



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.

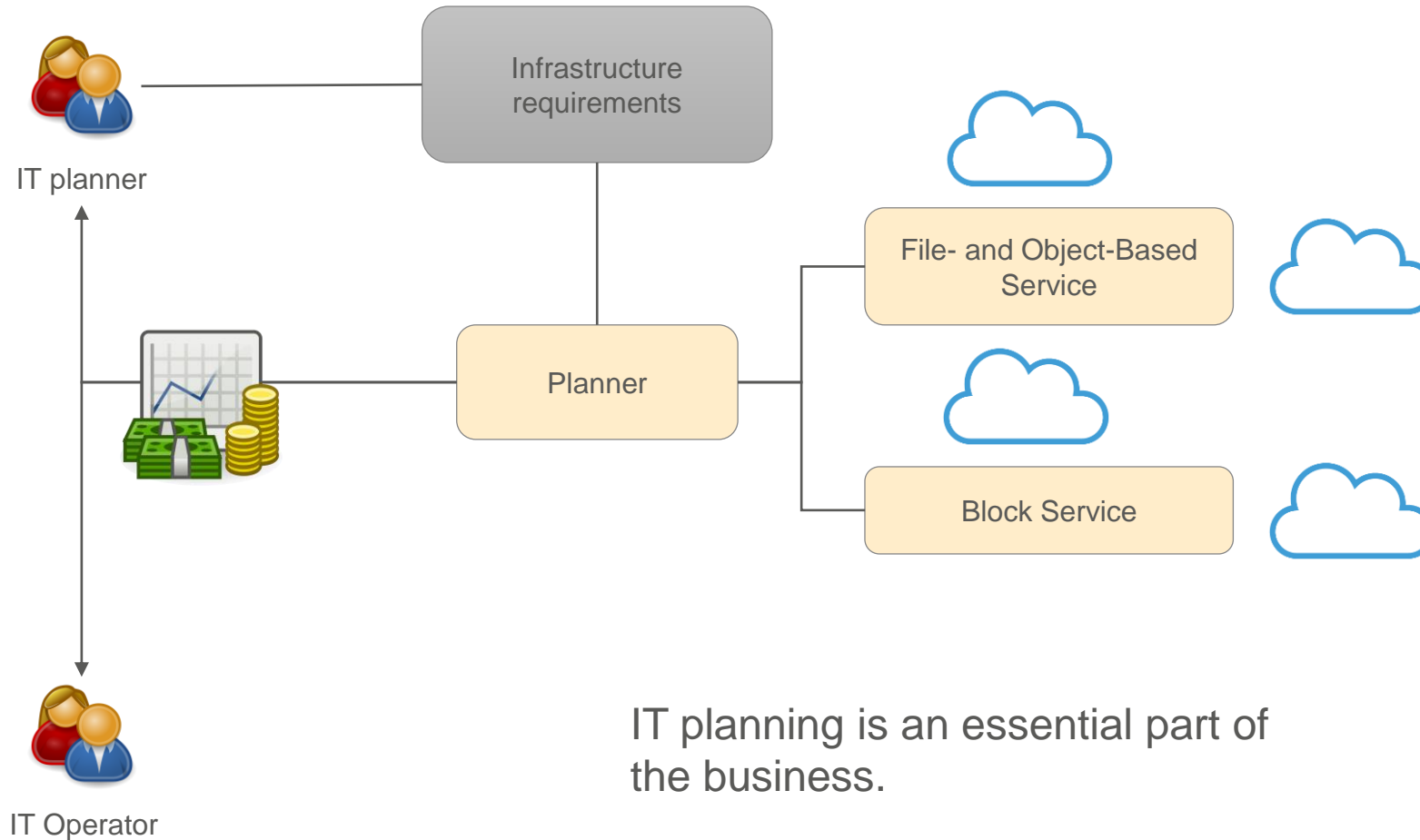
Improved agility and data sharing

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

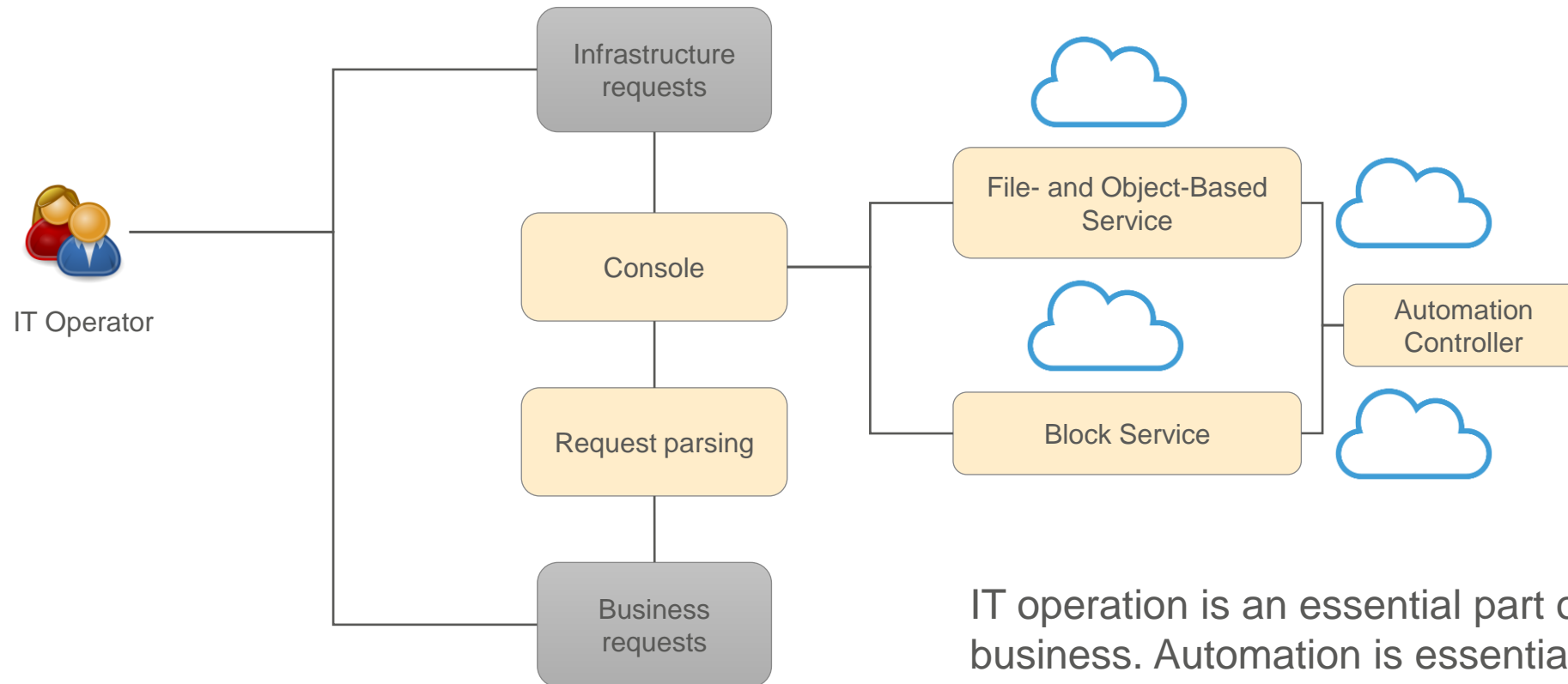
Storage Services

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

Use case: IT planning

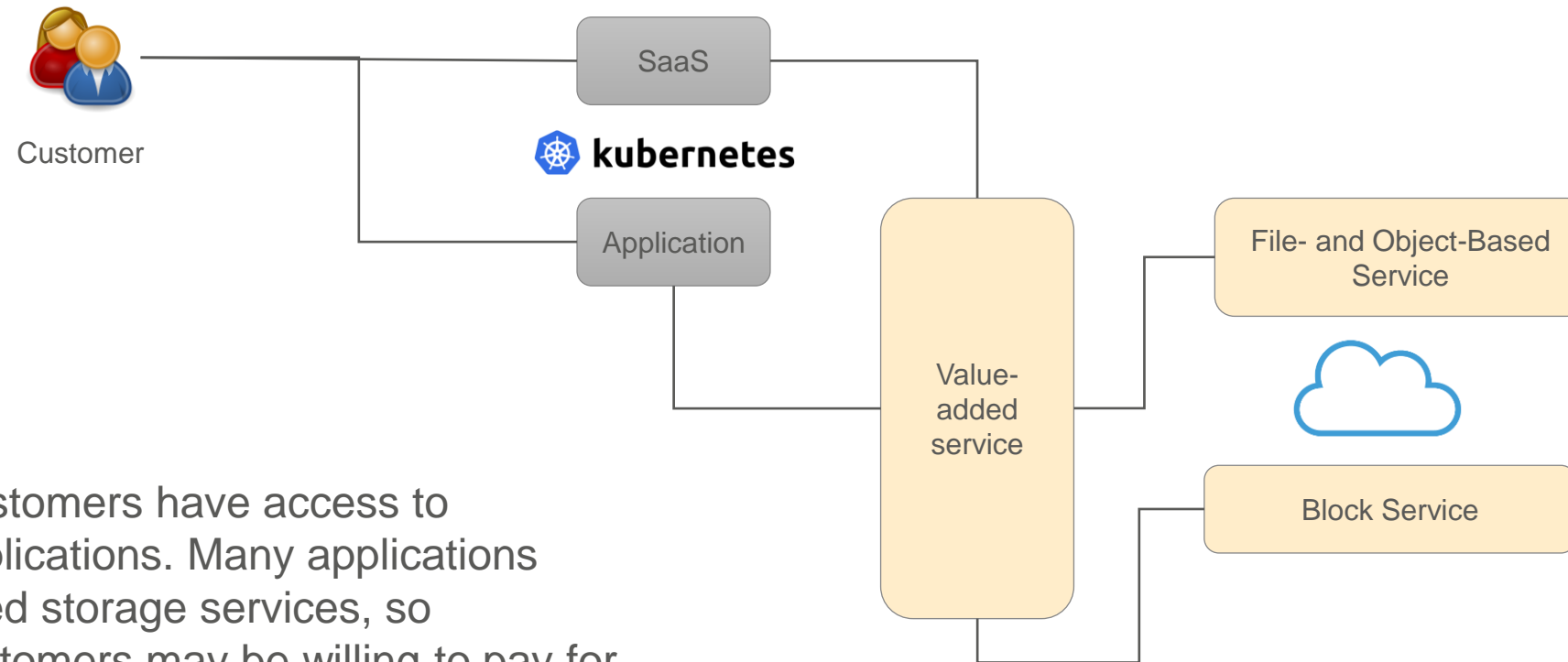


Use case: IT Operator



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 | lo2 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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