

## 99Bill.com

A leading independent third-party payment service provider in China

### Industry

Financial services

### Solution

OrientDB Enterprise  
by CallidusCloud

## Payment Service Provider Fights Fraud Faster and More Efficiently with OrientDB Multi-Model Graph Database

99Bill Corporation is a leading independent third-party payment service provider in China. The Shanghai-based company, owned by the Wanda Group ranked 380th on Fortune Global, offers a comprehensive suite of convenient electronic payment solutions to (more than one million) merchant partners. 99Bill's services enable electronic payment transactions via kiosks across the country as well as via Internet, mobile phone, and point-of-sale devices. Its services work with three billion domestic and international bank cards, including VISA and MasterCard.



### Challenge

Existing RDBMS was too slow and expensive to catch fraudulent ecommerce payments transactions as they are occurring, rather than after the fact.

### Benefits

20% Increase in Fraud Detection

#### 400% Faster

Queries are 400% faster than market leading RDBMS

#### Easy

"OrientDB is easy to use and there is no learning cost because developers already know SQL and JDBC"

**"OrientDB can do in milliseconds what our RDBMS could never do. With it, we are much more effective at catching fraudulent activity in real time."**

- Kisho Dai, Team Lead

### Fraudulent Transactions An Ongoing Challenge

Unfortunately, fraudulent transactions are inevitable for companies like 99Bill. The more money and greater the transaction volume, the bigger the target. Consequently, catching fraudulent transactions—as they are happening, rather than after the fact—is a top priority at 99Bill.

In the past, to combat fraud, the company relied primarily on its RDBMS to discover incompatible or suspicious data combinations, such as an account address located in the one country but the IP address residing in another, or a credit card number used multiple times in a short timeframe from geographically

distant locations. However, as fraudsters have become more sophisticated, attempting to form and analyze complex relationships between data sets simply could not be done fast enough to catch fraud in real time.

As 99Bill learned by experience, relational databases have multiple shortcomings. Although its RDBMS could collect and store a wealth of relevant information—phone numbers, call records, location data (IP address, latitude and longitude), social media accounts, friends, family relations, and so on—modifying or extending such huge data tables often took hours or days—and could impact the entire business process. In addition, with data volumes for every single dimension continuing to grow and already staggering in size—just one location table stores millions of records—the cost and difficulty of continued development and operation would soon become prohibitive. Lastly, to be able to successfully analyze the dynamic and diverse linkages among dimensions requires joining tables, but nested join commands slows down response time considerably.

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## Seeking a NoSQL Anti-Fraud Solution

Thus 99Bill sought a faster, more powerful solution for identifying suspicious patterns and links and verifying transaction accuracy. Key objectives included the ability to produce a query response as fast as possible and the ability to extend or modify the database easily as requirements change.

Seeking the best NoSQL offering, the company ultimately chose OrientDB Enterprise and Mi-Me Corporation, a technology partner with deep financial industry experience that partners with CallidusCloud in China. OrientDB Enterprise is a next generation Multi-Model database solution that combines features of a document, Key-Value, RDBMS, GeoSpatial and graph databases. Because every node or vertex and edge is a JSON document and the relationships between nodes and edges are part of each record, querying data requires no costly joins. Able to store 220,000 records per second on common hardware, OrientDB Enterprise provides incredibly fast performance and allows traversing partial or entire trees and graphs of records in a few milliseconds.

**Able to store 220,000 records per second**

## Creating a Pilot Database

After a team of software engineers from 99Bill, CallidusCloud, and Mi-Me collected and clarified requirements and objectives, it set out to build a prototype OrientDB database. To complete the pilot in the shortest possible time, the initial requirements focused on user IP address, latitude and longitude, user's communication record and address book to calculate the user's second-degree relationships, and a few other variables.



888 953 9572 (US)  
+44 203 3971 609 (International)  
inquiries@orientdb.com  
www.orientdb.com

As a first step in model design creation, Mi-Me had 99Bill create an exhaustive list of use cases and metrics to facilitate modeling. This process led, for example, to the development of a unique name for each address so that multiple users with the same address belong to the same address class—which eventually became the same location class with unique longitude and latitude. Once the model design was completed, model scripting and indexing followed in during the first stage, 99Bill engineers expressed satisfaction that nodes could be manipulated at such a low cost and that storage input/output performance improved remarkably. In the second stage, OrientDB automatically created edges based on unordered pairs from the RDBMS and the information cached during the first stage.

### Going Live to Catch Fraud in the Act

Once edges had been created, 99Bill began the transition into production mode. The implementation team prepared two distributed servers, one for writing and one for reading and redundancy. For faster synchronization between the two servers, the team switched from a synchronous mode to asynchronous—a very simple task but one that made a significant difference.

Managing the OrientDB database is also easy. In its management console, the team can quickly and easily monitor useful information, such as CPU, memory, disk usage, latency, and message synchronization data. It also uses the console to fine-tune and optimize Java Virtual Machine (JVM) performance.

### Outsmarting Fraudsters Faster

Now that Bill99 has OrientDB Enterprise in its arsenal, the company has a potent defense against people or bots that try to deceive its payment services. By treating every edge and vertex as a JSON document, OrientDB allows properties to be assigned within relationships (links) and eliminates document stores altogether. It can analyze and compare mountains of information from multiple dimensions in milliseconds to instantly flag suspicious activity and detect fraudulent transactions online.

“OrientDB can do in milliseconds what our RDBMS could never do,” says Kisho Dai, Team Lead.

“With OrientDB, we are much more effective at catching fraudulent activity in real time. Our catch rate has increased over 20%” says Jinnee Cui, Vice President.

**“20%+ increase  
in fraud detection after  
moving to OrientDB”**

- Jinnee Cui, Vice President



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