

CleverTap

Enabling Real-time Customer Experiences **At Scale**



**How Marketers Drive Personalization
for Real-world Use Cases**

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Abstract

In an ideal world, customers find your product, learn about it, like what you offer and make a purchase. But the reality is that customer journeys are far from being linear. We're dealing with a completely new kind of customer today: one who's impatient, needs information on the go, and who rewards context and relevance. This lack of patience is born from the desire for Instant Gratification, and signifies an undeniable shift taking place because of mobile and always connected devices.

For example, you're expecting a special delivery from Amazon. It's your anniversary gift and will be arriving in an hour. Wouldn't you want to be there to receive it?

Or, say you're waiting for a rideshare that is five minutes away. Do you wait for the app to tell you when it will arrive? Or do you check your phone every 20 seconds to track its progress?

Today's customer journeys rarely follow the traditional marketing funnel of: awareness > consideration > purchase. These consumers research heavily, are influenced by unpredictable factors, and change their consideration criteria numerous times before purchasing. They even use multiple devices to find information or get real-time assistance.

A recent Forrester Research report on experience optimization platforms finds that most organizations struggle to deliver a consistent customer experience. Because their digital intelligence processes and systems are distributed across different parts of their marketing technology stack. The research also finds that over two-thirds of enterprise marketing technology users identify the ability to integrate as the most important capability of marketing tools¹.

This presents unique challenges for brands who must innovate continuously to stay relevant. To support the velocity and amount of information needed by real-time use cases, brands need to develop a viable production system that allows for previously unknown workloads and data flowing through the system. To identify information when and where customers need it and further, to reach the customers in their key micro-moments, brands have to build massively scalable applications that facilitate these real-time use cases.

This whitepaper aims to provide enterprise teams with a deep understanding of CleverTap's scalable platform. It further describes how our proprietary architecture benefits from proven data ingestion, processing and messaging systems that contrast traditional workflows and facilitate the increasingly prevalent real-time use cases of today.

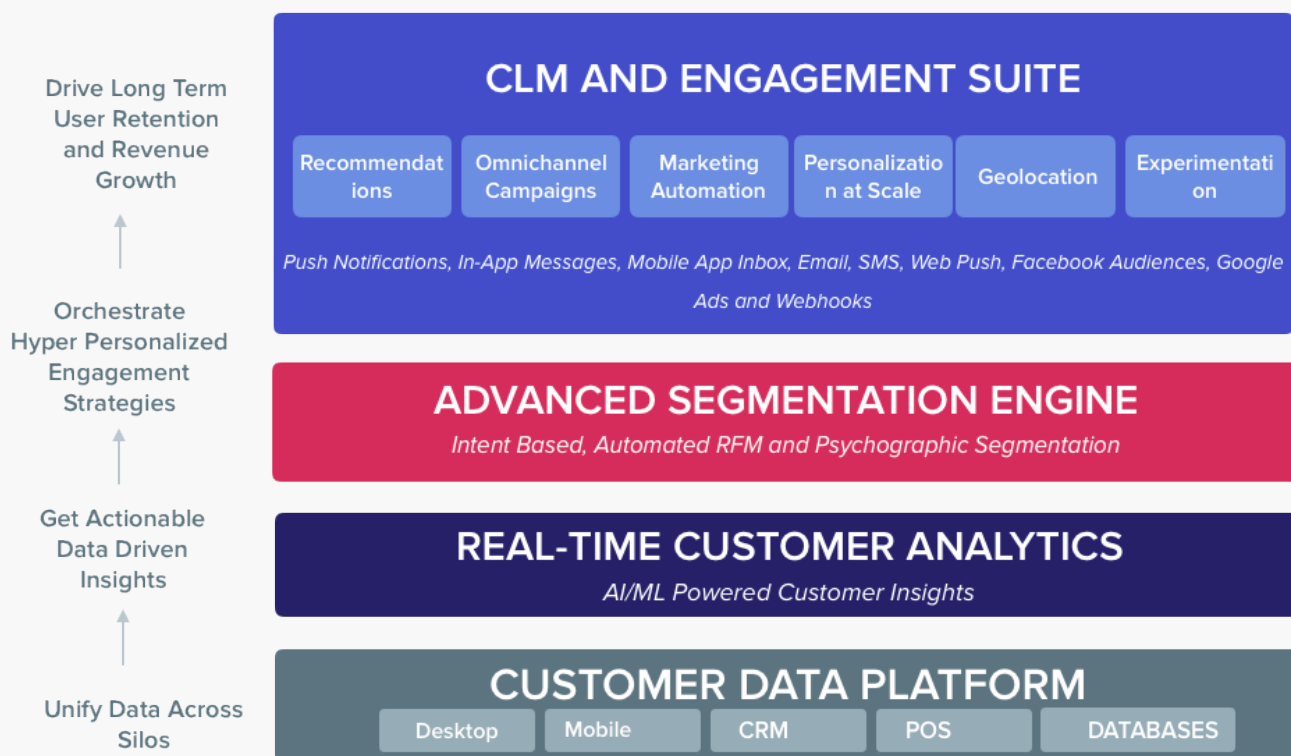
Introduction - Evolving Customer Expectations

CleverTap was built for today's customer journeys - where there are hundreds of touchpoints between initial awareness and conversion. We enable brands to be there when their customers need them throughout the entire journey so they can stay relevant as customers grow more impatient.

The cloud infrastructure allows for provisioning resources on demand, giving CleverTap the elasticity needed to meet frequent spikes in workloads as and when they arise. Automating processes on the cloud allows us to accommodate hundreds of millions of data points at sub-second speeds.

Having a robust infrastructure layer is great. But what we are truly obsessed with is enabling our customers to grow at sub-second speeds.

The CleverTap Customer Lifecycle Management (CLM) Platform



We aim to improve customer experience by making their omnichannel interactions scalable. And when you are an enterprise with extremely large data sets scattered across departments and geographies, that is easier said than done.

The answer lies in an optimal combination of capabilities described above. In the next few sections, we describe each of the layers in detail and demonstrate how CleverTap uses this proprietary architecture to help consumer brands optimize customer experiences at scale.

The Customer Lifecycle Management Platform Built for Scale

1. Unified Customer Data Platform for a Single Source of Truth

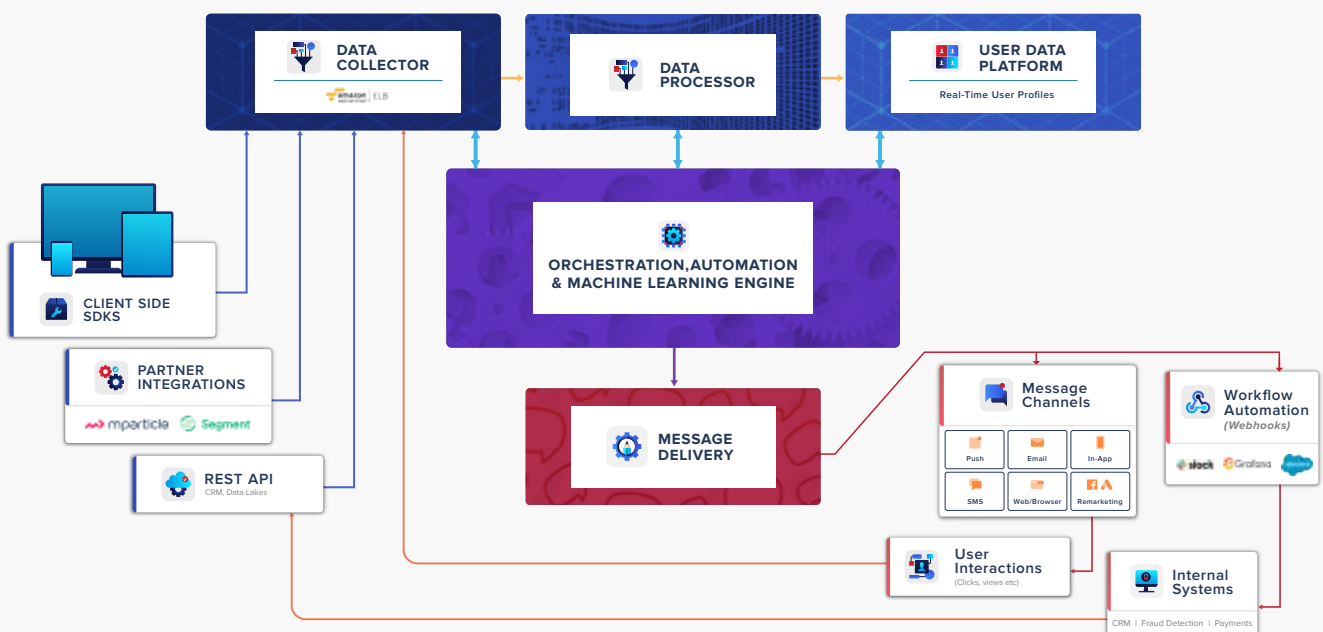
While enterprises collect and process data from multiple sources, the data is typically maintained in silos across teams and departments and is seldom used to improve or optimize customer experience. For example, email marketing, social media, and paid channel marketing are separate organizational silos that often do not talk to each other and result in discrepancies in customer experiences.

That's why a customer data platform (CDP) becomes critical. CleverTap's foundational layer of CDP creates a unified customer database with customer interactions over time from online and offline source systems. This [builds rich user profiles](#) with a 360-degree view of every customer. This layer is important for organizations looking to create a revenue-driven customer engagement approach that can also sustain long-term growth.

CDPs are designed to bring data from many separate systems such as mobile, web, server, product usage, CRM, Point of Sale, payment, call center, and others into a single platform. It gives teams a single view of every customer with unified, persistent user profiles that allow you to deliver consistent omnichannel experiences.

Our CDP enables enterprises to resolve differences in cross-channel efforts and bring more certainty to your omnichannel campaigns. It provides a REST API with endpoints, webhooks, server-side SDKs and error handling that support the most complex use cases including:

1. Sending user data and metrics from external systems to CleverTap (e.g., updating a user profile with support tickets from the issue management system)
2. Enriching external systems with user data and metrics from CleverTap (e.g., enriching a customer account in your CRM with the customer's purchase history)
3. Triggering campaigns in external systems based on real-time events tracked in CleverTap (e.g., sending a checkout reminder to users who have forgotten an item in their shopping cart)
4. Creating campaigns in CleverTap based on external events in real-time (e.g., sending a campaign with price drop alerts when a customer views a certain product)



2. Real Time Analytics: To Drive More Impact from Data

In a rapidly evolving environment, the ability to use data to make business decisions quickly becomes all the more important. Often, marketers are unable to use available data to make data-driven decisions. This problem is known as the last mile problem of business intelligence.²

Our advanced AI/ML capabilities help resolve this challenge by providing relevant customer insights from our customer data platform in real-time using a suite of discovery tools.

Discovery tools are aimed at delivering the power of data science to marketers so they can answer key business questions with insights generated from millions of rows of customer data. These discovery tools help visualize how customers navigate through an app to quickly determine what is causing retention or churn. The tools use predictive algorithms to take the guesswork out of determining who your most engaged users are.

The ability to analyze data in real time not only gives fresh insights but also helps in engaging users with the right message. Think of powering your campaigns with the ability to:

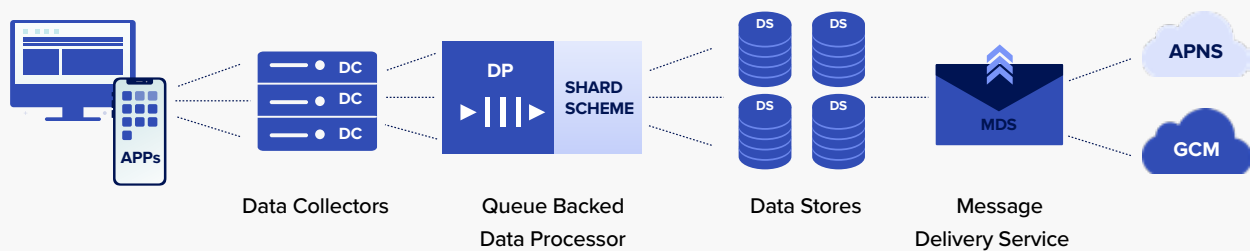
- Trigger campaigns with information on last minute flight gate changes
- Personalize cross-sell/upsell campaigns at checkout
- Analyze peak app usage during the sale period
- Identify friction points in the app and nudge users toward conversion
- Do day parting analysis to identify popular content type for streaming apps

3. One-to-one Messaging with Personalization at Scale

For most organizations, segmenting users effectively is still a challenge since they have to think of multiple dimensions to segment on. Plus, this is largely a manual process.

Delivering a personalized customer experience to millions of users, across tens or hundreds of dynamic user segments presents challenges. In order to achieve this, marketers need a martech stack that uses real-time data to engage users with contextual messages and help them personalize the customer experience for each segment at every touchpoint.

Our architecture is built on a proprietary database designed for analyzing user behavior at scale. We store the entire data set in memory, allowing us to process complex queries without any pre-computation – making us truly real time. Think instant score update, cart abandonment campaigns, or breaking news alert push notifications.



The architecture consists of a data collection layer, fronted by AWS elastic load balancers (ELBs), that accept data via HTTPS from client-side SDKs (as well as REST API). To remain responsive, the data collection layer does only minimal validation before dropping data into a separate data processing layer for preparation and delivery to the data store layer, where it is immediately available for querying.

The data store is one that stores real-time user profiles, user actions and metadata that describe those actions. We store the entire dataset in-memory to process complex queries without the need for any pre-computation - for high throughput and sub-millisecond latency, making us truly scalable in real-time.

Under the hood, the architecture is built to:

- Handle data ingestion (particularly out of band spikes) without any processing delays so that campaigns are triggered by incoming data in real time
- Strictly use exact metrics for all our analytics, segmentation and engagement offerings.
- Enable massive scale and real-time performance across millions of users. We provide answers for queries that span millions of data-points in near real-time without any pre-computation.
- Provide the flexibility of breaking larger data sets into smaller shards spread over multiple physical servers in order to scale limitlessly.
- Deliver the resulting messages to users in real time.

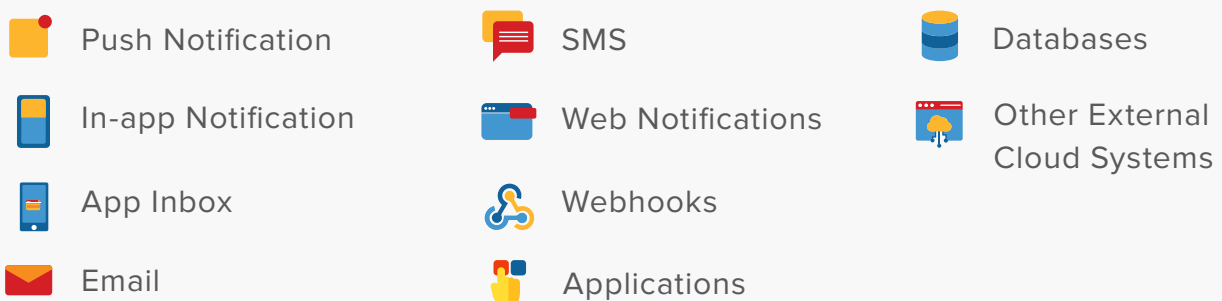
4. Flexible User Engagement Platform

The next layer we built uses machine learning capabilities to process millions of data points across an entire user base to enable marketers to optimize customer experiences at scale. This is made possible by a separate message delivery service (MDS) which is responsible for querying the data store to generate and deliver messages via email, push notifications, and other channels. With MDS, we ensure that the time it takes for the data to come into the CleverTap system to making that data point actionable is the lowest.

To realize the opportunity that comes with customer lifecycle management at scale, our ML engine synthesizes data insights to connect the dots between critical customer interactions (e.g., purchase history, app activity, browsing behavior, and device preferences) to deliver a more end-to-end experience.

With these insights, CleverTap helps marketers thoughtfully engage users while considering internal and external factors in their workflow such as limiting the number of messages you send in a day or using fall back channels in case a message does not reach users on the first channel.

Our platform facilitates high-volume delivery of campaigns across devices and physical and digital channels, including:



Today, we serve multiple apps having more than 100M downloads, sending thousands of timely messages daily to micro-segments of users.

5. Data Security and Privacy

Customer trust and data privacy are at the core of what we do. We are backed by a system architecture built for guaranteed uptime, with globally distributed data centers for redundancy. We have built an infrastructure that gives customers real-time replication, backups, and high redundancy, providing them with high availability and rapid recovery in case of issues.

5.1. Security and Compliance

Protecting customer data is a top priority at CleverTap. [Our security and risk management processes](#) safeguard each customer's data within its own silo, strictly restricting any movement of data between clients and ensuring no inadvertent access to data other than their own. We leverage multi-factor authentication, in-flight data security using industry standards, formal change management policies, and up-to-date security protocols on the dashboard and across all API endpoints to ensure that customer security is never compromised.

5.2. Physical and Network Security

We maintain data centers on AWS that are fully compliant with a range of certifications for industry-specific applications. The system is built so there is no single point of failure. Data is replicated across a number of physical and logical volumes to protect it against accidental loss. We follow best practices to protect the network perimeter, including maintaining redundant DNS servers and mitigation systems. Antivirus and a host-based intrusion detection system (IDS) are used on all production servers.

5.3. Encryption of Data At Rest and In Motion

We perform encryption at all incoming and outgoing data collection endpoints. TLS protocols with SHA256 algorithms are used to handle communication between CleverTap and customer applications. The data key used for encryption is itself encrypted using a unique customer master key and stored securely on the disk. The customer management key is stored securely using FIPS 140-2 validated hardware security modules and is never transmitted outside of the region where the encrypted data is stored.

5.4. Access Control

We restrict access based on least-privilege while allowing customers to easily manage their user data. We have also established best practices so customers can easily access their content and determine how it is stored and processed through user permission controls and approval workflows. This access model is enforced on each end user session.

Additionally, to access the CleverTap dashboard, every end user requires a unique user ID and password, along with multi-factor authentication and role-based access, ensuring multi-tenancy and complete data privacy. CleverTap passwords use PBKDF2 (Password-Based Key Derivation Function 2) with HMAC (hash-based message authentication code) along with a salt value and the SHA-1 algorithm.

5.5. Privacy

CleverTap has a formal [Privacy Policy](#) and [Terms of Service](#) that cover in detail how the platform collects and stores personal and non-personal data. Further, we do not mandate any specific user information to be sent by the publisher nor does the system seek any extra permission outside of what an app might typically ask for. We do not sell, share, rent or re-market publisher data to any third party.

We collect and store information provided by our customers: the app publishers. The CleverTap dashboard lets the app publisher run queries on this data set to extract reports like app logins, transactions, video views, etc. We also enable app publishers to send messages to users based on their actions or demographic profile. For example: a publisher can use CleverTap to send an email to users thanking them for a recent purchase. Our platform works with first-party data provided by the app publisher; we don't enhance or combine data from other sources at our end. Data is erased from our systems. We enable customers (i.e., the app publishers) to do this through both a dashboard deletion and an API deletion tool. If your end user revisits your app in the future, they will be treated as an anonymous user.

5.6. Business Continuity and Disaster Recovery

CleverTap is built on an infrastructure that relies on real-time replication, backups, and high redundancy. Our proprietary technology is fully-owned by us and allows us to provide high availability and rapid recovery in the event of an issue. We are not reliant on any external launch cycles or product updates to improve performance. We maintain business continuity and disaster recovery plans that use rapid recovery mechanisms in case of outages or in the event of availability or performance issues. We ensure continuous customer communication to keep clients updated until the issue is resolved.

5.7. Compliance

We are committed to maintaining strong data protection commitments while also ensuring that we provide customers with the tools required to comply. We follow best-of-breed measures to align with industry guidance on cloud security. By maintaining a shared responsibility with AWS, CleverTap is able to maintain fully compliant data centers that allow sensitive data to be stored securely.

5.8. General Data Protection Regulation (GDPR)

We are committed to delivering products that are at the vanguard of protecting our customers' and users' data. To that end, we are GDPR [General Data Protection Regulation](#) compliant. Consistent with our commitment to security and data privacy, we have appointed a Data Protection Officer (DPO) at CleverTap to ensure continued support for customers and end users. Within the purview of GDPR, all CleverTap users have the right to access, the right to delete, and the right to suppress.

- **Right to Access**

The end users (app users) may request to view their personal data by exercising their right to access, which allows them to understand how their personal data is being processed on your app, at which location, and for what purpose. We provide this feature to our customers (i.e., the app publishers) through a detailed report on end user profiles that you can generate on the dashboard and easily share with your end users should they request it.

- **Right to Be Forgotten**

The end users (app users) may exercise their right to be forgotten (or data erasure) on the app, giving them the complete authority to have their personal profile and event data permanently erased from our systems. We enable customers (i.e., the app publishers) to do this through both a dashboard deletion and an API deletion tool. If your end user revisits your app in the future, they will be treated as an anonymous user.

- **Right to Suppress**

This entitles end users (app users) to invoke the right to have all their personal data dropped from further processing by both the controller (the app publisher) and the processor (CleverTap). We allow this through our new SDK, which grants end users the ability to immediately have their devices stop sending data to CleverTap systems.

Our legal, security, and engineering teams collaborate to keep our compliance measures consistent. We have introduced a [Data Processing Addendum \(DPA\)](#) that formally designates CleverTap as a data processor and provides our customers with a complete understanding of our commitment to data privacy and ownership of personal data. We have a DPA in place with all customers to ensure compliance with the GDPR.

5.9. Application and Release Management

We provide continuous feature improvements to our product through an agile, continuous delivery approach to software development. We use software gating and traffic management to control features based on the type of product launch. All major feature changes are communicated to customers through our dashboard and product update blog posts and communication.

All code changes and updates are reviewed and have to go through quality assurance by designated repository owners. The deployment team manages updates and notifications about the CleverTap application and in case of any failure, the deployed code is immediately rolled back.

6. Marketing Automation Powered by Machine Learning

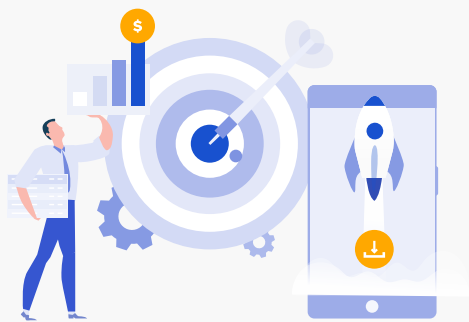
Knowing your users and their preferences is the foundation to delivering a seamless customer experience. But when you're dealing with millions of user data points, that's far from easy — and downright impossible without using intelligent systems and technology. For this reason, marketers have to embrace machine learning to deliver the experience users have come to expect, across all channels and touchpoints.

With its advanced data science and ML-powered features, our platform helps the modern day marketer create engaging experiences for users. Whether you're turning new users into champions or incentivizing current users to buy more, our highly scalable marketing automation workflow [Journeys](#) will help weave together engagement campaigns across channels seamlessly.

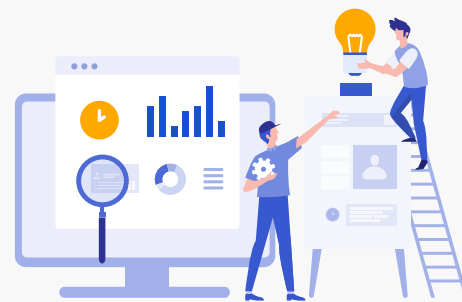


6.1 Intent Based Segmentation: Maximize Engagement with Every Interaction

Intent Based Segmentation uses machine learning and predictive modeling to determine how likely your users are to meet a specific goal. Looking at hundreds of dynamic digital signals such as a user's visit frequency, recency, and past transactions, it identifies three actionable user segments: most likely, moderately likely, and least likely to convert. This allows you to craft targeted messages to the right users, meet your KPIs, and increase marketing ROI by up to 5x.



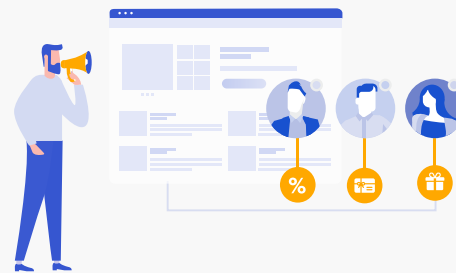
Step 1: Create a Goal: For example, maximize purchases for Electronics by May 24th.



Step 2: Let CleverTap's Intelligent Data Science Engine – Coeus - Predict the Outcome.



Step 3: Discover User Intent: Find users that are most likely, moderately likely, and least likely to convert.

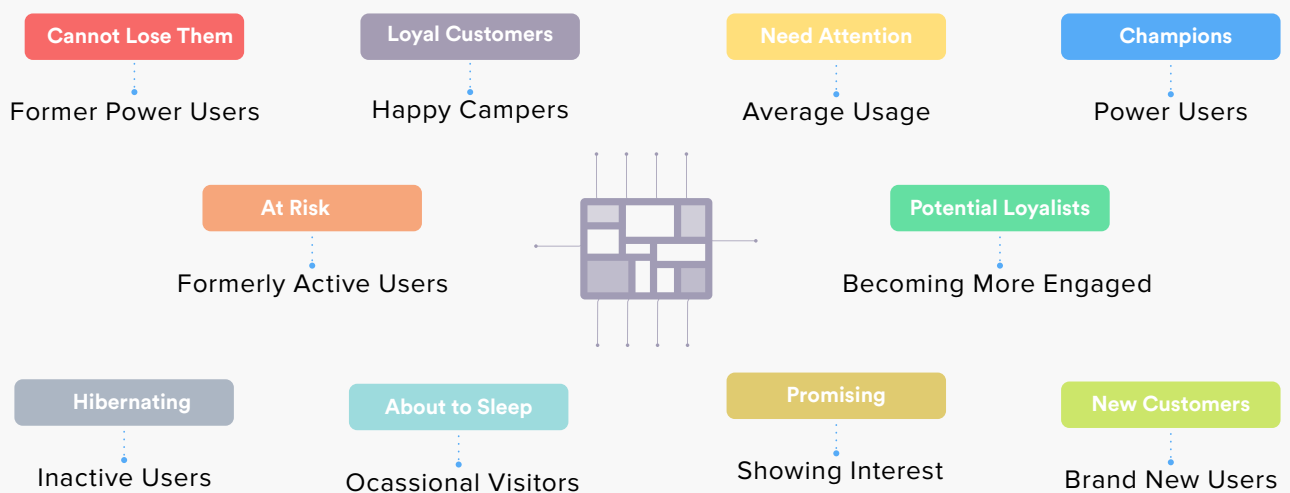


Step 4: Differentiate your campaign strategy with the knowledge of every user's intent.

6.2 RFM: Automated Segments Right Out of the Box

CleverTap's best-in-class automated segmentation technique – via recency, frequency, monetary (RFM) analysis – examines your customer activity to identify how recently and frequently they performed an action such as purchasing a product or booking a trip.

It divides your entire audience into distinct groups that range from champions and loyal users to at-risk and hibernating customers that are likely to churn. This allows you to identify the health of your audience, no matter how large, instantly and automatically.



Explore more advanced features of our platform by visiting:

<https://clevertap.com/features/>

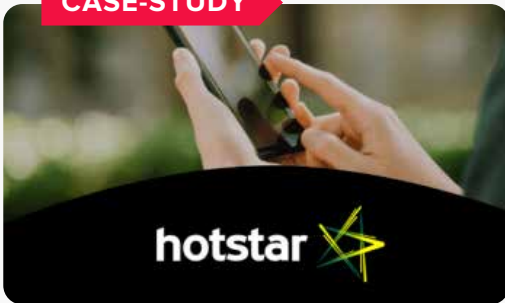
Conclusion

All the new channels, the usage of multiple devices, and the proliferation of digital and physical touchpoints has made the modern customer journey a lot more complex. This presents a challenge for brands that want to delight customers at every micro-moment. The key is to drive personalized conversations with your customers across their entire digital journey – one mobile moment at a time.

As customer expectations keep evolving, traditional marketing tools simply stop serving the modern day marketer. Data-driven marketing approaches powered by AI and ML will help marketers create a sustained competitive advantage that will be a game changer for any brand that wants to be top of mind for their customers. At CleverTap, we are constantly innovating to help brands create experiences that customers remember.

Enterprise Resources

CASE-STUDY



[How Hotstar Scaled User Engagement to Record-Breaking 10.3M Concurrent Users](#)

See how Hotstar, an online video streaming platform with more than 350 million users and 100,000 hours of video content, used CleverTap to drive growth with real-time engagement at hyperscale.

CASE-STUDY



[Cleartrip Achieves 5x More Cross-Sells with Personalized Campaigns](#)

Learn how Cleartrip, a leading online travel aggregator, used CleverTap to engage with users on various digital touchpoints to increase cross-sells and monetization.

BLOG



[FIFA and IPL 2018: Recalibrating CleverTap's Architecture for Scalability](#)

While billions were enjoying streaming games, ordering pizzas, and fine-tuning their fantasy teams, our systems and engineers were hard at work processing billions of incoming events and outgoing push notifications.

CleverTap

See how 8,000+ leading brands use CleverTap's customer lifecycle management and engagement platform to optimize user engagement and fuel business growth.

[SCHEDULE A DEMO](#)



SONY



GO JEK



FANDANGO

ShareChat



dealsplus+



ZILINGØ

YOURTRAINER

bookmyshow

WinVIEW GAMES

gracenote

truecaller

HealthifyMe

astro

DREAM11

TIMESINTERNET

Transform Your Customer Engagement With CleverTap

55 BILLION

User Actions / Month

12 BILLION

Messages Sent / Month

1 BILLION

Unique Devices Reached