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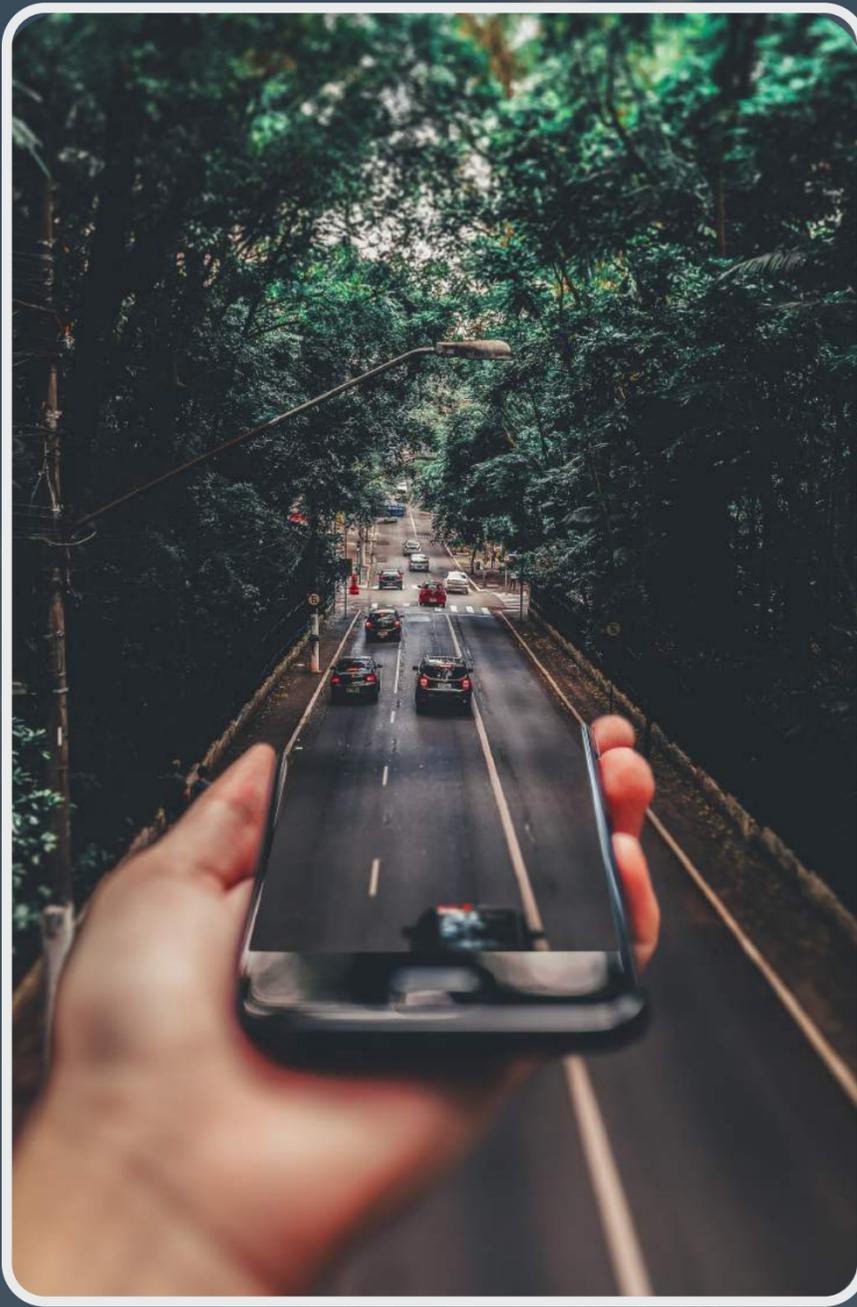
**The Technology Stack
Behind**

UBER



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1. What is UBER?

Uber is a ride-hailing service that connects riders with drivers helping the former reach their chosen destination at cost-effective prices. Apart from the cab services, Uber has also ventured into food and package delivery. Not only cars, but in some countries, Uber also has motorbikes under their ambit serving the customers from every segment.

Disruptive businesses and ideas might not be easy to deploy, but once these ideas gain traction, they become an unstoppable force. This is precisely what happened with Uber. Before completing the daily commuter's demands in 93 countries, Uber started as an experiment in Paris where the founders of the service were at the mercy of costly cabs that were not even available.

Presence in 93 countries



Total trips - 1658 million



Valued at \$78 billion



It is here that the duo founders got an idea to start a service where the users can request a ride by tapping on their phone. From its launch in 2009 to 2020, Uber is now valued at \$78 billion.

As per official data, Uber completed 1658 million trips in the first quarter of 2020.

Things we cannot imagine UBER did!!!

There are several reasons for Uber's success, and the most interesting thing that we found was that Uber once hired a nuclear physicist, computational neuroscientist, and machinery expert.



Why did they need them?

These three experts' task was to create a demand prediction algorithm that helped the team identify the highest demand areas. Such smart aspects of business development has helped Uber gain an audience in 900 cities spread across 93 countries, serving 103 million users every month via 5 million drivers.



As of July 2018, Uber completed 10 billion trips. This helped Uber bag the second spot only after SpaceX on CNBC's 2018 Disruptor Awards.

In the physical world, we call innovative designs and systems Engineering Marvels. The same can be used to refer to Uber in the digital world. It is evident that making an application like Uber, which has a global customer base, is not easy.

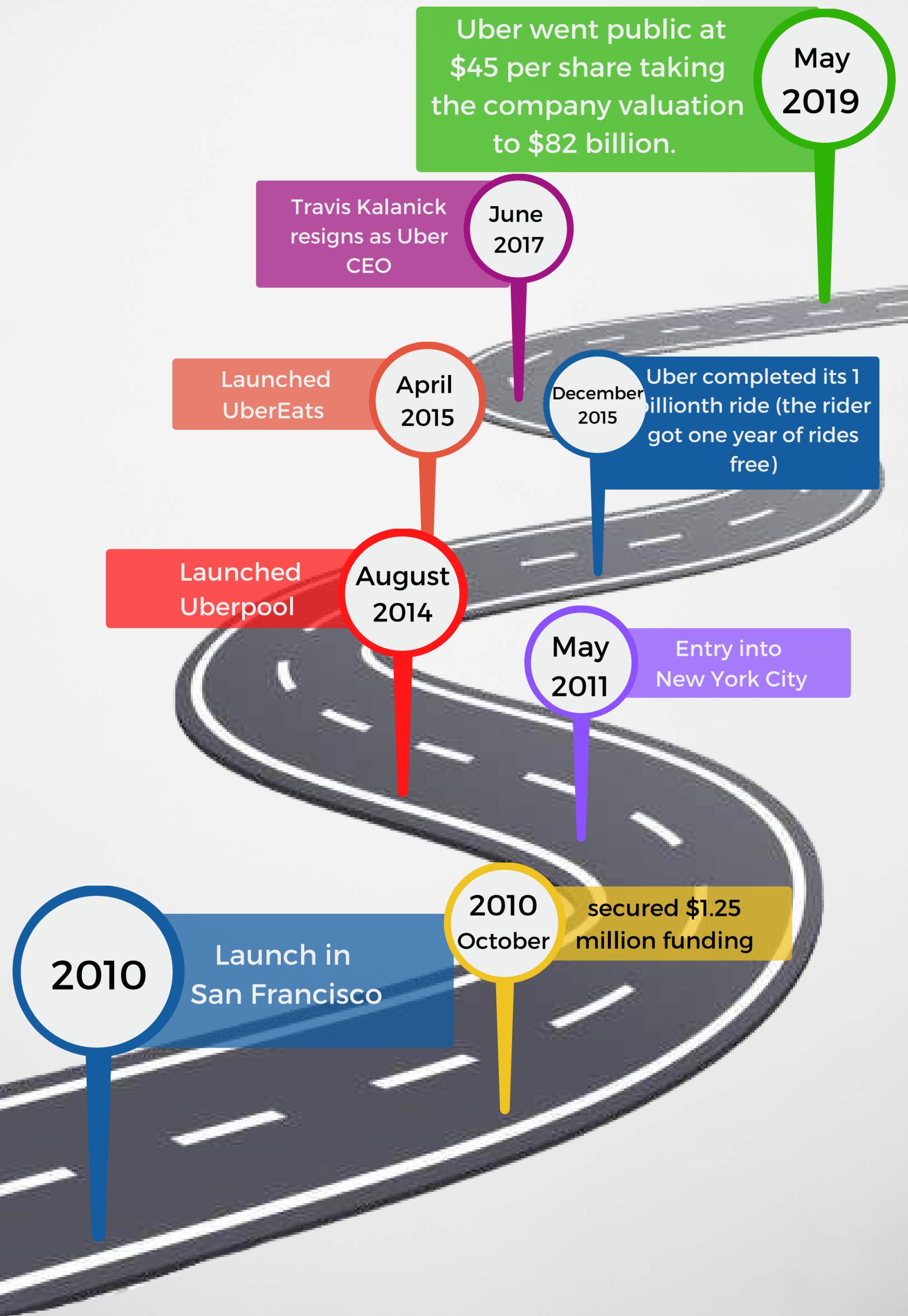


A great mix of innovation, expertise, and business strategy has made Uber a case study, a fount of inspiration, and an ambition for several entrepreneurs.

In this article, we will trace Uber's success highlighting the key moments of its growth along with the technologies used to build such an incredible service



2. From Plinth to Paramount and Still Growing

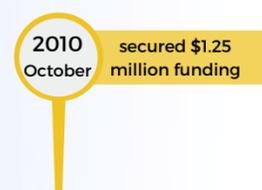


Uber started its operations in San Francisco in 2010, which is when the global ride-hailing service began to make history.

2010: Right after its launch, Uber got the interest of urban professionals and tech-savvy individuals in the city. The cab hire service instantly saved the people from parking troubles and helped them tread the city at cost-effective prices.



In **October 2010**, the name UberCab was changed to Uber, and the company bagged \$1.25 million capital funding for its expansion efforts. Come **May 2011**, Uber made its entry into the iconic New York City only to face heavy resistance from the existing vast taxicab service industry.



For some, this might be a deterrent. But for Uber, the resistance was a means to truly understand their services' power and potential to impact every user type. After six months, Uber made its way into Paris, the city where the founders Travis Kalanick and Garrett Camp got the idea for UberCab.



It is imperative to bring out new features progressively to sustain the customer's interest. Uber followed this philosophy and introduced UberPool in **August 2014**. UberPool allows random riders to ride together and split the fare.



In **April 2015**, UberEats made its way into the market and began operating in Los Angeles, Chicago, and New York. Here again, the UberEats service got its audience in the millennials and too-busy-to-cook professionals.



In **May 2019** Uber decided to go public at the New York Stock Exchange with a market cap of **\$75.5 billion**. In between these years, Uber completed 140 million trips in 2014, 1.8 billion trips in 2016, 3.7 billion (2017), 5.2 billion (2018), 6.9 billion (2019), and close to 10 billion in 2020.



Uber's growth is credited to a long list of reasons.

Some are related to the technology behind the service, while other non-tech reasons are about its business strategies and ability to create customer experiences. Focussing on the tech aspects, we will first talk about how Uber works, followed by the global ride-hailing service's Tech Stack.

3.How Does Uber Work?



Uber’s mission is to make transportation as reliable and smooth as running water. It must be present for everyone everywhere without interruptions. As per the official statements, to make this happen, Uber navigates through some complex data streams, analyzes them in real-time, and delivers the expected results in a fraction of a time.

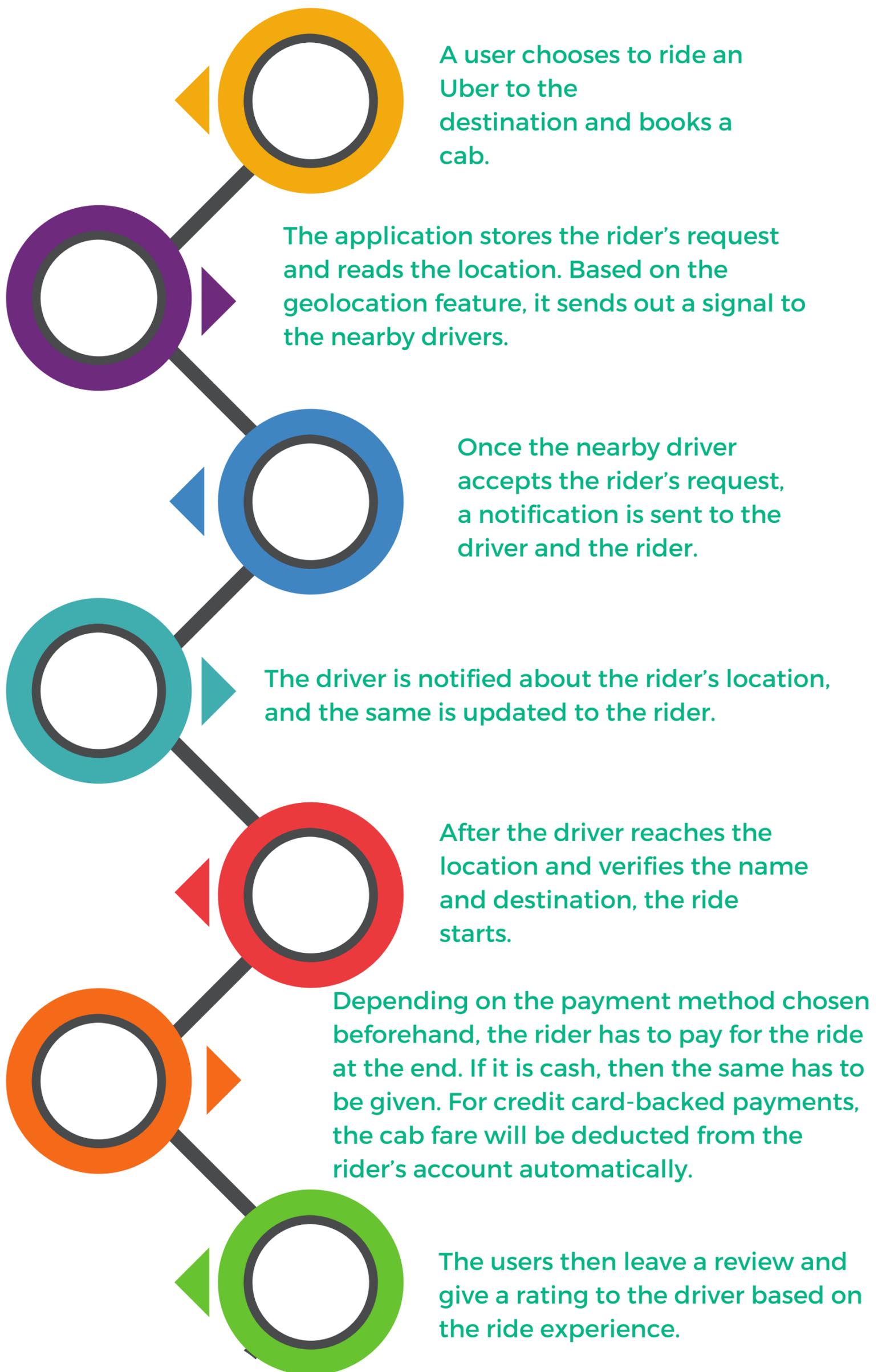
All of this is bundled up neatly onto a single dedicated platform on either side. The Uber UI is simple and intuitive, isn’t it? Well, everything that seems simple from the front has a highly complex infrastructure with several interweaved components working at the back.

Every time a user opens the app and calls for a ride, the entire machinery gets into action. Two interfaces start working in sync with each other. The rider’s interface is different from the driver’s interface, but they both work together to help the rider and driver connect.





Here is how it goes down



To complete this entire circle day in and out millions of times, Uber has built a piece of incredible machinery that works at the backend, making everything possible.

4. Uber Tech Stack



Now to the most important part of the guide. If using Uber is magic, then the tech stack are the tools used to create that magic.

Let's understand the Uber tech stack with every step.

Infrastructure and Storage: Uber deploys a hybrid cloud model for infrastructure and data storage. Multiple data centers run actively and act as backups for each other if one of the data centers trips or fails.

Uber also allocates one data center for every city, but the data pouring from that city is also backed up in another city's data center.

Presently, Uber uses Schemaless scalable data structure with MySQL, Riak, and Cassandra's.



Database	Schemaless with MySQL, Riak, and Cassandra
Distributed Storage and Analytics	Hadoop
Caching and Queuing	Redis

Data Logging: Logging is essential to take care of internal debugging and to set dynamic pricing.

For this purpose, Uber utilizes multiple Kafka clusters, followed by archiving the data into Hadoop.



Logging	Kafka
Data Indexing	ELK (Elasticsearch, Logstash, and Kibana)

Routing and Service Discovery: Uber's entire product offering is based on a service-oriented architecture (SOA). Uber uses two technologies; HAProxy and Hyperbahn.

Hyperbahn has been developed at Uber as a part of their open-source software development initiative. The purpose of Hyperbahn is to automate the services and make them intelligent and performant.

HAProxy helps with JSON requests routing. For front-end web server technology, Uber uses NGiNX.

Service Discovery	Hyperbahn
Routing	HAProxy

Development and Deployment: Uber uses the Phabricator technology for internal operations.

For other tasks like integration, the company uses Jenkins, and inventory management is handled with Clusto. Puppet is used to manage the system's configuration.

Internal Operations	Phabricator
Code Search	OpenGrok
Integration	Jenkins
Inventory Management	Clusto
Systems Configuration	Puppet

Languages Used at Uber: With the company's operations running worldwide, it is evident that Uber is utilizing a mix of several languages.

There are three main languages used by Uber;

- **Python**
- **Node.Js**
- **Java.**



Java is used for its obvious reasons; high performance and efficiency.

Python, along with Tornado, is used to take care of the microservices and asynchronous programming.

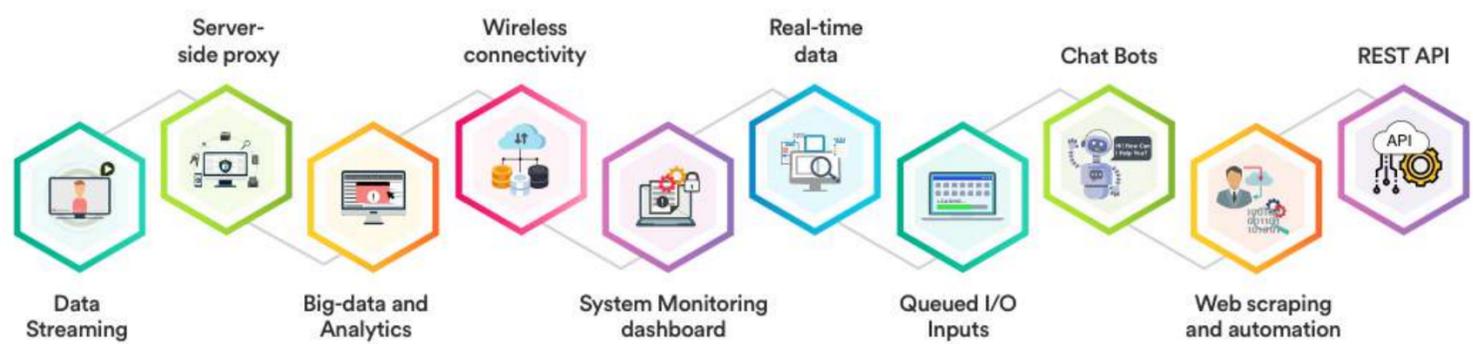
Testing: Uber uses two internal tools for testing; Hailstorm and uDestroy.

- Hailstorm helps with integration testing (a type of platform testing).
- uDestroy intentionally breaks the segments to help the testing team prepare for unexpected failures and improve handling.

4.1 Web Tech Stack

The core of Uber's Web Tech Stack runs on Node.Js, mostly because Node.Js has a large community of web engineers, which is vital to garner support and learning.

- **Web Server:** Uber's base web server, Bedrock, is built via Express.Js. Atreyu is used to ensure communication with the backend services.
- **Application Rendering and State Handling:** Both these functions are completed with the help of React.Js and Flux. React.Js components and modules are easily shared between the teams via the NPM registry.



4.2 Mobile Tech Stack

iOS application is written in Objective-C and Swift, whereas the Android application is written in Java. For some parts, the development team at Uber also uses React.

The Android Build System is completed with Gradle, and the company utilizes technologies like OkHttp, Retrofit, and Gson for networking. Picasso is used for image loading.

Using Espresso, Uber's Android development team can write native code by using Android SDKs.

The iOS build system is implemented with Buck. For the iOS application layout, component placement, and sizing, Uber's iOS development team uses Masonry and SnapKit. iOS application's crash detection is done with KSCrash, and the application's testing is done with OCMock.

Finally, the Uber mobile applications' storage tasks are done with LevelDB, and the back-end systems are completed with Schemaless and MySQL.

Uber leverages a wide gamut of technologies and frameworks to build, scale, and operate their internal functions. The combined impact of all these technologies working and supporting each other has helped Uber become a global phenomenon.

Not just the technologies, but the amazing team working on these aspects is also doing a commendable job to keep things running.

This brings us to the next question of the guide.



5. Why Should Anyone Build an App like Uber?



Most of all, the monetary benefits of building an app like Uber are enough to make anyone start working on it. Apart from this, building an application like Uber is a great thing to do.

After all, one can build a better product than Uber because everything about building a successful app is available on the public domain. So, as an intelligent business strategist, one can identify bottlenecks and build a better application.

Uber's surge pricing has forced various users to look for substitutes, and an Israeli ride-hailing service now cruising in New York has promised to say "No to Surge Pricing Ever." In London, Gett stood up and shook hands with black cab drivers to challenge Uber.

Most of all, we are living in a capitalist world where setting a monopoly is next to impossible. This is a free market, and anybody can enter or exit at will. Yes, any developer will need extensive planning and strategies to build an application like Uber, but it is not impossible.

Let us now explore the ways and means of doing the same.

6. How to Create an App Like Uber?



Every aspect of this process is imperative. Where idea validation helps build a strong case in favor of or against developing the application, the purpose of the discovery workshop is to answer questions like:

- What tools are required?
- What is the estimated cost?
- What will the app look like?
- How many people are required in the team to build the app?
- How to monetize the app?



Business analysis is the part where the creator will conduct market and competition analysis.

The combined effect of idea validation, discovery workshop, and business analysis is the identification of features



Features required for an Uber-like app



After identifying the features comes the design. Create prototypes, wireframes, and mockups of the rider and driver application. Include easy-to-understand interfaces with seamless navigation.

After selecting the designs, choosing the team and getting cost estimates, the development process can be started. Initially, you should build an MVP version of the application and scale it to include advanced functions.

Application building is an iterative process. The testing stage is essential to find bugs, performance issues, integration problems, and any other type of issue(s) that harm the user experience.

Conclusion

An Uber-like app is nothing short of a modern marvel. As one of the most widespread and extensive online platforms, Uber is a success story that every entrepreneur wants to experience. However, behind this global service, many integrated aspects are working together to make Uber work like a single machine.

Building an application like Uber requires extensive research pertaining to the market, customers, and competition. One also needs to identify the core features and design an intuitive application.

Simply put, every idea needs planning, execution, and efficient development. Several applications similar to Uber have come ashore to imitate the success of the ride-hailing giant. Anyone can build an app like Uber and start competing with the big players in the market subject to following the right approach and using the right technologies.