



A Passion for Innovation

How Tiscali Reinvented Itself as a Cloud Service Provider and Opened Up New Market Opportunities

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Here at Tiscali, we're committed to innovation and market leadership. As the only independent telecommunications operator in Italy, we pride ourselves on being first to offer new services such as subscription-free Internet. But continuous innovation requires constant evolution, and in Italy, just as around the world, businesses are increasingly adopting cloud computing for its compelling economics and unprecedented scalability.

When our industry began shifting from managed services to cloud computing, Tiscali saw an opportunity. We decided to leverage our expertise in telecommunications and managed IT services to offer turnkey cloud services for the business-to-business (B2B) market with guaranteed end-to-end performance, speed, and security.

New Opportunities Involve New Risks

At Tiscali, we had to pivot quickly to take advantage of new business opportunities in the cloud and to gain market share before our competitors did. As we began planning our cloud strategy and looking at ways to modernize our data center, we identified three primary areas of risk:

- **Performance.** As a cloud service provider, we can't afford to have high latency causing unpredictable performance for our customers' applications or our own.
- **Compliance.** Data protection and sovereignty concerns are particularly acute in Italy and across Europe. Government mandates and regulations are increasing pressure to adopt cloud services while meeting strict security and data residency requirements.
- **Control.** We need to retain control over and manage data in any "flavor," and we must avoid vendor lock-in to offer our customers more choices.

To manage these risks, we decided to host both internal and customer-facing services in the same private cloud, using a hybrid approach. This strategy allowed us to maintain control of data while transforming our business from a consumer-focused telco to a provider of enterprise cloud services.

Requirements for Our Hybrid Cloud Storage Infrastructure

Standardizing on the right storage solution was critical in making our data center cloud-ready. To transition to a service provider model and build a robust hybrid cloud platform, we looked to NetApp, our data storage partner since 1997, for help. NetApp has a local presence in Italy, offers support in the Italian language, and has always responded quickly to our rapidly changing technology and business needs.

We ultimately chose to base our hybrid cloud on the NetApp® clustered Data ONTAP® platform and VMware for the following reasons:

- **Data Fabric technology vision.** Tiscali and NetApp share a common vision for the future of the hybrid cloud—one in which choice and control are paramount. In that vision, a data fabric enables customers to move freely between public and private cloud services by using the speed and security of Tiscali's network. We can innovate without constraints, using our choice of hybrid cloud resources (see Figure 1).
- **Cloud-integrated storage.** Public cloud service offerings and pricing are constantly evolving. NetApp gives us the flexibility to adopt hybrid cloud on our own terms, and in ways that allow us to cater to a wide variety of current and future customer requirements.



Andrea Stefano Sardu is Tiscali's storage infrastructure manager. He joined the company in 2001. Mr. Sardu's team manages more than 1.5PB of heterogeneous data and is responsible for designing and architecting storage, data protection, and disaster recovery solutions for Tiscali and its enterprise customers. Mr. Sardu has more than 15 years of experience in storage technology. He holds a bachelor of science degree in IT from Università degli Studi di Cagliari.

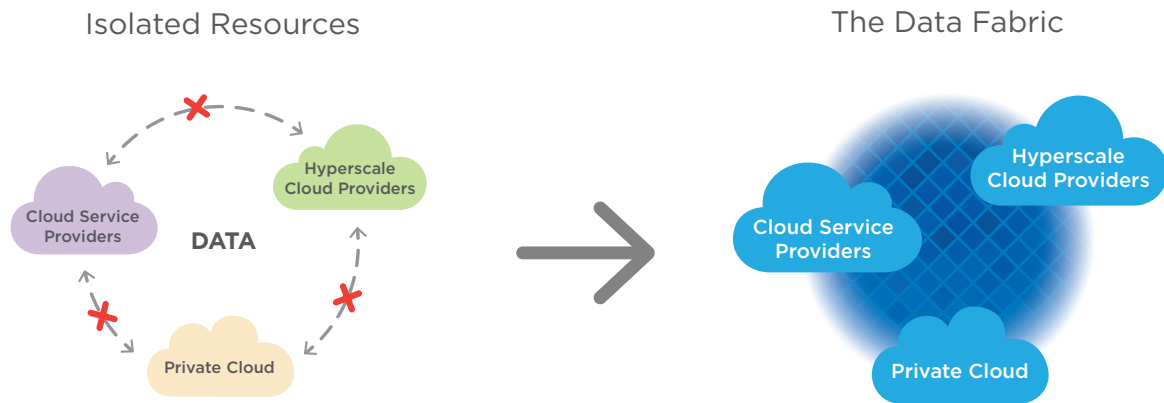


Figure 1) NetApp vision of Data Fabric technology. Tiscali benefits from a common set of data services delivered through a software-defined approach. Data management and transport are consistent and efficient, no matter where the data resides.

At Your Service: New Cloud Options for Business Customers

Tiscali's hybrid cloud provides the foundation for a host of revenue-generating B2B services, including:

- **Infrastructure as a service.** Many customers host production VMs in Tiscali's hybrid cloud, often while they use hyperscalers for large-volume testing and development.
- **DR as a service.** Customers in risk-sensitive industries, including a high-profile bank in Rome, have been able to improve their recovery objectives with DR services based on NetApp SnapMirror and VMware vCenter Site Recovery Manager.
- **Backup as a service.** Soon customers will be able to back up data to Tiscali's cloud with end-to-end encryption by using NetApp AltaVault® cloud-integrated storage. Customers can manage their own encryption keys, which is essential for many compliance scenarios.
- **Billing as a service.** Customers who host Oracle billing databases on Tiscali's cloud platform can outsource their billing to Tiscali to improve processes and reduce costs.
- **Cloud storage.** NetApp deduplication and compression help Tiscali offer cost-effective archiving in the cloud.
- **Managed e-mail.** Tiscali provides near-infinite e-mail storage to 2 million users, with 10GB mailboxes to start.

- **Nondisruptive operations.** Downtime windows are unacceptable in the world of cloud services. We needed our infrastructure to be able to support aggressive service-level agreements for application and data availability for customers.

- **Scalability.** As our hybrid cloud grows, we need the ability to quickly provision new customers without downtime, and without ripping and replacing infrastructure.
- **All-flash and hybrid flash performance options.** Customers often underestimate their performance needs, or require more storage I/O than spinning drives can provide in a reasonable footprint. NetApp gives us many options to accommodate these scenarios quickly and cost-effectively.
- **Secure multi-tenancy.** The ability to provide end-to-end security is a must for cloud service providers. Storage virtual machines (SVMs) in clustered Data ONTAP are secure, virtual storage containers that make it easy for us to isolate customers at the storage layer (see Figure 2).
- **Integrated data protection and disaster recovery (DR).** NetApp gives us a native toolset for low-overhead data protection that uses NetApp Snapshot® copies and SnapMirror® replication.

How We Built Our Hybrid Cloud on NetApp

We were the first NetApp customer in Italy to upgrade to clustered Data ONTAP because we saw the value of nondisruptive operations and we wanted to upgrade as quickly as possible. At our main campus in Cagliari, Sardinia, we deployed a total of 22 NetApp FAS8040 storage systems running clustered Data ONTAP to host both internal and customer-facing cloud services.

The NetApp Cluster-Mode Expert Team worked with NetApp Professional Services to design, configure, and implement the clustered environment. We used a combination of the NetApp 7-Mode Transition Tool (7MTT) and NetApp SnapMirror replication to migrate data from old systems. More than 90% of our data has now been migrated to clustered Data ONTAP. The 7MTT is an excellent tool—it helped us by automating portions of the migration and by performing prechecks to verify transition readiness. I recommend that any company that is upgrading Data ONTAP systems operating in 7-Mode to clustered Data ONTAP use this tool because it simplifies what can be a very complex process.

Tiscali Secure Multitenancy

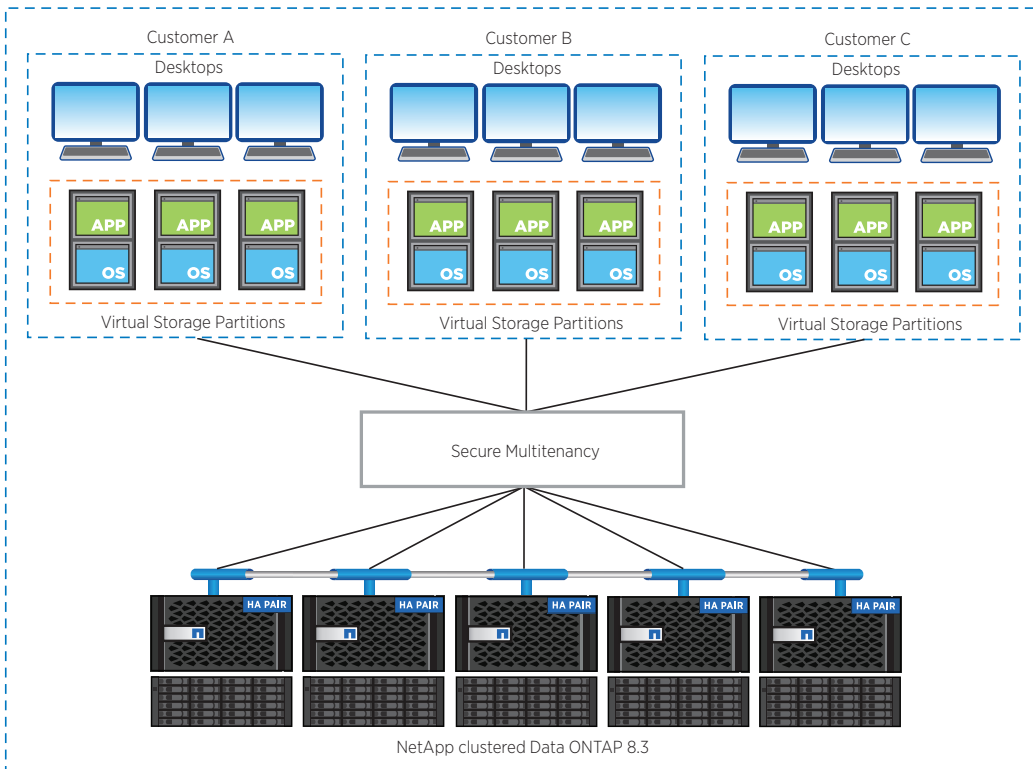


Figure 2) Secure multi-tenancy.
NetApp SVMs keep customer data isolated, even across shared storage resources.

We divided the FAS8040 storage nodes into three separate clusters. A 10-node NFS cluster supports our virtual hosting customers, our billing-as-a-service databases, and our own customer bills (millions of PDF files). An 8-node cluster is dedicated to our managed e-mail services. Finally, a 4-node Fibre Channel cluster supports our most critical internal applications, such as Siebel, TIBCO, and Oracle Financials, as well as our core databases (see Figure 3). Because of the multiprotocol support in NetApp, we were able to use FC SAN as well as NAS protocols for different workloads without complicating our infrastructure. Data is replicated to a DR site in Rome at regular intervals.

We're also using NetApp to support our fast-growing mobile services platform, which represents a new revenue stream for Tiscali. We recently deployed NetApp EF-Series all-flash arrays to deliver high-performance, dynamic billing while maintaining excellent performance for Tiscali Mobile Services (see the sidebar "Improving Mobile Services Performance by 300%").

Storage Efficiencies Behind Tiscali's Hybrid Cloud

NetApp solutions are critical to the efficiency of our cloud and the new services that we offer. We're realizing benefits such as simplified data protection and management, better use of available capacity, fast and efficient DR, and the ability to dynamically accelerate performance.

Simplified data protection and management

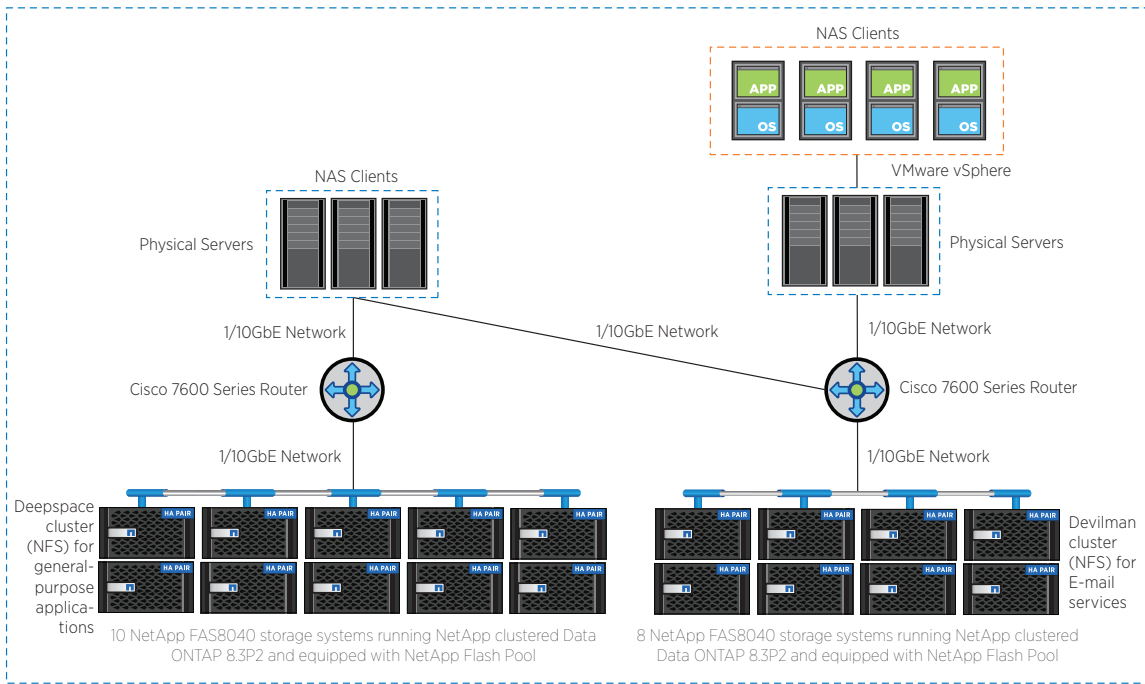
Data for our services is growing between 20% and 30% annually, and as we bring on more new customers, our growth will accelerate even faster. With tools such as NetApp SnapManager® for Oracle, for Microsoft SQL Server, and for Microsoft Exchange, we can automate backup, recovery, and database cloning, allowing four employees to manage 1.5PB of data. Without the data management tools that NetApp provides, we would need 10 employees who were dedicated to storage.

Better use of available capacity

With NetApp, we need much less physical storage than we actually consume in terms of logical capacity. NetApp deduplication is very effective on volumes that contain redundant data, helping us conserve 90% of the storage capacity in our virtual server environment and 70% for our billing systems.

We're also using NetApp FlexClone® technology to provision thin clones of the Oracle databases that support our core applications (ERP, billing, CRM, Tibco), allowing developers to immediately begin their work by using virtual copies of production. Not only does this approach improve time to market for new features, but it also saves us the 200TB that we would need to make multiple physical copies of the databases. It's very difficult to imagine operating today without FlexClone.

Tiscali NetApp NAS Environment



Tiscali NetApp SAN Environment

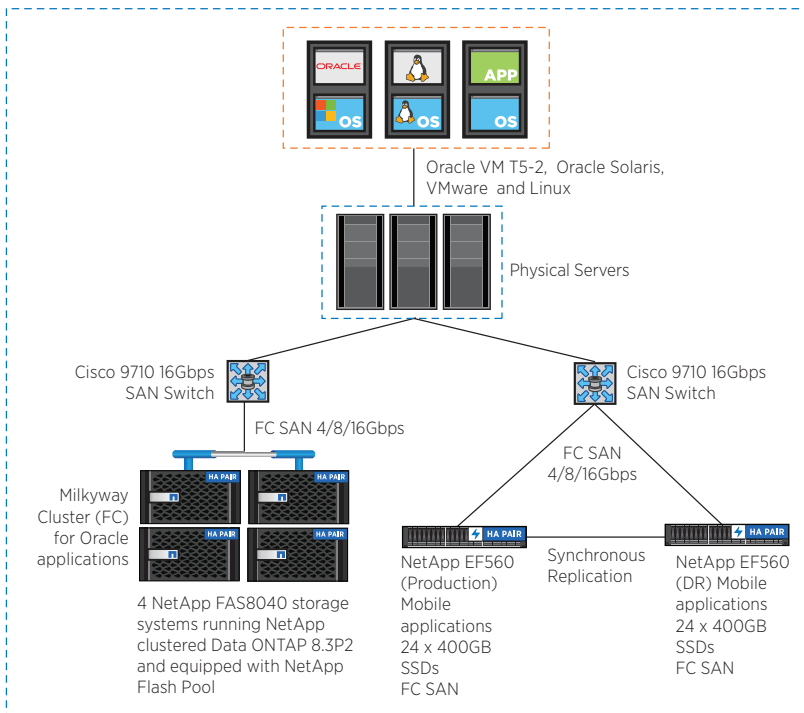


Figure 3) Tiscali NAS and SAN architectures.

Multiprotocol flexibility allows Tiscali to accommodate a variety of workloads. NetApp all-flash systems and Flash Pool™ SSD tiered storage accelerate performance.

Fast and efficient disaster recovery

Thanks to the network compression and thin replication features of NetApp SnapMirror, we were able to meet aggressive DR service levels by using our existing 100Mbps connection between Cagliari and Rome. This ability helps us to keep costs down and to price our services more competitively.

Improving Mobile Services Performance by 300%

Because we are a telecommunications company, mobile services are an increasingly important part of our business. It's a growing revenue stream for Tiscali, and customer demand for Tiscali Mobile Services is constantly increasing. However, we faced a technical challenge in meeting this demand while maintaining a great customer experience.

For every action that a mobile customer performs—whether it's placing a call, sending a text, or accessing a website—data is written to and read from the Oracle database that supports our NetCracker Rating and Billing Manager (RBM) application. That process requires a large amount of storage I/O. And here's the big problem: If the queries cause noticeable latency, they can compromise the end-user experience, which we must avoid at all costs.

To resolve this issue, we moved our mobile billing database to NetApp EF560 all-flash arrays, each equipped with twenty-four 400GB SSDs (9.4TB raw) to give us high performance along with rich data management features. One system supports production while another provides local DR with synchronous replication, mitigating the risk of data loss. The result is a threefold performance improvement over spinning drives!

In a real-world recovery or a test scenario, the NetApp Storage Replication Adapter for VMware vCenter Site Recovery Manager discovers the storage resources that are connected to VMware vSphere. It also manages failover and test failover of the VMs. As a result, we can provide very fast recovery times for our business and our customers.

Ability to dynamically accelerate performance

We use NetApp Flash Cache™ caching on our controllers to optimize read performance without adding more drives. For write-intensive applications that require high performance, we use NetApp Flash Pool, a feature of Data ONTAP, to automate storage tiering between solid-state drives (SSDs) and spinning hard drives on certain nodes.

The beauty of introducing hybrid flash nodes into a clustered Data ONTAP storage cluster is that we can move workloads to SSDs at any time, without taking applications offline. If a customer is experiencing performance issues, we can simply move the customer to a node that has Flash Pool configured. We also have the option to use NetApp All Flash FAS nodes to improve performance even more.

Business Impact: A Competitive Advantage in the Cloud

At Tiscali, we can now offer a wider and updated set of services and can evolve from offering our traditional telco portfolio to becoming a cloud services provider and business enabler. We can accelerate the return on investment that we have set into motion even as we evolve to capitalize on new market opportunities. We can be responsive to new customer and compliance requirements and can deploy new services quickly.

With NetApp, we have been able to:

- Guarantee 99.999% availability for cloud services.
- Enable customers to implement end-to-end DR in less than 30 days.
- Improve customer recovery point objectives (RPOs) from days to less than 1 hour.
- Reduce rack space requirements by 50%, using 60% less power and cooling.
- Store 70% to 90% less data with deduplication.
- Accelerate internal recovery objectives (30-minute recovery time objective and 1-hour RPO).
- Operate with 60% less headcount even as data grows by up to 30% annually.

Today we have an infrastructure that is more transparent than before, providing services that are flexible enough to sustain our business needs in terms of data movement, data security, and data protection. Our business is not waiting on the technology; rather, technology is creating opportunities for our business.

The velocity with which we are able to provide solutions today would not be possible without the NetApp infrastructure. And people are noticing—Tiscali just won a major tender to provide connectivity to all the public administration in Italy for the next seven years.

What's Next

In the near future, we plan to leverage the NetApp hybrid cloud portfolio to offer new services and to win new customers. We're testing NetApp AltaVault cloud-integrated storage to support a new backup-as-a-service offering that will allow customers to back up to our cloud with full encryption by using any backup software. We are also investigating the use of NetApp StorageGRID® Webscale object storage software along with AltaVault to offer more cost-effective cloud backup options to customers with large datastores.

We're pleased that NetApp offers NetApp Cloud ONTAP® to allow customers of Amazon Web Services to deploy a software-only NetApp system in the cloud. That option will make it even easier for us to bring those customers into our cloud and will help drive additional revenue. We are also in the process of becoming certified to host NetApp Private Storage for Cloud in our data center, which will give us another option to address our customers' data residency requirements.

As we add more customers, we will use storage quality-of-service policies in clustered Data ONTAP to keep service levels consistent. Our next goals are to unify data management for our entire hybrid cloud infrastructure, and to use NetApp OnCommand® Insight for capacity planning, chargeback, billing, and reporting on individual customer profitability.

Product List

- NetApp FAS8040, FAS6280, FAS6240, FAS6000, FAS3200, and FAS3100 storage systems
- NetApp EF560 all-flash arrays
- NetApp clustered Data ONTAP 8.3x
- NetApp 7-Mode Transition Tool (7MTT)
- NetApp Flash Cache
- NetApp Flash Pool
- NetApp SANtricity® Storage Manager
- NetApp OnCommand Unified Manager
- NetApp Snapshot and SnapRestore® technologies
- NetApp SnapManager for Microsoft Exchange Server
- NetApp SnapManager for Microsoft SQL Server
- NetApp SnapManager for Oracle
- NetApp SnapMirror
- NetApp SnapDrive® for Windows
- NetApp FlexVol® software
- NetApp FlexClone
- NetApp deduplication
- NetApp Virtual Storage Console for VMware vSphere

- VMware vSphere 5.x
- Red Hat Enterprise Linux/CentOS
- Microsoft Windows Server 2012 and 2008
- Oracle Solaris 8, 9, and 10
- Microsoft Exchange Server 2013
- Microsoft SQL Server 2012 and 2008 database
- Oracle Database 11g
- Sun/Oracle, HP, Dell, and IBM servers
- Cisco switches

Services

- NetApp SupportEdge Standard and Premium
- NetApp AutoSupport™ diagnostics
- NetApp Professional Services

About Tiscali

Tiscali S.p.A. is one of the leading alternative telecommunications companies in Italy. Tiscali provides its consumer and business customers with a vast range of services, including Internet access through dial-up and ADSL, voice, VoIP, media, and value-added services, as well as other technologically advanced products.

About NetApp

Leading organizations worldwide count on NetApp for software, systems and services to manage and store their data. Customers value our teamwork, expertise and passion for helping them succeed now and into the future.