nClouds | AWS Case Studies

nDimensional

nClouds helped nDimensional re-architect their cloud infrastructure for growth in scale and complexity.

Industry
Machine Learning, AI, Big Data, IoT

Location
Boston, MA

Challenge
Re-architecting cloud infrastructure for growth in scale and complexity.

Featured Services
Cloud infrastructure,
24x7 support

About nDimensional

nDimensional is a pioneer in building machine learning applications to solve industrial-scale challenges for organizations seeking to capitalize on big data and IoT. As one of a select few end-to-end platforms specializing in operationalizing machine learning in real-time production settings, nDimensional empowers teams with self-service data visualization, analytics, and machine learning to become data-driven. For more information, visit: http://www.nd.com/

Benefits Summary

Improved responsiveness	Better focus	Faster innovation	Faster scalability	Improved security

CHALLENGE

Re-architecting cloud infrastructure for growth in scale and complexity.

For nearly 30 years, nDimensional has been helping companies leverage their data to get a deeper understanding of what's going on in their businesses. The company's artificial intelligence (AI) platform enables industry-leading organizations to add intelligence to their production systems, and optimize business and physical processes in real-time.

nDimensional's public cloud application grew from receiving input from a few thousand to hundreds of thousands of sensors. This led to increased complexity and demands on the cloud infrastructure that became difficult to maintain and optimize. The lack of an integrated DevOps and cloud solution created various challenges for nDimensional:

- High latency when scaling up and down clusters in production systems.
- An average downtime of 5-6 hours, which was unsustainable for a 24/7 alert system with an SLA of less than one hour.
- Multiple data governance and system security issues.
- Inability to automate response to failures on clusters.

To address those issues, nDimensional began looking for a solution that would enable them to develop a scalable, automated deployment pipeline with downtime of fewer than 30 minutes.

"Downtime was a significant issue that we had, especially as we tried to roll out new features to our platform," says Dr. Rakesh Chalasani, VP of Technology at nDimensional. "We needed compute resources to scale up and down depending on how often we updated our machine learning models."

Why AWS and nClouds

nDimensional worked with nClouds, a Premier Consulting Partner in the AWS Partner Network (APN), to re-architect their infrastructure on the cloud. "The first thing we did was migrate from our existing pipelines on Ansible to Chef," says Rakesh. "Migrating to Chef allowed us to use many of the existing AWS infrastructure tools such as CloudFormation and OpsWorks, and automate all of our pipelines."

With AWS OpsWorks, nClouds was able to build auto-scaling features into nDimensional's infrastructure, allowing them to scale clusters up and down with zero downtime. The team automated their build process and separated it from redeployment, enabling blue-green deployments and faster release cycles. "We were able to move from an older to a newer release with almost no downtime," recalls Rakesh.

To improve security and compliance, nClouds worked with the nDimensional team to set up VPC and private and public routes through a VPN, resulting in better data governance and improved system access. "We made great strides in security by separating our production environment from the rest of development environment," adds Rakesh.

In building its new deployment pipeline, the company leveraged several Amazon Web Services:

- **AWS CloudFormation -** Enables the nDimensional team to run infrastructure as code and deploy AWS services in multiple configurations.
- **AWS CloudTrail -** Provides event history of AWS account activity to simplify security analysis, resource change tracking, and troubleshooting.
- **Amazon DynamoDB -** A zero-latency NoSQL database service for launching applications at any scale.
- **Amazon Elastic Compute (EC2) -** Services that are part of the environment run on Amazon EC2 instances and are organized using AWS instance tags.
- **Amazon Elasticsearch Service -** A service delivering Elasticsearch's APIs and real-time analytics capabilities to nDimensional's production environment.
- **AWS OpsWorks -** A fully managed service providing managed instances of Chef to automate the deployment pipeline.
- **Amazon S3 -** An object-based storage for storing and retrieving any amount of data from nDimensional's application sensors.

The solution stack includes additional essential tools and services:

- **Chef -** A configuration management tool that integrates with OpsWorks to turn infrastructure into code.
- **Datadog -** A monitoring service providing real-time anomaly detection for cloud applications.
- **Jenkins -** An open source automation server used to build automated deployment pipelines.
- **Scala -** A multi-paradigm language combining functional programming with object-oriented programming.

nDimensional customer use cases:

- Detecting issues and determining root causes in monitoring and diagnostic centers.
- Detecting credit card fraud.
- Optimizing fuel efficiency, emissions, and availability of electric power generators.
- Predicting bankruptcy.
- Authorizing radiology services for insurance companies.
- Using satellite imagery for mapping forest changes.
- Predicting sports injuries and player performance.

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

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nClouds Solution Architecture for nDimensional

Working with nClouds helped nDimensional build a scalable cloud infrastructure using best practices and tools. The company's new architecture used VPC Peering to connect a Utility VPC, containing Jenkins and OpenVPN, with a separate production environment VPC for improved security and performance. OpsWorks was used to create different layers based on server roles, and to enable auto-scaling across the infrastructure.
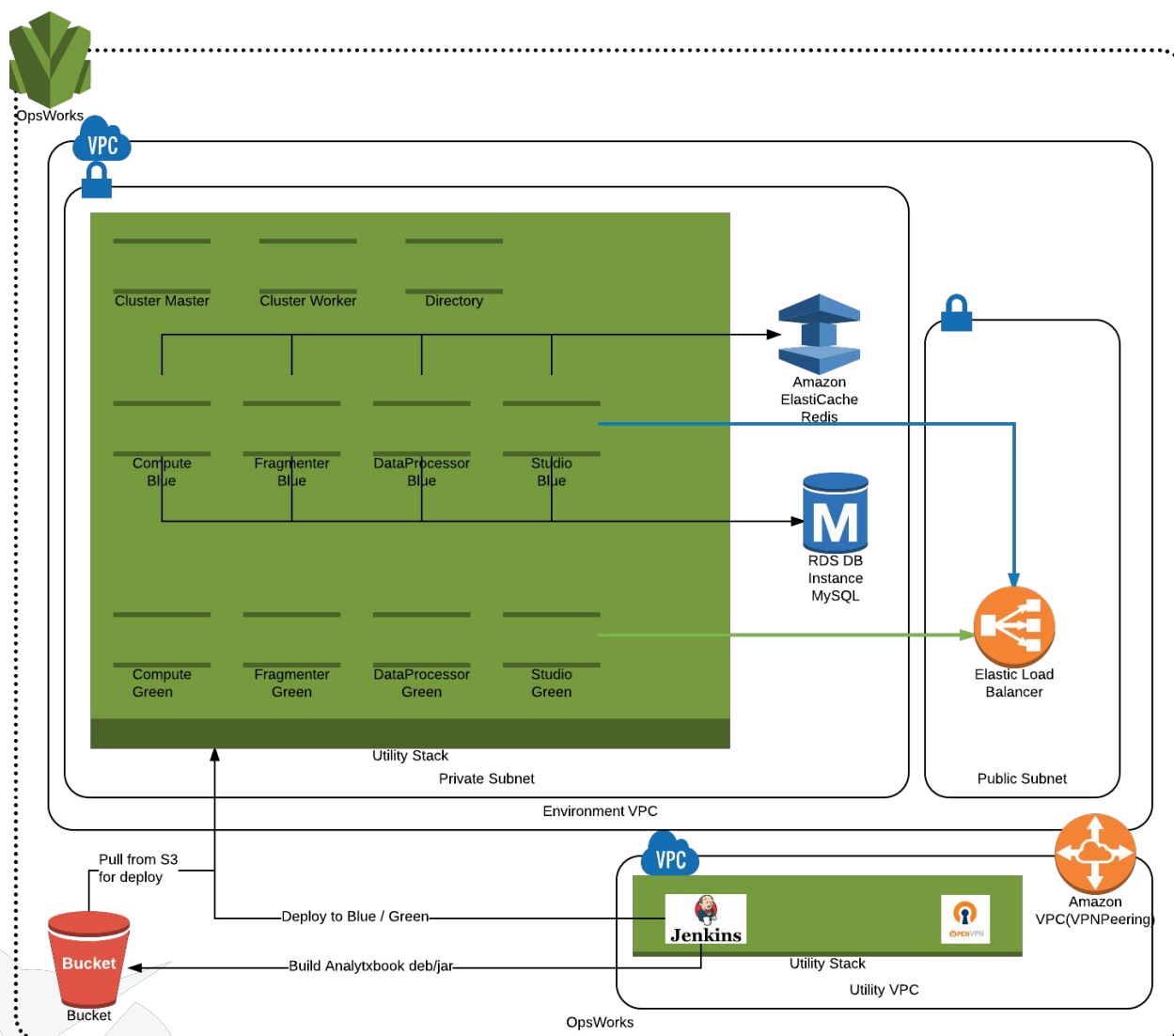
> At nDimensional, we use machine learning to help clients turn big data into actionable intelligence. Assessing the impact of nClouds on our journey, I am impressed by the combination of culture and deep skills to empower change, agility, and momentum."

Curt Lefebvre, Founder & CEO, nDimensional

The Benefits

Teaming with nClouds, nDimensional moved from an unscalable infrastructure to an efficient and fully automated deployment pipeline in the cloud. The project has yielded numerous benefits:

Improved responsiveness.

nDimensional now has 24/7 monitoring & support from nClouds, which allows for streamlined communication with customers. "We have a much better response to our customers," says Rakesh. "At this point, we maintain an SLA of 15 minutes for any major issues that may come up in our infrastructure. It's great and really responsive."

Better focus.

The nDimensional engineering team can now focus on creating new functionality and streamlining the rollout of new features, while the nClouds team maintains runbooks and responds to any incidents. "Our engineering team now has great insight on the stability and functionality of new features we roll out," says Rakesh. "That gives us a lot of focus and helps us determine what to work on next, and what new features to add in upcoming releases."

Faster innovation.

Redeployments containing new features now happen in less than 30 minutes (vs. 2-3 hours previously). And, the nDimensional team has the ability to roll out new releases more frequently. "We are able to push new releases more often -- as frequently as weekly or biweekly, in some cases," says Rakesh.

Faster scalability.

In the past, it would take up to one hour to add nodes to a cluster. It now takes 15 minutes. "Solving the issue of scalability provided us with the opportunity to save a lot of money on resources," adds Rakesh. "We can scale within minutes rather than the hour it used to take."

Improved security.

nDimensional now has an infrastructure that follows industry best practices with security built into the automation. "We are able to follow some of the best industry practices to improve security and carry out the various security compliance requirements we have," says Rakesh.

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.

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