Abstract

Trans Neuron, a start-up focused on solving the country’s severe supply-demand mismatch of skilled manpower, had inchoate software development processes leading to errors, missed deadlines, and portal downtime. Minfy came to the rescue with a DevOps compliant architecture, built for the cloud.
The Business Challenge: Streamlined Processes Needed for Speedy Delivery

India has a growing supply-demand gap for skilled manpower across sectors. Several academic institutions across the country are inadequately staffed, lack necessary infrastructure, and are insufficiently exposed to the industry for placements, curriculum development, and trainings. Towards addressing these challenges, the National Skill Development Corporation (NSDC), an agency of the central government, signed a partnership agreement with Trans Neuron for innovative technology solutions.

During the early start-up days and during the initial phases of idea development, software developers were coding, testing, building, and deploying the user interface (UI) and backend API services manually through their laptops and local servers. As the initial platform grew in scope and complexity, updates and new features had to be regularly deployed, and its infrastructure also needed to be scaled up to be able to serve users across the nation.

However, the inchoate processes typical of a start-up company were giving rise to delays and missed deadlines. Trans Neuron felt the need to streamline their efforts, and approached Minfy for help with a framework for continuous integration (CI) and continuous delivery (CD).

Using the AWS stack to implement the CI–CD framework

Minfy, an AWS managed-services specialist, helped Trans Neuron apply the DevOps methodology to their software development processes, morphing development and operations into one cohesive method. To enable this, it developed an AWS-enabled architecture to free developers from infrastructure administration and scaling tasks. Along with significant time savings for building and deploying software code, the new application stack also reduces the effort, cost, and time taken towards planning for scale. The diagram below lists out the main architectural components.

Trans Neuron’s platform application is coded in the Go language using Node.js and Angular JS. Backend is MongoDB. Gitlab is used for the code repository.

The AWS stack includes CodeBuild, CodePipeline, CodeDeploy to support developmental efforts. Frontend is Angular JS type 2 script based static content hosted on S3 bucket. Backend Micro Services applications is deployed onto Amazon ECS Cluster. Amazon ECS is used for scaling of the multiple container services in the application, and communications and notifications are handled using Amazon SES, SQS, and SNS. Routing and content delivery is managed through Amazon Route 53 and CloudFront, backups are managed with Amazon S3 Glacier, and security aspects are taken care using IAM switch role based access control for AWS console and programmatic access using secret keys, access keys and role based access for AWS services from applications.

The Client

Trans Neuron is a technology start-up engaged in developing artificial intelligence (AI) and machine learning (ML) enabled cloud solutions for India’s underserved skillling industry. It has created a thriving skills ecosystem, through bringing together academia, students, large corporates, and government agencies onto innovative digital platforms.

Trans Neuron’s platform features include industry aligned courses, skill acceleration programs, collaborative learning tools, certifications, live projects and internships, virtual incubation for young entrepreneurs, cognitive bot career counselling, online mentorship, teacher training, and AI hiring tools.
Source Code

GitLab is used as source code repository for this CI and CD Pipeline. DEV, Staging are used for Non-prod environment and Final code is merged to Master for Prod environment.

Build

AWS Code Build used for node JS and angular JS builds with npm dependencies to build docker image during build time.

Deploy

AWS CodeDeploy is used for deployment on the ECS Services update to run the ECS containers with latest docker images which pull latest images from ECR.

Multi-branch pipeline

AWS Code Pipeline was used for this CI and CD pipeline with Multi branch build, test, and deployment for Dev, Staging and Production environments.

Build notifications

AWS SNS topics are used for all build notifications such as build failures and build success along with logs for both frontend (Angular JS build issues) and backend applications (docker image build issues).

Roll Back

Rollback is done manually using ECS task definition revisions for backend applications.

For frontend applications roll back was done using S3 build artefacts build ID.
AWS VPC
TransNeuron Web application instances were hosted inside secured VPC (Virtual private cloud) private subnets and security groups. The security groups have restricted access except for web traffic ports such as http and https which are exposed via Load Balancer.

AWS ECS - Micro Services
TransNeuron Backend applications are micro services and deployed on ECS cluster which are configured as Auto Scaling instances on multi availability zones (Multi-AZ)
ALB Listener points to container ports which are exposed to the load balancer.

Database on EC2
Mongo DB is hosted on EC2 instance with
- automated AMI snapshots for Mongo DB using Lambda scripts
- DB backup taken via shell scripts and stored on S3 buckets

AWS S3
Following were stored on highly scalable and durable object storage services AWS S3 (Simple Storage Services)
- Build artefacts
- EC2 instance AMI snapshots
- Trans Neuron - Frontend application hosted on S3 as static website hosting
- CloudWatch Logs

AWS CloudWatch logs
CloudWatch logs was used to trace Application logs (using SSM agent)

Monitoring
Infrastructure ECS Cluster instances and application insights were monitored using third-party monitoring tools.
The Result: Well-Oiled Mechanisms Delivering Constant Innovation

Minfy’s implementation of the DevOps compliant cloud architecture is now helping Trans Neuron developers meet their targets and deadlines. Software building and deployment processes that were earlier haphazard, are now greased to perfection, and the platform is seeing zero downtime. This has better-positioned the company to focus on innovation and creativity, and the speedy release of ever more useful functionality.

An increasing number of students, academic institutions, and enterprises across the country are benefiting from the possibilities unleashed by Trans Neuron’s skilling ecosystem on the cloud. In the background, the Minfy team views the new architecture undergirding the cloud solution as a worthwhile effort towards the skill development of India’s youth.

About Us

Minfy™, a born in the cloud firm, helps enterprises with impeccable IT solutions for the cloud era. We help organizations move ahead in the digital world by changing the way they use IT. For over 5 years, we have dedicated ourselves to providing best-of-breed & well-architected cloud solutions to our customers, and are committed to partnering with them for success. Our offerings encompass SAP on cloud, Next-Gen Managed Services, Dev-Ops, CI & CD, and Microservices.