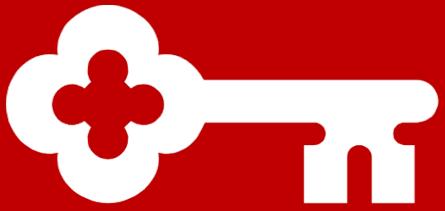


Banking on the future



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15
states

1,000+
branches

40,000+
ATMs

~17,000
employees

\$3.2B
revenue

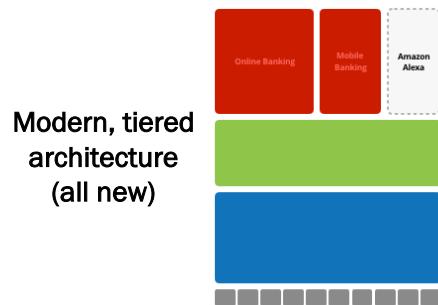
\$171B
assets

Where our journey started...

An 18-month project to *entirely redesign our digital experience* at every level for three million customers across the US.

We set out to
change everything, one step at a time

ARCHITECTURE

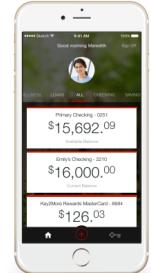
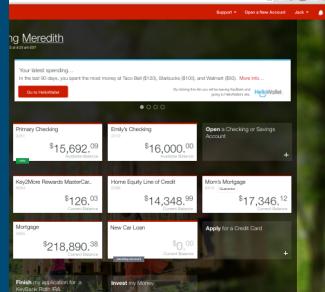


Modern, tiered
architecture
(all new)

New technology stack
Embrace open-source
Shared enterprise-class capabilities

USER EXPERIENCE

Widget-based UI that is easy to test
and learn
New focus on user research and
experience design
Real-time client feedback loops



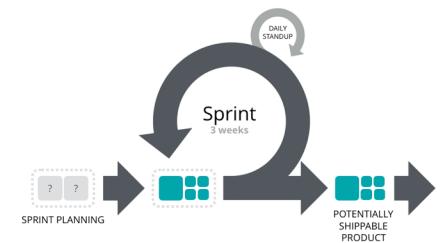
PEOPLE

Updated programming languages
and technical skills
New flexible team structure
Co-location with business partners
Mentoring and partnering



PROCESS

Move to an Agile-based software
delivery methodology

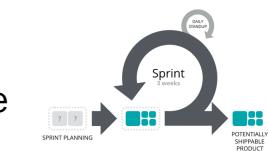


Embrace DevOps to infuse
automation, quality and resiliency
Smaller, more frequent software
releases

Where we began in 2020...

Firmly established DevOps practices.

Focus Areas		Strategy Impact
User Experience	Architecture	<ul style="list-style-type: none">• Acquisition of cloud-enabled platforms
	Contact Center	<ul style="list-style-type: none">• Deployment of natural language processing, chatbots, and virtual assistants
	Feedback Loops	<ul style="list-style-type: none">• Developing event supply chain
	Mid & Back Office	<ul style="list-style-type: none">• Implemented event supply chain
	People / Process	<ul style="list-style-type: none">• 30 programs using Agile delivery methods• Create collaborative learning environments to build talent pipeline



Where we **wanted** to go...

Expanding the scope of DevOps.

Focus Areas		
Architecture	Strategy	People / Process
<ul style="list-style-type: none">• Migrate data warehouse to the cloud• Scale up IaC and automation practices 	<ul style="list-style-type: none">• Continue and expand strategic partnerships• Modernize contact center capabilities 	<ul style="list-style-type: none">• Develop frameworks to support DevOps Dojos 

And then came the pandemic...

Using our ability to quickly pivot and take advantage of the practices and frameworks we've put into place over the last few years.

Focus Areas		Strategy Impact
User Experience	Architecture	<ul style="list-style-type: none">• De-prioritized cloud data warehouse work• Analytical Workspaces
	Contact Center	<ul style="list-style-type: none">• Chatbots to reduce the number of calls to the contact centers
	Payment Protection Program	<ul style="list-style-type: none">• Ideation to deployment (less than 10 days)
	Laurel Road	<ul style="list-style-type: none">• Transparent move from previous cloud provider(s)
	People / Process	<ul style="list-style-type: none">• Use CI/CD to get applications out faster and "open the front door"• Continuous feedback to understand the customer experience• Implemented extensive automation



Create clear goals

Deliver multi-cloud capabilities transparently

Deliver multi-cloud environments in which KeyBank workloads can both operate and be used for the evaluation, creation, and consumption of cloud resources and services.

Apply cloud core computing and automation to our KeyBank private cloud

Grow expertise in configuring and running business workloads in the public cloud as well as our private cloud.

Automate the delivery of IT compute, storage, and network resources

Reduce the time, effort, and cost of the delivery of IT required for application development, testing, release, and stable operations.

Operationalize everything

All cloud assets, code, configuration items, process, and architecture will all be designed to ensure everything can be turned over to KeyBank's run and associated build teams. This self-service goal ensures documentation, training, run books, automation, and process are designed for full operations handoff.

Track chargeback and showback (billing)

Create dashboards to track and monitor costs per business unit and to trace inefficiencies in code which can lead to inflated service costs.



Start with principle-based engineering

The KeyBank Cloud Native team provides end-to-end automation and cloud-based infrastructure to provide our KeyBank partners in the Lines of Business and Enterprise Technology with a transparent ability to embrace core cloud technology and concepts.

These new technologies are core to KeyBank's digital transformation vision.

The following principles form the core of our **strategy**:

- Zero-trust networking
- Zero-touch deployment
- Cloud neutral: Write once, run everywhere
- Cost and business value driven
- Infrastructure as code (IaC)
- Elastic, ephemeral, on-demand computing
- Operationalize everything

Design principles

- Open-source first
- Event-driven architecture
- Loosely-coupled components
- High availability and fault tolerance
- Independently scalable at all tiers



Core Cloud Native tools

Release Metrics

GCP Network Infrastructure

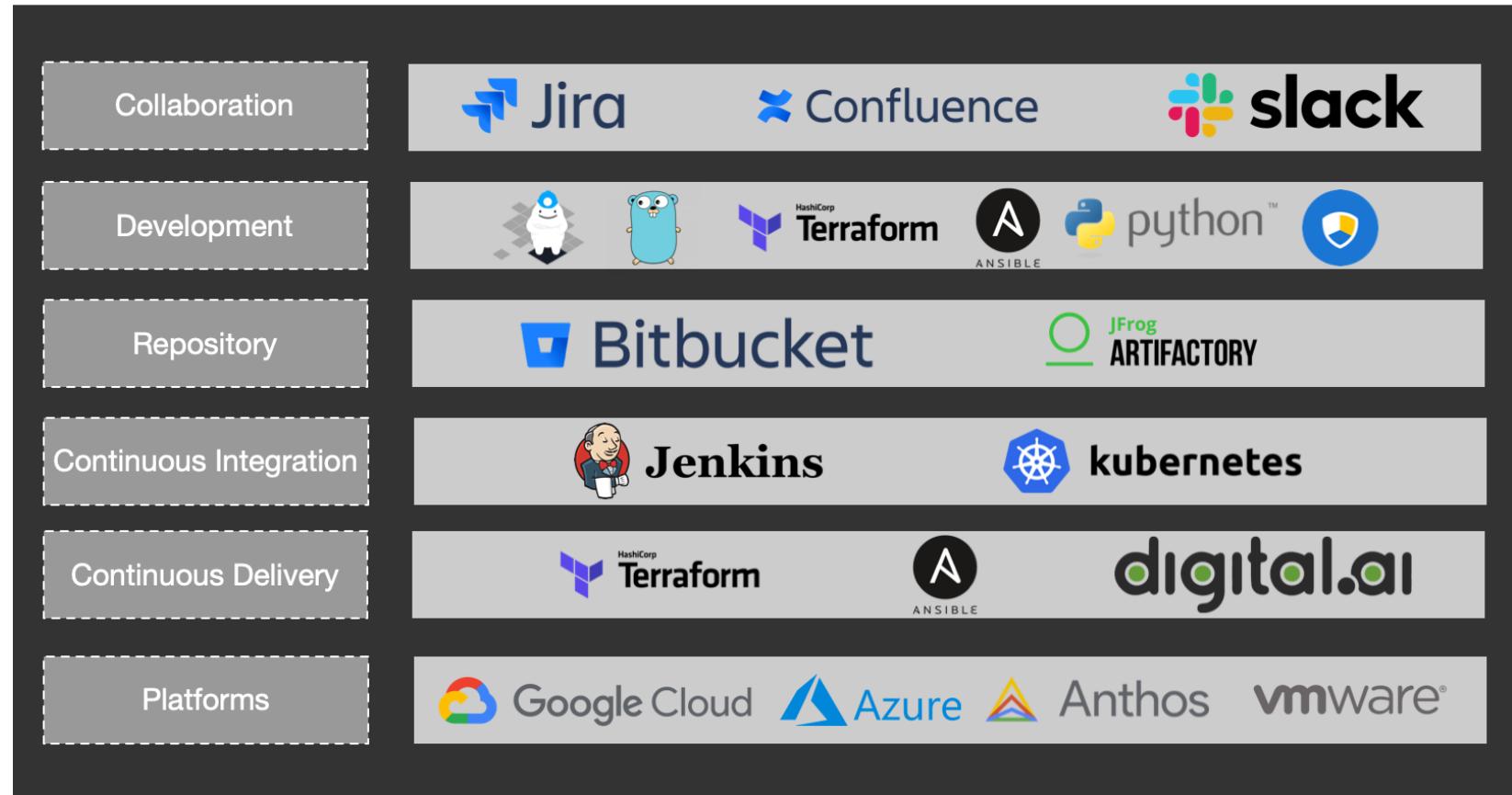
- Over 100 virtual network devices
- Full build, deploy, and test ~ 8 min

GKE On-Prem Full Cluster

- 75+ Kubernetes nodes
- Full build, deploy, test ~ 10 min
- Node up scaling < 2 min
- Pod scale out < 5 sec
- Upgrade time < XXXX minutes
- Zero-downtime upgrades

GCP KeyBank App Infrastructure

- ~ 400 GCP projects
- All configurations use IaC, GCP console R/O
- Project build < 40 sec



Hurdles and challenges

Security requirements	Scale	Business pressures	Skill sets	Costs
<p>Security team adaptation to the cloud has been slow and painful:</p> <ul style="list-style-type: none">• Cloud security• DevSecOps models <p>Solutions:</p> <ul style="list-style-type: none">• High touchpoint collaboration, bring the "experts," etc.	<p>The demand for moving compute to the cloud or to on-premises Kubernetes has been overwhelming.</p> <p>Solutions:</p> <ul style="list-style-type: none">• Federated model; one team cannot own everything• Continuous training (dojos)• Automation (IaC)	<p>Banking is moving at light-speed to digital. Emerging all-digital banks include Venmo, Amazon, Google Pay, PayPal, Apple Pay, etc.)</p> <p>Solutions:</p> <ul style="list-style-type: none">• Iterative cycles• Reduce cycle times• C-level leadership	<p>Tools for IaC</p> <ul style="list-style-type: none">Iterative developmentContinuous testingContinuous security testingSoftware-defined networking	<p>"Lift-and-shift" mindset doesn't work cost-wise</p> <p>Complex to create dashboards to monitor costs</p> <p>Inefficiencies in code can lead to inflated costs</p> <p>Pushback on chargeback model</p>

