VIEW POINT

CLOUD TRANSFORMATION - POV ON FACTORY MODEL APPROACH

Abstract

Cloud Transformation is often considered as a foundational element of enterprise Digital Transformation. Cloud Transformation Programs (CTP) encompass transformation of an organization in multiple dimensions of technology, process, applications (products). The acceleration of cloud adoption in an organization is a precursor to a much larger digital transformation agenda of the enterprise to maximize the business value. However, one of the critical and most challenging stages of the cloud transformation journey is the actual migration of existing applications on to cloud. The speed and scale at which legacy applications are migrated to Cloud determines the success of delivering the business value due to Cloud adoption. This PoV attempts to provide an overview of the cloud migration aspect of CTP using a factory model-based approach. The approach encompasses the ways of delivering large scale migrations using appropriate processes, tools, and people structures.

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Objective

This Point of View document intends to:

- Act as a quick reference guide for practitioners involved in large cloud transformation program
- Provide an approach to kick start the engagement with client at various phases of the Cloud Transformation journey
- Explain the factory model approach for scaling up during the execution phase in a multi-cloud environment
- Indented Audience: Program Managers, Architects, Consultants and Project Managers involved in delivery of Enterprise Cloud Transformation programs. Presales and Sales Managers involved in discussion with client at various stages of Cloud journey with the client

Overview

Most of the enterprises embarking on a digital transformation journey consider cloud first as the underlying strategy for cloud adoption. While cloud first approach can ensure every new application is built for cloud, the bigger challenge is to move the existing applications and data to cloud at scale and speed. The benefits of cloud transformation, which is the pre-requisite for the larger digital transformation, can be amplified through accelerated cloud adoption across the organization. The speed and scale at which legacy applications are migrated to Cloud determines the success of delivering the business value due to Cloud adoption. This required an industrialized approach towards cloud migration and hence a cloud factory setup would be a great way to achieve this. This PoV is based on our experience of executing a very large enterprise application landscape migration to multiple cloud targets in a factory model-based approach. Before getting into the details of the working of the factory model, we have explained the Cloud Transformation phases that would provide the background of the phases involved from an end-to-end perspective. The factory setup focuses on the assess and migration execute phases where the scale and speed is paramount, even though it is beneficial to consider a factory approach right from the Initiate phase of the cloud journey.

Our Experience with large scale migration in a factory model

Every organization has a unique approach to perform Cloud Migration. The 'Oil and Gas Major' had a very large IT infrastructure spread globally. Mega Data Centers in Americas, Europe, and multiple regional data centers (~145) like in Germany, Azerbaijan, Turkey, Singapore. While they adopted cloud first strategy for all new applications, they still had more than 3500 applications and Peta bytes of data still spread across various on-premises data centers. Infosys was the key partner to define strategy and was entrusted with the cloud migration program, which helped customer to achieve their 'Cloud First' Goal, two years earlier than the initial target.

The factory-based execution helped Infosys scale up the team while delivering at speed and quality, to achieve the accelerated migration aligned to the change in business priorities. The original target of 100% workload by 2025 was accelerated to 2023. This delivered the business case benefits and ROI realization earlier, helping the Digital Transformation across the enterprise

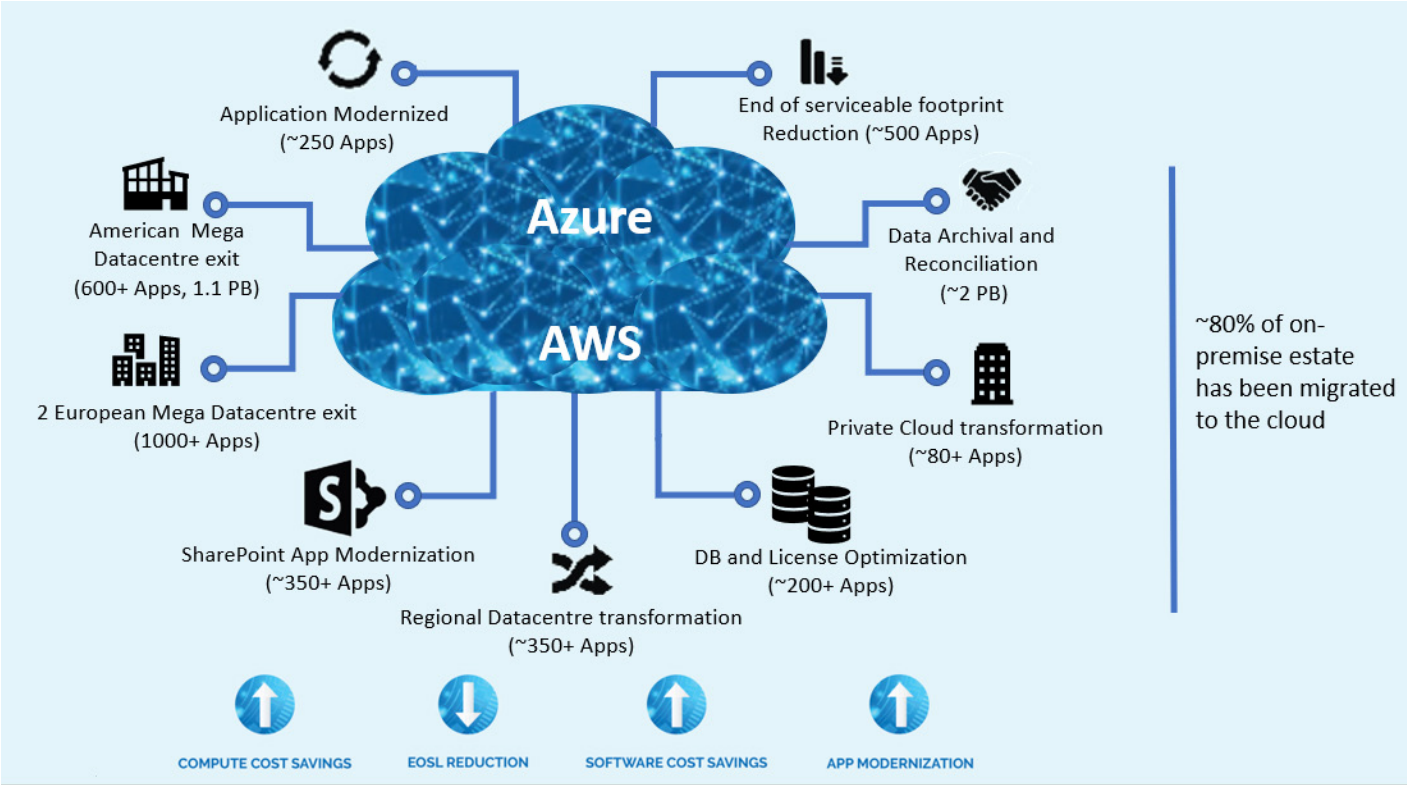


Figure 1: Cloud transformation program for an Energy Major

Outcomes:

- American Mega Data Centre closed, 600+ applications migrated
- European Mega Data Centers exit on track for closure by 2022, 1000+ applications migrated
- Data Migration, Reconciliation and archival (Petabytes of data moved to cloud)
- More than 1000 applications modernized and transformed
- 4000 servers decommissioned across data centers
- ~1800 applications migrated in 2 years through the factory with a throughput improvement of 5 times compared to period before the factory model was setup.
- Accelerated Migrations helped client to save ~40 M USD on Data Centre costs

Cloud Transformation Phases

A successful cloud adoption in any enterprise is greatly dependent on how well it is planned. Five phased approach is normally followed in large scale cloud transformation programs. The first phase involves defining the overall strategy and vision for the cloud transformation program. This includes business case development, defining cloud adoption strategy and cloud platform governance. This is followed by Initiate phase which involves setting up the internal team for driving the cloud transformation, identifying Cloud Service Providers and Migration Partners. This phase will also identify the pilot phase migrations and conducting PoCs for validation. The next phase is Assess which will do deep dive analysis of the application landscape and decide on the disposition. Assess phase is followed by Migrate which is actual execution of application remediation and cutover to cloud, based on disposition strategy. Operate will be the final phase where applications are moved to steady state operations with BAU team.

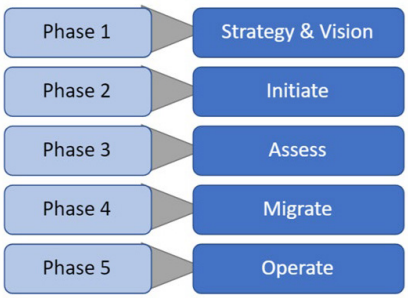


Figure 2: Phases of cloud transformation

The high-level activities carried out in each of the phase is described below before explaining the details of factory model.

Phase 1: Cloud Adoption Strategy and Vision

Cloud adoption, just like any other enterprise initiative, is mainly driven by cost. It is essential to understand the business impact, cost benefit and associated risks before deciding the cloud journey. It is also important to decide the cloud service provider(s) and migration partner(s) as part of the strategy.

While cost is an important driver, it is also important to approach this phase with the larger benefits in perspective beyond costs and consider this as an opportunity to also transform the technology, process, and business landscape. The overall process of this phase is depicted in the diagram below.

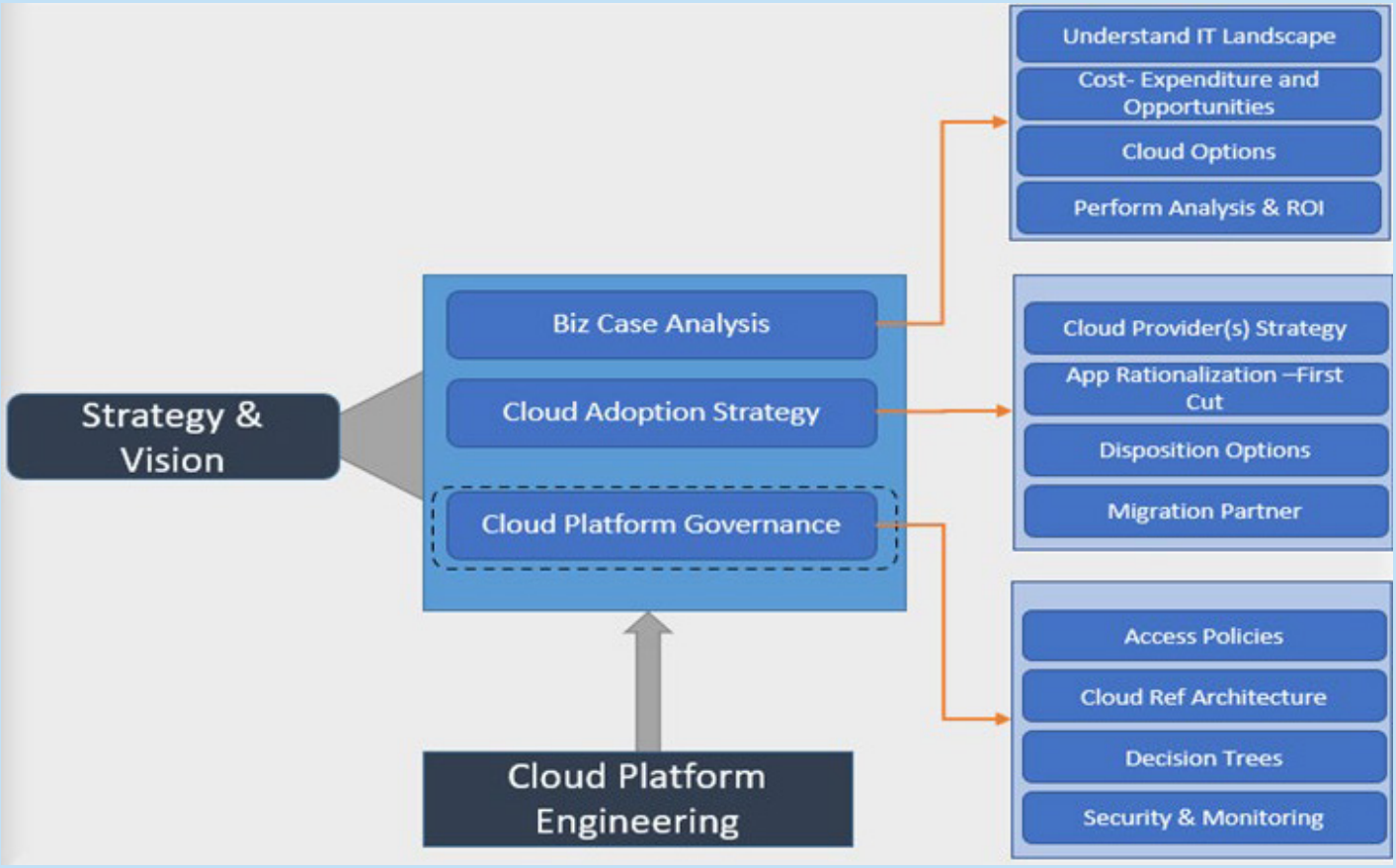


Figure 3: Cloud adoption strategy and vision

1. Business Case Analysis

Cloud migration in an adhoc manner will most likely result in a much more complex IT landscape. Hence it is vital to carry out the viability of cloud adoption. A business case analysis should be one of the imperatives of cloud migration.

The following are the aspects covered under this stage

- **Analyze Existing IT landscape –** Understand the existing IT landscape would involve using CMDB, Software Asset Management (SAM) and other systems in the enterprise. It is very important to have the larger picture and 'birds eye view' of the IT landscape to understand the complexity, interdependency, and redundancy.
- **Cost benefits -** Cost is one of the main factors influencing the feasibility. These costs components, typically fall into the following categories:
- **Operational Expenditure (Opex):** What will be net savings on Opex while adopting cloud and the TCO in cloud. This should factor the migration cost as well.
- **License Cost:** Are there any savings on license?
- **Time to Market:** What are the savings through automation?
- **Cloud Options -** Identify potential cloud service providers or any other alternatives

After you gather the above information, a business case analysis needs to be performed.

2. Cloud Adoption Strategy

The cloud adoption decision is followed by the cloud adoption strategy. Typically, this goes hand in hand with the 'biz case analyses. The main aspects are whether to have a

- A single cloud adoption or Poly cloud adoption
- Organizational strategy for choosing the cloud, in case of poly cloud
- Overall Migration strategy and plan – Data Center exits vs Migration approach (Lift and shift vs Transformation)

Next step is to create a first cut rationalized application mapping

- Identify the business-critical applications
- Identify core business systems which needs connectivity with on-premises
- Identify cloud disposition options – PaaS, SaaS, IaaS, Hybrid cloud etc.
- Identify potential prototype candidates

Depending upon the maturity of the enterprise cloud capability the following are some of the must have items before the cloud adoption journey can be embarked upon.

- Cloud Platform -Setup as per the enterprise standards (digital security, network connectivity, and scale)
- Cloud Engineering principles and Architectural Reference models

3. Cloud Platform governance

Typically, the cloud platform setup and cloud migration have some overlaps as far as we have seen in some of the large enterprise adoption. It may take a while to define and implement the entire realm of services that cloud offers. For e.g., Application services, database services, big data service, Analytics, and machine learning.

One of the ways is to start looking into the entire application landscape andsee what areas large volume have" to "prioritize the services that has large consumption, for e.g., in majority of the cases it will be application services and database. Hence start building the cloud platform and standards around this before building the other services.

Once, the cloud platform is ready with relevant engineering architectural principles the applications can be migrated to cloud. We don't have to wait for the entire platform to be set up for starting the migration process, some of the activities like rationalizing the list of applications to be migrated and license requirements for the databases etc. can be run in parallel.

Phase 2: Initiate

In the initiate phase, the first step is translating the vision to tangible outcomes. This is the most challenging phase to make progress. This is primarily due to the various levels of maturity of the processes in the organization and the impact it would have on the current state.

- Collate the list of applications from the enterprise cmdb
- Identify and prioritize the portfolio in a way to realize the most value of migration rapidly
- Validate the list with business and other enterprise stakeholders and should not be purely IT driven exercise
- Finalize the initial cut of the application with 'migrate' or 'decommission'

The below steps help to finalize the overall migration approach – partners, disposition, and timelines

- Conduct Workshops with Vendors and CSPs on migration approach
- Brainstorm on delivery model – Kanban/ Scrum
- Appraise/Build supporting functions team – like network, database, etc
- Conducting migration pilots for smaller set of applications

One of the outcomes of the initiate phase will be identifying the need for running the Execute phase in a factory model. The decision to setup a factory and the planning for the same should be considered during this phase and would influence the future phases.

Other outcomes of this phase would be:

- Decision on the cloud platform architecture
- Finalization of various workstreams (eg: End of Service Life (EOSL) priority, license rationalizations, cyber security)
- Future application migration wave plans based on portfolio priority and quick wins
- Decision matrix on the cloud disposition (Cloud First Vs Transformation first)

Phase 3: Assess

After the initiate phase firms up the enterprise cloud migration approach, we will need to perform a detailed assessment phase at an individual application level.

This is the phase at which the migration Factory Model is introduced. Primarily assessment phase involves understanding As Is Architecture & dependencies, POCs & Prototypes for validation and come up with Migration Plan & Cost estimates. Various factory elements like Purposeful Squads, Tools & Accelerators, Technical Design Authority are applicable here.

High level activities performed in each of these steps are explained below:

1. As-is Architecture & Dependencies

- Assess application architecture and technology stack
- Understand allocated sizing and utilization of existing infrastructure
- Identify the target state compute, storage, and network requirements
- Identify technical risks and potential mitigations
- GDPR or any other security compliance to be considered
- Create application target sate architecture and design

Assessment should not only consider technical aspects but also business, organization, security, and compliance. This is to finalize the migration strategy which is termed as Disposition framework. The

disposition strategy is cloud agnostic and below is the 6R strategy which is widely used

- Rehosting
- Replatform
- Repurchase
- Refactor
- Retire
- Retain

2. Prototype and PoC

At this stage it is important to evaluate the application transformation opportunities and confirm the application readiness for transformation. Any relevant PoCs required at application level needs to be perform that will help the finalization of the target architecture

3. Plan Cost and Estimations

Migration plan is greatly dependent on the Organization strategy on various factors – DC exit, EOSL remediations, Digital Security aspects etc. Cost of migration is mainly driven by the Architecture patterns which in turn is dependent on defined models which can be applied to most of the applications. This stage will help to plan budget and effort for the overall Programme.

Phase 4: Migrate

The migrate phase is where the actual execution of the migration activity is performed. The factory model applicability is maximum in this phase where the bulk of the migration efforts are consumed. Every application will go through a build, validate and cutover workflow in this phase more like an assembly line in a factory.

1. Build

Build stage includes granular activities to perform the migration of application to cloud. Depending on the disposition framework, activities at high level include Infrastructure provision, database setup, application upgrade /remediation etc.

- The target environment for the application set is configured
- Implement security, firewalls as per defined architecture
- Perform app, dB and dependent components upgrade
- Any dependent component functioning, and interface connectivity is validated
- Digital security validation
- Finalized network connectivity and firewall rules
- App and other components remediated and ready to be validated
- Update architecture document

2. Validate

This phase validates the business readiness of applications being migrated. The validation strategy highly depends on the target architecture, user base, NFRs etc of the application in cloud.

- Conduct testing to make sure the application is functioning as expected.
- Testing strategy needs to be aligned with disposition framework
- Perform end user testing as required
- Other tests include, performance, stress and dependent component testing as required

3. Cutover

Cutover is the transition of live application from On Premise to Cloud. High level activities are:

- User communications
- Data Migration
- Repoint the application from On Premise to Cloud environment

Phase 5: Operate

The final phase of the cloud adoption journey is the steady state operations. However, this is a critical phase that can potentially even influence the transformation agenda and how broad the cloud services are consumed. Hence the operate phase considerations must be accounted for even during the initial phases of the cloud adoption and decision making.

- Transition to OPS team: This is a decision that can influence the OPS team structure and skills. For example, an approach to do lift and shift migration can potentially enable the existing OPS team members to continue to support the applications. Here the application transformation is minimal and the cloud skills upgrade for the team is not difficult. On the other hand, if the application has undergone transformation significantly, it would be an opportunity to reorganize the support team structure as well, since the skill set, and approach required for operations support will be significantly different from the existing team.
- Other aspect of Operations in a cloud environment is the continuous improvement that happens to the cloud services capabilities. This needs to be seen as an opportunity to optimizing the Ops team based on the cloud landscape of application eg: CI/CD, optimize the compute based on usage, vulnerability scans on periodic basis, automated patch updates

Large scale migration through a factory-based approach

The enterprise level cloud migration can be executed in several ways, if the migration process and the steps mentioned in the previous sections are adhered to. However, when the scale is significant, the success of an enterprise scale cloud migration would depend on the scalability, speed of execute, agility and adaptability to the enterprise constraints and opportunities. Large scale can be defined based on the organization's apps portfolio size and complexity of apps in its portfolio. Typically, an application portfolio of more than 100 apps can be considered large scale. This requires a more predictable approach which can consistently produce the outcome of moving workload from on-premises to cloud aligned to the plan. A factory-based approach has been proven model to deliver such large-scale migrations of differing complexity successfully. The factory approach helps in industrialization of the migration activities. Migration factory indeed derives many insights from other industries, be it Kanban methods for throughput improvements or visual dashboards, concept of templates and tools at every stage, forming specialized squads which are purposeful and so on.

What is a factory model?

There are different definitions of factory model that are available in the context of cloud migration. Most of these definitions boils down to the approach of delivering large scale migrations using appropriate process, tools, and people. In the below sections one such approach of building the factory model is explained. Depending on the client context there could be variations to the process, tools and skills required in the factory, however broadly the approach can be adopted for any cloud migrations irrespective of the target cloud or the technology stacks of the underlying workloads.

Why this approach

The enterprise cloud migration strategies as explained earlier can be driven by multiple drivers like cost optimization, modernization, enterprise agility and innovation etc. As you can imagine these drivers are very dynamic in any large organizations, with competing priorities and difficult to define upfront. The scope of migration of workload would evolve over a period which requires scaling of people, processes, and tools in a consistent manner with predictability and speed. The factory model approach provides the framework for the planning and execution of these workload migrations from start to finish.

The typical 3R, 5R strategies most of the cloud migration programs adopt are discrete migration strategies which typically can be no more than place holders for migration dispositions coming out of the cloud architect's top-down planning. The end-to-end migration execution path will be influenced by the organization's IT and Digital security polices, capability, budget allocations, End of service life priorities to name a few. For e.g.: a decision to do lift-and-shift vs re-architecture in a practical migration scenario is not defined by the ideal disposition proposed during top-down planning, but a function of the other priorities mentioned above. This is one of the fundamental reasons why a more holistic approach must be adopted towards workload migration, considering the people and process capabilities in an organization. The factory model approach provides the required structure to manage these dynamicity of application migrations at scale and speed.

While the factory approach is ideal for many large migration programs, this might not be ideal in certain scenarios like:

- number of applications identified for migration is small
- the organization process is not mature or still evolving from the cloud adoption perspective
- too many decision makers with respect to architecture, business priorities etc.

Attributes of a migration factory

The factory model typically has certain attributes which helps us measure the success of the factory delivery. Some of the relevant attributes for the cloud migration factory are ability to scale up and down seamlessly, predictability of delivery, speed or throughput and cost efficiency

Scalability

Ability of the migration factory to scale up and down seamlessly helps the migration outcomes tightly aligned to the business needs. This is important because the migration scope typically evolves continuously due to different business priorities and the factory model should be able to accommodate these variations. The team structure and the tools and methods determine the ability to scale smoothly.

Predictability

Predictability of the outcome of the migration factory is an important attribute since there will be dependencies on various other teams who will be involved in the migration journey. These dependencies often derail the ability to migrate applications on time. The factory model should be able to minimize the impact of these dependencies by providing processes and standards that helps the predictability of migration outcome.

Speed

Speed of migration and transformation is another significant attribute of the migration factory that will realize the value of such programs faster. The factory model should provide the required tools and accelerators which can improve the speed of migrations

Cost efficiency

The scale and speed of the factory should directly translate to cost efficiency which is the most important attribute of such a factory. Often the cloud migrations are considered expensive and takes time to realize the ROI. Hence ability to provide the required transparency of costs and the highly optimized cost of migration is a key success factor for large migration programs.

How to scale up in a factory model

Detailed working of the migration factory can be articulated in the 3 dimensions of people, process, and tools. For the people dimension its all about the required organization structures, people training and up/cross skilling and creating specialized squads. The process and methods dimension encompasses the ways of working within the factory to ensure smooth flow of deliverables, be it project management process, architecture processes or testing/validation processes. The tools and accelerators is the last but the most critical pillar of the factory where the proactive identification and usage of relevant templates, reusables, and other accelerators helps delivering the outcomes in a predictable and accelerated manner.

1. People:

The 1st dimension of the factory model is the people. The factory will have a large team and hence it's important to define a scalable team structure that can plug-in and plug out team members with ease. While there can be multiple model available, we have adopted the squad-based structure depicted below to achieve this objective.

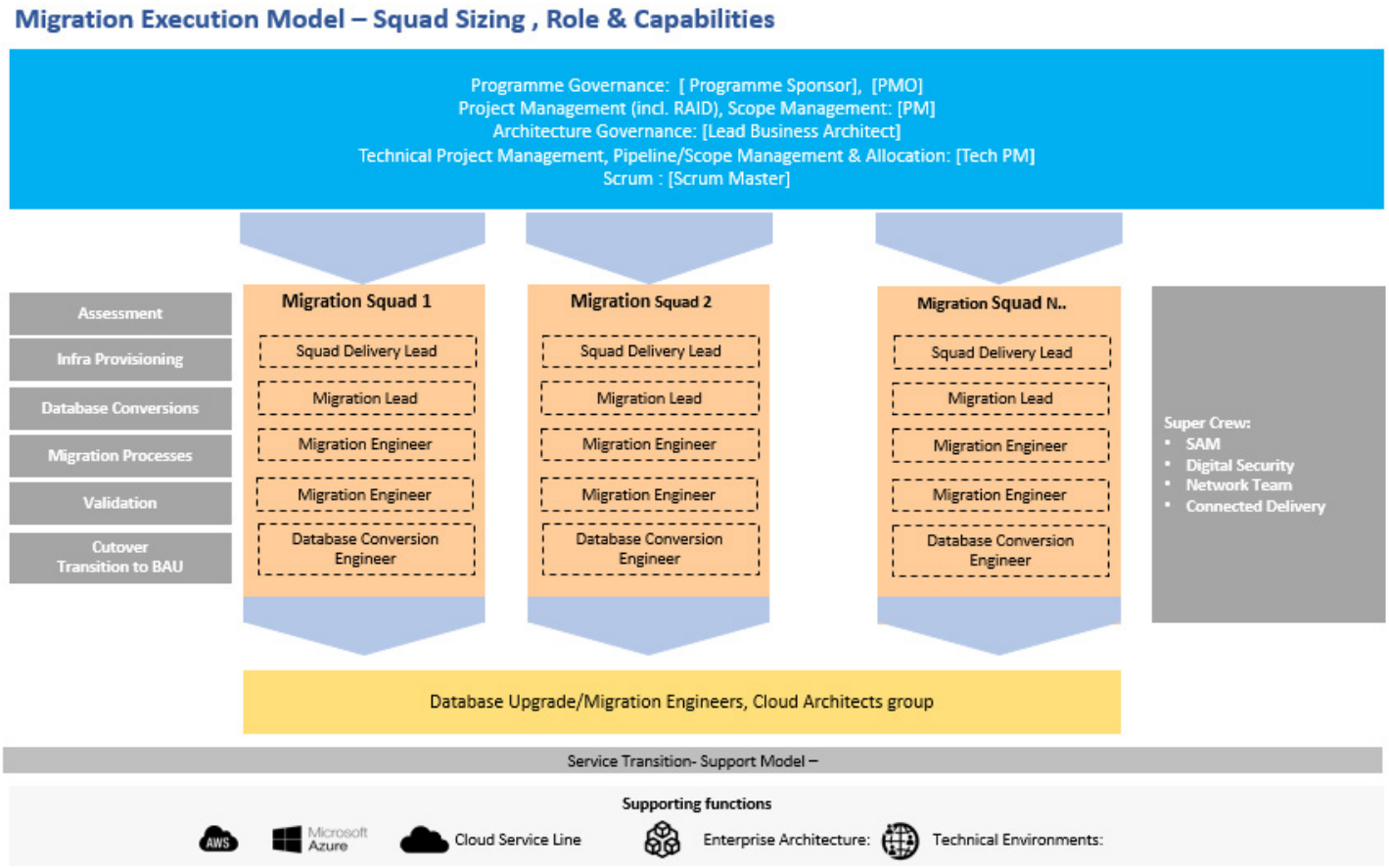
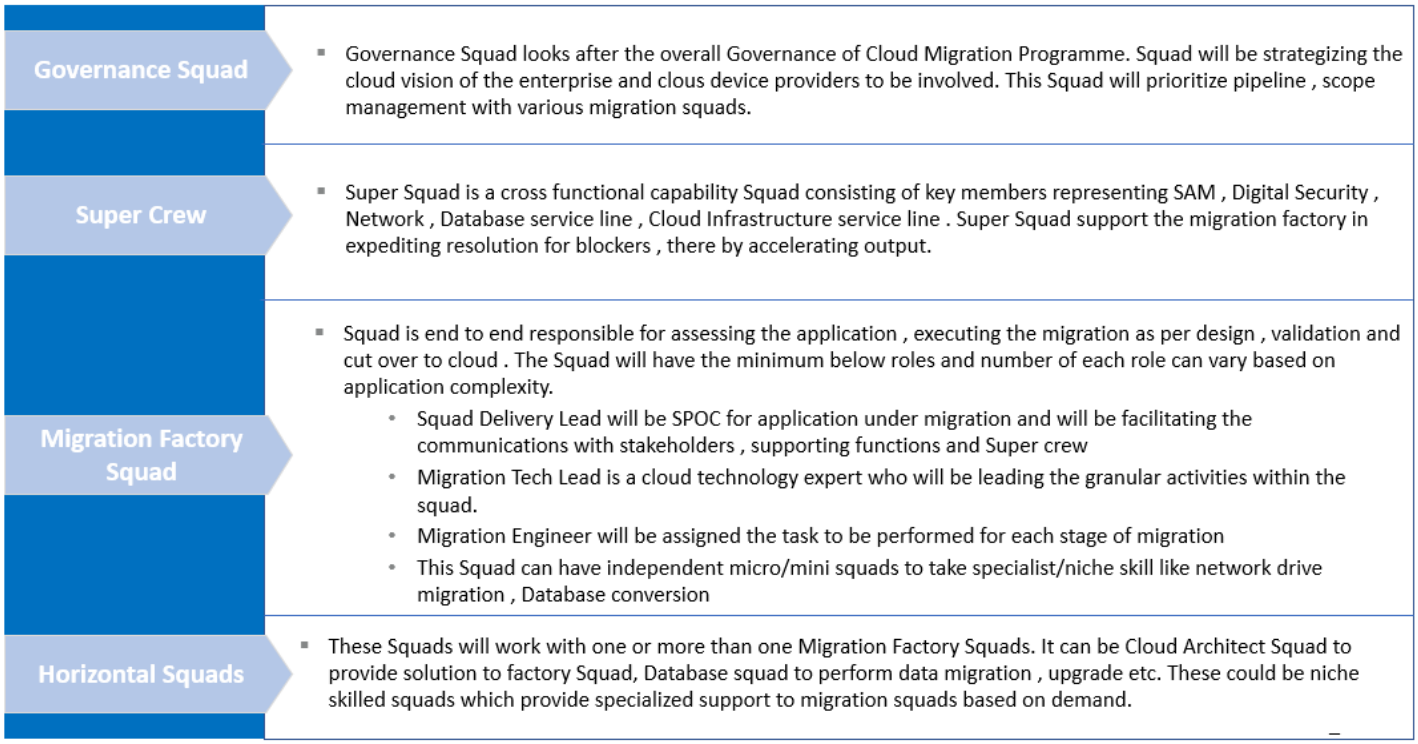


Figure 4: Typical migration squad structure

Purposeful squads: The concept of purposeful squads is driven by formation of squads with specific purpose. The central squad who is responsible for the migration delivery consists of Migration squads, Horizontal capability squads, mini and micro squads. There are other squads who support the migration delivery will be from the supporting functions, however, must be integrated well with the Migration delivery squads. The high-level description and purpose of each squad are explained below.



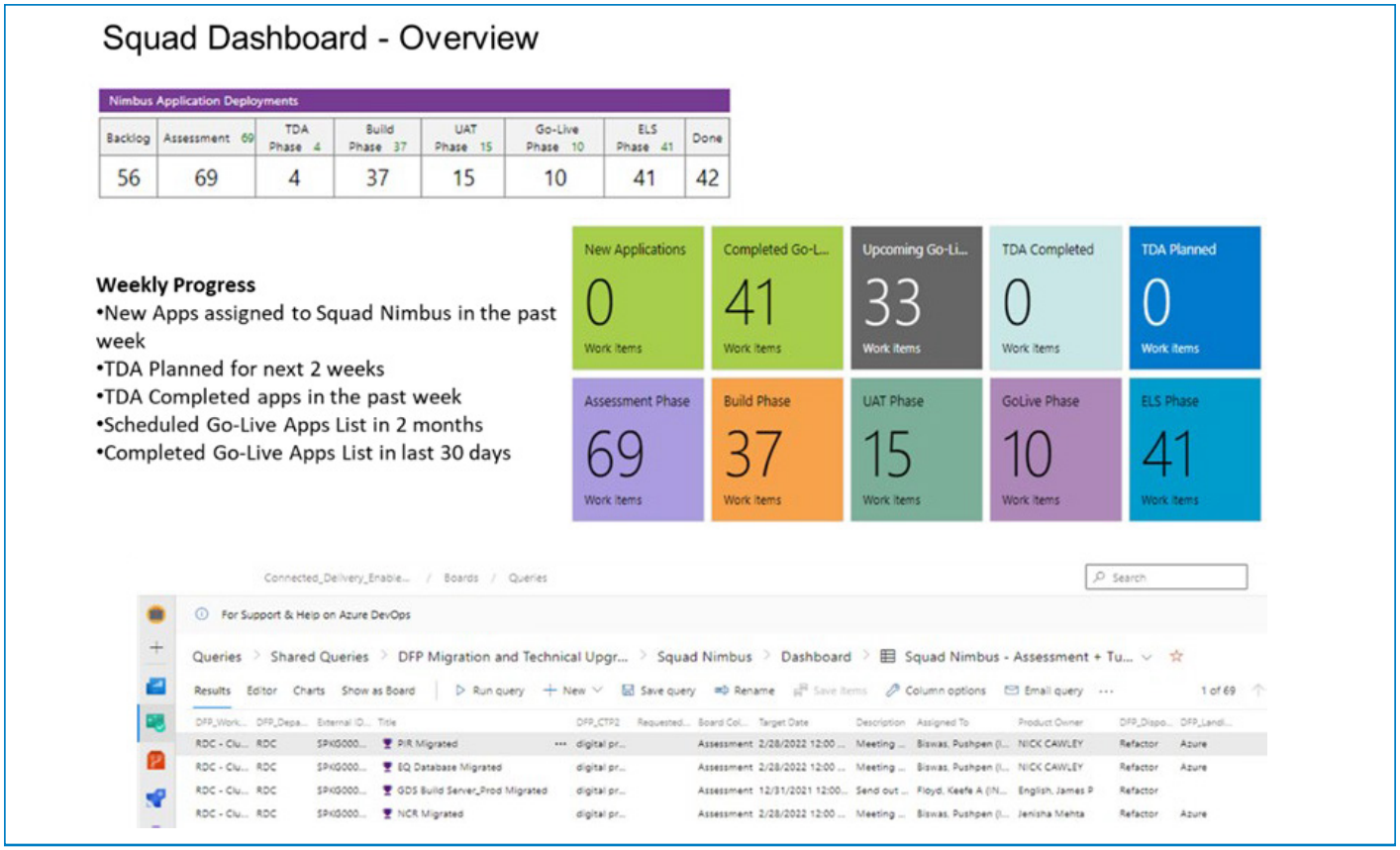
2. Process and Methods:

The 2nd dimension of the factory model is Process and Methods which the squads need to adhere to. This essentially consists of the (a) Project Management methods to be adopted, (b) A robust cost estimation model, (c) Architecture process and (d) Testing strategy for the factory.

a. Delivery Planning and execution Methodology

The agile ways of working and adopting an appropriate agile methodology is critical for providing the required scalability and speed with predictability. Kanban and Scrum are the 2 most common choices we have for adoption. The migration process steps are mostly activity based and mostly predefined. Even in case of rearchitecting an application which involves rewrite, from a migration perspective we can define an activity-based model. Hence a Kanban based methodology can be adopted for the migration factory. Below are the benefits of this approach:

1. Migration process involves many bottlenecks and dependencies on processes and people outside the migration team. Having a well-organized visual dashboard giving all the blockers, issues and action items for the various squads is important for speedy resolution. Using the Kanban dashboards in ADO or similar tools will help this purpose.
2. Kanban approach allows the squads to pick up more items into their WIP stage defined by the size of the pipeline. This ensures that there is always enough WIP items for the squad members to work on even when some items are blocked due to dependencies or issues. This ensures minimal wastage of efforts and hence costs
3. The various ceremonies like daily standup and retrospective meetings inherent to the Kanban methodology supports the agility and efficiency required of the factory squads. The learnings from squads are quickly implemented to the process improvements through this approach.



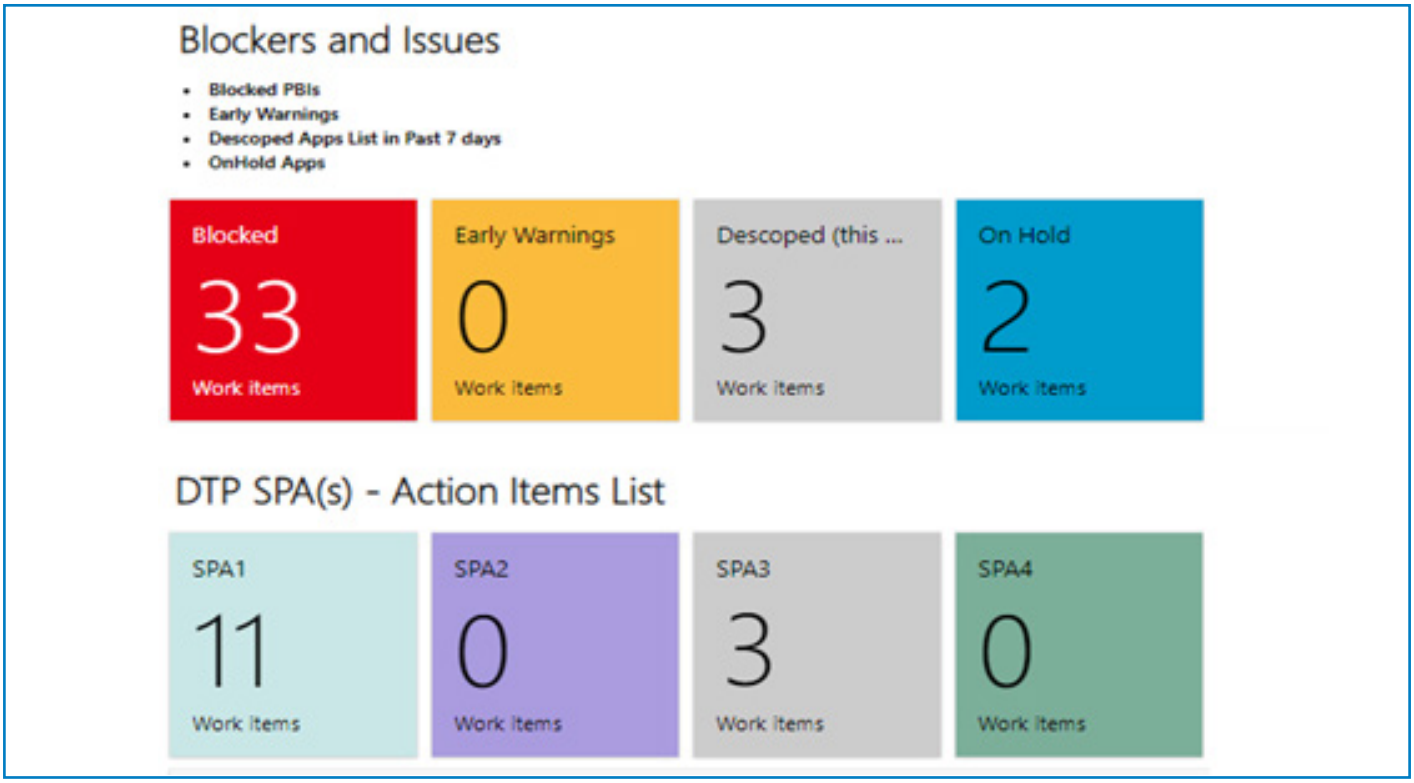


Figure 6: Kanban dashboard examples

Adopting only value adding process across the migration value chain must be adopted by the migration squads without fail. This is critical to ensure all the attributes of a successful factory model – speed, cost efficiency, predictability, and scalability. In principle this is easy to understand, however this must be incorporated at every stage like Architecture process, testing process, Change Management process, Cutover process etc.

b. Estimation Processes and Migration Cost Models

The significance of a very easy to understand and transparent migration cost estimation process is paramount to any large cloud migration programs. This plays a key role in every stage of migration in decision making. The migration workload or scope is usually dynamic over the course of the program due to various factors such as budget availability, business priority, availability of new techniques with CSPs etc. This requires organizations to have the ability to understand cost estimates at an application level. However, the large number of applications under consideration can make this a very challenging exercise and will eventually consume significant efforts and time to do the estimation itself.

This emphasizes the need for a standardized and pre-defined estimation model. A T-shirt sizing model is an appropriate model which provides granularity of cost at an application level, without doing detailed estimates for every application to be migrated. Each t-shirt size will have a cost associated with it and can provide the application cost. The determination of the size is a function of the application migration complexity. Complexity of application (eg: S,M,C,HC) is derived based on various application solution patterns. T shirt model creation approach is explained below. However, the model definition should be evaluated thoroughly to apply any additional parameters based on specific program's application portfolio context.

1. Define Architecture Patterns for application
2. Define Complexity based on Model Definitions statements which match the patterns
3. Complexity will map to cost and duration of migration

This model helps in standardizing the estimation model across multiple vendors who might partner for migration. Ideally around 90-95% of the application estimates should be covered in this model. For the remaining applications that might not fall into the patterns or model definitions, a custom estimate is done separately.

c. Architecture Process in Factory Model

Architecture Governance helps in aligning the technology stack with the overall organization's goals and strategies. It is important to have a defined set of principles and guidelines which ensures the technical designs adheres to organization's standards and processes. It also ensures all the architecture artefacts and operational level agreements are consistent across all the applications in factory model.

All the projects in the factory model must undergo one or more sessions of Design Reviews before being approved by the Technical Design Authority (TDA). The Design Review is typically conducted as a formal or informal session by a group of technical peers, depending on the project/ unit/organization, it could comprise of team leads, Business Architects, Enterprise architects or Cloud platform or service line architects. The goal of the Design Review session is to validate the target architecture options, assess the various Pros and Cons of the architecture, evaluate the return on investment (ROI) and Cost of ownership of a particular design over another. Design Review helps in validating the design and incorporate any changes based on the feedback and to ensure the documentation is aligned with organization and industry naming conventions and standards.

In large organizations it is recommended to setup a Design Authority which typically comprises of Senior architects, technology leaders, Enterprise /Business architects. The Design Authority is the formal gateway for approving any designs before proceeding to the build/execute phase. The Design Authority ensures the applications are aligned as per the architecture design guidelines and organization strategies and business needs. During the TDA sessions, the TDA should do a thorough assessment of the individual Architectural options and approve the right design considering any deviations and ensuring that a plan is agreed upon to address the deviations or technical debt within a particular timeframe.

Post Build Review is to assess the success of the post build architecture against the approved design by TDA. This review provides an opportunity to assess if the post build design was able to achieve the expected outcomes against the approved design, initial requirements both functional and non-functional and to check if there are any deviations. If so, what is the plan to address the deviations as part of continuous improvements within a stipulated time frame. Post Build review also provides an opportunity for the TDA to provide any feedback on the final design and incorporate new learning in the architecture governance which can help for future Design Review sessions.

d. Test Strategy in a Factory Model approach

This section emphasizes the importance of having a test strategy, test templates/ plans and Test lead/anchor for a typical cloud transformation program. In a factory model, the type or the combination of applications in consideration for migration are most likely to vary in terms of complexity, technology stack etc, therefore it is important to ensure only the right set of testing is chosen for each application instead of having a common set of testing methods for all applications.

It is important to have a testing strategy defined as part of the Migration factory. One of the key questions here is, how can we ensure Test strategy is consistent across all applications in a factory model, this is where a Test anchor role becomes important who will help develop a testing strategy for the set of applications in a factory model.

A Test Anchor/Lead must be assigned for a migration factory. During the initiate phase, Test Anchor must define a Test strategy and patterns/templates for the Test plans. The Test anchor must ensure the migration engineers /teams are made aware of the Test Strategy and test plans accordingly. Please note, the testing of individual applications itself will be done by the migration team members, therefore it is important that the different migration teams are aligned with the testing strategy for the overall migration.

During the Initiate phase the Test lead must try to have a broad view of all the applications and should try to derive a pattern as part of Testing strategy. Below mentioned are the sample patterns which are mainly driven by disposition of individual app:

- Application Sanity test - Lift and Shift, Migration with DB version upgrades
- Performance testing - Apps with global usage, highly concurrent users
- Latency Test - Business users are remote, known network issues, global usage of app
- Application Regression Test - Considerable conversions e.g.: Oracle to PostGre/SQL, Application rewrite
- Interface testing - for all migrations where apps have dependency on other apps
- User Verification of functionality- Application Rewrite

During the assessment phase, the application migration engineers should formulate the right test plan for the application which is based on Test strategy and as per guidance on the patterns and templates recommended by the Test Lead. Not all applications will have the same test plan, the application migration team should look at different aspects like the functional requirements and non-functional requirements and come up with the required testing plan for the application.

During the application Design Review, the test lead should review individual test plan for the individual applications and validate the test plan as to whether the right set of testing have been chosen for the application in question, suggest any changes in case of any change is required or approve the test plan.

In the execute phase of the migration, the Test lead needs to conduct regular QA checks to ensure all the applications adhere to the overall testing strategy. One key aspect to note here is, the testing of the applications is done by migration engineers. The migration engineer does the required testing for the application as per the guidelines/recommendations defined by the test lead.

3. Tools and accelerators

This forms the 3rd dimension of the factory model. The factory model approach needs to emphasis on using the right tools and accelerator and had to be planned upfront with a relentless focus on improving the coverage of the activities through automation. One way to provide this focus is to form an automation squad or a mini squad solely responsible for delivering the right tools and accelerators for the migration squads. The approach to automation can vary from simple reusable scripts to templates to larger Infosys tools or other 3rd party tools and accelerators. Below is the list of high-level activities in the factory model which should have templates/scripts/tools identified for accelerated migrations

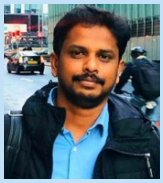
SL No		Activity	Playbook	Tools	Scripts	Template	Remarks
Project Discovery							
1	Onboard Teams	Onboarding	✓				Prerecorded Playbooks which give overall program vision, priorities
Planning							
2	Prepare architecture Patterns	Pre-Assessment				✓	Predefined architecture patterns and landing recommendation eg: .net app with Oracle backend, Mainframe app with web focus etc
3	Derive Estimates for assessment and migration	Pre-Assessment		✓		✓	Model definition template to categorize S, M, C and HC complexity and derive cost and duration of assessments and execute activity
Planning							
4	Collect Applications details	App Survey				✓	Data collection template predefined questionnaire
5	Capture network traffic details	App Survey		✓	✓		
6	Collect Capacity and utilization of legacy Infra	App Survey		✓	✓		
7	PreMigration Assessment for Data migration, conversion	DB Migration / Conversion Assessments		✓			Tools like AWS SCT, Infosys Data Migration tool, OraToPG, MS SSMA, are few popular tools
8	Estimate Opex and Capex for Cloud To Be Architecture	Prepare To Be Architecture		✓			AWS /Azure cost calculator available at CSP sites
9	Prepare detailed assessment report	Assessment		✓		✓	CAST Tool for assessment for Bespoke application
10	Prepare Architecture Deck	Architecture Review				✓	Predefined deck which captures high level details and critical decision points on the To Be architecture

Application Execute							
11	Prepare execute plan	Execute	✓			✓	Predefined set of activities captured on any tracking tools like Azure Devops
12	Submit various requests for Firewalls, Reverse proxy, license request with supporting functions	Execute				✓	Predefined templates relevant to each area where the requests are submitted. Eg: Firewall change requests should have a predefined template which captures source and destination IP range, ports and protocols and reason for the change.
13	Infrastructure Provisioning and Application deployment	Infra Provisioning			✓	✓	Infra provisioning can be automated using CloudFormation, ARM templates and can be incorporated along with CI/CD through Code deploy, Jenkins etc. Infosys ICAMP provides terraform templates/Cloud Formation stacks
14	Communicate with various stake holders for migration kick off, UAT testing, cut over notification etc	All stages				✓	
15	Schedule meeting with stakeholder - Go/No Go meeting, Testing Kick off, Cutover meeting	All stages				✓	
16	Application Deployment	Application Installation		✓		✓	Application deployment automations through various tools, Jenkins, code deploy, azure devops
17	Database migration/ conversion between different RDBMS	DB conversion		✓		✓	AWS SCT, Infosys Data Migration tool, OraToPG, SQL Server Migration Assistant
18	Perform vulnerability Scans	Validation		✓		✓	
19	Prepare test strategy	Validation/ Testing				✓	
20	Cutover Implementation plan	Cutover				✓	
21	Service Transition Checklist	Documentation				✓	
22	Runbooks for deployment strategy	Documentation				✓	Predefined template which has details to deploy the application from scratch
22	Capture Organization Standards (blacklisted tools, scripts)	All	✓				
23	Organization Platform Architecture and Services offered	All	✓				

Conclusion

A factory model approach for cloud migration is highly recommended for a successful cloud transformation program based on our experience. The benefit of this model is quite evident from the improvement in the speed and predictability of delivery, and ability to scale the team up and down based on business priorities, as well as the cost efficiency of the transformation. This model provides the framework to structure the people, process, and tools to deliver a repeatable and scalable cloud migration outcome. As cloud transformation is the foundation for any larger digital transformation initiatives in an enterprise, it is imperative for organizations to have accelerated cloud migrations at scale to achieve the expected business benefits

About the Authors



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