



## Sharing Data in the Cloud

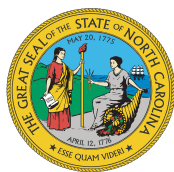
Application Integration Platform Service for North Carolina State Agencies

Initiated: Fall 2018

Completed: October 2023

Agencies: N.C. Department of Health and Human Services,  
N.C. Office of the State Controller and N.C. Department of Information Technology

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NC DEPARTMENT OF  
**HEALTH AND  
HUMAN SERVICES**

**NCDIT**



NORTH CAROLINA  
DEPARTMENT OF  
INFORMATION  
TECHNOLOGY

# Executive Summary

To deliver the best outcomes for residents and businesses, North Carolina state agencies share data across many different systems and applications that must be seamlessly integrated. Agencies are embracing cloud solutions with minimal development work for integration among cloud-based, legacy on-premise and mainframe applications, but this approach could result in the use of multiple siloed integration platforms by agencies.

The state of North Carolina recognized the need for an application integration platform that is cloud-based, flexible, easy to learn and can be offered as a statewide service for agencies to seamlessly share data across diverse on-premise and cloud applications. After a selection process involving 29 stakeholders from 11 agencies, the state selected Boomi as a preferred solution. The N.C. Department of Information Technology hosts and manages the enterprise-level service available to all executive branch agencies.

The Boomi in the cloud project stands out as innovative and distinct from similar initiatives by offering a holistic cloud integration platform, scalable architecture, high availability and disaster recovery capabilities, cost-efficient deployment and a collaborative enterprise approach. It conforms to state security standards and compliance needs, and the multitenancy concept provides security isolation for private and sensitive information while avoiding data silos.

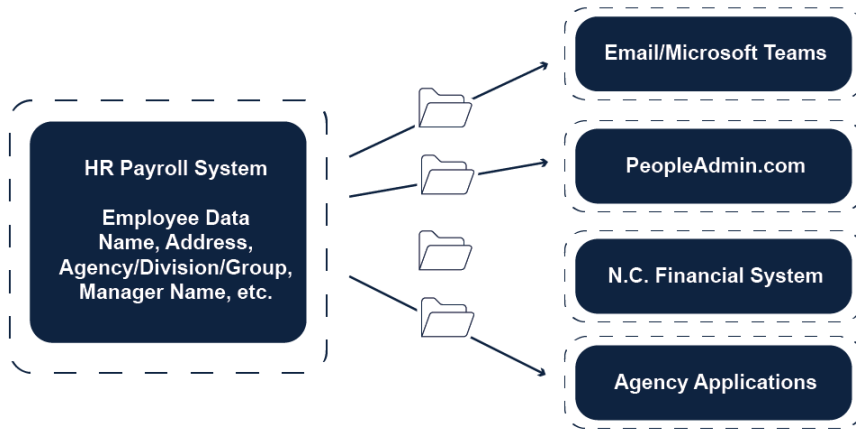
During the COVID-19 pandemic, the N.C. Department of Health and Human Services became the first agency to go live with Boomi. NCDHHS leveraged it to quickly develop more than 300 data integrations that provided real-time metrics for decision-making by legislators, state health officials, vaccine suppliers and distributors, testing labs, hospitals and personal protective equipment and mask providers. The Boomi service was also critical to the replacement of North Carolina's more than 30-year-old mainframe-based financial system, completed in October 2023.

Currently, four state agencies are live in production and maintain more than 400 integrations through Boomi, while a fifth state agency is migrating to the service. The service team engages with other agencies to adopt Boomi as an integration platform for application modernization and is investigating potential applications of new functionalities, including the use of AI to automatically generate an entire real-time integration process between endpoints.

## Idea

North Carolina state agencies must share data with each other to deliver the best outcomes for residents and businesses in areas from health care to finance. However, agencies use many different systems and applications that must be seamlessly integrated to manage information and increase operational efficiency. The connections built by agencies to exchange data among different systems often break down over time and do not have the flexibility to adapt to new technologies or systems' growth due to increased user demand.

For example, in the below image, employee data from the HR payroll system is shared in batches of files along separate connections to its various destinations, which can take days to be updated.



Legacy application integration among North Carolina state agencies.

State agencies are embracing cloud solutions with minimal development work for integration among applications, including SaaS, legacy on-premise and mainframe applications. However, this could result in the use of multiple siloed integration platforms by agencies.

NCDIT, in partnership with the N.C. Office of the State Controller and N.C. Office of State Budget Management, recognized the need for an application integration platform that is cloud-based, flexible, easy to learn and can be offered as an enterprise-level statewide service for agencies to seamlessly share data across different on-premise and cloud applications. This platform should:

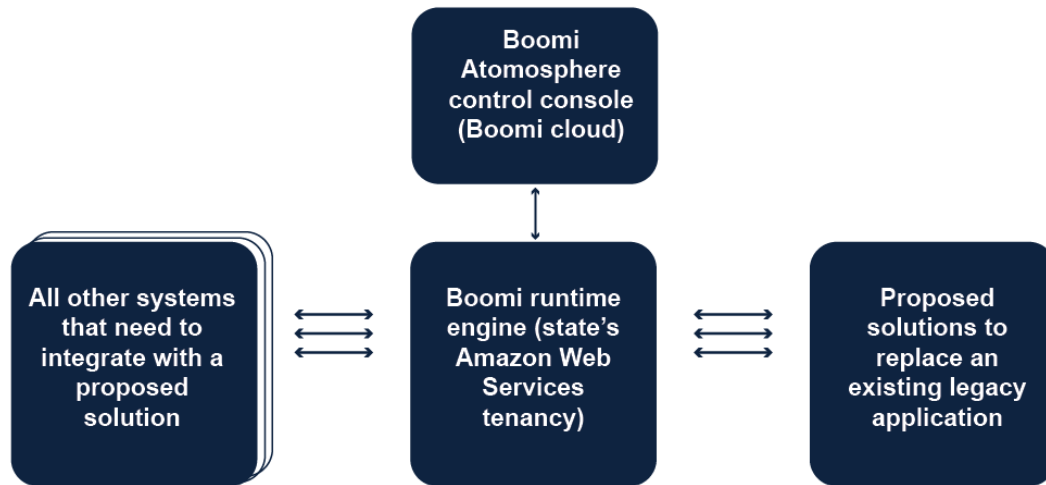
- Work in the state’s heterogeneous environment
- Support traditional file-based batch integration and modern real-time integrations
- Be easy to learn for the aging mainframe COBOL workforce
- Meet the expectations of the new tech-savvy workforce
- Provide an opportunity to share infrastructure costs across agencies

The state selected the Boomi Integration Platform as the preferred solution, initially hosted on-premises. NCDHHS was the first agency to leverage Boomi platform during COVID-19 pandemic and optimized the service by first migrating its tenancy to the Amazon Web Services cloud. NCDIT later migrated the service to the cloud, where most agency workloads resided.

This migration helped enhance performance, efficiency, cost savings, resource optimization, flexibility, high availability and disaster recovery capabilities for agencies. It lowered monthly costs from \$15,584 for on-premises infrastructure costs, excluding disaster recovery, to \$3,520 for all cloud environments, including high availability and disaster recovery. The enterprise service agreement with the vendor also allows agencies to share support and other costs.

More than a shared service, the Boomi application integration platform is offered as an enterprise-level service available to all executive branch agencies, which encourages enterprise thinking and sharing of common infrastructure across agencies. Aligned with NCDIT’s strategic priorities to drive digital transformation and innovation across the organization, it provides a roadmap for agencies to slowly switch from file-based batch integrations to real-time integration at their own pace, whenever they modernize their legacy applications.

The Boomi in the cloud project stands out as innovative and distinct from similar initiatives by offering a holistic cloud integration platform, scalable architecture, high availability and disaster recovery capabilities, cost-efficient deployment and a collaborative enterprise approach. In addition, a well-established user community of practice provides support and tools for new adopters. The easy-to-learn, low-code/no-code platform can also help reskill legacy developers and attract tech-savvy younger talent who want to work with the latest technologies.



Architecture of Boomi in the cloud service available to North Carolina state agencies

## Implementation

### Development

The planning phase of modernizing North Carolina’s more than 30-year-old mainframe-based financial system in the spring of 2018 revealed the need for an enterprise-level service application integration platform. After a selection process involving 29 stakeholders from 11 agencies evaluating integration platforms from competing vendors, the state selected Boomi as a preferred solution and adopted a risk-based approach to adapt this new technology.

The team developed an architecture to share infrastructure among agencies, allow for dedicated infrastructure if needed by agencies and provide each agency with a separate tenancy for integration development. NCDIT provided the annual funding of \$591,404.18 through June 2020 to stand up a service, including costs for the software license, professional services, infrastructure, training and agency onboarding cost. After procuring Boomi, the team engaged the N.C. Office of the State Controller, and the N.C. Department of Public Instruction conducted a proof of concept to understand and learn about the product and its viability for the enterprise-wide financial system. The findings were shared with the stakeholders.

Next, the state stood up a common governance framework and infrastructure that could be shared with each agency’s integration project. Once established, the service was added to NCDIT’s [Shared Service Catalog](#), which details services for state agencies, and the department communicated the new service to agency CIOs. NCDIT also created a community of practice for Boomi users across agencies to collaborate and share knowledge and best practices.

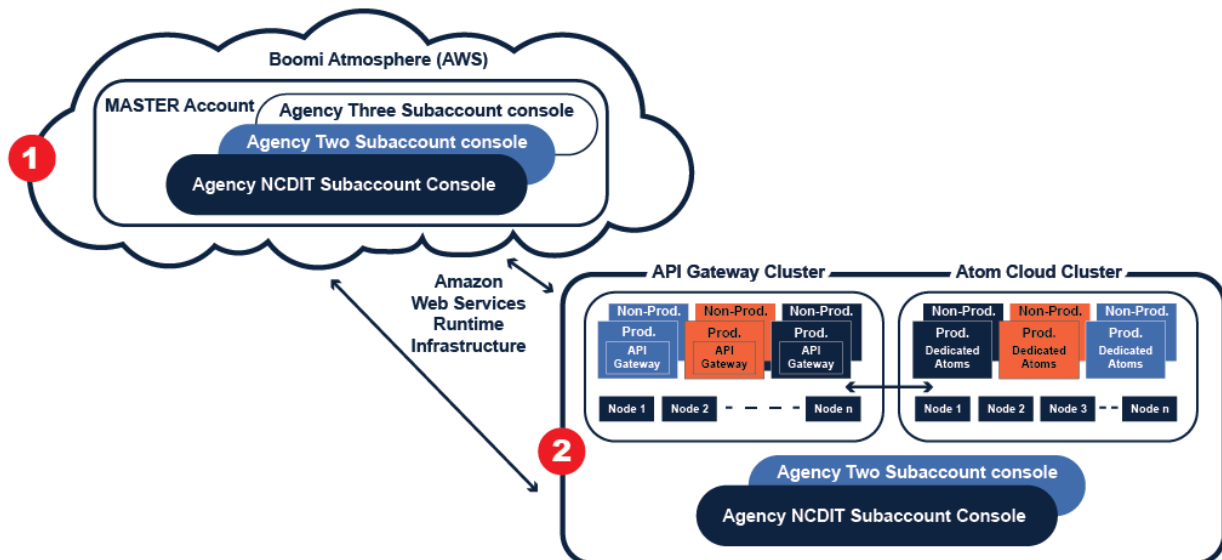
## Boomi Deployment Timeline

- **2020:** NCDHHS is the first agency to go live with more than 300 integrations
- **April 2021:** First phase of the N.C. Financial System goes live
- **October 2023:** Final phase of the N.C. Financial System with more than 200 integrations
- **January 2024:** Project presented to state agency CIOs

## Platform Architecture

The integration platform architecture consists of a cloud-based management platform, Boomi Atmosphere and a runtime engine. Boomi Atmosphere is hosted in the Boomi cloud and provides a console to develop and manage API and integration processes. Each agency has its own environment for development activities and controls sharing its API with other agencies.

The runtime engine is deployed in the state's AWS tenancy and is used to execute API and integration processes. The runtime engine connects to end-point systems using connectors and APIs. Connectors easily link and integrate third-party applications to send and receive data between them. They also provide connectivity to and from web applications, on-premises applications, SaaS applications and common data repositories using industry standard protocols and a standard data transport method. The runtime engine can be located on-premises or in any other cloud to meet the project's latency and compliance needs.



Conceptual architecture of Boomi in the cloud service

The runtime engine in the state's AWS tenancy provides several advantages. It:

- Conforms to state security standards and compliance needs
- Is managed and monitored by NCDIT's shared infrastructure team
- Has AWS Direct Connect to on-premises applications to reduce latency
- Releases all the resources from the runtime engine after completion of a job to the pool for other jobs, allowed sharing unused resources with other agencies
- Offers a multitenancy concept that provides the security isolation required for private and sensitive information while avoiding data silos

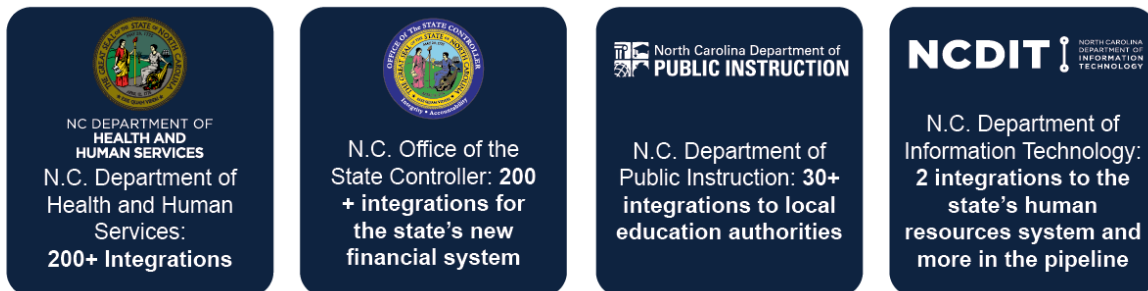
- Allows for shared or dedicated runtimes, sized and designated for specific business needs such as memory-intensive or computational-intensive workloads
- Offers flexibility in developing data flows and in the location and size of servers where data is stored, which improves performance and reduces latency

## Service Offering

NCDIT makes Boomi available to state agencies as a managed enterprise integration platform service offering. Agencies can access a technical account manager to quickly route high-priority tickets and enterprise account advisors for architectural advice with the project. Under the enterprise-level license agreement, customers have two options. One, NCDIT manages a secure, multitenancy shared cloud infrastructure, and agencies do not have to administer or pay separately for their infrastructure. Second, NCDIT sets up and manages a separate environment for an agency and handles all security vulnerabilities and patching, allowing the agency to focus on building and managing integrations.

## Impact

Foresight into the upcoming integration needs of the state drove the rationale for adopting and implementing an application integration platform as a service. Boomi in the cloud provides a reliable, resilient platform that keeps integrations running like clockwork for state agencies. Currently, four agencies are live in production and maintain over 400 integrations with Boomi. In addition, the N.C. Department of Environmental Quality is migrating to this service.



## First Adoption: COVID-19 Pandemic

Within a year of launching the first essential components of the service in 2019, the COVID-19 pandemic hit. NCDHHS needed real-time metrics to help legislators, the NCDHHS secretary and staff make informed decisions that would impact millions of North Carolinians' lives. Fast, flexible means were needed to ingest and transform data from disconnected systems for reporting, dashboards and analytics.

Utilizing the Boomi service, NCDHHS quickly developed more than 300 integrations between North Carolina's COVID Vaccine Management System and suppliers, distributors and several other entities, such as testing labs, hospitals and personal protective equipment and mask providers. Boomi supported more than 10 public-facing dashboards with COVID-related data, updated daily or weekly and used by 25 million visitors over a year, and 13 internal dashboards, accessed by 350 internal users daily. The system provided structure and visibility into data that was typically difficult to access and analyze (e.g., PPE, hospitalizations, lab testing totals). Automated pipelines through Boomi ingested and updated data at frequencies from once-a-day to hourly. Partly due to the data sharing enabled by this application integration platform, North



Carolina was recognized for reaching underserved and historically marginalized populations and ensuring equitable access to COVID-19 vaccines.

## **Second Adoption: N.C. Financial System**

The replacement of the on-premise, mainframe-based financial system with the cloud-based N.C. Financial System, launched by the N.C. Office of the State Controller in October 2023, marked the first initiative to implement a SaaS application for a statewide system. It seized the industry trend toward loosely coupled, mostly cloud-based business applications to adopt Boomi as an iPaaS.

Boomi provides the Office of the State Controller with a fast, flexible middleware with robust capabilities to support integrations between SaaS and existing agency subsystems, which range from homegrown applications to mainframe applications to cloud-based applications supported by state employees, contractors and vendors. Over the next five to 10 years, as agencies get funding and modernize their applications, the Office of the State Controller plans to switch from file-based integration to more modern web service-based integrations using the same Boomi Platform.

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*We are more than happy with the technology platform choices we made. All our infrastructure footprint is in AWS; there's zero on-prem infrastructure. Our integrations are running like clockwork.*

*N.C. Office of the State Controller*

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Boomi is easy to learn and maintain and has helped the Office of the State Controller retool and reskill IT staff from mainframe COBOL to cloud and web services. As Boomi evolves, it will allow the office to make technology decisions and develop new ways to integrate artificial intelligence as we enter the world of ChatGPT and Generative AI. In the future, the Office of the State Controller will investigate the potential to identify a source application and target application and have Boomi build an integration using AI.

## **Next Steps**

NCDIT's Boomi service team engages other agencies and encourages them to adapt Boomi as the integration platform in their application modernization efforts. This includes issuing requests for proposals for new applications and engaging the vendor to do proofs of concept with agencies. In addition, given that most data sharing and application integration still happens in batch mode, NCDIT is educating agencies to help them transition to real-time or near-real-time integration using Boomi. The service team is also working with the NCDIT Policy Office to draft statewide standard for adoption of Boomi as integration platform.

NCDIT has established a community of practice for users across agencies to share knowledge and lessons learned. Through monthly sessions, the community of practice educates members about new product functions and features.

As Boomi continuously evolves, NCDIT and partner agencies are developing uses for new features, including the use of AI to automatically generate an entire real-time integration process between well-known endpoints. For example, the Office of the State Controller will investigate the potential to identify an in-house source application and an external target application and then prompt Boomi to build an integration using AI.