

# Multi-tenancy for Cloud

## What is multi-tenancy?

Multi-tenancy is an architecture where a single instance of a software application runs on a server and services multiple customers – referred to, in this case, as tenants. Multi-tenancy enables separation between tenants running applications in a shared environment. In a multi-tenant deployment, the resources controlled by one tenant are physically or logically separated and secured from other tenants. In addition to tenant isolation, per-tenant reporting and quota management are often important. Multi-tenancy is a key requirement for IaaS, PaaS, and SaaS offerings across public cloud, on premises and hosted private cloud environments.

## Why multi-tenancy is a must for the Cloud

- **Agility and scale:** In a shared multi-tenant environment, rolling out new capabilities can be done once for the entire infrastructure for all customers. Contrast this with dedicated hardware per customer, where a change has to be orchestrated across all of the customer environments at large scale.
- **Cost efficiency:** To optimize for costs, cloud service providers (CSPs) and large enterprises need to maximize their infrastructure utilization. Multi-tenancy enables them to share infrastructure across multiple tenants, leading to significant savings compared to dedicated hardware for each end customer.

## Key requirements and Tintri solutions at-a-glance

REQUIREMENT	DESCRIPTION	TINTRI SOLUTION
<b>Self-Service</b>	In a cloud environment, tenants own and control their applications. Self-service gives tenants the control they need, enabling agility and flexibility.	<ul style="list-style-type: none"><li>• Provision VMs instantly without carving and tuning LUNs.</li><li>• Apply storage policies and service tiers through the self-service portal.</li></ul>
<b>Guaranteed Performance</b>	Tenants want consistency and predictability. This is challenging for CSPs as infrastructure is shared by many tenants.	<ul style="list-style-type: none"><li>• Provide built-in VM-level performance isolation.</li><li>• No noisy neighbor problems even with heavy mixed workloads.</li></ul>
<b>Differentiated Services</b>	CSPs cannot thrive on just providing basic infrastructure. They need to add value and create differentiated services to set themselves apart from competition.	<ul style="list-style-type: none"><li>• Support IaaS, Desktop-as-a-service (DaaS), Private Hosted Cloud and DRaaS use cases.</li><li>• Enable CSPs to offer performance service tiering with no storage overprovisioning.</li></ul>
<b>Automation, chargeback and reporting</b>	Automation is a key requirement to enable agile processes for deploying cloud applications as well as for monitoring, chargeback and reporting.	<ul style="list-style-type: none"><li>• Offer a comprehensive REST API and Powershell toolkit to enable full customization and integration with cloud platforms.</li><li>• Per-VM management and analytics provide unparalleled access and visibility into storage.</li></ul>

## Tintri multi-tenant architecture

A multi-tenant environment creates significant requirements for a storage system. These requirements are often cumbersome to design and implement with legacy storage. The Tintri VM-aware architecture removes the complexity by aligning itself with what matters most – the tenant application.

### Multi-tenancy at the management layer

In most cases, CSPs deploy multi-tenant services such as IaaS and DaaS by leveraging management solutions. For example, a CSP may deploy IaaS using VMware vCloud Director or OpenStack; VMware Horizon is commonly used for DaaS. These management packages provide the framework and tools for multi-tenant environments while Tintri surfaces specific tenant VM information to facilitate reporting and chargeback. Tintri also enables per-VM policy configuration through the Tintri REST APIs and Powershell toolkit.

### Hosted private cloud

In some private cloud deployments, tenants are given access to the infrastructure. Dedicated infrastructure per tenant is not cost efficient, so CSPs deploy private clouds on shared infrastructure and use multi-tenancy to isolate tenants.

Tintri supports hosted private cloud environments through: secure tenant separation, data encryption, service assurance and per-VM analytics that can be used for billing, chargeback and customization. (See Figure 1)

- **Secure tenant separation:** With Tintri VMstore sub-mounts, a CSP can separate tenant data. Access controls or VLANs paired with sub-mounts ensure that each tenant will only see and access their dedicated sub-mount.
- **Data encryption:** Tintri SecureVM enables data-at-rest encryption with no capacity or performance impact.
- **Service assurance:** By design, Tintri ensures consistent performance for every VM even in with mixed workloads. In addition, a CSP can offer different performance tiers through Tintri per-VM QoS.
- **Per-VM analytics:** Tintri provides in detailed per-VM data that is available through REST APIs. The analytics can be leveraged for billing, chargeback, troubleshooting and more.

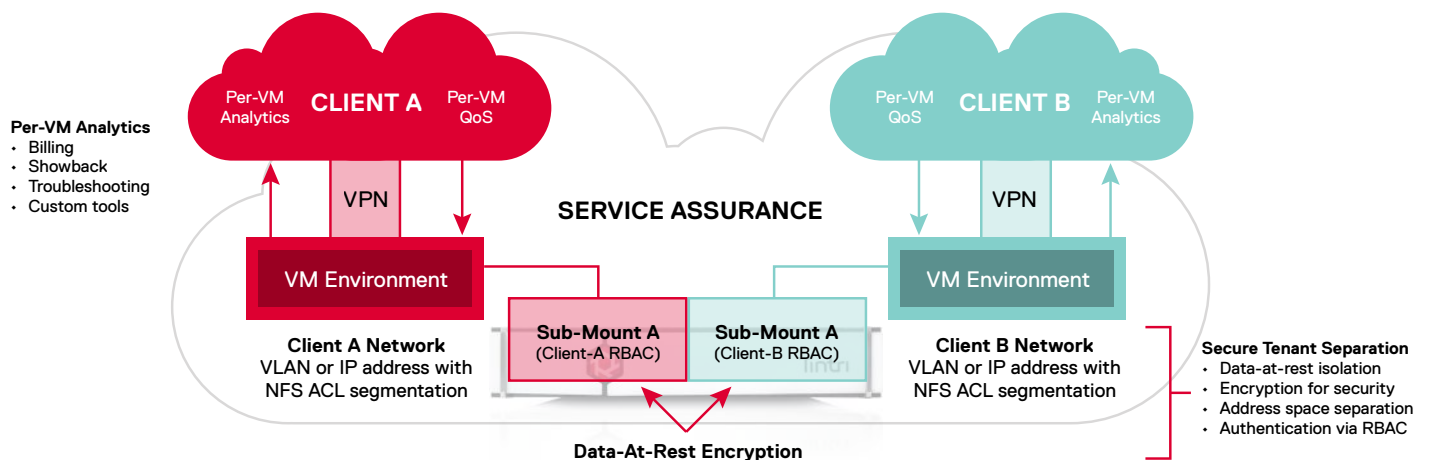


Figure 1. Tintri Multi-tenancy Architecture for Hosted Private Cloud

## Summary

Multi-tenancy is a must for cloud deployments but creates unique challenges for CSPs. With Tintri's VM-aware storage architecture, CSPs deploy storage that aligns with their virtualized multi-tenant environments. Tintri eliminates the need to map tenant VMs to LUNs, along with all of the associated planning, carving and tuning of LUNs. With Tintri, the focus is always on the VM-level policies, QoS and real-time analytics. Tintri QoS ensures that each tenant VM has consistent and guaranteed storage performance and enables CSPs to offer performance tiers in a way that is not possible with any other storage platform. And with Tintri's comprehensive REST API and Powershell toolkit, CSPs have the tools to integrate with any required tools, from self-service portals to billing platforms.



### Global HQ

303 Ravendale Dr.  
Mountain View, CA 94043  
United States  
+1 650-810-8200  
[info@tintri.com](mailto:info@tintri.com)

### EMEA HQ

Fountain House 10th Fl  
130 Fenchurch Street  
London EC3M 5DJ  
+44 (0) 203 053 0853  
[emea@tintri.com](mailto:emea@tintri.com)

### APAC HQ

9 Temasek Boulevard  
Suntec Tower 2, #09-01  
Singapore 038989  
+65 6407 1359  
[apac@tintri.com](mailto:apac@tintri.com)

### Japan HQ

Level 6, Kishimoto Building  
2-2-1 Marunouchi, Chiyoda-ku,  
Tokyo 100-0005 Japan  
+81 (3) 6213-5400  
[info.japan@tintri.com](mailto:info.japan@tintri.com)

Tintri, the Tintri logo, Tintri VMstore, Tintri Global Center, ReplicateVM, SecureVM and SyncVM are trademarks or registered trademarks of Tintri, Inc. All other trademarks or service marks are the property of their respective holders and are hereby acknowledged.  
©2016 Tintri, Inc. All rights reserved. 160118T10271

The OpenStack word mark and the Square O Design, together or apart, are trademarks or registered trademarks of OpenStack Foundation in the United States and other countries, and are used with the OpenStack Foundation's permission. Tintri is not affiliated with, endorsed by, or sponsored by the OpenStack Foundation or the OpenStack community