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Case study: Critical infrastructure optimization for fast-growing startup

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About LOi

LOi is the most important uruguayan online retail store, with more than 15 years of experience bringing all kinds of products to customers all across the country.

About Netlabs

Open Source Boutique Company with more than 20 years of experience, specialized In DevOps, Big Data/AI, SRE/Cloud and High Performance Scalable Systems for e-government, telco and tech startups.

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LOi, formerly known as 'La Oferta Irresistible', in a few years grew from a small e-commerce site focused on computer and electronic devices offerings, to being one of the biggest e-commerce companies in Uruguay, currently growing into Chile, Brazil and on its way to other countries.

LOi chose netlabs as its infrastructure engineering partner to be able to scale up their service to more users while maintaining system stability and keeping their monthly costs low. Also for being able to activate aggressive promotions that demand high increases in user access without degrading the service availability and performance.

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Challenges

- Support LOi's users growth keeping a simple and inexpensive infrastructure.
- Make sure their systems are highly available even in high-traffic promotions.
- Stabilize and secure their infrastructure.

Keys to Success

- Optimization of databases and servers for the developed system.
- Collaborative work of Netlabs and LOi for pushing forward necessary infrastructure improvements.

Results

- High eCommerce site availability and reliability.
- Steady growth keeping costs under control.
- Capacities generation for permanent infrastructure maintenance at low costs.

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The challenge

LOi developed their e-commerce system from scratch in PHP 10 years ago. Initially they had few users, but then it steadily grew until having to support thousands of simultaneous customers. Their strategy was building a very efficient software so they could keep infrastructure costs as low as possible, both by having a compact development team and optimizing the usage of the AWS Cloud to have flexibility in infrastructure services and availability. However, in their growth process they got to a point in which they were having a difficult time maintaining their systems up and running at good speed all the time, and that was the moment in which netlabs entered the picture.

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The challenge was supporting this growth stage by complying with their availability requirements while reducing infrastructure and maintenance costs as much as possible, before moving on to a next stage in their business plan, in which a more complex infrastructure could be set up. The key words for this work were stability - keep the service running smoothly to a growing number of users, even in big marketing pushes like Black Friday - and optimization - making the most out of each dollar invested in infrastructure.

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Database Optimization

As a first measure, we set up a replica database in a smaller RDS instance, to be able to move the traffic of internal reporting queries and automated systems like Amazon Personalize - which was set up by netlabs to be permanently trained to provide category suggestions for user searches.

We fine-tuned MySQL by updating the engine and moving from MyISAM to InnoDB for all tables, optimizing configuration parameters like temporary tables heap size, open tables cache, redo log file size, disabling of query cache, disabling of adaptive hash index, IO capacity, etc.. We also modernized the RDS instance types to use newer generation ones.

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One of the main performance issues we found was that some processes were slowing down the database access, which resulted in slow website response during marketing pushes.

We set up RDS Performance Insights and took a very close look at the most time consuming database queries and found many of them could be optimized for better system functioning. With this comprehensive work, we optimized many queries that were acting as a bottleneck for system performance and made sure the database was able to handle bigger loads without requiring more resources. Now we are making a close follow up of new or modified queries, to make sure no new performance issues are introduced.

Finally, we optimized the application server's kernel (sysctls), removed unused PHP modules, tuned PHP OpCache sizing and parameters, and also migrated from Apache to Nginx with PHP-FPM, obtaining remarkable improvements in server stability.

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Systems Stability and Security

Network setup was polished by properly configuring the Security Groups and the Availability Zones used for application and databases. Databases were also moved to private subnets having increased data protection, and additionally encrypting data at rest with KMS.

We set up Multi-AZ for the databases, also configuring AWS Backup for having periodical copies of the data in a different region, establishing a disaster recovery protocol which allows immediate failover in most cases.

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Automation & Monitoring

The system well-functioning is now monitored through a set of health indicators integrated to CloudWatch, which are infrastructure-as-code maintained with Ansible playbooks.

Alarms were integrated to our Slack workspaces using AWS ChatBot, setting up procedures to quickly attend issues 24x7.

We also now have clear data of the database performance depending on the number of users, so we can do manual instance upscaling in advance for special marketing pushes that require it, using RDS maintenance windows for which we can automate infrastructure modifications.

Conclusion

We went through an in-depth infrastructure review that allowed LOi to go through this growth stage keeping a tight control of infrastructure costs. The stability and performance achieved has strengthened the business to the current point, in which we started moving on to a new architecture based on AWS EKS, incorporating microservices and having autoscaling features.

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