Instance Strategy for IT Implementations

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ABSTRACT: Multiple factors affect instance strategy for an IT implementation. These can be classified into four areas: Government Regularity factors, Business Strategy, Functional Requirements, and Technology Implications. Each of these needs to be evaluated carefully before arriving at the instance strategy. Some of the factors are non-negotiable like government regulatory factors which need to be adhered to whereas for some of them, based on business priorities, certain choices can be made. This paper provides insight on each of these factors. Planning instance strategy is applicable for both on-premise as well as cloud implementations.

KEYWORDS: Instance Strategy, Architecture, Framework, Implementation Strategy

I. INTRODUCTION

With growing business complexity, the IT implementations have also become increasingly complex. Today's IT implementations need to cater users across multiple geographies, support complex business requirements, manage large data volumes and need to be available 24x7 with zero or very minimum downtime. This has posed many challenges in front of architects who design these architectures.

One of such challenges is to determine how many instances should be planned. There are many factors that affect the number of instances – some of them have direct impact where as some of them have indirect influence. The architecture planned should be robust at the same time flexible so that it can serve business needs for a long period of time.

Hence, an Architect needs to carefully evaluate all the factors before reaching a decision on the instance strategy. This paper examines these factors and provides guidance for designing the instance strategy. How many instances for your IT implementation is the questions that this paper attempts to answer.

II. BACKGROUND

Globalization has resulted in requirement for implementing the IT systems that:
- Need to be accessed by Large number of people – Transition Volume
- Manage Large Data Volumes – Storage Volumes
- Need to be accesses 24 x 7 with minimum downtime - Availability
- Be compliant to regularity requirements – Regularity Compliance
- Handel multiple and complex process - Capability
- Flexible to upscale easily - Resilience

All of the above requirements need to be taken into account while designing Architecture of the proposed IT implementation. Additionally there are data security and privacy requirements which are different for different countries that need to be adhered to.

Hence, while designing a global implementation of IT system, the instance strategy is an important architectural decision. If some of the factors that affect instance strategy directly or indirectly are overlooked, it will result in

compromised architecture that might not be able to stand the test of time. Hence, an architect needs to carefully evaluate all the factors before reaching a decision on the instance strategy. This paper examines these factors and provides guidance for designing the instance strategy.

III.   METHODOLOGY AND DISCUSSIONS

Exploratory Research Methodology was used. Various papers / articles in this subject area were studied. Also, researchers IT experience was leveraged to arrive at a consolidated list of factors and a methodology to arrive at number of instances.

Factors that affect the instance strategy can be classified into the following 4 categories:

A.   Government Regularity factors
B.   Business Strategy
C.   Functional Requirements
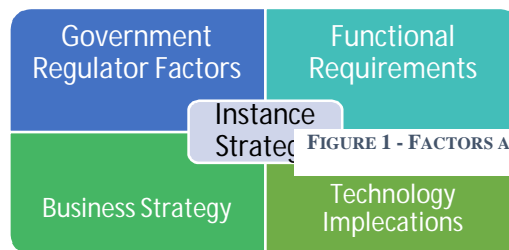D.   Technology Implications

FIGURE 1 - FACTORS AFFECTING INSTANCE STRATEGY

Each of the factors can amount of **Geographic** or **Physical** separation of instances. Geographic separation amounts to instances being located in geographically separate locations typically in different countries. Physical separation will mean that the instances will be separate. Please note that Geographic separation will automatically amount to Physical separation but vice versa need not be true. Physical separations will not necessarily mean Geographic separation as different instances can be located in the same data center as well.

A.   GOVERNMENT REGULARITY FACTORS:

This plays an important role and is foundation for determining instance strategy as Government Regulatory Factors must be adhered to. Government Regularity factors affects how the data is stored. There are 2 main factors that need to be considered while determining the data storage:
Where the data is located as depending on where the data is physically stored determines the legal jurisdiction to which the data is subject to. For example, data stored in EU will be subject to EU laws whereas data stored in USA will be subject to the US laws. **Who Controls the data** as some country laws place obligations on companies beyond that country's borders. For example, a US company operating in Europe is still subject to the U.S. Patriot Act. So even if the data is stored on a server that is physically located in Europe and so subject to EU data protection laws, the information can still be shared with the US government as the data is also subject to the U.S. Patriot Act. [1], [2]Certain government regulations put a control on where the data can be physically stored. The data protection laws apply to countries in European Economic Area (EEA) which apply to countries in EU. This prohibits the disclosure of personal information without consent of the owner. Hence while transferring or storing the data of customers from EU outside EU, it needs to be ensured that adequate protection level is guaranteed. [3]

While planning the instances for global deployment, it should be ensured that the government regulations are adhered to. The first point that needs to be considered is whether the data can be stored outside the countries / region boundaries. That will determine the minimum number of instances required. So for example, we have a global implementation spread across 5 regions / countries, and if 2 regions / countries have the requirement that the data cannot be stored outside the countries boundaries, then minimum number of instances required will be 2. Then we need to evaluate if the region where the instance will be located will be able to enforce requirements of all other regions whose data this instance will store. This exercise will determine the minimum number of instances that will be required. We then need to apply the other factors to see if we need to further split the number of instances. Government Regulatory factors will amount to Geographical Separation of instances – the instances been located in different countries.

B. *Business Strategy:*

Business requirements play an important role in instance strategy as business is the sponsor of the IT implementation. Especially when the business is spread across multiple countries or multiple regions, there are additional factors that need to be considered. These include:

- Business in different regions can have different business priorities. For example, for a region, the focus could be more on Service whereas in another it can be more on Sales. Hence the priority in which these process need to be implemented as well as the focus and attention that they would get might vary from region to region.
- Localization: Business models in different regions or countries can be different. The same process can be implemented in different ways in two different regions based on variety of local factors.
- Release Cycle and Ups and Downs of business: These can vary from region to region. This can impact the funding availability as well as when the business will like to go for a new implementation or new releases for an existing one
- Process Standardization: While standardizing the process across business units is a good strategy, it might always not be possible. Further standardizing process across regions will mean reaching consciences from larger number of people and requiring more thinking upfront which can delay the implementation

The above factors are impeding factors for a Single instance strategy [4]. Regions with similar characteristic on above parameters can be grouped together. Business strategy will amount to Physical Separation of instances.

C. *Functional Requirements:*

The third important factor for planning the number of instances is the Functional Requirements to be implemented. If we are planning to serve 2 sets of customers for which the business process are significantly different, then it's best to have 2 separate instances each serving a set of customers. For example, if we are planning to set up a call center for Retail Customers and Corporate Customers, It's best to have 2 separate instances for each set of customers if the business processes for each are different. By having separate instances, Implementation and Maintenance of application becomes easy as dependency is reduced. This also helps in dividing the data storage and transition load across instances.

Continuing with the example in above section, if we apply the functional requirements described in this section, which will mean 2 additional instances. However effect of functional requirements on instance is more for convenience and ease of maintenance and not compulsory as the Government Regulations described in the above section. It's important to note that multiple instances can sometime result in data duplication. Hence this factor also needs to be evaluated before making a decision.

Architect should carefully weigh the benefits before finalizing the strategy. Functional requirement will amount to Physical Separation of instances.

D. Technology Implications:

Technology can sometime put restrictions that compel having more instances for an implementation. Various technology factors need to be considered while designing an instance strategy includes:

- Data Volumes – Data Storage & Retrieval
- Transaction Volume-Number of transactions per seconds
- Network Bandwidth

However, recent technology advancements has reduced the effect of this factor as an Architect has number of options now available for designing the architecture for high data volume and transaction requirements. High data volume and transaction is typically required for industries operating in domains such as Telecommunication, Airline and Public Sector.

In order to balance the transition volumes and data storage and retrieval volumes various strategies can be adapted. Some of these include: Data Replication, Technologies such as Oracle RAC, Microsoft AlwaysOn etc. The new servers are able to scale up to large volumes easily. Hence all these should be carefully studied before we decide to have multiple instances to cater large transaction volumes or data storage requirements. With advent of new technologies, transition volumes and data storage and retrieval volumes is seldom a reason for having multiple instances.

Sometimes, we might want to consider multi instances to counter natural and man-made calamities like earthquakes, terrorist attacks etc. Like the proverb goes - "Don't put all the eggs in a single basket", we might want to have multiple instances so that even if one of the instances is affected, the other instances continue to function and the impact on overall business is lesser. However properly planning a Disaster Recovery (DR) site can also help to reduce this risk significantly. Also strategies like multi master replication can be deployed to mitigate this risk as in such a deployment, other instances can take over and downtime can be avoided.

Scalability, Resilience, Fault Tolerance, Survivability protection are the Technology factors that need to be considered while designing an instance strategy. Technology implication can amount to Geographical and / or Physical separation of instances.

IV. RESULTS

While planning instance strategy, we should check if Geographic Separation and/or Physical separation are required. Each implementation is different and different parameters will be applicable for different implementation. Each factor should be evaluated to check if it's applicable in the current case. These are summarized in the table below:

	Geographic Separation	**Physical Separation**
Government Regulations	**Yes** - Data cannot cross Boarder	**Yes** – Because of Geographic Separation
Functional Requirements		**Yes** - Split based on Functional Requirements
Business Strategy		**Yes** - Split based on Regional Business Requirements
Technology Implications	**Yes** - To tackle Network Bandwidth challenges	**Yes** - To improve Performance (e.g. large data and transaction volumes)

TABLE 1: FACTORS AFFECTING GEOGRAPHIC & PHYSICAL SEPARATION OF INSTANCES

Note:

- **Geographic Separation** – The instances need to be in 2 different locations typically in different countries.
- **Physical Separation** – The instances can be at the same location but need to be 2 separate instances.

For planning the instance strategy, step by step approach is required. Funnel approach as described below can be adapted to zero down on the instance strategy.
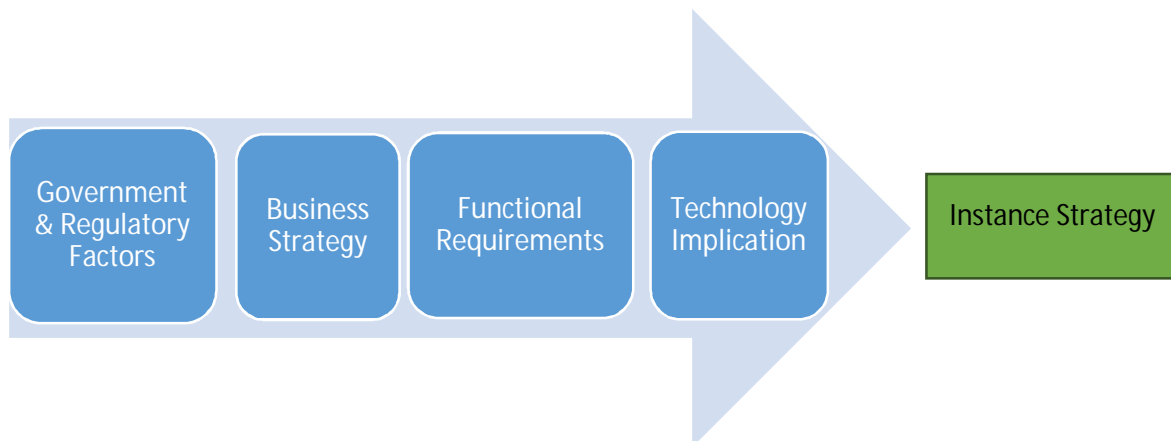

FIGURE 2: APPROACH FOR DETERMINING NUMBER OF INSTANCES

1. Depending on where the solution will be implemented and will be serving which customers, Government and Regulatory factors applicable should be determined. This will determine the minimum number of instances that will be required. This will also help in determining the data storing and sharing strategy
2. Business Strategy can add more instances. In some cases, government regulations might not warrant a separate instance but because of business strategy, we might want to have separate instances.
3. Functional Requirements can result into Physical separation this can be more for ease of maintenance and implementation
4. Finally Technology implications can further affect the number of instances especially for cases like bandwidth challenges, Performance, Storage Requirements etc

V. CONCLUSIONS

As we have seen above, there are multiple factors that need to be considered while planning the instance strategy. While it might seem that a Single instance will mean lower TCO, it might not be always so. On the other hand, too many instances will also not be appropriate. The above methodology can help an architect answer the "How many" instance question and he/she can design an architecture with the appropriate number of instances.

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BIOGRAPHY

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