Cloud First Framework

Guidelines for placement of new or existing solutions

Version History

Cloud First

Increasingly, workloads are becoming virtualized providing the AP with more flexible hosting options. "Cloud First" is the principle of putting the public cloud as the first hosting option for any existing or new solution.

The "Cloud First" Framework described in this document is a rigorous, repeatable, fact-based methodology to determine if solutions are better suited for hosting within a private (on-premise), hybrid or public clouds

The Cloud First Framework includes:

- 5 Considerations for cloud migration
    - Cloud Readiness
    - Customer Experience
    - Technical Requirements
    - Security Requirements
    - Cost
- Detailed breakdown of activities and outcomes
- Artifacts to be produced

Cloud Governance Principles

To the extent possible, the CFF will abide by the following principles.

- Solutions shall realize resilient architectures to ensure high availability and business continuity.
- Solutions will abide by security best practices and reside within a VPC unless otherwise approved.
- Solutions will be instrumented to provide operational health integrity and accelerate discovery of problems.
- Solutions will remain cloud-provider agnostic in order to minimize vendor lock-in
- Solutions should be fully automated with respect to:
    - Resource provisioning and testing
    - Software deployment and testing

Cloud Migration Framework

The architecture of any solution will determine the necessary software and infrastructure components. Architects have 2 choices:

- Private Cloud within a co-location datacenter
- Public Cloud within Amazon Web Services (AWS) - Virtual Private Cloud (VPC)

The ability for a solution to satisfy the following 5 factors will determine if the solution can be placed in the public or private cloud.

Factor 1: Cloud Readiness

Assessing the readiness of a solution is the first step in the path to cloud. The following are considerations for an architects and solution SMEs to evaluate. The outcome of this activity should be a general sense of feasibility and an estimated LOE to migrate.

Criteria	Considerations
Solution is virtualized/virtualizable	Is the solution currently virtualized? This may require a P2V exercise for some existing platforms. In some cases the P2V may not be automatic and must be carried out manually (e.g. Solaris to Linux migrations). Does the solution have prohibitions with the Xen Hypervisor?
Scaling considerations	Is the solution architected in such a way that it can be easily scaled up or down in an automated fashion? Does the solution have tremendous elasticity demands?
Solution Design	Are the logical components of the solution adhering to SOA design principles such as: • Loosely coupled (supports resilient design) • Reusable and Composable logic • Statelessness (resilient state-management)
Resilience	Can the solution handle partial failures of infrastructure or dependent components (retry or multi-path logic is key in cloud)?
Special Needs Assessment	Are there unique business or technical requirements for the solution that may make public cloud inappropriate? (e.g. solution must run on real-steel, data storage/transport concerns)

Activities:

- Architects and solution SMEs (for existing workloads) meet and discuss/document solution design and cloud considerations.

Artifacts to be produced:

Artifact	Description	Provided
Migration Topology & Level of Effort (LOE) Documents	Cost estimate of LOE to migrate solution to cloud.	☐
	Documented high-level logical and virtual solution architecture in the cloud.	☐

Factor 2: Customer Experience

The following are suggested business objectives that should be considered and will inform the decision to select on-premise or cloud for hosting solutions.

Criteria	Considerations
Understanding the platform consumers	Who is the customer or dependent systems impacted by the solution?
Solution Uptime (High Availability)	Is there a threshold of acceptable downtime?
	Does the solution architecture mitigate the need for downtime for maintenance or upgrades?
	Are SLAs available?
High Performance (time-based)	Is the system responsive (low latency) across all functionality (e.g. search, download, browsing)?
Responsive Design	Is the system able to effectively render information across device form factors?
Accuracy of Information	From a data perspective does the system manage data consistency, integrity and accuracy issues effectively?

Activities:

- Evaluate the use-case(s) and the consumer(s) of the solution. This may be dependent systems, internal users or customers.
- Evaluate that the solution through testing to ensure high-performance (including load), responsive design and accurate data.

Artifacts to be produced:

Artifact	Description	Provided
Performance measures	Documented performance metrics for consumer-facing functionality	☐
	Performance metrics for system-to-system dependencies where appropriate (usually measuring customer facing performance is a good indicator of overall system performance)	☐

Factor 3: Technical Requirements

Every solution considered for placement would have specific implementation details based on the workload requirements. The following criteria address the technical considerations to measure.

Functional & Non-Functional Requirements

Criteria	Considerations
Compute Resources	What are the IaaS specification requirements expressed in cloud configurations (e.g. m3.xlarge – RAM, CPU/vCPU)? This is a right-sizing exercise and may take some experimentation.
Network Resources	Does either solution pose limits on network bandwidth and speed required to support ingress and egress of data rates? (Load Balancers, Routers, DNS, switches etc.)
	Are there specific transport (ssl) or network protocols or port/firewall requirements?
	Have load balancers, DNS routing, IP Address ranges been determined? Consider that Load Balancers can take as many IP address spaces as there are compute nodes under management.
State-Management (*Caching*) Resources	Does the solution require state-management?
	Have managed services such as AWS ElasticCache (memCacheD/Redis) been considered?
Storage Resources	How much data is expected to be stored?
	Does the solution require file or block storage services? Performance requirements for storage?
	Is there backend database relational or non-relational requirements (e.g. AWS RDS)?
On-Premise Integration Considerations (*Search, Back-office, SSO, etc.)*	Integration costs associated with dependencies must be identified. Are there backend systems that you need to integrate with that are not publicly facing (e.g. SSO, ElasticSearch, etc.)?
	Are there other customizations necessary to run the solution?
	Can the backend/dependent systems (e.g. SSO) handle the expected load from the cloud?
Planned Growth	Across each of the first 4 factors (above) what is the planned growth for the solutions. Compute can be auto-scaled (caches will grow in proportion to compute growth) but data/asset storage needs typically grow and do not shrink.
Monitoring and Instrumentation	How will operational tools monitor your workload either in the cloud or on-premise and what is the integration costs to instrument your workload? Be sure to include detailed monitoring as part of any cloud-based architecture.
	Does the IT organization have the skills set to safely and responsibly manage the solution either on-premise or in the cloud?

The following activities and artifacts will inform the decision for technical requirements.

Automation Requirements

Automation imposes greater maturity on the SDLC through a greater emphasis on automating the provisioning, deployment and testing of both software and infrastructure. Furthermore,

environmental parity throughout the SDLC (DEV, QA, STAGING, PRODUCTION) is critical to realize the predictable outcome promised by automation. Finally, automation is to provide increased IT/Business Agility for deploying new applications, features or conducting POCs.

Criteria	Considerations
Increasing IT agility to deploy new applications or POCs more quickly	Does the current solution provide automation for deploying software, provisioning infrastructure and testing both?
Provisioning Infrastructure	Are you automating provisioning of IT resources? This implies parity of provisioned resources across the SDLC environments (e.g. DEV, QA, STAGING).
	Is resource provisioning approval being provided in an adequate fashion (on-premise/in-cloud)?
Environment Integrity	Ensuring that provisioned resources are tested and secure will require automated infrastructure testing to be performed as part of any deployment/provision process.
Software Deployment	Are you automating software deployments (Integration, QA and production)?
	Does the solution have unit-tests with adequate code coverage?
Automated Testing	Are other forms of software testing able to be performed? (e.g. Load/Stress, Component Failure, Failover-HA/DR)

Activities:

- Determine solution functional and non-functional requirements for proper sizing and architecture design resilience.
- Measure performance, resource utilization.
- Validate capacity assumptions.
- Evaluate maturity of solution automation.

Artifacts to be produced:

Artifact	Description	Provided
***Updated* detailed Architecture diagram**	A Visio or PDF file reflecting the proven solution architecture in greater detail than during the "cloud-ready" phase.	☐
F/NF Requirements Measures	Measures collected while conducting performance testing to solution architecture under sustained load (x times production load)	☐
Automation Plan	A detailed plan describing degree of automation achieved or expected for solution (including process and tools used).	☐

Factor 4: Security Requirements

The following criteria collectively provide quality of service to the business and solution.

Criteria	Considerations
Security & Data Protection	Data and operational security requirements must be considered (Authentication, Authorization, Encryption, SSL, Digital Signatures, RBAC, IAM, etc.)
	Do PCI-DSS compliance regulations apply?
	Are personal information, or financial data being stored in the cloud?
Hardening Virtual Machines	Are superfluous function locked down? • Unused operating system services • Leverage private/public IP subnets • Lock-down ports • Security Groups (Root Privileges) • Access Control lists

Activities:

- Follow Security best practices for resources and access control levels.
- Please refer to the AP-Cloud-Security-Guidelines-rev5.docx for full details

Artifacts to be produced:

Artifact	Description	Provided
Security, Monitoring and Support Plan	Double check that proper security procedures have been conducted.	☐

Factor 5: Total Cost of Ownership (TCO)

To execute an accurate cost analysis the cloud governance team needs:

- External cloud prices
- Factors 1-4 well documented and understood
- Internal cost models

Criteria	Considerations
TCO	Has the application usage pattern (based on initial and projected business demand/growth) been well understood?
	Compare cloud costs with internal costs base on the architecture and usage patterns. Cost comparisons for TCO must be performed for a minimum of 3 years and incorporate planned growth. Compute resource requirements across SDLC states (Dev, integration, QA and staging) must be included.
	Are there licensing costs associated with this solution stack?

Activities:

Perform a 3-year cost analysis for solution including any custom development, automation, and infrastructure spend.

Artifacts to be produced:

Artifact	Description	Provided
3-Year TCO	A spreadsheet detailing the 3-year CAPEX and OPEX spend for a solution.	☐