



Accelerate full-stack web and mobile app development for Startups

Best practices for building an
extensible MVP on AWS

The startup journey: From idea to MVP

As a startup founder, you're turning your idea into a creation. To validate it, you'll build a minimum viable product (MVP) and take it to market. Critical questions about the right path and the calculated risks often slow the journey to delivering a tangible product to your customers quickly—and there's little time to navigate any of these roadblocks. The need to push an MVP to market quickly looms large over the early stages of the startup lifecycle. In fact, speed to market may be the most pivotal factor in your organization's success.

The bottom line: Now that you're ready to build, you likely face limited budgets, resources, and time, no matter how inspiring or promising your idea is. Every decision you make during the development process can significantly impact long-term productivity and product functionality. Likewise, any compromise in the quality of the user experience impacts your chances for success. The good news: Best practices exist as guiding principles to help you move forward with confidence. These proven best practices can help your team rapidly bring your product to market, gain product-market fit to keep your growing customer base engaged, and drive momentum with investors.

UI meets API: Simplifying front-end web and mobile development

Front-end web and mobile developers create a differentiating user experience for their apps using front-end programming languages like JavaScript, Swift, or Kotlin, popular frameworks like React, React Native, Flutter, or Angular, and tools such as integrated development environments (IDEs). They code the presentation layer of apps, access and integrate data through APIs, and build cloud-powered features such as video or chat with real-time and offline capabilities for their web or mobile application. Developers care about performance, scale, reliability, security, cost, and flexibility to support the features they want in their applications, but they must balance these against their own experience and how best to increase productivity to get to market faster. Meeting the ever-rising bar for user experience and complex cloud features required in today's apps presents its own set of challenges.

To remain focused on creating a differentiating user experience, front-end web and mobile developers seek ways to be more productive building their application, especially the backend. They search for products that integrate with their favorite tools and frameworks. And although they are not looking

to become experts in proprietary software or complex cloud concepts, they do want flexibility and control over their app code—two important factors in building an app that scales with business growth and can be iterated on to meet evolving customer needs. Making the product is just one step. With an MVP, the real goal is getting it out the door as quickly as possible and making sure it's ready to scale.

In this eBook, we'll present three key challenges that business owners and app builders face and describe how Amazon Web Services (AWS) purpose-built solutions and services can help you overcome these challenges. You'll read about best practices and customer success stories and learn how AWS can help accelerate your startup journey from idea to MVP—and beyond.

CHALLENGE 1

Getting to market quickly

As you set out to build your MVP, your first question is likely to be:

What platform should I build on to maximize reach and engagement?

You'll need to choose between a web app (which runs in browsers), a mobile app (one that's downloaded from Apple or Google app stores and runs primarily on phones), or both. You'll work with a UX designer to create and implement a compelling, on-brand UX across a variety of device form factors. In parallel, you'll need to define and iterate a data model that powers the different app screens and lives in the cloud.

You may want to implement other features, such as sign-in/sign-up, live video streaming, group video and chat, or even geolocation features, such as maps. Then, you'll deliver the entire application—iOS, Android, and web front ends, as well as the backend—to your end users.

Other questions you're likely to consider include:

- **How will I measure success and test?**
- **What programming language will I use?**
- **What cloud provider will I use?**

Your decisions aren't just about you and your personal skill set. Assess your team's expertise and choose the tools that meet your team's capabilities and your app's requirements. There's no such thing as an easy decision for a startup founder. After all, every choice you make at the beginning is likely to have a significant impact on the future of your business.

Best practice: Choose purpose-built tools that will drive your success

Ideas are merely the starting point for your business. You must choose the tools and platforms that will carry your ideas to the successful outcomes you envision.

Once you decide which tools will help you get your MVP to market the fastest, you'll need to determine how your business will react in the face of unexpected obstacles or challenges and whether it has the capabilities to succeed and thrive in the face of those challenges.

Consider using a widely accepted programming language, such as JavaScript, and selecting a popular front-end web framework, like React. If you decide to build a mobile app, explore using a cross-platform framework, such as Flutter, which allows you to develop applications for iOS, Android, and web from a single codebase. Not only do these front-end frameworks accelerate development by reducing the amount of code you'll need to work with, but their developer communities are large and engaged and can help you solve problems along the way.

When considering criteria for a cloud provider to help build out your application functionality, look for development tools and frameworks that reduce the amount of code needed to accomplish your key use cases. Today, developer tools let you build an application backend and a front-end user interface (UI) and bind the two together in clicks, with full control over the application code. Leverage frameworks with deep capabilities for the most complicated tasks like authentication and data access and extended capabilities to improve the quality of your app, such as testing and analytics.

In addition, look for advanced features to handle caching, reconnection, data synchronization, and conflict resolution. For example, local data stores or local programming models can make working with distributed, cross-user data just as simple as working with local-only data. Choose tools that reduce the cloud learning curve. The quicker setups, faster workflows, and automated security that follow will leave you with less to worry about at the backend while giving you the freedom to focus on the problems you're solving for your customer.

How can AWS help?

AWS Amplify is a set of purpose-built tools that enable front-end web and mobile developers to easily build, ship, and host full-stack applications on AWS, with the flexibility to leverage the breadth of AWS services as use cases evolve. AWS Amplify provides tools for configuring cloud-powered cross-platform backends fast and libraries for connecting your web and mobile (iOS and Android) apps to the backend. AWS Amplify Studio is a visual interface that allows developers to easily build and ship complete web and mobile apps in hours. With AWS Amplify Studio, you can quickly build an app backend, create rich UI React components, and connect a UI to the backend in clicks. The AWS Amplify libraries integrate deeply with popular front-end frameworks and languages (React, React Native, Angular, Vue, Ionic, Flutter, Java, Kotlin, Swift) for building mobile (iOS and Android) and web apps, reducing the learning curve and lines of code required for building cloud-connected apps. AWS Amplify reduces the overall steps and lines of code required for front-end web and mobile developers to build full-stack apps on AWS, resulting in faster time to market. And you can extend your app with 175+ AWS services to support new use cases, DevOps practices, and user growth.

CUSTOMER STORY

Credit Genie pushes consumer-facing app live in under seven days

Challenge:

Fintech company Credit Genie entered the personal debt relief industry to provide technology solutions for debt counseling agencies. The company leverages data and analytics to help borrowers escape the personal debt trap by optimizing their debt to manageable levels. Its goal: to reduce the manual process of credit counseling interviews and decrease customer acquisition and operating costs through increased speed of client onboarding and improved accuracy and verification of borrower information.

Results:

- Built a five-page consumer-facing application for their MVP using AWS Amplify in less than one week
- Set up each agency to have their own version of the Credit Genie app on AWS Amplify with the same codebase deployed across multiple accounts, reducing overhead associated with billing operations

Tools and services used:

- AWS Amplify
- AWS AppSync
- AWS Lambda

[Read the full story ›](#)



creditgenie

"Any time something would hit the sprint board, it was some of the quickest development I had ever seen after 12 years in the industry. The Amplify developer experience is instrumental to the team's success."

Alex Kates, Software Architect at Credit Genie



CHALLENGE 2

Maintaining a fast pace of innovation

Getting an MVP out fast is essential, but the pressure to move quickly doesn't stop there. Maintaining a rapid-fire cycle of iteration and optimization is how startups continue the product journey post-launch. Unfortunately, tight budgets, small teams, and complex architectures can slow down development.

To avoid these obstacles and move fast, startups optimize for speed, but sometimes they sacrifice development best practices that disrupt app and feature release cycles. The result is a reduction in the pace of innovation once the app is in market. As your business grows, your requirements evolve and change. If you don't take the time to prepare your continuous integration and continuous delivery (CI/CD) best practices, your team will have difficulty working together. Greater control over aspects of your underlying infrastructure will also become a necessity. That includes access to the code and the ability to extend it as needed. You need the ability to quickly integrate off-the-shelf use cases or build custom features using a wide array of cloud services. Successfully iterating and releasing

new features requires working in isolation from production. As such, having control over underlying resources and the ability to develop using multiple accounts is extremely important.

Best practice: Choose a transparent, extensible solution

Low-code tools that promise to expedite time to market are not all created equal. Choose tools that enable you to customize the user experience or generate underlying code so that you're able to extend your apps with custom code. When you have access to code, you benefit from the ability to build in CI/CD pipelines with production and testing environments, enabling faster iteration in response to customer feedback. Build on a platform that offers multiple ways to extend your apps—whether that's adapting an existing use case for evolving company security policies or building custom use cases such as user analytics or geofencing with a broader set of services.

How can AWS help?

AWS Amplify backs every use case with one or more AWS services. When you build your app backend using the AWS Amplify command line interface (CLI) or admin UI, AWS Amplify automatically generates the underlying business logic and deployment code as AWS CloudFormation templates. As teams' requirements evolve, developers can choose to extend their app with custom business logic code in their preferred programming language. They can also combine the CLI with their own AWS CloudFormation templates or other AWS general purpose tools, such as AWS Cloud Development Kit (AWS CDK), to build and deploy custom features. When you use the AWS Amplify hosting service, you get the added benefit of built-in CI/CD. This accelerates developers' application release cycle with production and testing environments, allowing for faster iteration to address customer feedback.

CUSTOMER STORY

Busby grows user base by 860 percent without a single glitch

Challenge:

The founders of startup Busby, an app to help stranded victims of cycling accidents, decided to develop the MVP on their own due to a limited budget. To make that happen, they would need an end-to-end, easy-to-use, serverless app-building solution. The solution needed to support building and iterating on new features without additional work or infrastructure limitations. According to Co-Founder Kirk Ryan, AWS Amplify provided a fast, frictionless development experience because of its breadth of features and services.

Results:

- Completed MVP in three months
- Grew user base by 860 percent without a single glitch
- Added new safety features to support B2B partnerships without experiencing downtime
- Saved an estimated six months of development time and more than £100,000 in outside development costs

Tools and services used:

- Amazon DynamoDB
- AWS Amplify
- AWS AppSync

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busby

“We haven’t had to re-architect or even lose sleep with these large user acquisition events. As we’ve grown, we’ve pulled in real-time telemetry, analytics and even have machine learning now rolling into the mix, all powered through Amplify.”

Kirk Ryan, Co-Founder at Busby



CUSTOMER STORY

Knowt grows user base by 35 percent and improves performance of mobile and web applications

Challenge:

Fast-growing educational technology startup Knowt needed to make its flash-card- and quiz-generation app more agile to support its fast-growing user base and successfully pivot to shared user-generated content. The company started building an app for Android and soon expanded to iOS and the web. However, it found that many users didn't just want to create their own notes and flash cards; they also wanted to study from materials that others had already created. The company decided to go all-in on AWS to solve challenges quickly and meet its release timeline.

Results:

- Increased algorithm speed using artificial intelligence (AI)
- Accessed data quickly using scalable GraphQL APIs
- Improved performance of its mobile and web applications
- Helps users share notes, quizzes, and flash cards
- Grew user base by 35 percent—from 20,000 to 27,000 accounts
- Made user content fully searchable
- Deployed online learning management system

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Knowt

“By using AWS Amplify and GraphQL APIs on AWS AppSync, we streamlined the whole development process. Using these AWS services has made building in the cloud very simple.”

Abhi Patel, COO at Knowt

Tools and services used:

- Amazon SageMaker
- AWS Amplify
- AWS AppSync
- AWS Lambda



CHALLENGE 3

Setting the stage for future growth

Some founders and developers spend valuable time planning for every problem while sometimes overlooking two issues that lead to bigger problems down the road:

1. Over-engineering and developing features that users don't need, thus wasting limited time and scarce resources
2. Forgetting to plan for success when it happens

Make agility a defining feature of your early-stage startup's product development. The decisions you make when you have 100 customers should provide a foundation you can build on when you reach 100,000 customers and beyond. Developers know they need to care about performance, scale, reliability, and security but will often choose the path of least resistance early on, which can impact the startup later during the growth stage.

Prepare in advance. When it comes to your application stack (compute, integration, data stores), you not only need to get started quickly—you also need to make choices that support your future growth.

Best practice: Adopt a serverless-first strategy from day one

Serverless first is a strategy that prioritizes the adoption of serverless solutions, enabling you to increase agility throughout your application stack. As a result, your developers can focus on innovating—writing and iterating their code and building the product—instead of worrying about infrastructure.

A company that scales quickly needs the right support to mobilize for future growth. You need a provider that offers you maximum flexibility for each layer in your application stack, from compute to integration and data stores. A diversity of serverless offerings, from event-driven computing to SQL and NoSQL databases to REST and GraphQL APIs, prevents over-engineering at the start and gives you the tools to meet changing requirements as you grow. When your business takes off, a serverless architecture allows your app to scale automatically from one request to millions of requests per second, with microsecond latency across the globe. And you don't have to spend valuable hours configuring the underlying infrastructure.

How can AWS help?

By building a modern mobile or web app on AWS, you'll have a production-grade app from the start using a serverless-first strategy. Whether you use a front-end development tool like AWS Amplify or any number of AWS serverless solutions across your application stack, AWS handles the heavy lifting for you. Eliminate excess operational overhead associated with configuring or managing infrastructure, and only pay for the resources you use. Adapt to customer needs faster with app functionality that scales automatically from zero to peak demands. AWS gives you unmatched performance and security throughout the development process.

CUSTOMER STORY

All of Us Financial achieves groundbreaking scalability and security with AWS

Challenge:

Due to the sensitive nature of financial trading, All of Us Financial required a solution that ensured maximum security for all transactions performed via their platform. Rather than spending months creating their own backend infrastructure, the company utilized the efficient, low-cost, proven cloud-native solutions of AWS for unmatched security and operations. Building with AWS Amplify enabled front-end web and mobile developers to easily leverage the power of services such as Amazon Cognito to create a secure, scalable full-stack application.

Results:

- Managed complexity through a low-code backend
- Enabled front-end developers to build secure, scalable full-stack applications
- Provided authentication, authorization, and user management via integration of Amazon Cognito
- Gave developers time to focus on the core product

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Tools and services used:

- Amazon Cognito
- AWS Amplify



Build and deliver your MVP quickly with AWS

AWS Amplify and other purpose-built tools and services from AWS make it easier to build apps while leveraging the benefits of cloud functionality, resulting in faster front-end web and mobile development and time to market. As your business grows, AWS Amplify can be extended with other AWS services and tools to support custom features and app requirements. And since AWS Amplify is built on top of AWS serverless architecture, you benefit from the reliability and performance of AWS infrastructure. Start delivering secure, scalable apps from day one with AWS, the world's most extensive, secure, and trusted cloud platform.

[Learn more about AWS front-end web and mobile development ›](#)



[Learn how AWS Amplify](#) lets you build and deploy a full-stack React, Flutter, iOS, or Android app on AWS—front-end UI and backend—in just hours.

[Get started ›](#)