Cloud Solutions

Cloud environment presents an opportunity to enhance the user experience by providing a broader communication path for reaching out to the user or for providing a series of business services.

Cloud Application Planning

The design and development of cloud application requires many unique considerations.

* Business functions
* Application architecture
* Security for cloud computing
* Cloud delivery model
* User experiences
* Development, testing, and run-time environment

Cloud Business Support Services and Cloud Operational Support Services

Business Support Services- Customer orders, managing customer data, managing order data, billing, rating, and offering services.

Operational Support Services – Network, process such as maintaining network inventory, provisioning services, configuration network components, and managing faults.

Cloud Ecosystem

It is very important to understand the relationship between a cloud service and artefacts that can be developed based on and within the boundaries of an ecosystem focused IaaS or PaaS cloud services. Bringing any cloud service to market requires corresponding pre-investment along with respective metering and charging models in support of the corresponding business model.

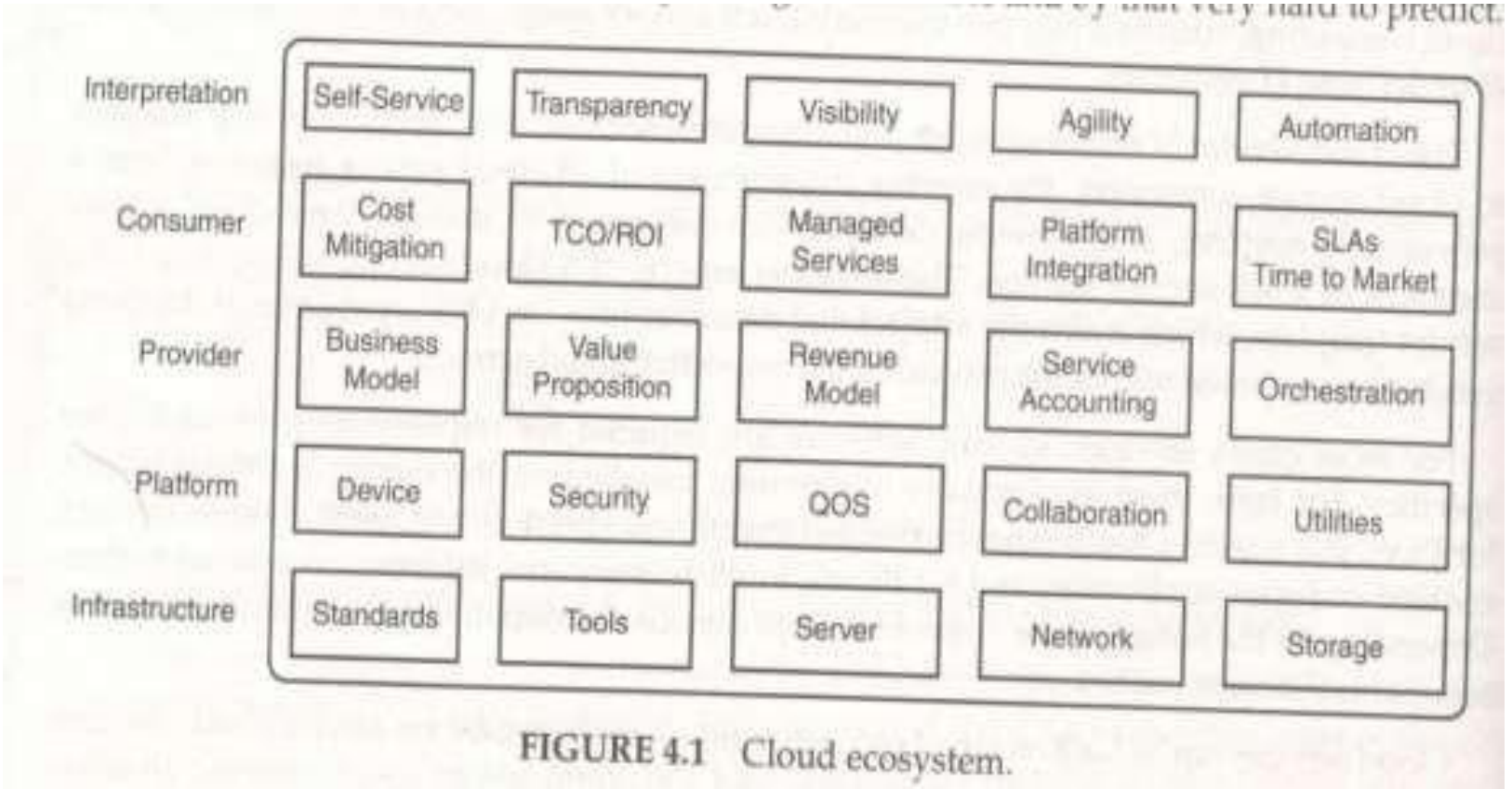

FIGURE 4.1 Cloud ecosystem.

Cloud Ecosystem

Cloud based environment come handy especially when used to develop, test, and run application for the following reasons.

* Available in private cloud environment or on the public cloud.

* Rapid access as a configurable development and test environment to speed timeto market.

* Self-service web portal for enterprise account management and provisioning in minutes.

* Pay-as-you-go pricing, with the choice of preferred pricing through reserved capacity packages.

* Security-rich environment designed to protect your system and data.

* Access to a rich catalogue of software images for improved flexibility and rapid provisioning.

* Rapid provisioning and faster time to value.

Cloud Business Process Management

Business Process Management (BPM) governs an organization's cross-functional, customer-focussed, end-to-end core business processes. It achieves strategic business objectives by directing the deployment of resources from across the organization into efficient processes that create customer value.

The principle to BPM is the 'continuous improvement', perpetually increasing value-generation and sustaining market competitiveness or dominance of the organization. It clearly defines, and aligns operation organization, and informationtechnology. The cloud environment can help in the following ways.

* Integration of core business :
    - Holistic
    - Crosses organizational functional and boundaries (height and breadth)
    _ Includes business and technologies.
* Value-focused efficiency :
    - Customer-centric perspective
    - Bottom-line success
    - speed at which ROI is delivered
    - Performance measurement
* Continuous :
    - This is based on longer period of intervals pertaining to cloud business
    - Continual improvement
* Cultural :
    - Cultural consideration of the organization and geographical area kept in mind at time of due diligence of the requirement.

Identifying BMP Opportunities

The opportunities required for successful cloud business process management and characteristics of cloud deploymentofferings. The answer to the following questions can help you identify cloud opportunities better.

* Are the strategic value proposition and capabilities defined for organization?
* How the overall strategy drive the design and execution of business process? Is there a traceability of execution to goal?
* How to manage core business processes?
* What are current process initiative?
* What are current process governance facilities?
* Are existing organization structure aligned to enable efficient process operation?
* How customers measure and assess the performance of processes?
* How process performances compare to your competitors?
* How effectively does current technology (Information, system, tools, machines etc) enable the enterprise core business processes?
* What risk and challenges does current technology present for current and future process capabilities?
* What product does organization have? What type of product?
* What are the notable pieces of IT portfolio?
* Has organization adopted SOA?
* How are process currently modeled in organization? What is included in the model?
* What design / development tools are currently used in the organization?
* What testing tools are currently used by the organization? What are the strengths/ Weakness of the tools?
* Describe the different business process that are automated in the organization?

Identifying BMP Opportunities

Cloud application development offerings provides.

* Cloud application references architecture.

*Unmatched experience developing high performance secure application across a wide range of technologies of the cloud vendors.

* Unmatched application security expertise.

* Leadership in cloud related technologies – multi-tenancy, virtualization, pervasive computing.

* Significant expertise with cloud business models.

* Ability to integrate a portfolio of related cloud service.

Cloud Technical Strategy

How technical strategy can enable cloud deployment for cloud customers.

Cloud service enable, cloud users to build middleware clouds in their datacenter and utilize public clouds it makes sense by providing the following cloud enabled middleware services.

* Infrastructure Services
* Platform Services
* Application Services

Cloud Technical Strategy

Cloud strategy enable organization to do the following.

* Build middleware clouds in their datacenter
* Utilize public clouds

where it makes sense It does

so by supporting in the

following areas

* **Cloud-enable middleware services**
  - Infrastructure Services
  - Platform Services
  - Application Services
  - Serving the on premise and public clouds

What does it mean to develop an application service for the cloud? It means product features development similar to on-premise software.

* **Enabling the software for cloud essentially implies :**
  - support for collaboration multi-tenancy
  - Self-service registration
  - Managing customers and their entitlements
  - Single sign on

Cloud Technical Strategy

- Additional security concerns.

* **Integration with the datacenter :**

- Firewall, reverse proxy configurations.
- Fully qualified domain name, certificates.
- Management of services, patch procedures.
- Isolation, recovery, backup issues.
-

Cloud Use Cases

Infrastructure as a Services (IaaS) or Test/ Development

Problem : Development teams requires unpredictable amounts of infrastructure to get their jobs done. To get all resources in a development cycled is quite a challenge. Procurement of hardware is a slow process. Static development and testing resources requires manual re- provisioning in order to re-purpose resource for use, or new resources need to be purchased to meet demand. Incase where project timelines are short, this will jeopardize the project delivery schedule. Different type of projects needs different kinds of development components(Like SQL,Server, SharePoint, Biz Talk etc)

Solution : Companies can create standardized service catalogue items for common infrastructure requirements and enable development and test teams to access infrastructures ina self service model (IaaS)

Cloud Use Cases

Standardized Development Platform/ Middleware (PaaS Enable)

Problem : Developer are often not concerned about the impact of their code on operation. They deliver their code without involving operation into architecture decision or code reviews.

Solution : Companies can create standardized development platform definition for use by development team to standardize and streamline their efforts.

Application Cloud

Problem : Companies wants to move beyond self-service for infrastructure and provide application owners the ability to define, instantiate and manage complex multi-tier application.

Solution : End user can access complete application definition and manage them according to their quotas and preferences defined by cloud administration. Application in production can be monitored across multiple factors and automatically scaled up and down according to business policies.

Cloud Use Cases

Software-as-a-Service (SaaS) to End Customers

Problems : Many companies want to deliver their applications to end users as a service. Creating a multi-tenant SaaS offering requires substantial development to support security, performances, and scalability needs. Due to those high costs, companies cannot offer new services based upon existing applications.

Solutions : Companies can provision a unique application instances per customer with private cloud automation capabilities. Environment are provisioned according SLA . Automation to on-demand complex application and configuration environment along with dynamic application scaling, and high availability across multiple datacenter.

Cloud Service management

A service management system provides the visibility, control, and automation needed for efficient cloud delivery in both public and private implementation.

* **Simplify user interaction with IT:**

  - User-friendly self-services interface accelerates time to value.

  -Service catalogue enable standards which drives consistent services delivery.

* **Enable policies to lower cost with provisioning :**

  - Automated provisioning and de-provisioning speeds services delivery.

  -Provisioning policies allows release and reuse of assets.

* **Increase system administrate productivity :**

  - Move from management silos to a services management system.

Cloud Service management

The emergence of cloud deployment is prompting enterprises to either assemble in-house team to manage specialize cloud services provider or look to third party cloud brokers chiefly due to following reason.

* Every service-oriented approach a mechanism to enable discovery and end –point resolution.

* Registry/ repository technology provides this where services delivery is inside the firewall.

* Cloud services delivered across firewall need something similar- a third party that serves as a service broker.

Broker is the critical success factor in cloud computing as cloud services multiply and expand faster. The growth of services brokerage business will increase the ability of cloud consumer to use servicesin a trustworthy manner. Cloud service providers are expected to begin to partner with cloud brokerages to deliver the services they promote. Brokers help companies choose the right platform, deploy apps across multiple clouds, cloud arbitrage services and capture best pricing.

Three categories of opportunities for cloud brokers.

* **Cloud service intermediations :** Building services atop an existing cloud platform, such as additional security or management capabilities.

* **Cloud aggregation :** Deploying customer services over multiple cloud platforms.

* **Cloud services arbitrage :** Supplying flexibility and ‘opportunistic choices’ and fostering competition between clouds.

Key Cloud Solution Characteristics

The essential cloud orchestrator and engine key characteristic capabilities are:

*** Scalability :** Cloud orchestrator should maintain an index of resources that are acquired by hypervisor and enable to scale across tens of thousands of machines across multiple geographic.

*** High Availability :** Cloud orchestrator keeps availability of 'Active-Passive' , 'Active-Active' anddisaster recovery (DR). Cloud orchestrator monitor individual physical server availability, failure and restart the VM.

*** Application Lifecycle :** Cloud orchestrator should offer complete application lifecycle support like, creation of infrastructure, installation, configuration, launching of application to deletion or expiration, in real-time demand.

*** Multi-tenancy / Role-based Administration :** Cloud orchestrator should support multi-tenant capability with specific user permission. The application owners or administrator logs in with credentials and view the application.

*** Policies :** Cloud orchestrator should provide rich set of policies that can be enabled, modified or new one can be created to take effect at the global level on application. Policies define an application to flex up to 10 VM during high load and reduce to only 2 VM during low load.

*** Alarms :** Cloud orchestrator should provide pre-defined alarms that can be set at the global level for applications, VM's, host, etc. Alarms are used to notify application owners or users regarding the threshold being reached.

Key Cloud Solution Characteristics

* **Application Awareness and Policy-based Allocation :** Cloud orchestrator should be aware of application requirements and optimizes the placement of application. Example- placing the VMs close to each other running the same application to reduce the latency.

* **Resources Awareness and Policy-based Allocation :** Cloud orchestrator should optimize the usage of the infrastructure, by intelligent resource allocation policies and load balancing of VMs.

* **Elasticity Based on Performance (Flex-up/ Flex-down) :** Cloud orchestrator should provide out-of-the-box functionality to flex-up or flex-down an application instances or resources based on performance metrics.

* **Reporting and Accounting :** Cloud orchestrator should provide metering and billing reports on resource allocation and actual usage. This information can be used in creating inventory capacity and consumption of resources by each applications.

* **Self-Service Portal :** Cloud orchestrator should provide a self-service portal for application owners. Application owners can request resources (machines), monitor and control them through portal. It should drive the workflow and provide a run-time environment management in order to support application elasticity.

ON-PREMISE CLOUD ORCHESTRATION AND PROVISIONING ENGINE

On-premise cloud orchestration and provisioning engine can be a bundled offering that includes hardware, software and the services needed to start the cloud computing. It should include service ecosystem, self-service portal, automation and control all of resources.

The objective is to provide a pre-package private cloud pre-installation and configuring ofsoftware, hardware, which includes all services and on top of that user can add additional services. A private cloud will accelerate selling efforts and effectiveness, along with leveraging the benefits of cloud computing such as virtualization, flexibility, scalability and self-service portal.

Benefits / Value Proposition

Powers faster time to innovation, lower cost per unit of innovation.

* **Innovation :** It should dramatically improve business value and IT's effect on time-to-market by enabling the business workloads to rapidly and accurately be deployed when and where they are needed.

* **Decrease Operational Expenses :** It must gain productivity increase in IT labour costs throughautomation. Maximize capita usage and reduce added capital expense.

* **Reduce Complexity and Risk :** With automation and standardization, the human errors-factor should be minimized.

ON-PREMISE CLOUD ORCHESTRATION AND PROVISIONING ENGINE

Cloud orchestration and provisioning requirement analysis :

To understand the cloud orchestration and provisioning requirement we need to first understand

* Test and development requirement of the cloud deployment.

* Be sure of the about the automation of the testing and development cycle to reduce the deployment time.

* Discussion with cloud customer about deployment of cloud orchestration and provisioning engine.

* set the boundaries of the environment, about 30-50 % of IT environment is devoted to test/ development purpose.

* With cloud orchestration and provisioning engine, a developer can log into a self-service portal select required resources and timeframe.

* Customer datacenter support thousands of application representing business workload, multiple type of servers, storage, networks, middleware, and operating system.

* Cloud orchestration and provisioning engine turns the existing environment into a cloud. That is in a quickly getup and running model, as a seed and grow model.

Entry point :

*** Turn existing environment into a cloud**

- Install cloud management platform and assign existing resources to the cloud.

- Scenario- Already enough equipment are their or cloud orchestration and provisioning engine offering is not the right platform.

*** Jump start the cloud**

- Hardware+Software+Service required for quick start up.

- Can use a seed and grow model- start with a cloud orchestration and provisioning engine and then addmore.

ON-PREMISE CLOUD ORCHESTRATION AND PROVISIONING ENGINE

Cloud Infrastructure Security

The security aspect of the cloud infrastructure goes side by side with Service Oriented Architecture (SOA) security. Is a layered approach.

Cloud Orchestration and Provisioning Engine : Integrate service management is offered with servers, storage, network, services, and financing as an integrated offerings for client test problems.

* **Improved time to value** - Quickly deliver a cloud using a preloaded and integrated system.
* **Improved innovation –** Dramatically improve business value and IT's effect on time-to-market by delivering services faster.
* **Decrease capital expenses –** Maximize capital usage and reduce added capital expenses.
* **Reduce complexity and risk –** With automation and standardization the human error factor is minimized.
* **Fit for purpose –** Based on architecture required by specific workload.
* **Self-contained –** Service management software, hardware, storage and networking.
* **Modular –** Automatically expandable and scalable.
* **Virtualized –** End-to-end across servers, storage and network.
* **Self-service –** Ease of consumption.
* **Light-out –** Zero touch automated operation.

Cloud Orchestration and Provisioning Engine : Is offered as a services engagement which can build a solution to a client's needs, including creation of custom virtual images for dispensing. Summary points are.

* **Drastically reduce set-up and configuration time**

- New environments in minutes!

* **Reduce risk by codifying infrastructure :**

- Freeze-dry best practices for repeated, consistent, deployments.

* **Security throughout the entire lifecycle.**

* **Simplify maintenance and management :**

- Flexibly manage and update the components of yours patterns.

- Ensure consistency in versions across development, test, production.

* **Spend less time administering , more time developing new solutions.**

COMPUTING ON DEMAND (CoD)

On-demand computing is the need of the hours, it is essential in a supercomputing environment. On-demand can be implemented using various virtualization technique. Cloud gives option to leverage the computing infrastructure without actually buying the hardware. This help in using the resource in a most efficient way by utilizing the same recourse to other workloads when the resources are idle.

The unique rich set of features that on-demand computing can offer enable services seeker to deploy a true utility. The platform allows users to.

* **Align cost with utilization :** so that users can scale costs down as well as up. This allows a workload to start with minimal upfront costs scale as the demand grows without paying a penalty to increase capacity.

* **Increase end-users availability significantly** : As workload can be moved dynamically it is possible to move workload from one server to another without interruption so remedial work can be carried out if server down time is required.

* **Balance workload dynamically across multiple servers :** Without taking applications offline. Using the workload mobility featured customer can align their costs by ensuring that workload is deployed in such a way as to optimize system resources.

COMPUTING ON DEMAND (CoD)

*** React to short-term resource requirement** : almost instantly. If a workload has to be deployed at short notice, a virtual machine (VM) can be created on the server and resources allocated instantaneously using the dynamic capacity model.

*** Reduce the physical foot print :** in the datacenter. Consolidation of workload on to a smaller number of servers will improve spaces, power, and cooling metrics.

*** Confidently increase system utilization :** to over 75% without fear of degrading performance for end-users.

*** Develop a simple charging model that reflects usage :** for end users as the servicesdelivery culture continues to mature.

*** Double the workload delivered :** in the power and cooling envelope.

Pre-Provisioning

For the on-demand computing requirement pre-provisioning is the viable option as it helps organization meetthe requirement of the dynamic datacenter requirements. Organization takes less time in commission of servers, when new workload is to be deployed.

This approach is ideal when :

* The sizing and capacity planning is fully understood.
* The workload is fairly constant, ensuring good utilization levels are achieved.
* There are business reasons that requires the physical separation of workload.
* Workload can be scaled horizontally.

On-Demand CPU/ Memory/ VM Resources

In the dynamic environment it is important to track the requirement of CPU, Memory, and VMs. It is based on the common pool concept where resources are allocated and de-allocated as the requirement is over.

This approach is ideal when

* Workload are trending upwards so investment can be aligned with utilization.
* Peek in workload are longer term.
* Workload scales vertically.
* It is more economically advantageous to ‘buy out’ dynamic capacity.

Dynamic Capacity

Utility CoD is used to automatically provide additional processor capacity on a temporary basis within the shared processor pool. Usage is measured in processor-minute increments, and is reported via a web interface or collection of report by cloud vendor engineer. Billing is based on the reported usage.

This approach is ideal where:

* The workload is very variable and multiple workload can be hosted on a single machine so that the utilization can be leveled out.

* The workload has short periods where system utilization increase massively but for the majority of the time it is not resource intensive.

* Workload can share a physical platform.

* The workload is designed to scale vertically only.

* Users want to dynamically balance workload across servers.

* Users want to continue to run very small workloads without incurring the overheads associated with running a physical server to support it.

Benefits :

* partition mobility, significantly reduced power/ cooling footprint, donation of unused processor cycles of VMs with dedicated processor to uncapped partitions and at the same time guaranteed performances of those VMs.

* Very short deployment time (time-to-market optimized)

* Lowest possible cost for deployment of small workloads.

* Less management effort, for example, when using VMs.

* Most granular charging scheme, pay for the CPU and memory cycles actually used.

* Complete decommissioning of partition, resources are available for other purpose.

* Flexible workload management workload can compensate for each other, thus reducing overall utilization.

* Ideal for environment with identical system management, utilities for development and testing.

Limitations :

* Short peaks must not exceed certain limits and needs to be monitored(Via web interfaces) to ensure best value is obtained.

* Utility CoD provides processor resources only to the uncapped partition.

Cloud Platform Characteristics Based on CoD

Cloud platform characteristics are discussed on the basis of low-end, on-demand,and dynamic-capacity-based servers.

Low-End Servers

* Physical segregation of servers.
* High administration cost due to management of more physical servers.
* Limited and complex scalability, process- maximum 8 processors per server- slower turn around time for server deployment.
* Longer lead time for server deployment from ordering of servers to setting up of infrastructure.
* Not ideal for short product lifecycle application due to fixed expenditure for hardware.
* Wastage of hardware resources for application that reacts to volatile markets.
* Unable to share resources between application.
* Wastage of un-used processing cycles if the application does not fully utilized the resources.
* No hardware/ application interdependency forcing down time on application owners.
* No capacity on demand capability. Downtime is required for adding new hardware.
* Low price per CPU cycle purchased but higher cost per CPU cycle actually used.

Cloud Platform Characteristics Based on CoD

On-Demand Platform

* Physical or logical segregation of servers or partition implementation.

* Lower administration cost due to less physical servers management.

* Can cater for quick turn-around time for new application deployment or increase capacity due to business requirements.

* Enhance time to market for new product launch with immediate availability of CPU/ memory capacity.

* Not ideal for short product life cycle application due to fixed cost expenditure for hardware.

* Wastage of hardware resource for application which reacts to volatile market.

* Able to share I/O, CPU and memory resource between applications.

* Able to take advantage of un-used CPU/ memory if dynamic VM reallocation or share pool methodology is implemented.

* To provide an environment in which there are no hardware/ application interdependencies forcing down time on application owners care full capacity planning and management is required.

* Capacity on demand capability –no downtime is required if CoD CPU/memory is sufficient.

* Higher price per CPU cycle, lower cost per CPU cycle actually used.

Cloud Platform Characteristics Based on CoD

Dynamic Capacity Platform :

* Choose virtual machine (VM) or workload virtual machine implementation for application consolidation.

* Lower administration cost due to less physical and logical servers management.

* Can cater for quick turn-around time for new application deployment.

* Enhance time to market for new product launch with immediate availability of infrastructure and setup.

* Ability to scale up and down which will be ideal for application with short product life cycle.

* Able to cater for application which react to volatile market, i.e scaling up and down capacity.

* Able to share I/O, CPU, and memory resources between application.

* Able to take advantage of un-used processing cycles of other application.

* No hardware/ application interdependency forcing down time on application owners as workload can be dynamically moved to facilitate maintenance etc.

* Capacity on-demand capability. No downtime is required as the machine is fully configured.

* Higher price per CPU cycle, lower cost per CPU cycle actually used. Average price due to theability to optimize utilization and rapidly deploy workload.

CloudSourcing

In todays era optimizing hardware resources and moving towards the large enterprise day by day so cloud computing has become the ingredient part of infrastructure deployment.

Cloudsourcing helps in end to end solution using cloud methodology using public cloud, infrastructure and platforms.

This include the whole cloud implementation, IT business consulting, integration, and configuration of the business. This gives an option to enjoy the benefit service industry with the benefits of the cloud that gives the innovative approach of paying the resources over subscription.

Real deployment of the cloudsourcing will require the business model with the impact of cloud customer and cloud vendor requirements.

Cloud customer have no control over infrastructure layout of the cloud deployment. Even there is no control over place from where the data services are offered from the cloud vendor. Cloud customer don’t have to think about the operational staff for the deployments.

Thus, cloudsourcing will be playing the vital role in the next generation of cloud implementation . With the availability of new open source tools integrated with partner cloud solution, platform and infrastructure, and the new charging models.

This will help to customize application on cloud infrastructure. This is primarily being offered as a public cloud and all offering will be available as managed service.

CLOUD OFFERINGS

Introduction

Information is pouring in faster than we can make sense of it, It is being authored by billions of people and flowing from a trillion intelligent devices, sensors, and instrumented objects. With 80 percent of new data growth existing as unstructured content from music files, 3D images, medical records, e-mail keystroke and more, the challenges is trying to pull it all together and make it useful.

Earlier organization could not fully or quickly synthesize and interpret all the information available. But now, there are mechanism that can capture, organize, and process all the data scattered throughout an organization, and turn it into actual intelligence. This enables organization in making better business decision.

CLOUD ANALYTICS

Cloud Analytic is the new offering in the era of cloud computing. Cloud analytic will help in consulting domain and ensure better result. It provides user with a better forecasting techniqueto analyses and optimize the services and provide a higher level of accuracy. Cloud analytic apply analytic principle and best practices to analyses the different business consequences and achieve newer level of optimization. Cloud analytic combines complex analytics with the newer software platforms and will lead towards the predictable situation out of every business insight.

CLOUD ANALYTICS

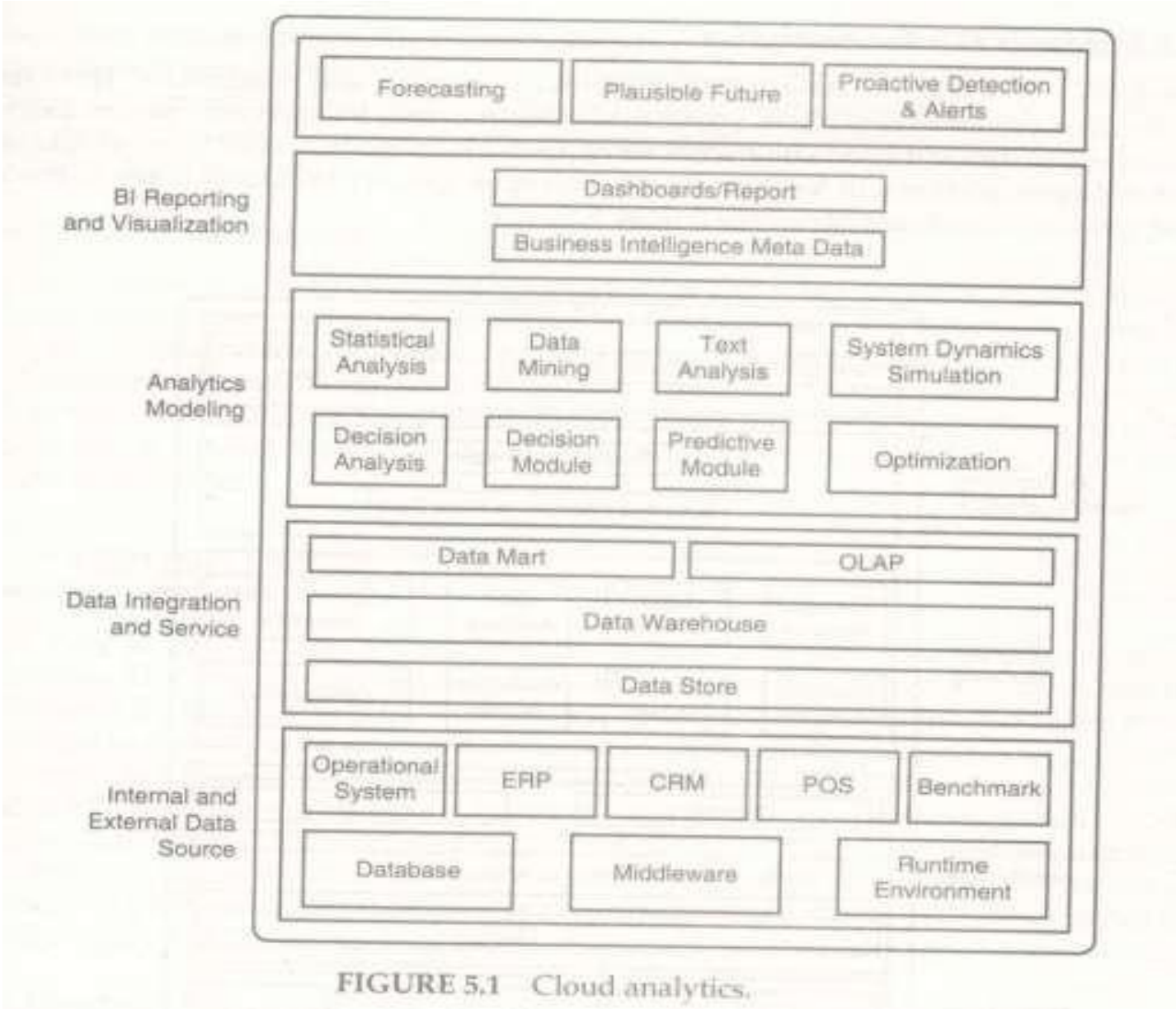

FIGURE 5.1 Cloud analytics.

Cloud Business Analytics Competencies

The cloud business analytic service is supported by different type of competency areas. The different competency are.

*** Cloud business analytics strategy :** This helps client achieve their business objectives faster with less risk, and at a lower cost by improving how information is recognized and acted upon across the enterprise or within a business functions.

*** Business intelligences and performance management :** This helps increase performance by providing accurate and on-time data reporting.

*** Analytic and optimization:** This provides different types of modeling techniques, deep computing and simulation techniques to check for different type of ‘what if’ analysis to increase performance.

*** Enterprise information management :** This let apply different architecture related to data extraction, archival, retrieval, movement, and integration.

*** Content management system :** This includes the different service architecture, technology architecture, and process related to capturing, storing, preserving, delivering, and managing the data. It also help to provide access in the global environment and makes it easy to share data with stakeholders across the globe.

How it works: Analytics

Analytic works with the combination of hardware, services, and middleware. This expertise makes it best suited to help clients extract new value from their business information. Deliveringbusiness analytic and information software require a seamless flow of all forms of data regardless of format, platform or location. Its focus on open industry standards is key to this effort, and gives us a significant advantage.

Analytics Business Outcomes

* Analysis systems help to get the right information as and when required, identify how to get it, and points out the right source to get it.

* Analysis helps in designing the policies faster based on the information available in the organization.

* Decision makers use the exploration service available in organization in making decision.

* Analysis help in gauging the business results by measuring the different metrics generated with the help of analysis.

* Analysis gives an option by which the organization can increase the probability, reduce cycle time, and reduce defects.

Cloud analytics business outcomes

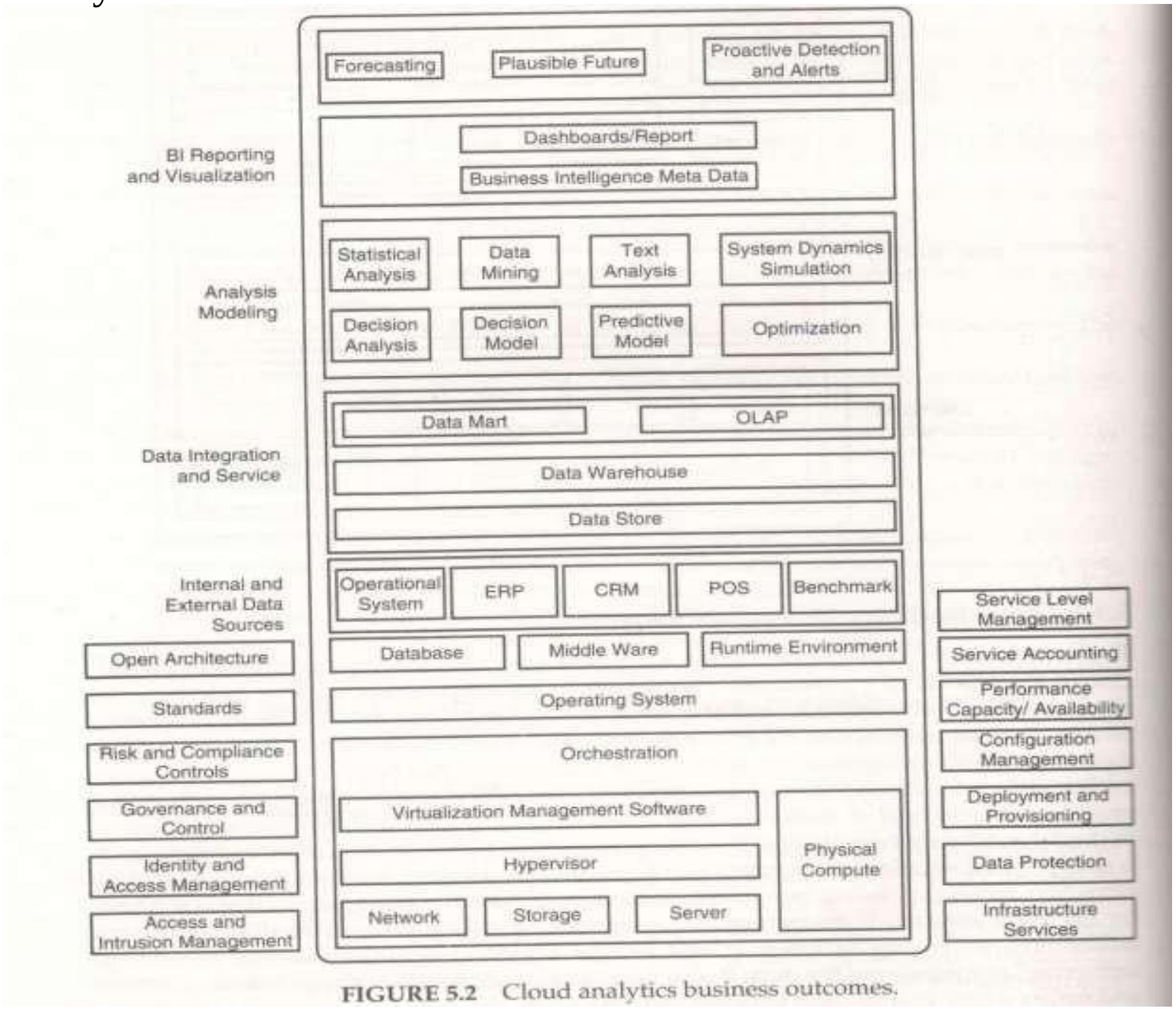

FIGURE 5.2 Cloud analytics business outcomes.

Testing Under Cloud

Testing of the cloud resources need virtualization services, this ensure more secure and scalable solutions where consumers can access the IT resources in the test environment. Testing under the cloud environment gives a insight by decreasing the manual intervention and reducing the processes in typical testing environment, by enabling the access of resources whenever required, it also reduces the capital investment, and enables the business to handle ups and downs of testing environment. With this, organization can reduce the test cycles, minimize the IT cost, reduce defects, rationalize the testing environments, and hence improve the service quality. This provide a good return on investment (ROI) on moving the typical testing environment to cloud.

Benefits :

* Cut capital and operational costs and not affects mission critical production application.

* Offer new and innovative services to client, and present an opportunity to speed cycles of innovation and improve solution quality.

* Facilitate a test environment based on request and provide request-based service for storage, network, and OS.

Testing Under Cloud

Value Proposition :

Business test cloud delivers an integrated, flexible and extensible approach to test resource services and management with rapid time to value. This is an end-to-end set of services to strategies, design, and build request driven delivery of test resources in a cost effective, efficient manner.

The Biggest Benefiters.

***** Testing and development under cloud environment will reduce operational cost and capital expenses, by solving the biggest problem of financial heads.

***** Reduces the cycle time of testing and development environment without buying the infrastructure.

***** Typically 30 to 50 percent of all servers in an IT environment are dedicated to test and development. So it is usually considered as low hanging fruit in terms of getting ROI and benefit out of cloud computing.

***** Many defect are introduced into developing and testing environment, because of high degreeof manual configuration, which often leads to backlogged because of limited access to test environment. This intends to entry into cloud computing.

Cloud Offering Key Themes

Datacenter is managed by operations organization. Operational departments focus on availability, stability of IT service, and IT cost efficiency. Operational department goal is to minimize risk for delivering on non-functional requirements by avoiding unnecessary change and promoting standard infrastructure requirements for application. Enterprise IT operations managers are tasked with serving two main constituencies.

* Application team- Delivery of production internal and/or external applications according to service level requirements in a cost-effective manner.

* Development team- Development department are driven by user needs for frequent delivery of new features. Development team often test new ideas and/ or features quickly in a realistic environment.

Key Themes

* **Infrastructure to Application**- The vision is to support complex multi-tier application provisioning such that the application can be fully configured and ready-to-run.

* **Development/Test Production**- In software development there is a high level lifecycle for applications. The beginning is development then the test(QA), followed by production. Production application are concerned meeting runtime performances SLAs, with dynamic scaling and managing more complex , multi-tier application.

Key Themes

Development/Test Production-production offering in life enterprise environment.

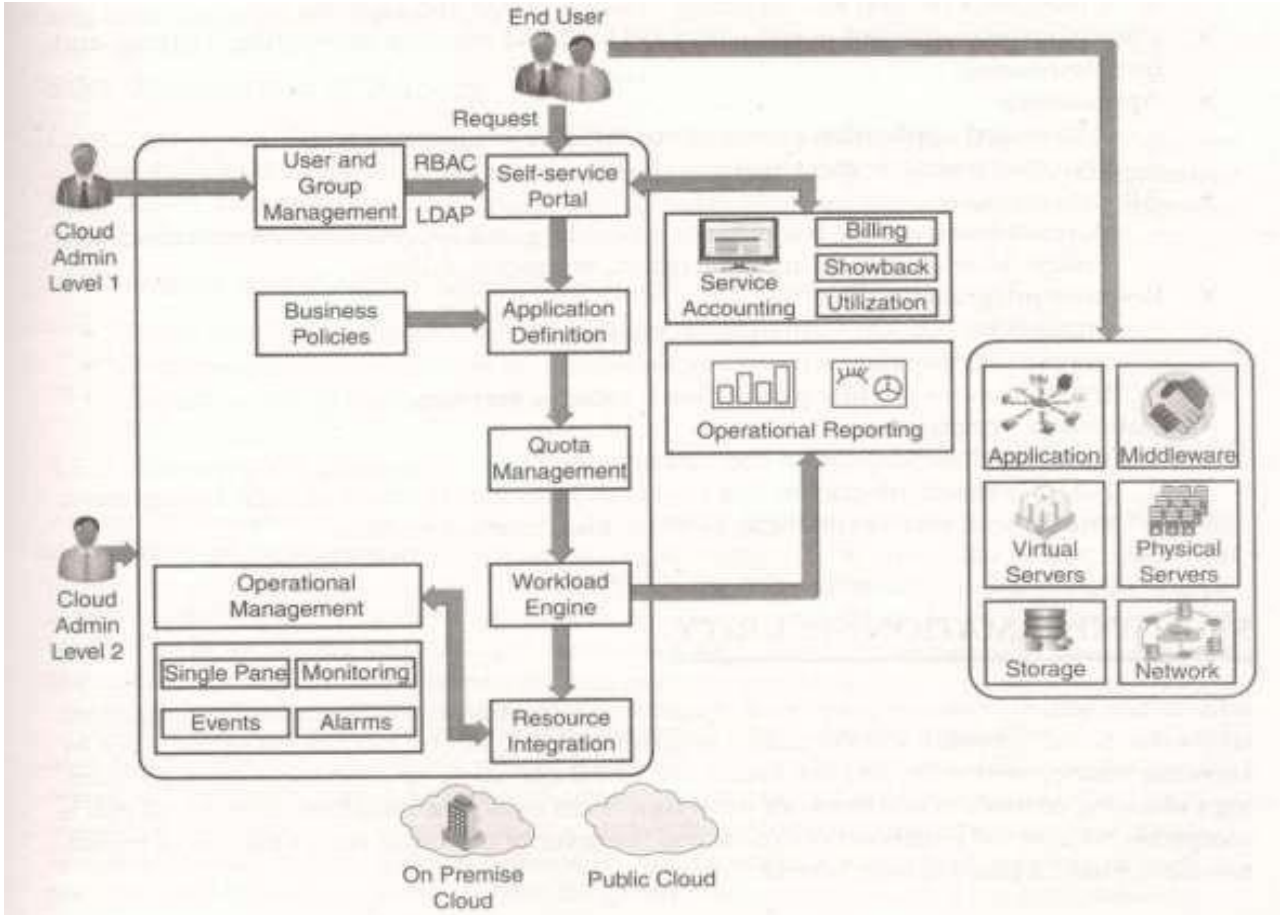

FIGURE 5.3 Cloud orchestration workflow.

Key Themes

- **Allocation and Runtime Scaling-** Allocation is the process of installing the services catalogue item like infrastructure, platform or application. Runtime scaling is the flexing up or down of required resource elements to meet SLA requirements defined by the application owners according to standard corporate standards and business policies.

Benefits

*** Increase agility and innovation**

- Enable self-service delivery (minutes)
- Delivery on SLAs.
- Simplify process for ‘what-if’ experiments.
- Gain control over public cloud usage.

*** Decrease costs**

- Increase utilization.
- Increase operational efficiency (100 servers per admin).
- Achieve a greener datacenter.
- Maintain vendor choice.

Offering Key Characteristics

*** Service layer**

- Self-service portal for different clouds users: Administrators, Cloud Developers and End-users.
- Chargeback/ billing and reporting based on usage and capacity.

*** Operational management portal with workload and resource monitoring, alerting, andtroubleshooting.**

*** Application**

- Automated application provisioning and lifecycle management.
- Dynamic scaling to meet SLAs.

*** Allocation engine.**

- Account based quotas, reservations, scheduling, and approvals for resource allocation.
- Policy-drivers automation of placement, migration, failover.

*** Resource Integration**

- Support for popular virtualization platforms.
- Support for popular provisioning tools.
- Integration for popular public cloud/ external services.

*** Datacenter integrations**

- Role-based authentication and authorization.
- Adaptor-based integration to accounting, asset management, change management, entitlement, service-catalogue system, and ticketing systems.

Information Security

Information security risks are potential damage to information assets. Successful organizations take a risk-based approach in information security. Nothing is 100% secure. A organization can take a risk-based approach, by focusing on implementing mitigating controls to address most significant risks. The remaining minimized risk is acceptable because likelihood of exploit and the severity of exploit versus the cost of mitigation do not have a positive cost/benefit.

Risk can be quantified by the expected (average) damage.

* **Value of assets :** What are the valuable information assets?
* **Vulnerabilities :** What vulnerabilities exist in your system that can be exploited and lead to damage of assets?
* **Threats :** The level of threats that aim at exploiting vulnerabilities.

Security controls are safeguards or countermeasures to avoid or minimize information security risks.

* **Must be effective :** Mitigate the given risk.
* **Should be adaptive :** Adapt to changing risks.

Three main types of controls.

* **Preventive :**Prevent security incidents (e.g. patching a vulnerability)
* **Detective :** Detect a security incident (e.g. Monitoring)
* **Corrective :** Repair damage (e.g. virus removal)

Successful organization recognize risks, implement the appropriate mitigation controls, and innovate to grow their business.

Information Security

Expectation of privacy

Customer expect that security should be built into services themselves. Over 50 percent of potential cloud customer avoid online purchases due to fear of financial information being stolen.

Enterprise must shore-up their weakest supply chain partners.

* More evenly distributed security responsibility.

* Increased transparency from start to finish.

* Eased burden of customer facing unit.

Security Challenges

- Day-by-day datacenter and infrastructure are stretching the limit of resources as the information is growing. This gives rise to data integrity problems and security challenges. Another area is web application deployed have dozens or sometimes have hundred of defects, which are exploited by hacker. Companies must take proactive action to catch vulnerabilities as early as possible.

Information Security

Security Compliance

- Cloud security needs policies and procedures for governance and risk factor.
- It is required to conduct third-party checks and audits for the agreement(SLA) that are breached in the process.

Identify –Based Protection

Cloud environment requires extra protection level, as it works with diverse set of groups. So authentication is needed for getting access to resources for the environment. It also requires regulated monitoring of users, details regarding the logging to the resource, and check-up for the background verification. Gauge the risk if something goes wrong due to improper use of resources.

Maintenance of the identity is required to conduct the smooth operation in the cloud deployment and authentication real users. The biggest problem is to make the confidential data secure, this is done by using secure protocol over the network, and firewalls.

Data Protection @ Cloud

Protection of data, how it is stored, how it is accessed, what the compliances are, and what audits are required as per the SLA. It also regulates the breaching of the data and its separation on the storage infrastructure.

This is handled by encrypting the data in cloud. Another point to be consider is protection of mobile data, in internet based cloud it is not possible to send large amount of data. Therefore, the data should be encrypted.

Information Security

Application Security @Cloud Deployment

Protection mechanism for application at the image level. The cloud vendor have a clear and sound way to tackle this by meeting the demand of the subscriber for issuing the licenses for the required period of interval, destroying then after use, and making sure that the sensitive unimportant data is also destroyed at the same time.

When working in a protected virtual environment, everybody in the cloud deployment should adhere to an agreed upon basic security policy. Cloud vendors and subscribers should have a audit check on the intrusion-based policies and check the prevention system put in place to handle it. This is more important when working in a shared environment, because there are different subscribers on the cloud environment.

Physical security measure include biometric, closed circuit television(CCTV) monitoring to restrict unauthorized entry.

Virtual Desktop Infrastructure (VDI)

Virtual desktop infrastructure provides end-user virtualization solutions. This is designed to help transform distributed IT architecture into virtualized open-standards-based framework leveraging centralized IT services. Virtual desktop infrastructure combines hardware, software, and services to connect to the clients.

Virtual desktop: Virtual desktop infrastructure is to run desktop operating systems and applications inside virtual machines that reside on servers in the datacenter.

Architecture Overview

Virtual desktop infrastructure create a framework that offers many advantages to the enterprise such as:

* **Cost reduction:** More efficient use of resource can increase utilization.

* **Flexibility: -** Common physical infrastructure can support a variety of end user.

  - New desktop images can be created dynamically without hardware procurement cycle.

  - Multiple type of guest OS can run on the virtual machine, so that physical hardware can support a range of end user without integration or reconfiguring.

* **Security:** The data remains in the datacenter with access control.

* **Availability:** Higher availability as VM can be quickly migrated to a different physical server in the event of hardware failure.

* **Efficiency:** Service delivery is more efficient when IT processes are optimized for a centralized environment.

Enterprise level

* Virtual desktop infrastructure(VDI) provides a set of proven integration patterns and methods for implementing a cloud virtualization with help of various tools and product.

* Virtual desktop infrastructure solution (shared service, virtual client, workstation blades, streaming) is shaped by the components selection. The base virtual desktop infrastructure architecture is designed to integrate with existing client environment.

* VDI solution introduce a new method of delivering and managing user desktop environment.

* VDI solution is designed to reduce the dependency on distributed PC and laptops. By placing critical application and data in a centralized datacenter with access from a variety of client device option.

* VDI end-user desktops run on virtual machine hosted in a centralized IT infrastructure in the client datacenter.

* VDI solution provides increased security as no data leaves the datacenter. Additional resources can be easily and quickly added to the IT infrastructure as business requirement arise.

* VDI virtual client solution integrates into the organization datacenter to leverage existing network and infrastructure services.

Enterprise level

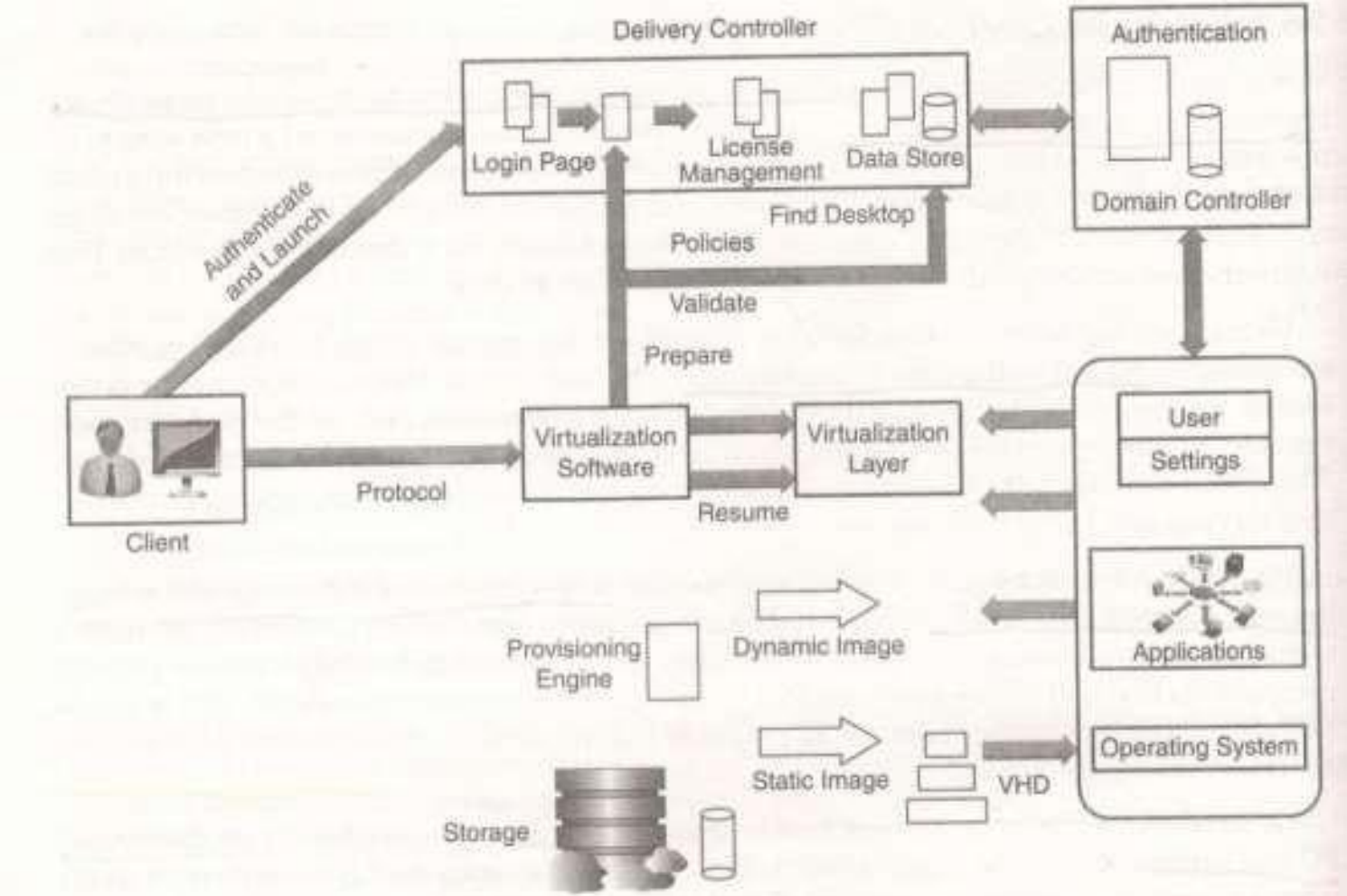

FIGURE 5.4 Virtual desktop infrastructure.

Enterprise level

***** The Desktop client device can be new or existing thin client device, PCs with an access client, a web browser or various combination depending on the client environment.

***** The VDI access services or ‘connection broker’ provider device and user authentication, portal integration, session management, host monitoring, application streaming, and consumption-based metering. This also provides load balancing of all servers.

Client Access

The users use their remote desktop client device to connect to their virtual desktop. This service is provided by all vendors and supported by set of product that connect remote client to the centralized virtual desktop. This process is know as ‘connection brokering’.

Desktop Virtualization Services

The core of the VDI can be viewed as a central-server based resource pool with components connecting end-users to applications, networking, and storage resource.

Desktop Management

Virtualized client and desktop management proactively manage diverse desktop environment and virtual desktop infrastructure server-based client technology.

Pool Management for Virtual Desktop Infrastructure

Management server authenticates the user, determine the pool they belong to, and using predetermined policies, provisions a desktop for that end-user. This pool can be persistent or non-persistent. A pool contains multiple hosted virtual desktop, which are initially identical and cloned from the same template

Non-persistent: pools contain multiple hosted virtual desktops, the connection server allocates entitled users to a virtual desktop from the non-persistent pool as requested. This allocation is not retained when the user logs off the desktop and the virtual desktop is placed back into the non-persistent pool. And further re- allocated to other entitled users.

Persistent pool : When a group of users is entitled to the persistent pool, every user in the group is entitled to any of the virtual desktop in the pool. This is typically a many-to-many relationship. The managementconnection server will allocate users to a virtual desktop as required. The allocation is retained for subsequent connections.

Individual desktop assignment is a static, one-to-one relationship between user and a specific virtual desktop. This configuration is good for the power users where the desktop is specifically configured for a particular user. This configuration can includes specific application, data access, and resource allocations. Individual desktop give users a high degree of customization.

STORAGE CLOUD

Storage is key in all the type of cloud deployment (Private, Public and Hybrid cloud). Storage management in cloud can help organization to address their challenges around data and storage management in their clouds like- Availability of data at all time – Storage resource utilization- Application performance- Longer restore times- Higher storage costs-Low productivity of storage personnel –Increased risk of data lose and downtime.

Value Proposition

Storage cloud reduced the complexity of managing cloud environment by offering a complete portfolio of automated solution for managing data and storage infrastructure, enabling better efficiency for business resiliency, reducing costs and improving security, while increasing visibility, control, and automation of the cloud storage infrastructure.

Challenges

Cloud administrator often find it difficult to meet challenges they face concerning storage and datamanagement.

***** Data availability and application performance.

***** High capital and operating costs, less return on investment.

***** Utilization of storage resource.

***** Lack of automation – low productivity of storage personnel with specialist doing mundane tasks.

Storage Cloud

For customer, the drivers for adopting cloud technologies have been cited as:

* Paying for only what they use.

* Cutting costs.

* Monthly payments instead of all up front.

* Having a standardized system.

* Always having the latest software version, since nothing is installed locally.

Business Drivers

* Need for standardization and automation of storage services.

* Need to meet service levels consistently – provisioning on-demand computing capacity and storage capacity.

* Need for simplified management of their storage infrastructure – quick provisioning and redeployment of resource, built-in data reduction capability.

* Data security and compliance issues.

* Need to lower costs – lack of upfront capital lower utilization of hardware resource.

* Recovery Point Objective (RPO). Recovery Time Objectives (RTO).

Benefits

* Improve service levels by ensuring data availability and application performance and by quick provisioning through automation.

* Reduce capital and operational expenses by leveraging standardization, automation, virtualization.

* Operational utilization of storage resource and built-in data reduction capabilities to manage more storage with less hardware.

* Reduce hardware, software and administration costs with policy-based data storage management.

* Manage risk and streamline compliances through real-time data production.

Product/ Solutions Overview

Storage management software and services solution for cloud help ensure that business and IT are fully aligned and supported by integrated service management. They help delivers a workload-optimized approach and offer a choice of implementation options for superior service delivery with agility and speed.

Production/Solution Description

Cloud vendors should offer a complete portfolio of software solutions and services for storage managementin cloud, designed to help streaming of storage resource to support cloud service, protection, and management of data, being able to virtualize the entire storage infrastructure, and offer it as a single resourceto the cloud.

CLOUD MANAGEMENT

Introduction

Companies and their IT vendors are focused increasingly on virtualization-based cloud services and consolidation solutions. Virtualization infrastructure present organization significant challenges in the area of implementation and service management. Cloud solution provides a insight into the relationship between virtualized and physical IT assets-who is utilizing shared resources and what and how much they are using, this information is critical in accurate billing process and service level agreement (SLA) compliances.

Serviced-Based Model

The service-based approach has been driven in part by cost transparency and cost reduction requirement.The success of serviced-based model largely dependent on business manager and IT manager working together to define the service portfolio.

Resiliency

Resilience is the ability to rapidly adapt and respond to risks, as well as opportunities. This maintains continues business operation that supports growth and operates in potentially adverse conditions. The risk are different at different geography locations. By using 80/20 rule, it says 80 % of the issues are common across all business processes, all business entities and all buildings.

With resilience framework, by looking at the different parts of the company, one understands whether to accept the risk or whether to avoid risk and mitigate, or transfer the risk to cloud vendors.

Resiliency

So it is understood is that a resilience framework is needed. The resiliency blueprint include different layers. – Facilities - Technologies – Application and data – Processes (IT and Business) –Organization, and finally, Strategy and vision.

The framework enables to examine the business, understand what are the area of vulnerabilities in business-drive, data-drive, and event-drive risks. And quickly pinpoint the area of concern and help understand what action to take to reduce the risk associated with the area.

Resiliency Capabilities

The strategy combines multiple parts to mitigate risks and improve business resilience.

***** From facilities perspective, -one may want to implement power protection.

***** From security perspective, – to protect data and application –one may implement biometric solutions, mirroring, remote backup, identity management, e-mail filtering, or e-mail archiving.

***** From process perspective, -one may implement identification and documentation of most critical business process, split functioning of process, specific requirement confirming to government regulation and standards.

***** From an organization perspective, -one may take an approach that addresses the geographic diversity, backup of workstation data, virtual workplace environment.

***** From a strategy and vision perspective, - one would look at the kind of crisis management process to have in place. And also to examine clearly articulate security policies to everybody and how to implement change management.

Resiliency

Resilience tier can be defined as a common set of infrastructure services that are delivered to meet a corresponding set of business availability expectations. Criteria describing resilience tiers were developed by the lines of business and include characteristic/ attributes for business impact (ex: revenue), risk (ex: legal), application availability (ex: 24X7), and agility (ex: multiple physical instances).

Provisioning

Provisioning process is a service that uses a group of compliant processes called ‘solution Realization’. Provisioning is a broad-based service that begins with a Request for Service(RfS) to build a fully provisioned environment for the purpose of hosting an application, database, etc. Provisioning environment include Development, Test, Quality Assurance (QA), Production, Disaster Recovery (DR). Provisioning defines and communicates what information is required to begin provisioning. The output from provisioning is an environment configured and tested with an appropriate hardware platform, storage, network, operating system, middleware, other system software, backup capability, monitoring capability, and with the applicationinstalled per requirements.

* Provisioned products are servers built with all the software and infrastructure required to support a business application.

* Standard solution are defined so that standard workflows can be derived.

* Design is completed with due diligence before the Request for Service is accepted, includingdocumentation of all specifications.

* Server hardware is assembled, cabled, and connected to the network and SAN before work orders are released to provisioners.

PROVISIONING

Characteristics

The owner providing technical delivery to the customer specifications are reviewed for completeness and accuracy before work orders are released to provisioners. The missing and incorrect information is resolved, the provisioned product is tested, assured for quality, and signed off by technical owner before being turned over to the customer.

Approach

Provisioning process takes an assembly line approach to building a server and integrating its components, without any interruption due to unforeseen or redundant work.

The process has following activities.

* Planning process execution.

* Validating build specifications precedes building.

* Packaged software installation procedures being tried and tested precedes installing the package on a server.

* Having servers racked, stacked, cabled, and connected to storage and network precedes issuing work orders for provisioning the operating system and base software image.

PROVISIONING

Benefits

*** Ability to measure progress of all the work related to one RFCs:**

- Supports the ability to delivery to service levels.

*** Continuous improvement activities based on process measurements:**

- Enable eliminating delays and learning to continuously provision servers rapidly to shorten the time to delivery.

*** Isolation of the build, install, configure, and customize tasks from requirement, design, and hardwaresetup activities:**

- Provides focus for leveraging provisioning automation tools.

*** Role players performing a finite set of repeatable activities:**

- Enable the collection of intellectual capital necessary for beginning to automate their activities and for planning full automation.

*** An assembly line approach to provisioning:**

- Facilitates automation of piece parts of the process in an incremental approach to self-service.

PROVISIONING

Long-term Goals

* Achieve operational efficiencies by using a common set of processes and procedures to deliver provisioning service to the enterprise.

* Achieve target environmental defect rate.

* Establish and achieve Service Level Objectives for delivery of provisioned environments.

* Reduce time to set up development and test environments.

* Reduce hardware/ software spending through optimization of all environments and reuse of assets.

* Enforce enterprise provisioning standards.

Short-term Objectives

* Reduce the defect rate for the set up of the development and test environments.

* Improve and provide consistency in the provisioning of environment for all platforms.

* Transfer skill and knowledge of new standard processes and procedures to provisioning teams.

* Gain stakeholder agreement before deployment of a provisioned product that all requirements have been met.

* Reduce rework.

* Improve quality of work experience for process participants.

ASSET MANAGEMENT

Asset management and change management interact frequently. The activates that require changes are subjected to approval an rely on RFCs. There are different factors that helps to develop the asset management strategy,

*** Software Packaging:** Asset management relies on software packages, to serve the customer for requested software packages.

*** Incident Management (IM):** It is used to track the any interruption or issues to the asset management service. IM is encountered during OS or application installation, or during verification of other provisioned components.

*** Pool Management:** Pool management works with asset management to make sure the product requested are available on the requested date and for specified duration. Pool management serves as intermediary process between asset management and the Infrastructure on Demand (IoD) process and activities.

*** Release Management(RelM) :** It controls the scheduling and testing of additions and updates to environments.

*** Configuration Management:** It helps in the absence of a process with its own repository for assets and inventory items.

*** System Management (SysM):** Is for both process and service. It provides information on what attributes of OS, middleware, business application components need to be monitored. A mature SysM process determine triggers, threshold, events generation, severity, event correlation, automated response, and tools that will be used.

* **Operational Readiness Management(ORP):** Is to prepare for release into the environment it is necessary, with document describing and supporting the provisioned product align with enterprise standards.

* **Backup Management :** EPM is used for backup management.

Cloud Governance

One of the major component of governance model is the proper definition of role and responsibilities within an organization structure. The **domain owner** within the organization own and are accountable for the business functionality. The domain owners report to the head, but also have responsibility of reporting within their business domain. One of the major aspect of cloud governance is to ensure that the lifecycle of service maximizes the value of SOA to the business. The service lifecycle phases are model, assemble, deploy and manage.

The cloud governance scenario should been broken down into realization, they can be:

* Regulation of new service creation.

* Getting more reuse of service.

* Enforcing standards and best practice.

* Service change management and service version control.

Cloud Governance

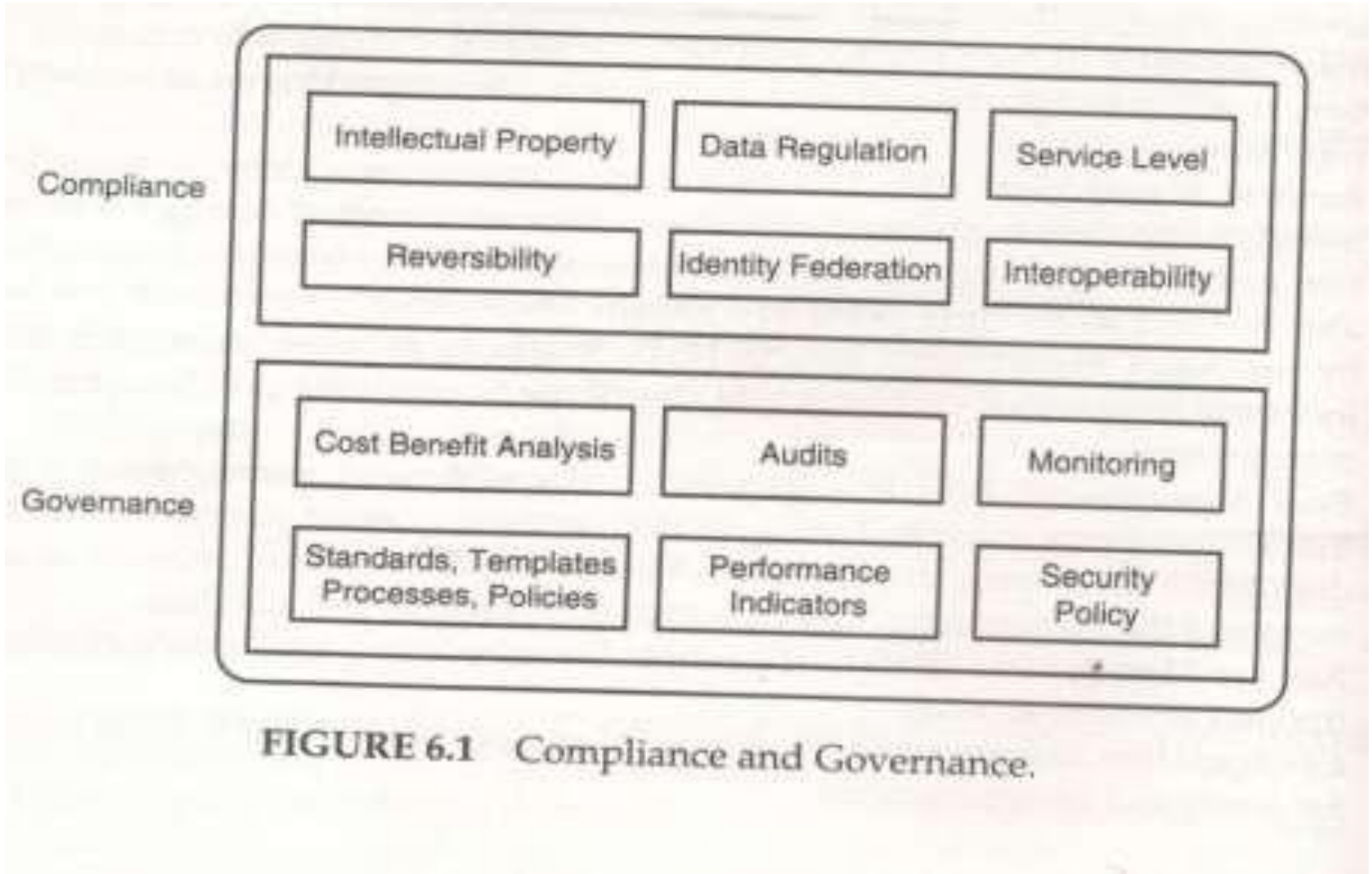

FIGURE 6.1 Compliance and Governance.

High Availability and Disaster Recovery

High Availability(HA) and Disaster Recovery(DR) are important factors for cloud deployments. HA and DR define the SLA factor between vendor and subscriber to ensure service availability, trust and help develop credibility for the cloud vendor.

HA traditionally focus on avoidance/ recovery form non-catastrophic disruptions-server failure, software failure, power failure, network disruption, denial of service attacks, viruses/worms, etc.

DA traditional focused on planning for and recovering business operation following catastrophic disruptions.

***** Site/facility destruction, hurricanes, tornadoes, floods, fire, etc.

***** Often long duration(days to week)

***** Often involves shifting work (and people) to alternate facilities for some period of time.

Availability ratio: is the proportion of time, that the service is actually available for use by the customer within the agreed service hours. There are different terms to work on.

*** Mean Time Between Failure (MTBT):**

- The mean(average) time between successive failure of a given components, sub-system, or system.

*** Mean Time To Recover (MTTR):**

- The mean (average) time that it takes to recover a components, sub-system, or system.

*** High Availability(HA):**

- Deliver an acceptable or agreed-upon high level of service to end-user during schedule periods.

High Availability and Disaster Recovery

*** Continuous Operation (CO):**

- To allow an end-user to access the system at any time of the day on any day of the year(24X7X365).

*** Continuous Availability (CA):**

- A system that delivers an acceptable or agreed-to-high level of service at any time of the day on day ofthe year (24x7x365).

*** Availability Management:**

- The process of managing IT resource(people and technology) to ensure committed levels of service are achieved to meet the agreed upon needs of the business.

*** Recovery Time Objective(RTO):**

- **-** Is the period of time within which systems, application, or function must be recovered after an outage.

Disaster Recovery : is the process of creating, verifying, and maintaining an IT continuity plan that is to be executed to restore service in the event of a disaster. The declaration of a disaster.

***** Protect and maintain currency of vital records.

***** Select a site or vendor that is capable of supporting the requirement of the critical application workload.

***** Provide a provision for the resolution of all IT services when possible.

High Availability and Disaster Recovery

True business need high availability of IT systems including rapid recovery for disaster. An availability strategy is required to guide the organization in implementing high availability and support rapid recovery from a disaster.

* Align the IT strategy with the business strategy and requirements.
* Justify investment in HA and DR initiatives.
* Ingrain HA in the IT culture.
* Define a robust IT architecture and invest in building HA into the design of the infrastructure

CHARGING MODELS USAGE REPORTING, BILLING, AND METERING

Challenges: Many organization do not implement sophisticated internal chargeback mechanism due to the complexity.

Benefits : IT managers must leverage a chargeback system to harvest opportunities for improving and streamlining service delivery.

Cloud Chargeback Models

* IT custodial service employs a cost recovery mechanism called chargeback.
* Chargeback is a mechanism to institute a fee-for-cloud-service type of model, for varying degree of cloud service levels at differentiating costs.
* To device an effective chargeback model, it is imperative that the IT organization have a complete understanding of their own cost structure and cost breakdown by components used as resources.

CHARGING MODELS USAGE REPORTING, BILLING, AND METERING

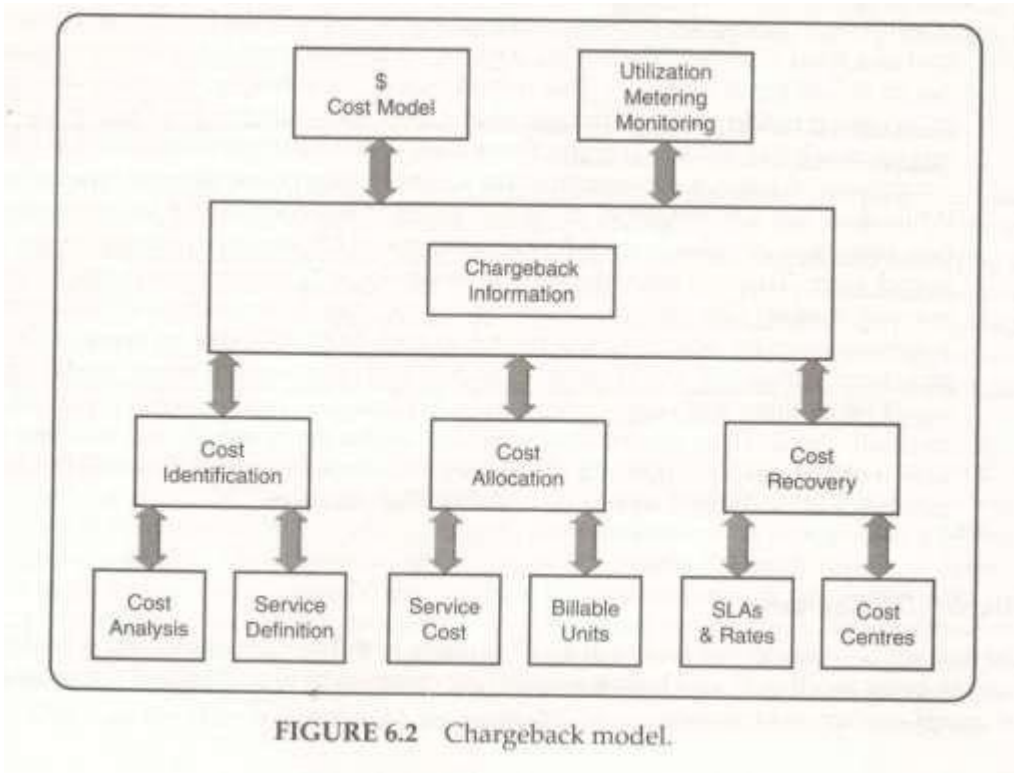

FIGURE 6.2 Chargeback model.

CHARGING MODELS USAGE REPORTING, BILLING, AND METERING

When it comes to employing chargeback models, there are various models prescribed and practiced in the industry today, and each of these models will have to be evaluated to see which one best fits the cultural and operational boundary of the organization.

*** Standard Subscription –Based Model:** This the simplest of all type of model. This model entails dividing thetotal operational costs of IT organization by the total number of application hosted by the environment. The model is simple, but its flaws are, it promotes subsidy and unequal allocation of resources.

*** Pay-Per-Use Model:** This model targets for environments with line of business(LOB), of various sizes. This model emphasizes on charging based on application's consumption of resources and choice of service level agreement (SLAs). This model is complicated in its approach, simply due to the framework around resource usage and its monitoring, while this model ensure fair and equitable cost recovery, it may take longer to arrive at agreeable metrics and cost models associated with resource consumption.

*** Premium Pricing Model:** The premium pricing model focuses on class of service and guaranteed availability of resource for business applications. As the name suggests, the LOBs will incur a premium for preferential treatment of application requests, and priority in resource allocation during time of contention to meet the service goals fully.

*** Hybrid Model :** The hybrid model attempts to adopt best of breed models and offers the combined advantages of two or more chargeback(CB) models.

Simplifying Chargeback:

The ultimate goal of any chargeback model in a shared environment is to provide the business with resilient and robust value-add IT services at a competitive costs. These cost advantages are enabled by efficient use of hardware and software resources, and the resiliency comes from harnessing the computing power of virtualized grid like IT infrastructure.

Simplifying chargeback is vital to adoption and acceptance to a shared service infrastructure

First step: To simplify is to educate on purpose and intent of adopting the education can be used to gather RFC on appropriate chargeback models. This will provide a baseline of mindset around chargeback.

Second step: A complete breakdown of IT organization costs. This transparency will encourage better understanding of operational cost by other participating LOBs.

Third step: Device a model which is agreeable to all.

IT Infrastructure Governance

Governance in a shared infrastructure becomes paramount, as resource shared by all business units require some level of policies and control mechanisms that define the boundaries and upholds the business unit requirement. A chargeback model may reflect the higher costs associated with such a requirement, but governance ensures that the cost allocation is fair.

Basic Requirements:

The chargeback metric used in determining the individual business units share of funding contribution should be directly tied to the Service Level Agreement between central IT and the business unit and should reflect the following elements.

* **Fairness:** The chargeback approach must be seen as allocating costs in proportions that reflect each units true consumption of information and communication services. One group should not be subsiding IT usage at the expense of another.

* **Control:** Business units should have a degree of control over, or input into, IT spending decisions.

* **Repeatability and Predictability:** Charges should be repeatable (there should be consistency in the application of data collection and charging methods so that charges are consistent) and predictable (a business unit should be able to create a reasonable forecast of its expected change over a 6 to 12 month period).

* **Simplicity:** The chargeback algorithm needs to be easy to understand and simple and inexpensive to implement.

•

Chargeback Schemes – The chargeback approach are as following

Allocation Based: In this model, IT service cost are buried in corporate overhead as a budget line item, usually determined one year at a time. This model charges business communities based on their position within the enterprise (ex: the share of employees, unit shipment volume or total revenue). This model is attractive as it is the simplest and costs least to implement. However some weakness are

***** The difficulty of rebalancing the scale when the business measures change.

***** The lack of incentive for end-users to control their resource usage.

***** The frustration of business manager unable to control or influence their budget share although at least it will be predictable.

Flat Fee: This model adds element of negotiation and capacity planning. The IT organization determine what percentage of the IT service workload a business area represents, calculate a preliminary package rate for that area, then negotiates a rate with business managers. Flat fee is appropriate for environments in which third-party application packages are used heavily.

Resource-or Usage-Based(Direct Cost Recovery): Resource-based costing and its most common form of implementation, usage-based costing, focuses on developing a standard unit cost for each major resource type or category that best represent the usage of that resource. For example for any application or business, CPU usage can be measured in CPU seconds consumed, storage usage can be measured in number of bytes storage occupied, and on network can be no of bytes transferred. The basic idea is that the costing unit represents some measure of the resource consumed that can be traced back to the user of that resource. Thisscheme is not effective in a complex PC-based and distributed computing environment. This approach is also called **IT product-based approach**.

Chargeback Schemes

Product-or-Service –Based: In this model instead of charging business unit for CPU seconds consumed or number of bytes transferred on network. This model defines IT costs in measurable events, transactions, and functions that are relevant to the business and outside the IT organization. Example invoice produced, cheques written, e-mail message sent, reports delivered, number of claims processed, number of policies written, or some other metric that represent measures the work performed. This approach can be called as **business product-based approach**.

Activity-Based: Activity-based costing(ABC) is the most difficult of all the method to develop and implement. Activity based costing assigns costs to each activity that goes into delivering a product or service.

ABC is a cost methodology which:

***** Derives the cost of an organization's outputs(product and service).

***** Identifies the activities and tasks(processes) used in the production and delivery of the outputs.

***** Identifies the resource consumed in the performance of these processes and instruments these activities so that the cost per task can be rolled up into a charge per major activity by department.

ABC takes resources (ie, expenses from the general ledger accounting system), moves them to activates (ie, moves cost to activities), and then moves the costs from activities to cost objects (ie, product and service).

Activity-Based Management(ABM) is the method or process of using the data(cost information) produced by ABC. ABM takes that information and uses it to find ways to improve those costs and the overall operation of the organization.

Chargeback Schemes

External Pricing Model/ Market-Based: This model is geared towards turning a profit. The model presumes that an IT organization operates in a fairly open market inside and outside the enterprise and require some ‘market testing’ for the cost of services. Pricing is determined by what is available on the outside market by surveying. A small percentage of midsize enterprise use this model, it has clear advantage, it may wellbecome a hallmark of IT organization recognition as value-generating service providers.