

eBook

Overcoming API Complexity:

How to Assure Modular and
Distributed Applications



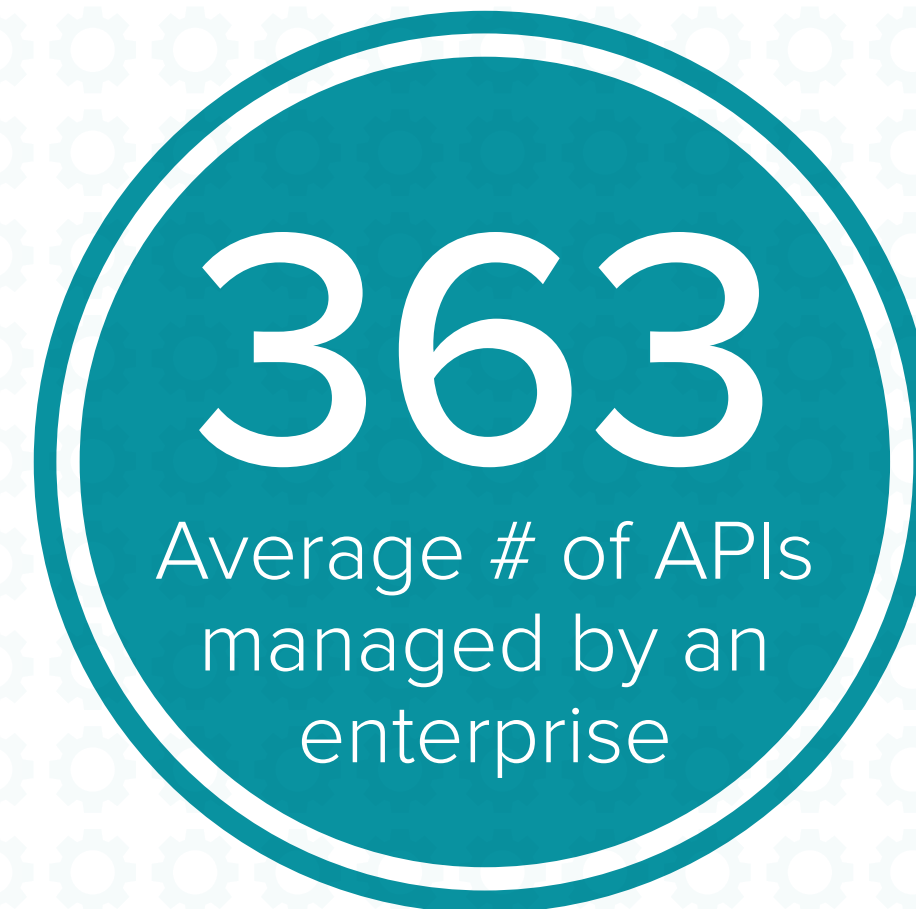
Introduction

A lot has changed in the last decade. Applications are no different. In just the last 10–15 years, the explosion of technological advancements—like the emergence of the cloud, mobile and the Internet as a means of “reliable” transport—have led to a paradigm shift in application architectures.

Not long ago, applications were mostly self-contained and self-reliant. Businesses built and owned the entire infrastructure, and when something went wrong, they knew the problem was “inside the house,” so to speak. Not anymore. As applications have grown to encompass ever more functionality, versatility and connection, they’ve moved from monolithic to more modular, service-based architectures. This offers a lot of advantages, of course, but it also brings some challenges.

The modular and distributed nature of new applications means they often rely on a number of external third-party services, backend integrations and cloud APIs, distributed across the Internet and mostly outside the control of the business who owns the application. So, without the right monitoring tools, most modern applications workflows effectively take place in the dark. This complexity and lack of visibility means that when an issue arises, finding the root of the problem can be difficult and time consuming.

In order to deliver a reliable and high-performance digital experience, ITOps and DevOps teams should be enabled to measure and test critical workflows and backend interactions to external API endpoints. In this eBook, we’ll discuss the issue of ballooning application complexity and how enterprises can gain insights into the parts of the experience they don’t own or control.



Modern Applications Bring a Web of Dependencies

Modern applications are a bit like icebergs. The user sees the top—the point where interaction or transaction happens—and draws their conclusions from there about the business. Ideally, it's a seamless, simple experience. Like an iceberg, though, what the user sees is only a small part of the whole. Most applications today, even for something as small as placing an item in your cart, rely on a vast underlying web of services and platforms distributed across the Internet to do their job—typically via a REST-based API.

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That might mean a messaging service uses Twilio for cloud communication, an e-commerce site uses Stripe for payment processing, or a delivery service uses Google Maps for geolocation (among countless other examples). To optimize the delivery of these digital experiences, we need to understand how the APIs are performing, and when it comes to assuring overall application performance, understanding API reachability over Internet and cloud provider networks is crucial.

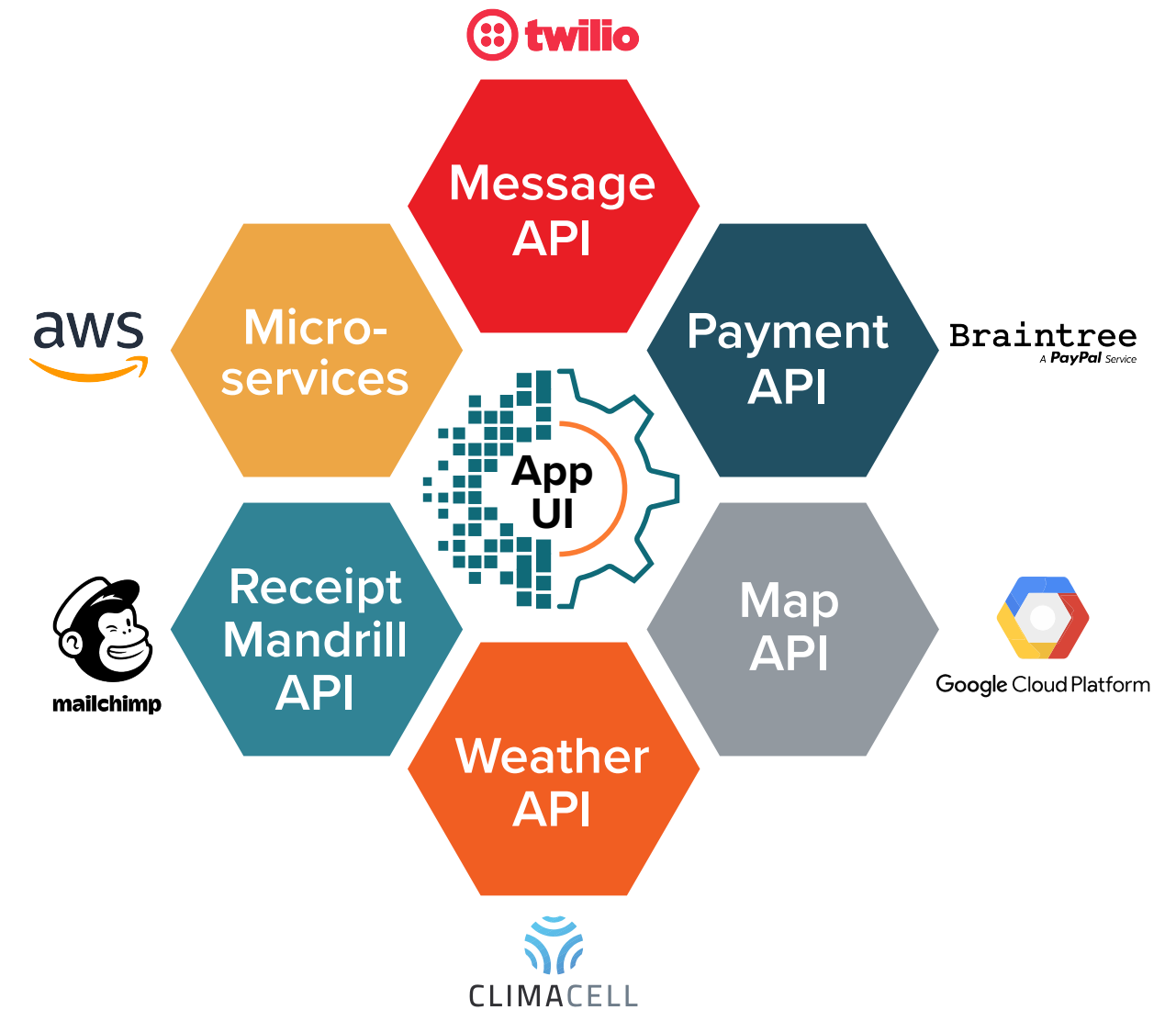
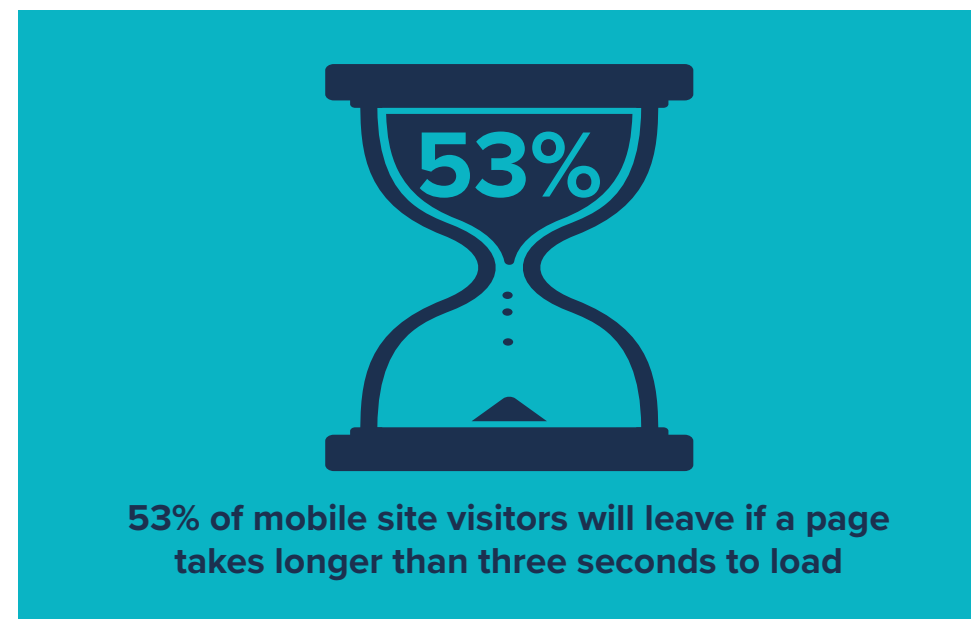
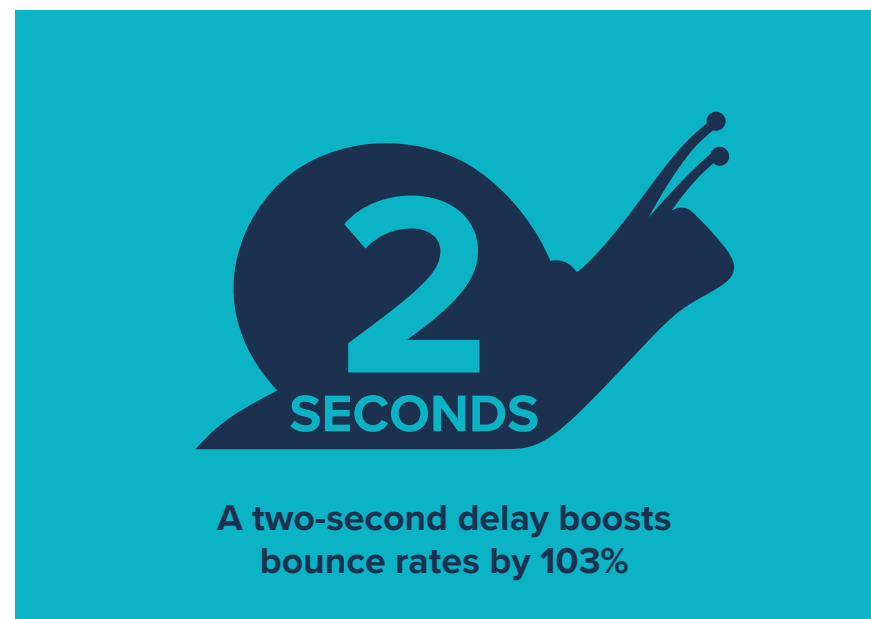
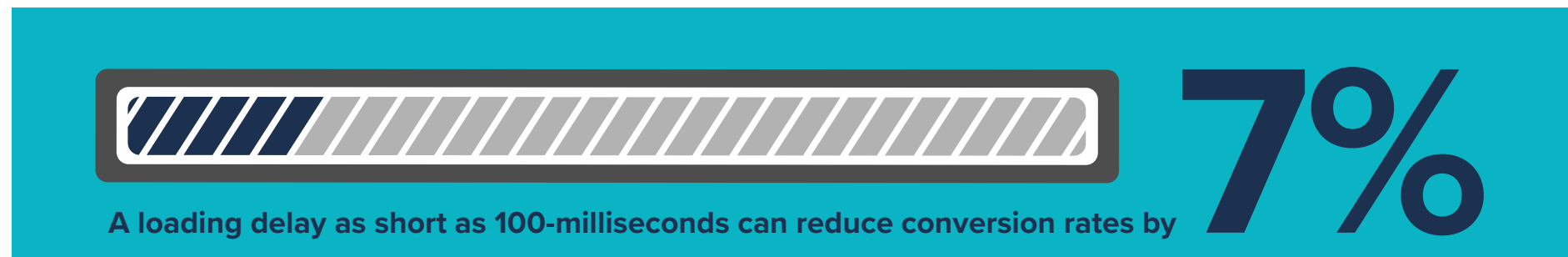


Figure 1. Modern applications are increasingly dependent on third-party APIs distributed across the Internet.

What's at stake?

When something in this chain goes wrong and impacts the user experience, users don't see the cause. They just see a subpar experience with your application—and the spinning wheels and long load times might make a buyer rethink their purchase. Akamai's Online Retail Performance Report¹ examined approximately 10 billion user visits to top online retailers over thirty days and found that:



Your customers aren't the only ones suffering from the issues that arise when you can't see below the surface of an application's workflow. Business users frequently feel that negative impact, too. A poor-performing application that serves a business-critical function, such as Salesforce or Microsoft 365, can lead to lost employee productivity. No matter your industry, ensuring a positive digital experience is a priority for ITOps and DevOps teams.

¹Akamai Online Retail Performance Report. "Milliseconds Are Critical: Web Performance Analytics Show Even 100-Millisecond Delays Can Impact Customer Engagement and Online Revenue." April 2017.

Lack of Visibility Obscures Application Workflow Issues

When problems arise in the application workflow, you need a fix fast. But the complexity and distributed nature of modern application workflows makes finding the root cause of the problem difficult and time consuming. Legacy network and application monitoring tools, while useful, don't necessarily provide the level of visibility required to quickly understand the problem, escalate appropriately and resolve issues across external workflows. Packet capture and flow analyzers, for instance, don't work outside of your own environment.

This means businesses are often blind to most of the delivery path and, therefore, the source of most issues that impact user experience. To properly escalate and resolve a problem outside of your own infrastructure, you need enough evidence to convince third parties to take action. Without that evidence, you're left spending precious time and money on help desks and inefficient troubleshooting, while your users are left with a problematic application experience.

There are other challenges beyond simple visibility. Delivery paths are constantly in flux, as there is no steady state on the Internet. For example, if you're dependent on a third-party API based in Ireland, there's no guarantee that they will still be based there tomorrow. Data centers pop up, relocate or disappear entirely. All this can directly impact the functionality of your application. This means we need more and better tools to properly address issues that arise.

While browser synthetics enable you to test applications and measure user experience across entire workflows, there are instances when a single request in the browser triggers multiple backend API interactions that cannot be directly observed from the user's perspective. For example, when a user requests a trip using a ride-sharing app, the application makes a series of API calls to validate the user's credentials, confirm the destination address and process payment, before sending the user an email receipt. Because these backend services are invisible to the client, a failure or performance issue at any of these will ultimately go undetected and directly impact the customer.

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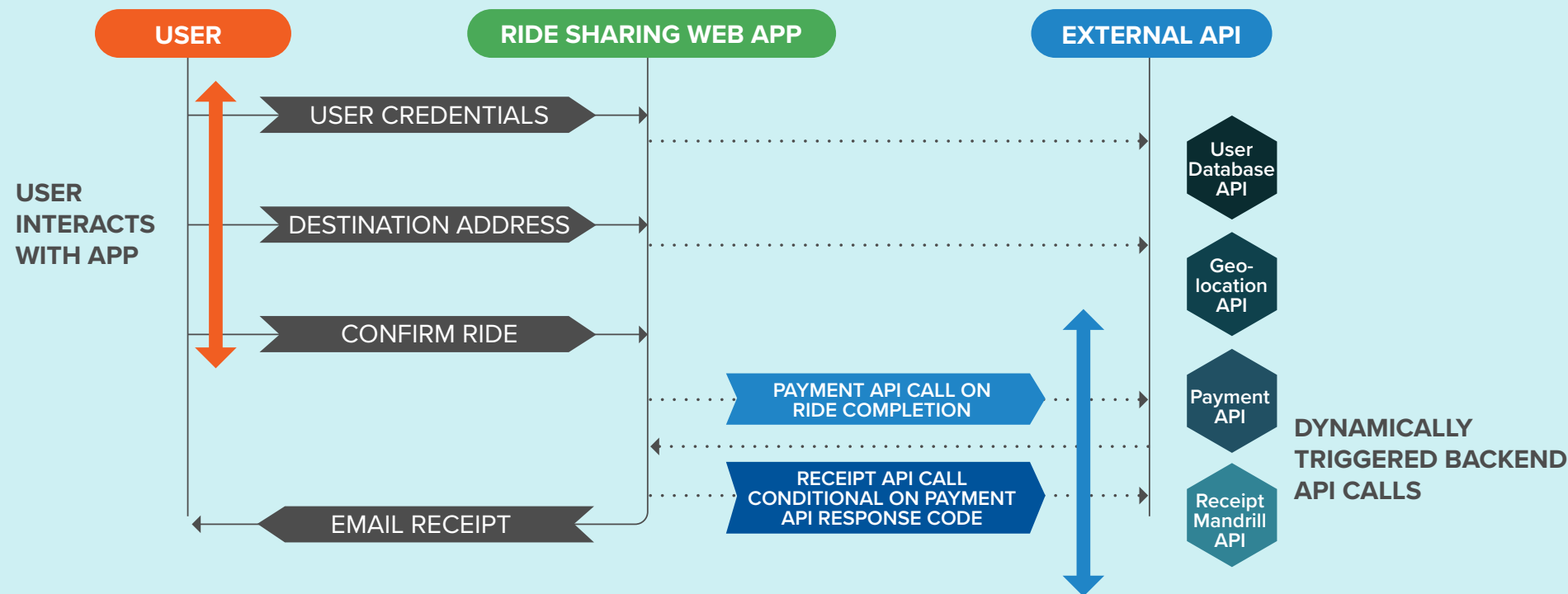


Figure 2. API call flow representing a user journey with multiple external API interactions

Application owners need a testing approach that doesn't rely on front-end interactions only. Instead, they need an approach that incorporates testing from within the context of the core application to understand the impact of underlying network transport, such as ISP, CDN or cloud provider networks. This is where adaptive API monitoring comes in.

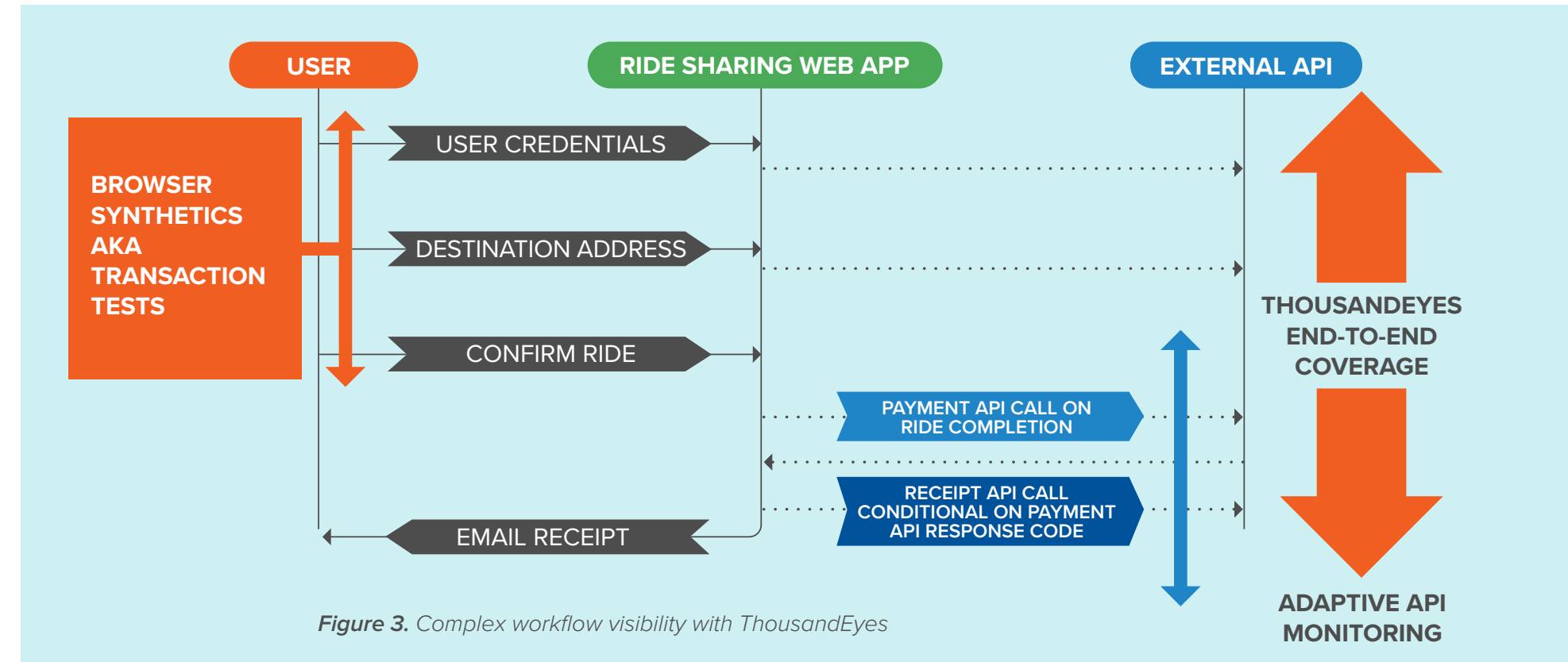
“ By executing sequential, conditional or iterative API calls against your API dependencies, Adaptive API monitoring offers a highly flexible synthetic testing framework that emulates backend application interactions with remote API endpoints.”

Assuring Modern Apps Requires a New Set of Eyes

ThousandEyes delivers unprecedented visibility into networks and infrastructure your applications rely on. This means that the Internet, cloud provider networks, the extended ecosystem and user-level performance (regardless of location) are all visible, so you can manage every network like it's your own. Adaptive API monitoring takes this visibility a step further, empowering application owners to measure and test critical workflows and backend interactions to external API endpoints. By executing sequential, conditional or iterative API calls against your API dependencies, it offers a highly flexible synthetic testing framework that emulates backend application interactions with remote API endpoints.

API monitoring tests can be run from vantage points that are external to the application environment, or from agents placed within the application hosting environment out to the API services. (An advantage of this latter deployment approach is that the specific network paths and performance from the application to the API endpoints can also be monitored.) By using markers within the test to identify key tasks within the workflow, such as the time it takes to confirm the destination address in the ride-hailing example, you have the ability to monitor the performance of a backend API service indirectly. With crucial data, such as performance timings for page loading and detailed waterfall views of the sequential and cumulative exchange, enterprises can gain a deeply granular view of the individual elements of the application workflow alongside a sweeping macro view of collective service delivery paths across the Internet.

All this adds up to powerful testing options and unprecedented visibility across the external networks that impact application experiences. This means you can dynamically measure performance, differentiate timings between each iterative function and validate the logic of complex workflows. The benefit is rapid problem solving, smarter workflows and valuable insights into opportunities for optimizing the digital experience.



Delivering Application Experience Now—and Into the Future

Today's applications are increasingly modular, distributed and dependent on external third parties—which can make troubleshooting them and optimizing performance extremely difficult. Enterprises can now take advantage of best-of-breed API-based services while maintaining control of the end-to-end application experience. With ThousandEyes, ITOps and DevOps teams can leverage a powerful framework to address visibility across every composite application service and even multi-service interactions. It means businesses can see the rest of the iceberg and manage every aspect of their application, even beyond their domain of ownership.

How can you get started?

[Reach out to us](#) today or [request a trial](#) to learn more about how ThousandEyes can help you take control of the Internet like it is your own network.



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About ThousandEyes

ThousandEyes delivers visibility into digital experiences delivered over the Internet. The world's largest companies rely on our platform, collective intelligence and smart monitoring agents to get a real-time map of how their customers and employees reach and experience critical apps and services across traditional, SD-WAN, Internet and cloud provider networks.

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