



happiest minds

The Mindful IT Company

Born **Digital** . Born **Agile**

APPLICATION MODERNIZATION LEVERAGING AZURE

for a Leading EdTech Customer

A leading Edtech company that provides web-based solutions for universities offering fully online degree programs in the US is facing challenges with application maintenance, availability, scalability, and security. By adopting Happiest Minds' 5-step approach, the customer has overcome the above challenges and stayed at the forefront of their industry's evolution.



Legacy Application & Challenges

Following are the challenges customer encountered with their existing legacy application -

Lack of Maintainability

Feature enhancement & code maintenance were difficult on legacy technologies.

Maintaining on-premises servers was tedious.

Lack of Availability

Managing the centralized servers for global customers was complex.

Lack of Scalability

Existing application architecture did not support scaling the application.

Enhancing the server performance based on business growth was difficult.

Less Secured Systems

Without robust monitoring and logging capabilities, detecting real-time security incidents was tedious.

Difficult to follow modern compliance and regulatory requirements due to outdated security controls and practices.

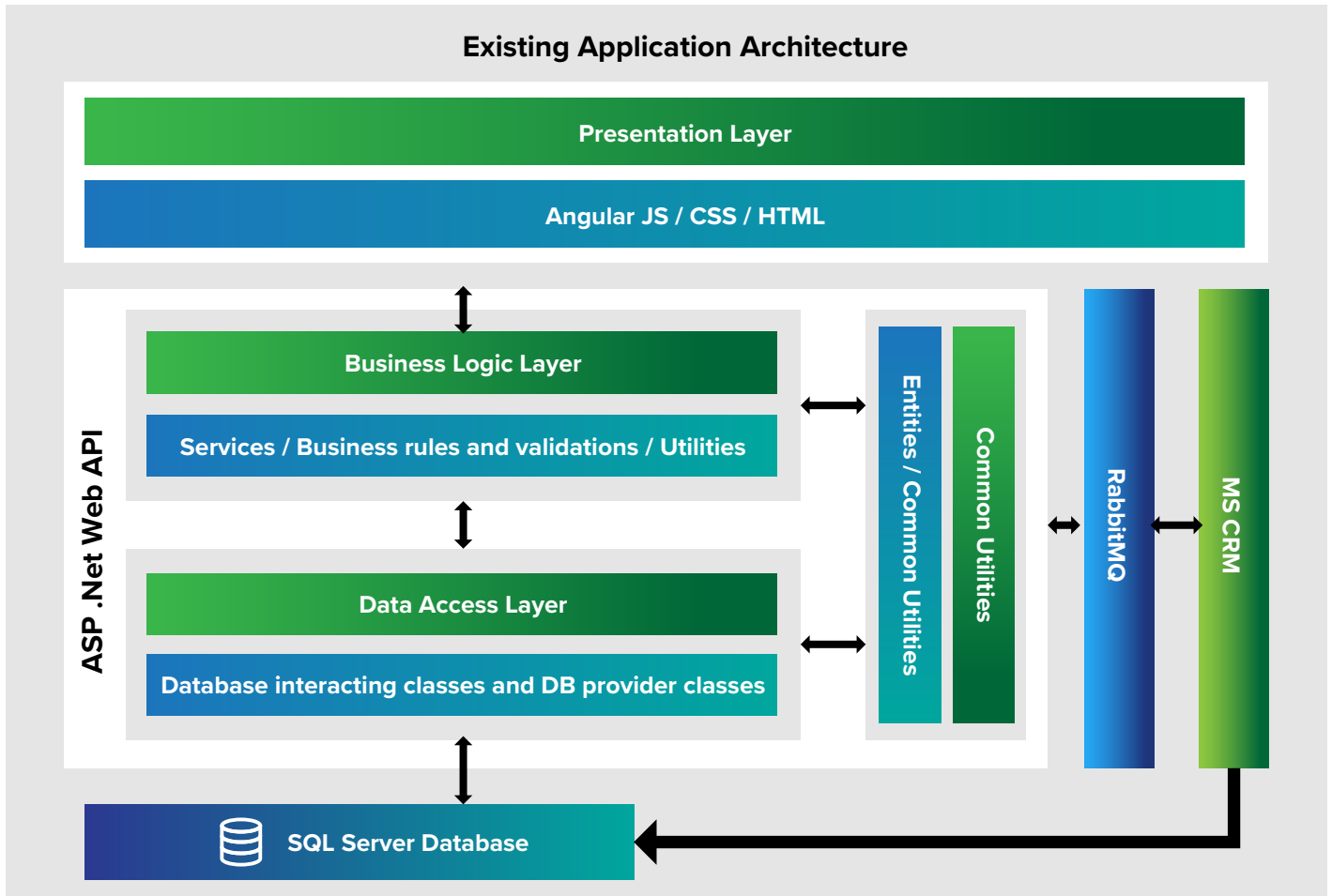
Lack of modern security controls such as encryption and advanced threat detection exposed sensitive data to unauthorized access.

Existing Architecture

The existing architecture was monolithic - a three-tier application developed using the below tech stack.

Front End and Backend - Angular 1.1 & ASP.Net Web API.

Database, Existing Integration and Message Broker - SQL Server 2012, CRM and RabbitMQ respectively.



Business Goals

The customer was looking for the following business goals with modernizing existing application on Azure.

- 1** Reducing costs by using pay-as-you-go model for Azure services.
- 2** Enabling use of a new business model that innovates faster and responds to market opportunities more effectively.
- 3** Improving the customer experience by building a robust application handling large workloads and adapting to changing demands.
- 4** Increasing agility & adaptability for market and business changes.
- 5** Improved security by built-in security controls, threat detection, and prevention tools.
- 6** A robust disaster recovery solution to protect the applications and data from outages. The proposed solutions should quickly restore applications and data in the event of a disaster, minimizing downtime and data loss.

Happiest Minds has a proven cloud five-step migration approach as follows:

1. Assessment & Planning for Migration

Assessment and migration phase involved:

- ✓ Selecting the right cloud provider based on business capabilities, cost model, existing application's workloads and architecture requirements – Azure emerged as the clear-cut winner.
- ✓ Evaluating current infrastructure, identifying dependencies, and assessing workload readiness for Azure compatibility using tools like Azure Migrate.
- ✓ Right migration strategies (from 7 R's of migration) were chosen based on application complexity and business use.

Application Components	Migration Strategy	Delivery Model & Benefits
UI (Angular)	Re-architecture & replatform – Legacy Angular solution was migrated to the latest Angular version with Microfrontend architecture & entire platform runtime, middleware, framework was packed into a Kubernetes container.	PAAS Cloud-Ready, Cloud-Friendly, Cloud-Native.
Business Logic	Re-architecture & replatform – Asp.net web API was refactored into .net core Microservices and containerized.	PAAS Cloud-Ready, Cloud-Friendly, Cloud-Native.
Database	Lift & shift - Primary database was segregated into multiple DB instances per microservices and was lifted and shifted as Azure SQL instance.	PAAS, Cloud-Ready, Cloud-Friendly.
MS CRM	Repurchase – Replaced with Salesforce solution.	SAAS, Cloud-Ready, Cloud-Friendly, Cloud-Native.

1. Assessment & Planning for Migration contd..



Assessment tools were chosen considering current project ecosystem, integrations, tech stack and architecture.

Tools	Usage
Azure Migrate	This migration tool was used for: <ul style="list-style-type: none">• Discovering and assessing virtual machines, web applications, and databases.• Estimating migration costs and timelines.• Creating migration plans with different strategies (rehosting, replatforming).
Azure App Service Migration Assistant	This azure service: <ul style="list-style-type: none">• Helped migrating ASP.NET web applications to Azure App Service.• It analyzes our application and provides recommendations for migration steps and potential code changes.
Azure Database Migration Service	This azure service: <ul style="list-style-type: none">• Simplified database migration to Azure by enabling seamless transfer of data from SQL Server to Azure SQL Database.
Azure AppCat Tool	This tool helped: <ul style="list-style-type: none">• Identifying potential compatibility issues, opportunities for modernization, and effort estimations for suggested changes.

P.S.- Azure Migrate, Azure App Service Migration Assistant and AppCat tools were used for the initial discovery of monolithic applications and its potential compatibility issues. This tool helped us to identify application components, dependencies, and overall structure.



Apart from the automated assessment, deep diving into existing codebase helped understand the internal logic and coupling between different modules. Domain-driven design carried out by product experts helped in segregating the different product/business lines into microservices.

2. Migrate Application

Prepare the cloud environment

- Before starting the development phase, a secure environment was set up for infrastructure, services, application, and data.
- The network team built a secure environment for the application by setting up Kubernetes cluster data plane. Azure security groups control traffic from the Kubernetes control plane into the Azure VPN through nodes, containers, firewall rules, and identity and access management.
- Once the environment is set up, the application was developed and migrated to microservices in a phased approach based on product/business lines.

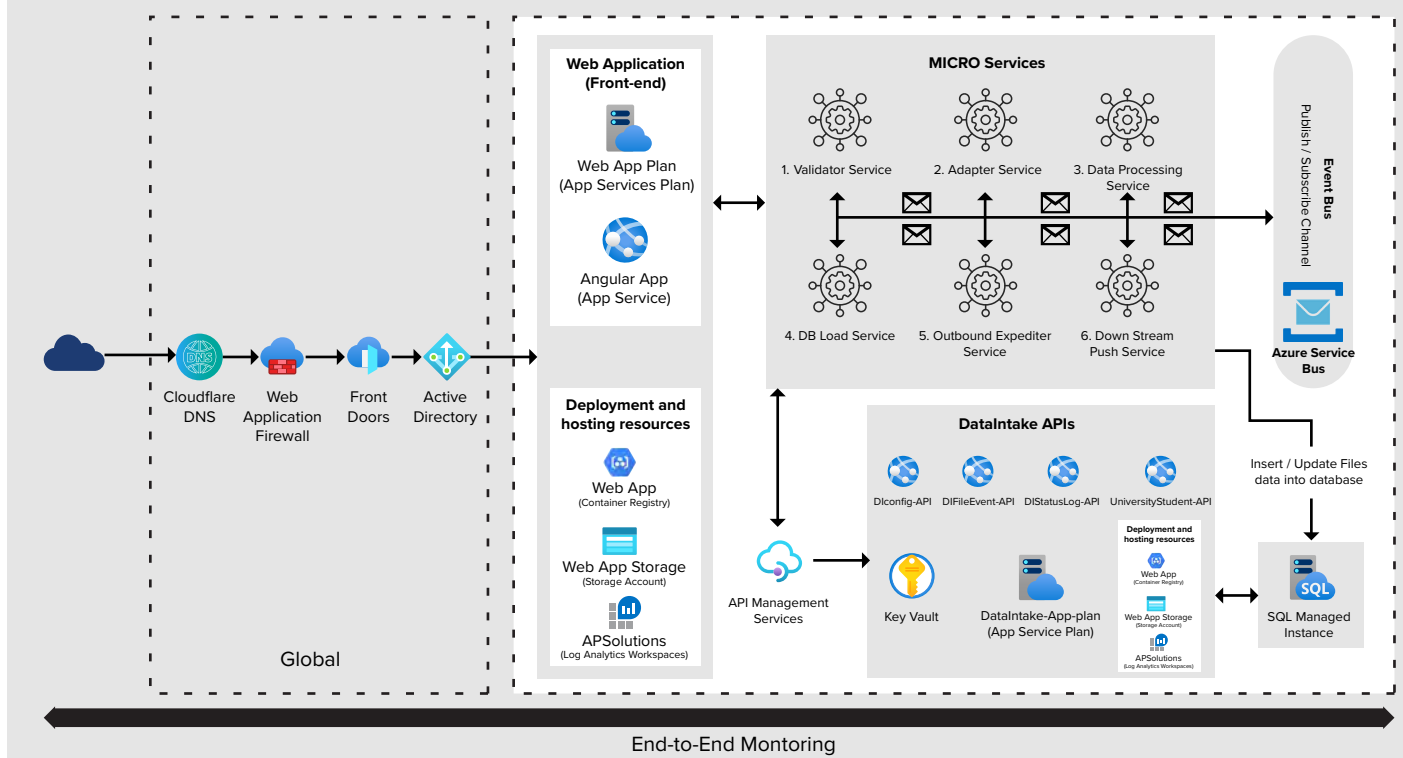
Application Migration

- The application was broken down into multiple modules based on business lines and developed into smaller ASP.NET core microservices.
- Application configuration was accessed as configuration as a service.
- Databases and infrastructure code were injected in microservices as backing services.
- Azure service bus was used as a message broker for asynchronous communication between services.
- Application components were packaged into docker containers running in Kubernetes cluster.
- Application security was enforced via JWT and MFA.
- Application performance was optimized by implementing cloud native techniques like caching and load balancing.

Database Migration

- Azure Database Migration service was used to migrate on-premises data to Azure SQL for instance.
- Microservice per database schema strategy was used for database segregation among services.
- The data(files) stored in Azure blob storage was encrypted using Azure key vault & managed keys to protect data at rest.
- Azure SQL DB authentication was done with Microsoft Entra ID (formerly Azure Active Directory) for all the users.
- Database queries were optimized for improved performance in the cloud environment.

After migration, the achieved architecture on Azure looked like:



3. Enabled Monitoring, Logging & Alerting

- ✓ The Elasticsearch application logs were used for monitoring the cluster and diagnosing issues.
- ✓ Open-source monitoring tools – Prometheus & Grafana were used in Kubernetes for monitoring cluster health and performance.
- ✓ Azure Monitor, Application Insights & Azure Log Analytics were used to monitor resources, security events and provide alerts and notifications when security incidents occurred.
- ✓ Azure security center was used for automated vulnerability assessments and patching recommendations.

4. Building Automated Pipelines

- ✓ Automated DevSecOps pipelines - Azure DevOps provides the team with continuous integration, continuous deployment, and continuous delivery capabilities to deploy, upgrade, roll back, and delete application releases for Dev, QA, UAT, and Prod environments.
- ✓ Application & DB components packaged in a docker container inside Kubernetes cluster are delivered in the above environments via automated pipelines using Kubernetes templates.

5. Configuring DR Strategy

- ✓ UI & Business Tier were deployed on multiple servers, pointing to failover region during outage.
- ✓ Asynchronous data replication and read replicas for DB Tier were promoted during failover to secondary regions.
- ✓ Snapshot and database backup techniques helped in quick recovery.
- ✓ Deciding RTO and RPO metrics helped in quick recovery in times of critical workload.
- ✓ An effective cloud-native software operational model helped plan, organize, monitor, control, and optimize cost-efficient cloud software operations.

Value Delivered to the Customer



Reduction in overall operational infrastructure and maintenance cost by 40%.



Improved application scalability.



Increased availability of the application by 70% with multi-region deployment.



Robust disaster recovery strategy delivered for a dynamic workload.



Enhanced security.



Improved and efficient monitoring, logging and alerting system for the entire application.

For more information, write to us at
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About Happiest Minds

Happiest Minds Technologies Limited (NSE: HAPPSTMNDS), a Mindful IT Company, enables digital transformation for enterprises and technology providers by delivering seamless customer experiences, business efficiency and actionable insights. We do this by leveraging a spectrum of disruptive technologies such as: artificial intelligence, blockchain, cloud, digital process automation, internet of things, robotics/drones, security, virtual/ augmented reality, etc. Positioned as 'Born Digital . Born Agile', our capabilities span Product & Digital Engineering Services (PDES), Generative AI Business Services (GBS) and Infrastructure Management & Security Services (IMSS). We deliver these services across industry groups: Banking, Financial Services & Insurance (BFSI), EdTech, Healthcare & Life Sciences, Hi-Tech and Media & Entertainment, Industrial, Manufacturing, Energy & Utilities, and Retail, CPG & Logistics. The company has been recognized for its excellence in Corporate Governance practices by Golden Peacock and ICSI. A Great Place to Work Certified™ company, Happiest Minds is headquartered in Bengaluru, India with operations in the U.S., UK, Canada, Australia, and the Middle East.