An Oracle White Paper

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Cloud Computing Maturity Model
Guiding Success with Cloud Capabilities

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Executive Overview

Oracle has developed a comprehensive cloud maturity model based on collective experience and best practices. Maturity models are useful to benchmark yourself against others in your industry, gauge progress on your initiatives, and perhaps even discover that you are on track to achieving your goals.

In an emerging area like cloud, there are many short term and long-term tasks and benefits. Some of these are related and some not. But, in developing a sustainable long-term architecture, it is best to be aware of the various points of entry and create a strategy that ensures alignment over time. Cloud Computing requires significant and often far-reaching changes to truly reap all the promise of this new model for IT. Successful adoption of a Cloud model depends on careful planning that addresses the full range of capabilities implied by a comprehensive Cloud Computing strategy.

In recent years Oracle has been working with a wide variety of companies that are in various stages of Cloud adoption. Further, Oracle had gained valuable experience in developing the Oracle Public Cloud service. This collective experience has been captured in the Oracle Cloud Maturity Model such that it can be used to measure the progress of a Cloud initiative and, more importantly, can identify specific capabilities that are lacking or lagging and are therefore inhibiting the Cloud initiative. A remediation approach for each of the identified inhibitors can be determined from industry best practices and prior experiences. These remedies can then be prioritized and used to create a plan to put the Cloud initiative on a path to success.

Having an approach to Cloud Computing based on an extensive Cloud Maturity Model that is based on deep experience and best practices accelerates Cloud adoption and dramatically reduces the risks associated with the transformation that Cloud Computing requires.

Introduction

This paper describes the Oracle Cloud Maturity Model and how the model is used to accelerate Cloud adoption by identifying specific capabilities that are either completely lacking or which are lagging with respect to the other capabilities necessary for successful Cloud adoption.

Cloud Maturity Model

The Cloud Maturity Model defines the following key concepts: capabilities, domains, maturity, and adoption.

Capabilities and Domains

The Cloud Maturity Model includes sixty **capabilities** that capture the best practices that Oracle has collected over years working with a wide variety of companies. These capabilities provide the detail necessary to truly measure and guide the progress of a Cloud initiative.
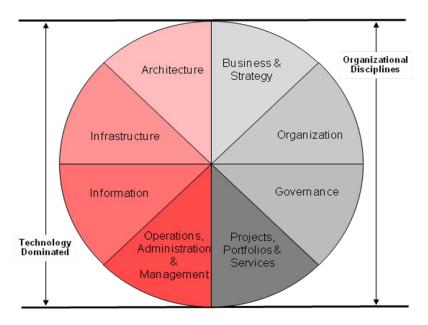

Figure 1: Cloud Maturity Model Domains that contain 60 specific capabilities

The Cloud Maturity Model uses the concept of **domains** to classify and organize the related capabilities. As depicted in Figure 1, there are eight domains in the maturity model:

Business & Strategy - Contains capabilities that provide the high-level constructs that allow the Cloud initiative to proceed. This includes such things as business motivation, expected benefits, guiding principles, expected costs, funding model, etc. Capabilities such as service selection and service level agreements gain relevance in Cloud initiatives as well.

Architecture – Contains capabilities concerning the definitions of the overall architecture and guidelines for various practitioners to ensure adherence to the architecture. Capabilities fundamental to cloud architectures, such as resource pooling, interoperability, and self service are considered in the model.

Infrastructure – Contains capabilities concerning the service infrastructure and tools that provide the technical foundation for the Cloud initiative. Shared services, provisioning, and model packaging are particularly important in cloud infrastructure.

Information – Contains capabilities concerning the information aspects of Cloud, such as metadata management, as well as customer entitlements, and data durability.

Projects, Portfolios & Services – Contains capabilities concerning the planning and building of cloud services, and management of the portfolio of services.

Operations, Administration & Management – Contains capabilities concerning the post deployment aspects of cloud service i.e. the Operations, Administration, and Management aspects of the cloud environment. This includes capabilities for the delivery of self-service functions, and change management.

Organization – Contains capabilities concerning the development of organizational competency around Cloud Computing including the organizational structure and skills development, as well as executive sponsorship and organizational authority.

Governance - Contains capabilities concerning the governance structures and processes that support and guide the cloud efforts. These include policy management, risk management, and auditing capabilities. Maturity and adoption of adequate governance is a leading indicator of the overall success of a Cloud Computing strategy.

These eight domains, although interrelated, are distinct, and they form a means of organizing an assessment effort, as well as the development of a roadmap. Successful transition to Cloud Computing requires adequate progress in all of these domains. Inevitably an organization will be more advanced in some domains (and further in some of the capabilities within a domain) than others. Therefore, it is important to be able to measure the relative maturity within each domain (and capabilities therein) and across domains to identify areas that are lagging. Once the lagging areas have been identified it is possible to formulate remedies and thereby improve the success of the overall Cloud Computing initiative.

For example, an organization might have a reference architecture that is widely disseminated, had been reviewed and accepted broadly, but lacked significant elements (e.g. resource pooling strategy) required to provide a complete architectural vision for Cloud. Having both a reference architecture and a resource pooling strategy are best practices, and both are therefore captured in the Cloud Maturity Model as capabilities.

For each capability included in the model, a description for each level of maturity and level of adoption is provided. Although there is always some level of subjectivity when measuring capability, these descriptions minimize the subjectivity injected, and thereby provide, as best as possible, an objective measure of both maturity and adoption.

Best practices for Cloud Computing are evolving, and there is considerable room for debate when interpreting the essential characteristics of a Cloud (e.g., what constitutes self service); therefore, the Cloud Maturity Model remains technology, standards, and product agnostic while still capturing the major tenants of a complete Cloud Computing strategy.

Additional capabilities are added as best practices emerge. Thus, the details of the Cloud Maturity Model will continue to evolve as more experience with Cloud Computing is gained. This allows the specifics to evolve as industry and Oracle knowledge of Cloud Computing advances.

Maturity and Adoption Assessment

In order to properly measure the overall progress of a Cloud initiative in a large organization, the maturity of the individual capabilities and the degree of adoption of such capabilities across the organization must be assessed. At this time, this approach is unique to the Oracle Maturity Models for Cloud Computing. An example of plotting maturity and adoption levels is shown in Figure 2.
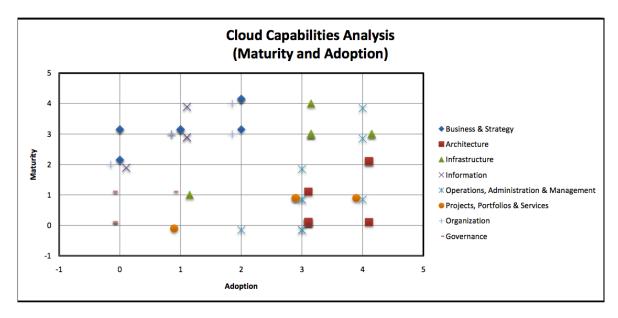

Figure 2: Plotting the Cloud Maturity Model – measures both maturity and adoption levels

Maturity

Within the software industry, maturity is frequently related to the Capability Maturity Model (CMM) and the CMM successor, the Capability Maturity Model Integration (CMMI). The Cloud Maturity Model parallels this understanding and measures Cloud capability against six defined maturity levels.

The maturity levels progress from 'None' up to 'Optimized.' These levels define the path an organization usually takes moving toward Cloud maturity. Cloud Computing by its very nature, requires coordination, cooperation, and a common vision to be successful; therefore, it is necessary to define the strategy before it is possible to be truly successful at repeating it and then ultimately optimizing it.

The six levels of maturity used in the Cloud Maturity Model from lowest to highest are:

None - There is no Cloud approach being taken. No elements of Cloud are being implemented.

Ad Hoc – Awareness of Cloud Computing is established and some groups are beginning to implement elements of Cloud Computing. There is no cohesive Cloud Computing plan being followed.

Opportunistic – An approach has been decided upon and is being opportunistically applied. The approach has not been widely accepted and redundant or overlapping approaches exist. It may be informally defined, or if documented, may exist primarily as "shelf ware".

Systematic – The approach has been reviewed and accepted by affected parties. There has been buy-in to the documented approach and the approach is always (or nearly always) followed.

Managed – The capability is being measured and quantitatively managed via some type of governance structure. Appropriate metrics are being gathered and reported.

Optimized – Metrics are being consistently gathered and are being used to incrementally improve the capability. Assets are proactively maintained to ensure relevancy and correctness. The potential for market mechanisms to be used to leverage inter-cloud operations has been established.

Adoption

Adoption measures how widely Cloud Computing is being accepted, embraced, and applied within the enterprise. For smaller organizations within a single line-of-business, maturity and adoption are usually tightly related since there is a single approach to Cloud being followed by the entire organization.

However, within large companies with multiple divisions or lines-of-business this is not usually the case. It is common to have one or multiple administrative purviews. Each may differ in relatively maturity of Cloud Computing capabilities. The Cloud Maturity Model handles these situations by providing a separate measure for adoption level. This allows a single division or administrative purview to be effectively evaluated for Cloud maturity while still capturing the level of adoption as a separate measure.

For small organizations, it may be desirable to ignore the adoption dimension altogether and simply measure maturity. Conversely, for very large organizations with a goal to achieving a broad Cloud adoption, it may be desirable to measure the maturity for each division or line-of-business separately and then provide a single measure of adoption across the enterprise. It should be noted, however, that for the realization of many of the key Cloud benefits, higher levels of administrative purview and deeper adoption across the organization is critical.

The levels of adoption used in the Cloud Maturity Model are:

No Implementation - There is no current implementation anywhere in the organization of the capability being measured.

Discrete Resources - The capability is established for a single resource (e.g., application, hardware system, discrete organizational workgroup [e.g., project]).

Across Collections - The capability is established consistently for a collection of resources, primarily defined by the resource affinity or coupling in relation to a higher level function (e.g., suite of related applications, an HA cluster of servers, or a composite engineered system).

Across Pools - The capability is established consistently throughout a pool of resources, primarily defined by a common administrative purview (e.g., JEE applications, shared servers or storage environments throughout a data center, or an organizational division).

Across Units – The capability is established consistently within an operating unit (e.g., applications, hardware environments across multiple data centers or resources across an independent operating unit or subsidiary).

Across Clouds – The capability is established consistently across an entire 'enterprise' and may span cloud providers (i.e., all applications, all data centers or all organizational units, or multiple clouds are using the same approach).

Applying the Cloud Maturity Model

A detailed assessment of an organization requires interviews of a variety of roles within the organization including executives, enterprise architects, developers, project and program management, operations, etc. The assessor then uses the details of the Cloud Maturity Model to assign levels of maturity and adoption for each capability. These scores can then be presented in a variety of forms depending on the audience and the amount of detail desired.
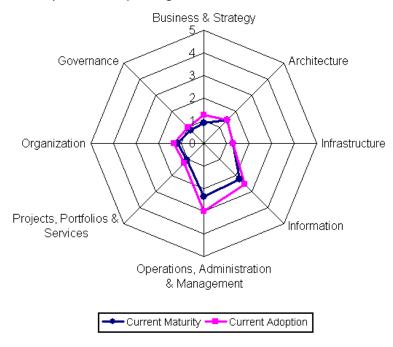

Figure 3: Spider Graph of Maturity and Adoption

For example, a spider chart (Figure 3) can be created by averaging the maturity and adoption scores for the capabilities within each domain. This type of graph provides a high-level view of the overall maturity and adoption for the organization and can be used to highlight domains that are lagging with respect to the other domains.

The assessed values can also be used when defining a phased approach to improving the Cloud initiative. A key input to the phased approach is the level of maturity and adoption that the organization needs to achieve in order to meet the goals of the Cloud initiative. This target level of maturity and adoption is analogous to the 'vision' for the Cloud initiative.

While this 'vision' level of detail is appropriate for an executive, the Cloud program manager, needs finer detail so that an actual plan for improving Cloud capabilities can be created. One such detailed graphic is the Cloud capability heat map as shown in Figure 4.

The graphic in Figure 4 illustrates the maturity via color-coding for each capability within an example subset (three of the eight domains). The red colored capabilities have a maturity level of 'No Cloud', orange indicates 'Ad Hoc' capabilities, etc. For example, the matrix shows that within

the Business & Strategy domain, there is no capability for the Pricing Model. Clearly this is then an area that requires improvement and that improvement plan becomes part of the approach to Cloud.
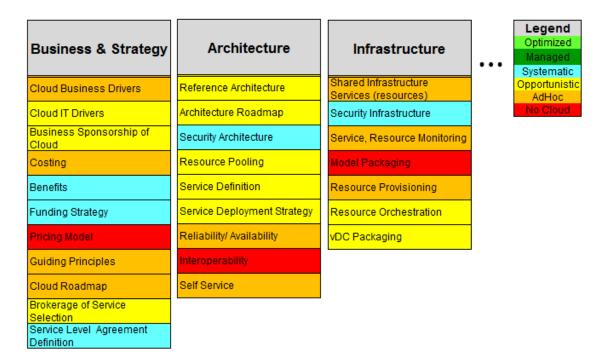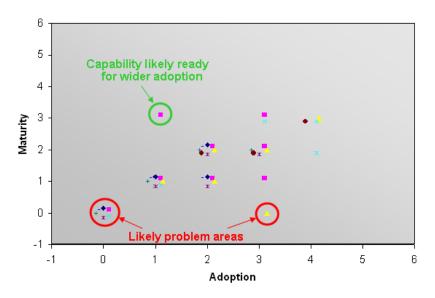
Business & Strategy	Architecture	Infrastructure		Legend
Cloud Business Drivers	Reference Architecture	Shared Infrastructure Services (resources)		Optimized
Cloud IT Drivers	Architecture Roadmap	Security Infrastructure		Managed
Business Sponsorship of Cloud	Security Architecture	Service, Resource Monitoring		Systematic
Costing	Resource Pooling	Model Packaging		Opportunistic
Benefits	Service Definition	Resource Provisioning		AdHoc
Funding Strategy	Service Deployment Strategy	Resource Orchestration		No Cloud
Pricing Model	Reliability/ Availability	vDC Packaging		
Guiding Principles	Interoperability			
Cloud Roadmap	Self Service			
Brokerage of Service Selection				
Service Level Agreement Definition				

Figure 4: Cloud Capability Heat Map (three of eight domains highlighted for illustration)

Figure 5: Cloud Capability Scatter Plot

Plotting maturity versus adoption can also illustrate some capabilities of interests as shown in Figure 5. This graph plots the maturity and adoption for all of the capabilities on a single scatter plot. Of particular interest are the outlier scores since these tend to be either areas requiring improvement (closer to either axis) or areas showing excellence (farther away from the origin). For example, a score with high adoption value and low maturity may indicate a wide usage of a poor practice (with its potential negative effects) while a score with high maturity and low adoption values may indicate an opportunity to spread a well-understood best practice that could be embraced by more organizational units or higher levels of administrative purview fairly quickly, i.e. an easy win.

The graphs described are only a representative sample of the types of graphs that can be created to analyze and present the Cloud capability scores. The real value is not in the graphs *per se,* but rather the detailed, accurate, complete measurement of the progress of the Cloud initiative which can be used in a variety of ways to improve the success of the Cloud initiative.

Conclusion

Cloud Computing can reduce the cost of delivering services, and increase business agility. Achieving these benefits requires a systematic, widespread, holistic, and pragmatic approach to Cloud.

The Oracle Cloud Maturity Model includes sixty capabilities that reflect industry and Oracle best practices. This provides the details necessary to accurately measure the progress of a Cloud initiative. The measurement of the Cloud implementation progress can be analyzed to find areas that need improvement. These areas can then be addressed by applying industry and Oracle best

practices to increase the success of the Cloud initiative and drive greater value for the organization.

Because the Cloud Maturity Model contains considerable Oracle intellectual property, access is restricted. To get access to the Cloud Maturity Model, please contact your Oracle account team, or alternatively, send an email to its_feedback_ww@oracle.com.

IT Strategies from Oracle

IT Strategies from Oracle (ITSO) is a series of documentation and supporting material designed to enable organizations to develop an architecture-centric approach to enterprise-class IT initiatives. ITSO presents successful technology strategies and solution designs by defining architecture concepts, principles, guidelines, standards, and best practices.

This document is part of a series of documents that comprise the Cloud Enterprise Technology Strategy, which is included in the ITSO collection. Please consult the ITSO web site for a complete listing of Cloud documents as well as other materials in the ITSO series.

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