



Cloud User Business Requirements for Storage Management and Services

and providers on the market



Goals

- Services (aka APIs) that can provide valued storage functions.
 - Multi-tenant support (SLO)
 - Support most popular storage functions
- Chargeback capabilities that can charge internal departments or external customers after consumption of such a service.
- Identify the options between:
 - Features of vendors (on-prem and public clouds)
 - Business models of providers
- Use cases to show the value of these services
 - Lower TCO
 - Improve agility and data sharing

Provider's Business Goals

Lower CapEX

- A good planner with multi-cloud, multi-vendor infrastructure planning and impact analysis

Lower OpEX

- Service automation for daily operation jobs, such as tuning, tiering, trouble shooting, data mobility, etc.
- Customization for Carrier business needs. For example, storage automation for end users

Higher Revenue

- Value-added services for consumer-oriented data service. For example, auto-mapping of application needs and storage, based on statistics.

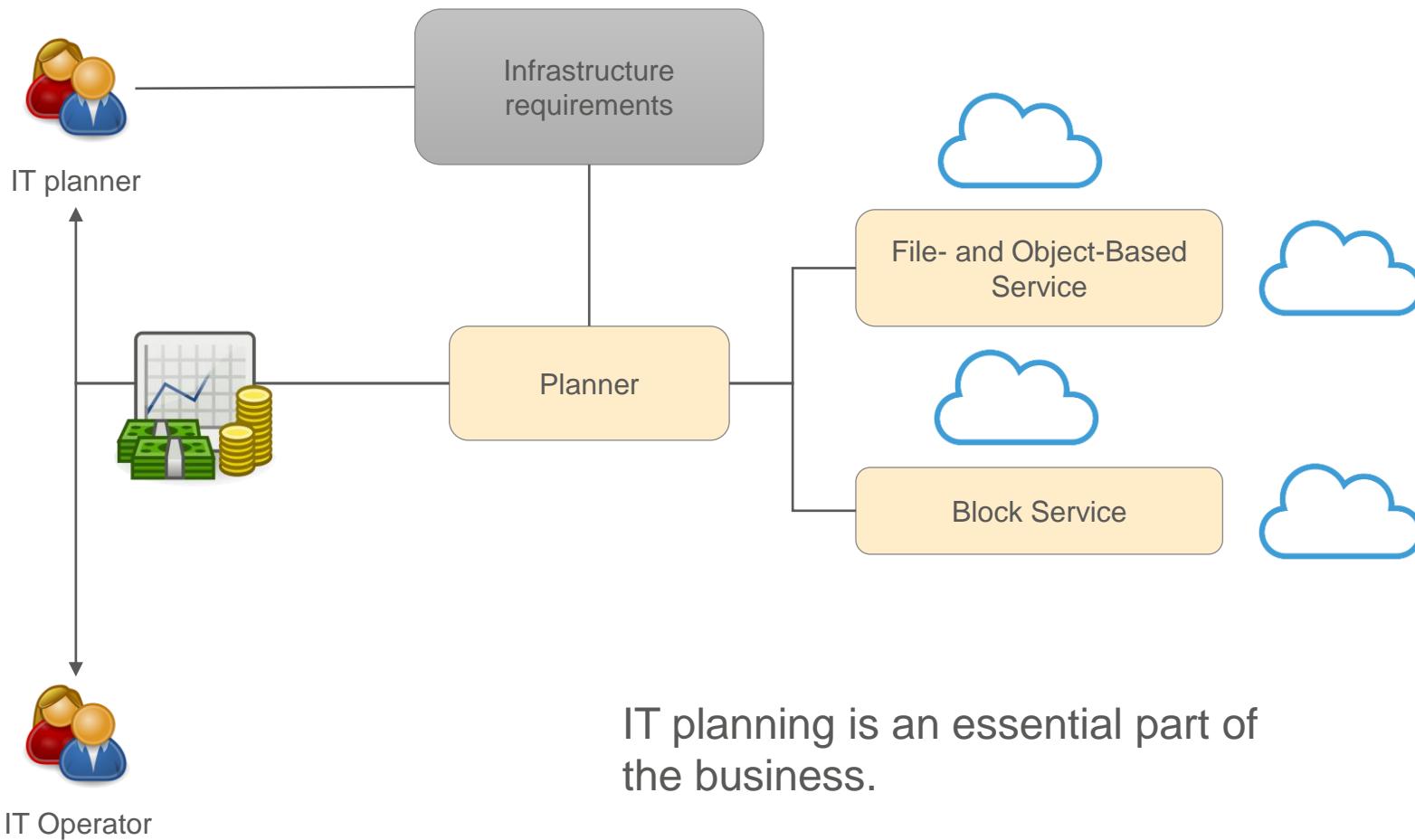
Improved agility and data sharing

- Multi-vendor support and multi-cloud support. Data mobility among providers.

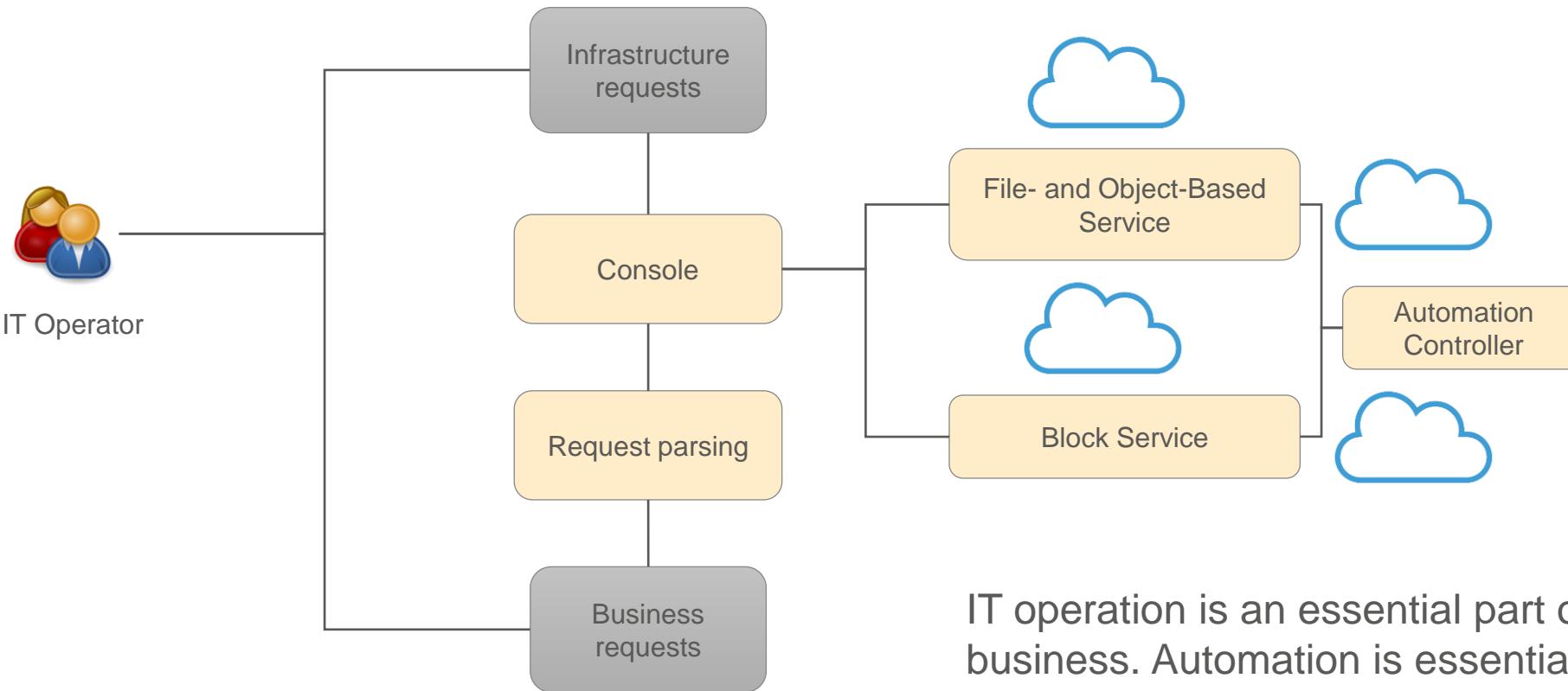
Storage Services

- File and Object Based Service (FOBS)
- Block service

Use case: IT planning

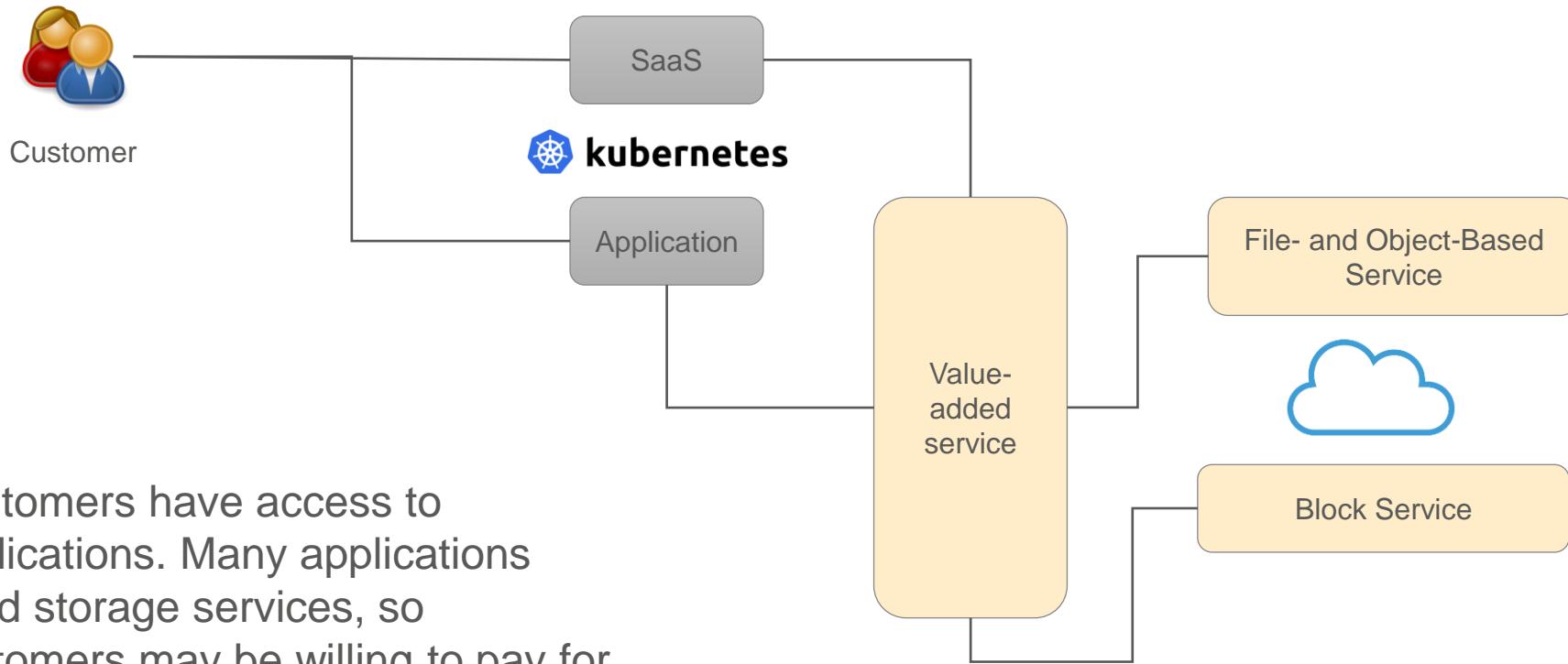


Use case: IT Operator



IT operation is an essential part of the business. Automation is essential in modern day IT operation.

Use case: Customer



Customers have access to applications. Many applications need storage services, so customers may be willing to pay for value-added services.

Some requirements to providers

- Pay-as-you-go and multi-tenant chargeback
- Vendor neutral (no vendor lock in)
- Meet SLOs (reliability, performance, etc.) with appropriate prices
- Data Mobility / Tiering / Multi-vendor / Multi-cloud
 - Available on demand anywhere. Increase value of data.
 - Data can be tiered to different locations (Partial or Full). But maintaining reliability and performance SLOs.
- Tuning
 - Auto-tuning: by statistics, recommend for lower cost/higher performance
 - Auto-tiering while meeting SLOs (TCO and performance optimization)
 - Potentially among devices/vendors/clouds
 - High utilization rate (Lower the equipment owner's cost)
- Alert, monitor and failover
 - Alert and fix performance degradation
 - Failover when disaster happens
- SLO/QoS
 - With multi-tenancy, each tenant is isolated.
 - QoS limitation for tenants. No noisy neighbor problem.
- Easy to manage (Lower the cost of administration)
 - Management interface integrated with User's business service

- Object Service

- S3 compatible
- Object and file often share a platform as file and object based storage (FOBS)
- Less performant than block
- Flexible usage
 - Apps can use HTTP to access anywhere
- Multi-vendor/multi-cloud data mobility is simple (PUT/GET/DELETE)
 - PROS: easy to manage
 - CONS: Hard to distinguish among vendors
- Market is very competitive
 - Price per TB pushed to very low (particularly cold storage)

Object service choices on the market

	Public cloud vendor1	Public cloud vendor2	On-prem cloud vendor3	Ideal Object Service
SLA	99%--99.99% 10% credit 95%--99% 30% <95% 100%	<99.9% 10% credit <99% 25% credit	Unclear	Clear SLA
Best SLOs	99.999999999 (11-9s) durability with 3AZs. 99.99% availability standard. Max I/O performance mode (number of Ios), General purpose performance mode, throughput bursting mode	99.9% reliability	From all-flash to regular HDD based solutions; Software-defined solution with 3 rd party vendors	Clear SLO commitment
Price	Standard \$0.023/GB-month Intelligent Tiering available Standard Infrequent access \$0.0125/GB-month One zone IA \$0.01 Cold \$0.004 Deep \$0.00099 Plus data transfer prices	Premium \$0.15/GB-month Hot \$0.0208 Cool \$0.0152 Archive \$0.00099 Plus data transfer prices	Detailed price is unclear	Price with upfront instructions and tiered service for appropriate prices
Monitoring and alerting	Cloud watch	Monitor	Monitoring tools	Monitoring tools that can identify the SLO violations and help troubleshooting
Online Tiering upgrade	Intelligent tiering with monitoring and automation charge \$0.0025 per 1000 objects	N/A	N/A	Can automate the tiering
Data mobility	Data Sync	File Sync	Sync tools	Easy to use tools
Multi-cloud	N/A	N/A	N/A	Location transparency
Management	Cloud GUI	Cloud GUI	Unified Console	Unified GUI; single-pane management

- File Service

- Very common in enterprises
 - Fundamental in OA, Finance, etc.
- Tiering is natural due to cost reasons
 - Unit price varies from high-end to low-end
 - Costly for mission-critical/high performance services
- Good for data sharing (for both Read-only and Read-write)
 - Relatively easy to share data multi-clouds (NFS)
 - Data fabric can share data across multi-clouds with optimization
- Multi-cloud/multi-vendor tiering is not common on the market

File service choices on the market

	Public cloud vendor1	Public cloud vendor2	On-prem vendor3	Ideal File Service
SLA	99%--99.99% 10% credit 95%--99% 30% <95% 100%	<99.9% 10% credit <99% 25% credit	Unclear	Clear SLAs
Best SLOs	99.999999999 (11-9s) durability with 3AZs. 99.99% availability standard. Max I/O performance mode (number of Ios), General purpose performance mode, throughput bursting mode	SMB sharing Standard file sharing: ~60MB/s per file, Premium: up to 200MB/s Also work with 3 rd party file services such as vendor N.	Tier 1: 330MB/s per TB Tier 2: 28MB/s per TB Tier 3: 10MB/s per TB	Clear SLOs defined
Price	Standard \$0.30/GB-month One zone \$0.16/GB-month Standard Infrequent access \$0.025/GB-month Infrequent access request \$0.01/GB Lifecycle management: one zone \$0.043, Standard \$0.08	Premium \$0.16/GB-month Transaction optimized \$0.06 Hot \$0.0287 Cold \$0.0228	Tier 1: \$0.2352/GB-month Tier 2: \$0.1098 Tier 3: \$0.0436	Appropriate price associated with each tier
Monitoring and alerting	Cloud watch	Monitor	Monitoring tools	Monitoring tools that can locate the root cause and help troubleshooting
Online Tiering upgrade	Lifecycle management between IA and non-IA; use Data Sync to move between performance modes	N/A	N/A	Auto lifecycle management between tiers
Data mobility	Data Sync	File Sync	Sync tools	Data can be accessed and migrated anywhere
Multi-cloud	N/A	Available via vendor N	Vmware Cloud Foundation	Multi-cloud support
Management	Cloud GUI	Cloud GUI	Unified Console; Consolidated tools for different purposes	Unified GUI; single-pane management

- Block Service

- Almost a must have in Enterprise environment
 - Bread and butter configuration
- Performance tiering is common (from extreme high to low budget)
 - Platinum, gold, silver, bronze tiers
- Multi-vendor/Multi-cloud data mobility is hard
 - Neither tiering nor online LUN migration is easy

Block service choices on the market

	Public cloud vendor1	Public cloud vendor2	On-prem vendor3	On-prem vendor4	Ideal Block Service
SLA	99%--99.99% 10% credit 95%--99% 30% <95% 100%	99%--99.99% 10% credit 95%--99% 25% <95% 100%	Unclear	100% availability guarantee; details of the agreement unknown	Clear SLA terms
Best SLOs	Io2 and io2 block express profile with 99.999% durability; max IOPS/volume: 256,000; sub-millisecond	99.999% availability P80 Ultra disk; IOPS: 160,000; latency is undeclared but could be sub-millisecond	99.99% availability; Performance tier 1, 2, or 3: 1800, 1100, 700 IOPS per TB; latency could reach sub-millisecond	Mission Critical Cloud-native; 100% availability guarantee; NVMe system. Business critical workloads has 99.9999%, NVMe	High availability: Six 9; High IOPS and low latency
Price	\$0.125/GB-month \$0.065/provisioned IOPS-month up to 32,000 IOPS \$0.046/provisioned IOPS-month from 32,001 to 64,000 \$0.032/provisioned IOPS-month for greater than 64,000 IOPS	\$0.12/GB-month \$0.05/provisioned IOPS	Base capacity charge (recurring) + on-demand usage charge (per use); \$0.1573/GB-month Tier1 \$0.1039/GB-month Tier2 \$0.0715/GB-month Tier3	Base capacity charge (recurring) + on-demand usage charge (per use); but price is undisclosed Cloud Volume 0.12/GB-month	Clear and transparent price terms.
Monitoring and alerting	SLO monitoring	SLO monitoring	Management tools; SLO monitoring unknown	Management tools; SLO monitoring	SLO monitoring; ideally self-healing
Online Tiering upgrade	N/A	West central US region only	Unknown	Unknown	Support online tier upgrade; ideally auto-tiering
Data mobility	N/A	N/A	N/A	Cloud volumes	Support data mobility
Multi-vendor	N/A	N/A	N/A	Limited SDS vendors	Multi-vendor support is a plus
Multi-cloud	N/A	N/A	Using Vmware Cloud Foundation	Cloud volumes block and cloud volumes backup	Support major public clouds (DR/backup/migration)
Management	Cloud GUI	Cloud GUI	Unified Console; Consolidated tools for different purposes	Unified Ops console	Unified GUI; single-pane management

Thank You.

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