



Track, measure, and improve your fitness.



With a post-Christmas promotion driving a million new downloads, the database was 400% the size it was 6 months before and still accelerating. Concerns were being raised over whether Cloud-hosted hardware was the right choice for a new database platform... it turns out it wasn't.

RUNKEEPER KEEPS PACE WITH

2ndQuadrant 
Professional PostgreSQL

2ndQuadrant services in this case study:

- Performance forecasting
- Upgrade Advisor
- Monitoring
- Consulting

A FIT FOR PURPOSE DATABASE

FitnessKeeper Inc. is the company behind RunKeeper, a mobile fitness platform that leverages the location technology in smartphones to help runners and other fitness enthusiasts better track, measure and improve their fitness

Their flagship iPhone application has been downloaded millions of times, and was named by TIME magazine as one of the top 10 iPhone applications of 2009. In 2010 they launched on Android, and have several additional smartphone and non-smartphone devices planned.

Few types of computer applications have ever grown in adoption as fast as the recent expansion in the mobile phone space. The engineering team at RunKeeper have been on the front lines of exponential growth since their earliest iPhone application was introduced. And the database lifecycle services of 2ndQuadrant have let them keep running on their favorite track—application development and innovation—at full speed, without

the normal overhead of a full-time database administrator.

RunKeeper's application uses the GPS devices in smartphones to record a detailed log of the route taken by a runner. When finished with their "Trip", a single run tracked using the application, the user uploads the result to the company's web application servers. From there, they can analyze their individual Trips for information like speed, duration, and distance. And of course dedicated runners want to track a variety of trends in their running over time.

The problem...

Concerns about the performance scaling of the RunKeeper database started after the introduction of an Android version of the application in April of 2010, just in time for the famous Boston Marathon that's held near the company's headquarters. No one was sure how fast new users would be running onto the new Android platform.

Like many web applications, RunKeeper's main application servers scaled nicely using a Cloud Computing approach. New application server nodes could be added and subtracted as needed based on demand, and it was vital that the database side could be scaled up too.

Looking slightly longer term, RunKeeper planned for significant growth in the New Year's Resolution fueled drive to shed those Christmas pounds. They wanted to ensure their servers could cope with the load without missing a heartbeat, especially as the

KEY FACTS

Founded in 2008 by Jason Jacobs and based in Boston, Massachusetts, FitnessKeeper Inc. provides smartphone applications and operates an online community for tracking fitness activities.

In May 2010, FitnessKeeper reported the 2 millionth download of their running app RunKeeper from Apple's App store. In November of 2010 FitnessKeeper Inc. secured a \$1.1m investment from sources at LaunchCapital and O'Reilly AlphaTech Ventures.

The January of 2011 promotion saw over a million downloads of RunKeeper Pro just in its first four days.

FitnessKeeper Inc., 580 Harrison Ave, Suite 12, Fourth Floor, Boston MA 02118, United States. 857-753-4505. www.runkeeper.com

marketing team wanted to take advantage of this seasonal inflection point in the fitness industry by running an aggressive customer acquisition campaign.

At that point, 2ndQuadrant was contacted for input on scaling up the database side of this application. US principal Greg Smith set out to see if Cloud-based hardware was suitable for this application.

As things turned out, it wasn't.

One of the major themes running throughout Greg's groundbreaking book *PostgreSQL 9.0 High Performance* is that performance decisions should be based firmly on monitoring data. This forms a major part of the Database Lifecycle Management services model offered by 2ndQuadrant.

Speculation about where scaling bottlenecks will appear are rarely correct; hard numbers are needed to make the right management decisions. RunKeeper's own capacity planning and forecast was already embracing this idea this on the application side. But they didn't have deep enough visibility into the database; more data was needed.

After doing some normal database tuning exercises, along with installing enough logging and monitoring to capture the database activity, there was some good news. RunKeeper's database could handle quite a bit of growth still before expecting to run into any problems. But it wasn't clear yet what the

bottlenecks on the database side were even going to be. Now that the server was known to be in good shape, and the right data to make good management decisions was being collected, the Cloud migration planning was rescheduled for when the server become more heavily loaded.

Monitoring software was left in place so that traffic and server capacity could be closely observed.

As forecast, the seasonal uptick in fitness at New Year and RunKeeper's promotion around it in 2011 brought a new rush of users. With them came the first signs of the database server starting to

struggle under its still exponentially increasing workload—the database was 400% the size it was just six months before.

Now there was enough data to make an informed decision about where the real limits in this database were coming from. The results were surprising.

The database side of most web applications are designed and scaled up with the assumption that data reads will far outnumber writes. But this application didn't work like that at all. The many data points around one runner's Trip made for a burst of writes, and they might only view the result a single time.

This wasn't a standard web application read/write profile; this was far more like a classic Online Transaction Processing (OLTP) workload. And

"We were able to continue to deliver the kind of service our users had come to expect, in terms of site performance and reliability, while going through exponential growth—and we did so in a cost-effective way" states FitnessKeeper founder Jason Jacobs.



OLTP workloads don't work well on Cloud hardware at all. A heavy write rate, with large bursts from individual users, is nearly their worst-case scenario.

There was no way that RunKeeper would be able to service all the new and existing users satisfactorily unless something changed.

The Solution...

High transaction rate environments have been a specialty for both Greg Smith and the rest of 2ndQuadrant for years. The problem with the original server was that its hardware was setup assuming RunKeeper was a typical web application, which it was not. Simply throwing more applications servers at the problem in "Cloud-like" manner would not have solved the problem, and there was no time to undertake a major re-design of the service architecture.

However, an alternative approach was suggested by 2ndQuadrant. If deployed onto the sort of server hardware known to support write-heavy workloads well instead, a dramatic performance improvement could be achieved.

A new server with just the right hardware for this style of application was provisioned, and 2ndQuadrant Hardware Benchmarking confirmed it performed as expected. PostgreSQL replication was used to migrate to the new server with minimal downtime. And, just as hoped, the new server ran this application dramatically faster.

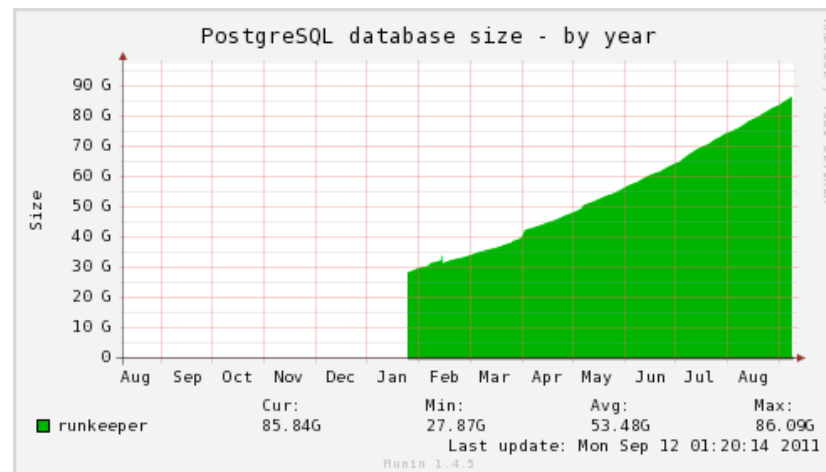
With constant growth, the performance forecasting at RunKeeper has to stay focused on headroom:

how much larger the database (and the rest of the application stack) can get before it's expected to slow down. The server migration bought enough headroom so that six months later it's still keeping up—despite the data growing another 250% during that period.

When growing at this rate, and adding innovative application features, performance scaling work can never be completed. But 2ndQuadrant's systematic monitoring and tuning techniques have kept the RunKeeper database running fast enough to keep up with its user's own runs, through 1000% data growth in just over a year.

would have added a large capital expense to operations. Using PostgreSQL instead has contained costs, even while the company's installed base grew exponentially, making it easier to achieve long term profitability.

The users of RunKeeper barely noticed these technical innovations in the back end of their favorite fitness application, as changes were carried out with minimal interruption to service.



The Benefits...

The FitnessKeeper team was able to demonstrate to investors that they had made a good choice of technology in PostgreSQL, and in working with 2ndQuadrant.

Trying to create this innovative service using traditionally licensed commercial database software

About 2ndQuadrant...

2ndQuadrant is the world's leading authority on the open source PostgreSQL RDMS. We provide a range of services that underpin the Database Lifecycle of PostgreSQL implementations.

Our 24x7 "Continuous Touch" and high value "Point" services support over 100 corporate and public sector organisations in 15 countries across US, Italy, France, Germany, Latin America and the Nordics.

We are a Platinum Sponsor of PostgreSQL and with over 5 years of proactive development and significant contributions to PostgreSQL, we are the largest single group of PostgreSQL contributors. We have developed and contributed key PostgreSQL features such as:

- Point In Time Recovery (PITR)
- Warm Standby Replication
- Hot Standby
- Asynchronous Commit
- Partitioning

2ndQuadrant is structured as a low-overhead, dynamic and flexible organisation of independent partners based in England, Italy, Germany and the US. Our international footprint gives us wide exposure to hundreds of PostgreSQL implementations, our local presence allows us to tailor our services to in-country specific requirements.

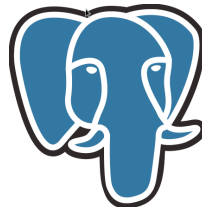
About PostgreSQL

PostgreSQL is a powerful, open source object-relational database system. It has more than 15 years of active development and a proven architecture that has earned it a strong reputation for reliability, data integrity, and correctness.

It runs on all major operating systems, including Linux, UNIX (AIX, BSD, HP-UX, SGI IRIX, Mac OS X, Solaris, Tru64), and Windows.

PostgreSQL is fully ACID compliant, has full support for foreign keys, joins, views, triggers, and stored procedures (in multiple languages). It also supports storage of binary large objects, including pictures, sounds, or video. It has native programming interfaces for C/C++, Java, .Net, Perl, Python, Ruby, Tcl, ODBC, among others, and exceptional documentation.

PostgreSQL has been awarded the Linux New Media Award for Best Database System and is five time winner of the Linux Journal Editor's Choice Award for best DBMS.



PostgreSQL
the world's most advanced open source database

Contact us

*2ndQuadrant Ltd
7200 The Quorum
Oxford Business Park North
Oxford OX4 2JZ
United Kingdom
Phone. : +44 870 766 7756
Fax: +44 870 838 1077
Website: <http://www.2ndquadrant.co.uk/>
E-mail: info@2ndquadrant.com*

*2ndQuadrant US LLC
7472 German Hill Road
Baltimore,
MD 21122
United States Phone: +1 888-333-5136
Website: <http://www.2ndquadrant.us/>
E-mail: info@2ndquadrant.us*

*2ndQuadrant France
13, avenue des Pyrénées
31810 Venerque
France
Phone: +33 9 72 17 01 31
Website: <http://www.2ndquadrant.fr/>
E-mail: contact@2ndquadrant.fr*

*2ndQuadrant Italia
viale Vittorio
Veneto,
60 59100 Prato PO
Italia
Phone: +39 0574 870600
Fax : +39 0574 870601
Website: <http://www.2ndquadrant.it/>
E-mail: info@2ndquadrant.it*

*2ndQuadrant Deutschland GmbH
Spielberger Str. 49
70435 Stuttgart
Germany
Phone:+49 711 55076995
Website: <http://www.2ndquadrant.de/>
E-mail: info@2ndquadrant.de*