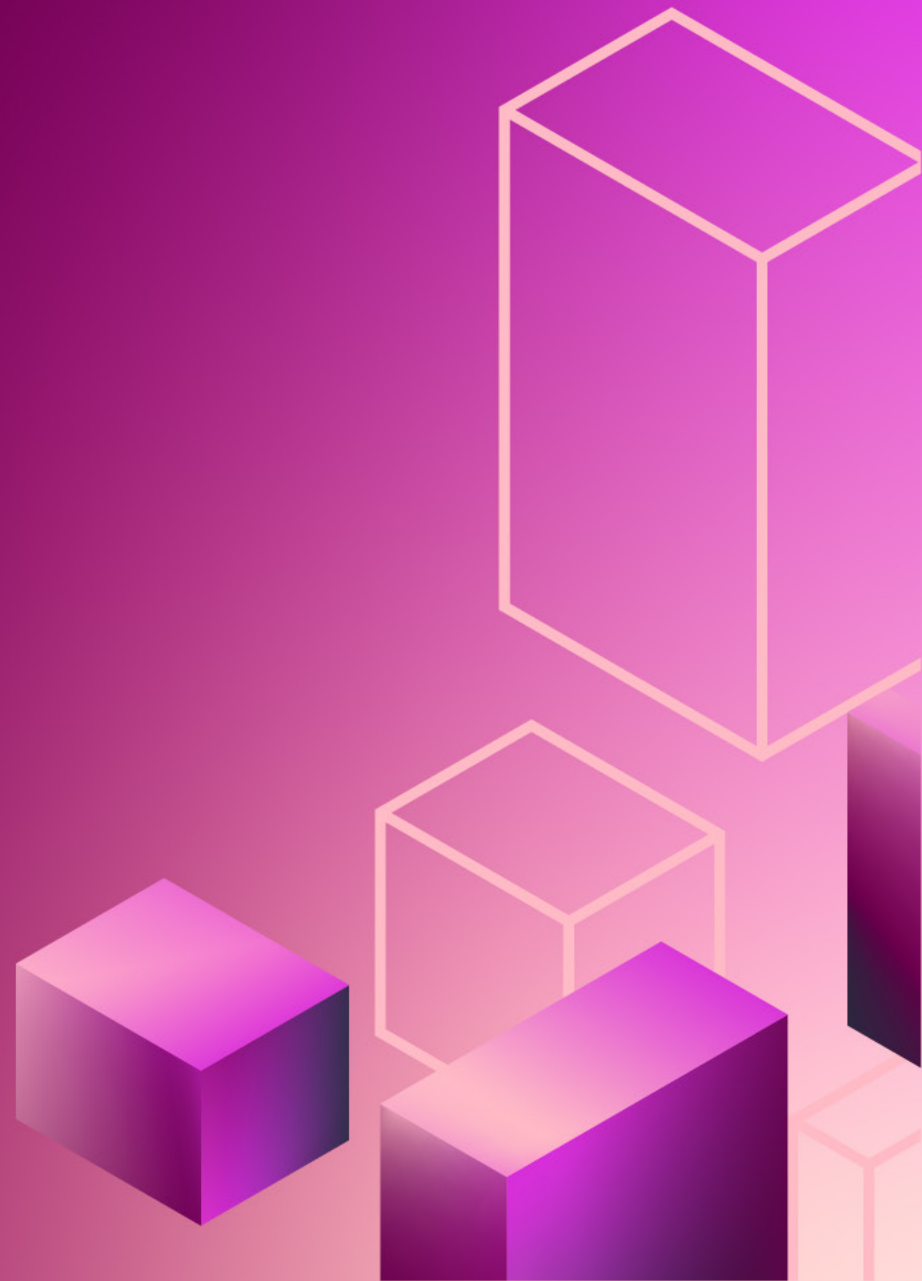




Accelerate full-stack web and mobile app development for startups

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 will build a minimum viable product (MVP) and take it to market. Critical questions about the right path and the calculated risks often stand in the way of delivering a tangible product to your customers as fast as possible—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 move from idea to market faster, gain product-market fit to keep your growing customer base engaged, and drive momentum with investors.





UI meets API: simplifying frontend web and mobile development

Frontend web and mobile developers create a differentiating user experience for their apps using frontend 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 applications. Developers care about performance, scale, reliability, security, cost, and flexibility to support the features they want in their applications, but they must balance these needs against their own experiences and how to best 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, frontend web and mobile developers seek ways to be more productive when building their applications, 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 only 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 will 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 will 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 will 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 will work with a UX designer to create and implement a compelling, on-brand UX across a variety of device form factors. In parallel, you will 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 like sign-in/sign-up, live video streaming, group video and chat, or even geolocation features, such as maps. Then, you will deliver the entire application—iOS, Android, and the web frontend, 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 development and hosting will I use?**

Your decisions aren't just about you and your personal skill set. You need to assess your team's expertise and choose the tools that meet both 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 will 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 frontend 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 the web from a single codebase. Not only do these frontend frameworks accelerate development by reducing the amount of code you will need to work with, but their large and engaged developer communities 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 frontend user interface (UI) and bind the two together in clicks, with full control over the application code. Leverage frameworks with deep capabilities like authentication and data access for the most complicated tasks and extended capabilities, such as testing and analytics, to improve the quality of your app.

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 enables frontend 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. 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 Amplify Studio,

you can quickly build an app backend, create rich UI React components, and connect a UI to the backend in clicks. The Amplify Libraries integrate deeply with popular frontend frameworks and languages (React, React Native, Angular, Vue, Ionic, Flutter, Java, Kotlin, Swift) for building web and mobile (iOS and Android) apps, reducing the learning curve and lines of code required for building cloud-connected apps.

Amplify reduces the overall steps and lines of code required for frontend web and mobile developers to build full-stack apps on AWS, resulting in faster time to market. And you can extend your app with more than 175 AWS services to support new use cases, DevOps practices, and user growth.



CUSTOMER STORY

Branch Insurance improves hiring diversity and accelerates app development on AWS

Challenge:

Fast-growing insurance technology startup Branch Insurance had ambitious goals for improving hiring diversity and radically simplifying the end-user experience for insurance customers by offering bindable prices using only their name and address. Offering this simplicity requires powerful infrastructure to process data quickly and store it efficiently and securely in compliance with regulations. Branch took an all-in approach to serverless architecture with AWS, using **AWS AppSync** as the foundation for its backend infrastructure and API service and Amplify open-source client Libraries for managing authorization flow.

Tools and services used:

- [AWS Amplify](#)
- [AWS AppSync](#)
- [Amazon Cognito](#)
- [Amazon DynamoDB](#)

Results:

- Designed an onboarding curriculum for junior developers from underrepresented groups to focus on the AWS services and serverless architecture
- Hired 28 percent more Black engineers, 26 percent more Hispanic or Latino engineers, and 10 percent more female engineers than industry averages
- Achieved a six-month acceleration in app development velocity
- Operates at three percent of the typical cost for similarly sized startups

[Read the full story ›](#)



“Building a product on AWS is like doing it on ‘easy mode’ because there’s so much that’s simplified by using managed services. We just write business logic and interfaces. That’s the great benefit of using AWS.”

Joe Emison, Co-Founder & CTO, Branch Insurance



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 following launch. Unfortunately, tight budgets, small teams, and complex architectures can slow 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?

Amplify backs every use case with one or more AWS services. When you build your app backend using the Amplify command line interface (CLI) or admin UI, Amplify automatically generates the underlying business logic and deployment code as **AWS CloudFormation** templates. CloudFormation lets you model, provision, and manage AWS and third-party resources by treating infrastructure as code (IaC) with templates written in JSON or YAML. As teams' requirements evolve, developers can choose to extend their app with custom business logic code in their preferred programming language using something like the **AWS Cloud Development Kit** (AWS CDK). The AWS CDK is an open-source software development framework that abstracts away much of the complexity involved in setting up infrastructure, enabling developers to define cloud application resources using familiar programming languages. They can also combine the CLI with their own CloudFormation templates or other AWS general-purpose tools, such as AWS CDK, to build and deploy custom features. When you use the Amplify hosting service, you get the added benefit of built-in CI/CD. This accelerates developers' application release cycles with production and testing environments, allowing for faster iteration to address customer feedback.



CUSTOMER STORY

QsrSoft launches employee engagement app in 90 days with 2 developers

Challenge:

During the COVID-19 pandemic, QsrSoft customers, such as McDonald's and other restaurant operators, were facing challenges with retaining and motivating employees. To help fill this gap, QsrSoft reinvented its restaurant dashboard on the built-in security and scalability of **AWS Lambda** and Amazon DynamoDB—solutions that enabled its developers to focus on the application instead of infrastructure. The company also selected Amplify for fast, easy application development and secure, reliable web hosting. As a result of these choices, QsrSoft completed the application build in only 90 days and onboarded more than 1,000 locations in six months.

Tools and services used:

- [AWS Amplify](#)
- [AWS AppSync](#)
- [Amazon DynamoDB](#)
- [AWS Lambda](#)

Results:

- Onboarded 100 locations within one week
- Onboarded over 1,000 locations within six months
- Decreased time spent configuring QsrSoft TV to three minutes

[Read the full story ›](#)



“We can think bigger and more creatively working on AWS. We have a much better product because of our ability to innovate.”

Adam Pehas, Director of Development, QsrSoft



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 strategy from day one

Serverless solutions enable 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 to data stores. Diverse serverless offerings, from event-driven computing to SQL and NoSQL databases to REST and GraphQL APIs, prevent over-engineering at the start and give 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 web or mobile app on AWS, you will have a production-grade app from the start using a serverless strategy. Whether you use a frontend development tool like 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.

Build and deliver your MVP quickly with 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 frontend web and mobile development and time to market. As your business grows, Amplify can be extended with other AWS services and tools to support custom features and app requirements. And because Amplify is built on top of AWS serverless architecture, you benefit from the security, 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 frontend web and mobile development ›](#)



Learn how Amplify lets you build and deploy a full-stack React, Flutter, iOS, or Android app on AWS—frontend UI and backend—in only hours.

[Get started ›](#)

