9. MIGRATION TO THE CLOUD

Migration to the cloud is an easy process and has benefits but at the same time the volume of work is also considerable.

9.1 Benefits of Migrating To the Cloud

Following is the benefits of migrating to the cloud:

- Popular languages, frameworks available and the applications can be written in the modern languages like Python, Java, PHP and Go. Applications can be paired with compute engines to integrate other familiar technologies like Node.js, C++, Scala, Hadoop, MongoDB, Redis and others too.
- A customer can focus on the code and leave the database administration, server configuration, sharing and load balancing to the provider. A customer can test different live versions of the applications. Multi tenancy support lets the customer compartmentalize the application data.
- Multiple storage options are available to the customer. A customer can choose the traditional MYSQL database using cloud SQL or NoSQL database.
- Object storage using cloud storage
- Application engines make a customer more productive by eliminating the need to write boiler plate code. Managed services such as Taskqueues, Memcache and the User’s API which allows a customer to build any applications.
- Familiar development tools like Eclipse. Intellj, Mavin, Jit, Jenkins, Pycharm, etc. allows a customer to test applications locally in a simulated environment and then deploy the application with simple command line tools or a desktop launcher.
- Deployment at Google's scale is possible. One can scale up to 7 billion requests per day and automatically scale down when the requests reduce.

9.2 Challenges to the Cloud Migration

There are a few specialized issues identified with the cloud movements which have been advanced by the School of Computer Science of St. Andrew's University. They are as per the following:
In house IT, faculty are at a danger of getting to be reliant upon the cloud sellers over which the client has no control.

The client association might likewise require more assets to do movement to the cloud and beat the issues that may emerge after cloud relocation, particularly in the territory of satisfactory learning of cloud operations.

The client association's client delegates could take more time to intention client issues as their inquiries may oblige inputs from the cloud administration supplier.

Migrating to the distributed computing could lessen the level of work's fulfillment of the IT staff whose occupation obligation changes for active specialized administration to overseeing outer cloud suppliers just.

The client associations would likewise need to adapt to the better approach for overseeing IT as they would no more have control over the information programming help contracts or the fittings administration.

The open cloud has a multi tenure gimmick due to which it expands the security danger of the database. Deserts or shortcomings in the application of one client association may influence the database of other client associations.

The onus is on the client association to guarantee that the administration sellers meet their administration level necessities. It is the client association that needs to distinguish what is required in the IT framework to incorporate it with the cloud framework. It might likewise need to make a base format to demonstrate the foundation, the applications and the security needed by the client association to the administration supplier.

Dan Kuznesky who is distributed computing analyst expresses that around 451 urban areas are impervious to relocate from the custom IT framework to the Cloud frame.

9.3 Cloud Service Automation Software
Relocation to the cloud obliges particular cloud administration mechanization programming. It is a situated of framework administration apparatuses that are utilized to give and deal with the life cycle of IT administrations amid relocation. It is a robotized administration and is focused around the innovation of HP Company
called Opsware. The apparatuses are a piece of CSA that oversees undertakings like work process, design, provisioning administration and observing.

### 9.4 Cloud System Matrix

It is a composed arrangement of setting up pools of assets and adaptably sending IT benefits in the pools. It abbreviates the time that it takes a client association to convey IT base and complex applications. The HP cloud framework lattice 7.0 environments were propelled in November 2011. It incorporates reintegrated server, system, stockpiling and programming parts. This specific form incorporates the peculiarities of cloud blasting and automation toward oneself provisioning. Judith Hurwitz an industry investigator portrays the relocation prepare as 'a linchpin of HP techniques.'

It is a bound together figuring framework that consolidates virtual and physical server razor sharp edges. A focal reassure is utilized to deal with asset's pools, physical and virtual servers and system network. The motor of the cloud framework lattice is the Matrix Operating Environment that oversees screens and procurement servers for physical and virtual assets. The Matrix OE additionally does system administration. It is a base cloud overseeing framework that empowers clients to procurement and alters complex foundations as per business request.

### 9.5 Cloud Start

It is a made plan out of setting up pools of benefits and adaptably sending IT advantages in the pools. It contracts the time that it takes a customer relationship to pass on IT base and complex applications.

The HP cloud skeleton grid 7.0 cloud environments was moved in November 2011. It consolidates reintegrated server, framework, stockpiling and programming parts. This particular structure consolidates the quirks of cloud impacting and robotization to oneself provisioning.

Judith Hurwitz an industry examiner depicts the movement plan as 'a linchpin of HP procedures. It is a bound together figuring skeleton that unites virtual and physical server well sharpened sharp edges. A central console is used to manage resource's pools, physical and virtual servers and framework system.

The engine of the cloud system cross section is the Matrix Operating Environment that manages screens and acquisition servers for physical and virtual resources. The
Matrix OE furthermore does framework organization. It is a base cloud regulating schema that enables customers to acquisition and modifies complex establishments according to business demand.

9.6 Cloud Orchestration
Cloud movement brings with it the need of synchronizing, organizing the payment of use, administrations and procurements among various servers furthermore frequently in numerous databases. It is the coordination of distinctive cloud components to guarantee frameworks and application administration, mix, help, charging, provisioning, contract administration and administration level contract administration.

9.7 Systems That Can Be Migrated In Cloud Migration
At its core, the cloud is a scalable architecture that permits data to access from anywhere with an Internet connection. A user must understand that the cloud and the migration to the cloud is just another IT resource. The motivation to migrate is normally due to the breakdowns in the traditional infrastructure or the delays. This makes an organization want to collaborate more efficiently with a partner on documents or on new business requirements.

The easiest systems to migrate to the cloud are:

- **Websites:** At this point, most organizations have made decisions to put the website on a server who is not the office server for obvious reasons that do not need an explanation. There is no comparison to the cloud web host where reliability and performance are concerned.

  Those with a significant web presence integrated web hosting from Convio, Salesforce and Google provide scalability and integration that an organization's internal IT infrastructure is not capable of providing.

- **Emails:** Moving beyond the external interface, email is an excellent application to be moved to the cloud environment. There are plenty of tools to move emails in and out of systems so the migration of emails to the cloud is quick, clean and rapid. The cloud also provides efficiency and continuity because of the strong backup systems. Most cloud email systems provided 99.999% uptime guarantee.
• **Test Environments:** Organizations have a critical need in their businesses to build test environments. When the requirements are heavy, the organizations make the transition to the cloud environment, and so the Amazon cloud seems to have been popular for this transition. It allows the user organization to prebuild the applications and the appliances. Besides, it is cost-effective as the user organization only pays for what they use.

• **Constituent Relationship Management (CRM):** There are great benefits to move the CRM services to the cloud. The improvements in the systems these days allow the end user great versatile experience without actually installing any software. It must be noted that migrating to a new CRM system is not easy, and it is a complex process. These systems contain vital information of the organization's assets and net worth as well as net value and moving them to a new system of CRM is a costly affair. While evaluating the migration process, it is important to:
  - Take a year look at costs associated with software purchase and maintenance.
  - Then add the indirect costs like Internet upgrades, backup and data retention services, add on applications, training and staffing. CRM migration can change the way organization functions so it is important that careful planning, strategy and the ownership is clearly defined.

• **Files /Collaborations:** Files are an easy asset to migrate to the clouds. There are no complex requirements. There are solutions like Box, Office 365, and Google Drive, etc. For larger companies the impediments come at the time of synchronizing the data or applying and updating security permissions.

Large investments are required to run equally large applications that involve thousands of users. However, this is a onetime cost as thereafter it is a pay as you use a system. A user organizations need to be careful and understand not only the costs involved but also those that come as additional.

The other issue that needs to be taken care of and is of concern is what happens to the equipment after the application has been migrated to the cloud, particularly when there could be other applications sharing the cloud processing power, shared disc resources and expensive data licenses.
In large organizations when one application is migrated, there could be a necessity for other applications to be migrated to the cloud to complement the first application migration which the licenses all of them, or some of them would have to be handed over to the service provider.

There is also a possibility that the service provider could use an individual client organization’s license for purposes other than that of the client organization. It also means that a client organization may land having to pay twice if there are multiple applications that have been hosted by different service vendors on the same platform.

Most of the big systems do not work alone, and additional applications are needed from different vendors to import data and enhance reports.

Due to the low traffic at night and the low intensity of watched security, most of the data transfers take place at night, which means that the service provider has to be on call to provide maintenance.

Also, there may be several suppliers who are involved in the running of and the support of an application suite. It is important to check whether the suppliers have the necessary access as per the service contracts.

In cloud migration, most employees are covered under the Transfer of Undertaking's regulations in most countries. This could also have a negative impact for employers if technical staff cannot be re-deployed elsewhere in the organization.

As with any other connectivity that is delivered remotely a client organization must ensure that the work cost, and the service costs are incorporated in the regular charges so that it enables a client organization to actually land up paying interest-free EMI’s for that particular service and not separately.

In the process of migration to the cloud, there is every possibility that the provider will use IPSec’s VPN across the Internet to provide connectivity. So it is important to recheck that the client organization’s the Internet is resilient and the links, proxy and firewalls are also resilient.

It is a fact that cloud services after migration can provide value added and enhanced services to client organizations, but one must clearly understand the implications of such services also.
Any migration appraisal should be treated as an individual and independent project.

SaaS migration on a large scale should be a conscious business decision on behalf of the client organization based not just on technical merits but taking into account the possible pitfalls and can affect the business of the client organization.

In comparison, the PaaS platform is more compatible for organizations to move data to the cloud.

9.8 Migration Services
There are two migration options given below:

- **Complimentary Migrations**

  Simple like migrations can be performed of an organization’s dedicated virtual cloud environments to the Rackspace public cloud or managed virtualization with zero or little downtime.

- **Professional Services Migration**

  For complex or dedicated set ups, the team of the service provider works in tandem with an organization to assess the needs and to provide a smooth and fluid migration.

9.9 Migration Methodology
In the event that, where the capacities of business of a customer association oblige a discriminating application, the point is to make the applications open through different channels. The applications are rerouted to run in an environment that is similar to a server to permit access to multi customers for multi channels.

Legacy applications that are sent on IBM centralized computers are rerouted to run on open and conveyed stages utilizing programming than can reproduce an IBM centralized server environment or that can successfully give the same capacities all alone. The illustration for such an occurrence is Oracle Tuxedo.

Which movement alternative is to pick depend totally on the business prerequisites of a customer association furthermore the demands under which the customer association capacities?
The most straightforward and the easiest errand is that the web administration empowering an application so it can interface with different applications in the web. These administrations, in any case, must be changed with web administration abilities by utilizing either outsider arrangements or local peculiarities. Applications written in Visual essential or PowerBuilder can be altered to communicate with different applications likewise. Everything projects need not be changed. Just that that is reusable business administrations needs to be recognized and changed with web administration capacities. Relocation alternatives, for example, database stage relocations and a re-plat structuring applications created on legacy stages are mainstream on the grounds that they are simpler to utilize and understand the profits of movement rapidly. Then again, relocation application that needs a complete rebuilding design of an application is more averse to be chosen in view of the expense and time included in actualizing these undertakings. New advances have risen that can give application straightforwardness. It permits the catch of database calls issued by an application and afterward made an interpretation of on the fly to execute them against the target database. The point of this methodology is to altogether decrease the application changes that happen amid relocation. These innovations need to be further tried, and the precision of SQL explanations checked before conveying them in discriminating mission-related organizations.

9.10 Analysis and Design
The investigation and outline stage comprises chiefly deciding the execution of the target database. Due to the distinctions in the database, it is critical to create and arrange that powers the suitable peculiarities and useful in the Oracle database. Mind must be taken that the application picked peculiarities don't bring about a change in the application code or an abatement in information quality because of truncation if database components, for example, milliseconds and digits. Amid this stage, the needs that need to be tended to are:

- **Database plan format:** It is paramount to see how to guide the database of the source database. Information bases vary in how the plans are composed, and the design is essential. A portion of the databases are perfect while the other would not be good. In such cases, plainly the greater part of the databases doesn’t cooperate easily
with the Oracle guidelines and there are contrasts, which may come up amid the relocation process unless the system is stringently emulated.

• **Database item naming traditions:** Three noteworthy issues ordinarily come up in such traditions amid database relocation to an Oracle database article naming traditions.

• **Use of held words:** Reserved words have an exceptionally adaptable and indistinct nature. Databases contrast in what they term as saved words, and every one's variety is not the same as the other. Amid relocation, it is conceivable that some database segments and tables may run into confinements in the target database.

• **Object name length confinements:** Microsoft SQL server and some other information bases permit the name length to climb to a 128 characters long however once more, the main special case of criticalness is Oracle, which does not allow this either.

• **Use of uncommon characters in the item name:** This is regularly not permitted in a database despite the fact that Oracle does not permit. It is not an issue with some other databases.

• **Data sort mapping:** All information bases help a mixture of information sorts to handle numeric, character, substantial protest, and XML and time stamp information. These information sorts that are accessible are regularly the standard sorts; however they vary regarding points of confinement on information length and accuracy permitted.

• **Lack of a BIT information sort:** It is paramount to realize that Oracle does not help the Boolean sort or BIT information sort. Along these lines, while moving to Oracle these information sorts must be changed over to a solitary digit numeric or a solitary character information sort.

• **Lack of exclusive information sorts:** Some databases permit the making of exceptional sections in tables that the database redesigns as and when a record in the table has been gotten to.

• **Locking conduct:** Most social databases oblige a brief securing of lines tables when a client gets to the columns as an issue of database inquiries. Because of this
conducted, the framework might briefly experience these locking courses of action because of substantial burden.

- **Use of Commit/rollback in triggers:** Oracle does not permit the utilization of commit or rollbacks in information bases, however some information bases like Sybase permit incomplete control of the SQL proclamations that are likewise executed in a trigger.

- **Use of zero length strings:** Most databases backing the idea of zero length strings that are the line of limitlessness communicated and boundless. Prophet, then again, does not help these and one needs to be cautious where it can be utilized and where it can't. The length of the string is not invalid as it might be an obscure yet zero is still a digit with a worth.

A customer association must know and be mindful of what is in the database before picking the appraisal of cloud movement. The administration suppliers must give the fitting model of relocation to suit the business usefulness of the customer association. For huge association, it is extravagant associations and in addition a complex one. So a wrong evaluation of the sort of model would prompt entanglements that would have included expenses to redress with the right arrangement.

For huge scale relocations, it is critical to give the veritable and right business sagacity to have the capacity to discover the right model of utilization. Around there, most customer associations are unwilling to uncover the full business knowledge of the association and want to take the danger of needing to correct an application than to give full business insights to the administration supplier.

The safety from the business stance is reasonable in light of the fact that the association must have the capacity to land at a choice in the matter of whether the administration supplier can be trusted with the center touchy truths and data about the matter of the customer association. This is maybe why there has been safety from 453 urban areas around the globe to relocate to the cloud.

For more modest associations and undertakings, it doesn't make a difference that who are utilizing it for transitory periods of tasks, missions and exploration. Likewise, it doesn't generally make a difference as the PaaS private or PaaS open or PaaS
crossover, and in this manner, the security measure is autonomous of the applications composed by the client association or the client venture.

A couple of different issues that do come up amid cloud movement notwithstanding having tremendous profits that it brings to the table the cloud’s foundation scene, the distributed computing relocation alternative, the product seller's review, the benefit administration capacity of the client association. Once the movement methodology begins there is information standardization amid and after the procedure of cloud relocation. The change of control over database and licenses to the administration supplier are additionally the abilities of the benefit administration co

9.11 International Migration Problems
Large-scale businesses in almost every country have some difficulties in cloud migration. Many countries have designed their own policies to tackle with the problems in cloud migration and other issues.

- **Russian Migration Policy**

The complexities of businesses and trade relationships have made the Russians swing between regulatory restrictions and liberalization of cloud migrations. It is not absolute clear and may say it is still a bit cloudy as to whether the regulatory measures of export or import of data is restricted or not despite the Russia following a liberalized policy.

- **United States of America Migration policy**

There are several challenges that America is going through and which are becoming more and more prominent. Under these circumstances, America is trying to persuade all citizens and corporations as well as business houses to put their database on the cloud, which has its drawbacks. While following a policy of liberalization, it is, in reality, using restrictive procedures that have an impact on the public cloud migration and the private cloud migration.

- **India**

India has taken a conservative view of the cloud migration and is, in effect, following neither a liberalized policy nor a restrictive one in this case. It is a watchful silence
and a cautious approach while giving full independence to cloud computing under watchful eyes.

- **China**

China possibly has to most efficient cloud migration systems as well as cloud control systems and getting past the infrastructure or alert systems is difficult. The rest of the world has not yet fully been able to understand the additional features that China has added to the cloud migration processes, but a conservative view would be that China is following a liberalized policy for cloud migration while restricting the export of its own data.

The purpose of mentioning these four players is that they either makes or breaks the international regulations of cloud migrations internationally. It is literally a case of where one country will try to import the data, and the host country will close the container.

The other is when the host country tries to export the data, and another country puts up a shield against the transfer.

Then come the complexities of regulations and domestic policies of data migration to the cloud, and at the same time it also becomes a case where to avoid detection in one country the data is migrated to a cloud and placed in a de-regularized country.

Compared with the new features that emerge of the cloud migration of data a simple process can be so useful in so many ways that it brings up the questions of legitimacy and illegitimacy in the processes.

It to be remembered that any new changes in the IT sector in any country always bring in stiff resistance, skeptical views, unanswered questions, grey areas left to interpretation and then slowly the processes become defined and clear and the process settles down to become a routine IT process, which will also happen eventually to cloud migration in the foreseeable future.

Having said and researched these far and added viewpoints that have not yet been submitted anywhere or cited anywhere the opportunities of cloud computing and the benefits will finally prove to be an asset to business management.