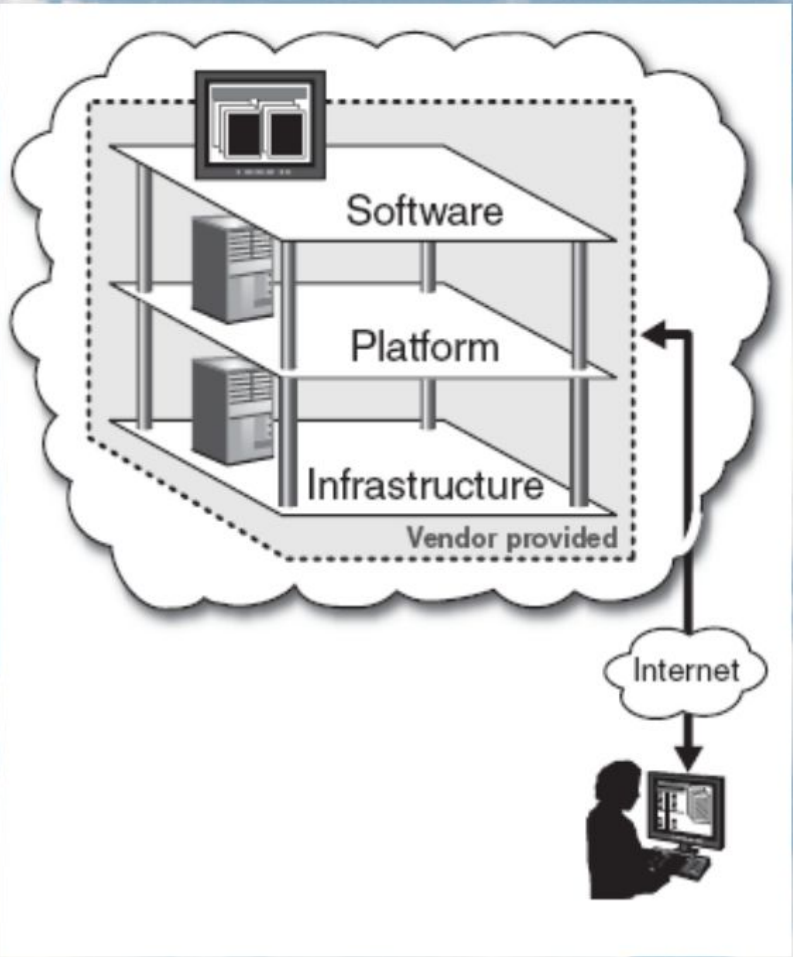
- **The customer uses their own applications**



Service Models

Software-as-a-Service (SaaS)

- Also referred to as “software on demand,” this service model involves outsourcing the infrastructure, platform, and software/applications.
- Typically, these services are available to the customer for a fee, pay-as-you-go, or a no charge model.
- The customer accesses the applications over the internet.



Where Is My Data?

- Data resides on servers that the customer cannot physically access
- Vendors may store data anywhere at lowest cost if not restrained by agreement

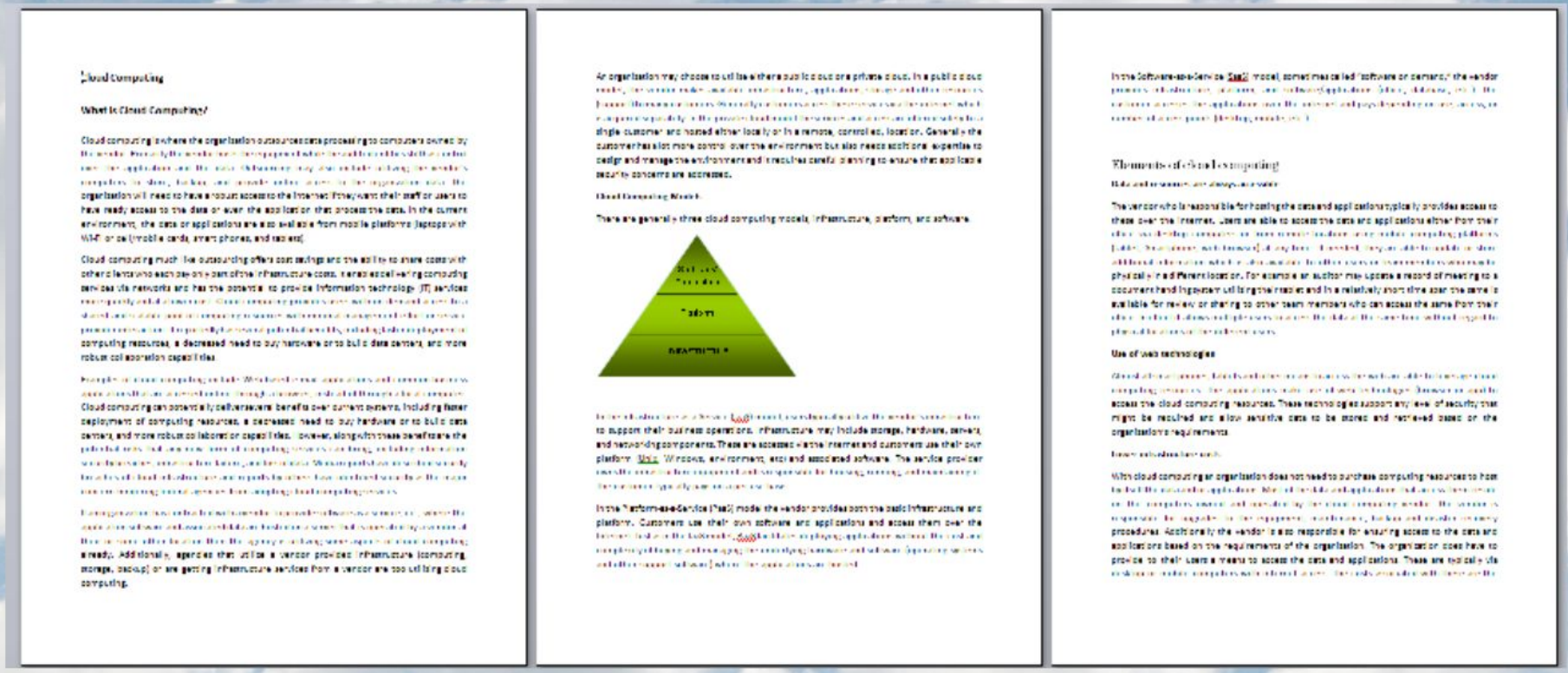
Cloud Computing Guide

The guide is about a 10 page document that describes cloud computing and areas of risk

These risks should be managed by the IT organization that chooses to utilize cloud computing

For IT Auditors these risks are a roadmap which you can utilize to create your audit program

Cloud Computing Guide



Cloud Computing Guide

What is Cloud Computing?

Cloud computing is where the organization outsources data processing to computers owned by the vendor. Primarily the vendor hosts the equipment while the audited entities still has control over the application and the data. Outsourcing may also include utilizing the vendor's computers to store, backup, and provide online access to the organization data. The organization will need to have a robust access to the internet if they want their staff or users to have ready access to the data or even the application that process the data. In the current environment, the data or applications are also available from mobile platforms (laptops with Wi-Fi or cell/mobile cards, smart phones, and tablets).

Cloud Computing Guide

Audit Concerns

When an organization chooses to utilize cloud computing, they need to be aware of risks that they may face with the service provider, the risk they face if they are unable to effectively oversee the service provider, and other risks related to management and security weaknesses in the service providers approach. As an auditor you will need to understand what the agency has done to mitigate the risks with cloud computing. When we as auditors are asked to appraise whether an entity or organization getting the benefits of cloud computing are managing the vendor to ensure that they get the required services we need to be aware of the risks that they may face.

Cloud Computing Guide

- Risk Areas
  - Service Provider Risks
  - Technical Risks
  - External (Overseas) Risks
  - Management/Oversight Risks
  - Security / Connectivity / Privacy Risks

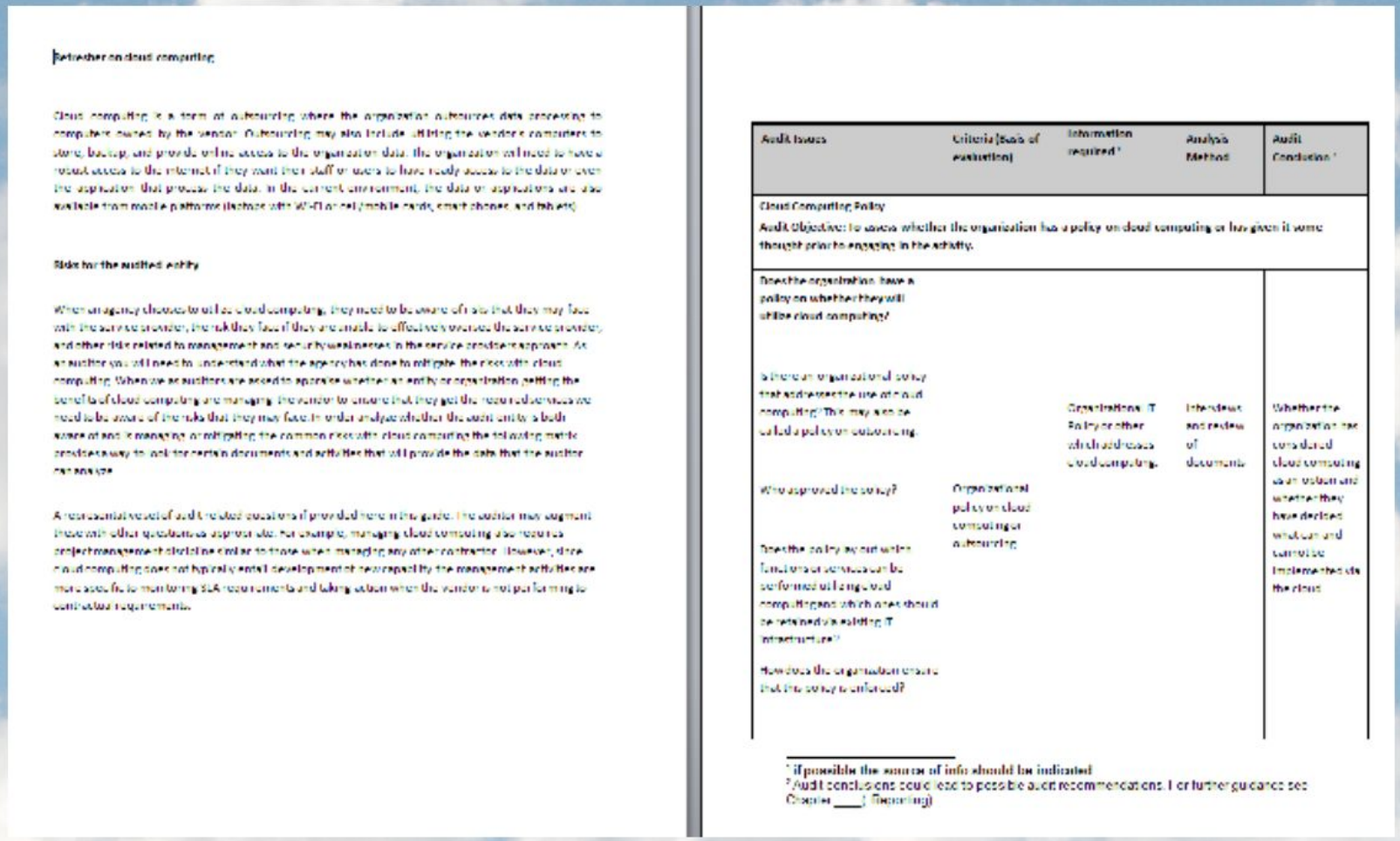
These were discussed at the last meeting along with some mitigation strategies that the IT organization could use

The IT auditor would use those as a road map to frame audit questions

Cloud Computing Handbook

- The handbook provides the IT Auditor with some audit related questions that begin to explore whether the organization is managing the risks and the vendor

Cloud Computing Handbook



Refresher on cloud computing

Cloud computing is a form of outsourcing where the organization outsources data processing to computers owned by the vendor. Outsourcing may also include utilizing the vendor's computers to store, backup, and provide online access to the organization data. The organization will need to have reliable access to the internet if they want their staff or users to have ready access to the data or even the applications that process the data. In the current environment, the data or applications are also available from mobile platforms (devices with Wi-Fi or cell/mobile cards, smart phones, and tablets).

Risks for the audited entity

When an agency chooses to utilize cloud computing, they need to be aware of risks that they may face with the service provider, the risk they face if they are unable to effectively oversee the service provider, and other risks related to management and security weaknesses in the service provider's processes. As an auditor you will need to understand what the agency has done to mitigate the risks with cloud computing. When we as auditors are needing to assess whether an entity or organization getting the benefits of cloud computing are managing the vendor to ensure that they get the required services we need to be aware of the risks that they may face in order and assess whether the audit entity is both aware of and is managing or mitigating the common risks with cloud computing the following matrix considers a way to ask the certain documents and activities that will provide the risks that the auditor can analyze.

A more comprehensive set of audit related questions is provided here in this guide. The auditor may augment these with other questions as appropriate. For example, managing cloud computing also requires project management activities similar to those when managing any other outsourcing. However, since cloud computing does not typically entail development of new capability the management activities are more specific to monitoring SLA requirements and taking action when the vendor is not performing to contractual requirements.

Audit Issues	Criteria (basis of evaluation)	Information required *	Analysis Method	Audit Conclusion *
Cloud Computing Policy Audit Objective: To assess whether the organization has a policy on cloud computing or has given it some thought prior to engaging in the activity.				
Does the organization have a policy on whether they will utilize cloud computing? Is there an organizational policy that addresses the use of cloud computing? (This may also be called a policy on outsourcing. Who approved the policy? Does the policy set out which functions or services can be performed at a cloud computing and which ones should be retained in existing IT infrastructure? How does the organization ensure that the policy is enforced?	Organizational policy on cloud computing or outsourcing	Organizational IT Policy or other which addresses Cloud computing.	Interviews and review of documents	Whether the organization has considered cloud computing as an option and whether they have decided what can and cannot be implemented via the cloud

* If possible the source of info should be indicated
* Audit conclusions could lead to possible audit recommendations. For further guidance see Chapter ____ (Reporting)

Cloud Computing Handbook

Audit Issues	Criteria (Basis of evaluation)	Information required [1]	Analysis Method	Audit Conclusion [2]
Cloud Computing Policy **Audit Objective: To assess whether the organization has a policy on cloud computing or has given it some thought prior to engaging in the activity.**				
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Cloud Computing Handbook

Security **Audit Objective: To assess whether the agency is periodically monitoring the vendor to ensure that security requirements are being met.**				
What are your security requirements and how are you ensuring that the CSP is meeting them? What security standards are you requiring that the CSP follow? What portions of your data requires encryption? Who is responsible for this encryption?	Security requirements , CSP Infomartion security management policy and procedures Agency adopted security standards.			Whether the agency has thought about security controls and standards and has required the CSP to follow the same.

Next Steps

- As and when members conduct IT Audits that involve Cloud Computing we would like to receive your audit questions so we may update the guide
- Members may contact the Chair or SAI USA for additional information