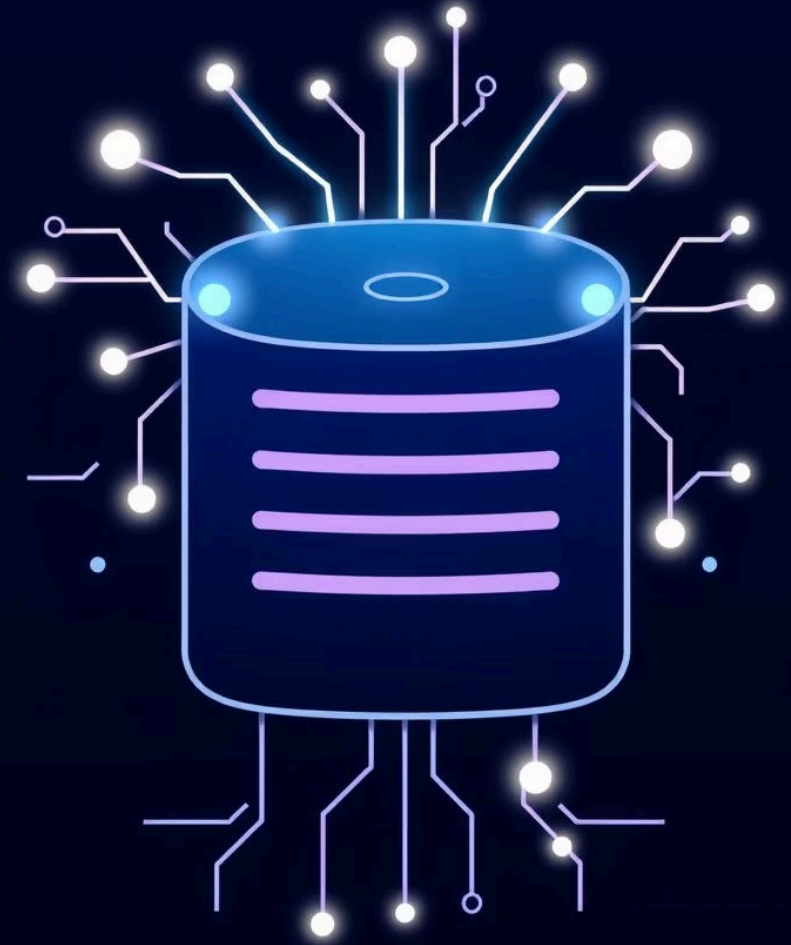


# AI-Powered Database Capacity Planning & Performance Forecasting

Empowering Database Administrators and SREs with proactive insights for optimal performance.



# The Hidden Challenges of Database Growth

Databases are the heart of modern applications, but their continuous growth can lead to subtle, yet critical, performance problems. What starts as a small issue can quickly escalate into widespread slowdowns and outages if not addressed proactively.

### **Bloated Tables**

Unused space accumulates, making tables larger and slower to process. This often stems from neglected vacuuming processes.

### **Outdated Statistics**

Database query optimizers rely on accurate statistics. When these are outdated, queries take inefficient paths, leading to significant delays.

### **Inefficient Indexing**

Indexes are crucial for fast data retrieval. Poorly designed or outdated indexes can turn quick searches into agonizingly slow operations.

### **Unpredictable Spikes**

Sudden surges in workload, often driven by external events, can overwhelm capacity and cause unexpected performance degradation.

# Our AI-Powered Solution

We've developed an AI-powered database health and capacity planning tool designed to bring predictability to database management. It goes beyond reactive measures, providing a **proactive solution** to identify and address potential issues before they impact performance.

- **Historical Data Collection:** Gathers extensive database metrics like disk usage, inserts, updates, deletes, and vacuum history.
- **External Factor Integration:** Incorporates real-world events, from economic shifts to natural disasters, to contextualize and refine predictions.
- **Advanced Forecasting:** Utilizes LSTM (Long Short-Term Memory) neural networks to predict usage patterns up to 12 months in advance.
- **Intuitive Visualizations:** Presents complex data as clear time-series graphs, empowering DBAs with actionable insights.



## Chapter 3

# Core Capabilities

Our tool provides specialized forecasting to keep your database in peak condition.



### Vacuuming Forecasting

Predicts precisely when tables will need vacuuming, preventing bloat and maintaining optimal performance.



### Workload Forecasting

Forecasts future disk growth, anticipated inserts, and query load, enabling precise capacity planning.



### Proactive Alerts

Delivers early warnings about potential performance bottlenecks before they impact users.



### Index & Stats Management

Alerts DBAs when statistics are outdated or indexes become inefficient, suggesting timely optimizations.



### External Factor Integration

Adjusts forecasts to account for real-world events that could cause unusual workload spikes.

# The Workflow: From Data to Insight

Our system processes information through a streamlined, intelligent pipeline.



## 1. Data Ingestion

Collects comprehensive database metrics and relevant external factors.



## 2. Preprocessing

Cleans, structures, and prepares raw data for analysis.



## 3. Modeling with LSTM

Trains the AI model on historical patterns to learn complex dependencies.



## 4. Prediction & Forecasting

Generates precise 12-month growth forecasts for various metrics.



## 5. Visualization

Presents forecasts as interactive time-series graphs for clear insights.



## 6. Alerts & Recommendations

Suggests timely actions like vacuuming, reindexing, or stats updates.

# Why LSTM for Database Forecasting?

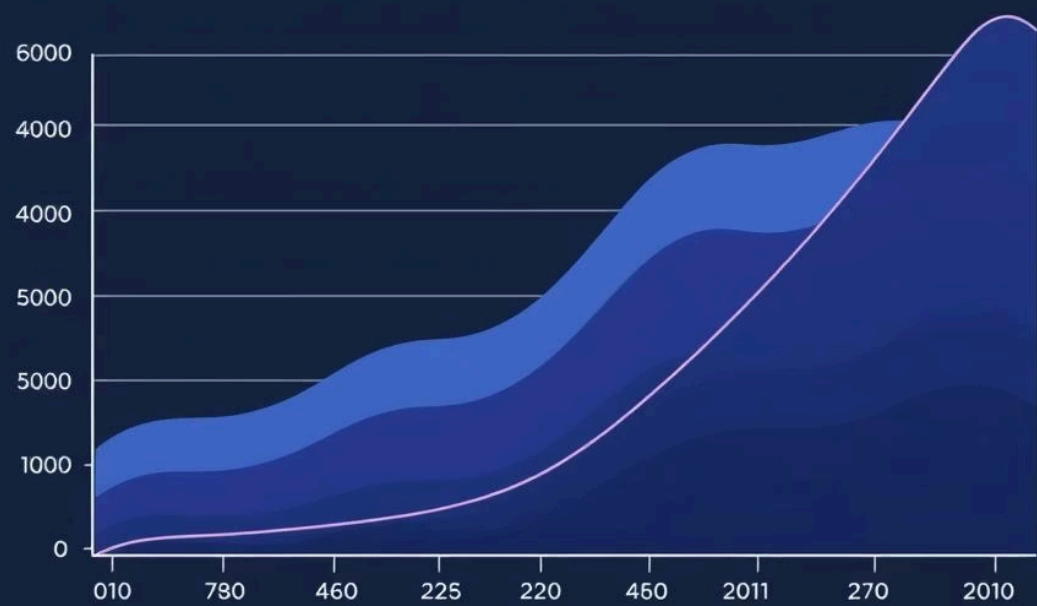
Long Short-Term Memory (LSTM) networks are a specialized type of recurrent neural network (RNN) that excels with sequential data, making them ideal for time-series forecasting in database capacity planning.

- **Time-Series Expertise:** LSTMs are specifically designed to process and predict data sequences, like database growth over time.
- **Long-Term Memory:** They effectively capture and remember long-term dependencies and patterns in workload, unlike simpler models that might forget past trends.
- **Accuracy with Irregularities:** Crucially, LSTMs can handle irregular growth, seasonal patterns, and unexpected spikes more accurately than traditional linear models.



# Demo Snapshot: Insights at a Glance

See how our system translates complex data into actionable intelligence, showing both historical trends and future predictions.



Disk Usage & Forecasted Growth

## ⓘ Alerts & Recommendations

- **Vacuuming:** "Vacuum needed on 'user\_sessions' table in 5 days."
- **Reindexing:** "Reindex recommended for 'products' table (30% bloat)."
- **Statistics:** "Risk of outdated statistics for 'order\_items' this Wednesday."
- **External Factors:** "Significant spike in queries predicted around upcoming election date."

## Chapter 7

# Transforming Database Management

Our AI-powered solution delivers tangible benefits that revolutionize how you manage your databases.

### Proactive Maintenance

Shifts from reactive firefighting to intelligent, preventative action, minimizing downtime.



### Better Capacity Planning

Avoids sudden storage issues and resource bottlenecks with accurate future projections.



### Optimized Performance

Prevents costly slowdowns and ensures consistent, peak database performance.

### DBA Efficiency

Empowers DBAs by automating monitoring and alert generation, freeing up valuable time.



### Future-Ready Insights

Integrates real-world events into predictions, preparing you for any unexpected challenges.



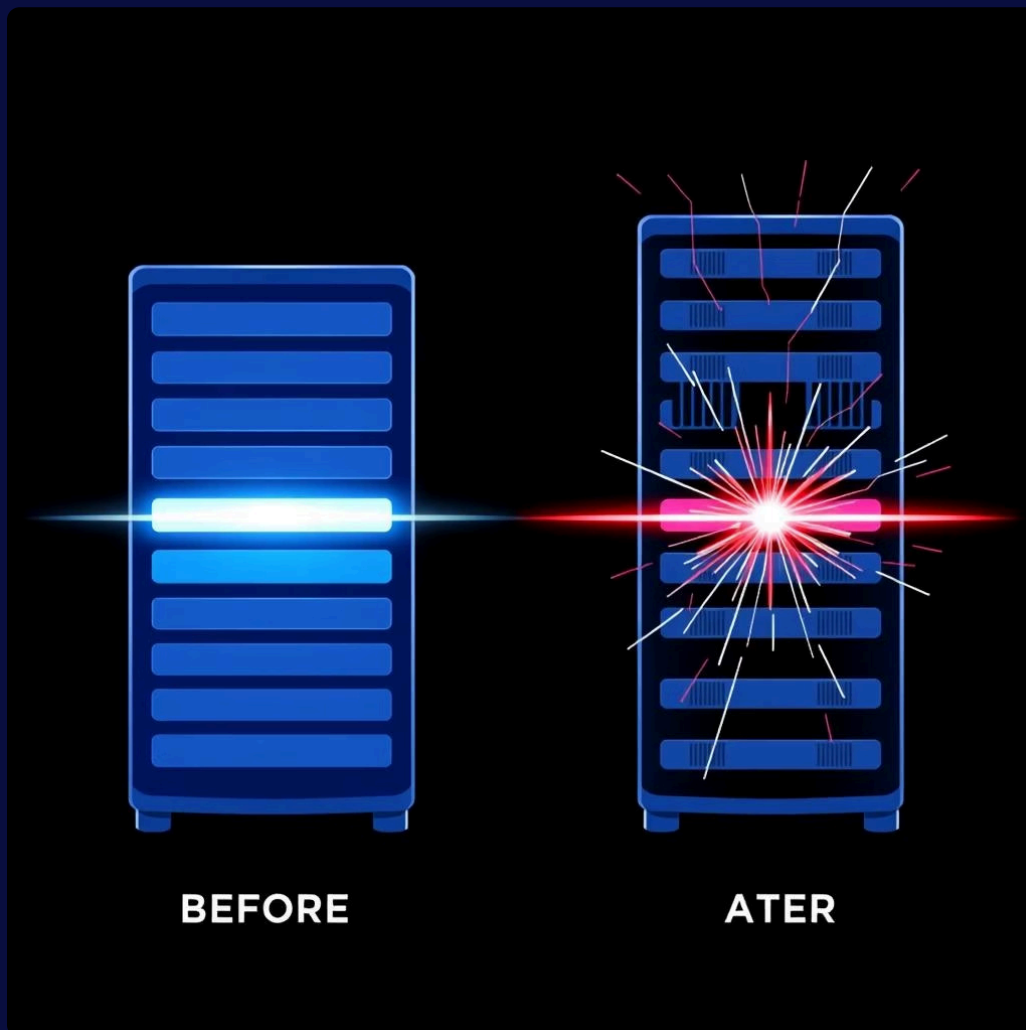
# Conclusion: Your Database, Future-Proofed

Our AI-powered tool acts as both a vigilant health monitor and a reliable crystal ball for your database infrastructure.

By leveraging advanced AI and comprehensive data analysis, organizations can finally move beyond the traditional reactive approach to database management.

## This enables you to:

- **Prevent Slowdowns:** Identify and resolve issues before they impact user experience.
- **Avoid Surprises:** Forecast workloads and external impacts to mitigate risks.
- **Plan Resources Intelligently:** Optimize infrastructure and budget based on accurate future predictions.

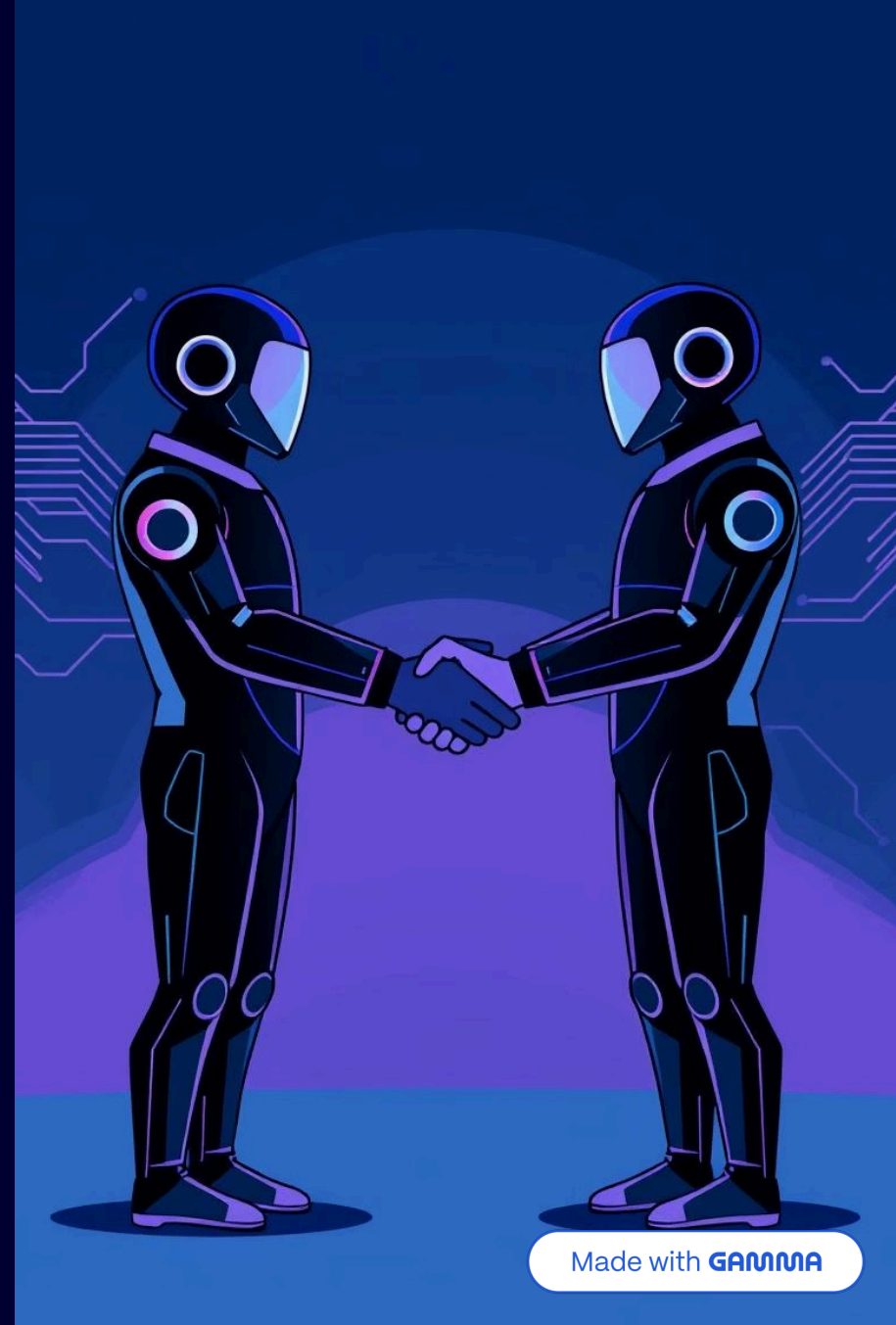


# Ready to Transform Your Database Management?

Contact us today for a personalized demo and discover how AI can empower your team.

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[Learn More](#)



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