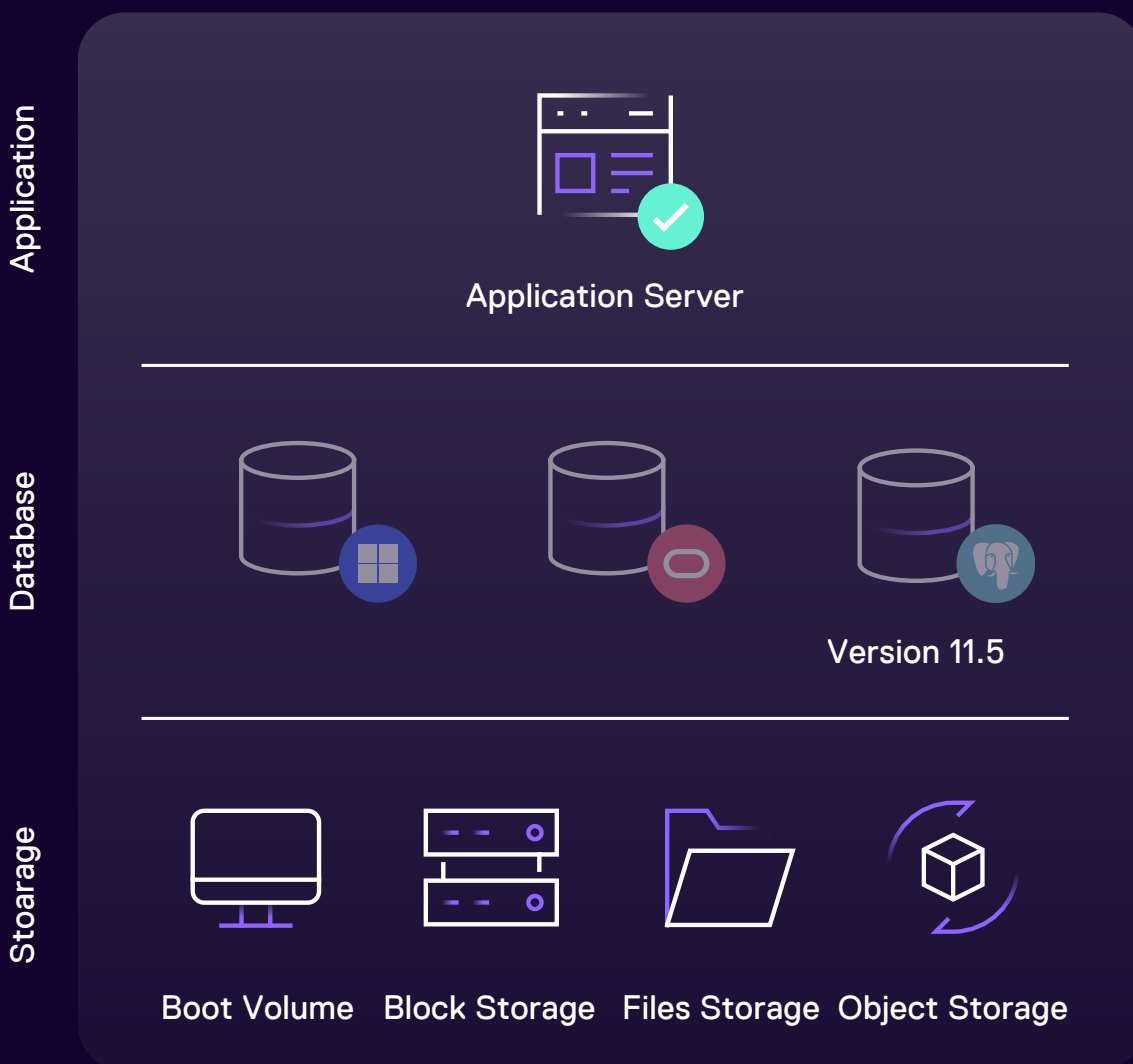


WHITE PAPER

Achieving Cost Effective, Fully Automated, Full Stack Disaster Recovery on OCI

Dbvisit StandbyMP Software Enables FSDR to Support Oracle SE, SQL Server and PostgreSQL for Cost Effective, Fully Automated Full Stack Disaster Recovery.



Introduction

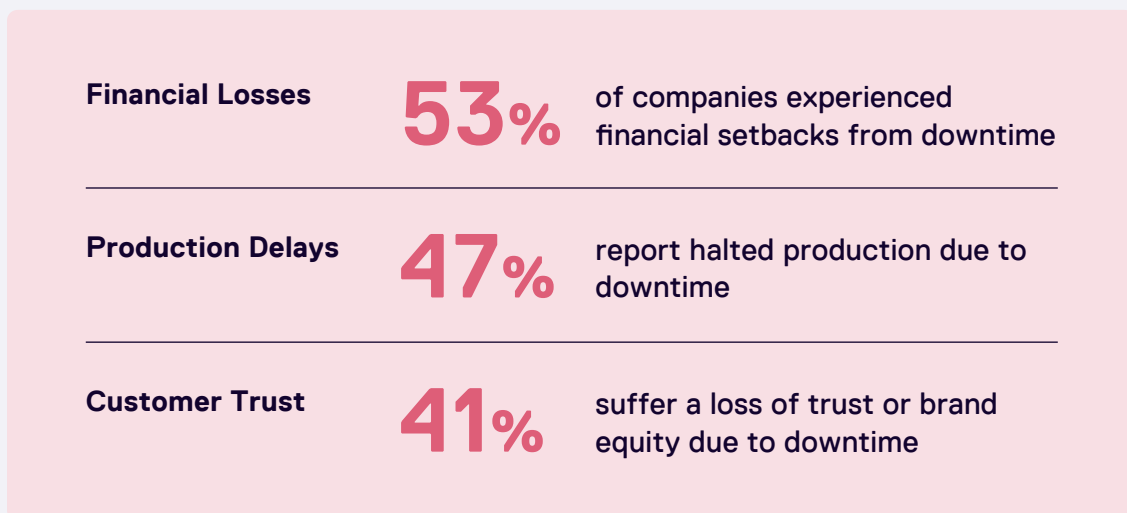
Robust Disaster Recovery (DR) plans are indispensable for maintaining business continuity of on-premises systems. Despite the popularity of cloud services like Oracle Cloud Infrastructure (OCI), these services are not immune to outages and disruptions. This white paper discusses the importance of DR in the cloud, evaluates existing OCI solutions, overviews OCI’s recently released FSDR (Full Stack Disaster Recovery) service, and finally introduces Dbvisit StandbyMP software that enables FSDR to support Oracle SE, SQL Server, and PostgreSQL databases for the creation of more-cost effective architectures and easier administration of multiple database platforms.

The Cloud Still Needs Dedicated Disaster Recovery

Cloud platforms promise high availability and resilience, yet they can still experience downtime due to various factors, such as regional power failures, natural disasters and cyber-attacks. Organizations must prepare for these disruptions to prevent financial losses, production delays, and damage to their reputation.

Downtime Has a Real-World Impact

A study conducted by Forrester Research interviewed 100 IT directors in large US enterprises. The research clearly demonstrated the critical impact downtime can have on organisations. These statistics underline the importance of a robust DR strategy, even for cloud-based infrastructures:



Outages Demonstrate the Vulnerability of Cloud Services:

The cloud does have outages, including full regional outages. The following are examples that highlight regional-wide outages. The purpose of these examples is to show that (1) the cloud does suffer downtime, and (2) within-availability-zone disaster recovery cannot always protect you against these region-wide failures. This reinforces the need for comprehensive, geographically-diverse DR plans.

Notable Cloud Outages:

June 2024	The UniSuper Pension fund suffered multi-day downtime caused by removal of their account and infrastructure caused by an error in Google Cloud provisioning. Luckily, services were able to restore from an on-premises backup.
May 2023	Google Cloud Paris suffers an outage due to a cooling system water pump failure. The outage spread from a single zone outage to a region-wide outage affecting over 100 cloud services.
December 2022	Alibaba Cloud experienced a major outage due to a refrigeration failure, resulting in the shutdown of many regional services, including a major cryptocurrency exchange and the Monetary Authority of Macau's website.
July 2022	Google Cloud's Europe West2 Suffered region-wide downtime caused by the simultaneous failure of multiple cooling systems resulting in service unavailability for between 18 hours and 33 hours.
December 2021	Amazon's AWS entire USA East Region experienced a major outage for five hours due to a networking issue.

Technologies Available on OCI for DR

Robust high availability (HA) and disaster recovery (DR) solutions tailored for Oracle databases are available on OCI. These include:

- **Data Guard and Active Data Guard:** Available for Oracle Enterprise Edition that offers the creation and maintenance of out-of-region warm/hot standby databases for comprehensive protection.
- **Dbvisit StandbyMP:** A third-party disaster recovery software for Oracle Standard Edition, that like Oracle Data Guard enables the creation and maintenance of a highly resilient warm standby database. StandbyMP is also extremely easy to use and features a highly intuitive setup and administration interface backed by response24/7 support.

The Remaining Challenge with Database DR Tools

While Data Guard and Dbvisit StandbyMP are highly effective database-specific DR tools, these solutions do not cover the entire application stack. This necessitates additional tools and coordination across database and application teams, which can result in delays and mistakes, jeopardizing business continuity.

The Opportunity to Create an Automated Full Stack Disaster Recovery Solution

A unified Full Stack Disaster Recovery (FSDR) tool addresses these challenges by providing a single solution for recovery of the entire stack, including infrastructure, middleware, database, and applications. This integration simplifies the recovery process, reducing the risk of errors and enhancing efficiency.

Introducing OCI Full Stack Disaster Recovery (FSDR)

What is FSDR?

FSDR on OCI is a DR orchestration service offering comprehensive disaster recovery capabilities across the entire application stack. It ensures recovery for all layers, including infrastructure, middleware, database, and applications. What’s more its disaster recovery is comprehensive, scalable, and highly intuitive.

Key Benefits of FSDR

- 1. Comprehensive Coverage** Protects the entire application stack.
- 2. High Resilience** Provides cross-region DR, minimizing impact from even regional outages like those listed on prior page.
- 3. Flexibility** Supports both Oracle and non-Oracle applications.
- 4. Simplified Management** Automates the operation of comprehensive DR plans, enabling easy execution during incidents.
 - a. Single Pane of Glass Operation: FSDR standardises DR operations for even vastly different business systems by using a single pane of glass.
 - b. DR at Scale: FSDR can handle multiple DR workflows at scale without a huge team of technical experts.
 - c. Simple Execution: Any authorised user can execute and monitor recoveries without needing to understand the complex processes.

FSDR Architecture and a Switchover

A typical FSDR architecture has an application layer with Bare Metal VMs for compute; a Database Layer, which can be Bare Metal, Exadata, Autonomous Database, or a Base Database Service; and an Infrastructure Layer, with Boot Volume, Block Storage and File Storage.

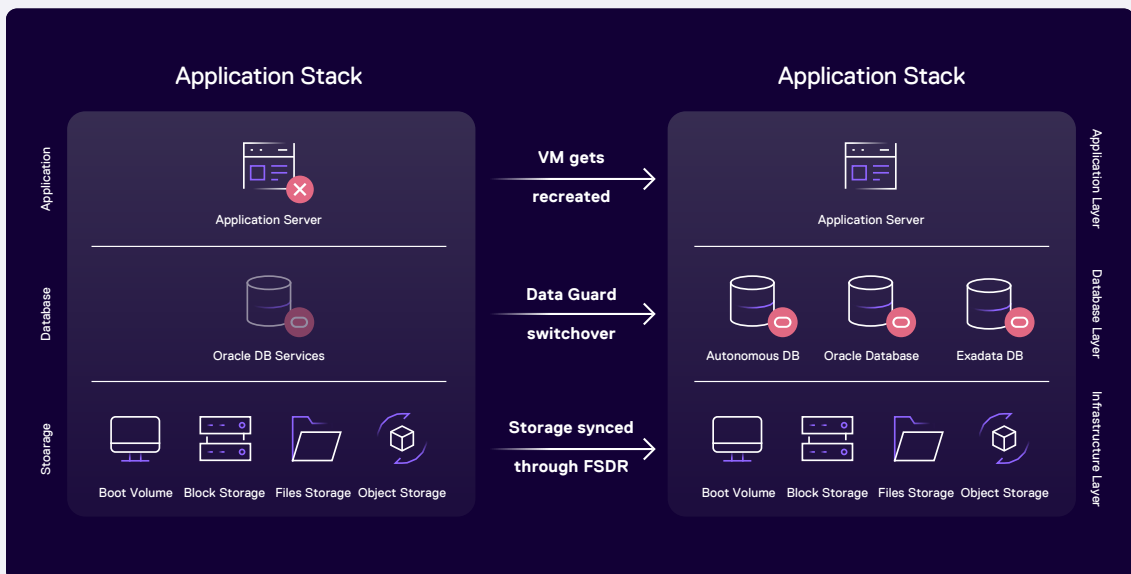
A resilient environment created using FSDR consists of a primary site and a secondary site, located in a different region:

- Database Layer: Primary database exists on primary site, and Standby database, continuously updated by Data Guard, exists on secondary site.
- Storage Layer: Continuously synchronised through FSDR.
- Application Layer: Application VM on the secondary site is not created until failover occurs providing significant compute cost savings.

Steps if a switchover occurs:

If the application server goes down in the primary region, then a failover is initiated.

- Application Layer: Application VM gets recreated on the secondary side.
- The database switches over to the standby database.
- The application is redirected to the new primary database at the secondary site.



Limitations of FSDR

Despite its strengths, FSDR does have database platform limitations that limit its potential for unifying disaster recovery plans across the organisation.

FSDR Natively Lacks Support For:

- Oracle Standard Edition
- Microsoft SQL Server
- Limited PostgreSQL Support

Dbvisit StandbyMP unlocks FSDR for Oracle SE, SQL Server, and PostgreSQL

Dbvisit StandbyMP software extends FSDR's capabilities to Oracle SE, SQL Server, and PostgreSQL databases. It uses physical replication technology to create a continuously updated standby database that fully integrates into FSDR and can be quickly and automatically brought online when needed.

By combining FSDR and Dbvisit StandbyMP, organisations benefit by having a single DR orchestration tool that scales over multiple applications and databases including Oracle SE, SQL Server, and PostgreSQL.

Benefits of Dbvisit StandbyMP

#1

Broad Support

Covers Oracle SE (Both Bare Metal and Base Database Service), SQL Server, and PostgreSQL.

#2

Right-Size Database Licenses

Right-size your database licenses to your performance requirements while keeping resilient disaster recovery.

#3

Automated Failover

Ensures minimal downtime and reduces error risk.

#4

Seamless Integration

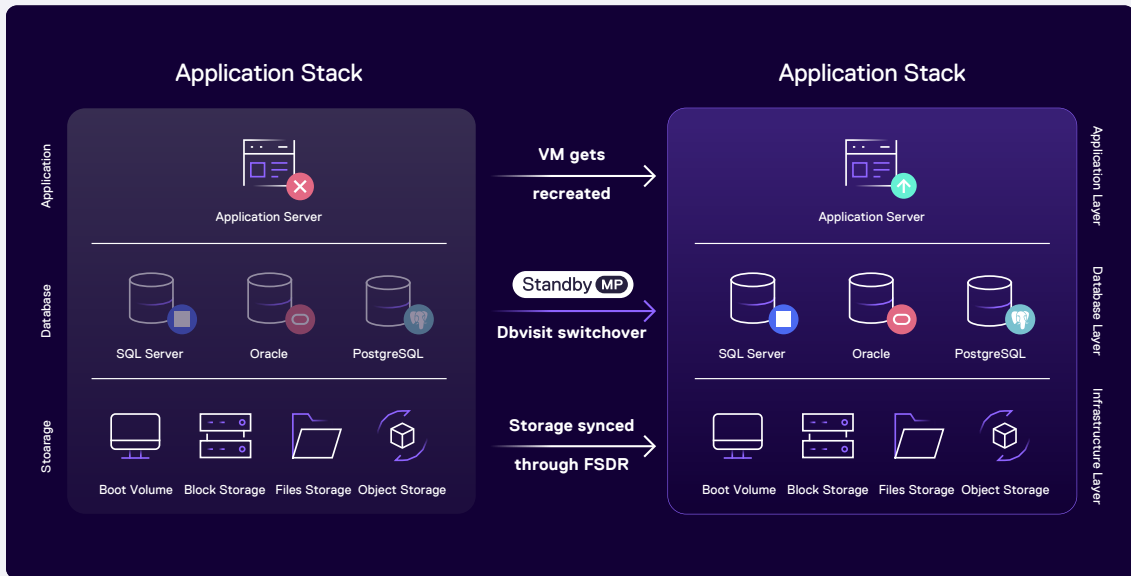
Works with FSDR to provide a unified DR solution for the entire application stack. This includes DR Testing functionality.

#5

Trusted Solution

StandbyMP is used by over 1700 organisations in 120 countries for database disaster recovery and is backed by 24/7 support.

How it works



Typical architecture using Dbvisit StandbyMP and FSDR:

- **Application Layer:** Compute bare metal VMs. The VM at the secondary site is only created upon failover to optimise cost and efficiency.
- **Database Layer:** BDS (Oracle SE), Bare Metal (Oracle SE, SQL Server, PostgreSQL). The secondary (standby) database is created and continuously updated by Dbvisit StandbyMP.
- **Infrastructure Layer:** Boot Volume, Block Storage, File Storage. This is synchronised to the secondary site by FSDR.

This architecture and recovery process ensures minimal downtime and seamless recovery.

Dbvisit StandbyMP Components and Architecture within FSDR

There are two architectures that are used when integrating Dbvisit StandbyMP with FSDR. The first architecture is required for databases created using the Oracle Base Database Service but can be also used with databases hosted on Bare Metal. The second architecture can be used for Bare Metal systems only.

Architecture 1: Architecture for the Base Database Service



- The StandbyMP Control Center (dbvcontrol) compute VM controls the StandbyMP agents installed on the primary and secondary sites
- The dbvcontrol VM is a member of the FSDR DR group. Here FSDR will ask dbvcontrol to perform specific tasks at specific times as part of the DR plan.
- The dbvisit compute VM (dbvcontrol) manages database switchover/failover by remotely connecting to the primary and standby machines and running scripts.
- (note resources required by this dbvisit compute VM are very minimal)
- During a failover/switchover, the DBS machine remains intact (not migrated).
- It is recommended to use a DNS hostname with a switching mechanism (rather than a discreet IP address) to ensure a smooth transition of Dbvcontrol to the standby site

Architecture 2: StandbyMP Simplified Bare Metal (Compute VM) Architecture



- Both Compute VM machines are registered in DR Groups within FSDR
- There is no need for the additional Control Center Compute VM
- This solution is simpler but has one limitation that if after Switchover the primary fails then the Control Center will not be available. However, even in this case critical operations on the standby can be run locally, with no Control Center access.

CASE STUDY

Air and Water Utility in India

A large air and water utility company in India, who had recently acquired to other leading air and water utilities, faced significant DR challenges due to a fragmented tech stack and compliance requirements. The company needed a resilient DR solution to ensure continuous operations, especially since they supplied critical services to hospitals.



If my JD Edwards goes down, or something happens to our database, and I'm not able to create an accurate invoice, then supply would be disrupted, which could be catastrophic for the customer.

Challenges

- **Fragmented Tech Stack:** Different systems across acquired entities.
- **Compliance Requirements:** Stringent due to the nature of their products.
- **OCI Outage:** A recent outage in Mumbai underscored the need for robust DR.

Solution

The company chose Oracle as their cloud provider and then implemented FSDR and Dbvisit StandbyMP on Oracle SE, achieving:

- **Unified Platform:** Consolidated DR processes and created a unified management platform to consolidate managing different datacentres, databases, and applications.
- **Cost-Effective DR:** Leveraged Dbvisit StandbyMP for Oracle SE, improving cost efficiency.
- **Resilient Architecture:** Deployed in-region and cross-region DR.
 - Mumbai à Mumbai (HA)
 - Mumbai à Osaka (DR)

Results

- ✓ **Easy DR Testing:** Enabled regular and seamless DR testing, including switchovers to the Osaka Datacentre.
- ✓ **Cost Savings:** Achieved using Oracle SE and optimized DR processes, where the application layer is only spun up on switchover.
- ✓ **Simplified Operations:** Streamlined operations with a unified DR solution.
- ✓ **Data Sovereignty Compliance:** Met stringent data sovereignty requirements.

Summary of Benefits of Dbvisit StandbyMP and FSDR

Combining Oracle SE, Dbvisit StandbyMP, and FSDR offers:

#1**Cost-Effectiveness**

Significant savings through Oracle SE licenses. Further savings can also be made as the secondary application compute VM is only initiated upon failover.

#2**High Resilience**

Robust DR to an out-of-region site for the entire application stack.

#3**Simplified Management**

Intuitive and unified DR management across the application and database layers, multiple database platforms, and various applications.

#4**Comprehensive Coverage**

With StandbyMP FSDR not only supports Oracle Enterprise Edition licenses, but also Oracle SE, SQL Server, and PostgreSQL.

In conclusion, leveraging Dbvisit StandbyMP and FSDR together with Oracle SE provides a comprehensive, cost-effective, scalable, and easy to manage solution that ensures business continuity and robust disaster recovery capabilities.

