

ObjectRocket™



by Rackspace.

for MongoDB

Fast, Scalable, Reliable, Fully Managed

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1. Introducing ObjectRocket for MongoDB

MongoDB is one of the most popular NoSQL databases available. Thanks to its ease of deployment and flexible data model, MongoDB has become a popular choice to underpin today's mobile, social and connected applications. While it's easy to spin up a new application using MongoDB, many developers and DBAs find that scaling MongoDB instances presents a range of unexpected challenges. Hiring and retaining the right expertise is chief among them. Ensuring the optimal platform and database architecture for a growing MongoDB instance requires costly expertise that is often difficult and time-consuming to find and retain.

ObjectRocket for MongoDB is a managed database-as-a-service (DBaaS) platform engineered specifically for MongoDB. It provides customers with pre-configured, highly performant MongoDB instances that scale automatically in the cloud — all backed by award-winning Fanatical Support® from Rackspace. As a managed solution, ObjectRocket enables businesses to leverage the speed and flexibility of Mongo's document-based data model while freeing up technical resources to focus on development rather than database management.

ObjectRocket allows customers to run demanding database workloads on the cloud without suffering from the performance issues that result from hosting high I/O database workloads on generic servers in the public cloud. The ObjectRocket platform is tuned for MongoDB performance at every level of the technology stack, with a fully redundant, container-based, all-PCIe flash infrastructure. Customers can choose between replica sets, shards, or a custom designed dedicated rack all with SSL-enabled connections to ensure high availability, scalability and security.

Rackspace and ObjectRocket specialists manage customer environments, including architecture design, optimization and configuration, 24x7x365 monitoring, performance tuning and issue diagnosis — and it's all backed by Fanatical Support. Our experienced MongoDB experts are on-hand to offer guidance around complex challenges such as shard key selection, query optimization, security guidance and much more.

By combining purpose-built technology with leading MongoDB expertise, the ObjectRocket platform offers:

1. Simplified management
2. Easy, powerful scalability
3. Optimal performance
4. Availability, stability and redundancy
5. Data and application portability
6. Flexible deployment options

ObjectRocket for MongoDB is ideal for customers looking to benefit from a highly performant, scalable NoSQL database while simultaneously focusing their technical resources on activities that truly differentiate their business — like building better apps and improving time-to-market — rather than on maintenance and tuning at the database layer.

2. Challenges of Managing, Scaling and Optimizing MongoDB

It's easy for many developers to start building applications with MongoDB. However, maximizing performance and ensuring consistency in the public cloud presents a range of complex challenges, particularly as the environment grows.

OPTIMIZING MONGODB REQUIRES EXPENSIVE EXPERTISE

Because MongoDB is a relatively new technology (and increasingly in high demand), it is typically expensive and time-consuming to hire engineers with meaningful experience managing Mongo production environments at scale. As of 2014, the average salary for a Mongo DB engineer was \$107,825 according to Dice.com.¹ But this experience is critical when it comes to planning for scalability, automating routine management tasks and optimizing the database layer for specific application needs.

DATABASE MANAGEMENT STRAINS TECHNICAL RESOURCES

Without dedicated DBAs and engineers, developers may spend too much time configuring and troubleshooting the database layer instead of writing code. This can slow time-to-market, decrease application quality and deprive technical contributors of the time they need to pursue new ideas.

SCALING INVOLVES COMPLEX DECISION MAKING AND HIGH RISK

Although MongoDB is inherently designed to scale in the cloud, scaling horizontally presents a range of challenges. For a horizontal cluster, architects must plan how to best split data onto different servers, when to shard those workloads, and how to select the best shard keys for each one.

Poor architecture decisions — or a failure to plan for sharding early on — can have catastrophic results as the system grows. But the necessary preparation can further slow time-to-market, exacerbate the expense of retaining MongoDB expertise, and place even more strain on other technical resources.

GENERIC PUBLIC CLOUD SERVERS YIELD INCONSISTENT DATABASE PERFORMANCE

Ensuring fast, consistent database performance is difficult on the public cloud. As with any high I/O database workload, MongoDB's performance is particularly impacted by noisy neighbor problems. Spikes in multi-tenant utilization not only slow down query speeds, but also make them unpredictable and difficult to code around. As a result, applications that rely on generic public cloud databases experience inconsistent performance.

3. Benefits of ObjectRocket

SIMPLIFIED MANAGEMENT AND ACCESS TO EXPERTISE

In order to ease the burden of managing MongoDB, ObjectRocket offers:

1. Database-as-a-service (DBaaS) platform fully managed by Rackspace specialists
2. Custom tools to automate deployment, monitoring, maintenance and scaling
3. Multiple easy-to-use interface options

Fully Managed MongoDB Solution – ObjectRocket is a fully managed DBaaS, allowing customers’ access to experienced Mongo experts around the clock.

Rackspace DBAs and customer data engineers (CDEs) help design, configure, manage, scale, optimize and secure customer MongoDB environments. And with industry-leading Fanatical Support, customers receive a broad range of services, from schema design to query optimization.

Examples of services included with ObjectRocket for MongoDB:

Deployment	Architecture design, optimization and configuration
	Design and implementation of sharded cluster for future scaling
	Initial design and construction of indexes
	Free MongoDB data migration assistance
	Security configuration (ACL, accounts, etc.)
	Configuration of automation and scheduled features (RocketScale, AutoKey, balancer schedule, other options as needed)
Maintenance	Advanced administration, monitoring and alerting
	Managed patching and updates
	Upgrades of MongoDB versions
	Direct communication and escalation to MongoDB for bugs and feature requests
Scaling	Consultation, recommendation and implementation of shard keys
	Provision new instances
	Resizing and/or growing instances
Optimization	Performance tuning and issue diagnosis
	Query optimization,
	Compactions
Backups and DR	Disaster recovery (DR) and business continuity
	Recommend and plan replication to DR site
	Participate in DNS management for failover to DR site
	Participate in DR RTO/RPO requirements
	Restores from backups

“After evaluating a number of vendors, we found that [ObjectRocket by] Rackspace provided the fastest I/O and best hands-on support specialists for our platform.”

– **Chris Luken**

Senior VP of Product

Development at SponsorHub

Suite of Operations Tools – The ObjectRocket platform includes a range of backend and customer-facing tools that simplify the management of MongoDB, saving customers time and allowing them to deploy and scale faster.

- Automated Deployment – Enables customers to deploy clusters in 3 clicks
- RocketScale – A backend job that detects when a customer needs to grow based on a pre-set threshold, then handles the process of adding a new shard to the cluster
- AutoKey – Automates the process of adding a shard key based on a hashed index of the object ID in an ObjectRocket instance
- AutoCompaction – Allows MongoDB instances to be compacted while online and in the background on the ObjectRocket platform
- Monitoring – Monitoring, alerting and reporting available via user interface
- Schedulable Balancer – Customers can select to enable or disable balancer windows and define the window, accessible as a UI widget

Multiple Interface Options – ObjectRocket offers three easy-to-use methods for users to interface with the platform:

- Control Panel – A graphical user interface (GUI) that includes visual indicators for space usage breakdown across clusters, shard balance and more.
- API – A RESTful HTTP API over SSL. Regular data operations like add, get, update and delete are supported against any collection, as well as various metadata operations for observability and management of the instance.
- Mongo Shell – Issue interactive commands and functions via Mongo shell.

EASY, POWERFUL SCALABILITY

ObjectRocket has both an inherently sharded and non-sharded option, architected to scale MongoDB horizontally for rapid growth from day one. Automated sharding and pay-as-you-grow pricing make basic scaling fast and easy. Mongo DBAs and engineers are available to help customers solve complex scalability problems and avoid costly mistakes.

Inherently Sharded – When customers sign up, they receive immediate access to a fully provisioned sharded cluster in whatever size they choose. All of MongoDB’s sharding components that require careful consideration and expertise (shards, config servers and routing instances) are automatically set up, eliminating the need for customers to perform any manual configuration.

“Scalability with ObjectRocket means we actually hit our milestones. They’ve grown with us as fast as we can, and they’ve made this process seamless. Beforehand we were onboarding clusters day in and day out. That’s all been offboarded to Rackspace, and it’s just invisible success.”

*– Dane Atkinson
CEO of SumAll*

Automated Sharding – The RocketScale™ tool detects when customers need to grow, and then handles the process of adding a shard to the cluster. The tool functions by polling basic metadata for a certain usage threshold (configurable by the customer), then compares it to the actual disk usage of each instance.

If the disk space used by the customer exceeds the threshold, a new shard is added, and the ObjectRocket notification system sends a message regarding the change. Once a new shard is added, the MongoDB balancer will run per its schedule, balancing the data onto the new shard. In addition, customers can simply hit “Add Shard” in the ObjectRocket Control Panel any time they need to scale up manually.

Automated Shard Key Selection – In addition, the AutoKey tool automates the process of adding a hashed-based index and shard keys on collections in an ObjectRocket instance. While hashed-based shard keys are not perfect for every scenario, they are often a good general-purpose shard key for a large set of use cases. As a result, AutoKey can simplify and speed up the shard key selection process, especially at scale.

Once customers activate AutoKey, shard keys will automatically be defined where they don’t already exist (for collections greater than 256MB). The AutoKey daemon fires up periodically and checks for keys to create. Once it finds missing keys on collections, it proceeds to create the key and indexes.

For collections that are especially large, are used frequently, or have specific access patterns, highly engineered keys may still be necessary. AutoKey is configured at an instance level, but specific collections can still have a custom shard key, so for these cases, customers can set manually defined shard keys where required, or depend on our DBAs, and let AutoKey handle the rest.

OPTIMIZED MONGODB PERFORMANCE

Every aspect of the ObjectRocket stack has been tuned specifically to make MongoDB run fast — from infrastructure to configuration.

As a result, ObjectRocket ameliorates the inconsistencies that users typically experience when running databases like MongoDB on generic public cloud servers. By increasing transactions-per-second and enabling fast, predictable database performance, customers can deliver a better, more consistent experience to end-users.

“Working with ObjectRocket, the query times for our Friends Feed went down to less than a second from three to seven seconds. When you get those kinds of results, you keep doing it.”

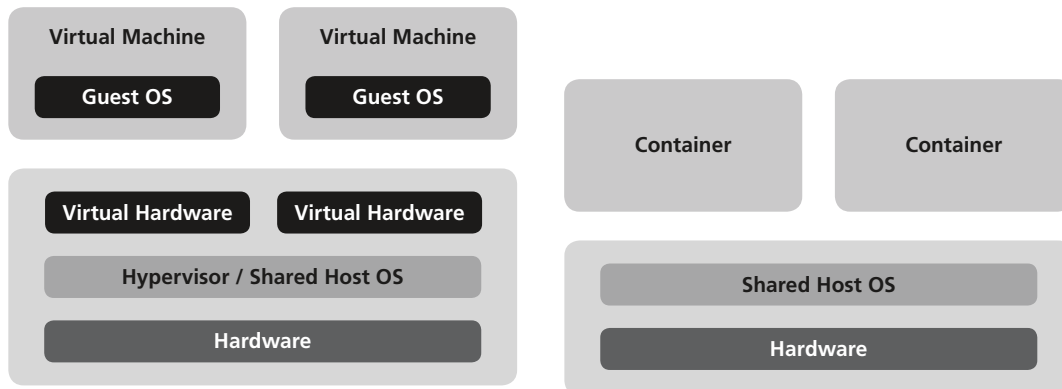
– Greg Avola

CTO & Co-Founder of Untappd

All-PCIe Flash Infrastructure Purpose-Built for MongoDB – ObjectRocket is built on all-PCIe flash-based infrastructure. As a result, the entire platform utilizes a highly performant I/O subsystem ideally suited for MongoDB, leading to increased speed and improved consistency.

Container-Based Virtualization – In addition, ObjectRocket’s physically separate systems employ a containerized approach to isolate CPU, memory and I/O resources, which yields additional performance improvements. Traditional hardware virtualization — with virtualized memory, processor and hard drives — is not optimal for high I/O workloads like MongoDB. The overhead of running multiple operating systems (sometimes known as “the hypervisor tax”) imposes penalties that especially impact database workloads. Conversely, container-based virtualization provides close-to-native performance, eliminating the need for virtualized hardware and multiple operating systems, facilitating higher density.

Traditional Hardware Virtualization vs. Container-Based Virtualization



ENSURED HIGH AVAILABILITY AND STABILITY

ObjectRocket includes built-in redundancy, replication and free, automatic backups to help prevent downtime and data loss.

Replication and Fully Redundant Infrastructure for High Availability – Customers receive a 3-node replica set in order to ensure high availability, with primary, secondary and tertiary servers always running hot for sharded instances; or primary, secondary and an arbiter for non-sharded instances. Instances are multiplexed across multiple, physically separate systems. In addition, ObjectRocket is built on fully redundant infrastructure — from the network all the way up the stack — further reducing the possibility of downtime.

Automated Compaction Helps Eliminate Downtime – Similarly, the AutoCompact tool enables customers to compact collections or repair databases without experiencing extended downtime. With automated online compaction, MongoDB instances can be compacted online and in the background on the ObjectRocket platform. The application will only experience a replica set election in order to start using the newly compacted slave.

Free Automated Backups – In addition, ObjectRocket offers free daily backups for any MongoDB instance, of any size, running anywhere. Users can sign up for a free account, add a MongoDB instance — either hosted with ObjectRocket or hosted remotely — and we will start backing it up at no charge. Through this service, ObjectRocket gives customers peace of mind, knowing their data or their customers' data is backed up.

The system detects the source address of a user's cluster and performs a backup from the Rackspace datacenter closest to the database (optionally over SSL). This is done via mongodump, then compressed on disk. The dump exposes any problems reading the data, any problems with the BSON structures or any other issues. Backup daemons monitor progress and, upon successful completion, log the issues onto the ObjectRocket metadata repository. Users can then see the backup list in the ObjectRocket UI.

To restore a database, users can email support@objectrocket.com, and a representative will reply to upload their dump file to the destination they choose. ObjectRocket can also directly restore the dump to a connect string. This makes file restoration extremely simple and reliable.

Users' initial backup will be performed within 24 hours, and then every 24 hours after that. ObjectRocket saves one backup on disk per day and automatically backs up any single instance, replica sets and sharded clusters up to 250GB. For larger amounts, customers can contact the ObjectRocket support team for help ensuring smooth, customized backups.

DATA AND APPLICATION PORTABILITY

The ObjectRocket platform is built on open standards and includes integrations to ensure data and application portability. Because it utilizes an open source, community edition of MongoDB, customer data is always portable, with no threat of database vendor lock-in. ObjectRocket also offers free migration services, making it easy to get started.

In addition, the platform supports a range of methods to export or intake data. For instance, the Mongo-Hadoop connector is an open source library for Hadoop — certified by both MongoDB, Inc. and Rackspace partner Hortonworks — that allows users to leverage MongoDB as an input source or output destination for MapReduce jobs as well as Hive and Pig queries. Users can also export MongoDB backup files in .bson format to a local HDFS file system or Rackspace Cloud Files offering.

When utilizing ObjectRocket for MongoDB, users can run their application layer anywhere, including Rackspace or AWS regions via AWS Direct Connect with integrated ACL sync. For example, if a customer is hosting their application on AWS EC2, they can connect to ObjectRocket through AWS Direct Connect.

FLEXIBLE DEPLOYMENT AND SECURITY MANAGEMENT OPTIONS

The ObjectRocket platform provides a choice of deployment models to best suit customers' internal IT and security needs. In addition to flexible, highly scalable multi-tenant hosting, customers with additional performance, security or compliance requirements can also select a single-tenant environment. Single-tenant isolation gives customers complete control over their database, and allows them to utilize the full resources of their host machines, eliminating noisy neighbor problems altogether.

ObjectRocket also offers a range of security management features, including SSL-enabled connections, policy-based network access control, role-based access control and an integrated firewall. Single-tenant customers also have the flexibility to further customize their environment with a variety of other security tools, such as dedicated firewalls, intrusion detection and log management. To ensure enterprise-grade security, single-tenant customers can also benefit from data at rest encryption.

With Fanatical Support, customers may also leverage Rackspace security expertise to help them protect their data address and compliance concerns. Rackspace security engineers assess customer environments, offer guidance and recommend specific tools to help customers meet stringent standards such as HIPAA or PCI.

4. ObjectRocket vs. Unmanaged Hosting

	Unmanaged	ObjectRocket
Deployment Options	Public cloud with generic commodity servers	Multiple deployment options on hardware optimized for MongoDB: <ul style="list-style-type: none"> • Public cloud • Private cloud • Dedicated servers
Deployment Process	Manual deployment: <ul style="list-style-type: none"> • Manual installation • Manual configuration of storage, networking, security, monitoring and more • Manual testing and optimization, with a tradeoff between rapid deployment and future scalability 	<ul style="list-style-type: none"> • 3-click deployment for multi-tenant deployment • Rackspace experts tailor architecture and handle configuration and deployment for single-tenant deployments
Performance	<ul style="list-style-type: none"> • Lower performance on generic commodity servers not optimized for high-I/O database workloads • Noisy neighbor problems on public cloud create inconsistency 	Consistent database performance on hardware configured and tuned specifically to make MongoDB run as fast as possible
Scaling	Manual scaling: <ul style="list-style-type: none"> • Configure cluster • Select shard key • Expand cluster • Test and optimize • Customer handles complex challenges and spikes alone 	<ul style="list-style-type: none"> • Automatic scaling with RocketScale and Autokey • MongoDB experts on-hand for unique challenges and spikes
Monitoring	Customer allocates significant resources to monitor performance, security, etc.	ObjectRocket's MongoDB experts proactively monitor the network, server and MongoDB for connections, lag, status of replicas, size, number of queries, etc. 24x7x365
Compaction	Manual compaction entailing significant downtime	Auto-compaction means instances are compacted while online and in the background
Availability	Manual high availability (HA): <ul style="list-style-type: none"> • Pay for backups • Customer must solve for HA • No SLAs 	Automatic high availability and backups <ul style="list-style-type: none"> • No cost for backups • Automatic HA • Industry-leading SLAs

5. Common Use Cases

The ObjectRocket platform is well suited to help companies solve a range of use cases:

- Mobile and Social Apps
- Customer Experience Management
- Multi-source Situational Awareness
- Scalable Interactive Learning

MOBILE AND SOCIAL APPS

MongoDB is simple for many developers to code against, and its flexible document-based model and built-in geospatial features make it ideally suited for social applications, mobile and rich media content. However, many successful apps experience dramatic, unpredictable surges in registered users, often leading to outages. In hyper-growth situations, the database layer is the one of the most common causes of scaling bottlenecks.

With ObjectRocket, app developers can rely on ObjectRocket engineers to architect their system for optimal horizontal scaling, and then scale automatically, relying on RocketScale and AutoKey. This enables customers to grow at a rapid rate without worrying about issues such as long-loading feeds. In addition, ObjectRocket's purpose-built architecture ensures consistent performance for intensive use cases such as social news feeds, helping customers ensure a consistent, high-quality customer experience. This allows developers to focus on improving their app rather than solving for the database layer.

WEB CONTENT MANAGEMENT

Several leading Web Content Management (WCM) providers have added customer intelligence components relying on MongoDB to power solutions that provide marketers with a single view of the customer. However, many marketing technologists and IT departments lack the expertise necessary to deploy, maintain, optimize and scale MongoDB. With ObjectRocket, marketers and IT specialists can take advantage of MongoDB expertise to fill the gap.

With ObjectRocket managing the underlying Mongo database, customers are able to take full advantage of WCM "customer intelligence" features like real-time behavior tracking (clicks, views, purchase history). This enables businesses to provide highly relevant experiences such as real-time offers to their own customers, without hiring their own Mongo experts.

SCALABLE INTERACTIVE LEARNING

For many universities, learning platforms supporting massively open online courses (MOOCs) must handle enrollments of over 100,000 students for popular programs and provide an interactive, content-intensive environment. MongoDB allows them to support key considerations such as integrating content and media from a variety of sources. However, ensuring the low-latency access times required to ensure user engagement involves a range of complex challenges that many universities and other institutions lack the expertise to solve.

With ObjectRocket, customers get a platform tuned specifically for MongoDB at every level of the stack, allowing them to provide the necessary performance required at peak load times, even when processing rich media from a variety of sources.

6. Conclusion

For customers seeking a highly performant, scalable, fully managed MongoDB solution, ObjectRocket for MongoDB is the ideal choice. The ObjectRocket platform allows customers to optimize their database for speed and scalability while simultaneously focusing their technical resources on activities that truly differentiate their business.

To learn more or chat with a specialist: **1-844-208-1147**
or **www.objectrocket.com/mongodb/**

About Rackspace

Rackspace® (NYSE: RAX) is the #1 managed cloud company. Its technical expertise and **Fanatical Support**® allow companies to tap the power of the cloud without the pain of hiring experts in dozens of complex technologies. Rackspace is also the leader in hybrid cloud, giving each customer the best fit for its unique needs — whether on single- or multi-tenant servers, or a combination of those platforms. Rackspace is the founder of OpenStack®, the open-source operating system for the cloud. Based in San Antonio, Rackspace serves more than 300,000 business customers from data centers on four continents.

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