Infosys’ Workload Migration Planning suite

A Codified and scientific approach to determine application readiness for cloud adoption and detailed planning for application migration including Remediation and Validation.

Infosys’ workload migration suite to analyze and recommend readiness plan for enterprise applications for AWS deployment and optimization

**Differentiators:**

- **Codified Infosys vast experiences:**
  Decision Logic for cloud suitability using 20+ formulae and algorithms based AHP (Analytical Hierarchical Process) Model

- **Analytical Wave Planning Workbench:**
  Infosys application migration Workbench - Used to identify and remediate potential incompatibilities in migrating the applications

- **Migration Point Estimation Model:**
  Infosys’s estimation model based on “migration point” rather than subjective models like S,M,C models
End to End Flow for Cloud Application Migrations

Cloud Suitability Assessments

Initial list of Apps

Remediation Blueprinting

Inventory Base-lining

Architecture, Dependencies, Capacity, NFR, etc.

Waves and Clusters – Wave Planning Principles

Initial list of Apps

Setup and Planning

Pilot execution

Analysis

Execution

Testing

Deploy

Migration Wave/Cluster 1

Optimize

Migration Wave/Cluster n

Analysis

Execution

Testing

Deploy

Migration Wave/Cluster 1

Optimize

Migration Wave/Cluster n

Analysis

Execution

Testing

Deploy

Review Metrics

Learnings

Optimal Waves

Flex Capacity

Migration Pipeline

Forecasting

Migration DB
Infosys’s Cloud Suitability Assessment Framework helps assess workloads from different dimensions for “Cloudification” feasibility

- Define feasible Cloud Models (Private, Public- SaaS, PaaS, IaaS)
- Assess Infra for Feasibility to build Private Cloud
- Define suitable Cloud models for various Application Clusters

- Filter for Cloud Feasibility
  - Filter out Applications based on high level assessment- e.g.
  - Legacy or planned for retirement
  - HW / Appliance dependent
  - Highly unstable or low priority
  - High Cost/expensive to move

- Cluster Application per key characteristics:
  - Security, Regulatory/Compliance Requirement
  - Business Criticality, SLAs
  - Technology, Usage patterns
  - Choose right representative samples from each clusters.
  - Assess application (clusters) for cloud suitability

For applications which are found suitable to cloud
1. Determine the approach and to move such applications to Cloud
2. High Level Estimates for moving suitable applications to cloud.

* AHP : Analytical Hierarchical Process Model.
Quantitative Analysis: Analyzes applications for cloud suitability based on AHP model

Step 1: Collect 30+ characteristics for each application as defined by model

Step 2: The model derives HML score for each criteria and for each application

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Derived Weightages</th>
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<tbody>
<tr>
<td>Elasticity</td>
<td>0.29032</td>
</tr>
<tr>
<td>Optimal Utilization</td>
<td>0.22581</td>
</tr>
<tr>
<td>Application Maturity</td>
<td>0.19355</td>
</tr>
<tr>
<td>Migration Ease</td>
<td>0.16129</td>
</tr>
<tr>
<td>Integration Ease</td>
<td>0.12903</td>
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</table>

Step 3: Criteria weights are derived using AHP Model

Step 4: Cloud Suitability score is derived based on the weighted score

Step 5: Cloud deployment model score is derived based on the weighted score

Based on this model, decisions would be taken whether an application is suitable for cloud model. If so, whether to move an application to private or public cloud.
Migration Types to move applications to Target State

Current State (Multiple Data Centers)

Physical Servers

Virtual Servers

Migration Types to move applications to Target State:
- Scenario 1: As-IS (COTS, Custom Apps)
  - Image Based (P2V / V2V)
  - Deploy & Reconfigure
- Scenario 2: Upgrade / Re-Install (COTS, Custom Apps)
  - Upgrade, Re-Mediate, Re-install, reconfigure
  - Test and Data migrate
- Scenario 3: Re-Platform (Custom Apps)
  - Re-Platform, Remediate, Reconfigure, Test and Data Migrate
- Scenario 4: Re-Architect (Custom Apps)
  - Re-Architecture, Re-Factor, Re-Write, Test and Deploy
- Scenario 5: Migration Not Required (retiring / retired), sufficient info. not available
  - Leave as-is on source platform

Target State:
- Private Cloud (Iaas, Paas)
- Public Cloud
- On Premise. Physical / Virtual

Scenario 1: As-IS (COTS, Custom Apps)
- Image Based (P2V / V2V)
- Deploy & Reconfigure

Scenario 2: Upgrade / Re-Install (COTS, Custom Apps)
- Upgrade, Re-Mediate, Re-install, reconfigure
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- Re-Architecture, Re-Factor, Re-Write, Test and Deploy

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Applications Migration to Cloud: Approach using the Factory Model

A ‘Wave-based’ application migration approach leverages Infosys’ Migration Factory Model to optimize cost and overall migration time. Migration Factory Setup is a standard set of well-defined common processes to be followed. Factory model will:

- Comprise Tools for automated process leading to Accelerated Migration. Tools will comprise both Infosys and product based tools.
- Leverage Infosys repository of List of Incompatibilities, Best Practices, Challenges faced.
- Have customized or common Scripts for database migrations leading to cost Optimizations.
- Ensure reduced time and effort by following standard process and optimal resource utilisations.

The migration team will establish a Factory model during the Pilot Wave that will be leveraged to efficiently complete migrations during the subsequent phases. This setup will significantly increase run rate and improve productivity.
For any workload migration program, two major activities need to be addressed. Assessment and Migration. The WLM platform addresses through its two modules: The Assessor and Migrator.

Current Workloads
- Java/J2EE Apps
- SAP/CRM Etc
- Mainframe

Target IT Disposition
- On Premise
- Public Clouds
- Private Cloud
- Hosting/Managed/Other

Target Cloud Suitability Assessor
- Auto Discovery
  (CMDB, ServiceNow, Probes)
- Other Sources
  (SMEs, CSV etc)

Migration Type Disposition
- As-Is Migration
- Upgrade
- Re-Platform
- Re-Engineer

Catalogs
- S1
- S2
- M1
- M2
- C1
- C2

Complexity, Wave Planning, and Cost Analysis
- ROI

Tools & Process
- Reference Architectures
- Migration Plans

Recommendations

Migration Candidates
- Java/J2EE Apps
- .NET Apps
- C/Unix Apps
- SAP/CRM Etc
- Mainframe Apps
- SAP, CRM etc

Infosys Remediation and Migration Accelerators/Tools (JMAT, .NET and Unix Migrators)


Mainframe Re-Hosting (Microfocus, Clerity etc)

Mainframe Re-Engineering

SAP Migrator, SAP Tools, Oracle Tools, Database Migration Tools etc.

Deployer

Target IT
How does the WLM Assessor work?

1. **Data Sources**
   - SMEs
   - CMDB or Network Scan

2. **Data Elicitation**
   - Analysis
   - Priorities of each of determining Factors

3. **Decision Logic**
   - Determine Cloud Suitability Score

4. **Determine Cloud Deployment Score**
   - Example:
     - If (‘utilization’ < 25% then optimal_utilization = ‘H’, else if < 50% then ‘M’, else ‘L’)
     - If (‘periodicity’ = 4 then elasticity = ‘H’, else if =3 then ‘M’ else ‘L’)

5. **Create Cloud Disposition Chart**

6. **Determine Migration type**
    - Determine Migration complexity & Costs

7. **Calculate Future Infra & ops costs (yearly spend)**

8. **Calculate as-is infra & ops costs (Yearly)**

9. **Create Wave plan, Roadmap & MPP Plan**

10. **Create ROI chart & spend chart**

11. **Recommendation**
How the WLM Migrator Works? – Re-Platform or Upgrade of Applications.

- Standard (J2EE, Unix etc) and Application server incompatibilities and deprecations
- Knowledge Base of major incompatibilities (m/c readable in XML format)
- Pre-populated in the tool. Additional Customer specific incompatibilities on need basis added to the tool per engagement.
- Application Source Code to be Remediated/Migrated
- Code Parser in WLM
- Determine list of changes to be made in the code
- List all Direct replacements & suggested changes
- Automatically through WLM change after getting confirmation from developer
- List all INDIRECT replacements & suggested changes
- Provide suggested changes to developer interactively through WLM
- Non-Simple replacements: ~ 60% of code Typically
- Simpler Replacements: ~ 40% of code Typically

- IDE
  (Eclipse, VS etc)
- Make changes & Test
- Deploy
Appendix
Wave Plan Approach
Before starting execution phase, it is highly important to create an effective wave plan. A well thought through wave plan helps us to achieve efficiencies due to economies of scope, scale and also taking into considerations like inter-dependencies, complexities etc.

• An Effective Wave Planning (right composition of Waves / Clusters) has a important bearing on the overall effectiveness of our Model.

• Here we have given two approaches we have followed in other similar engagements for creating logical grouping of applications into waves.

• Infosys will follow an approach suitable by leveraging experiences based on the following two approaches (approach 1 or approach 2 or a combination with required customizations).

Approach 1: Vertical slicing.
In one similar engagement we sliced the applications vertically. We looked at an application as a whole and then applied certain key application grouping principles and then created application groupings based on these key principles. These key principles and the mechanism we used to create the application grouping are in following slides.

Approach 2: Horizontal slicing.
In another similar engagement we sliced the applications starting with database instances, then followed by server instances and then created a set of master groups of applications. Details are in following slides.
Wave Planning Approach – Vertical Slicing – Key Principles

1. Core Principles

Consideration

- Limit the ‘number of Waves’ for a given functional area to a optimum number possible
- Complete the migration for a given functional area in ‘contiguous’ waves
- Migration activities for a functional area is completed in the quickest and swift manner
- Try to meet ‘preferred timelines for Migration’ for each application (per survey) as much as possible

2. For Effectiveness across all waves

Considerations

- Optimal Number of Applications in a Wave and Wave Duration. Approximately 30 to 40 Applications in a Wave.
- Dependent Applications will go in a same wave.
- 3rd party applications / common Middle ware components will get migrated earlier in the cycle (Early Wave)
- Conduct Pilot with Sufficient representative of major functional areas in Pilot.
  - ‘Try out’ all functional areas during early waves.

3. For Effectiveness within a wave

Consideration

- Try to evenly Distribution of Migration Complexity (SMC) across waves
- Try to evenly Distribution of Business Impact applications (LMH) across waves
- Avoid touching ‘Active’ Waves in initial waves
- Avoid Touching too many Functional Areas in a Wave. Limit the number of Functional Areas in each wave to the optimum Possible
Wave Planning Approach – Horizontal Scaling. This is another way of effectively cluster the applications into waves based on technology layers like database layer etc.…

Application Grouping : Horizontal Slicing Illustration

Slice the applications starting with database instances, then followed by server instances and then created a set of master groups of applications.

Group by Database Instances
Multiple applications sharing a single Database instance
Or sharing more than one Database instances

Group by Server instances
Multiple Database Groups residing on a common physical server

Master Release Groups
Server Groups related to common Upstream / Downstream systems, Business dependencies

20 Release Windows
Release 1 Release 2 Release 20
Waves formed using wave formation principles – an Illustration....

Minimal information will be captured for applications that will be retired soon. No Assessment / migration to be conducted.

Non-decomposable smaller clusters formed as waves with different wave formation principles.
# Summary of Infosys Tools/Accelerators/Frameworks used in Cloud Application Migration

<table>
<thead>
<tr>
<th>Assessment Phase</th>
<th>Accelerators/Frameworks</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHP based cloud suitability framework</td>
<td>Application suitability framework which uses 35+ different application characteristics to determine cloud suitability for application</td>
<td>✓ Increases Predictability. &lt;br&gt; ✓ Improves Accuracy of estimations/plans</td>
</tr>
<tr>
<td>Infosys Analytical Wave Planning Framework</td>
<td>An analytical scoring model to create waves and ascertain effectiveness of wave plans.</td>
<td></td>
</tr>
<tr>
<td>‘Migration Point’ Estimation Model</td>
<td>Infosys’s estimation model based on “migration point” rather than subjective models like S,M,C models.</td>
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<th>Execution Phase</th>
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<tr>
<td>Infosys Cloud application Migration Workbench</td>
<td>Used to identify and remediate potential incompatibilities in migrating the applications.</td>
<td>✓ Increases Productivity. &lt;br&gt; ✓ Improves Efficiencies</td>
</tr>
<tr>
<td>Migration Factory framework</td>
<td>Factory model leveraging the best of process, tools and people for migrating applications in a an efficient and cost effective manner</td>
<td></td>
</tr>
<tr>
<td>Database Migration tools</td>
<td>Database Scheme Verification Tool and Discovery tools</td>
<td></td>
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</table>
Recommendation Summary:

For all workloads in a portfolio:

1. Cloud suitability disposition results.
2. Cloud suitability distribution based on LOB or functional groups.
3. Migration type disposition results.
4. High level roadmap for migrating the workloads.
5. Cost spend details including current costs, target costs, and migration costs.
6. ROI and breakeven period.
Cloud Suitability Disposition:

For each workload in the portfolio

1. Is the workload suitable for private cloud or public cloud or on premise

2. The percentage distribution of workloads which are suitable for private cloud, public cloud or on premise.
Workload Migration (WLM Solution Suite) Assessor – Cloud Migration Type Disposition

Migration Type Disposition:

For each workload in the portfolio, provides migration type.

1. Is the workload need to undergo as-is migration or re-platform or upgrade.

2. Percentage distribution of workloads which will go through as-is migration or re-platform or upgrade.
Workload Migration (WLM Solution Suite) Assessor – Cloud Spend Chart

Spend Chart:
Provides expected spend on the following (quarterly wise)
1. Target cloud infrastructure
2. Target cloud Operations.
3. Cloud migration costs.
Case Studies
### Case Study on Similar Engagements: A Major Financial Services & Insurance Company

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situation</strong></td>
<td>Customer is a leading independent wealth management company in Australia and New Zealand looking at embarking on a cloud transformation journey with IaaS as the new paradigm to provision the infrastructure services. Customer is in the process of transforming their current IT assets into a hybrid cloud based target environment. Infosys has been executing this transformation program from the very beginning including strategy creation, architecture definition and actual migration of workloads and infrastructure into target cloud environment.</td>
</tr>
</tbody>
</table>
| **Infosys Offering** | - Infosys is helping the client in their IaaS transformation covering design, build, setup, migration and ongoing operation /support of the hybrid cloud ecosystem  
- Infosys is providing a centralized orchestration solution to manage the Cloud Ecosystem across multiple vendors  
- Assessment of Applications (120+) for cloud disposition to different zones like private, public and hybrid clouds.  
- Migrate application (120+ across 84 clusters) workloads spread across 700 servers in Production and Non-production environments to the Cloud Ecosystem  
- Trusted partner for transformation and single point accountable for Cloud Operations & Governance with adherence to SLA based outcomes |
| **Business Value** | - Improved productivity through automation and reduced operational costs.  
- Dynamic provisioning of resources to handle peak loads.  
- This transformation program will deliver cost advantage of upto 30% on an ongoing basis |
Case Study on Similar Engagements: A Canadian Rail Road Major

### 2. A CANADIAN RAIL ROAD MAJOR

#### Situation
- The North American railroad company wanted to improve productivity and reduce operational costs
- Client had highly heterogeneous infrastructure and technology stack.
- Client is using leading Hosting provider, incurring very high cost for infrastructure hosting
- Significant delays (6-10 weeks) in Infrastructure provisioning, adversely impacting time to market

#### Infosys Offering
- IT transformation leveraging Cloud
- Developed Cloud strategy comprising of hybrid Cloud solution, Decision Framework and Roadmap
- Readiness Assessment - 550+ applications & corresponding Infrastructure
- Included Portfolio Modernization, Re-platform, MF Re-hosting, Tech upgrades and Rationalization & Consolidation
- Build Service catalog, Cloud automation, integration and federated security models
- Implement a common process, definition, terminology. Leveraged process repository to accelerate ITSM implementation

#### Business Value
- IT simplification through portfolio rationalization and technology standardization
- Standardized Environments & Service Catalog
- Automated Provisioning across private & public cloud
- >40% reduction in infrastructure cost, >90% reduction in environment provisioning
- Reduce time to integrate with partners
Thank You