nClouds | AWS Case Studies
LendingHome

LendingHome

Industry

Financial Services, Marketplace, Real Estate

Location

San Francisco, California
Pittsburgh, Pennsylvania

Challenge

Improve uptime and flexibility, accelerate innovation, and gain finer-grained control of the cloud environment for security, regions, and cost.

Featured Services

Cloud migration, containers, DevOps, AWS Well-Architected Review

About LendingHome

Founded in 2013, LendingHome is revolutionizing the world of mortgages to put the power, and the keys, where they belong — in the borrower's hands. To accomplish that, LendingHome has built an end-to-end mortgage platform that offers a seamless, transparent, and reliable online process for homebuyers, real estate professionals, and investors. They're doing this with innovative technology and a team of seasoned real estate industry experts.

LendingHome is the fastest growing online mortgage marketplace with more than $2B in mortgage loans originated and $1.3B in principal returned to investors. They've been recognized with Forbes 2019 Fintech 50, Best Loan Origination Platform 2021 Fintech Breakthrough Award, 2021 HousingWire Tech100 Winner. LendingHome is now Kiavi.

Benefits Summary

Improved uptime, user experience, internal SLAs, and operations	Improved control and flexibility	Faster performance	Reduced cost	Improved security and compliance

CHALLENGE

Improve uptime and flexibility, accelerate innovation, and gain finer-grained control of the cloud environment for security, regions, and cost.

Imagine that your successful, award-winning fintech has reached an inflection point where continued growth and user satisfaction require a fundamental shift to improve scalability and uptime and enable faster innovation. LendingHome recognized they had hit this point.

Key to the success of the brand is the platform's user experience — for both customers and internal users. In fact, LendingHome is its own biggest user since they created their own mortgage origination system. If the software doesn't work, their analysts can't work.

Why AWS and nClouds

LendingHome engaged with nClouds, an AWS Well-Architected Partner and Premier Consulting Partner in the AWS Partner Network, to perform an AWS Well-Architected Review based on a set of architectural best practices for reviewing critical workloads running on Amazon Web Services (AWS).

The review confirmed evolving concerns and revealed new insights on the business impact of LendingHome's existing cloud-based architecture:

- **Inconsistent uptime** stemming from Heroku platform-as-a-service (PaaS), and CloudFlare website performance and security. As a result, user experience, internal SLAs, and operations deteriorated.
- **Insufficient control and flexibility** within Heroku's "black box" evidenced by H10 errors that couldn't be resolved by merely re-architecting code as there was no distinction between actual app crashed vs. routing mesh issues. Donovan Bray commented, *"Heroku's great – we wouldn't be where we are within as few years … if we didn't have Heroku."* However, by 2017, he knew that LendingHome needed improved control and flexibility, and wanted to create a second region (which Heroku didn't offer at that time). LendingHome had reached a core pivot point regarding the trade-off between flexibility and simplicity.
- **Performance speed and cost** were not sufficiently optimized.
- **Security and compliance issues** - While Heroku now provides a service called Private Spaces, at that time Heroku didn't offer the ability to create a second region, and LendingHome needed redundancy for regulatory compliance. There was no granular access control for third-party services add-ons, like New Relic. As a result, all of LendingHome's engineers became administrators by default. As Heroku housed LendingHome's databases in the public space, databases and applications were exposed to the Internet and there was a risk that unauthorized people could "come knocking on the door."

> "Working with nClouds to migrate our infrastructure from Heroku to AWS we've achieved improved uptime, faster performance, and a more secure environment. And the increased control provided by our new environment is enabling us to innovate faster."
>
> **Donovan Bray,**
> **Senior DevOps Manager,**
> **LendingHome**

> "Before engaging with nClouds [we tried] on our own to tackle this huge project, and we just knew we needed help. So, we contacted [nClouds] and brought them in – I wish we brought them in sooner."
>
> **Donovan Bray,**
> **Senior DevOps Manager,**
> **LendingHome**

nClouds proposed remediation and worked with LendingHome to develop a proof-of-concept to demonstrate the potential improvements. Then they collaborated on a rapid path to deliver into production.

In migrating its workloads to AWS, LendingHome leveraged several Amazon Web Services:

- **Amazon Aurora** - Delivers the speed and reliability of high-end commercial databases simply and cost-effectively.
- **Amazon API Gateway** - Makes it easy for LendingHome's developers to create, publish, maintain, monitor, and secure APIs at any scale.
- **Amazon CloudFront** - A large-scale, global, and feature-rich CDN that provides LendingHome with secure, scalable and intelligently integrated application delivery.
- **AWS CloudFormation** - Allows LendingHome to treat its infrastructure as code.
- **Amazon ECS** - Enables LendingHome to run and scale containerized applications on AWS easily.
- **Amazon EC2** - Services that are part of the environment run on Amazon EC2 instances and are organized using AWS instance tags.

- **Amazon ElastiCache** - Makes it easy for LendingHome to scale-out, scale-in, and scale-up to meet fluctuating application demands.
- **Amazon Redshift** - Enables LendingHome to analyze all their business data using their existing business intelligence tools.
- **Amazon S3** - Stores and retrieves data from LendingHome's VPC environments.
- **Amazon SQS** - Allows LendingHome's team to send, store, and receive messages between different applications in their environment.
- **AWS Lambda** - Makes it possible for LendingHome to run code without provisioning or managing servers.
- **Amazon EC2 Spot instances** - Allows LendingHome to optimize their costs on the AWS cloud.
- **AWS Autoscaling** - Monitors LendingHome's applications and automatically adjusts capacity to maintain steady, predictable performance at the lowest possible cost.

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MSP Partner
Public Sector Partner
SaaS Competency
Well-Architected Partner Program

LendingHome's solution stack also includes additional essential tools and services:

- **Datadog** - A monitoring service providing visibility into LendingHome's entire environment.
- **OpsGenie** - Streamlines LendingHome's alerts and incident resolution processes.
- **Pingdom** - Provides insights into the website's availability and performance.
- **Splunk** - Enables LendingHome to collect, monitor, analyze, and visualize their data.
- **Buildkite** - A platform for running LendingHome's automated CI/CD pipeline.

nClouds' Solution Architecture for LendingHome

LendingHome worked with nClouds to migrate their workloads from Heroku to AWS. Instead of using a lift-and-shift cloud migration approach, they used a containerization and DevOps approach. The first step was creating the support infrastructure.

The new infrastructure uses VPCs as boundaries for its different environments to ensure fine-grained control of their security, regions, and access. There is a single ECS cluster per VPC, with each cluster having at least one root variant. Each variant has six applications comprised of 35 services. The largest variant has six applications consisting of 847 services (not all scaled up), 470 tasks, and 60 ECS hosts - m4.xlarge.

> "
> It's really important to think about how you're going to layer your infrastructure. At the beginning, I highly recommend you do … a comprehensive IP plan … for your entire corporate and production side."
>
> **Donovan Bray,
> Senior DevOps Manager,
> LendingHome**
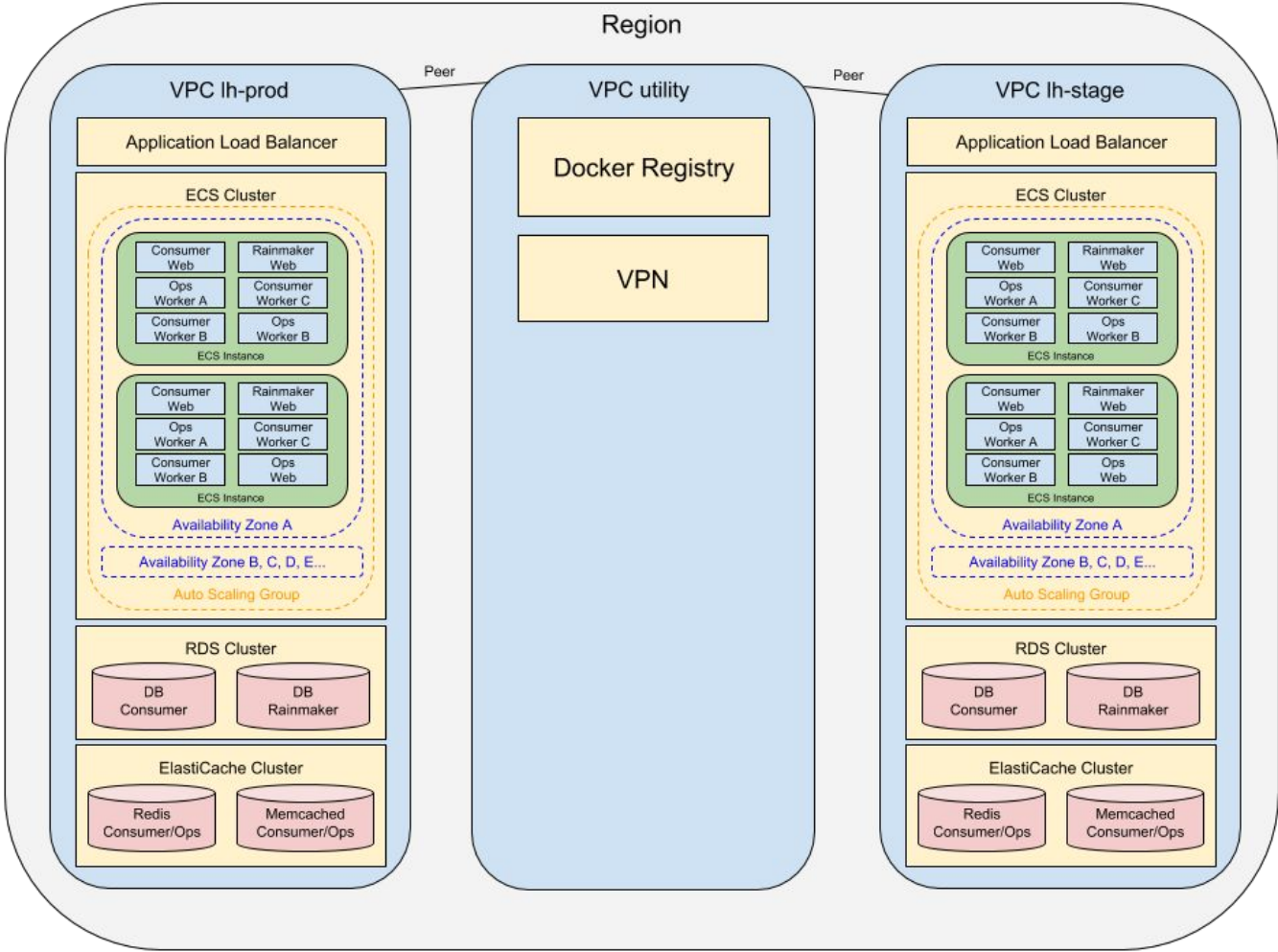
The Benefits

Teaming with nClouds, LendingHome moved from an unstable infrastructure on Heroku to a secure, efficient and scalable environment on AWS cloud. The project has yielded numerous benefits:

Improved uptime, user experience, internal SLAs, and operations.

In the past, Heroku caused significant downtime issues in LendingHome's production environment. Today, there's virtually no downtime attributed to their production infrastructure on AWS.

Improved control and flexibility.

By replacing Heroku with a modular and scalable Amazon Virtual Private Cloud (VPC) architecture, LendingHome now has the flexibility to mix and match best of breed applications. Since the migration, they've been able to experiment with the encryption of environment variables and how they use load balancers. Donovan says, *"[It's like] you're playing with Legos, and you can pretty much put it together however it makes sense."*

Faster performance.

LendingHome switched from Heroku Postgres to Amazon Aurora Postgres and, as a result, they've realized 3.5% faster performance. The Speed Index of LendingHome's pages was 3.11 before migration and improved to 2.92 post-migration.

Reduced cost.

By leveraging Spot Instances on AWS, LendingHome can take advantage of spare compute capacity in the AWS cloud available at steep discounts, scaling application throughput up to 10x for the same budget. By simply selecting Spot when launching EC2 instances, they can save up to 90% on On-Demand prices.

Improved security and compliance.

LendingHome now has an infrastructure that follows industry best practices, using security building blocks combined with third-party applications like OpenVPN. *"Our main priority was to set up VPC boundaries for the different environments in our infrastructure,"* says Donovan.

nClouds worked with the LendingHome team to set up private and public routes through a VPN, resulting in better data governance and improved system access. The team also leveraged AWS Lambda to maintain its servers, and AWS CloudFormation to transform their infrastructure into code. With VPC Peering, nClouds was able to create a private virtual network within LendingHome's infrastructure, allowing them to define what could be exposed publicly.

About nClouds

nClouds is a certified, award-winning provider of AWS and DevOps consulting and implementation services. We partner with our customers, as extensions of their teams, to build and manage modern infrastructure solutions that deliver innovation faster. We leap beyond the status quo.