The API Economy

The Next Trillion Dollar Software Wave

Fusing Serverless and Framework-Defined Infrastructure in Next-Gen APIs and Full Stack Templates

What is an API?

- An API (or “Application Programming Interface”) is a software intermediary for an application or service that enables other applications or services to send them requests and receive responses to those requests.
- They allow different systems to talk to each other in a seamless, fast fashion.
- This gives developers certainty when integrating systems and can also enable larger monolithic services to be broken down into smaller independent services with defined interfaces.

Everything Must and Will be Transformed into an Application Programming Interface (API)

- Every digital and physical asset and item on the globe must be controlled and communicated with.
- To make this happen, we need to make every digital asset programmable, thereby turning everything into an API.
- The world is on track to have a trillion programmable endpoints in the near future.

What is Digital Transformation?

- Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers.
- It's also a cultural change that requires organizations to continually challenge the status quo, experiment, and get comfortable with failure.

API the Key to Digital Transformation

- The ability to innovate at an unprecedented rate is the key to succeeding in today's fast-paced digital world.
- In recent years, many businesses have realized APIs, that set clearly defined methods of communication among various software components, are an effective way to enable the digital transformation of their enterprise.

APIs Role in Digital Transformation

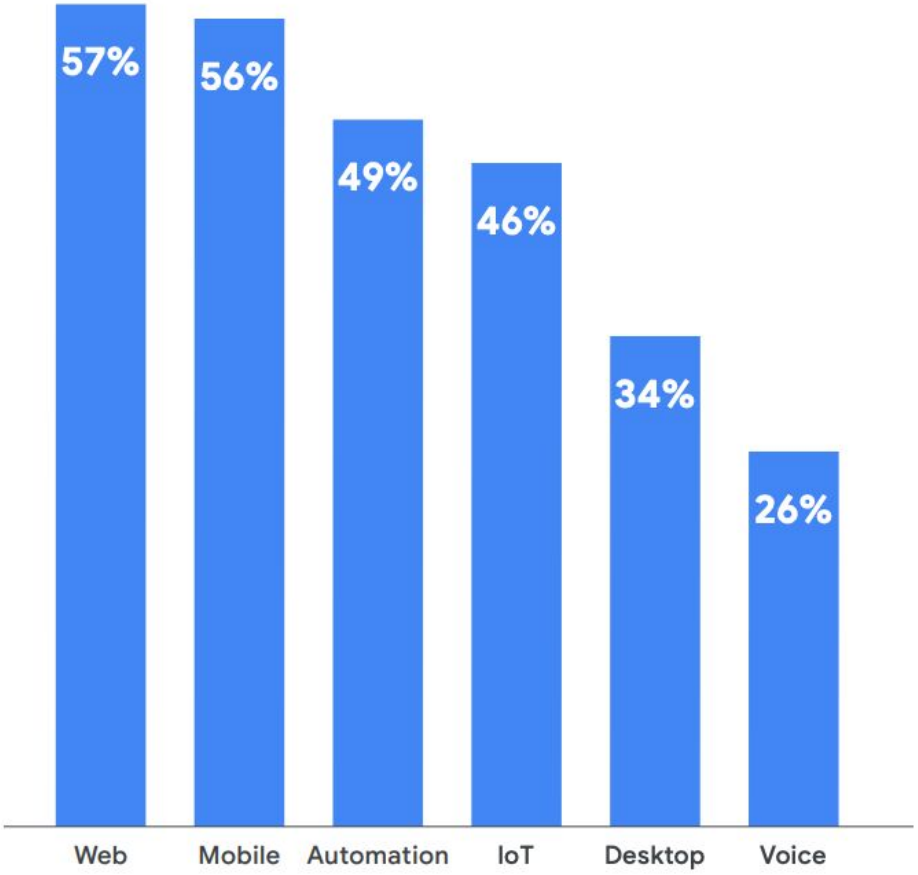
- Companies are finding it critical to have a digital-first strategy, where they can offer products and services through an omnichannel approach.
- Omnichannel – is a multichannel approach to sales that seeks to provide customers with a seamless shopping experience, whether they're shopping online from a desktop or mobile device, by telephone, or in a brick-and-mortar store.
- This starts with moving from on-prem to the cloud, where it's common to leverage multiple vendors.
- This approach results in information federated across multiple providers/systems.
- This is a huge problem because having a digital-first strategy requires access to real-time, relevant information across multiple systems and the mobility to execute business processes via multiple devices.
- For this to work, APIs must be used to access separate systems and provide necessary connectivity.

API Adoption is Exploding

- Every future app will need an approach to *Program the World*, a way of connecting, accessing and controlling every digital and physical asset on the planet.
- We must enable every form of digital asset to become programmable, transforming everything into an Application Programming Interface (API).
- "The world is on course to having a trillion programmable endpoints," said Tyler Jewell, the managing director at Dell Technologies Capital.
- **Everything must — and will — become an API.**

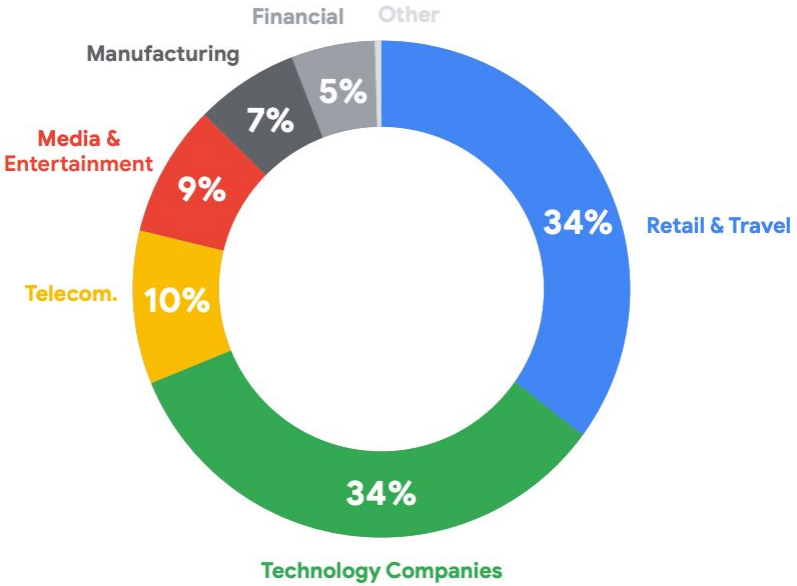
Top API Platform Initiatives

Applications Powered by APIs

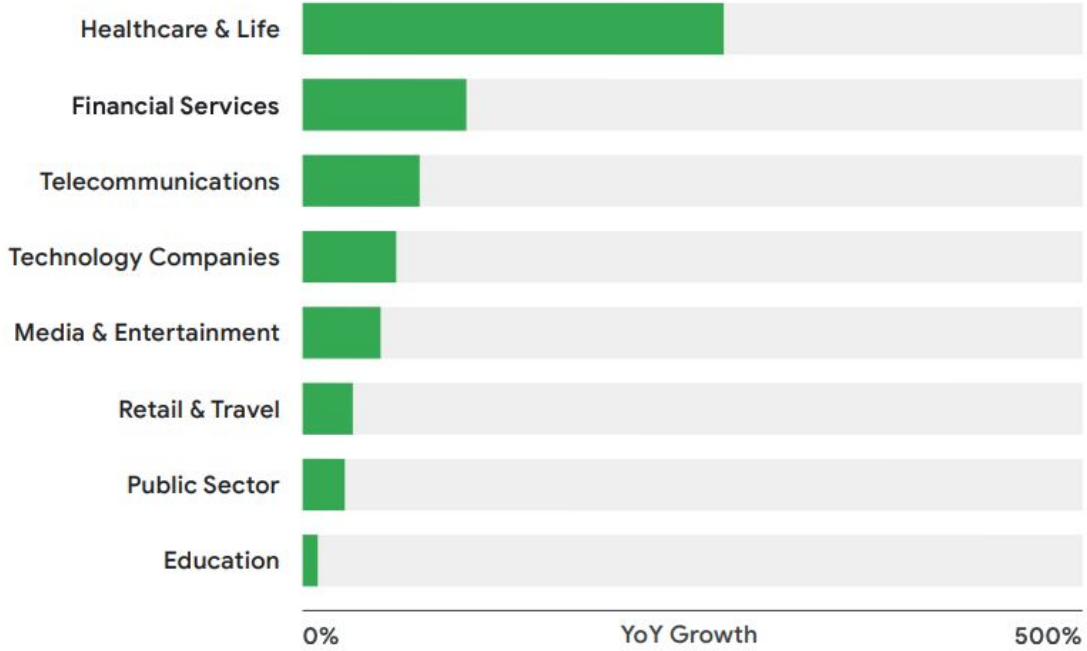


Upstream Impact of API Operations

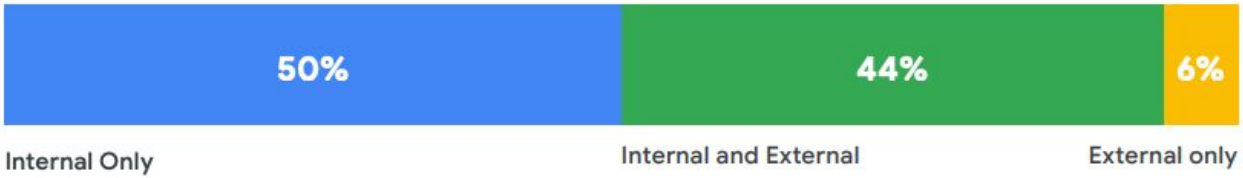
The API Traffic

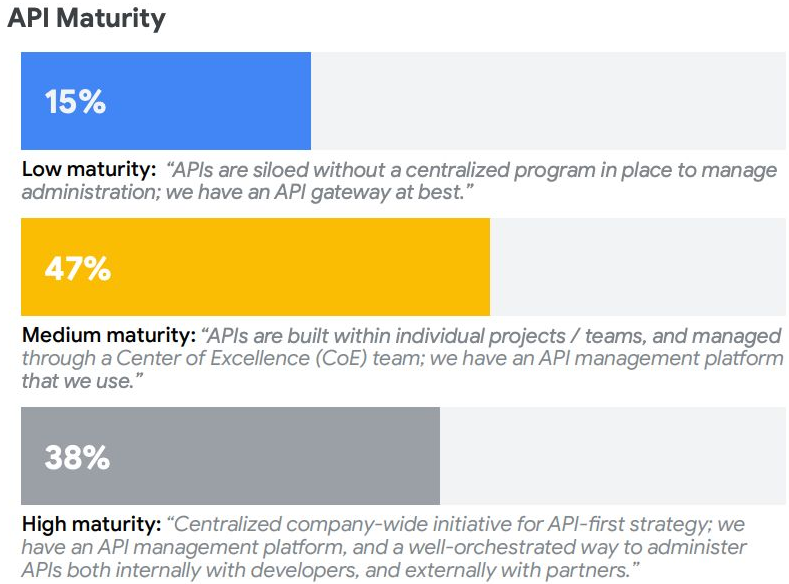


Healthcare industry sees an explosive growth in API traffic in 2020



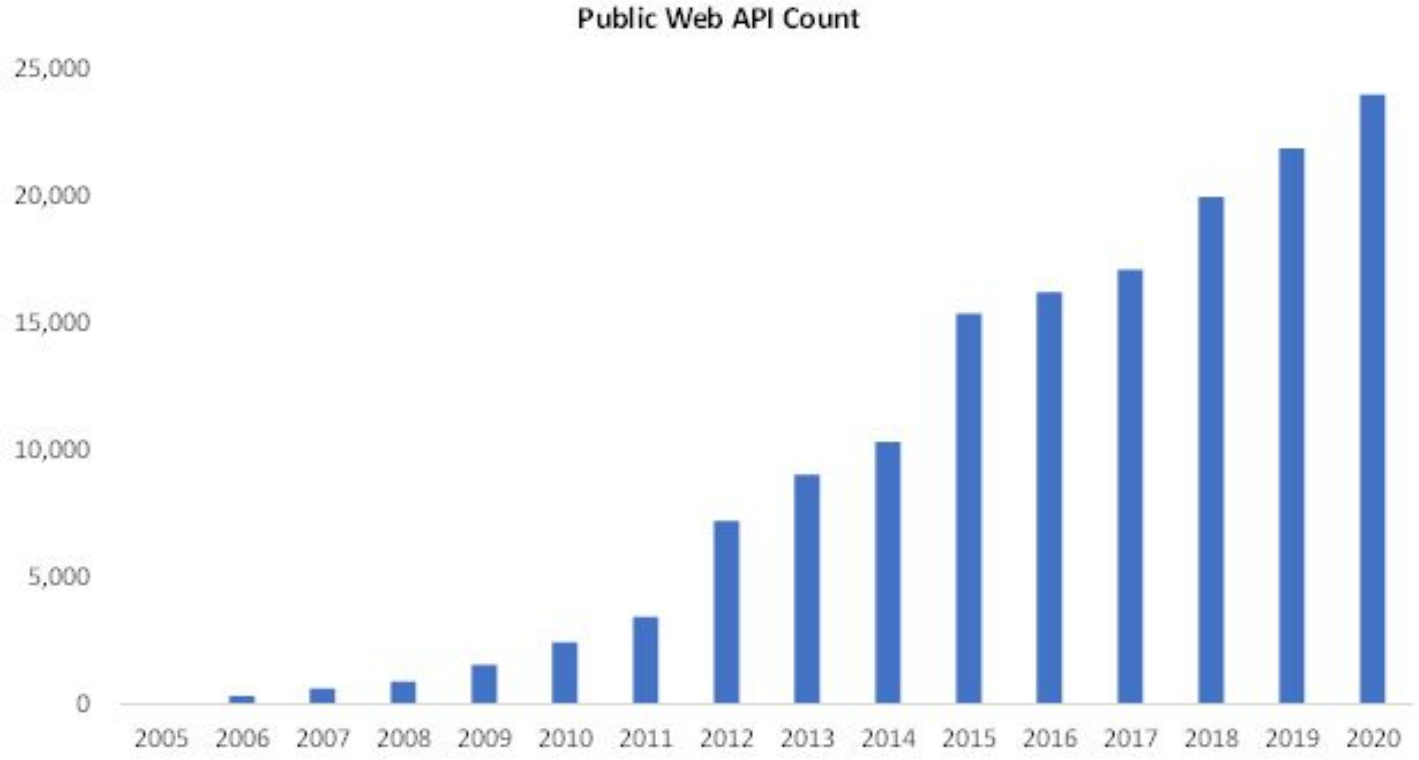
Types of APIs





Research indicates higher API maturity tends to correspond with more robust digital transformation efforts. Companies based in the United States, larger companies, and companies within the technology and financial services verticals were most likely to report high API maturity.

Views of APIs


Public Web API Count
25,000
20,000
15,000
10,000
5,000
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020

API as a Product?

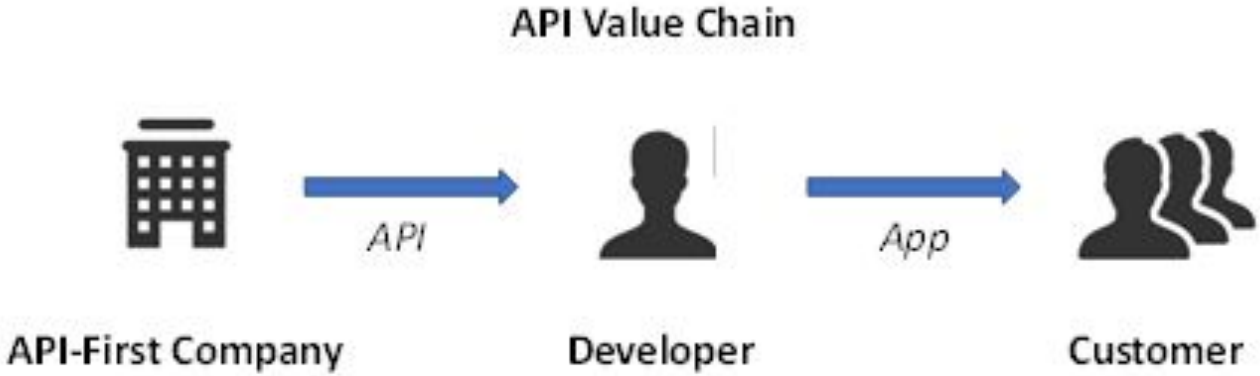
- If you told developers back in 2005 that they could make money off of an API, they'd laugh at you. The notion that you can build just a layer of software— just one functionality— and sell it as a product seemed insane.
- The obvious problem with “selling” an API as a product is marketing. There's no sleek interface to promote and no demo that can show off the bells and whistles. It's essentially an invisible product, whose value is only evident once it's integrated into a platform— something that takes hours, days, or weeks to become familiar with.

Why all the Interest in APIs?

- One of the most important reasons is the growth in cloud computing, which has led to the need for integration.
- APIs enable companies to more easily build products and services that would otherwise take too long to build.
- Developers can use APIs to more easily access business-critical information and focus on other priorities instead.

What is the API Economy?

- The innovative power of APIs has lead to the realization that software as a service (SaaS) applications can be built by combining APIs built by specialized API providers.
- That, in turn, has created the API Economy, which empowers developers to specialize and monetize their skills and domain knowledge.
- The exchange of these APIs and the systems to manage them is, in a nutshell, **the API economy**.


API Value Chain
API
App
API-First Company
Developer
Customer

The Exchange of Value is What Makes an API Economy?

- In the API economy a developer may have different roles. It may be a Application developer or API provider.
- A API provider can also develop on top of other specialized APIs, thus creating layers of APIs.
- This creates an API economy where developers charge each other for the APIs built by them. The API provider charges others for using his APIs, and at the same time pays other providers to use their APIs.
- The application developers who uses all these APIs bills the end-customer for the service. This exchange of value is what makes an API economy.

Benefits of API Economy

- The API Economy levels the playing field for everyone from the smallest developers to the largest companies.
- A taxi booking SaaS app, for example, might combine a mapping API, communication API, and billing SaaS API, each from different providers, with their own UX layered on top.
- This makes it easy to launch new services without having to build everything from scratch. This makes it easier for all participants to develop unique products, services and functionality quickly and with less cost.

The Effects of the API economy on Businesses

- The ultimate goal of the API economy is to facilitate the creation of user-focused apps that support line-of-business goals and improve workforce throughput.
- Today's demand for data integration has been encouraging vendors of all sizes to "go modular" and break complex software components down into smaller, containerized components called microservices.
- The API economy and the use of microservices make data and services more accessible and flexible.
- By building a business model around APIs, businesses can rapidly scale up by using APIs. This can be done by accessing third-party services and data, or using APIs to transform their own data and services into a platform that encourages others to build upon and use it.

The Importance of the API Economy

- APIs simplify access to the information contained in software platforms and their functionality.
- They make software platforms and their data easier to integrate.
- The API economy is important because it enables businesses to profit off their APIs and create business models around them.
- It allows a business to monetize a portion of its data and services, and to **turn itself into a platform**.

pana cloud

“The API economy is an enabler for turning a business or organization into a platform” — Gartner

Platform?

- In the most general terms, a platform is a group of technologies, solutions, or offerings that form an iterative basis for developing, implementing or deploying other offerings.
- A platform is a business model that creates value by facilitating exchanges between two or more interdependent groups, usually consumers and producers. They make software platforms and their data easier to integrate.
- In order to make these exchanges happen, platforms harness and create large, scalable networks of users and resources that can be accessed on demand.
- Platforms create communities and markets with network effects that allow users to interact and transact.
- Panacloud is a Platform for the API Economy.

How do customers benefit from a third-party API vs building internally?

- **Empower Developers**: Leveraging third-party APIs induces innovation. Save time/internal resources by spinning up and testing a new feature in days, not months
- **Better Customer Experience**: APIs reduce friction in the customer experience by making it possible to bring in customer information from different sources.
- **Cost and Resource Effective**: Third-Party Serverless APIs charge on usage, so companies can pay based on the utility received rather than a year-long subscription/number of seats.
- **Increase Data Visibility**: Because of the connected ecosystem these APIs create, businesses get real-time visibility into their customers and how their business is performing, leading to proactive and data-driving decision-making.
- **Faster Time to Market**: With APIs, internal teams don't need to code functionality from scratch or stitch together multiple applications — they start with integration.

API-First Approach

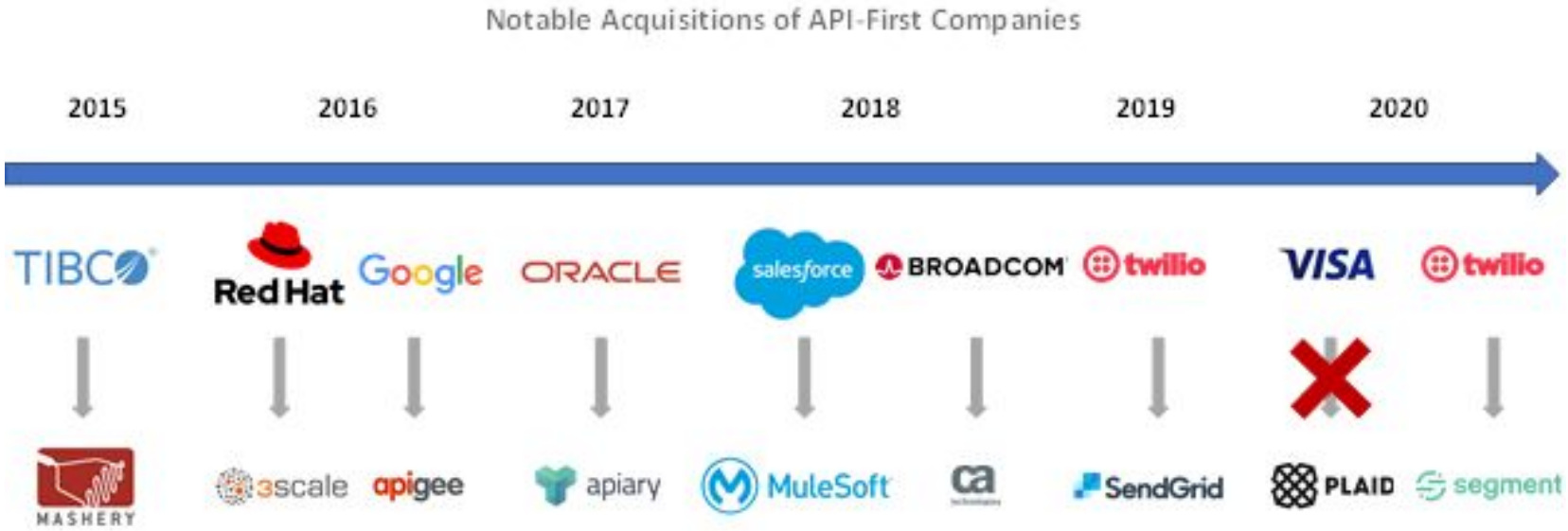
- The idea is API-as-a-product.
- An API-first approach means that for any given development project, your APIs are treated as “first-class citizens.”
- APIs allow companies to break down capabilities into individual, autonomous services (aka microservices).
- An API-first strategy allows organizations to build APIs that serve all applications, and applications can be developed and maintained efficiently for all devices, platforms, and operating systems.

67% of Developers Embrace an API-First Philosophy

- According to Postman's 2021 State of the API report, more and more companies are adopting Application Programming Interfaces (or APIs).
- Sixty-seven percent of survey respondents ranked themselves as a five or higher in terms of embracing an API-first philosophy, while only 62% ranked themselves in this way in 2020.
- Developers are spending more time with APIs. Forty-nine percent of respondents said that more than half of their organization's development effort is spent on APIs (compared to just over 40% last year), showing the prevalence of APIs in digital organizations' technology stacks.

The Rise of the API-First Companies

- Companies like Stripe, Twilio, and Okta offer APIs as their **primary product**.
- Valued today at over $100+ billion, Stripe is the biggest independent API-first company.
- Twilio market cap is $55.97B.
- Okta has a market cap of $35.90 B.


Notable Acquisitions of API-First Companies
2015
2016
2017
2018
2019
2020
TIBCO
Red Hat
Google
ORACLE
salesforce
BROADCOM
twilio
VISA
twilio
MASHERY
3scale
apigee
apiary
MuleSoft
ca
SendGrid
PLAID
segment

The Third-Party API Economy

@graceisford

The API Economy Challenges

1. Often there is no direct contact between the API provider and the developer who utilizes it, it can be hard to know which API to build with what functionality.

2. It is difficult to know which APIs are available and which API to use and their comparative strengths and weaknesses.

3. Most of the current SaaS applications and API are built using legacy Cloud 1.0 technologies, thus they don't have usage based billing support and also some have scalability issues.

4. The APIs are centrally managed and multi-tenant by their very nature, making it difficult to manage, measure resource usage in a serverless environment, and bill the tenant.

5. Each and every API provider has to build a custom platform to monitor and measure serverless resource usage and bill clearing functionality thus increasing the time-to-market.

6. There is an extreme shortage of serverless cloud developers thus making life every difficult for both API providers and SaaS app companies.

7. There is a scarcity of coherent and comprehensive training material for multi-tenant serverless SaaS app and API developers.

Serverless APIs

- Ideally, the developer who uses APIs wants to be charged a usage based subscription fee, not a fixed monthly subscription.
- This usage based subscription fee has been made possible by serverless cloud technologies.
- Serverless is also being called Cloud 2.0.

Standards for API Definition

- For REST APIs, and GraphQL have emerged as the winner.
- While REST is popularly regarded as the standard way to design APIs, GraphQL is increasingly touted as a revolutionary technology capable of trumping REST's weaknesses.
- These two formats has resulted in more standardization and better tooling for developing and managing APIs.

OpenAPI Specification

- The OpenAPI Specification is a specification for a machine-readable interface definition language for describing, producing, consuming and visualizing RESTful web services.
- Applications implemented based on OpenAPI interface files can automatically generate documentation of methods, parameters and models. This helps keep the documentation, client libraries and source code in sync.

What's in it for us

- We can find a gap in an existing system or can find a real world problem which has not yet been automated. And develop a platform for that with API first approach.

  E.g if there is a popular online store where there are multiple retailers, a product comparision or price comparison API can create a difference.

Deploying APIs

Infrastructure as code (IaC) is the industry-standard practice for provisioning infrastructure in a repeatable and reliable way.

Framework-defined infrastructure (FdI) is an evolution of IaC, where the deployment environment automatically provisions infrastructure derived from the framework and the applications written in it.

Next.js defines and deploys API's using FdI.

Infrastructure as Code (IaC)

1. Infrastructure as code, also referred to as IaC, is an IT practice that codifies and manages underlying IT infrastructure as software.
2. The purpose of infrastructure as code is to enable developers or operations teams to automatically manage, monitor and provision resources, rather than manually configure discrete hardware devices and operating systems.
3. Infrastructure as code is sometimes referred to as programmable or software-defined infrastructure.

Framework-Defined Infrastructure (FdI)

1. A build-time program parses the source code written to a framework.
2. Understands the intent behind the code.
3. Then automatically generates the IaC configuration needed to run the software.

This means more predictable, lower cost, and lower risk DevOps through truly serverless—dare we say, infrastructureless—architecture.

FdI Advantages

- Abstracts over cloud primitives such as servers, message queues, and serverless functions, making them mere implementation details of the frameworks' concepts.
- Providing portability between different target infrastructure providers.
- Eliminating the need to manually configure infrastructure to run an application in production.
- Increasing the time spent writing product code over system management.
- Allowing the unchanged use of the framework's native local development tools.
- Standardizing on pre-reviewed secure services.

Thank You

API and Template Marketplace

Fusing Serverless and Framework-Defined Infrastructure
in Next-Gen APIs and Full Stack Templates