Mutualink Scales Its Emergency Interoperability Network with Redis Enterprise

Executive Summary

Mutualink provides secure interoperable communications and information sharing solutions for emergency management, first responders, schools, and private security and protective service providers worldwide. As the company prepares to grow its real-time emergency interoperability network to the next order of magnitude, the communications provider has turned to enterprise-grade Redis from Redis to support its next-generation solution. Redis Enterprise's active-active architecture based on CRDT (conflict-free replicated data types), which is designed for immediate and conflict-free data consolidation among geographically distributed applications, along with its seamless support of stateless microservices, has proven to be an ideal choice for Mutualink's advanced architecture technology stack.

The Need: A Next-Generation Database for a Next-Generation System

Mutualink's hardware and software empowers agencies worldwide to interoperate and communicate. The company connects two-way radio, phone, video, text and data among thousands of global customers on its network. As Mutualink embarked on the next generational design of its popular emergency communications solution, a primary goal was to build a system that would allow the company to increase the scale of its deployments by a factor of hundreds, if not thousands, of users. "Our current product requires a fair amount of installation and configuration," said Paul Kurmas, Director of Strategic Product Development for Mutualink. "It serves us well but in order to grow by orders of magnitude, we need to add efficiencies up and down our technology stack—not only in how entities are managed and configured, but even in how devices are built and deployed."

Achieving more efficient, self-service deployment has meant leveraging modern development and deployment practices such as microservices in order to achieve scalability and faster time to market. It's also meant prioritizing the system's ability to provide instantaneous data consistency and consolidation across an ever-growing network of geographically distributed applications. "At any point in time, our client programs might need to spontaneously deliver traffic to a different data center in a different part of the country," said Kurmas. "In an emergency situation, we can't tell our customers 'sorry, you have to log out and log back in again because your mobile call moved to another data center' so we need to ensure seamless rerouting in real time without data loss or conflict."

These next-generation system requirements translated into an urgent need to find a database that could overcome the inherent challenges of the stateless and highly distributed application environment that comes with microservices.

Redis Enterprise a "Clear Winner"

Early on in its search for a database that could handle the challenges a microservices architecture presented, Mutualink recognized that Redis' lightweight footprint and extreme extensibility lent itself perfectly to Mutualink's microservices environment. "We could see right away that Redis was going to be a great solution for us as a fast, live data source for our microservices architecture," said Kurmas. "By relying on Redis to maintain and distribute the state, every part of our system could be as stateless as possible." In addition, Redis' suite of flexible data structures and efficient commands was a perfect fit for the lightning fast communication of the ad-hoc small datasets (e.g. text messages, videos, geographic locations, files) that the Mutualink system was responsible for delivering between customers.

Initially, Mutualink was content with the idea of open-source Redis, but when the development team discovered that Redis Enterprise from Redis offered CRDT-based active-active architecture, a replication technique in which all database instances are available for read and write operations

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Paul Kurmas
DIRECTOR OF STRATEGIC PRODUCT DEVELOPMENT
MUTUALINK

Mutualink's Requirements

- **Extreme scalability with active-active replication.** With plans to scale by several orders of magnitude, Mutualink needed a highly scalable database that could provide data consistency and consolidation across an ever-growing network of geographically distributed applications.

- **Microservices compatibility.** Mutualink's next-gen system is built on microservices and required a database that inherently understands the stateless nature of this environment.

- **High performance.** The emergency nature of the communications that Mutualink's system facilitates requires sub-millisecond latency.

and are bidirectionally replicated with built-in conflict resolution, it quickly became a must-have. So much so that the team rethought significant elements of its first cut at the next-generation systems' architecture in order to leverage this replication feature. "The importance of sub-millisecond latency and synchronization across all database instances cannot be emphasized enough," said Kurmas. "It's crucial to our core mission and future growth, and the fact that Redis Enterprise could address that for us made it a clear winner."

Redis Enterprise Gets to the Heart of It

Redis Enterprise is the core of the central junction point operations for the next-generation system that Mutualink is building. This central junction point, referred to internally as the edge server, is the clearinghouse where all normalized multimedia communications among Mutualink's customers interconnect. In this role, Redis Enterprise will act as a real-time, high-speed data store, performing many critical functions, including:

• Storage of the directory (i.e. living model) of the network that Mutualink publishes to its clients

• Knowledge management of all active conversations taking place so that Mutualink can track participation and make fine-grained authorization decisions in real time regarding who is allowed to take part in ongoing collaborations

• Multi-media event synchronization, and event distribution to topics or queues—either locally or between different geographic data centers, depending upon the event's destination

• High-performing search across Mutualink's directory of users with robust suggestions based on phonetic well as direct spell to make it easy for customers to quickly identify and engage other agencies during an emergency response

To accomplish these functions, Mutualink takes advantage of Redis Enterprise's many flexible data structures such as lists, strings, and hashes, as well as specialized features such as task queues, atomic calendar, and the RediSearch text search and secondary indexing engine. Additionally, on the near horizon, the development team intends to bring Redis' newest data structure type, Redis Streams, along with Redis' powerful geospatial data capabilities into the new system's design. "We view location information as a key application asset and so Redis' geo-specific commands are something we anticipate using strongly in the very near future," said Kurmas. "And the efficiency of Streams definitely speaks to allocation of work in a microservices model."
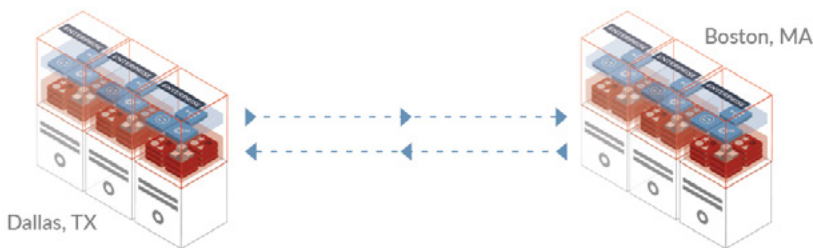
Years of Man Hours Saved by Redis Enterprise

Mutualink's initial deployment of its next-generation system is targeted to support a minimum of 100,000 concurrent users. From there, the architectural goal is to scale deployment to millions or tens of millions of concurrent users simply through the addition of microservices and Redis Enterprise platforms. It's a lofty goal, but by Kurmas' calculations, Redis Enterprise has already saved his team years of man hours: "The new system needs to function as a single application across a large—and ever-growing—number of locations. Redis Enterprise has given us a solution to this problem that, honestly, is saving us dozens of staff years of design and development, not to mention debugging."

Having Redis as a knowledgeable partner has also paid off dividends, providing Mutualink with not only invaluable Redis expertise, but also the confidence of knowing it's building its product around a database that is soundly structured and supported by a highly-invested company. "We needed a solution that would allow us to reasonably claim that the architecture serves the immediate need in an affordable way and will grow through deployment, not re-architecture, to the next order of magnitude—and the next order of magnitude beyond that," said Kurmas. "And we think we've found it."

Redis Enterprise Benefits

• **CRDT-based active-active replication.** As the only NoSQL database providing CRDT-based active-active replication, Redis Enterprise offers real-time and conflict-free data consolidation among geographically distributed applications.

• **Microservices-friendly architecture.** Built specifically with microservices in mind, Redis Enterprise has many features to achieve data persistence in a stateless microservices environment.

• **Flexible data structures and commands.** The individualities of many small datasets (e.g. text, video, file) are efficiently addressed for lightning fast emergency communications.