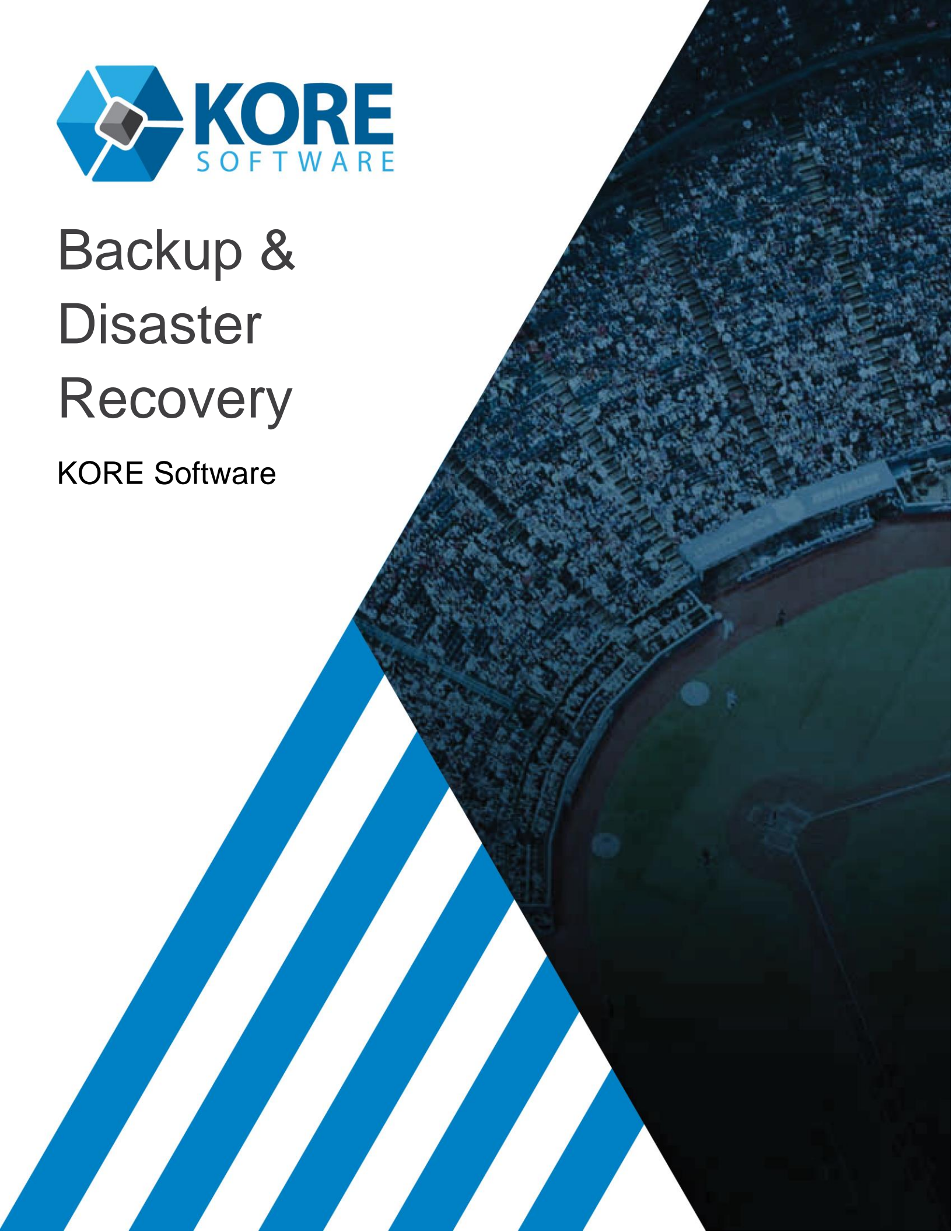




# Backup & Disaster Recovery

KORE Software



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## 1. Overview

KORE Software recognizes the importance of maintaining a robust disaster recovery plan (DRP) and backup strategy to maintain a high level of availability and security of data for our customers. This document provides a high-level overview of KORE Software's backup strategy, disaster recovery plan, recovery time objective and recovery point objective broken out by individual products.

Additionally, this document provides insight into KORE's high-availability strategy.

## 2. Backup & High Availability Strategy

### 2.1. High Availability

KORE Software utilizes Amazon Web Services best practices (as defined in "Architecting for the Cloud: AWS Best Practices" whitepaper - <https://aws.amazon.com/whitepapers/architecting-for-the-aws-cloud-best-practices/>) to ensure customers receive a consistent and highly-available experience when using KORE's modules.

#### 2.1.1. Single Points of Failure

As part of all production systems, a full review is performed to identify any single points of failure, document and build in redundancy. Examples of these include:

- Auto-scaling groups and multiple availability zones for web servers
- Multiple availability zones for active-active database clusters with AlwaysOn availability groups
- Redundant load balancers for all external facing endpoints

#### 2.1.2. Automation

As much as possible, KORE automates infrastructure, testing, deployments and auditing. This allows for faster disaster recovery and a consistent experience for customers.

#### 2.1.3. Security by Default

Security by default is a key principle at KORE Software. By default, no access is granted to a given resource. For access to be granted to a database, a server or data store, it must be explicit and reviewed. In addition to limiting permissions, regular reviews of security groups, network access control lists and data store permissions are performed.

## **2.2. Database Backups**

### **2.2.1. KORE Ticketing & Fan Engagement, Sponsorship & Partner Engagements and Suite & Premium Modules**

KORE Software takes full database backups every 24 hours and transaction log backups every 15 minutes. These backups are immediately copied to Amazon S3 where the data is automatically replicated across multiple devices within multiple data centers. Amazon S3 provides 99.999999999% durability and 99.99% availability (<https://aws.amazon.com/s3/>). Backups are retained in Amazon S3 for 30 days and then are purged.

### **2.2.2. KORE Data Warehouse & Analytics Module**

KORE Software utilizes Amazon Redshift as a data store for the Data Warehouse & Analytics module. The database is backed up every 8 hours or when 5GB of data changes within the system, whichever is first. Additionally, the raw data being imported into the warehouse is stored in Amazon S3 and can be re-imported in the event of a disaster.

## **3. Disaster Recovery Plan**

### **3.1. Summary**

KORE Software utilizes Amazon Web Services best practices for disaster recovery (as defined in “Using Amazon Web Services for Disaster Recovery” whitepaper - <https://aws.amazon.com/disaster-recovery/>). A combination of “Backup & Restore” and “Pilot Light” methodologies are implemented.

By utilizing Amazon Web Services, KORE is able to operate in multiple geographic areas throughout the United States and Europe and maintain disaster recovery environments in distinct data centres.

#### **3.1.1. KORE Ticketing & Fan Engagement, Sponsorship & Partner Engagements and Suite & Premium Modules**

KORE maintains multiple production ready ProSports environments which can be scaled quickly to accommodate full load as a pilot light recovery.

The backup & restore portion is primarily around SQL Server databases. In the event of a disaster, automated scripts will be triggered to restore all client database to a different geographic region.

### **3.1.2. KORE Data Warehouse & Analytics Module**

In the event of a disaster affecting KORE's Data Warehouse in Redshift, a snapshot of the entire cluster will be restored to a different geographic region and the DNS entries pointing to the cluster will automatically failover to the new cluster. This allows for a fast recovery of individual clusters and return to operations for Tableau reporting, direct SQL connections and ETL processing.

## **3.2. Geographic Redundancy**

KORE's ProSports and Data Warehouse modules are primarily hosted in data centres in Oregon, Northern Virginia and Ireland data centres. A disaster in any of those regions can be handled by the load being redirected to a different region. However, in the unlikely event that those regions are unavailable, KORE maintains scripts to spin up infrastructure in the Ohio, California and Frankfurt regions.

## **3.3. Disaster Recovery Testing & Reviews**

KORE does regular disaster recovery reviews to ensure the plan is kept up to date and is valid for the latest changes to ProSports and Data Warehouse.

In addition to reviews, KORE performs annual tests which involve creating the disaster recovery environment and validating functionality across the new environment.

## **3.4. Recovery Point Objective**

### **3.4.1. KORE Ticketing & Fan Engagement, Sponsorship & Partner Engagements and Suite & Premium Modules**

The recovery point objective defined for these modules is 15 minutes. With transaction log backups being taken every 15 minutes, the maximum data loss in the event of a disaster can be kept very low.

### **3.4.2. KORE Data Warehouse & Analytics Module**

The recovery point objective defined for this module is 8 hours. In general, backups are taken more frequently, but the maximum amount of data loss is 8 hours.

## **3.5. Recovery Time Objective**

### **3.5.1. KORE Ticketing & Fan Engagement, Sponsorship & Partner Engagements and Suite & Premium Modules**

The recovery time objective for these modules is defined at 8 hours. For the majority of cases, KORE is able to restore the system very quickly, but in the event of a full-fledged outage involving multiple geographically located data centres going down, KORE is able to restore system functionality in 8 hours.

### **3.5.2. KORE Data Warehouse & Analytics Module**

The recovery time objective for this module is defined at 8 hours. For the majority of cases, KORE is able to restore the system very quickly, but in the event of a full-fledged outage involving multiple geographically located data centres going down, KORE is able to restore system functionality in 8 hours.