WHITE PAPER

LARGE US BASED SCHOOL DISTRICT – MODERNIZATION AND CLOUD MIGRATION JOURNEY WITH INFOSYS

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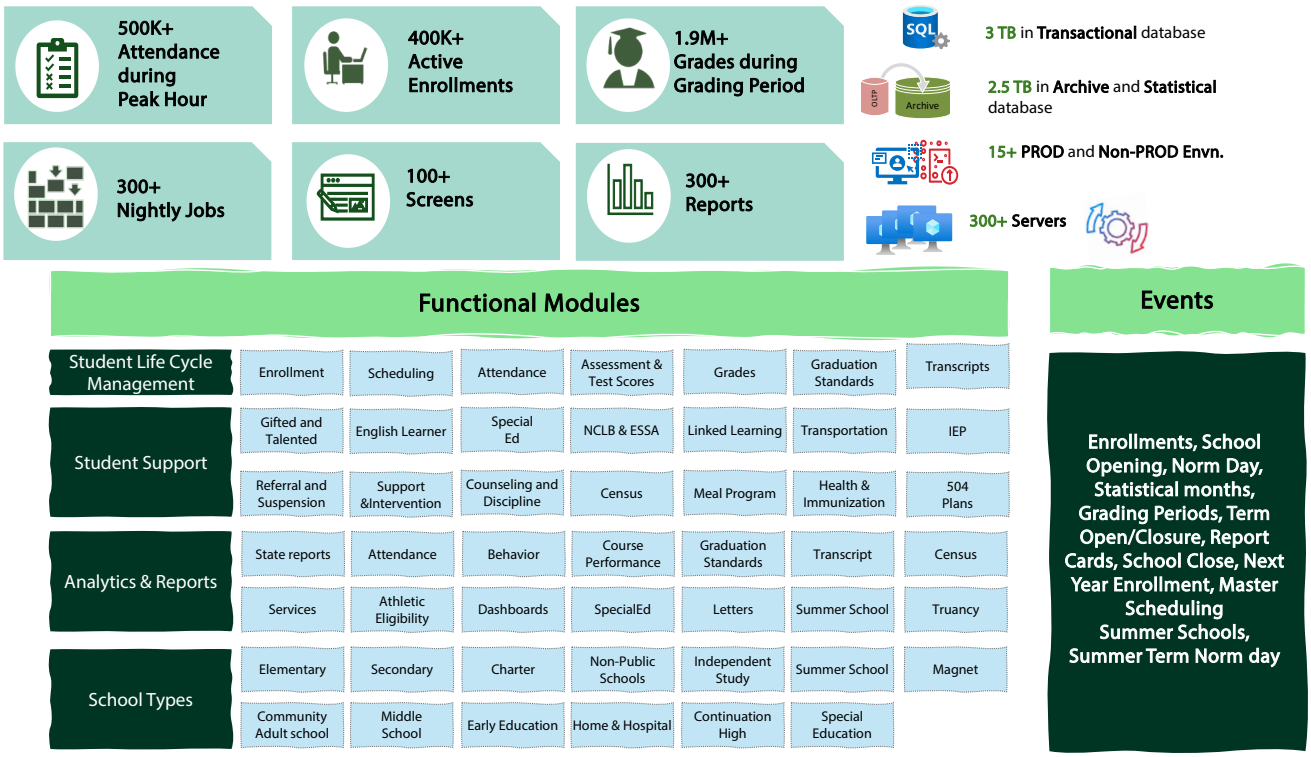
Introduction: A School District looking for transformation

A leading US-based school district faced a critical situation with its outdated Student Information System (SIS). The monolithic architecture of the legacy system created significant operational and technical challenges, hindering the district's ability to deliver quality educational services. With over 30,000 teachers and staff across 1,400 schools relying on the SIS for daily administrative tasks, analytics, and decision-making, the system's limitations were increasingly unsustainable. Frequent downtime, performance degradation, and scalability constraints posed an immediate need for transformation to ensure continued support for students and educators.



Why Modernize? The Case for Change

The district's legacy student information system was built on a monolithic .NET framework with a two-tier architecture, relying heavily on a SQL server backend. Despite its robust features, including managing enrollment, attendance, transcripts, and academic progress, the system faced numerous limitations:

Performance Issues:
Frequent downtime and memory leaks impacted critical workflows, causing disruptions during key periods like grading and school openings.

Scalability Constraints:
The system struggled to handle increasing user demands, limiting its ability to scale for future requirements.

Data Privacy Challenges:
Emerging compliance requirements made it difficult to ensure robust data security.

High Maintenance Costs:
Complex dependencies and outdated frameworks resulted in high operational costs and maintenance complexity.

Rigid Architecture:
The effort to build new features either for integration with modern applications or build functionalities for users is very high and complex.

These challenges underscored the urgency for modernization. A comprehensive digital transformation was essential to transition to a modular, cloud-efficient architecture that could address these issues while positioning the district for future growth and providing a seamless, reliable platform for teachers, students and administrative staff.

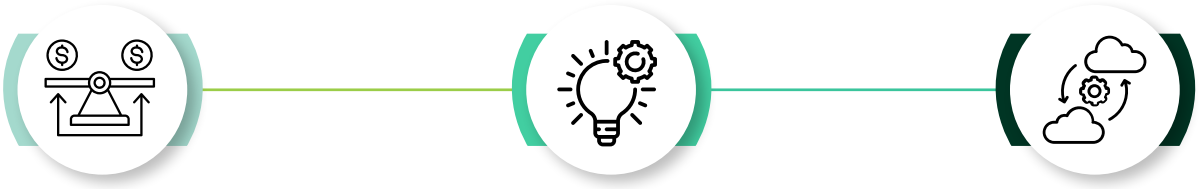
Our strategic approach to the problem

Infosys leveraged its deep experience in application modernization and our enterprise cloud transformation services (Cobalt) to bring about the transformation of the Student Information System.

The district partnered with Infosys to strategize and implement a solution. Infosys began with a comprehensive assessment of the district's legacy Student Information System (SIS), understanding the as-is system and critical challenges that substantially impacted the district's ability to deliver quality educational services. The assessment identified Significant technical debt, severe performance bottlenecks, and reliability issues.

A thorough analysis revealed that a simple lift-and-shift to cloud would be insufficient and potentially counterproductive, as it would merely move existing problems without addressing core issues or delivering necessary ROI.

Our final approach was to embark on a three-phase digital transformation journey:



Stabilization:

Address critical technical debt and performance issues to ensure short-term reliability.

Modernization:

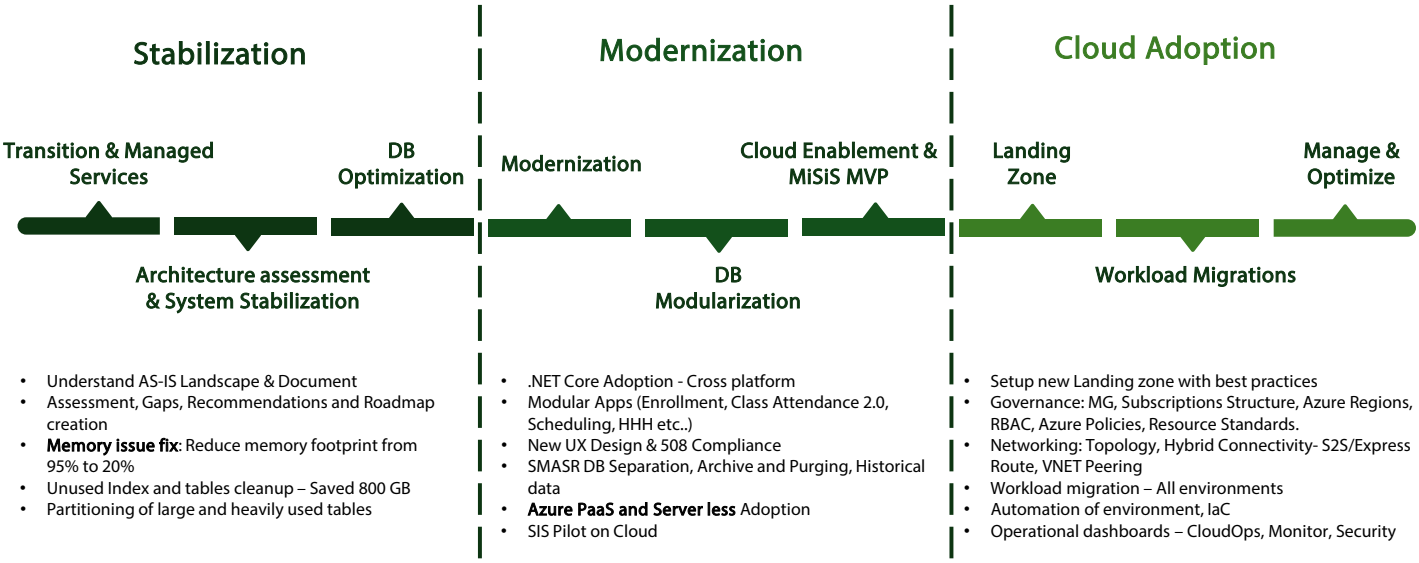
Transform core modules into cloud-native applications with enhanced capabilities.

Cloud Adoption:

Build a secure, scalable cloud infrastructure and migrate operations to optimize costs and performance.

This phased approach ensured uninterrupted educational services while systematically addressing legacy system challenges. By adopting a modular architecture, the district aimed to:

- Enhance system performance and scalability.
- Enable rapid feature deployment.
- Strengthen cybersecurity and compliance.
- Support evolving educational technology needs with a flexible, future-proof infrastructure.



Each phase was carefully designed to build upon earlier successes, ensuring sustainable transformation while maintaining continuous educational services.

We will look at a more detailed view of the implementation approach in this section.

The Business Impact

The modernization initiative delivered transformative results as shown below:

Improved System Performance:

Application performance improved by 20%, with a 57% reduction in database size and a 75% decrease in memory usage.

Enhanced User Experience:

Modern UX design and 508 compliance improved accessibility and usability.

Cost Savings:

Cloud optimization strategies reduced costs by 45%, leveraging environment consolidation and hybrid benefits.

Operational Efficiency:

Critical workflows were streamlined, reducing database compute usage by 80% and improving response times by 44%.

Scalability and Security:

A robust cloud foundation enabled the district to scale seamlessly while ensuring data security through advanced Azure-native controls.

High availability and redundancy:

Application availability is ensured for users during data center outages and other DR situations.

These outcomes significantly impacted school operations in a positive way:

For Teachers/school admins:

No more system lags—attendance tracking is instantaneous, enhanced usability across functionalities like enrollment and scheduling.

For IT Teams:

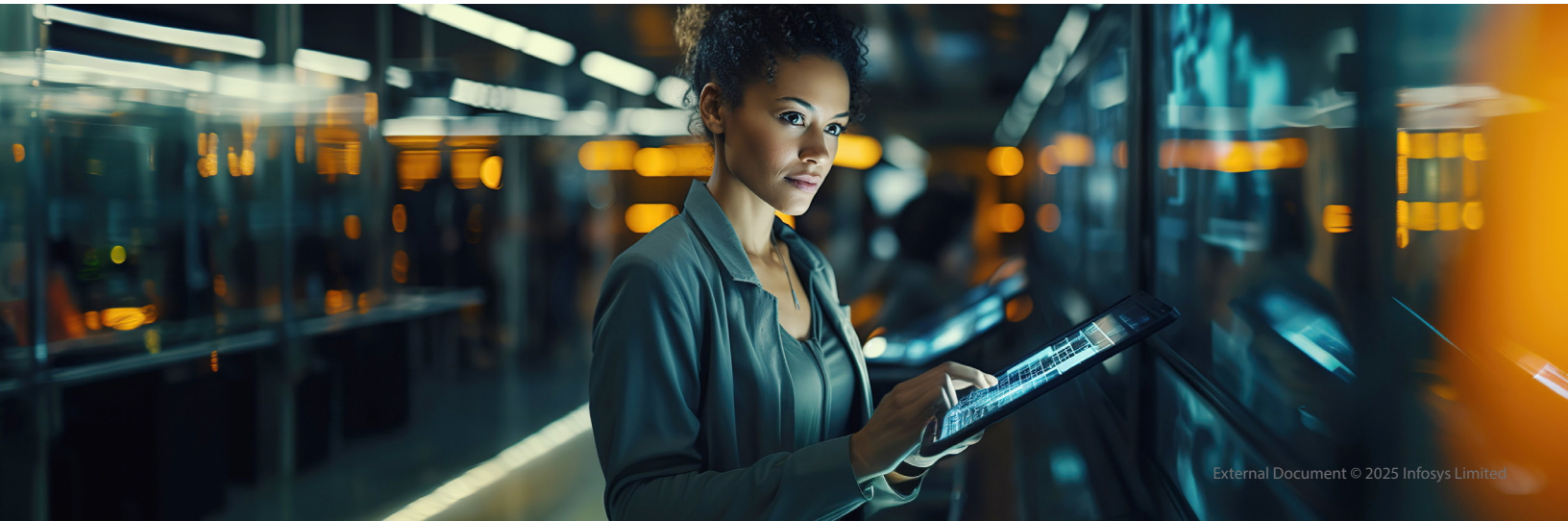
Faster deployments of business requirements into production, effort optimized towards delivering new features vis-à-vis just operational support.

For Administrators:

Better visibility and control over infrastructure spend

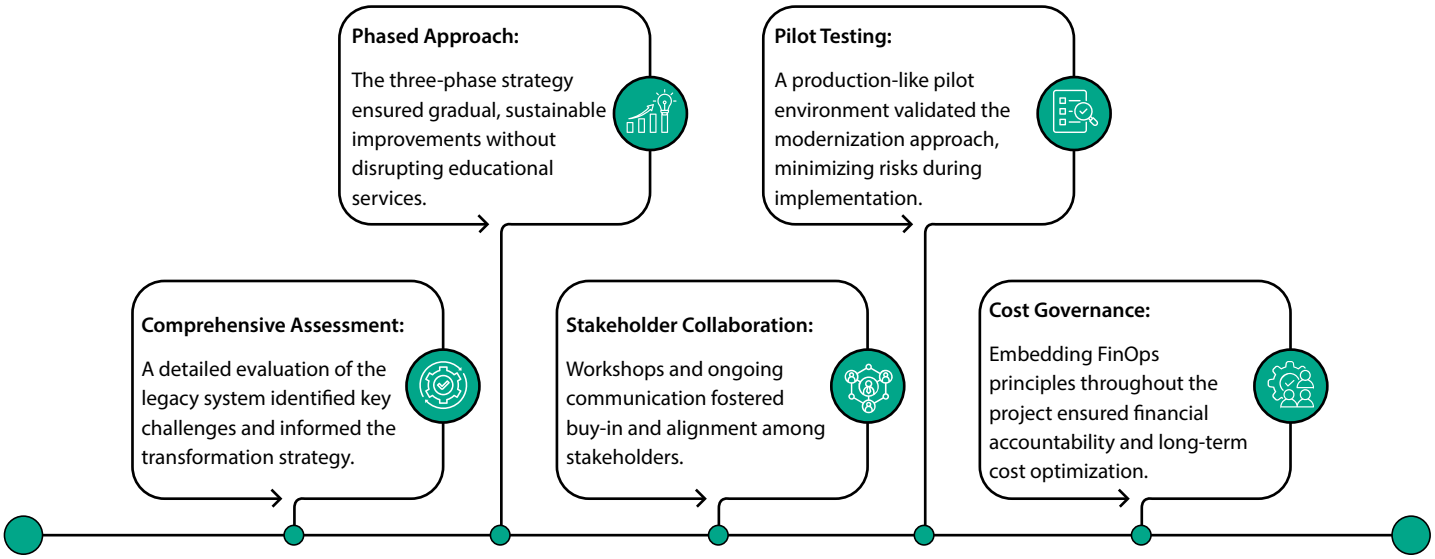
For Students & Parents:

Access to real-time academic insights anytime, anywhere.



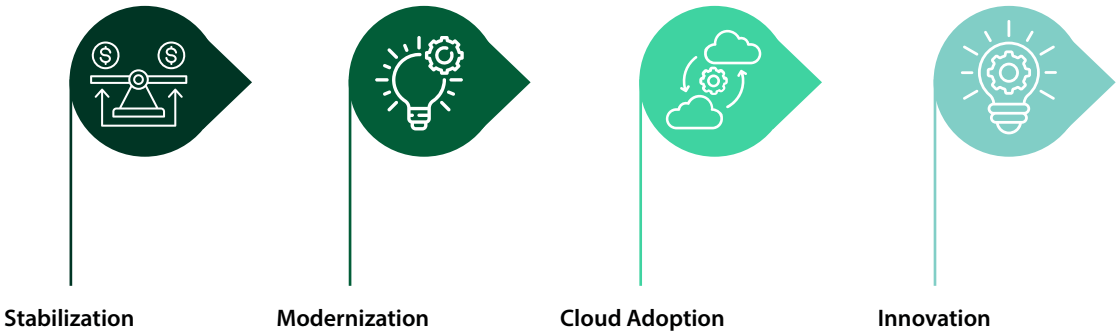
Best Practices for a SIS modernization

The district's success was rooted in several best practices that Infosys was able to embed into the process based on our app modernization and Cobalt expertise:



The Road Ahead

We've modernized; now, let's innovate for the future



With a modernized and cloud-enabled SIS, the district is well-positioned to embrace future challenges and opportunities. The new platform supports:

Continuous Innovation:

Modular architecture allows for rapid adoption of emerging technologies including AI based innovation like Gen AI adoption, automation, predictive analytics and chatbots.

Scalable Growth:

The system's cloud foundation and the leverage of cloud native solutions ensures scalability to meet evolving educational demands.

Data-Driven Decision-Making:

Advanced analytics and reporting capabilities driven by near real time data sync and seamless integration empower educators with actionable insights.

Sustainability:

Ongoing cost optimization and governance practices maintain financial efficiency.

Conclusion

The district's modernization journey demonstrates the transformative power of a strategic, phased approach to digital transformation. By addressing legacy system challenges and embracing a cloud-first strategy, the district has created a resilient, future-ready SIS that empowers educators, administrators, and students alike. With this transformation, we believe the district has taken a leap towards achieving its strategic goals in education transformation for the students. This implementation is also a true testament of Infosys capabilities and the success that is possible through great collaboration with the customer and truly navigate our next. Some feedback is given below:

> Migrating SiS to the Cloud is a groundbraking accomplishment, one without an equivalent in the education sector. The second largest school district in the country now proudly stands as the largest student information system in the Cloud. This remarkable feat not only showcases our commitment to enhancing educational infrastructure but also sets a new standard for other districts to aspire to
>
> **Senior Director, Client**

> Your dedication and meticulous preparation have been instrumental in achieving these milestones. Many of you went above and beyond your assigned duties, showcasing an incredible level of commitment and teamwork. A special acknowledgment goes to those who worked tirelessly through the night, coordinating efforts across the United States, Canada, and India to ensure everything went smoothly
>
> **Architecture Review Board, Client**

A more detailed look at the implementation:

System stabilization and performance optimization

The Objective of this phase was to address critical issues which were affecting the system reliability and enhance system performance with minimal efforts and time. Our comprehensive assessment revealed systemic challenges across application, database, and infrastructure layers that needed immediate intervention.

Application Layer

Addressed critical performance bottlenecks by resolving memory leaks, reducing overall memory usage from 95% to 20%. Remediated poorly written Entity Framework queries, SQL queries, and stored procedures, and implemented essential security fixes and technical upgrades to enhance application stability.

Database Layer

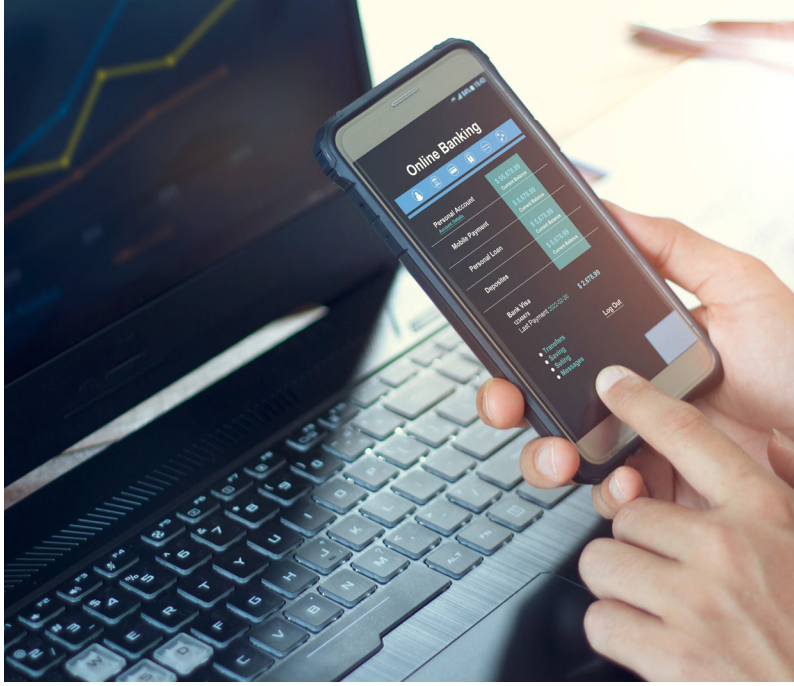
Executed comprehensive database optimization through strategic removal of unused indexes, implementation of data compression, TempDB optimization, and table partitioning, while also purging historical data and logs to reduce disk space usage. These improvements, combined with streamlined ETL processes, reduced the load on the database and job processing time from days to hours.

Infrastructure Layer

Enhanced infrastructure efficiency through optimized server resource use, implementation of critical security patches, and system upgrades, complemented by improved monitoring and performance tracking capabilities.

Highlights of stabilization phase

- Reduced database size by **57%.**
- Decreased memory usage from **95%** to **20%.**
- Reduced the number of web servers in production by **25%.**
- Improved application performance by **20%.**
- Significantly enhanced system stability.



"The stabilization phase established a strong foundation by resolving critical performance bottlenecks, enabling the path toward comprehensive modernization."

Modernization strategy and execution

Understanding the significant financial and operational risks involved in comprehensive or full application modernization, we developed a strategic, targeted approach focused on maximizing value while minimizing disruption. Our data-driven analysis revealed that three primary modules - Attendance (62% of user traffic), Enrollment (10%) and Scheduling (6%), — accounted for 78% of all user interactions.

This insight drove us to adopt a strategic modernization approach focused on:

- Transforming critical functions while keeping operational stability.
- Building a scalable, cloud-ready architecture with enhanced security.
- Improving system performance and bringing down operational costs.

The modernization was executed through our proven Six-phase methodology, ensuring systematic progression from module selection through deployment. This structured approach enabled us to:

1. Select and prioritize modules based on business impact.
2. Analyze system dependencies and plan implementations.
3. Design modern, user-centric interfaces.
4. Implement cloud-ready architecture.
5. Ensure quality through comprehensive testing.
6. Deploy with minimal operational disruption.

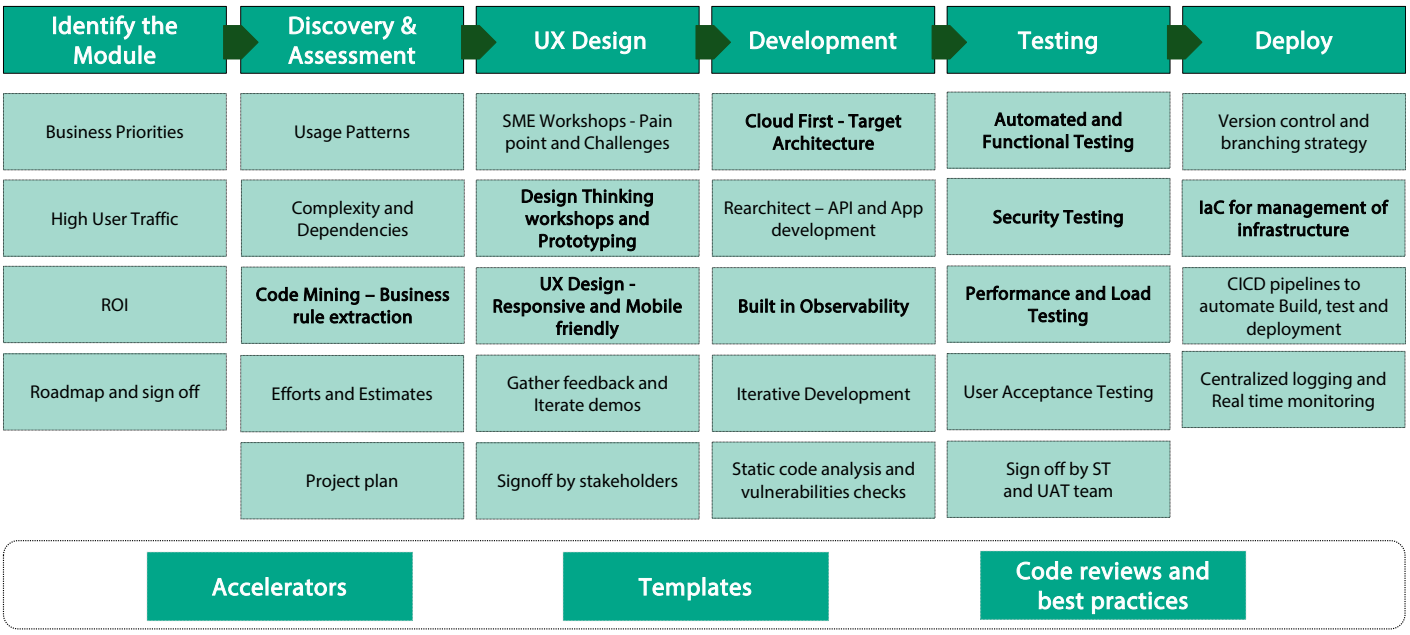


Figure 3: Targeted Modernization methodology

The modernization phase delivered many transformative outcomes:

- Improved user experience with modern UX design
- Enhanced accessibility through 508 compliance implementations
- Dramatic performance optimization with:
    - **o 90+%** reduction in database calls in modernized apps
    - **o 44%** improvement in response time
    - **o 80%** decrease in database compute usage

Cloud Adoption

Pre-migration

Understanding the critical nature of the Student Information System and its impact on daily educational operations, we implemented a carefully orchestrated pre-migration strategy to plan zero disruption to the school district's operations.

Our comprehensive preparation encompassed:

- Conducting multiple cloud awareness workshops with customer side stakeholders to foster a deeper understanding of cloud benefits, clarify adoption processes, and ensure organizational readiness.
- Thorough infrastructure assessment using Azure Migrate tools.
- Strategic adoption of the Microsoft Cloud Adoption Framework.
- Development of detailed disposition and migration strategies.
- Design aligned with Azure Well-Architected Framework principles.
- Detailed planning for migrating each environment, managing dependencies, establishing a RACI matrix, identifying risks, setting a regular cadence, and creating a comprehensive cutover plan.

To confirm our design and approach, we established a production-like pilot environment where the following critical factors could be evaluated:

- Simulated real-world user loads and performance scenarios.
- Evaluated scalability and high availability designs.
- Verified security controls and compliance requirements.
- Implemented FinOps practices for cost governance and optimization strategies.

- Proved the effectiveness of monitoring and operational procedures.

This cautious validation-first approach delivered the following outcomes:

- Verified cloud architecture meeting performance requirements.
- Validated security and compliance framework.
- Evaluated risk mitigation strategies including DR & Azure native high availability capabilities.
- Effective cost optimization: 45% projected cost reduction with Environment Consolidation, SQL & OS Hybrid benefits use, Reserved & Savings Plan implementation, Automated VM shutdown and Resource optimization.

> "Through rigorous pilot testing and validation, we established an evidence-based foundation for full-scale migration."

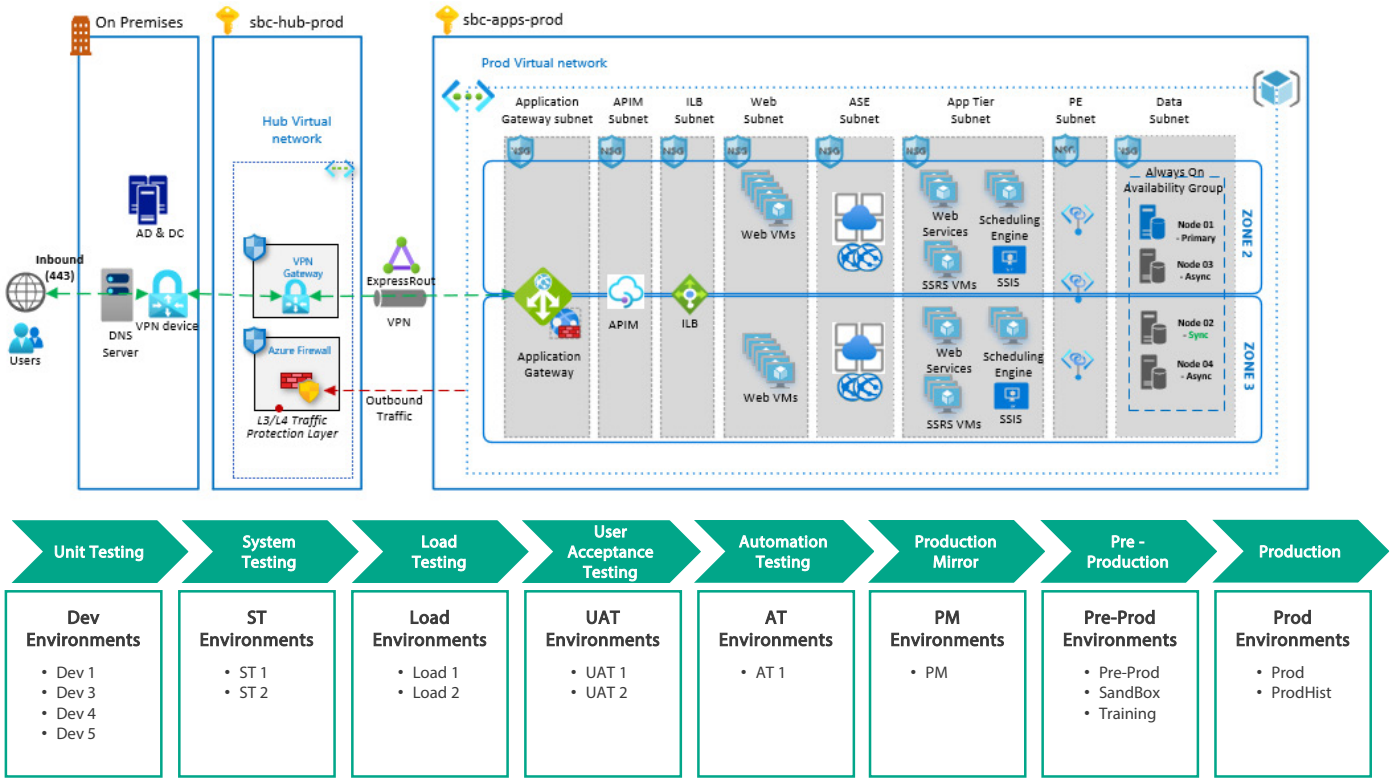


Figure 4: Presents our iterative migration approach.

Strategic Implementation Framework

Building upon the solid groundwork from stabilization and modernization phases, we executed the cloud migration through a meticulously planned three-phase cloud migration strategy that ensured seamless transition while maintaining educational service continuity.Our migration execution followed a strategic progression:

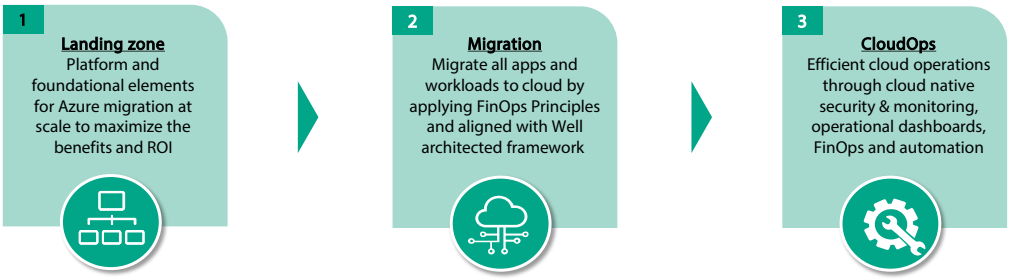


Figure 5: Outlines our comprehensive migration phases.

Phase 1: Landing Zone

Established foundational cloud infrastructure by implementing platform elements essential for secure, scalable operations. This included setting up following dimensions to maximize ROI and ensure compliance.

a. **Governance Framework:** Implemented management groups, subscription structures, resource policies, role-based access controls, resource naming conventions, tagging policies, and standards to ensure controlled cloud operations.

b. **Infrastructure Foundation:** Established platform and application subscription architecture, along with a network topology featuring hybrid connectivity via ExpressRoute and VNet peering. This included meticulous planning of VNet address spaces, subnets, network security groups, virtual network peering, user-defined routes, traffic restrictions and management, domain controllers, and Network Watcher.

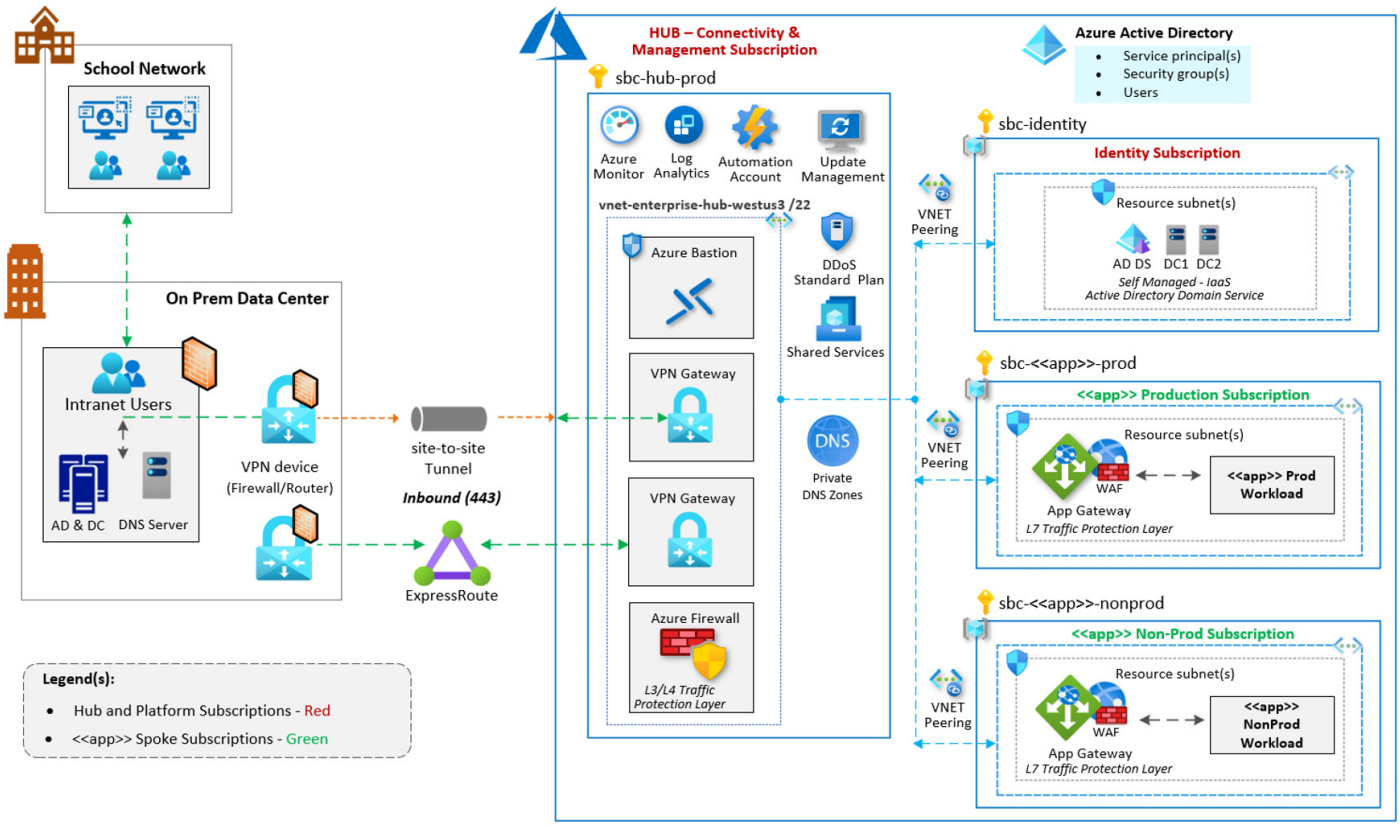


Figure 6: Azure Foundation Design

c. **Security Controls:** We deployed cloud-native security controls, including Azure Defender for Cloud, DDoS protection, identity and vulnerability management, firewalls, and Web Application Firewall (WAF). This robust and adaptable approach safeguards application workloads and environments from threats while enabling business objectives by leveraging Azure native controls and recommended third-party tools for comprehensive security.

Figure 7: Cloud Native Security

d. Observability: Established centralized monitoring, logging, alerting, and observability framework to ensure operational visibility.

Phase 2: Migration

Our cloud migration followed a comprehensive four-phase approach: beginning with tool-based discovery and assessment to develop detailed disposition strategies, followed by systematic execution through wave-based migration using our migration methodologies and automation capabilities. The transition concluded with rigorous validation including smoke, regression, and performance testing, and was supported by a robust post-migration hyper care phase ensuring continuous monitoring and proper documentation handover to maintain operational excellence.

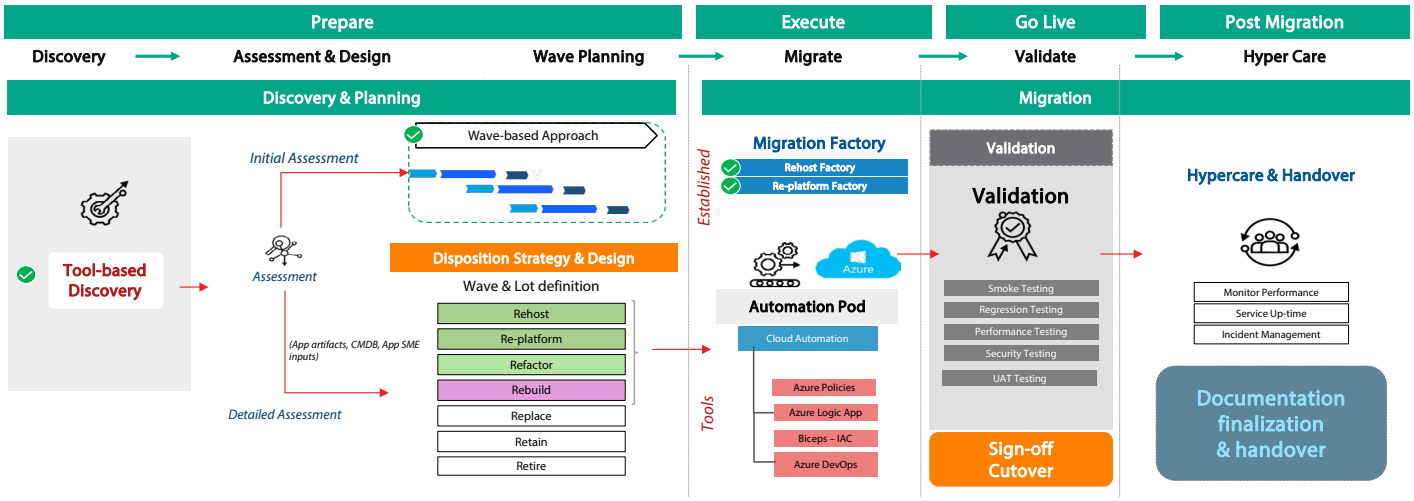


Figure 8: Migration Approach

"The successful migration marked the culmination of our digital transformation journey, delivering a scalable, secure, and efficient platform that positions the district for future educational excellence."

Phase 3: CloudOps [Manage & Optimize]

The CloudOps foundation, initially established during the Landing Zone and Migration phases, created a robust framework that has been subsequently enhanced and optimized during this phase.

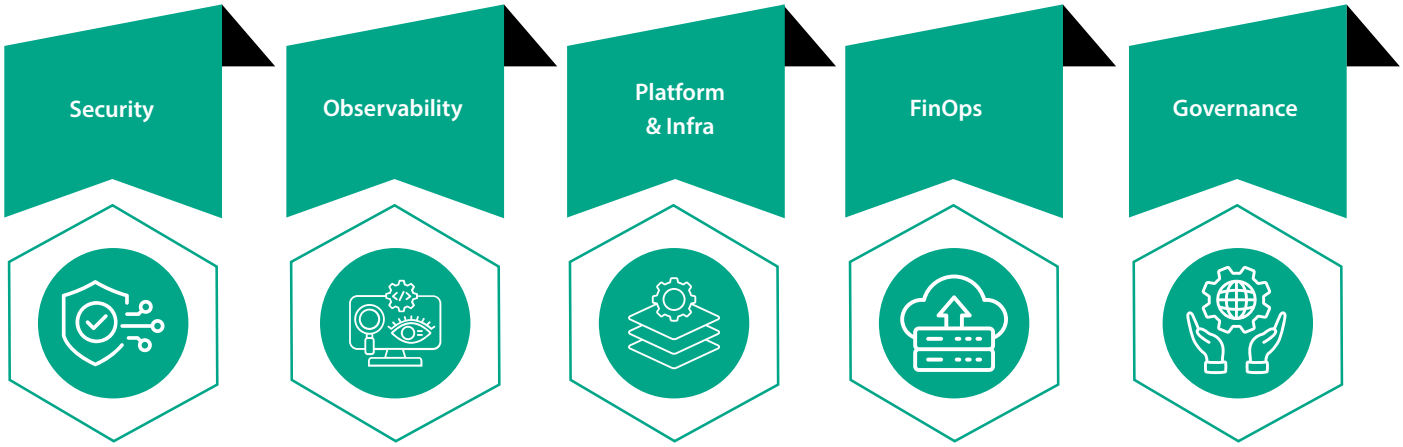


Figure 9: CloudOps Focus Areas

Security: During the Landing Zone phase, we implemented a comprehensive security framework based on the "security by design" principle. This foundation incorporated DevSecOps practices, establishing essential security controls and governance protocols. The Migration phase expanded upon this groundwork by implementing cloud-native security controls and developing scalable security measures that adapt to evolving requirements.

Observability and Business Continuity: The Migration phase saw the implementation of monitoring stack. This included deploying comprehensive alerting systems for Azure resources that track crucial metrics such as CPU usage, memory utilization, and storage capacity. We established application-specific monitoring capabilities to track key performance indicators, including response times, application performance, active sessions etc. The system features automated alert mechanisms that trigger when metrics deviate from established thresholds.

High availability was engineered into the core architecture during the design and migration phases, with failover mechanisms and redundancy protocols implemented to ensure service continuity during potential disruptions.

Platform and Infra: Leveraged Azure automation capabilities to establish systematic approaches to infrastructure management. This included implementing automated patching protocols, vulnerability management systems, and Infrastructure as Code (IaC) practices to ensure consistent and repeatable deployments.

Governance Structure: The governance framework, initiated in the Landing Zone phase, established comprehensive guidelines and guardrails using Azure policies. We developed detailed protocols for application onboarding, subscription management, and policy implementation. This framework emphasizes automation to minimize manual intervention while maintaining consistent governance standards.

Through this phased implementation approach, we created a solid operational foundation that continues to evolve and adapt to changing business requirements while maintaining security, efficiency, and reliability standards.

FinOps: Cost-Efficient Cloud Transformation

The Landing Zone phase established the foundational elements of our FinOps strategy, including a structured subscription hierarchy, comprehensive tagging strategy, and budget allocation framework etc. During the Migration phase, we implemented detailed cost visibility reporting systems that provide actionable insights for ongoing cost optimization initiatives.

Our cloud transformation stood out due to a cost-governance driven approach, establishing financial and operational excellence from the outset. By embedding cost optimization principles across all phases from stabilization to final migration, we fostered cost awareness, optimization, and shared accountability.

Our strategic implementation began with foundational cost optimization through environment consolidation, followed by maximizing licensing benefits via SQL and OS hybrid arrangements which delivered about 45% reduction in service costs. We then implemented intelligent automation, including VM shutdown schedules and PaaS service autoscaling, based on detailed analysis of business-hour and weekend usage patterns. Building on insights from our pilot implementation and Azure Advisor recommendations, we used Azure Reserved Instances and Savings Plans for long-term cost efficiency. To ensure sustainable optimization, we partnered with Infosys FinOps CoE and Microsoft partners to set up and nurture a cost-conscious culture within the organization.

To ensure sustainable financial governance, we ensured the following:

- Developed automated cost monitoring solutions.
- Created customized Power BI dashboards for real-time financial visibility.
- Established a dedicated FinOps Center of Excellence
- Implemented continuous cost optimization reviews and accountability.

"Our cost-optimized migration approach not only achieved significant savings but also established a sustainable framework for continuous financial governance and optimization."

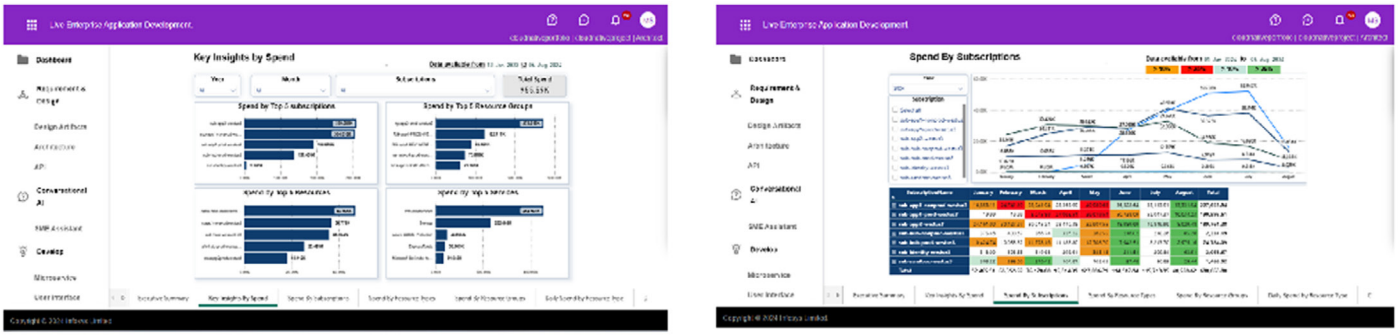


Figure 10: Illustrate our custom-built cost management solutions enhancing financial visibility

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