VERITAS CommandCentral™ Service: Enabling Utility Computing

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The IT Utility

Making pragmatic IT investment decisions poses a dilemma for business leaders. On the one hand, automating business processes using sophisticated technology can lead to lower operating costs, greater competitive advantage, and the flexibility to quickly adjust to new market opportunities. On the other hand, the relationship between IT spending and business success is murky, and often mysterious.

The mystery of IT spending is due, in part, to the traditional view of IT as an operational expense – a variable cost on the corporate balance sheet. Treating IT as an operation usually results in costs being lumped together, making it very difficult to enforce accountability for individual expenditures. From a line-of-business perspective, this means it is hard to convey real-time fluctuating priorities back to the IT organization. And from the IT side, lacking a clear understanding of the business need for appropriate levels of service – be it performance, availability, or access to the latest technology – resource allocations become hit or miss. Utility computing aims to solve these problems.

Utility computing increases the transparency between IT spending and line-of-business priorities. Organizing IT around a utility model, rather than an operations model, allows IT departments to package the technologies they offer according to the characteristics of individual resources and their real-world costs. The utility model gives business users greater flexibility when making IT purchasing decisions, with choice being firmly based on a description of the service they will receive – for example, the recovery time characteristics of a particular storage platform – and the cost of that service. Connecting the dots between actual IT costs and end-user value leads to more effective decision making when deploying technology resources.

Transparency also helps corporate IT departments compete with managed service proposals from external providers. By clearly illustrating the services and service levels being offered, the utility model allows business users to accurately assess the price-performance value of internal IT products. This sets a benchmark that external providers must meet, and gives IT departments a distinct competitive advantage.

The enterprise storage infrastructure, responsible for up to 25% of many IT budgets, offers tremendous scope for realizing the rewards of utility computing.

A Service Approach to Storage

Provisioning enterprise storage – including storage related services such as backup and recovery and replication - in a utility (or service) model delivers benefits to IT and storage end users. A utility is able to maximize the advantages of a multi-vendor pool of storage resources, improving capacity utilization and giving corporate storage buyers greater leverage when negotiating with individual vendors. This service-based approach also allows storage management to be centralized – improving administration efficiencies, allowing best practices to be applied uniformly across all resources, and increasing the scope for automation.

A storage utility strengthens the IT department's ability to satisfy end-user service level demands. By clearly stating the expected service levels of each packaged storage product, the IT department helps end users accurately map application needs to a storage-product offering. This gives the IT department a clear understanding of the service-level expectations of a business application. And end users of the business application benefit by knowing that IT is able to live up to the service level it has defined.

To highlight how a storage utility operates, a rough analogy can be made to a commercial utility company offering water resources to businesses and households.

The Water Utility Analogy

Just as a storage array holds data for delivery to applications over a networked storage infrastructure, a water utility holds its product – water – in storage tanks and reservoirs for delivery through a network of pipes to customers. The water utility offers different products to consumers based on a required level of service. For example, if a business consumes a large volume of water and possesses its own storage tanks, it may receive special pricing incentives and delivery guarantees in exchange for agreeing to an off-peak delivery schedule. Householders, who have higher quality of service (QoS) demands but consume fewer resources, can be offered a product with characteristics that reflect their specific needs. Business and household consumers are invoiced at the end of each month, with each bill showing how much has been consumed and at what cost. If water spending exceeds budgeted estimates, consumers can choose from the following actions: reduce future consumption, increase the water budget allocation, or discuss future resource needs with the water utility to determine if a more cost-effective service level is available. This allows the consumer to accurately anticipate the cost of water and plan for future resource consumption. By using different combinations of price and performance, the utility is able to stimulate or discourage consumption to optimize the capacity of the delivery infrastructure.

Enterprise storage offers a wider range of service-level variables than a water product, but the utility principle is the same. A storage utility delivers storage and data protection services to end users based on QoS parameters of the service purchased. Delivery is automatic. The end user need not know anything of the nuances of the storage and network infrastructure to utilize the allocation or be assured of data protection. At the end of each month billing reports detail how much storage each consumer used, the level of data protection chosen, and the total cost. This allows each consumer to assess their use of storage resources – whether it is physical disk allocations or services offered to secure the allocations – and make decisions about how they plan to utilize the resources in the future.

Prerequisites for a Storage Utility

Deploying storage services to end users as a utility requires a change in the way IT departments do business. Organizational and process changes must be made before a service-based delivery approach can be implemented.
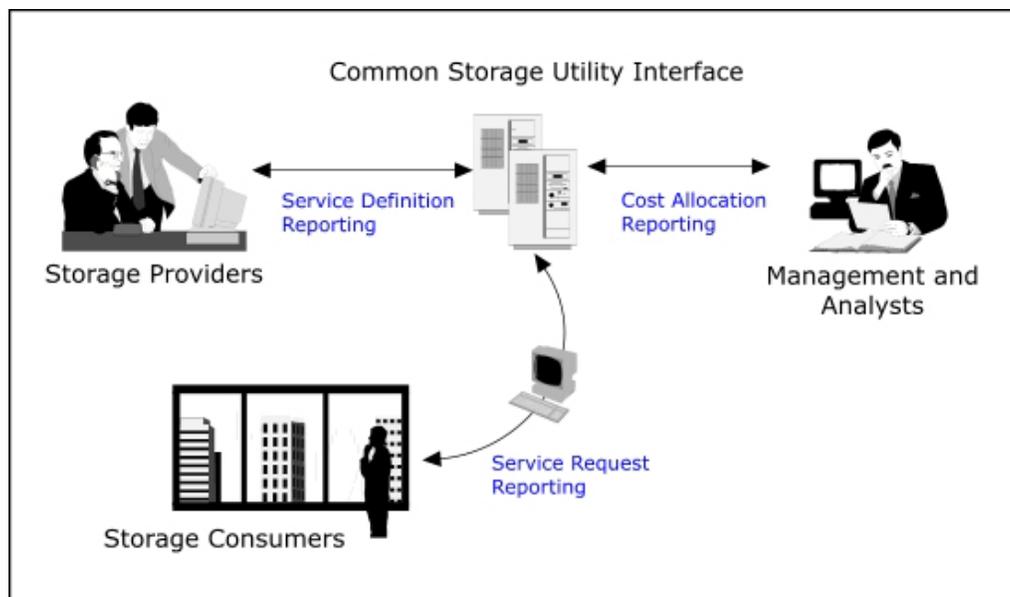

Figure 1. Stakeholders in the Storage Utility

The utility model defines three main stakeholders:

- **Consumers** – end users, whose applications make use of storage and data protection services

- **Providers** – the enterprise storage managers and backup administrators whose job it is to ensure that all storage and data protection products provide the required levels of service

- **Managers and analysts** – who supervise the allocation and consumption of storage and data protection resources

All stakeholders in the utility must agree on the definition of a customer and on product pricing. Many large IT organizations are already moving in this direction out of necessity.

In addition to aligning organizational structure with the utility model, the storage hardware and software infrastructure must be capable of being hosted as a service offering. For example, providing a backup service to all end users means the capacity must be available to satisfy demand if all consumers choose to purchase the same service.

Common Interface

One of the defining characteristics of a utility is the relative simplicity of the mediation process that sets up service delivery to a consumer. For a storage utility, this translates to a straightforward common interface allowing consumers to view service offerings, choose between them, and report on resource use. The common portal interface allows efficient self-service automation of the resource delivery process and provides a unified interface for consumers, providers, and management.

Products and services offered through the utility are described in the language and terminology of the consumer, not the provider. The emphasis being placed on service levels and terms of engagement, rather than technical product descriptions.

All consumers of utility services need access to information, but not necessarily all information. An important aspect of providing a simple mechanism for purchasing services is the ability to tailor the options available to a specific consumer, or user. This may mean that power users and regular users have access to different information, and that managers have access to even more information. The customization necessary to support sophisticated views of data requires policy management capabilities that differentiate between classes of users and information.

Defining the Services on Offer

The systems development lifecycle deployed in most enterprise IT environments holds the key to defining storage utility service offerings. Administrators of enterprise storage – the service providers of the new utility – are involved in the development lifecycle at a number of critical stages.

As applications move through the development process, administrators are responsible for determining which storage services are required, such as backup and recovery and storage management. As the application moves from initial development into the production environment, the administrator's tasks change, for example, sizing production capacity allocations and preparing disaster recovery contingency measures. And, with a mature application in the production environment, administrator involvement again changes – this time to one of providing ongoing maintenance services.

Each stage in the application lifecycle that requires action from a storage administrator will be governed by mechanisms for initiating, approving, and signing off on requests for service. These often well-documented interactions between the application owner (IT developers and line-of-business users) and storage administrators can serve as the starting point when defining storage utility services. After each service offering is identified, a price must be set that gives utility consumers a realistic measure of the value of the product being offered.

Self-Service Provisioning

For IT managers, one of the major advantages of the storage utility model is the opportunity to automate tasks throughout the provisioning process. The portal interface enables utility consumers to choose appropriate services, guided by an established workflow. Behind the scenes, integrated storage management and provisioning and enterprise data protection technologies perform the heavy lifting. This automated, self-service approach speeds the delivery of services and allows storage providers to establish consistent best practices across the enterprise.

Feedback and Analysis

Each product offered by the utility encodes a service level agreement (SLA) between provider and consumer. Monitoring service-level compliance is a fundamental prerequisite of the utility model. Every resource within the scope of the utility's jurisdiction must be continuously scrutinized, and the success or failure of SLAs must be reported back to consumers, providers, and management.

A utility's data collection and reporting capabilities provide business intelligence for both consumer and provider. Providers can assess the efficiency of the storage pool and diagnose problems. Consumers can report on the allocation and service costs and plan for future usage. And, managers and analysts can report on the success of the pricing models developed by the utility and the overall effectiveness of the utility in provisioning storage.

VERITAS CommandCentral™ Service

Responding to customer demand for higher service levels, more application data, greater flexibility, and lower cost, VERITAS is pioneering the utility computing model as the most effective and efficient way to align IT assets with line-of-business priorities. VERITAS CommandCentral™ Service transforms the allocation and protection of enterprise storage from a cost-based overhead into a value-based utility.
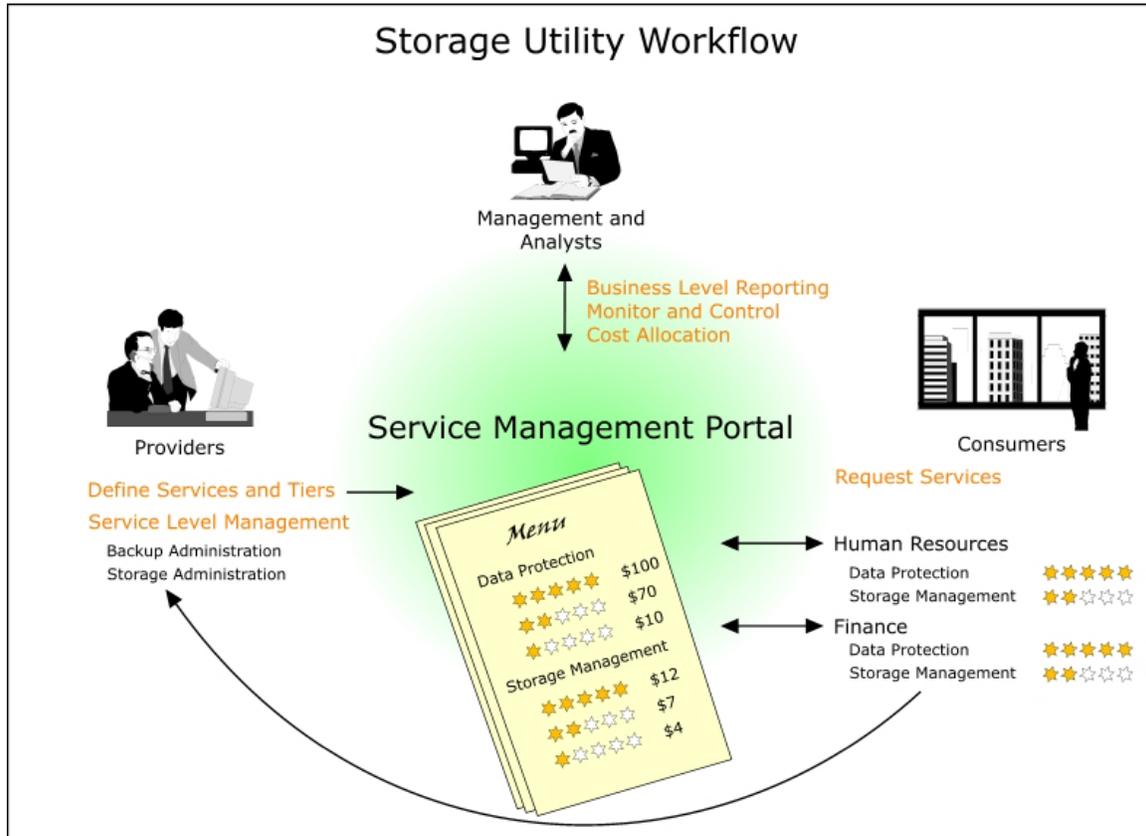

Figure 2. Storage Utility Workflow

Operations Management and the Service Management Portal

CommandCentral Service consolidates storage management and data protection activity in a centralized portal, backed by a sophisticated, database-driven knowledge base. The Service Management Portal mediates interactions between utility providers (storage managers and backup administrators), consumers (developers, system administrators, and line-of-business users), and IT management and analysts. All storage management and data-protection services are provided to utility consumers from the unified interface of the portal.

The CommandCentral Service Management Server provides the backbone of the storage utility and performs the physical integration between different components of the storage infrastructure. Using the Service Management Portal, administrators access the management server functions and define automated self-service storage management and data-protection applications.

The Service Management Portal gives IT administrators the flexibility to control access to storage services based on the individual user or the role they perform in the organization. Personalization also extends to consumers, who can configure the portal interface to their liking, creating unique personal dashboards with colors and logos to reflect departmental branding.
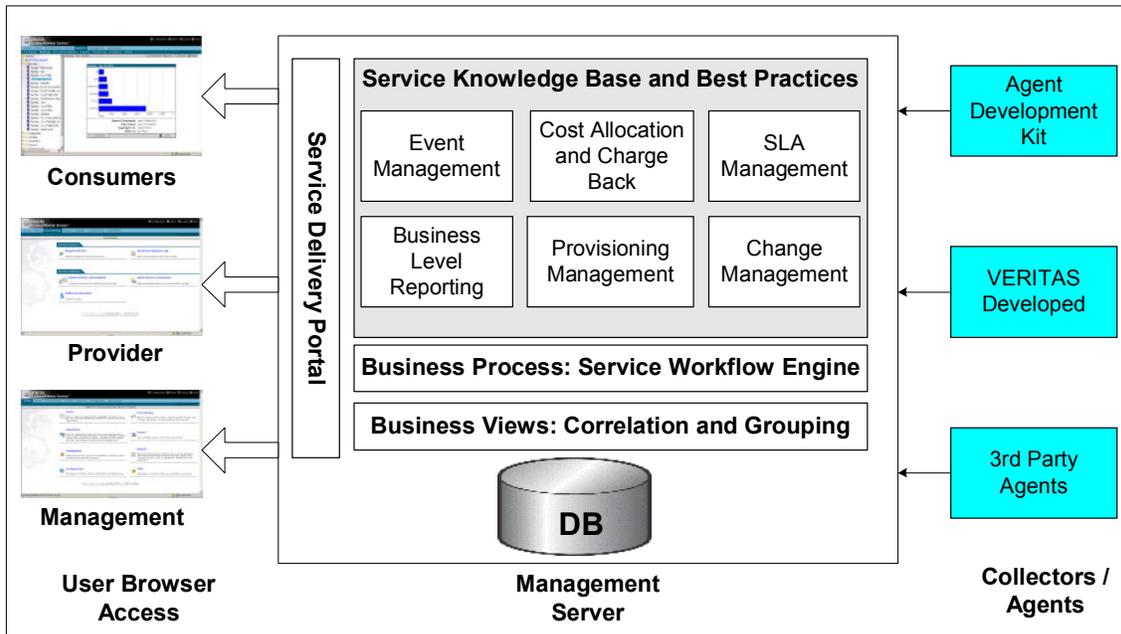

Figure 3.   CommandCentral Service Technical Overview

Service Delivery Workflow

Administrators define self-service storage provisioning and data protection applications to the management portal as workflows. Each workflow represents a service on offer to utility consumers and is associated with a service description and price.

Workflows encapsulate storage management and data-protection best practices by pre-defining the steps followed when storage resources are allocated and backups are scheduled. Each workflow can be fully automated or assisted (a combination of automated and manual steps).

For example, a systems administrator requesting an increase to a storage allocation for a human resources (HR) application will be presented with different options depending on the circumstances of the environment. If the CommandCentral Service management server determines that additional space is needed for a development environment the allocation request can be processed automatically. However, if the management server detects a production HR application, the user can be prompted to follow an assisted workflow. The allocation request can be routed to a financial controller for approval, and – after being authorized – it can be validated against the management server knowledge base. The management server will ensure the correct type of storage has been requested and determine the need for downstream storage management activities, such as changes to zoning and masking configurations. The backup administrator can also be alerted to the presence of new storage resources requiring protection. The complete list of actions necessary to perform the requested service on the production server is then delivered to an operator for execution. Finally, the request is returned to the systems administrator for signoff. At all times, the administrator has access to the progress of the service request through the service delivery portal.

Workflow audit trails provide administrators with the feedback necessary to analyze and refine processes. The open architecture of the workflow engine also allows customization and extension using scripts and notifications.

Cost Allocation and Chargeback

Each utility service offering is given a price by providers. The price gives consumers an indication of the value of the service being offered and provides insight into the relationship between a product's QoS and real world IT costs.

Providers can adjust pricing based on a variety of weights and variables – the goal being to optimize use of the infrastructure's capacity. For example, if an existing backup window is being under-utilized, data protection service offerings during that time frame can be priced attractively to give consumers an incentive to choose those offerings. Similarly, a product can be presented to the consumer with a choice of service levels, each priced according to its cost. Consumers are thus given an incentive to make the best choice based on their requirements and available budget.

Utility consumers are periodically billed for their resource use. Chargeback functionality, managed by the CommandCentral Service management server, gives consumers essential feedback on their use of storage resources. It also helps consumers budget for future storage and data protection spending. Even in environments where chargeback is not formally implemented, understanding the cost of storage and storage services can lead to better planning.

Physical Infrastructure Integration

The CommandCentral Service management server works with storage management and data protection software to automate storage provisioning and backup tasks and gather information about the configuration and use of resources. A central information repository hosts intelligence about the infrastructure for use in workflows and in monitoring and reporting applications.

VERITAS and third-party tools interact with the management server in one of three modes:

- CommandCentral Service provides embedded support for VERITAS NetBackup™, giving agent-less connectivity between the management server and the NetBackup master and media server

- CommandCentral Service data collection agents provide the connectivity middleware for downstream software products, including VERITAS Backup Exec™, VERITAS SANPoint Control™, and Legato NetWorker

- An XML interface supplements the middleware and agent-less connectivity methods, enabling data from unsupported storage management and data protection tools to be imported into the central repository
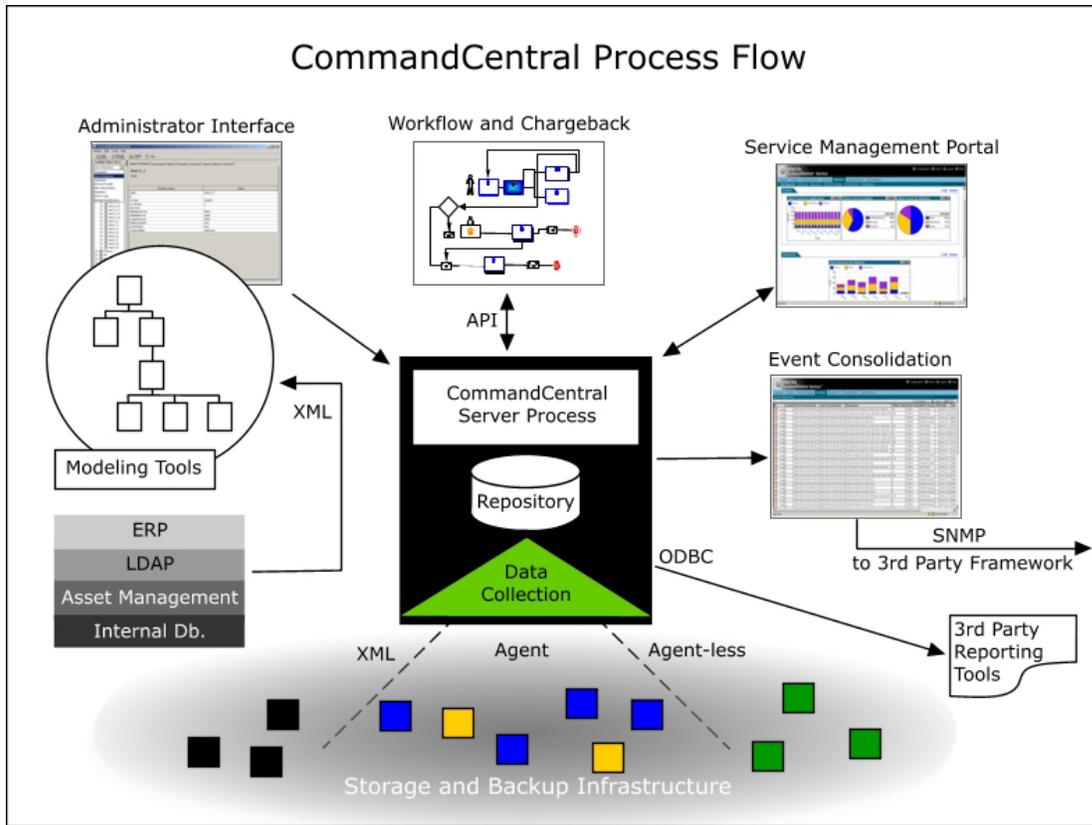
Figure 4.   VERITAS CommandCentral Service Process Flow Diagram

Centralized Event Management

Event messages, generated during workflow execution, are routed back to the CommandCentral Service management server regardless of the originating software component. The management server consolidates the messages and then routes notifications to the appropriate party as indicated in the workflow.

The management server also acts as a forwarding service for event and status information generated in the storage infrastructure. Agents route messages back through the management server where they are supplemented with information from the CommandCentral Service knowledge base. The enriched messages are then forwarded to the appropriate monitoring console for action. For example, if CommandCentral Service receives a failure message containing IP address, failure ID, and date and time stamp it can add business context to the message by including location and application information from the knowledge base. The enriched message can then be passed to a network systems management tool, such as HP OpenView or IBM Tivoli Enterprise Console.

Mapping Physical Assets to Business Views

Information in the CommandCentral Service repository represents a complete picture of the physical storage and data-protection environment, extending down to the file system and database level. However, without additional data points – geographic location of equipment, the departmental ownership of resources, and the correlation between a business application and the storage environment – this information is of questionable value to end users.

The CommandCentral Service administrator interface gives end users access to sophisticated modeling capabilities, allowing repository data to be sliced and diced according to business-centric views of the infrastructure. The modeling tools support hierarchical views up to 20 levels deep and can map and classify data by location, organization, application, or custom, user-defined categories. The multi-dimensional views generated by the modeling tools give end users meaningful access to otherwise esoteric storage and backup infrastructure data.

Business Level Reporting

Having mapped central repository information to structures that represent a business view of the environment, utility consumers are able to access data using the multi-faceted reporting interface. This reporting interface supports drill-down capabilities, allowing users to identify IT assets and then determines the individual attributes of resources. Intelligent filters further subdivide existing views for exceptionally granular access to data.

The portal's monitoring facilities provide all utility participants with an active service level scorecard. Deviations from agreed upon service levels can be quickly identified and the problems addressed. Viewed historically, the service-level monitoring data also provides input for fine-tuning service offerings.

The reporting interface also offers storage personnel consolidated access to error logs and to output from storage management and backup tasks. The repository's media-use and allocation-efficiency data can also be used for capacity planning, and to track changes in resource consumption over time.

Conclusion

The provisioning, protection, and management of enterprise storage and data protection infrastructures accounts for a major portion of the IT budget. Applying the utility computing model to storage provisioning and data protection promises to deliver significant dividends and address the paradoxical challenge of providing better services at lower cost.

While no one would argue that the cost of IT services and resources vary according to the level of service promised, quantifying these costs has always proven to be elusive. VERITAS CommandCentral™ Service gives enterprise storage managers and backup infrastructure administrators the tools needed to raise consumer awareness of costs, and by doing so provides a model to contain them.

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