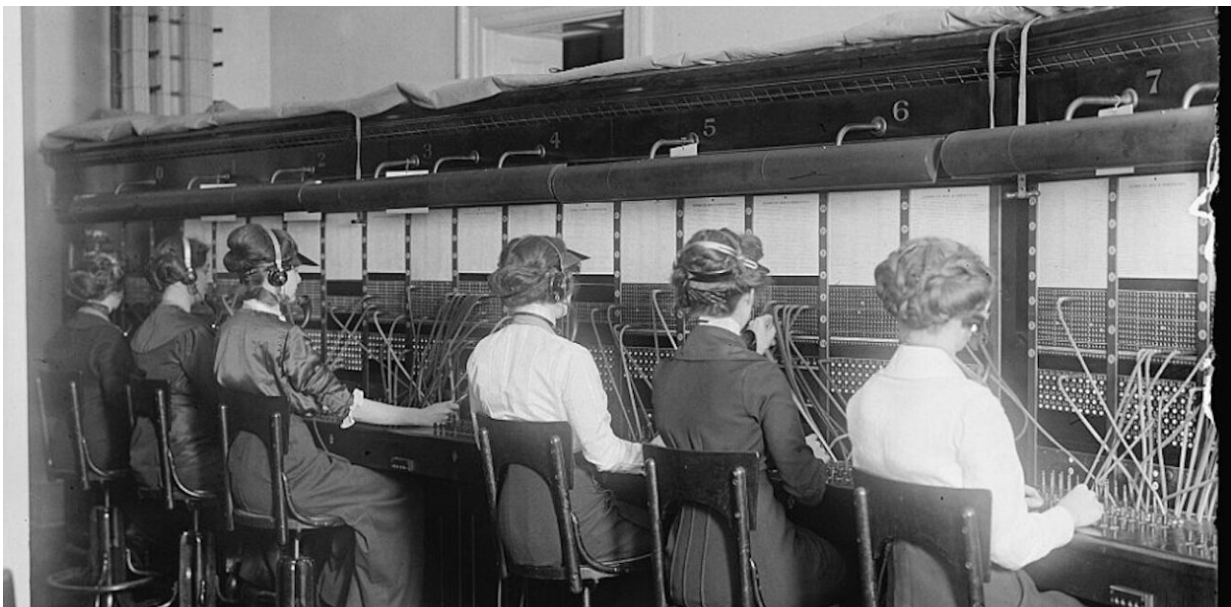# What are APIs? A computer scientist explains the data sockets that make digital life possible

September 26 2023, by Tam Nguyen

Under the hood of your digital life, APIs are making connections. Credit: [Library of Congress](#)

APIs, or application programming interfaces, are the gateways to the digital world. They link a wide array of software applications and systems. APIs facilitate communication between different software systems, and so power everything from social media—think of the share buttons on webpages—to e-commerce transactions.

At a simple level, APIs are like electrical sockets. A software application that you're using, say the playback controls for a video on a webpage, is like an appliance. The system that provides data or services that the application needs, say YouTube, is like the electrical grid. The API, in this example the [YouTube Player API](#), is like the standard electrical outlet that lets any appliance plug in to the grid.

APIs are not really so simple, though. Another analogy is a restaurant. The customer is the [software application](#), the chef is the data or service, and the waiter is the API. The waiter brings the customer the menu, which lists available dishes—i.e., options for accessing data or service—and then brings the customer's request to the chef.

APIs rely on defined rules and protocols that ensure accurate data exchange and effective collaboration. There are APIs for specific uses and software developer preferences.

Why APIs matter

APIs power various applications and services across many diverse industries. Facebook, Instagram and Twitter, now rebranded as X, let users share their content across these [social media platforms](#). By leveraging their [social media](#) credentials, users can log into websites, weather apps and games to simplify their online experiences. Amazon and PayPal depend on APIs for secure payment processing and efficient order fulfillment. Navigation services like Google Maps leverage APIs to provide real-time location data and accurate directions. Even voice-activated smart assistants like Amazon's Alexa and Google Assistant use APIs to manage and control smart home devices.

Who has access to an API also matters. For example, in March 2023, X began charging a wider range of users for access to its [data API](#), which lets users collect large numbers of tweets to see what people are tweeting

about. Businesses use the API for market and competitive research. But many people with limited resources, like developers of some free apps and social science researchers, also rely on it.

APIs are also playing a role in making artificial intelligence widely available. For example, Google, Microsoft and OpenAI provide APIs for software developers to incorporate AI in their products.

As APIs continue to shape the digital landscape, developers face challenges. Ensuring the security and privacy of data exchanged through APIs is paramount, given their integration into critical systems. As APIs evolve, managing their complex ecosystems and making sure old programs can use new APIs will be a considerable task.

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