Overview

We have seen so far how workload and workload characteristics influence our choice of cloud deployment and service delivery models.

In this chapter, we are going to discuss in detail the workloads that are most suitable for cloud environments. The chapter will cover workloads that are not appropriate for cloud.

A workload may be characterized by using the following parameters

- Mission Criticality
- Data and Transaction Security Requirements
- Availability Requirements
- Compliance and Audit

The above list is far from complete. Other considerations may impact our choice of cloud architecture for a particular workload. But for most purposes, these factors significantly influence and monopolize the overall decision.

The decision to fit a particular workload on cloud must take two factors into consideration.

- The environment to which the workload belongs;
- Delivery model that is most suitable for the workload

The environment for workload determines the deployment model of the target cloud – public, private or hybrid. In this next section, we'll look at the characteristics of the workload and the suitable Cloud model for the purpose.

Workloads most suitable for Clouds

Development and Test Workloads
An organization going in for a cloud transformation initiative typically chooses to begin the transition with Development and Test workloads. There are multiple reasons for this.

- The development-test workloads are less critical and have less stringent response requirements.
- The users for development-test workloads are internal users – specifically the development and test team. These teams double up as test users for the Dev-Test Cloud.
- All problems with the initial setup and configuration of Cloud are internally reported and resolved with minimal impact to the business.
- Development-Test environments also allow for regression testing of the cloud setup. The cloud setup under test can be tested against varying, tailor-made workloads. This is not possible for production systems.

These non-production workloads can be placed preferably on public clouds, however the private cloud solution is preferred in certain cases.

If the customer had been running a workload on in-house IT infrastructure, the IT organization may want to use a private cloud setup for the development test. This allows for more control on the design of the Cloud solution. However, over time the customer will choose to move the Dev-Test workload to public cloud, to accommodate the increasing production workload requirements.

For a new company with no existing in-house hardware setup, a public cloud is the best solution for hosting initial development and test workload. Public clouds avoid the initial capital issues involved in setting up the infrastructure.

Production Workloads

Temporary Workloads
Temporary non-production workloads are preferably placed on a public cloud. Temporary workloads requires hardware infrastructure for a short duration of time. A customer may not want to spend on hardware for this kind of workload. A good option in this case, would be to subscribe to a public cloud service, use the hardware for the period of subscription. On completion, the customer will not have any excess hardware in the datacenter that is not being used.

Some examples of temporary workload are:

Workload I

Requirement of additional capacity to meet the compute needs of Olympics or a World Cup-Cricket. These are events that occur once in four years. A news agency may require additional servers during the World Cup but will not have any use for them after the games are over. This is a classic case of temporary workloads.

Workload II

National Population Survey is done once in a decade. During the survey, additional compute capacity is required for data entry and processing of survey data. Once the survey is over, the compute capacity will no longer be required. So, instead of purchasing additional hardware to meet the temporary demand, a government may choose to hire compute servers on public cloud for the duration of the survey.

Mission-Critical Production Workloads

The criticality of a workload can be judged by the impact it has on the business. An organization may suffer huge losses and may suffer irreversible damage to its brand reputation, if a critical workload fails to perform or suffer from loss of data.

A mission critical workload has requirements that are a superset of all the other requirements put together – Reliability, Availability and Security (RAS).

Typically, the most critical workloads are not more than 20% of the entire workload put together.

Disaster Recovery and Backup Workloads are important part of the critical production workloads.

Private Clouds are best suited to run mission-critical production workloads. This private cloud may be on or off-premise, internally or externally managed. However, the organization that owns the workload has complete control on the private cloud.

Private Cloud provide the following advantages to mission critical workloads

- Private Cloud can be custom-built to suit the workload requirements
- Advanced features – high availability, disaster tolerance and backup recovery can be custom built into a private cloud
- Easy to comply with existing compliance laws – PCI, HIPAA etc.
- Robust Data and Transaction Security since the cloud is built in-house.

Some examples of mission critical production workloads are:

WORKLOAD I

A stock exchange enables trading of stocks through a trading platform that is accessible to millions of traders. To ensure smooth operation of a stock exchange that is handling billions of transactions per second, the trading application workload must be placed on reliable, secure and highly available servers. This is only possible if the stock exchange has a complete control over the stock exchange servers or the cloud hosting these servers. A public cloud would not be able to meet the SLA, Security and Compliance requirements of this workload.

WORKLOAD II

An ecommerce website that accepts credit cards as a payment option. The ecommerce servers must comply with PCI (Payment Card Industry) compliance to be able to transact using credit cards or to store credit card data. This is one of the best use cases for Private Cloud.

Mixed Workloads

Consider an organization has a mixed workload of production and non-production servers.

The non-production workload primarily comprises of development-test servers.

The customer would want to place a part of workload on the private cloud for compliance, security and criticality reasons and a part of the workload on the public cloud.

The customer wants to have an option of moving the workload between the private and public cloud based on load. For example, the customer may want to move the non-production workload back to the private cloud from public cloud, to save on the subscription costs.

This aspect of flexibility is provided by a Hybrid Cloud. A Hybrid Cloud has the best of both the worlds. Let’s take an example of a production only workload that is most suitable for a hybrid cloud.

WORKLOAD

Consider an organization that maintains an email collaboration server to provide emails services to employees, contractors, channel partners etc. A use-case for

Hybrid Cloud would be to use the private cloud to maintain mailbox for employees for security reasons. The mailbox for contractors and channel partners can go on the public cloud. However, to balance the workload or for security or any other reason, if the customer wishes to move all the mailboxes back to private cloud, the hybrid cloud provides an automated mechanism to achieve the migration.

A hybrid cloud uses an external service provider for the public portion of the cloud. Before an organization sets up a hybrid cloud, the SLAs for availability must be discussed with the public cloud service cloud vendor to ensure a good integration and higher availability for services hosted on hybrid cloud.

Industry specific cloud workloads

Examples

Ecommerce
Ecommerce companies generally use credit card to process payments. An important part of building a payment infrastructure is compliance to PCI (Payment Card Industry) standards. A Private Cloud solution serves best for ecommerce since it makes it easy to comply with PCI standards.

Healthcare
Healthcare industry has similar compliance regulations that must be adhered to by the companies in building a IT infrastructure. For example, HIPPA.

A Private Cloud solution serves best for healthcare domain.

Education Sector
Sharing is an important part of education sector. Information clouds are built to distribute information and create information in collaboration. Security is a lesser concern in the education sector.

Public Cloud is most suited to host education service applications. The education sector primarily uses LMS (Learning Management Systems) that may be provided in PaaS mode to users. For example: Moodle.

Workloads not suitable for Clouds

Public Cloud
Specific workloads those are not suitable for Public Cloud

- Regulated Industry workloads adhering to PCI, HIPPA compliance regulations are not suitable for Public Clouds. These are best suited for Private Clouds.
- Workloads that require high security and which cannot rely on third party providers irrespective of their SLA. Public Clouds may retain customer data over a period of time after end of subscription. There's no way to ensure that the data is deleted by the public cloud vendor and there's no easy way to audit that. Even though the data is deleted, it may not be completely wiped off the disk.
- Workloads that require custom or stringent implementation of high-availability, disaster tolerance or backup recovery mechanisms are not supported by Public Clouds.
- Workloads that make undue assumptions on the OS or the underlying hardware will not run on Public Clouds. Public Clouds make use of open standards. Hence, all the proprietary or legacy applications are not easy amenable to public clouds.
- Public Clouds do not ensure continuity of data and data retention over a long period of time. These can be enforced to an extent using SLAs; however, cases like the cloud vendor going out of business pose challenges to its enforcement.

Private Cloud
Specific workloads those are not suitable for Private Cloud

- Legacy workloads that may not be very well supported on Private Clouds. However, in most cases, it is possible to accommodate legacy workloads by running these in emulated mode over newer hardware.
- Small workloads that does not justify a full implementation of a Private Cloud. Building a Private Cloud requires a significant CapEX, which goes into purchasing hardware, cloud stack licenses and other software. A small workload may not meet the ROI expectations of the organization.
- Geographically distributed datacenters and workloads pose challenges to Private Cloud architecture in its current state.
- A desktop as a service workload (Desktop Virtualization) catering to geographically dispersed users with bandwidth constraints puts heavy dependency on the network bandwidth and network link reliability. This kind of workload may suffer from bad response times.

Summary

This chapter focused on the factors that impact a workload and its suitability to run on particular cloud implementation.

The best way to profile a workload for a cloud type is to classify the application in tiers: Tier-1 to Tier-4. An SLA can be associated with each Tier. If the SLA provided by a cloud service vendor does not meet the SLA required for a Tier, the application has to be hosted on Cloud implementation that meets or exceeds the SLA requirement.

An additional factor that impacts our choice of cloud is the cost-feature tradeoff. Startups are more cost sensitive, hence most likely to go for public cloud. Large organizations with existing datacenters will prefer to host their internal private cloud, as in most cases, the hardware required is already in place.