Appice

CUSTOMER ENGAGEMENT PLATFORM

INTEGRATED DATA PLATFORM

CDP | ML Models | Omni Channel Engagement | Analytics

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Executive Summary

We are living in the golden age of data. Brands today have numerous ways to capture customer's preferences, habits, likes, dislikes or behaviour. Every minute of every day, customers interact with the bank's digital assets, outbound, inbound, and owned media creating huge amounts of data—static and dynamic, structured and unstructured. Capturing data is the first step, but there remains a large gap in transforming data into actionable insights and business actions.

Our goal is to help Bank's use data to drive digital engagement & revenue.

AppICE is an integrated data platform which is being used by leading banks in India such as SBI Yono (60 mn customers), Union Bank of India (45mn customers), Bank of India (20 mn customers), SBI Cards (15mn customers) and Internationally Etisalat (12 mn customers). With AI and ML at its core, the platform provides a full stack solution from data integration to insights - powering data-driven decisioning & insights, enabling brands to deliver highly personalized experiences; that drive conversion, loyalty and improve ROI.

Key Pillars of Platform:

- **Customer Data Platform [CDP]**: Build a 360 view with all transactional, behavioural & first party data for in-depth, real-time insights into customer preferences & engagement patterns, enabling personalized marketing campaigns that resonate with each individual.
- **Campaign Automation**: Deliver hyper personalised omni-channel campaigns across touchpoints. Push Notifications, In-App, Web Push, Email, WhatsApp and SMS campaigns.
- **ML Studio**: MLOps and AI models are integrated to seamlessly build and deploy models for Churn, NBO and Propensity
- **No Code Analytics**: Democratise data drive insights with self-serve advanced analytics.
- **Reverse ETL** : Leverage 1st party data to build segments which can be synced with all downstream tools such as CRM, Ad Platforms. This helps increase ROAS by 20-25%
- **Personalisation API's**: Leverage all data for real-time personalization API which can be used by CMS, CRM or product teams. Enhance CRM data with next best offers, personalized recommendation or LTV.
- **Crash Analytics**: App monitoring that gets to the root cause for every issue.

Business benefits of a unified, integrated data platform:

All Data in One Place	New Audience Segments	Drive Personalisation
Remove data silos. Get all data from CBS, DLP, DBS Add Credit Rating Data Data from Advertising Build foundation of customer experiences and business insights.	**Combine Transactional, Behavioral & Demographic data to build new and beneficial segments** Understand high value customers, Online spenders, Loyal customers, Propensity to buy (x)	**Build clusters & use data across touchpoints** Omni-channel targeting Push, In-App, Web Push, SMS, WA Target high propensity for product (x) Personalised nudges for reminders, loyalty drivers
Value Realized: Customer 360 –A single pane	**Value Realized:** Audience segmentation & real-time insights leads to higher efficiency.	**Value Realized:** Enhance customer experience & loyalty

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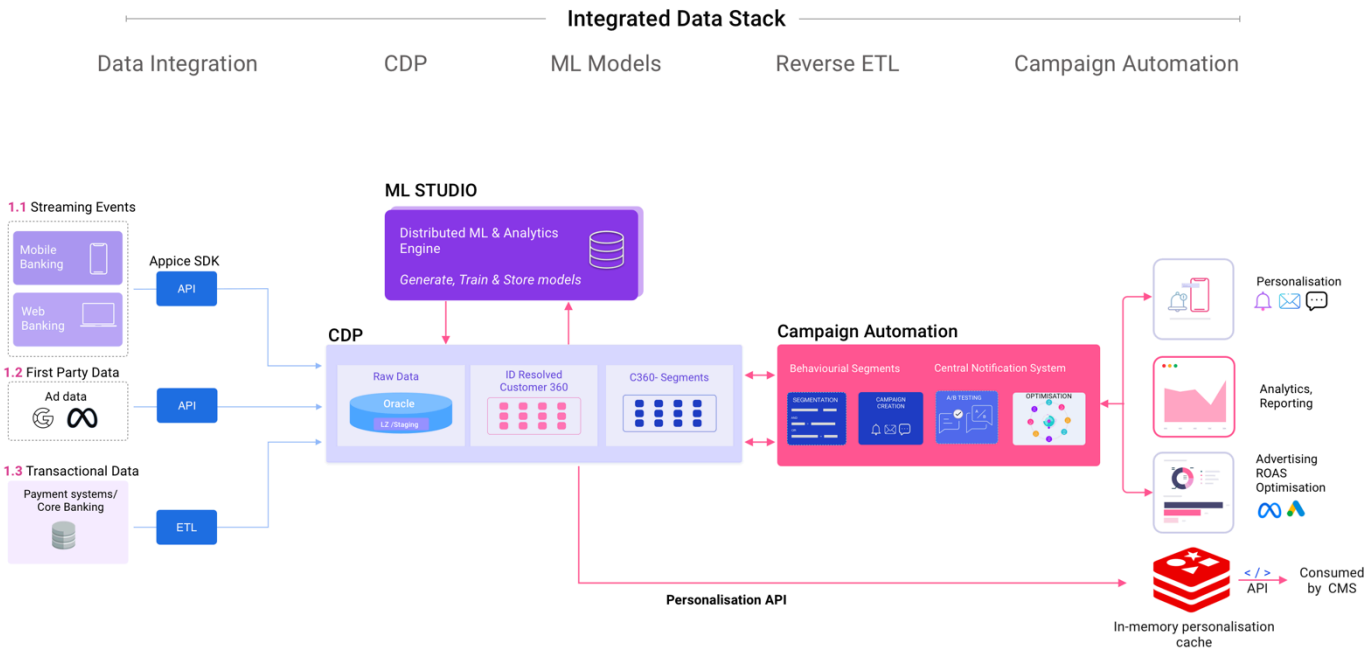
Data Activation	ML Models	Marketing Efficacy
Real Time Moments, Triggered Moments Upsell basis propensity Optimize journeys Shift behavior eg. credit decisioning based personal loan offer on App	**Build and deploy ML models to improve conversion, acquisition or retention with ML Studio** Predictive models, Churn, Propensity, Cross-sell, NBO Customer event scoring	**Access to Real-Time segments & data connectors critical to stay competitive** Activate segments in social or paid media with reverse ETL Suppression Segments Prospecting with propensity models
Value Realized: Improve operational KPI's.	**Value Realized:** Reduce time to market.	**Value Realized:** Improve ROAS

Platform Overview:



- Mobile SDK to ingest App events
- Web SDK to ingest Web events
- Transactional data connectors
- Google and Meta connectors

- CDP: Customer 360
- ML Studio to build models
- Segmentation: Transactional & Behavioural data

- Campaign creation & targeting
- Push, In-App, SMS, Email, WA, Web Push
- Reverse ETL
- Campaign reporting

- No code analytics platform
- Personalisation API
- App performance & crash analytics

Drivers of Personalization: Behaviors and Profiles

When it comes to personalization, especially from the standpoint of the data and technology that drive the customer experience, it is critical to distinguish between the two primary methodologies for personalization: behaviors and profiles.

This distinction is important because the data sources and technologies behind each can vary significantly.

Behaviour-Based Personalization
In behaviour-based personalization, one step determines the next step in the customer journey. Each touch, swipe or click is recorded as an *event* to understand the experience and actions of customers.

Behaviour-based models require a significant amount of event data for training the model as well as driving personalization in real-time—data that represents the granular actions taken by each user. Events are collected using streaming pipelines, and real-time personalization requires a robust infrastructure that can handle high volume with low latency.

Data of in-session behaviour, such as page views, product views, purchase, download or the sequence of certain behaviors can be used to drive personalisation by:

- *o* Targeting segments built on past behavior *or*
- o Leveraging recommendation models based collaborative filtering models

Profile-Based Personalization
In profile-based personalization, 'characteristics determine the next step' in the customer journey. This generally means that some demographic characteristic of the user (i.e., age, gender, job title, interests, etc.) or transactional data or derived traits (balance, propensity, credit risk etc) determines the next steps in the customer journey.

Profile-based models require programmatic access to user profiles & transactional data in real-time.

Combined Models
While the use of the above personalization methods individually is common, our end-to-end platform offers a '*combined model*', which leverages both behavioural data, rich profile data, and, many times, other outside data, such as credit scores, geo-location, etc.

Combined models are particularly challenging because they require robust pipelines and centralized storage for both event and profile data. And for models to be effectively deployed, pipelines that receive algorithms' output from advanced data science workflows also need to be managed.

Delivering Real-Time Personalization
Built on the concept of a Modern Data Stack, AppICE CDP delivers real-time personalization for banks across their entire portfolio of products.

Functionality

Sno	Integrated Data Platform	
1	Customer Data Platform (CDP)	
1	Customer Experience Platform (CEX)	
2	Monitoring & Crash Reporting (Mobile Apps)	
3	Email Designer & Email Performance Analytics	
4	ML Ops and AI driven ML Models	
5	Integration of Social Media Reporting	
6	Reverse ETL to send data to Ad Networks for Paid Media Optimisation	
7	Self serve No-code Analytics for Transactional Data	

#	Functionality	Solution Capabilities	Details
	Channel engagement and personalization		
1	Channel engagement and personalization	Auto-triggered/Customized notifications based on the Customer actions on Bank App or Website	Notifications can be triggered based on customer action in the past or when they are live on the app. Behavioural data can be combined with transactional data to build specific segments to send Auto-triggered/Customized notifications.
2	Channel engagement and personalization	Customized notifications/ offers based on the customer profile, balance…etc.	Notifications can be triggered based on customer action in the past or when they are live on the app. Behavioural data can be combined with transactional data to build specific segments to send Customized notifications/offers based on the customer profile etc.
3	Channel engagement and personalization	Communication based on customer preference	Appice platform understands which channels customers engage on. This intelligence is used to enhance communication effectiveness.
4	Channel engagement and personalization	Customer Notifications (SMS, email, in-app push notification, WhatsApp)	Available Engagement Channels: SMS *(gateway to be provided by Bank)* Email *(gateway to be provided by Bank)* Push Notification In-App Notification App-Inbox WhatsApp *(number & API to be provided by Bank)* Web-Push Web-Popup
5	Channel engagement and personalization	Dynamic content delivery based on user preferences and behaviour	The system provides templates that can be customized using the popular mustache handlebar templates to deliver dynamic content based on user preference like language, time, geo or behaviour on the app/website.
6	Channel engagement and personalization	Notifications & Alerts: Push notification for real-time updates and customizable alerts for app activities or promotions	We offer flexibility to send Notifications & Alerts: -Segments based on user activities - Past events or live events -Central Notification system (CNS) can connect with Internal DB/systems to generate real-time notifications -API's to connect with 3rd party systems (eg. Payment Gateways) - Basis ML cohorts or computed traits

7	Channel engagement and personalization	Feedback Mechanism: User feedback and survey tools to gather customers opinions and mechanism for analysing and acting upon customer feedback.	This can be achieved via following available engagement channels: In Survey In Rating
8	Push notification	Personalization of push notifications based on business level events via broadcast.	Engagement Channels: Push Notification
9	Push notification	Personalization of push notifications based on customer's preferred language	Engagement Channels: Push Notification --> Language
10	Push notification	Ability to send push notifications with images, videos, GIFs and Emojis	Engagement Channels: Push Notification --> Expanded Image upload
11	In-App Messaging	Display messages directly within the mobile app based on trigger criteria.	In-App notifications can be set up basis any event performed by customer - past events or live events
12	In-App Messaging	In-app messaging templates for personalization	Various templates for onboarding, investments, customer service, offers can be created & targeted basis segment, time, dates, frequency etc.
13	In-App Messaging	Personalization of In-App Messages based on the customer's preferred language.	In-App messages can be shown in English or Hindi. We support various other languages like Tamil, Bengali, and all the major languages of the world.
14	SMS Campaigns	Build personalised SMS campaigns	Campaign builder module allows SMS text editing with functionality to embed emoji or short URL
15	SMS Campaigns	Ability to send SMS messages to the entire user base or to a selected segment or to a selected set of customers based on business level events or manual broadcast.	The messages can be sent to the full audience or a particular segment as small as 1 based on business level events or broadcast. Further these messages can also be added to the AppInbox to make them permanent unlike push/sms/wa messages that can be deleted or blocked.
16	SMS Campaigns	Personalization of SMS based on the customer's preferred language.	SMS can be sent in English or Hindi - The system provides templates that can be customized to deliver dynamic content based on user preference like language, time, geo or behaviour on the app/website.
17	SMS Campaigns	Manage and optimize SMS communication process with recipients via DND (Do-Not-Disturb) and frequency capping	DND list can upload on the platform to create a -ve list or campaigns can be sent as per time schedule (8am-8pm). Frequency capping is part of campaign scheduling.
18	Email Campaigns	Design Email campaigns within the platform	Build new HTML emails or edit existing templates.
19	Email Campaigns	Send time-sensitive updates and promotions via Email.	Part of campaign scheduling
20	Email Campaigns	Personalization of Email based on business level events via broadcast.	Personalise basis - Name, Segment, Funnel dropoff, Page visited, language, time, geo or behaviour on the app/website.
21	WhatsApp Campaigns	Trigger interactive conversations with quick replies or add defined CTAs to drive customers to do the desired action.	Business WhatsApp number to be provided by the Bank. We will build an interactive messaging layer for WA.

22	WhatsApp Campaigns	Manage and optimize WhatsApp communication process with recipients via DND (Do-Not-Disturb) and frequency capping	WhatsApp number and API access is to be provided by the Bank. Appice uses these API's to send messaging with DND, Frequency capping variables (campaign launch stage)
23	Personalization	Create personalized messages and content based on user data and preferences.	Platform provides message builder for Push, In-App, Web-Push, SMS, WA, Email using internal DAM - which stores images & templates.
24	Personalization	Tailor messaging to specific user segments. Personalization based on product attributes and user behaviour data.	Behavioural data is ingested via Appice SDK and used to build segments - Who, What, When, Where.
25	Personalization	Personalization based on Recommendation Models using Artificial Intelligence (AI).	Next Best Action (NBA) based on behavioural, Transactional data - AI determines what is the next best offer and personalised for each user e.g. using credit score, balance, risk profile, loan requirement personalised recommendations on new credit card, pre-approved loan, investment plans & insurance.
	Data Analytics		
26	Data analytics	Behavioural customer data reports and dashboards	Aggregate Reports on DAU, MAU, WAU. Funnels and Journeys. Segment trend. Campaign performance across channels.
27	Data analytics	Real-time reports across web & mobile App	All reports are generated in real time for App and Web.
28	Data analytics	Segments based analytics	Segments can be created using Events data (Past & Live) who did what and when, App performance, Computed Traits or using uploaded customer data.
29	Data analytics	Funnel view and users drop offs	Funnels are created, for conversions or drop-offs, using behavioral data.
30	Data analytics	Journey effectiveness and bottleneck identification	Journeys are created for the entire App - these reflect what customers are doing in our App.
31	Data analytics	Average time spent per customer journey	Part of Reports/Dashboard
32	Data analytics	Daily active users	Part of Reports/Dashboard: DAU, MAU, WAU by time period
33	Data analytics	Real-time sessions and live active users	We have a near real time system where the user's sessions are made available with a slight delay on our panel so as to not interfere with the main activities of the users. The session and other behavioural data is captured in the background to conserve bandwidth and improve UX. The data is hence near real time (delay of few seconds)
34	Data analytics	Customers device models	Part of Reports/Dashboard
35	Data analytics	machine learning models with predictive analytics	ML models to predict Propensity, Churn, LTV or any specific model can be built (upto 5)
36	Data analytics	Identify and analyse trends over time	Trends for past data are available out-of-box. Any specific trend report can be customised as per bank's requirement (upto 5)
37	Data analytics	Tracking customer behaviours in response to the received notifications. Popups and error messages	Part of Reports/Dashboard: App campaign effectiveness
38	Data analytics	Historical Data Analysis, based on custom date and time	Part of Reports/Dashboard: App usage data

39	Data analytics	Advanced exporting based on different variables and filters	Part of Reports/Dashboard: App usage data
40	Data analytics	Scheduled and automated reports	Scheduled and Automated Reports can be setup as per business requirements
41	Data analytics	Filtering and sorting options	Filtering and Sorting options for various fields are provided out of the box and more can be added as per requirement.
42	Data analytics	Customizable Data visualization such as charts, and dashboards	We have a sophisticated visualization engine that can let business users built custom charts and dashboards in minutes. It allows advanced data analysts to also build reports using SQL so that both the audience can build, share and export visualizations from a single tool.
43	Data analytics	Data Archiving	Data retained for 1 yr
44	Data analytics	SMS and Email communication performance / tracking	SMS gateway to be provided by Bank. Email SMTP server to be set up by Appice. If Bank has any pre existing email gateway, we can used their API's
	CDP		
45	Data Unification	ETL data from CBC, CRM, Ad Platforms or 3rr Party Marketplaces to build a complete customer 360	CDP (customer data platform) has pre-built connectors to ingest data from various sources, internal DB's via ETL, SFTP/CSV Uploads or API's. Mobile App data is ingested using Appice SDK.
46	Data Unification	Collect and unify customer data from various sources, including, mobile apps, APIs, Payment systems, SFTP, CSV Uploads and other sources to enhance personalization and targeting	CDP (customer data platform) has pre-built connectors to ingest data from various sources, internal DB's via ETL, SFTP/CSV Uploads or API's. Mobile App data is ingested using Appice SDK.
47	Customer 360	Centralized user-profiles and interactions to create a comprehensive view of each customer - C360	CDP creates a customer 360 using behavioural, transactional and App usage data. ML models for Propensity or Churn are also part of C360.
48	Reverse ETL	Social media integration for enhanced engagement	This is enabled via a feature called Reverse ETL
49	Predictive Analytics	Leverage data to predict user behaviour and preferences.	Propensity and Next Best Action Machine Learning Models are available out of the box to predict user preferences.
50	Predictive Analytics	Predict App Uninstalls, Dormant, Conversions, or any custom behaviour.	This feature is enabled through Churn Prediction and RFM Segments
51	Predictive Analytics	Auto creation of segments based on past behaviour using Machine Learning Models.	RFM (Recency, Frequency, Monetization), Pareto-NBD and auto segmentation based on vector embeddings are supported.
52	ETL Connectors for different Data Source	Data Ingestion from various source systems channels	We have pre-built connectors for data ingestion
53	User Segmentation - Transactional & Behavioural Data	• Define segments of your user base based on attributes and behaviours. • Segment users for targeted messaging and campaigns. • Ability to export Segments to any custom end-point for re-targeting	- Segments are built using Behavioral data or transactional data: We follow the segmentation concept of Who, What, When and Where - Segments are used to send targeted campaigns in any channel. - Top 10 Segments are used to build trends. - We have a high performance personalisation API, which can be consumed by any downstream system.
	Campaign Management		

54	Campaign Management	Campaigns effectiveness measurement	Sent, Delivered, Opened, Clicked, CTR
55	Campaign Management	Tracking of the different sources of leads landed on Bank App or Website channels and identification of the most active page promoting a specific product	UTM codes generated by Platform are used to track lead sources. These codes have to be inserted in campaigns by business users - either in campaigns created on platform or in social media. Identification of the most active page is by capturing visitor numbers on a page.
56	Campaign Management	Marketing messaging	Segment messaging, personalised by user actions or behaviour, delivered in an omni-channel campaign.
57	Campaign Management	Campaign planning & content marketing: easy content creation, editing and publishing capabilities	We will provide MMP integrated with SDK to track acquisitions from paid digital ads to the mobile app and from there the account opening process. Insights/reports are restricted in IOS(ATP). The Android ecosystem is still without restriction, though in 2024 Google will redact many granular reporting features. Visuals for campaigns, Role based access are part of Platform (3rd party vendors are given specific roles to build campaigns). Reverse ETL sends specific segments (H/M/L basis LTV or propensity) to social media platforms so as to enhance bidding effectiveness.
58	Campaign Management	Marketing analytics	Sent, Delivered, Opened, Clicked, CTR
59	Campaign Management	Lead generation & cross-selling	Lead generations are primarily done through NTB channel (new to bank) or ETB channel (existing to bank) customers. Further NTB is optimized using our reverse ETL to make ROAS significantly better. This is especially important in the context of 3rd party cookies going away. The NTB/ETB channel is further targeted through cross-sell and up-sell models that we already have in our system.
60	Campaign Management	Campaign optimization	Campaign ROAS can be optimized by passing the insights from our system to ad networks so that lookalike audiences, custom audiences and suppression lists can be made to enhance campaign efficiency in real time. Further, the system can optimize owned audience marketing by building campaign flows based on costs starting from the lowest cost like push to email to sms and finally to ad networks.
61	Campaign Management	Campaign planning and activation	The system has capability to create & put campaigns in draft. It can also allow you to plan & schedule campaigns in advance.
62	Campaign Workflow	Ability to have a campaign workflow involving multiple stakeholders like product, marketing, compliance, quality etc, for SMS, Email, Notification and WhatsApp messages	Maker-checker flow is part of campaign operation. Platform allows building templates which can be edited or re-used for creating new campaigns, targeted at new segments on multiple channels.
63	Campaign Workflow	Ability to have a maker-checker workflow for broadcast messages	The system supports maker-checker functionality out of the box.
64	Campaign Workflow	Ability to add/edit/delete any conditions of the published workflows and also maintain the audit logs for change management.	The system allows to add/edit/delete the conditions of the published workflows and maintains an audit log for change management. The system also allows copy and edit functionality of the workflows.

65	Campaign Workflow	Ability to have out-of-the-box templates for various use cases such as Onboarding, Retention etc.	The WYSIWYG system allows you to edit the templates that are pre-configured and available out of the box. However, we recommend building these templates for specific use cases of the bank's customers to build a personalized experience.
66	Campaign Workflow	Ability to schedule SMs, Email and push notifications at a future predetermined time	There is a system to schedule messages, delay them post a trigger event, stagger them across a time window and various other knobs are there to tune the campaign workflow.
67	A/B Testing	Ability to perform A/B testing for SMS, Email, notification and WhatsApp messages.	A/B Testing is enabled out of the box where it can be sent manually or the user can ask the machine to use AI and ML algorithms to create a homogeneous A/B/n split of the audience and the control group.
68	A/B Testing	Ability for all stakeholders to track performance of A/B testing on a real-time basis	All campaigns are tracked on a real-time basis and reports can be seen in the campaign analytics section.
69	A/B Testing	Test different variations of messages and campaigns to determine the most effective content and timing using Artificial Intelligence (AI).	STO (send time optimisation) is done using AI and ML to determine the most effective content & time of messages.
70	A/B Testing	Test different combinations of channels to determine the winning path using Artificial Intelligence (AI).	Canvas module allows testing of different combinations of channels.
71	Campaign Measurement	Advanced analytical capabilities for analysing behaviour trends, funnel drops, retention cohorts, user paths, session and source tracking, RFM and app uninstall metrics.	Behaviour trends, funnel drops, retention cohorts, user paths, session and source tracking, RFM are available for both Android & iOS. App uninstall metric is only for Android.
72	Campaign Measurement	Track the source of leads/ which campaign triggered the customer to download the app and open an account (from which social media campaign, website…etc.)	For App this requires Google/Apple subscription and has a separate per install/tracking pricing. For Websites, this doesnt require any subscription.
73	Campaign Measurement	Ability to track real-time engagement metrics such as open rates, click-through rates, and conversion rates, and provide a view for all stakeholders involved in the campaign push out .	We have rich and real-time campaign reporting metrics that cover all areas of the campaigns like impressions, clicks, conversions, errors and time/platform wise performance. More dimensions and parameters can be built through our custom visualization solution if needed.
74	Email Campaign Measurement	Analyse performance of Email campaigns - Individual and at aggregate level	Reports on Email delivery (Sent, delivered, Opened, Cicked) will be taken from the gateway and shown in Appice Dashboard.
75	Multi-channel messaging	Engage users through various communication channels such as Push Notifications, In-app Messages, Email, SMS, WhatsApp, and Interactive Newsfeeds. Send consistent messages across different platforms.	We support Push, Email, SMS, Whatsapp, In-App and news feeds. These messages can be multilingual and trigger the behaviour just-in-time or can be built for a segment basis behavioural and transactional data.
	Others		

76	Data Security	Vendor has to ensure the solution should have the ability to support anonymization / encryption / .	We have a privacy preserving architecture that enables anonymization (a hashed id, called HashID) is used to communicate across the system. We use AES 256 based encryption and use TLS v1.2+ and SSL/TLS for encryption of data in transit.
77	Digital Channels	Business functions / team collaboration, Role-based access control for different user types (admin, contributor, view, guest..etc)	We use RBAC (Role Based Access Control) and use that to control the various functions. Some roles present out of the box are admin, manager, markete.
78	Digital Channels	A/B testing capabilities for optimizing campaign, tasks, journey, CX..etc	A/B Testing for campaigns is provided out of the box. For tasks, journeys, cx etc it requires integration with the application.
79	Digital Channels	Market competitor analysis and benchmarking (through open social media, website data… etc)	We don't provide market competitor analysis and benchmarking.
80	Digital Channels	Data accuracy and consistency and avoid duplications	We run two pipelines one is a data ingestion pipeline and another is a data verification pipeline that ensures data is fresh, clean, de-duplicated and consistent.
81	Digital Channels	User authentication and authorization: secure user login with multi-factor authentication	Secure login via SSO and/or Multi-factor authentication and various other security mechanisms are inbuilt into the system. More details have been shared in the Security requirements sheet.

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Customer Data Platform (CDP)

With the customer data platform (CDP), Banks can harness this massive treasure trove of customer data gleaned from sources and systems within and outside the bank to create highly personalized, conversion-focused customer engagement.

The platform builds a Single Customer View (SCV or C360) which drives the segmentation, personalisation and allows ML models to contribute to the brand's growth.

AppICE CDP can combine insights from every stage of a customer's banking journey, from their transaction history to their current spending patterns, to create a constantly maturing customer account portfolio. This will enable delivery of enhanced experience to customers through personalized interactions, such as helping them navigate through credit card and loan application experiences that align with their specific circumstances and context.

The CDP connects to the CEX module to drive personalised messaging on App, Web, SMS, Email alongwith the advertising ecosystem (through a process called "Reverse ETL") to send segmented data for targeting.

Also the CDP will help ensure the security of financial data and personally identifiable information (PII) and adherence to privacy norms and security standards.

We enable banks to build a single source of truth on their own DataLake / warehouse.

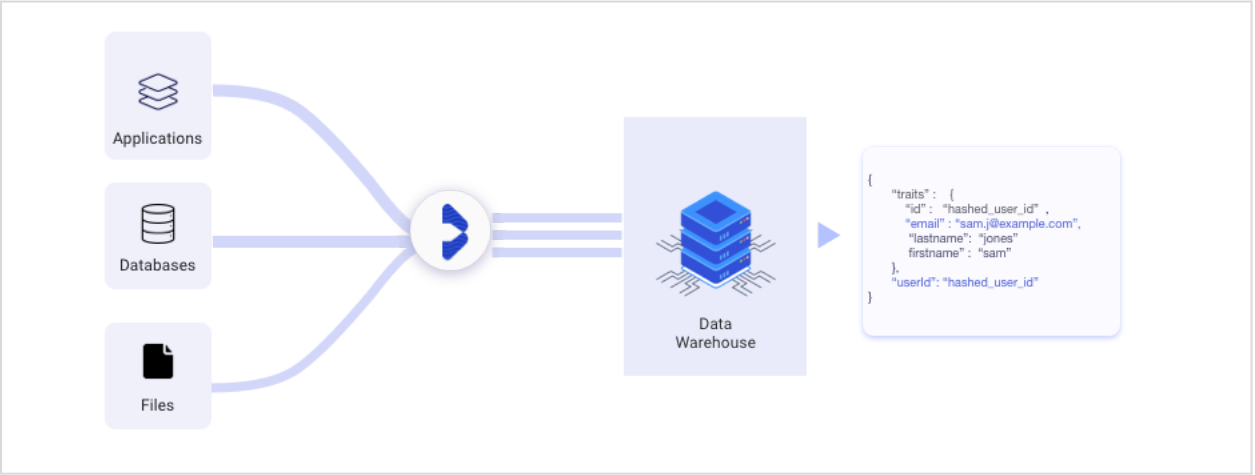
Key Advantages

- **Customer 360**
    - Combine data from different sources to build a customer 360
- **Feature/Traits Table generation:**
    - Put all your user traits in one place for easy activation into downstream systems
    - Better segmentation using all available customer data
    - Pre-built Library of Predictive Models for common use cases. Some include…
        - **Churn Prediction:** Predict the likelihood of someone churning
        - **LTV Prediction**: Predict if a customer will be high-value or low-value
        - **Offer Purchase Prediction:** Find customers who are likely to buy a certain product
- **Activate data into downstream systems such as advertising platforms through reverse ETL**

1. Data Extract : ELT

The advantage of implementing a CDP is that data from all non-event, customer-tools gets extracted and becomes available in the warehouse/ data lake.

CDP – ELT Process



The ELT process is broken out as follows:

i. **Extract.** Our data extraction tool pulls data from sources such as SQL or NoSQL databases, CRM, Advertising platforms or XML files. This extracted data is stored temporarily in a staging area in a database to confirm data integrity and to apply any necessary business rules.

ii. **Load.** The second step involves placing the data into object storage, where it is ready to be analyzed by data analytics tools. The object storage can be synced to the Bank's data lake.

iii. **Transform.** Data transformation refers to converting the structure or format of a data set to match that of the target system. Examples of transformations include data mapping, replacing codes with values and applying concatenations or calculations.

2. Customer 360

For real time targeting and personalisation.
It collects and unifies first-party customer data, from multiple sources, to build a single, coherent, complete view of each customer.

With all customer data in the warehouse we provide a comprehensive Single Customer View (SCV) – or 'C360' – about every customer on an individual level, a system of record that is the single source of truth for your customer data for marketing teams. This holistic customer profile that consists of metrics enables you to engage with individual customers throughout their customer journey.

- Demographic data such as age and income, lifestyle and behavioral traits, product propensity scores, and customer lifetime value.

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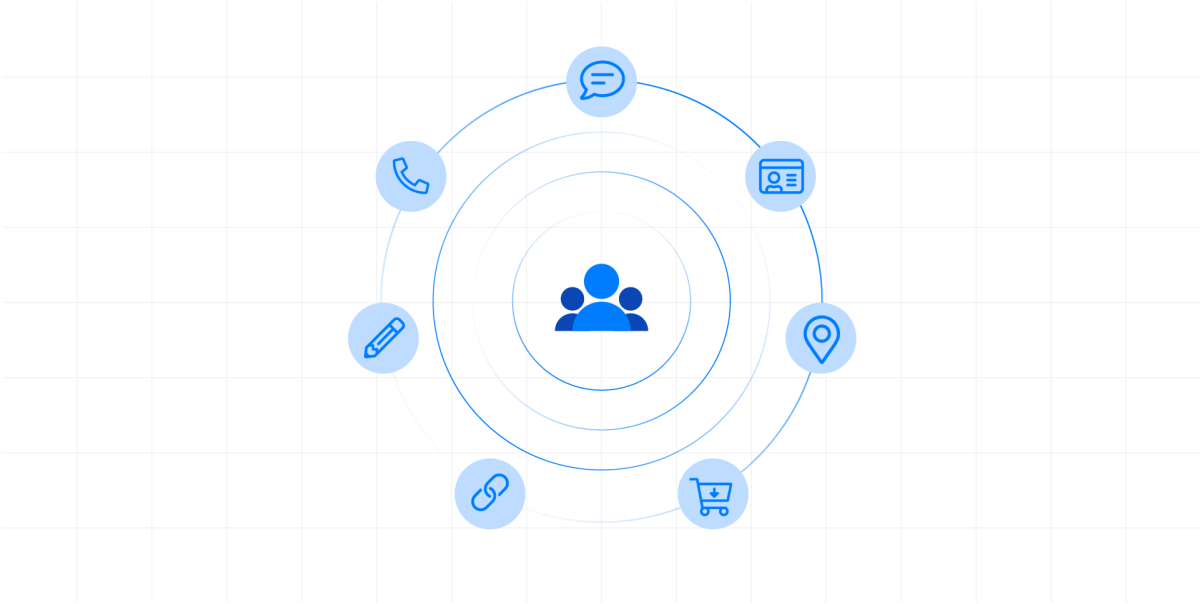

Building the User Profile

Use the data CDP brought in to put your user features and attributes in one place

Sample Table

email	age	addr	first_day_seen	last_seen_date	carts_in_n_days	total_amt_spent	n_complaints_raised_ever	pref_login	campaign_found
sam@gmail	30	45 South Ex part II	06/01/2022	09/22/2022	5	312	7	mobile	adwords

User Features
Email
Age
Address
Preferences

Top of Funnel Events
Engagement features
Session Features
Marketing Attribution

Purchase Events
Pre-revenue features
SKU based features
Revenue based features

Operational Features
Customer Status Features
Device features
CS (Customer Support) based features
Refund based features

A typical use case: Resurrecting a previously High Value Customer who hasn't opened App or logged in

CDP Identity Resolution

email	ap_id	age	city	first_day_seen	last_seen_date	carts_in_n_days	total_fd_amt
sam@gmail	0xa34bc	30	delhi	06/01/22	07/22/22	5	312987

[Use Case: Send a retargeting ad to previously loyal customer who we haven't seen in a while]

This data can be sent to

- Ad Networks via the process of Reverse ETL
- Use to send personalised App Push or Web Push Notifications

3. Data Actions Reverse ETL

The term “reverse ETL” comes from “extract, transform, and load,” which is the process of taking data from a source, cleaning and structuring it, and sending it to a data warehouse or data lake. If you load data before transforming it, you’re performing ELT. In short, ETL/ELT and reverse ETL sit on opposite sides of a data pipeline. One fulfils data integration, the other, data activation. Reverse ETL is the process of copying data from a warehouse into business applications like CRM, analytics, and marketing automation software.

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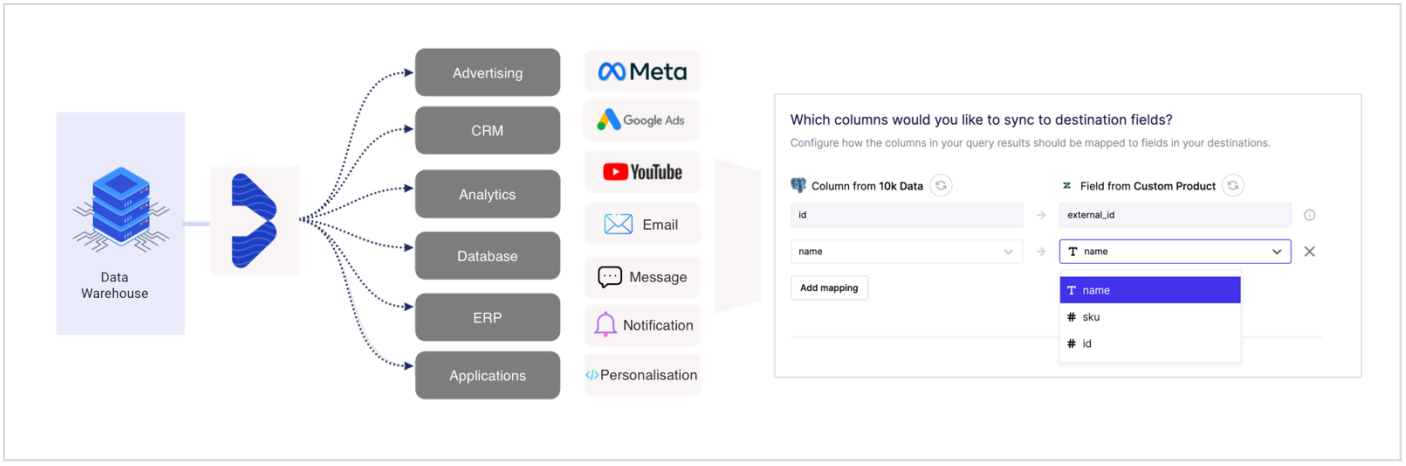

CDP Sources & Destinations

We integrate and aggregate data from a multitude of channels and data sources in different formats, both in batch and streaming. The platform provides multiple SDK’s for ease of implementation and use.

- Out-of-the-box integrations with popular tools like Zoho CRM, Salesforce, ZenDesk, Customer.io, Google AdWords, Facebook, Google Sheets etc.
- 12+ SDKs and plugins to collect events from web, mobile, and server-side.
- SDK’s provide developer friendliness and ease of use across environments.
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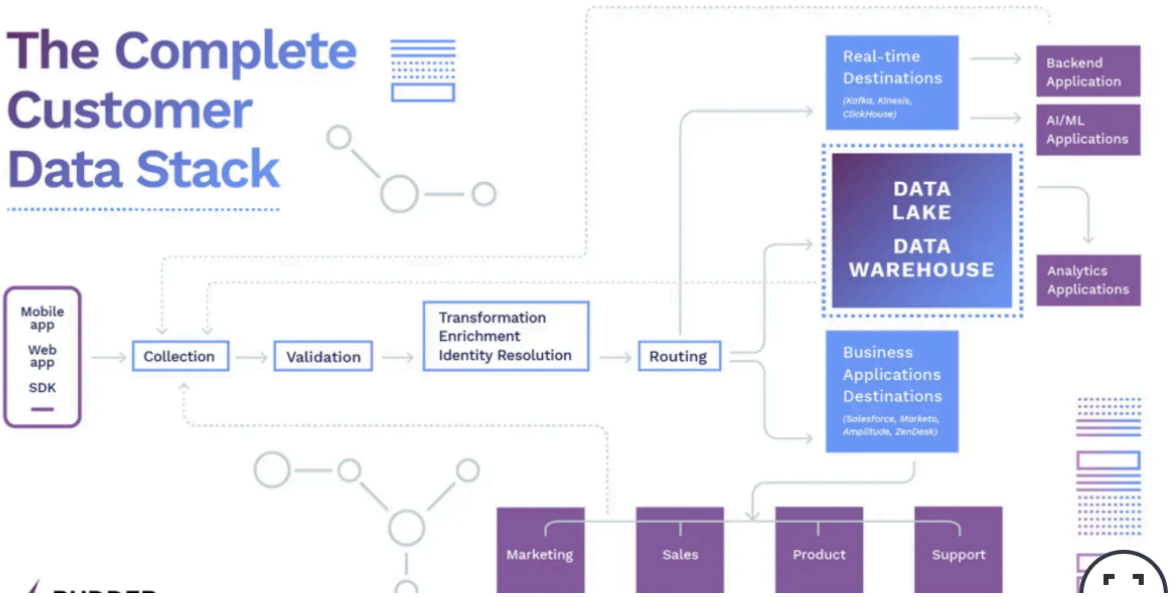
Category	Usage
Browser	Collect Behavioural Events from Websites. Nudges and Walkthroughs campaign rendering.
Mobile App	Collect Behavioural Events from Mobile App. Nudges and Walkthroughs campaign rendering.
Server	Collect data from 3rd party Platforms – CRM, Google, Meta, Partners and internal systems e.g Digital Platform

SDK	Categorisation	
Javascript	Browser	The JavaScript SDK sends event data from your website to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. It supports SPA and popular CMS e.g Strapi, Webflow, Ghost, Wordpress etc.
React	Browser	
Cordova	Mobile App	The Cordova SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. Its popular usage is in enterprise scale hybrid mobile applications.
Unity	Mobile App	The Unity SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. Its popular usage is in mobile gaming applications.
Flutter	Mobile App	The Flutter SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. Its popular usage is in enterprise scale hybrid mobile applications.
Swift	Mobile App	The Swift SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. Its popular usage is in enterprise scale 'native' mobile applications.
Objective-C	Mobile App	The Objective-C SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. It's popular usage is for IOS Apps.
Android	Mobile App	The Android SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. Native Android Apps use this SDK.
Kotlin	Mobile App	The Kotlin SDK sends event data from your App to an ingestion layer. It also receives campaigns (nudges & walkthroughs) that it renders basis triggers. It's popular usage is for Hybrid Mobile Applications.
NodeJS	Server	Server side SDK for S-to-S integrations.
Golang	Server	Server side SDK for S-to-S integrations
php	Server	Server side SDK for S-to-S integrations
Ruby	Server	Server side SDK for S-to-S integrations
DotNet	Server	Server side SDK for S-to-S integrations

Appice

Data Integration



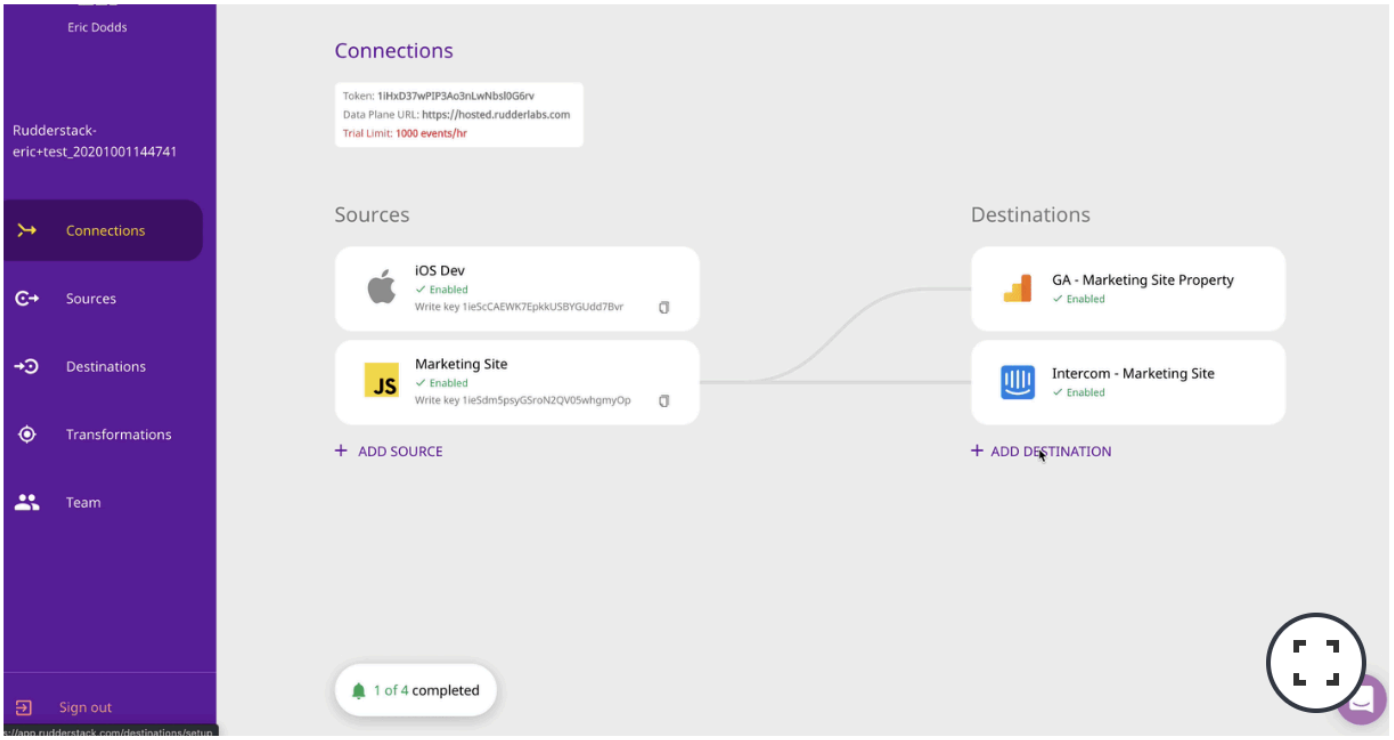
Appice has powerful capabilities to integrate with various backend systems through three broad mechanisms

1. Server based integration for data sources like Databases, SFTP, DWH etc
2. API based integration for data sources like CRM, Google Ads, Facebook Ads etc
3. SDK based integration for streaming data sources like Web, App, Queues like Kafka etc

- Ingest data from every app, website, and back-end
- Turn anonymous traffic into known users
- Sync raw event data to your warehouse or data lake
- Automate integrations and maintenance
- Clean, enrich, and transform events in real-time
- Easily implement cookieless tracking

Appice integrates with 200+ sources and destinations

Appice



CRM and Support
Create user records and send critical events to platforms like Salesforce, Zendesk, Zoho, and Intercom to automate support tickets, lead status changes, and account updates.

Sales and Marketing
Make sure your marketing and sales tools always have the same data. Send data in real time to tools like Hubspot, Salesforce Marketing Cloud, and Klaviyo.

Data infrastructure
Populate analytics and BI with customer data by sending it directly to infrastructure tools like Snowflake, Databricks, S3, Redis, Postgres, Kafka, Materialize, and more.

Warehouse/Datalake destinations

The below table lists the supported warehouse/data lakes destinations and different source types that you can use with them:

Destination
Amazon Redshift
Amazon S3 Data Lake

- Azure Synapse
- Azure Data Lake
- ClickHouse
- Databricks Delta Lake
- Google BigQuery
- Google Cloud Storage Data Lake
- Materialize
- Microsoft SQL Server
- PostgreSQL
- Snowflake
- Oracle DWH
- IBM DB2 DWH

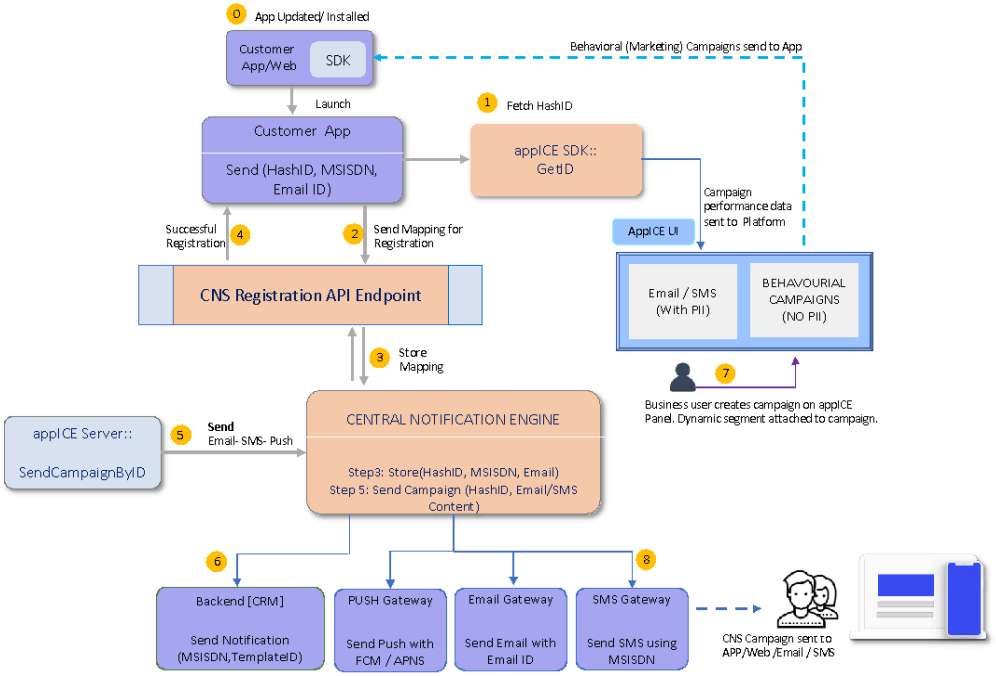
API Integration

Central Notification System (CNS)

Privacy Preserving Architecture

The central notification system is a purpose built architecture for banking platforms which integrates with backend systems, CRM, DWH etc which allows the marketing automation to work without using PII data.

- Customer Events
- CRM
- Backend - Custom API
- Data Warehouse
- Batch/Real time data



CNS Platform can be used for:

- Marketing campaigns or
- Transactional Notifications sent from legacy Databases

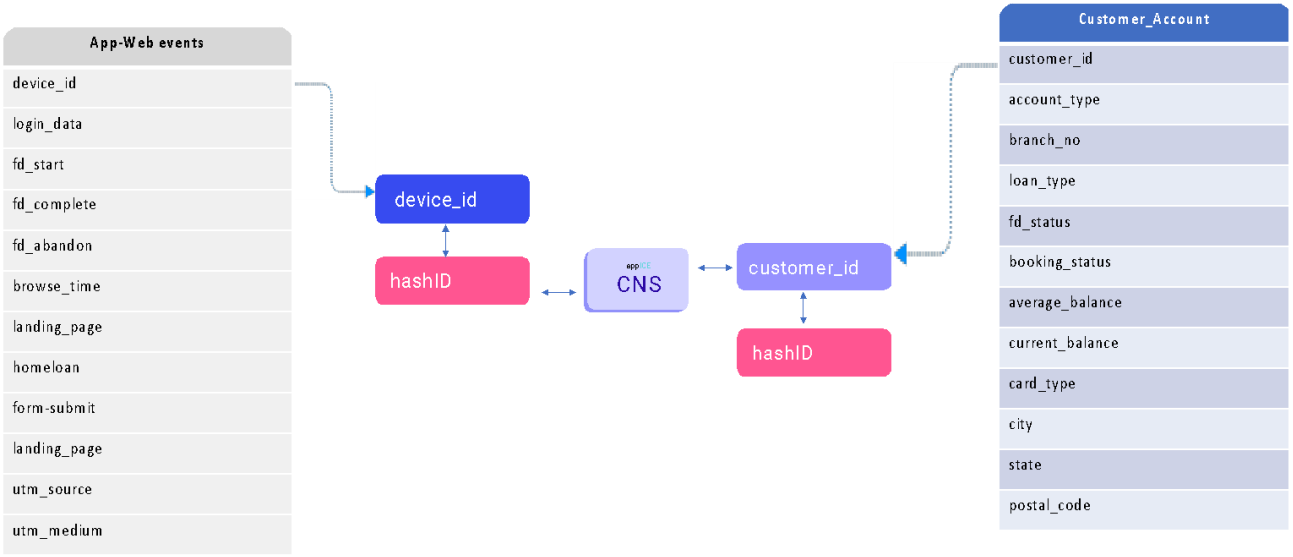
Example:

Type of Campaign	Details
Marketing Message: Retention, Upsell, Cross Sell, New Product announcement, Rate change, Promotions	App & Web Push: using Hash ID for customer device or browser
Marketing Message: Funnel Drop off, Cart abandonment or Multi Touch Campaign	SMS & Email along with In-App
Transactional: Payment due date, Investment Related, Account updates	App & Web Push: using Hash ID for customer device or browser. Add Email, SMS as reminder mediums
Customer Account Data based on LMS, CRM, Card, Digital Platform, CBS, ACoE Models etc	App & Web Push: using Hash ID for customer device or browser

CNS usage beyond personalisation: Since the Bank's internal (CRM, Analytics) systems do not know Device ID of customer, their capability of leveraging insights is limited .

AppICE CNS module is the **"bridge"** with it's **Privacy Preserving Architecture**

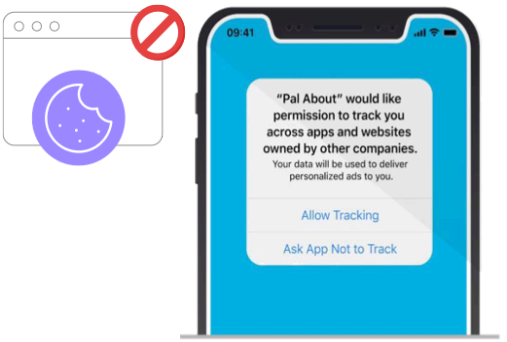
Appice



Attribution with AppICE

In the recent past global privacy changes at Device level and at Advertising Platform Level have changed the way Martech stacks and Advertising Industry used to Run, Manage and Analyse paid digital adverting on Google and Facebook. Apple has introduced ATT (Tracking at IOS device level) and has deprecated 3rd party cookies at Browser level (Safari). At consumer level, ad blockers further restrict the ability to build attribution models. Google will deprecate the 3rd party cookie from Chrome & Android next year impacting 'veracity of attribution' & reporting by Ad platform reports. Our ML-based model gives comprehensive solution for attribution.

1. Signal loss by Google & FB has increased CAC
2. App Tracking Transparency (ATT) Framework:
    - Was announced at Apple's WWDC 2020
    - Effectively deprecated the identifier for advertisers (IDFA) as we know it
    - Imposes advertising measurement restrictions:
        - No IDFA for deterministic attribution without consent
        - No probabilistic attribution (IP + UA) without consent
3. Facebook has reduced attribution to 7 Days.
4. Google with deprecate 3rd party cookies from 2024



"Unless consent is captured via Apple's App Tracking Transparency (ATT) framework, no user nor device information shall be used for targeting or measurement"

Advertising data ingested in CDP (Google & FB) can be used to build a Multi Touch Attribution model to generate insights on paid campaign performance or

We will provide MMP integrated with SDK to track acquisitions from paid digital ads to the mobile app and from there the account opening process (though reporting may be restricted by IOS ATP regulations)

Appice

Machine Learning Studio

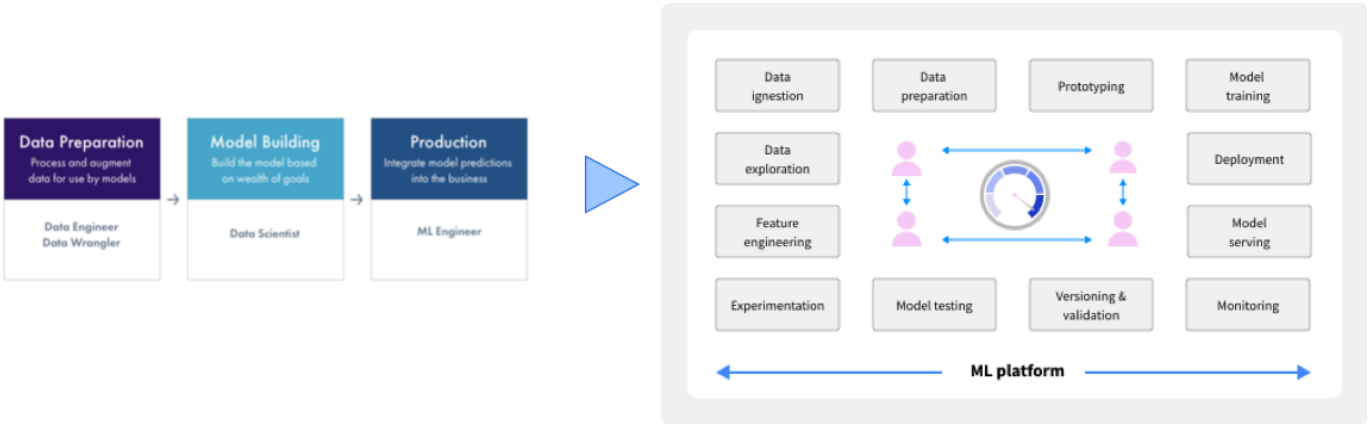
From Data to Actions

Our ML Platform is an enterprise grade system for machine learning projects which brings unmatched speed, performance, and flexibility required to handle all types of data and analytics approaches.

1. MLOps Lifecycle

Our Platform is built to power and accelerate machine learning and data orchestration at the scale required to turn data into actionable insights and actions.

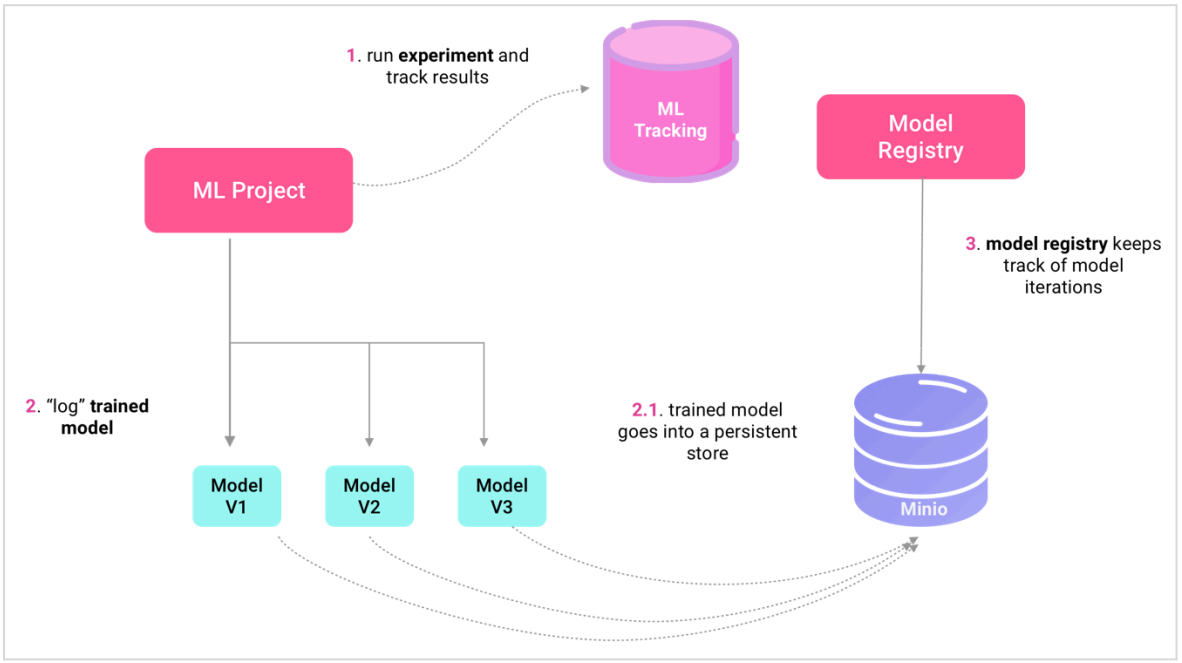
The 3 main stages of ML lifecyle are sub-divided into many stages before the model is ready for deployment.



2. ML Model Training & Storage

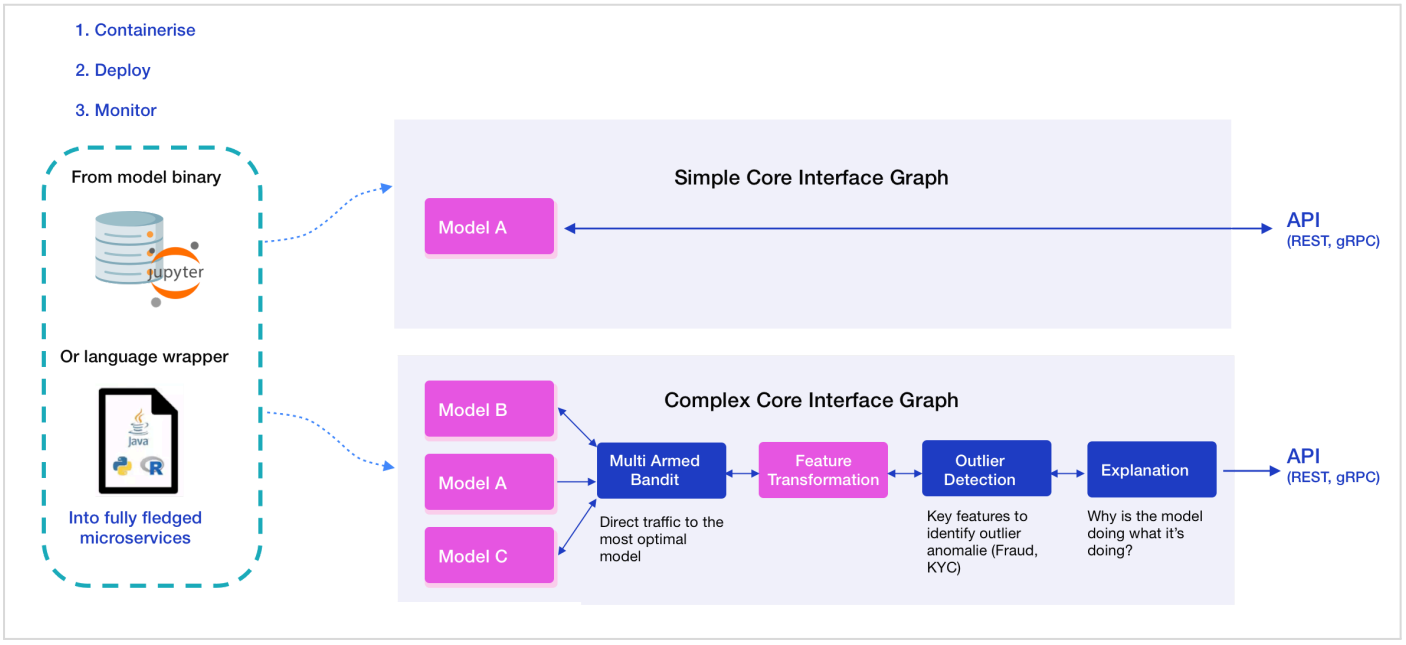
For the following functions

1. Experiment and Tracking
2. Project for Packaging
3. Store the trained Model
4. Registry of Models



3. ML Model Serving

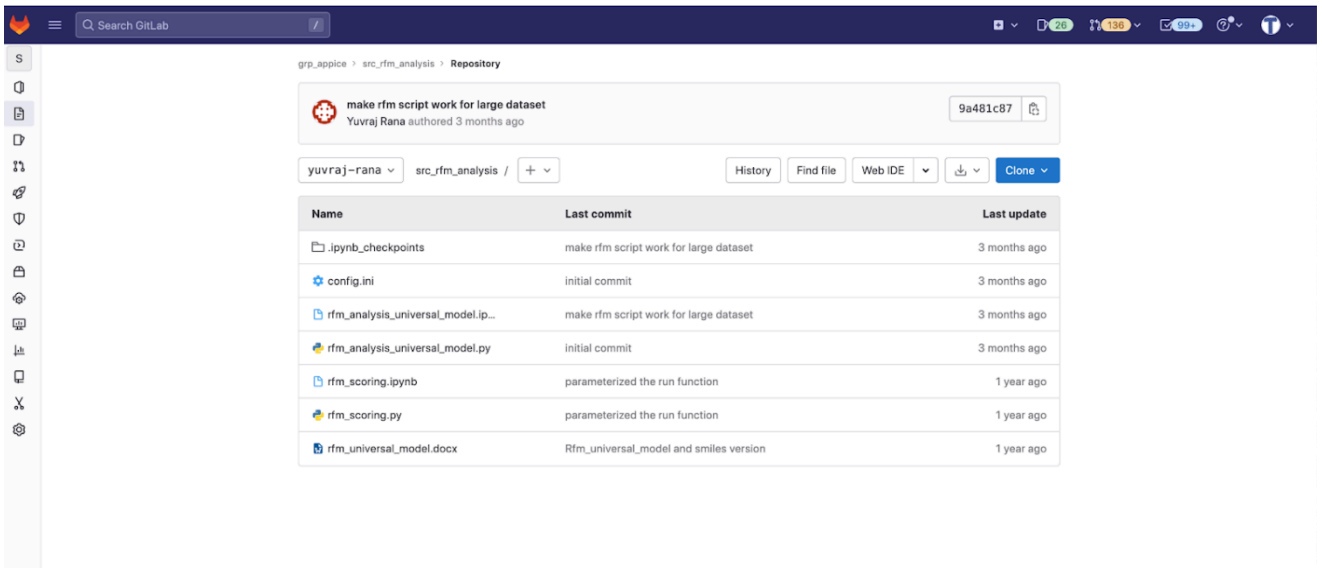
ML Engineers uses kubectl via ML Server to deploy ML Model on Production



Data Science Workflow

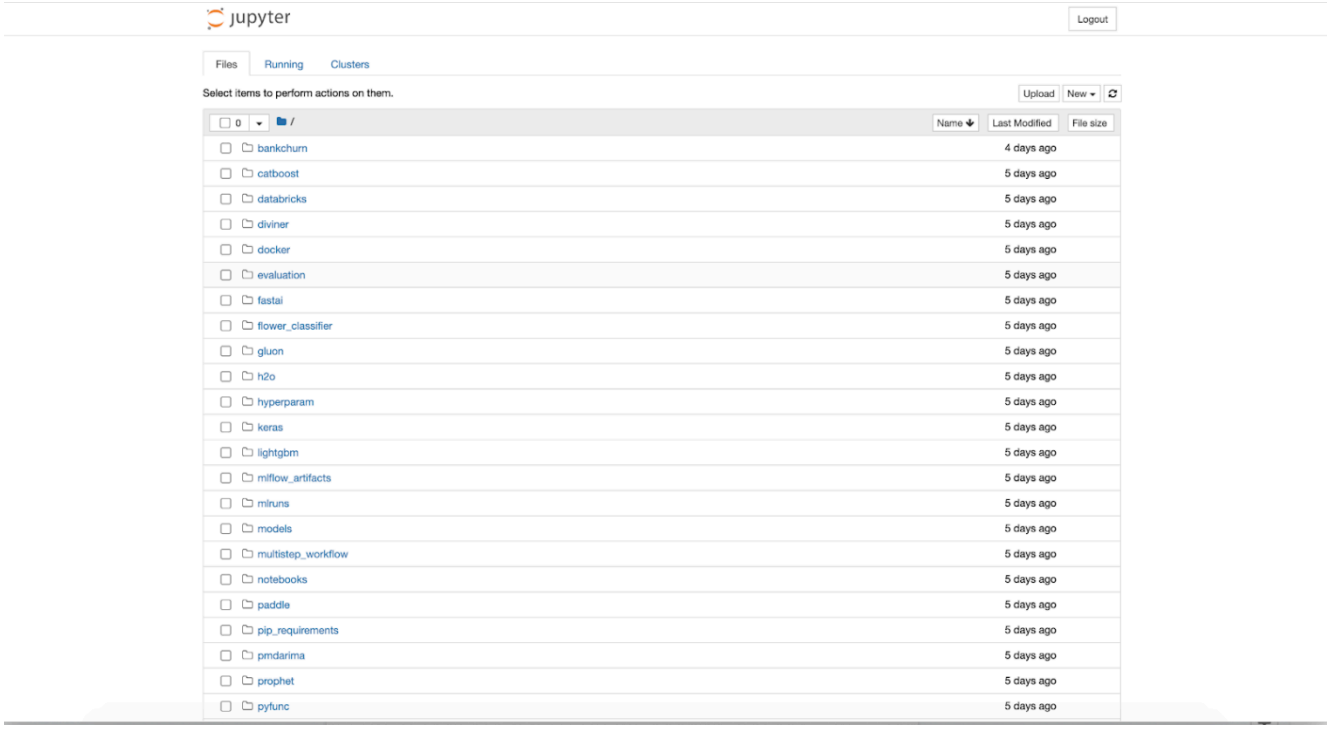
Stage 1: Source Control and Versioning - Use Gitlab On-Premise

Collaborative tool for version control, data science & analytics code. Teams from Bank's own analytical divisions can collaborate on ML models.

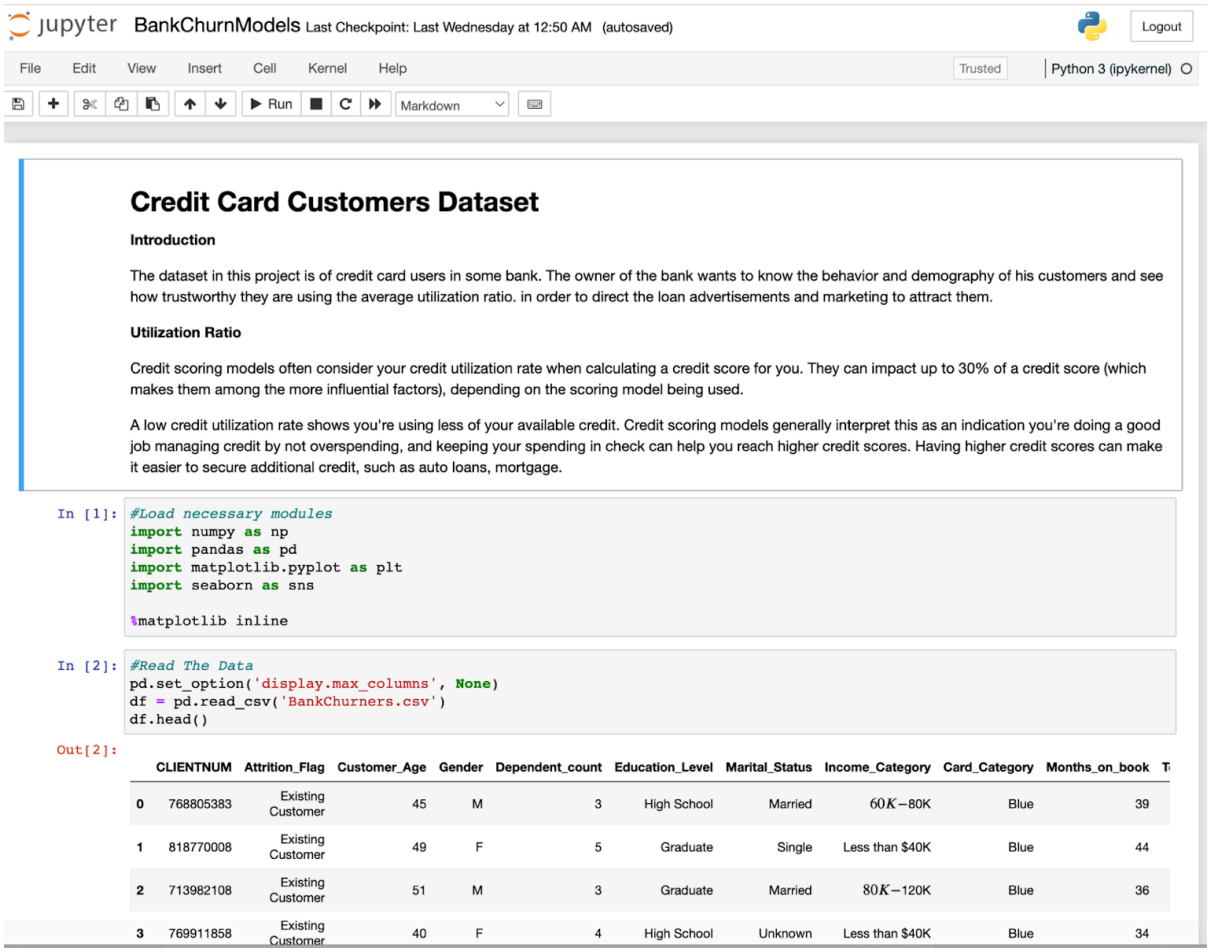


Stage 2: Data Science Team Development - Use JupyterHub and JupyterLab Notebooks

JupyterHub will be made accessible to data science teams. This Hub will be integrated with source control and downstream experimentation and inference tools.

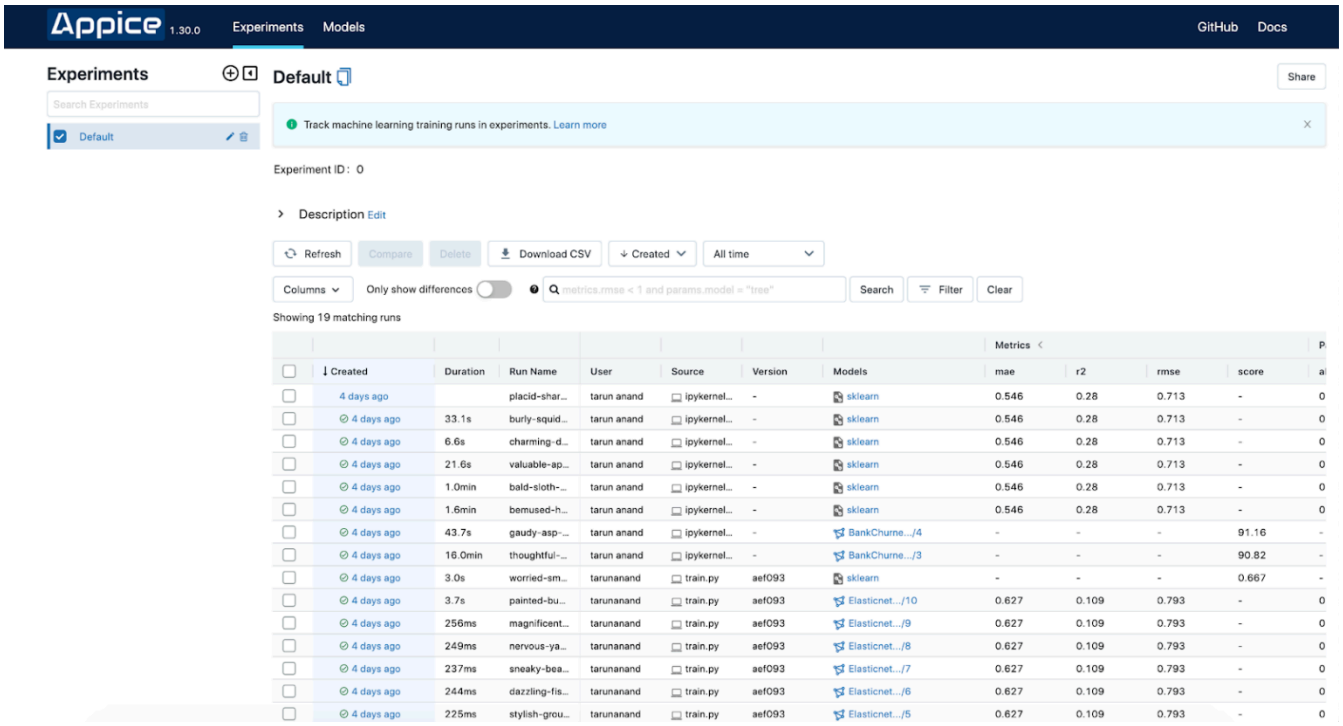


JupyterLab Notebook: For an individual data scientist or an analyst to train, test and register ML models.

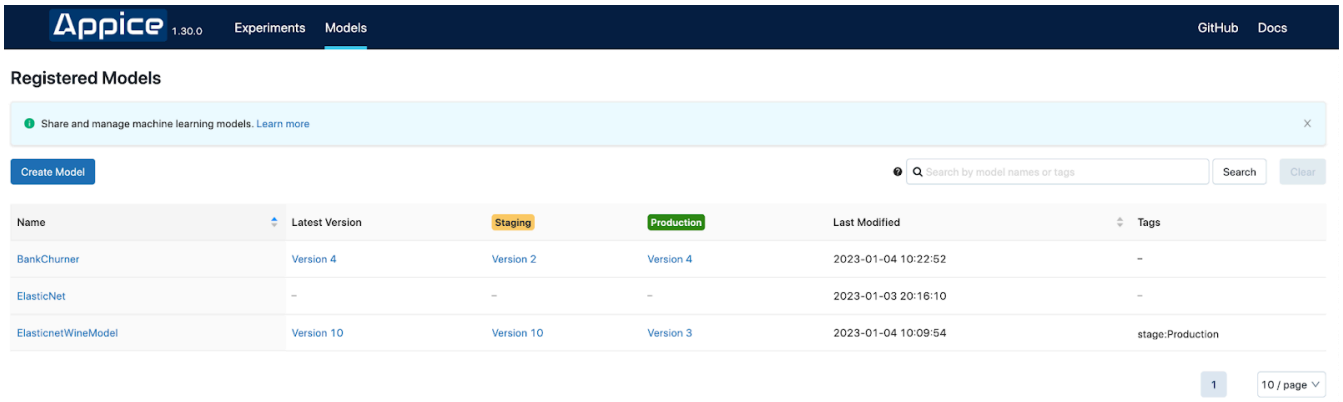


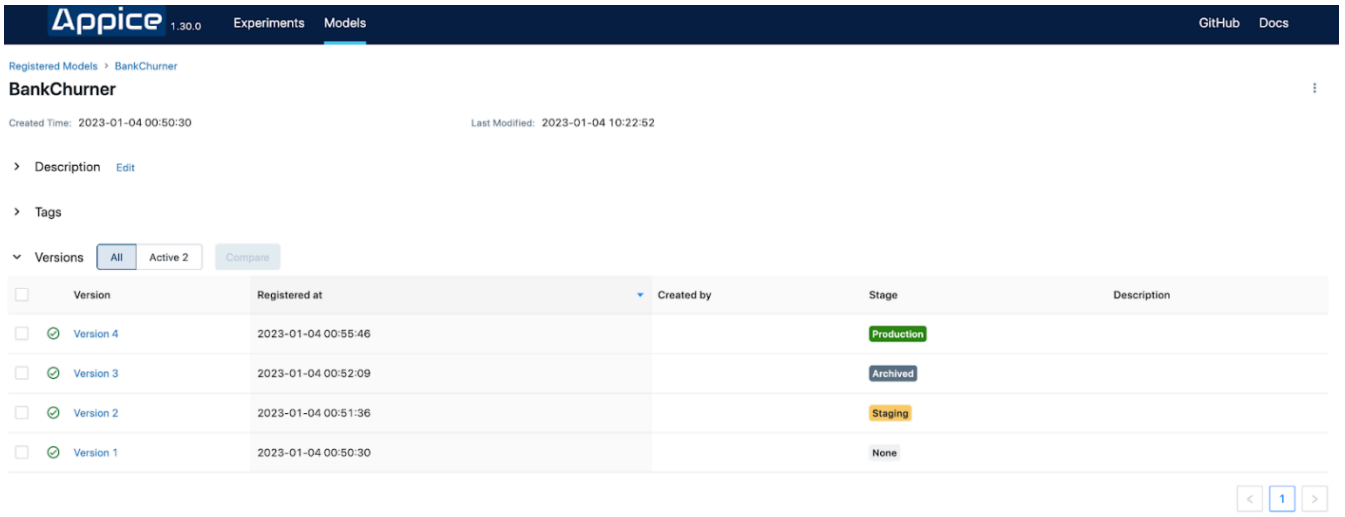
Stage 3: All MLops Life Cycle stages are configured and run from the platform- Experimentation, Models, Artifact Storage & Registry

i. Experiment Tracking: Each experiment will run and the parameters, metrics and artifacts will be stored for reproducibility. Parameters such as RMSE, R2 etc. are logged for each experiment.

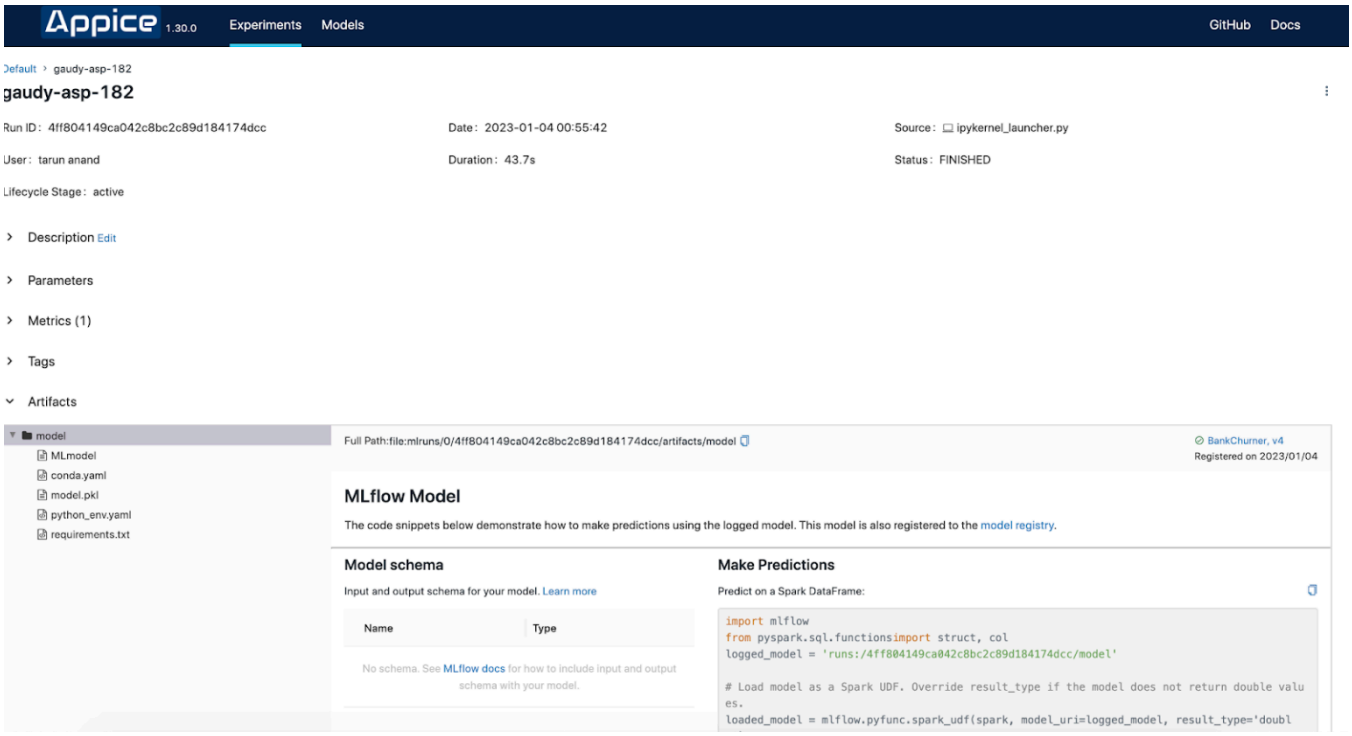


ii. Model Registry: Version wise deployment registry of models. Each model can be tagged for deployment in staging, production or other deployment environments.

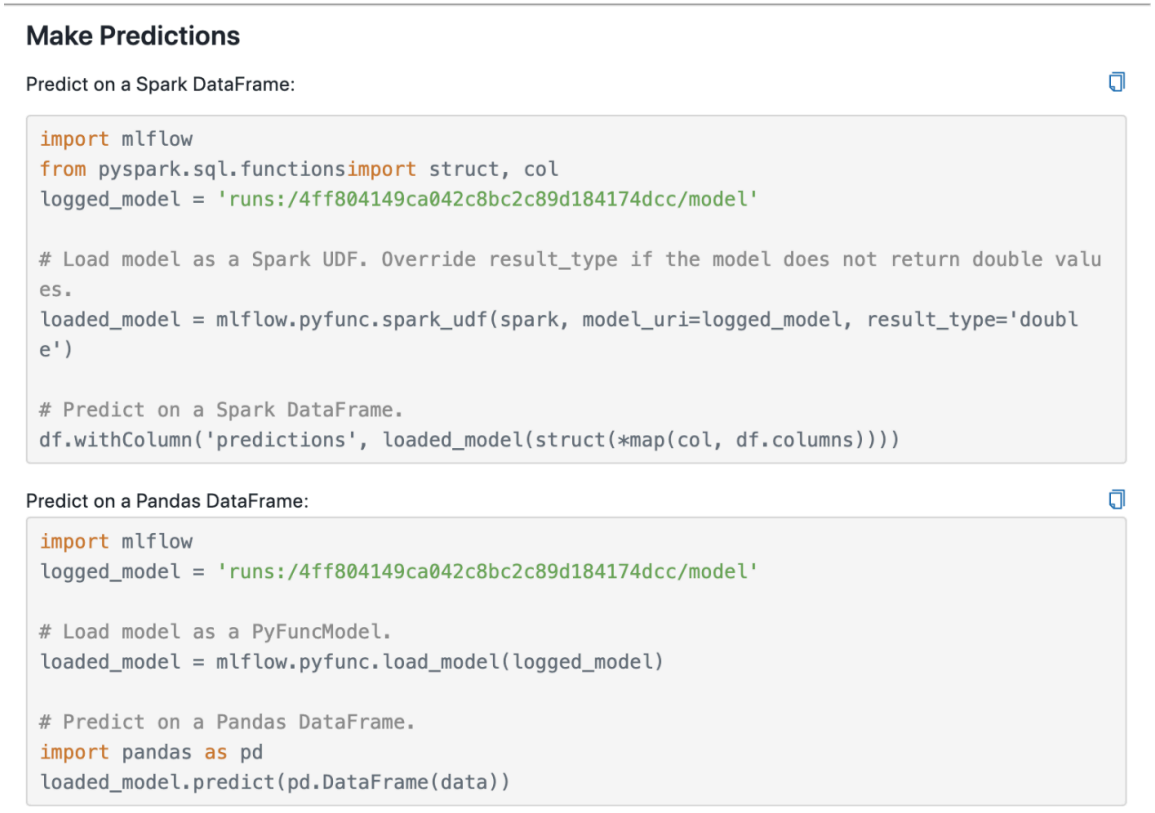




iii. Artifact Storage: Models are stored in serialized formats for easier deployment using CI/CD tools.



iv. Inference: Ready to use inference system in batch or API mode.



Make Predictions

Predict on a Spark DataFrame:

```
import mlflow
from pyspark.sql.functionsimport struct, col
logged_model = 'runs:/4ff804149ca042c8bc2c89d184174dcc/model'

# Load model as a Spark UDF. Override result_type if the model does not return double valu
es.
loaded_model = mlflow.pyfunc.spark_udf(spark, model_uri=logged_model, result_type='doubl
e')

# Predict on a Spark DataFrame.
df.withColumn('predictions', loaded_model(struct(*map(col, df.columns))))
```

Predict on a Pandas DataFrame:

```
import mlflow
logged_model = 'runs:/4ff804149ca042c8bc2c89d184174dcc/model'

# Load model as a PyFuncModel.
loaded_model = mlflow.pyfunc.load_model(logged_model)

# Predict on a Pandas DataFrame.
import pandas as pd
loaded_model.predict(pd.DataFrame(data))
```

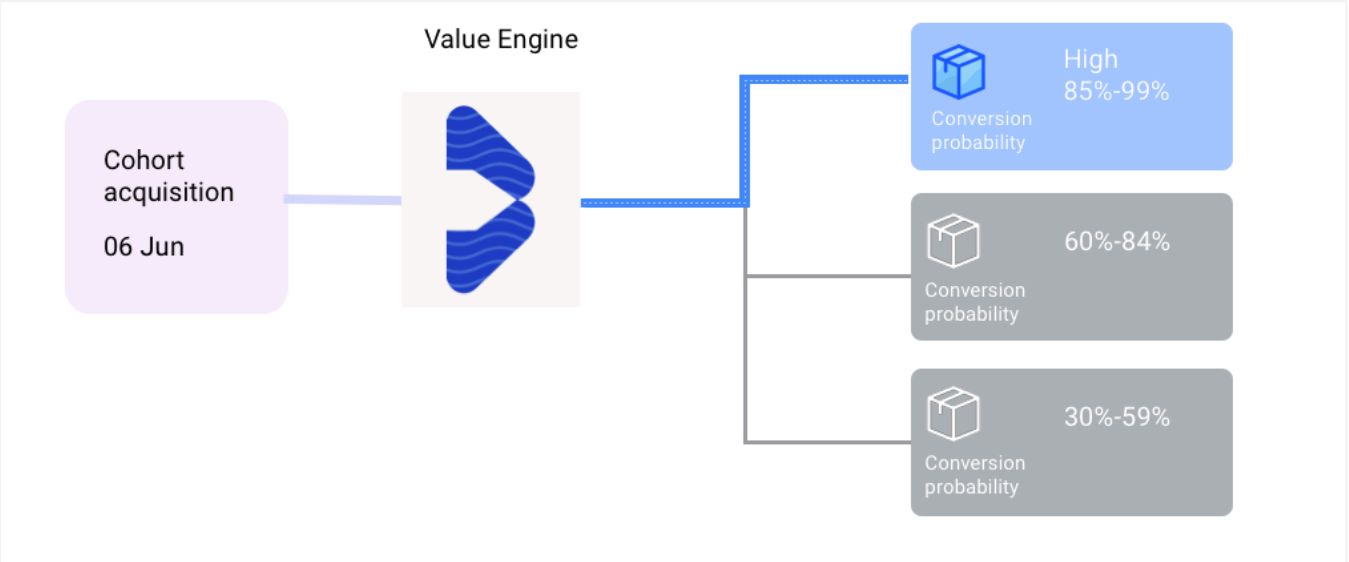
Appice

Data driven Personalization

1.LTV-Based Predictive Audiences

Our AI predicts every user's future value and propensity, allowing you to generate and activate better, smarter audiences -leverage user-level intent and LTV predictions to acquire more customers like your best one, easily generating real-time audience seeds for lookalikes.

Predictive Audiences enables you to scale prospecting campaigns without compromising ROI, by cutting down the wait time from acquisition to manifested value, usually weeks to months.



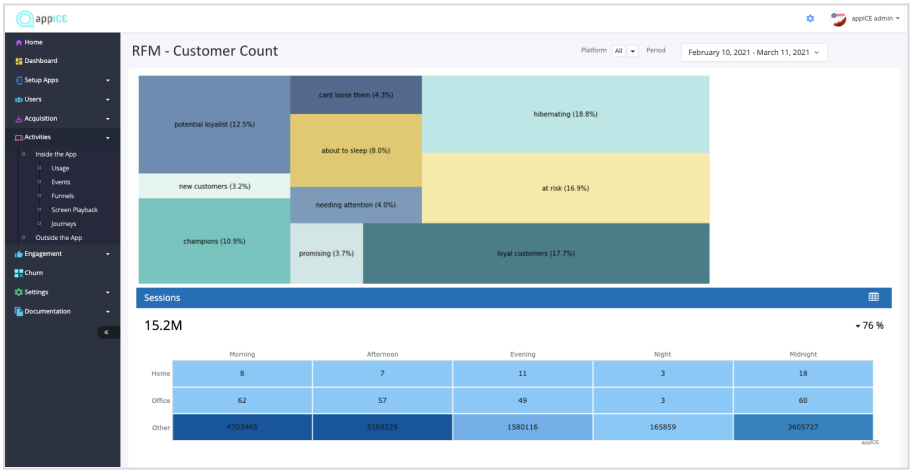
2.Next Best Action

Predictive modelling and optimization based on ML/AI triggers, previous interactions to find the best offers or products which have a higher propensity to be consumed. Power engagement or loyalty programs with web/app usage data, purchases, loyalty status, card status, account status, inflow/outflow to make the optimal offer for each customer.

Machine learning algorithms predict the probability of a customer's action by learning patterns in historical data consisting of explanatory variables and known outcomes. Without data points of known variables and outcomes, such a model cannot be built.

3.RFM Analysis

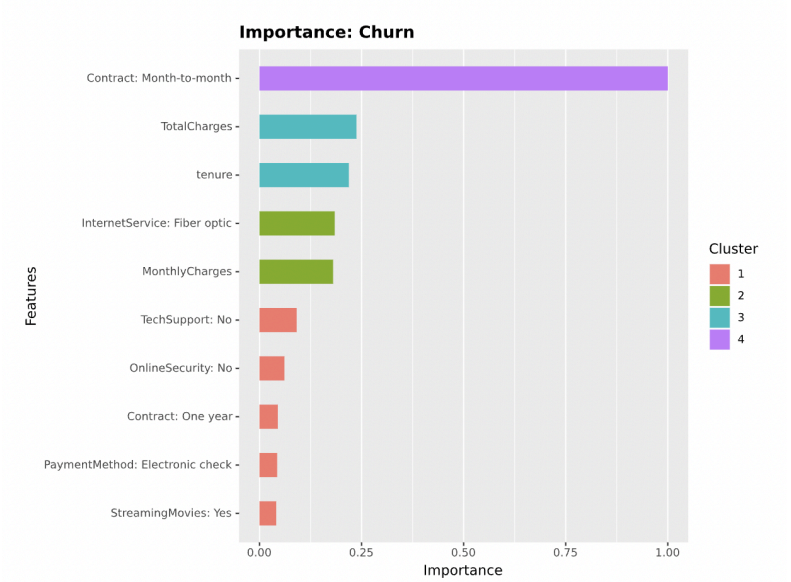
Understand which users are at risk and which need to be rewarded basis the behavior and interactions. Campaign performance data is used in real time to build RFM segments. This is used in case transactions happen on the site or app.



4.Churn Modelling

Churn Prediction Model is a predictive model that calculates, on an individual customer basis, the likelihood (or susceptibility) that a customer will stop doing business with the company. It gives you an indication, for each customer at any given time, of how high the risk is that you will lose them in the future.

It's a binary classifier, which means that it divides customers into two distinct groups (classes) based on whether or not they leave the company. In most cases, in addition to placing them in one of the two groups, it will also tell you the likelihood that the customer is a member of that group.

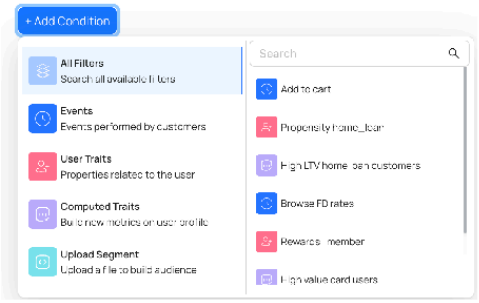


Note: Additional models as per bank's requirements can be built on mutual agreement.

Segmentation

Both transactional and behavioural data is used to generate segments for targeting:

CDP: Building User Segments

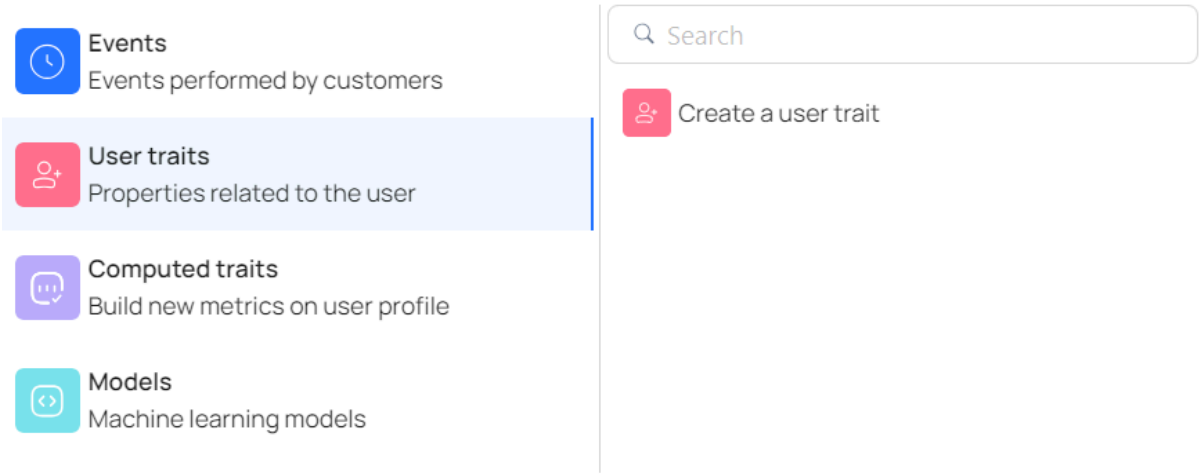


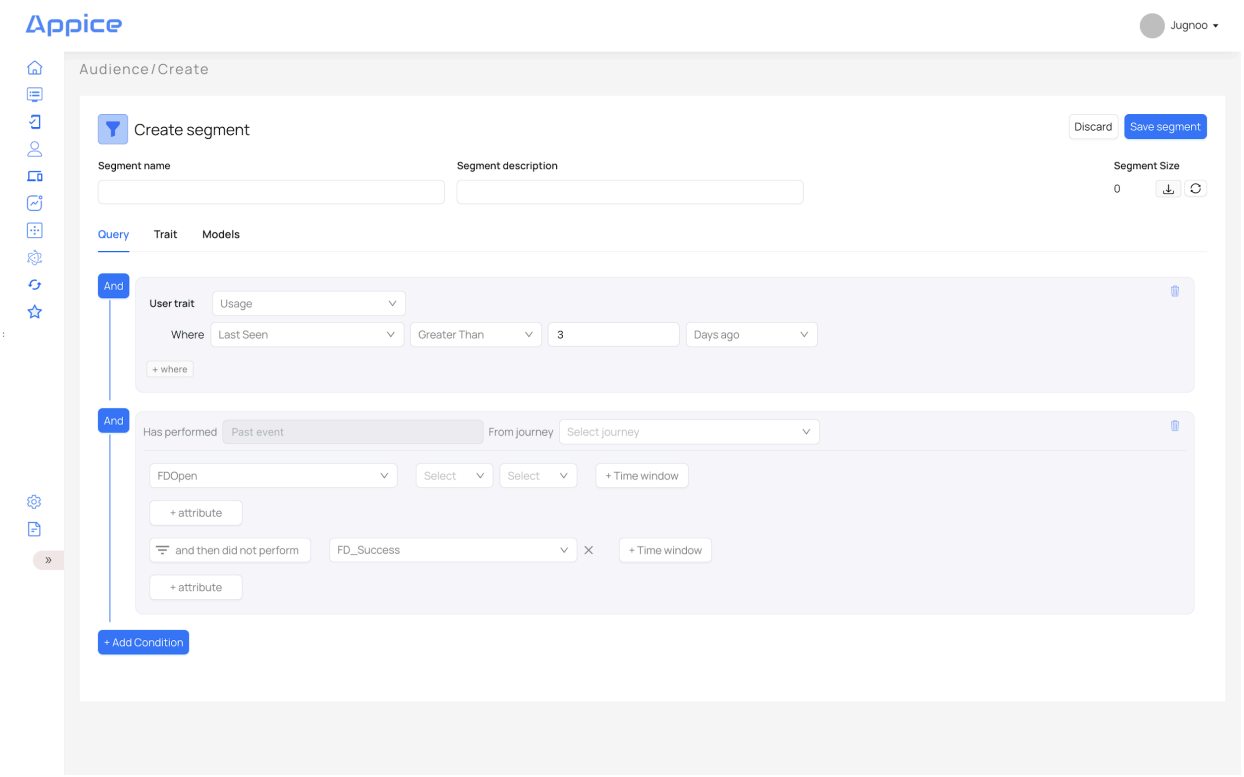
Behavioral Events	Events of DBP Journeys Events of DLP Journeys
User Traits	Device parameters App usage details Location & GeoFence ML computed values Custom variables Events of DLP Journeys
Computed Traits	Sum: Sum of all online debit Trnx in last 30 days Sum of all customer order values Average: Average session time of a user Count: Count of online Trnx. in last 60 days Most Frequent: Most Frequent category visited Find most frequent property value of an event First: First page a user visited Last: Last product a user viewed
Upload Segment	List of customers

SEGMENTS:

Can be a combination of

- Events Data: From DBP & DLP, ingested via Appice SDK
- User Traits: User parameter ingested via Appice SDK e.g Device, first seen, location
- Computed Traits: Transactional data ingested via oracle queries on CBS





I. Behavioural Segmentation

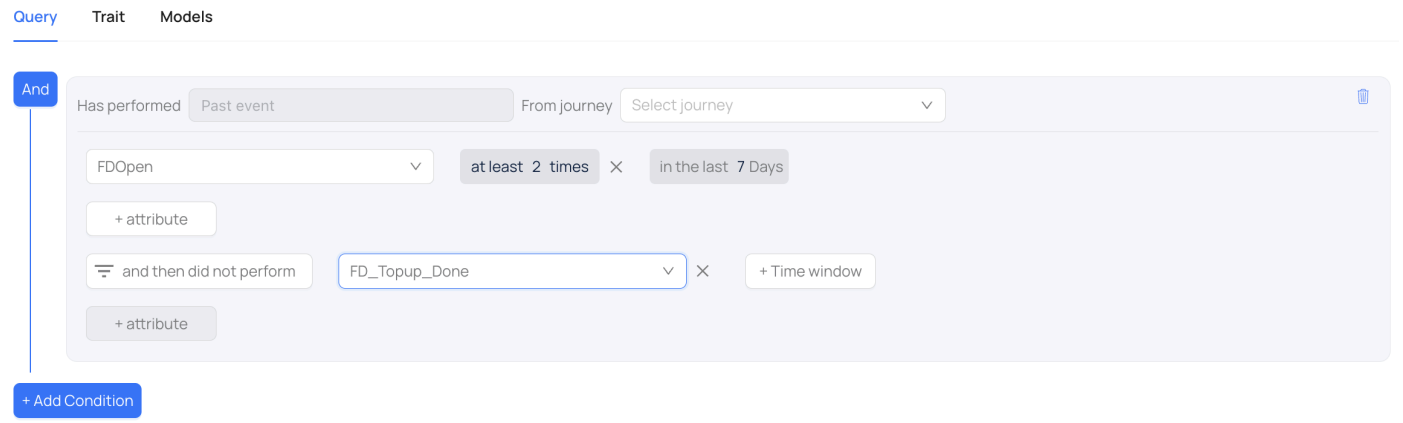
AppICE is built on the premise that the user journey is a combination of who they are, what they are doing, when and where.

WHO : User Properties such as First Seen, Last Seen, Session Length, Android or IOS users etc.
WHAT : User behaviour on the app with all the events listed above.
WHERE: User location or based on Geo parameters
WHEN : Basis Time of usage

Using these parameters, an audience segment is created. Each audience segment has a 'reach' which gets defined by the number of users which fulfil the 'segment' criteria. When the campaign segment is activated, various controls for sending the campaign are available such as

1. Frequency : Number of times the campaign is shown in *x* time limit
2. Date Range
3. Send Now or Delay
4. Days of Week
5. Time Range for sending campaign

Micro segments allow brands to run hundreds of experiment's on what strategies are most likely to convert customers.

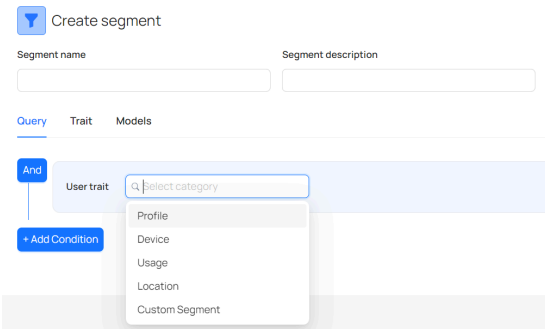


Examples:
FD Journey Dropoff

- Using events data from FD Journey, various stages of the journey are available on the panel :
- Use FDOpen as the start point of the Journey
- Add Frequency and Time duration
- Add final step of the Journey by selecting and then did not perform e.g FD_Topup_Done
- Add time window, which is linked to the event selected previously e.g FDOpen

II. User Traits

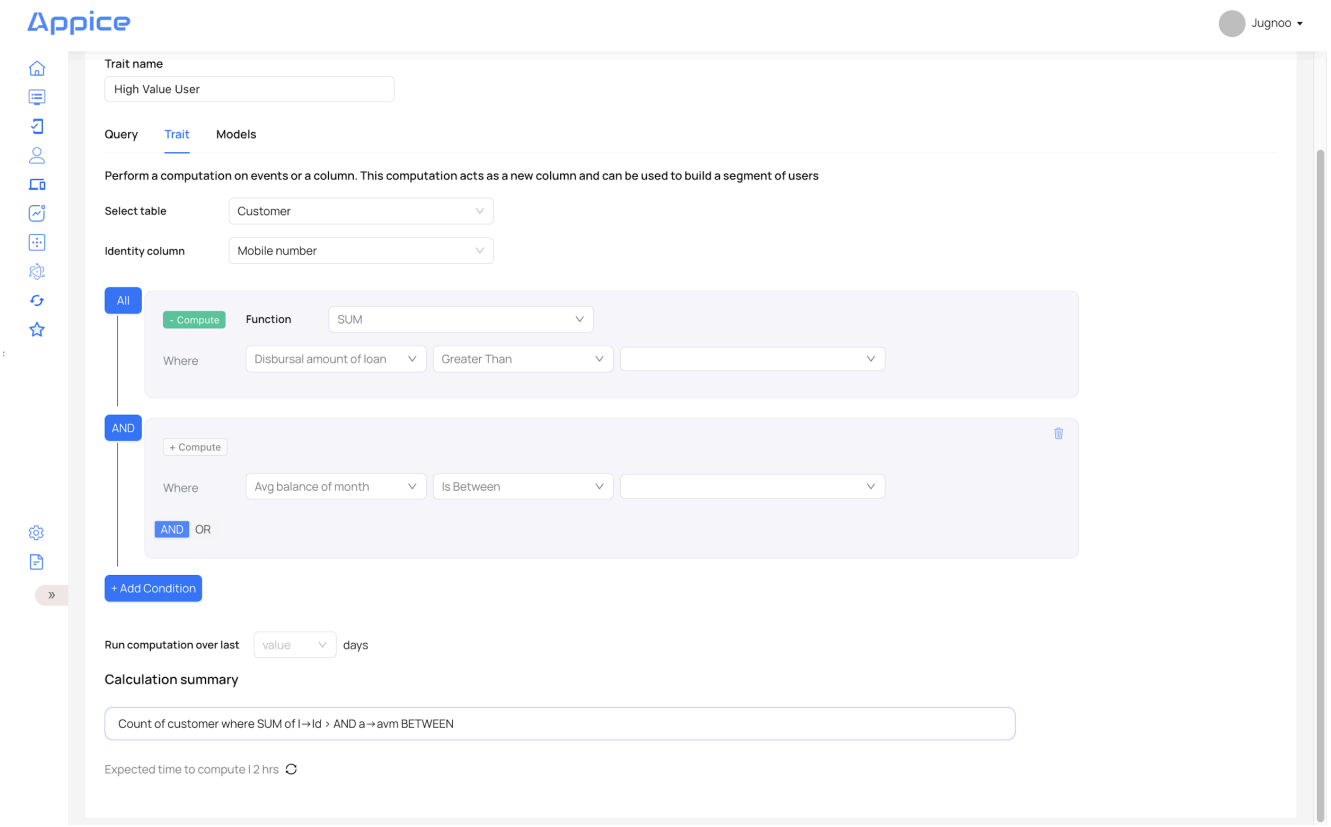
Audience can be created on the basis of User properties like Device, Profile etc.



Business users can also upload audience segments on the dashboard via csv files. These csv files can be transferred from SFTP location.

III. Computed Traits

Transactional data from C360, is used to perform functional computation on CBS (or other data sources) data fields.



BUILDING COMPUTED TRAITS

You can use computation on the transactional data to build 'computed traits' and these set of customers can be included in a 'segment'.

Functions used in calculations: SUM, AVERAGE, MIN, MAX,COUNT

Let's understand the use of this functionality via the following requirements:

Examples:

i. Those customer who have loans > $ xx amount

Using compute function: To include all the customers who have loan amounts (from multiple loans or single loan) greater than $ xx:

- Use compute function <SUM>
- Select col 'Disbursal amount of loan' is <*greater than*> $ xx

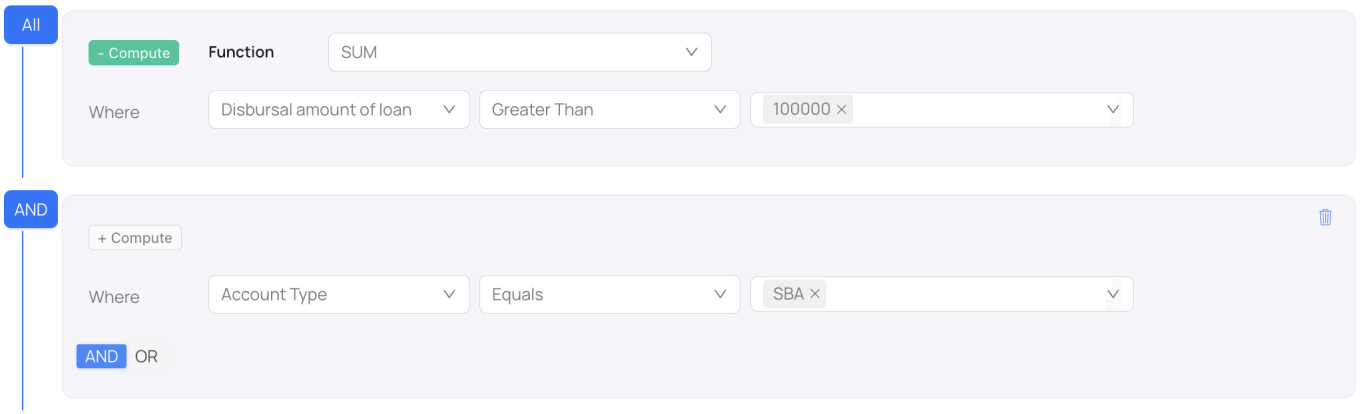
ii. Those customers who's average account balance is between $ xx – $ yy amount

Without compute function: Include all customers who may have multiple accounts, but a single CIF

- Do not use compute function
- Select col 'Avg balance of month' <*is between*> $ xx to $ yy

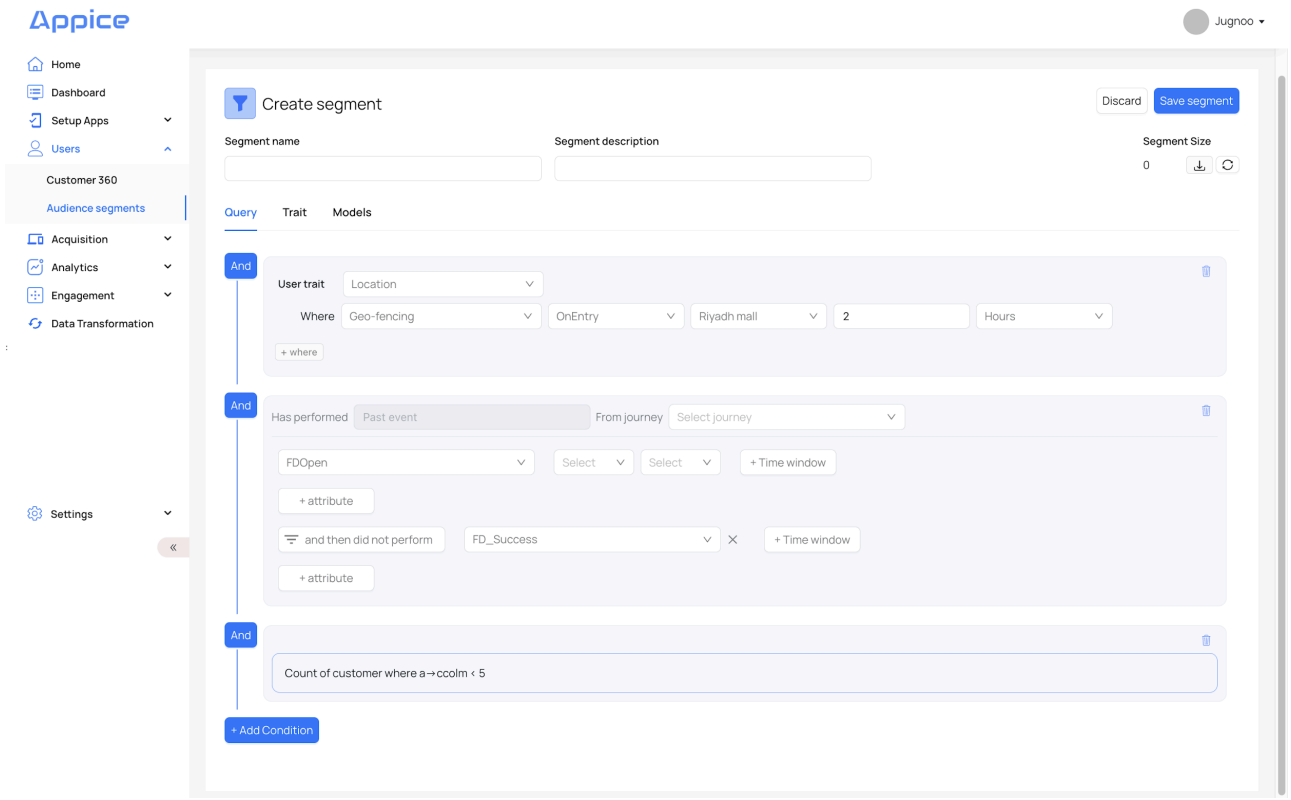
iii. Loan disbursal amount by SCHM_TYPE

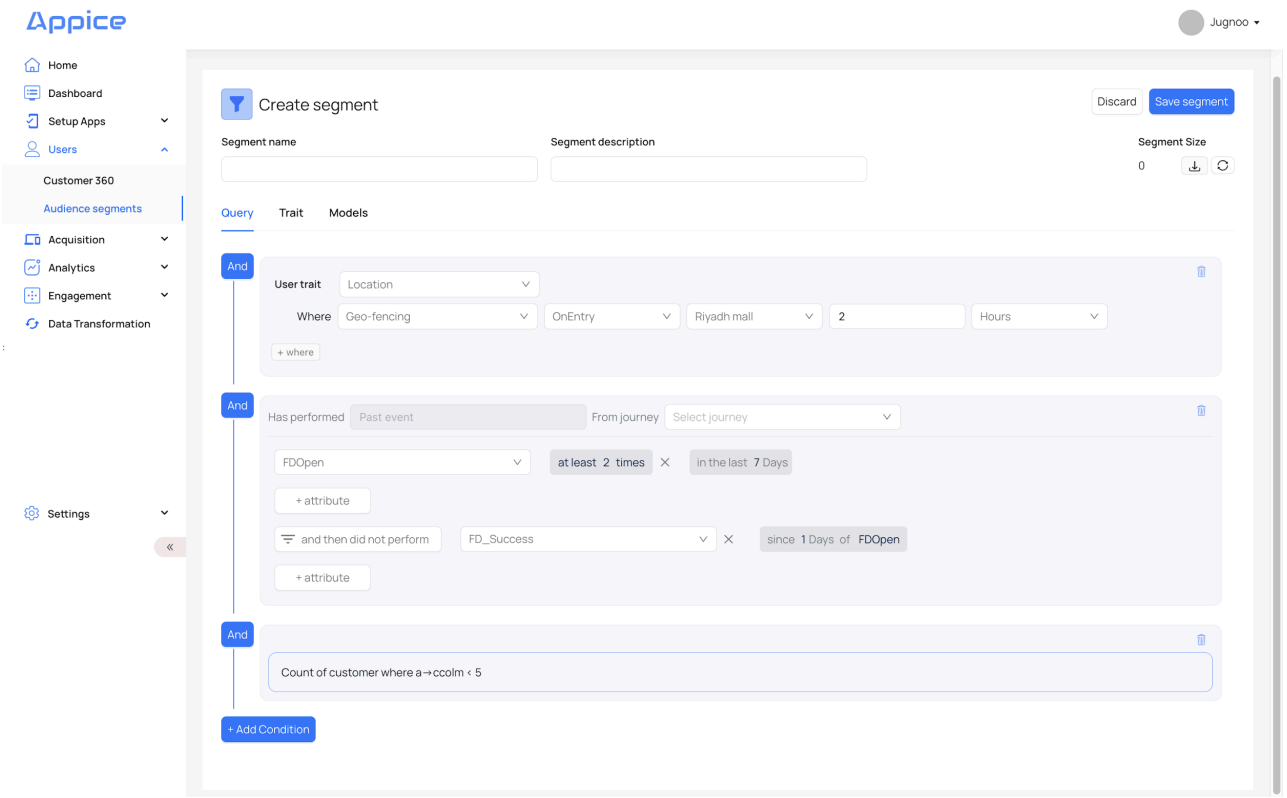
- CBS Fields like SchemeType has multiple Account Types such as SBA , CAA, CCA, LAA, ODA, TDA
- These values become available in ComputedTraits when building a Trait



IV. Combine Customer 360 data

Combining all data in golden record to take engagement actions





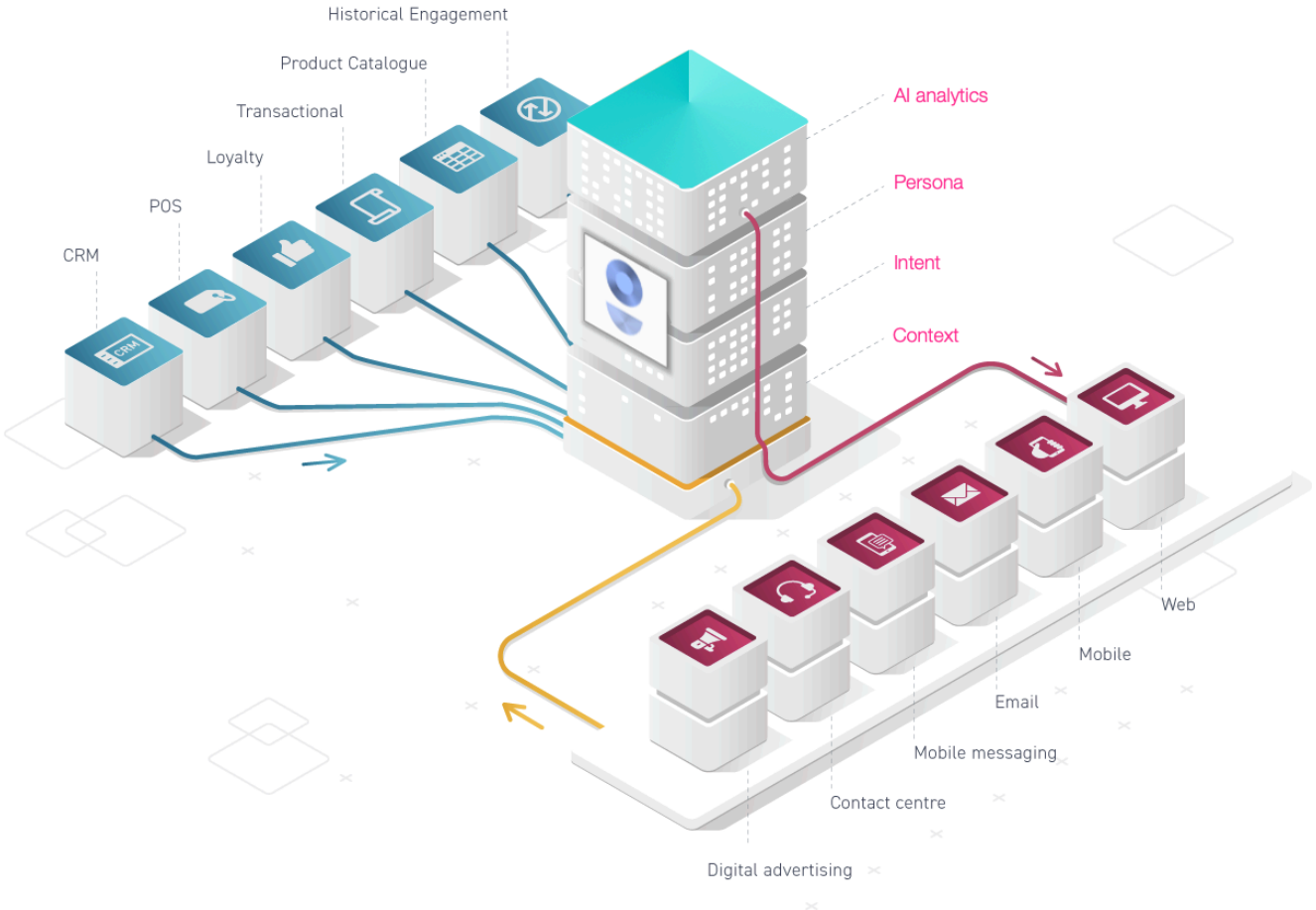
The following functional dimensions allow segment construction to enable various use cases:

Data Type	Example
Behavioural Events	
Past Events, Live Events	Events & Attribute captured by SDK
Example: Events of a journey e.g FDOpen, FDSuccess	Customer who has started the 'Deposit' journey at least 2 times in the last 7 days And did not complete the 'Deposit' since 1 day of FDOpen
Frequency Functions for Events	At least, At most, exactly
Time Functions for Event	In the last, in the next, before, since,after x Time unit in Seconds, Minutes, Hours, Days, Weeks, Months
Attribute Functions	Equals, Not equals, contains, In(set operator), Not in(set operator) , Starts the string, Ends the string , Does not start the string, does not end the string
Did Perform, Did not Perform Function	
User Traits	
User Profile	Language, User ID etc
Device	

Usage	First seen , Last seen, Session count, Total session, Notification permission
Location	City, District ,State
Location - Geo Fencing	Entry, exit
Custom Segment	ClientID, DeviceID, Email, Mobile
Computed Traits	
Compute Function	Sum, Min, Max, Count, Average
Data Fields	All Transactional / Demographic / Product usage fields in Customer 360

Customer Experience Platform (CEX)

AppICE (CEX) is an Omni-Channel MarTech Platform designed especially for Banks and Financial companies with a PII preserving architecture. Our platform is designed to deliver **real-time, one-to-one personalized** communication, with a powerful segmentation engine, and a suite of engagement tools, to create amazing user experiences.

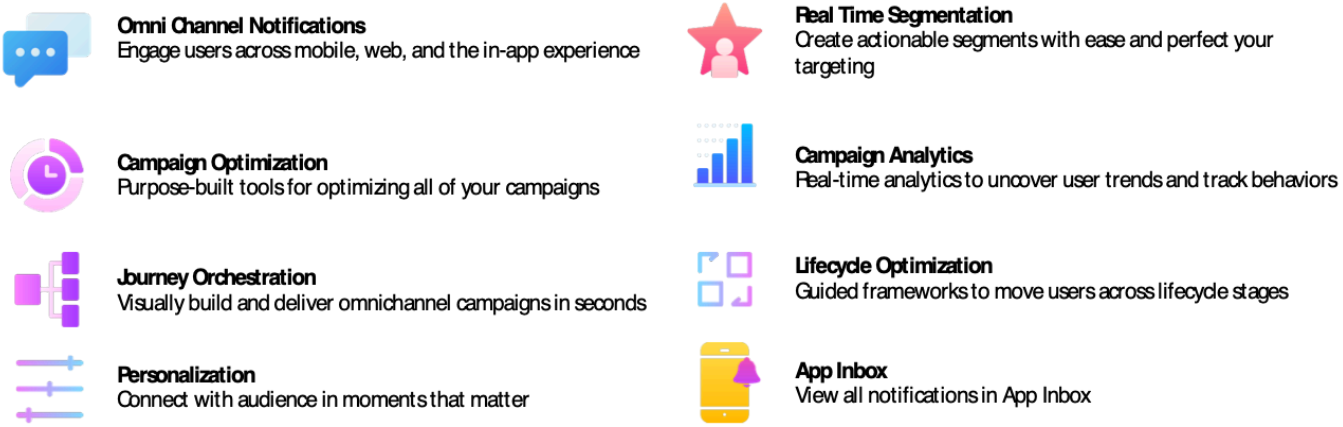


Appice

Features

The integrated solution supports every aspect of mobile or web engagement, retention and monetization by delivering:

- Real Time Analytics to uncover App and Web engagement
- Intelligent insights to track CX and behaviour on digital assets
- Powerful segmentation tool
- Templatized Campaign Builder for all Channels
- Notification engine for
    - Behavioral Notifications (events data from AppICE SDK)
    - Transactional Notifications (data from CDP)
- Omni Channel Personalization on :
    - Push
    - In-App
    - Mobile App-Inbox
    - Web Push
    - Web Pop-up
    - Email
    - SMS
    - WhatsApp
- Advanced Push Notifications
    - Normal Text
    - Text (with Emojis)
    - Expanded / Banner
    - Video/ Animated GIFs
    - Carousal
- Comprehensive server-side attribution
- Multivariate (or A/B) testing
- Heat Map Analytics
- Collaborative and Competitive intelligence of Apps on device(Android only)
- Proximity based geo marketing solutions
- Nudes & Walkthrough



Appice

Key Differentiators

1. **Speed & Scale**: We have one of the fastest data platforms *based on materialised query architecture;* which incrementally maintains the results of SQL queries as in-memory materialized views, providing low latency for complex transformations.

2. **Hybrid Deployment Architecture**: The only platform with both On-Premise & Cloud deployment model that meets the stringent requirements of Bank's security posture and regulatory compliance.
    - Cloud Deployment for Fast Pilot and Testing
    - On-Prem Deployment for Secure, Compliant Production Environment

3. **Zero PII Architecture:** Central Notification System (CNS) enables Enterprise Application Integration (EAI)
    - Integration with legacy banking applications, like CBS, CRM, Data Warehouses/Data Lakes
    - Connect the enterprise systems with modern analytics and engagement systems through a single API or file based secure integration.

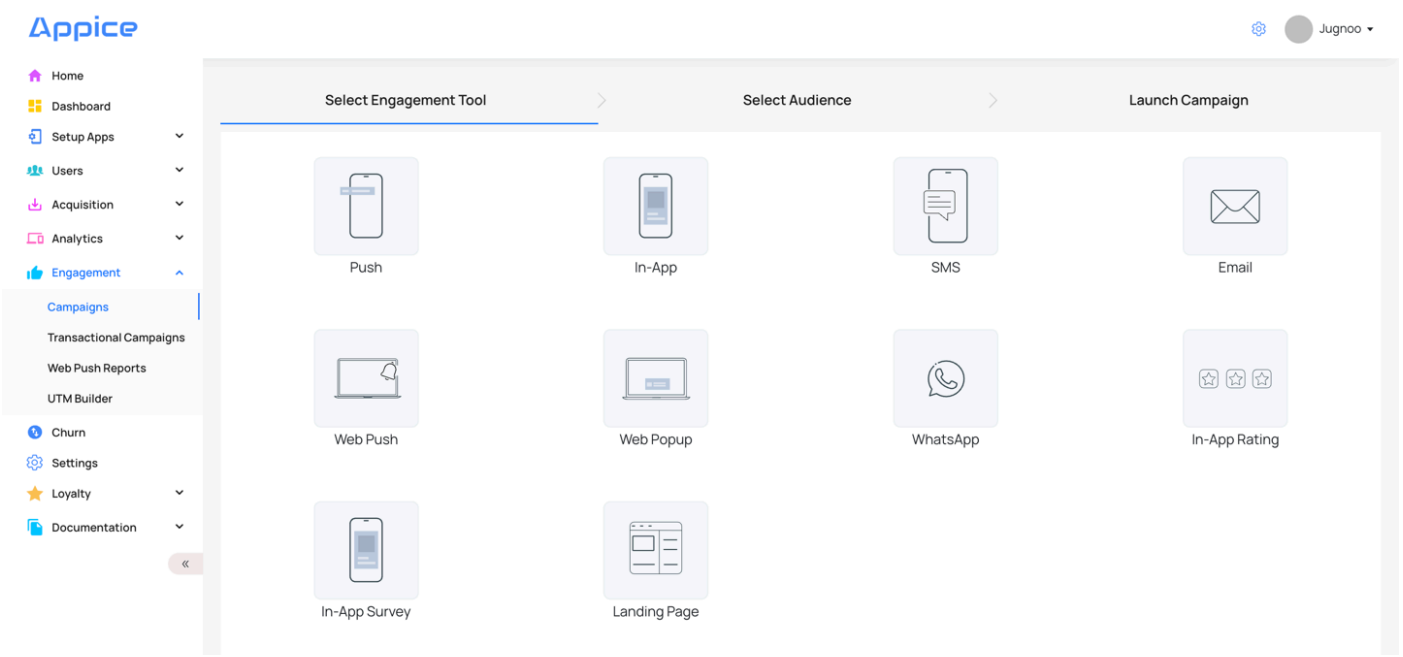
4. **Comprehensive server-side attribution**
    - Measure your advertising campaigns efficiency using our attribution module.
    - Fraud prevention in advertising attribution

5. **Collaborative and Competitive Targeting of Apps**
    - An Industry First Solution to target users based on similar services being used for e.g. other Banks, Fintechs or digital services like e-commerce (Android only)
    - Bring back customers who are fence-sitters or using your competitor's services.

6. **Proximity based geo marketing solutions**
    - Use Radial/Polygon based geofences that are best suited to real world environments
    - Use Dwell Time and Real Time targeting

7. **Patented Solution for User Interests and Demographics Intelligence**
    - Uses standard Smartphone sensors to extract intelligence
    - Privacy and regulatory compliant
    - Based on US Patent 20140179270

Campaign Workflow



Campaign Process

Steps	Methodology
1.Define user journeys and use cases for engagement	Events & Attributes foreach user- journey
2.SDK Integration	App & Wen Dev teams integrate SDK which captures interactions with UI.
3.Events Data	All actions performed by users are captured in real-time e.g. App open, page browsing, select product, add to cart, buy product, exit.
4.Build Segments	As per engagement use cases e.g [customers who did not log in in past 30 days and have made a FD in last 30 days and …]
5.Select Campaign Type	App Push, In-App, Web-Push, SMS, Email
6.Build Campaign	Edit previous campaign or build a new one – Headline, Image, Body Copy , CTA, Button colour , Deep Link, Language, Special parameters etc.
7.Build Campaign Variants	For A/B test
8.Define Campaign Schedule	Date of campaign, Time, When to make live
9.Taking campaigns live	Move campaign from Draft to live stage
10.Campaign Analytics	See analytics in real-time to iterate

The platform offers various engagement channels such as Push, In-App, Web Push, Web Pop-up, Email, SMS, WhatsApp. Once the channel is selected, one can start building a campaign with multiple variables:

Example:

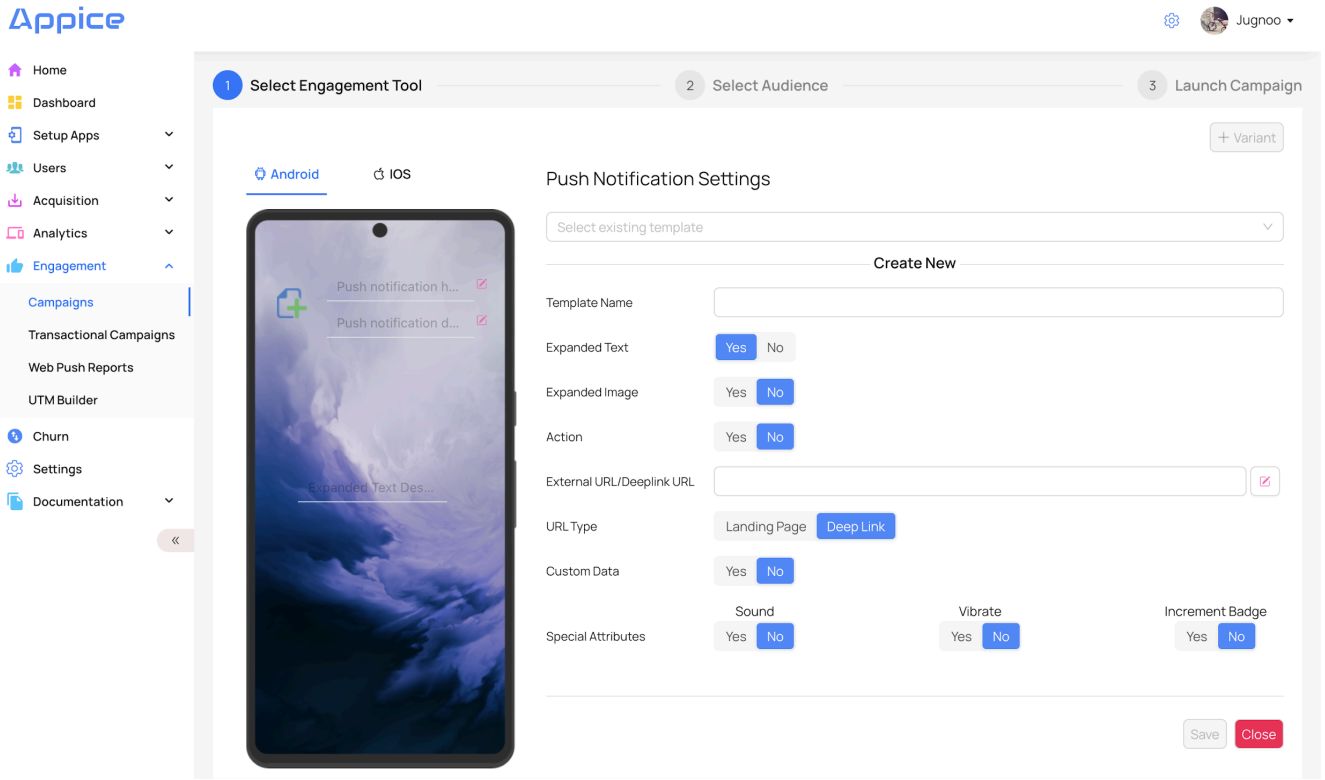
Push Campaign: Creative and Parameters

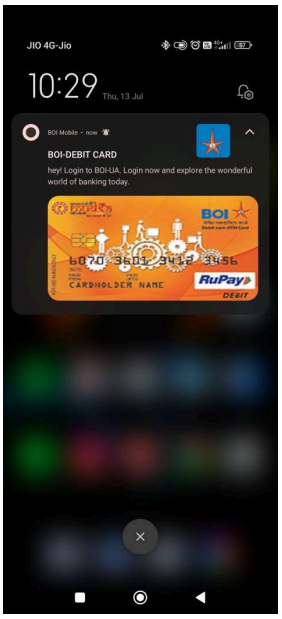
Push notifications provide the capability to communicate brief, yet important alerts to your mobile app users. Appice's rich segmentation and powerful infrastructure lets you send time-sensitive, relevant, and personalized push messages on a large-scale. AI/ML also filters out any irrelevant/inconsistent/obscene words.

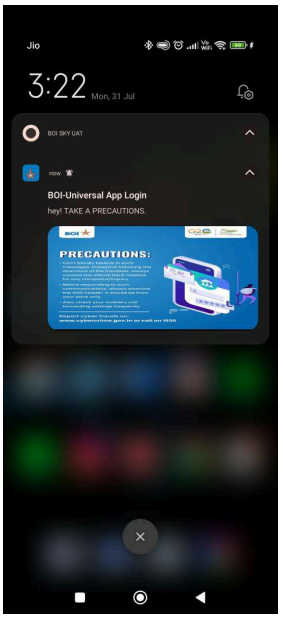
The *Push Notification* module on the Appice dashboard under *Campaigns* makes it easy to set up push campaigns for all your users or specific user segments. These segments can be created on the basis of past or live user behavior, user properties, or a combination of user behavior and properties.

Once a campaign has been sent, you can view detailed reports on how many messages were sent, how many users clicked on them, and how many users converted as a result.

Push notifications display in the notification tray or the notification inbox of the user as displayed below.

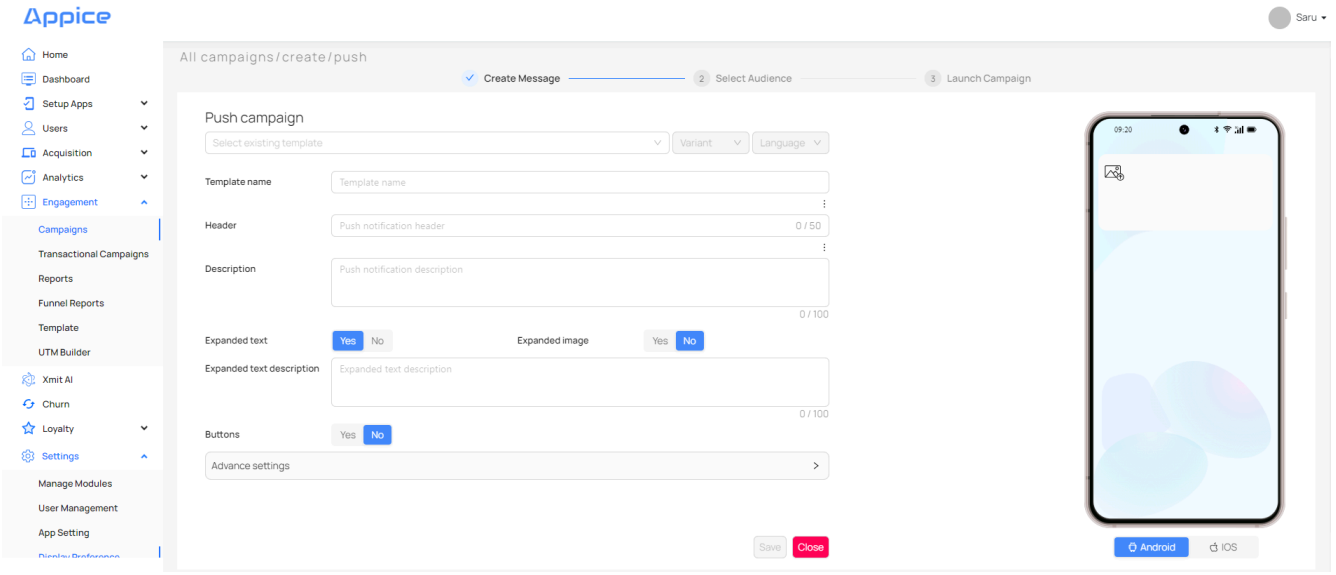






You can follow these steps to create a new Push campaign.

On clicking Push notification, it takes you to next page, where you can put basic details, such as Template Name, Expanded Image etc. Then click on Submit → Next.



Select Existing Template - You can type and search for an existing template from the dropdown or you can create a new template.
Template Name - Name of the new template.
Header - Title of the push notification.
Description - Description of the push notification.
Brand Icon : 60x60
Expanded Image -
Yes - Expanded image should be shown, additional to icon, headline & description in Push received on device.
No - Expanded image should not be shown.
Expanded Image size: (w)600 x (h)300

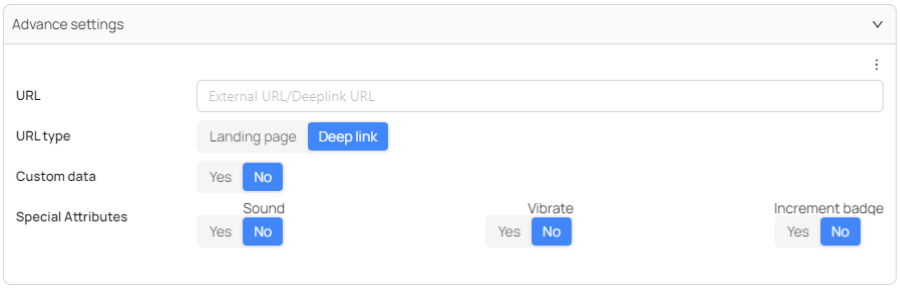
Expanded Text -

Yes - Expanded text should be shown, additional to icon, headline & description in Push received on device. Description to be put in the **Expanded text description** textbox.

No - Expanded image should not be shown.

NOTE: Push is received with headline & description on device. On scrolling the 'arrow' icon, it should show Expanded image or Expanded text.

Advanced Settings -



URL - Landing page is an external URL where your user will land upon clicking the notification. Deep links allow you to land the user to a particular part of your app. If you want to use external URLs, then you have to whitelist the IPs or provide http/https before the URL so they can be handled properly by the SDK.

URL type -

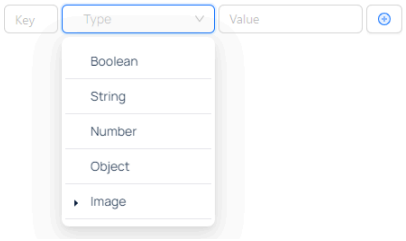
Landing Page - If selected, on clicking the notification, it should take to external URL, which is put in the option below.

Deep Link - If selected, on clicking the notification, it should redirect to a specific product screen within the app.

Custom Data -

Yes - This is valid only with the Deeplink option. It does not affect even if it is put with a Landing Page URL. On clicking notification, it should take you to a specific target screen.

No - No custom data to be put.



NOTE: This is applicable for the AppInbox feature.

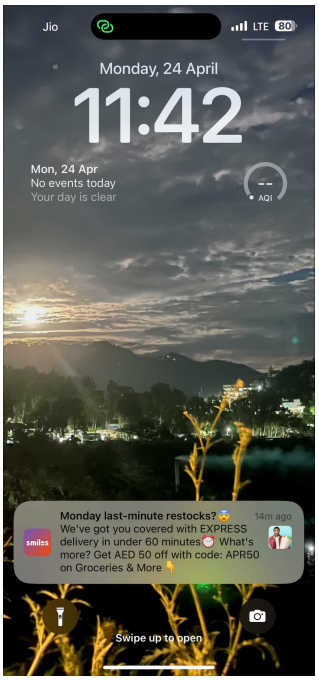
Special Attributes -

- Sound - Notification to be received with sound.
- Vibrate - Notification to be received with vibration.
- Increment Badge - Show badge count on App icon. Applicable for iOS only.

User interaction with Push notification

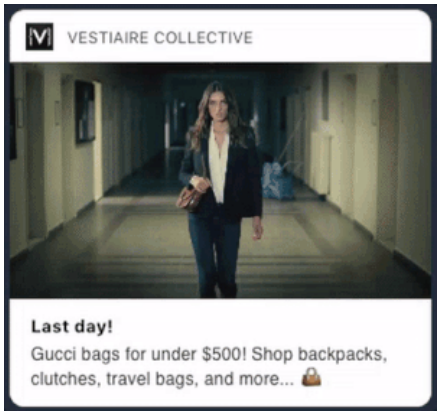
Once users receive Push notifications on their devices, they can either:

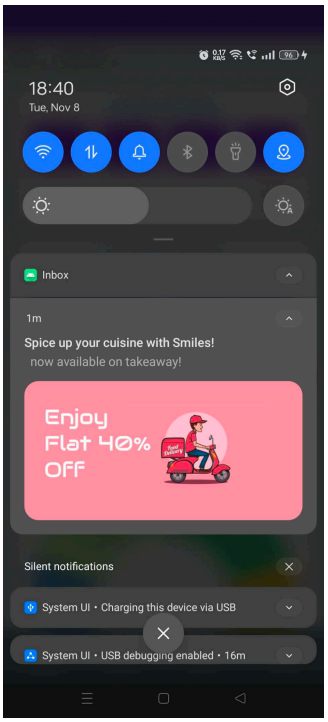
- swipe to remove the notification, or
- scroll down to read the full notification, or
- scroll down to see the rich pus,or
- click to go to specific screen within the App or any external URL

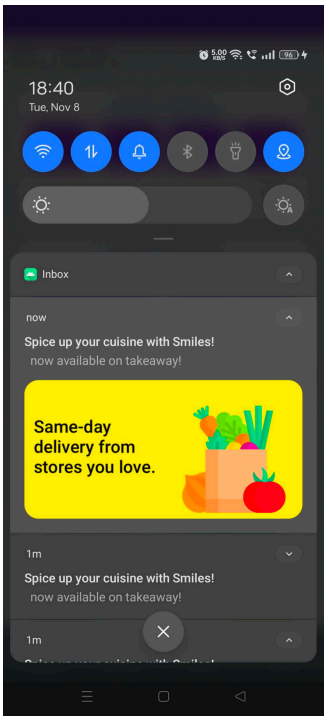


Rich or Advanced Push Notifications

- Show & Tell for Push Messaging
- Marketers have power to paint a picture on their lock screen in addition to text
- Engage customers more deeply by including photos, videos, gifs
- Provide a richer and more actionable experience







There are four steps to Send a Rich Notification:

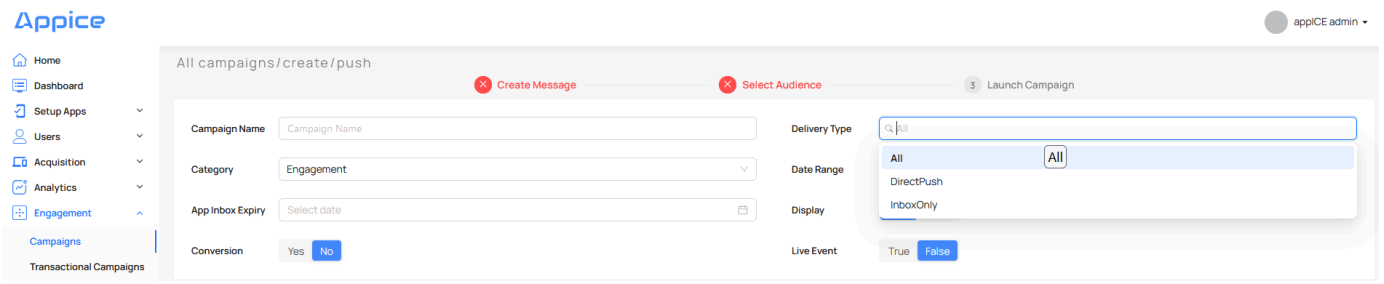
1. Choose your audience
2. Create message
3. Add media file or URL
4. Review and launch

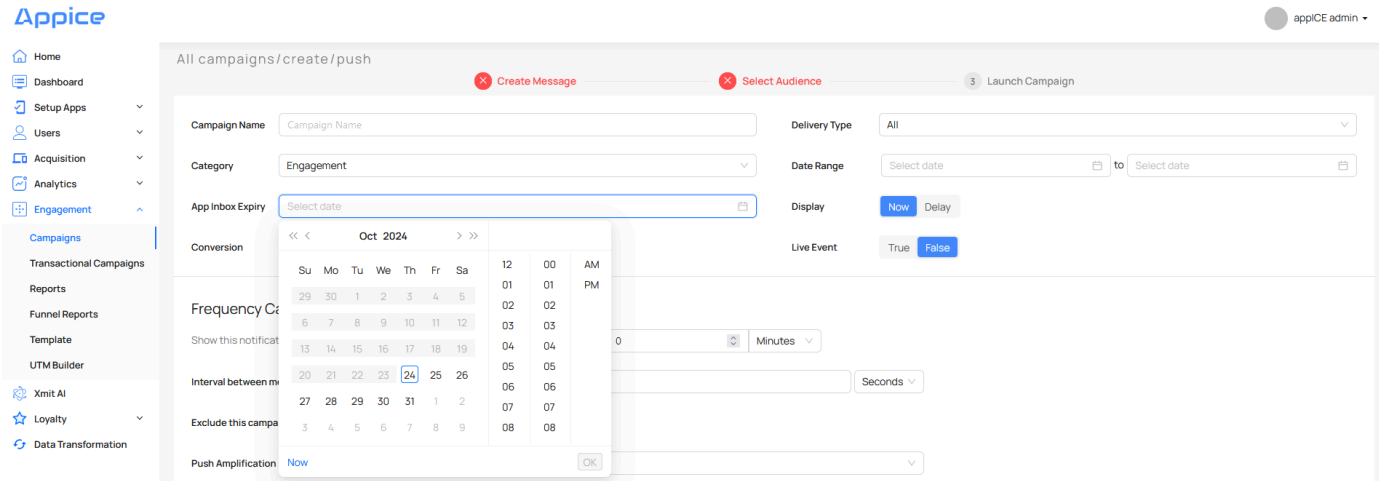
AppInbox

App Inbox is a messaging channel that provides the ability to deliver rich, individually customized content to your users. Messages that are sent to App Inbox are saved on the user's device.

Push notification and in-app campaigns are great for grabbing the app user's attention, but they are short-lived. Once swiped off, they lose their ability to engage the customer. If the user is not online or is busy, you lose the opportunity to engage with them forever.

App Inbox provides the ability to send lasting content directly to your app from the CleverTap dashboard. Moreover, the inbox messages are targetable to individual segments such as other messaging channels. Your inbox can look different from the inbox of another user; the possibilities are endless.

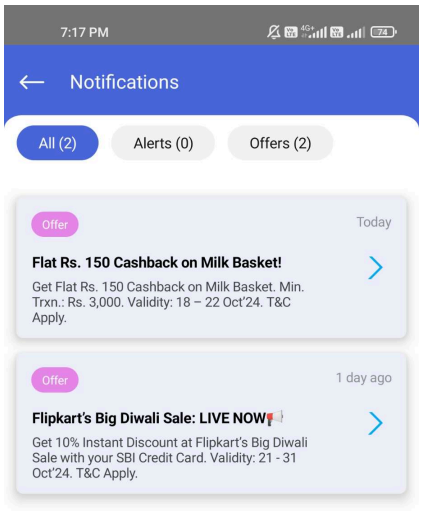




User interaction with App Inbox messages

Once users receive messages in their App Inbox on their devices, they can

- read the messages
- click the messages to go to specific screen within the App or any external URL

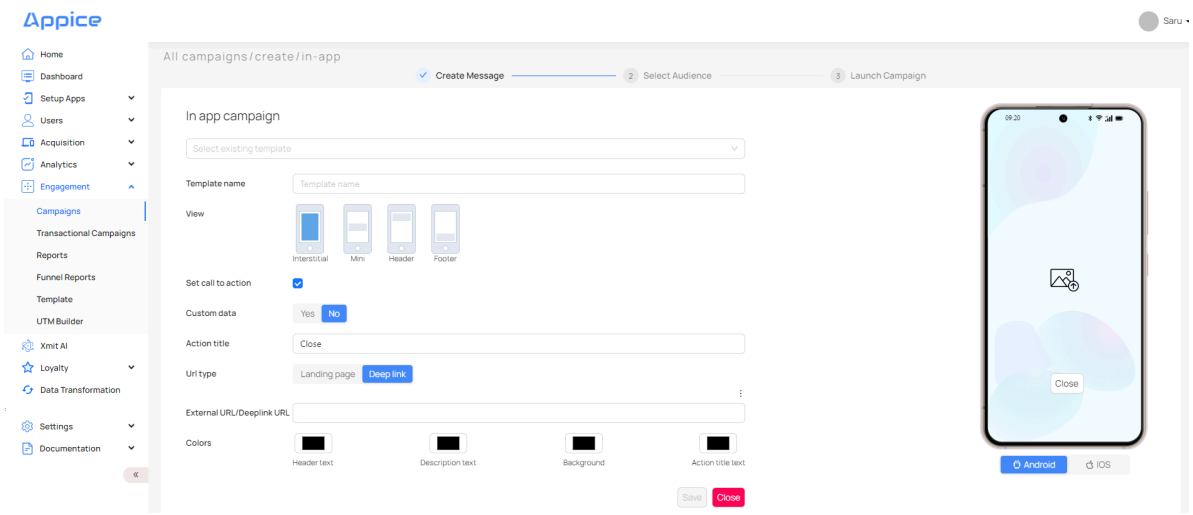


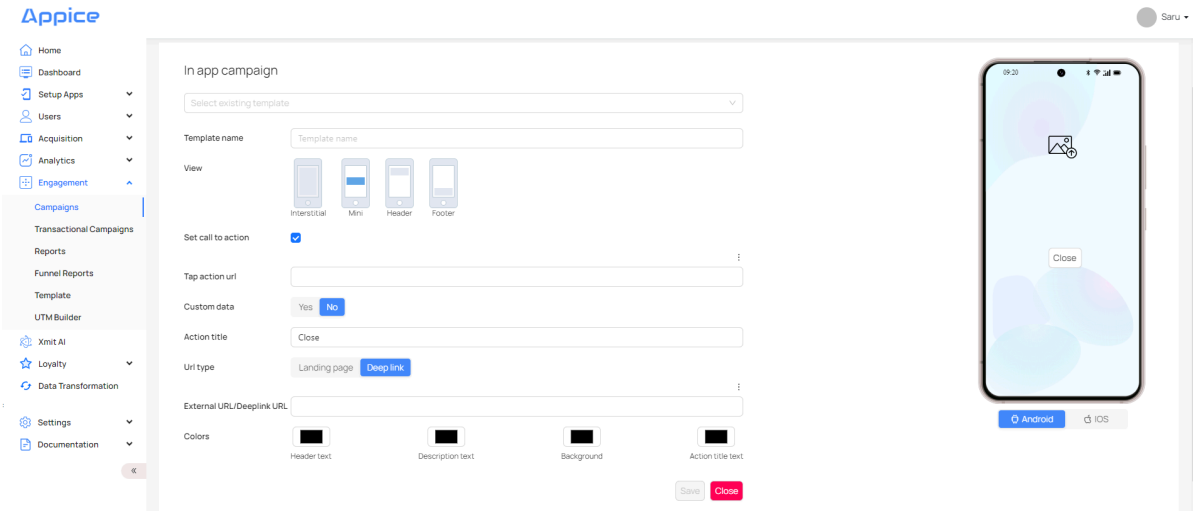
In-App

In-app notifications are pop-up messages that are shown to the user while they are inside your application. These notifications are useful where we want to show contextual messages, such as discount offers while the user is within the application, OR where users have turned off push notifications.

The *In-App Notification* module on the Appice dashboard under *Campaigns* makes it easy to set up In-App campaigns for all your users or specific user segments. These segments can be created on the basis of past or live user behavior, user properties, or a combination of user behavior and properties.

You can trigger a message based on an action. Users receive messages when they perform an action in the app instead of waiting for the next app launch. It makes the messages more contextual and increases conversion.





Select Existing Template - You can type and search for an existing template from the dropdown or you can create a new template.

Template Name - Name of the new template.

Set Call To Action - If this is selected, you will see the Action Title and Action URL, otherwise not.

- **Action Title** - Action to be performed/button to be placed on In-App notification. For example, the Close button has been put on the In-App screen, in the above case.
- **URL Type** - Landing page is an external URL where your user will land upon clicking the notification. Deep links allow you to land the user to a particular part of your app. If you want to use external URLs, then you have to whitelist the IPs or provide http/https before the URL so they can be handled properly by the SDK.
- **External URL/Deeplink URL** - On clicking the Action Title, what action should happen. For example, it should take to the respective screen within your app or it should to some external URL.

Tap Action URL - Put a URL where the user should land on clicking an In-App.

Custom Data - Put deeplink where the user should land on clicking an In-App.

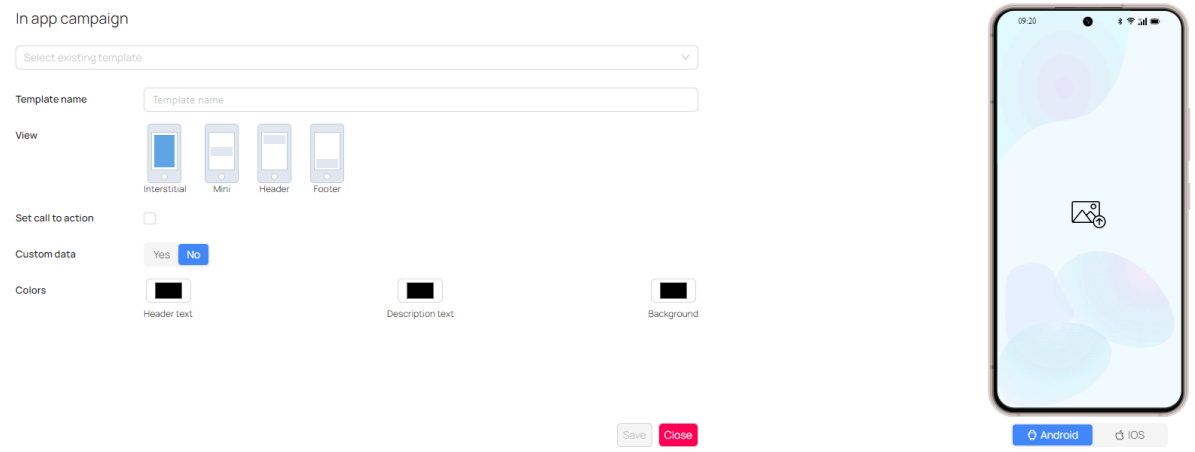
Colors -

- **Header Text** - Color of header text. It should be in Hex Code like #RRGGBB.
- **Description Text** - Color of description text. It should be in Hex Code like #RRGGBB.
- **Background** - Color of background. It should be in Hex Code like #RRGGBB.
- **Action Title Text** - Color of action title text. It should be in Hex Code like #RRGGBB.

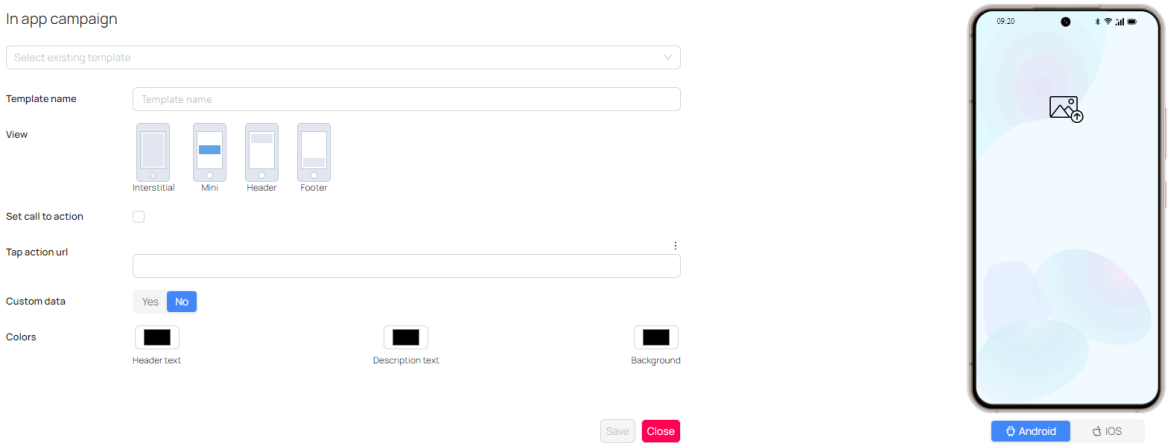
In-App Description - Description to be shown along with icon. This is applicable for Header & Footer views only.

View (Interstitial, Mini, Header, Footer) - How you want to see your In-App i.e. whether on full screen or in header or in footer or between the screen.

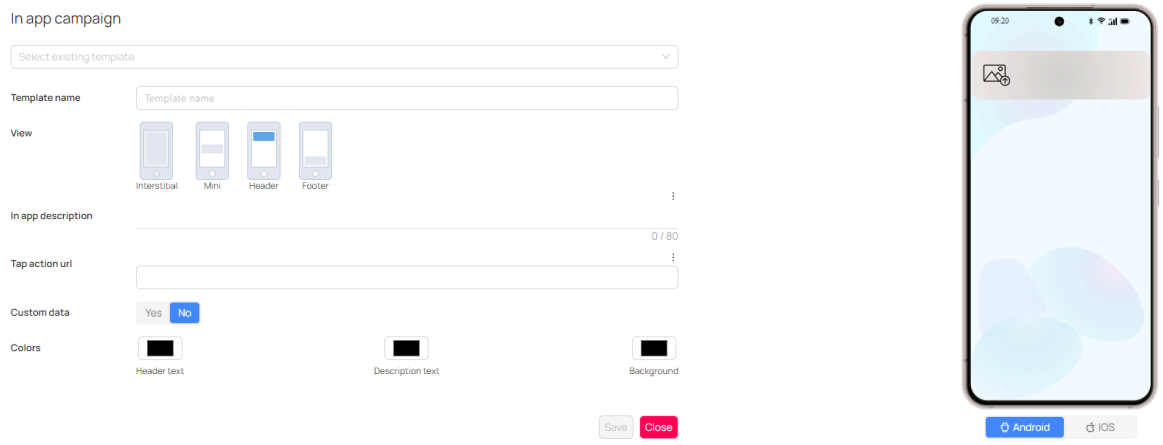
Interstitial (Full Screen) - Uploaded image/gif to be shown as Full Screen. Image dimensions need to be in between (w)480 x 800(h).



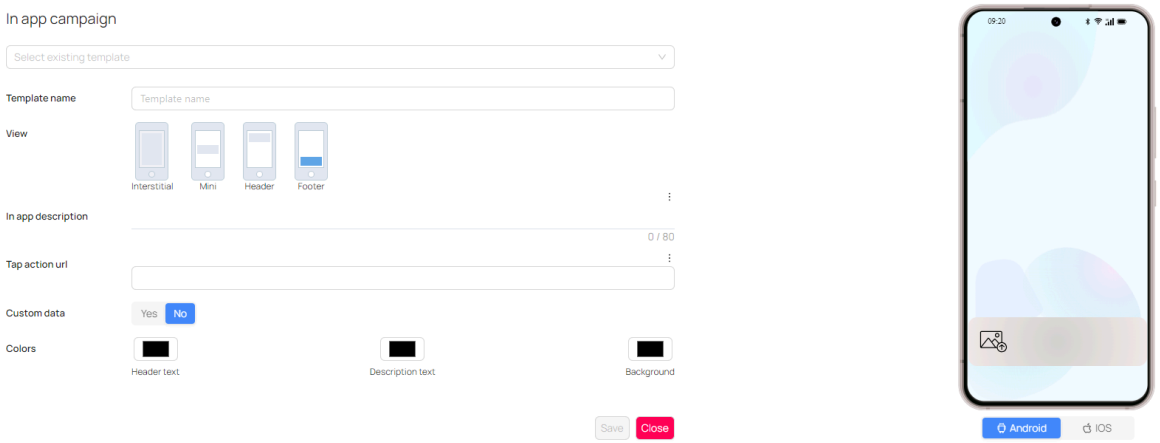
Mini - Image/gif dimensions need to be (w)400 x 400(h).



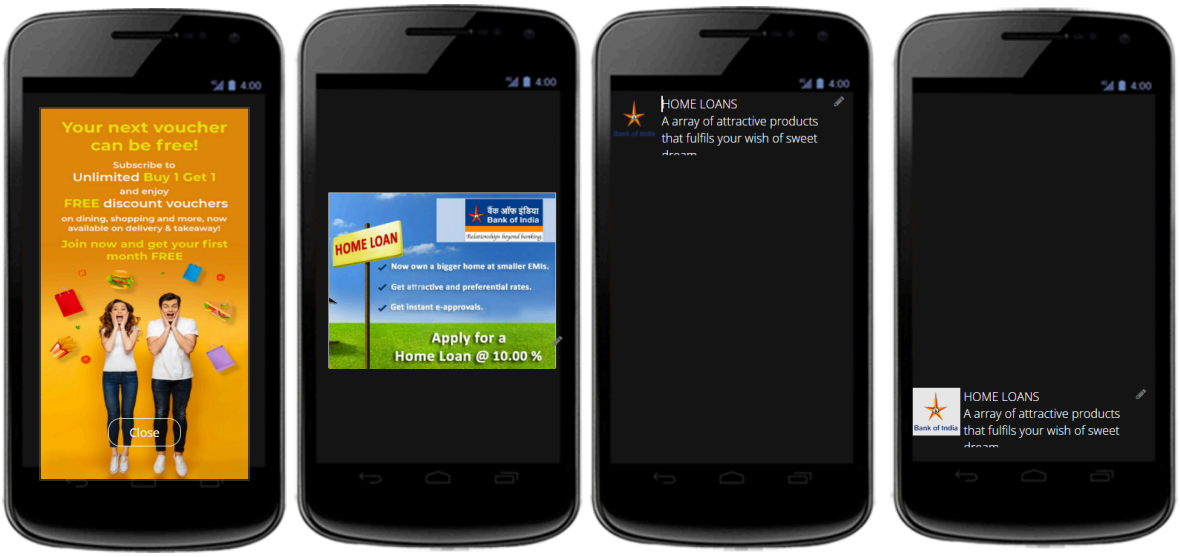
Header - Image/icon dimensions need to be in between (w)60 x 60(h) and (w)96 x 96(h). Message characters need to be 80 characters long.



Footer - Image/icon dimensions need to be in between (w)60 x 60(h) and (w)96 x 96(h). Message characters need to be 80 characters long.



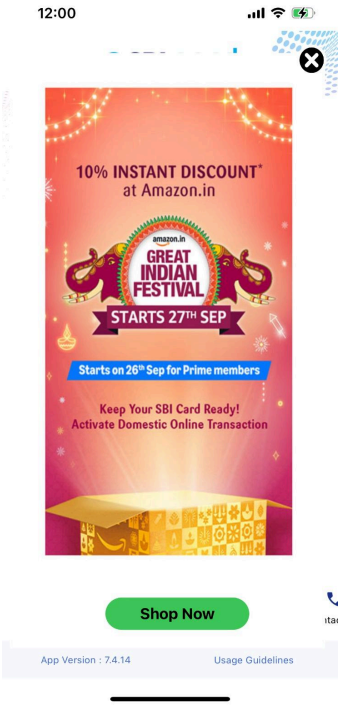
In-App notifications display inside the app, as displayed below.



User interaction with In-App notification

Once users receive In-App message on their devices, they can either click on:

- X button to close the In-App notification, or
- CTA button to go to specific screen within the App or any external URL



Creative Sizes: Basis Channel

S.No.	Channel	Creative Type	Image Size	File Size (Max)
1	Push Notification	Icon	Between (w)60 x 60(h) and (w)96 x 96(h)	100 KB
		Expanded Image	(w)600 x 300(h)	500 KB
2	In-App Notification	Interstitial (image, gif)	(w)480 x 800(h)	500 KB
		Mini	(w)400 x 400(h)	500 KB
		Header	(w)60 x 60(h) and (w)96 x 96(h)	100 KB
		Footer	(w)60 x 60(h) and (w)96 x 96(h)	100 KB

SMS Campaign: Creative and Parameters

Sometimes depending on the capability of the Gateway providers, we may need to use webhooks to trigger campaigns. Here are the steps to follow:

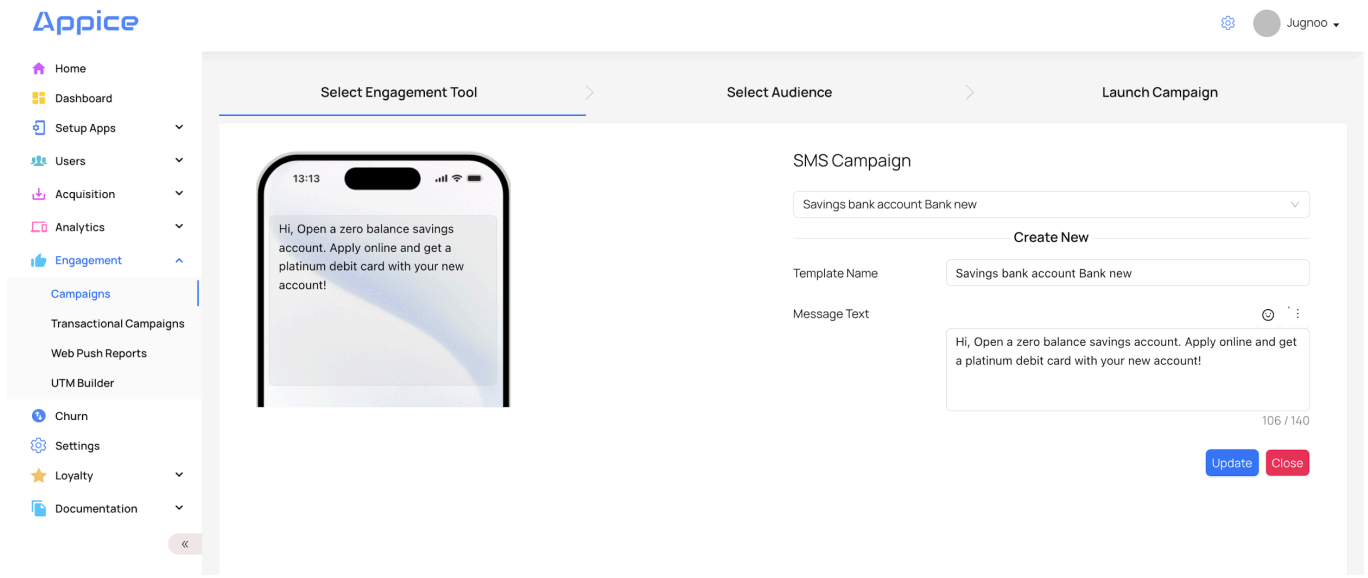
Steps to configure the webhook:

- Appice will **Trigger a Webhook**.
- Get the following details from [vendor] API endpoint for sending SMS. For example:
    - [vendor] **SMS API Endpoint:** https://api.abcdxyz.com/smppsend
    - Add the necessary **parameters** for sending the SMS:

- username: Your [vendor] account username
- password: Your [vendor] account password
- to: The recipient's phone number (you can use a Appice contact property like {{contact.phone_number}})
- from: The sender ID you configured in [vendor]
- text: The SMS message content (which can also be personalized using Appice contact tokens, e.g., {{contact.firstname}})

Here's an example of how the webhook payload might look:

```
{
 "username": "your_username",
 "password": "your_password",
 "to": "{{contact.phone_number}}",
 "from": "YourSenderID",
 "text": "Hello {{contact.firstname}}, thank you for signing up! Your order is confirmed."
}
```



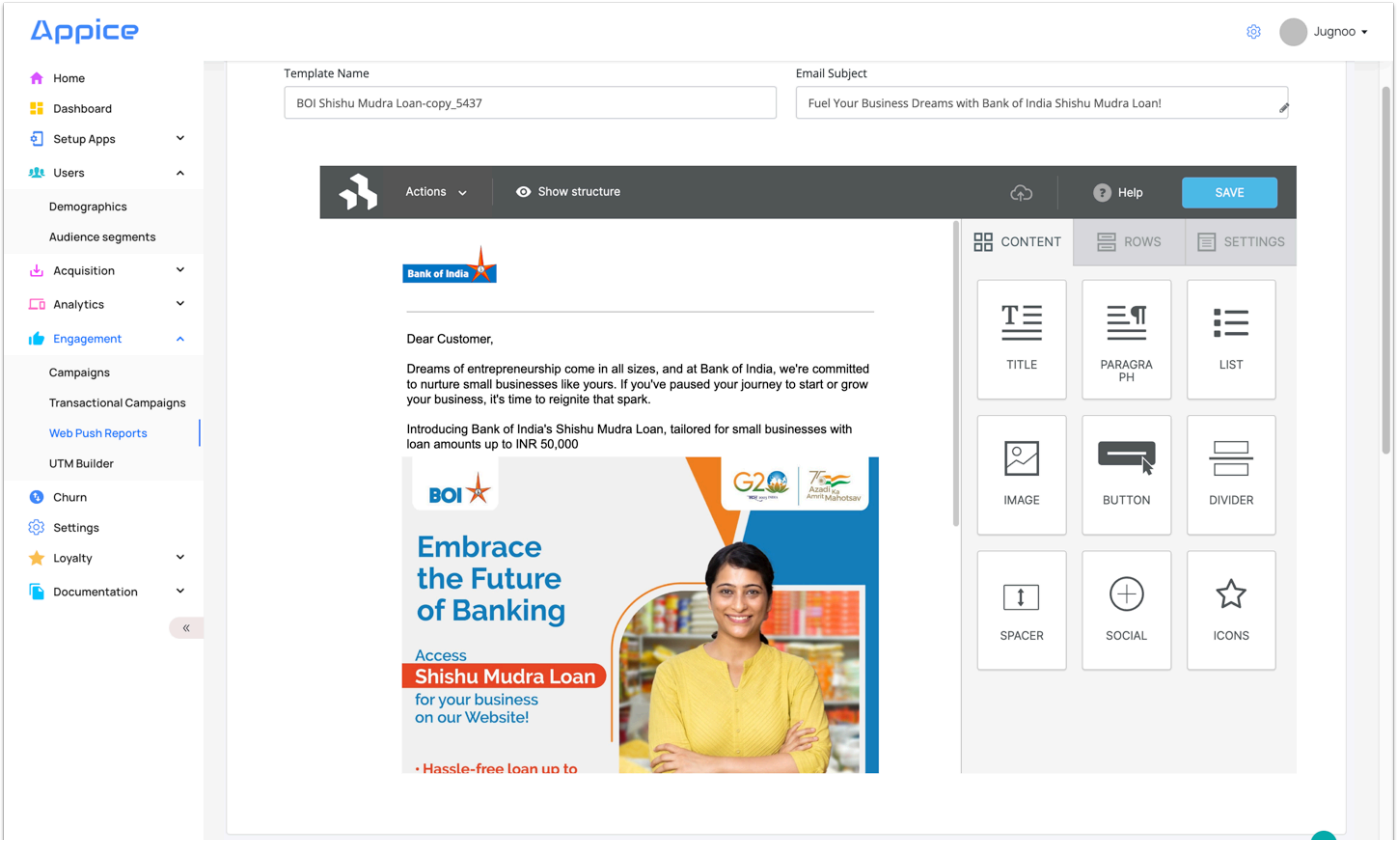
Email

Operationally, it's a challenge to change email templates and content as it involves back and forth between agencies and marketing teams. Once commonly used templates have been designed, marketing users can create 100's of new communication material with a drag-n-drop operation – and set up newsletters for various segments in seconds.

- Ability to predefine text blocks and image
- A relationship between text blocks and images
- Flexible text-fields that shrink/grow
- Editable fields (both text and images) that can be altered
- Video or rich media content

Once commonly used templates have been designed, users can create new communication material with a drag-n-drop operation. You can set up newsletters, FB advertisements, web banners, business cards, Retail posters etc in seconds. Reduce back and forth on call and email to get to the right design and give freedom to operating units to create on-brand work; every time.

Drag N Drop Editor

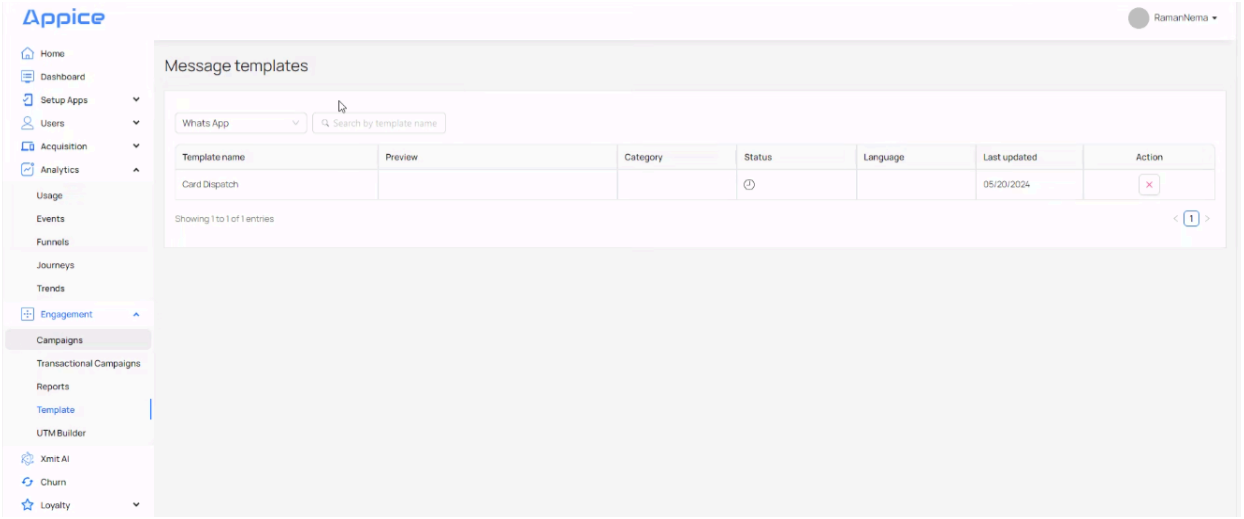


Follow this step to integrate Email service providers details in Appice Platform. This step ensures that all emails sent through Appice will be routed via IBM-DBP infrastructure.

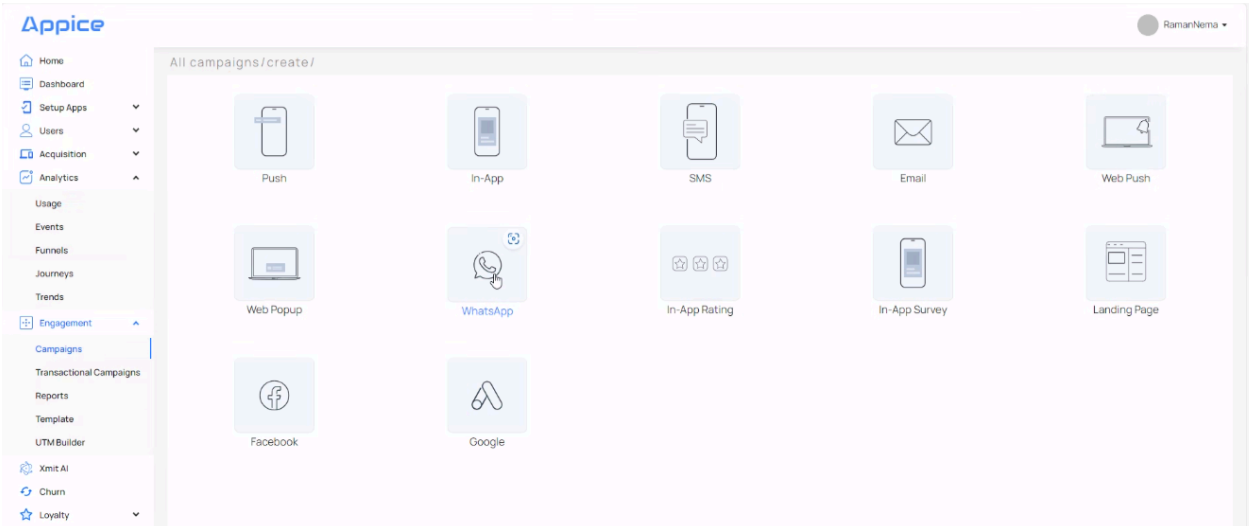
In the SMTP settings on Appice Panel, input [vendor] SMTP credentials:

- **SMTP Server:** smtp.xxxtmail.com
- **Port:** 587 or 2525 (for TLS) or 25 (no encryption)
- **Authentication:** Use your [vendor] API key as the password

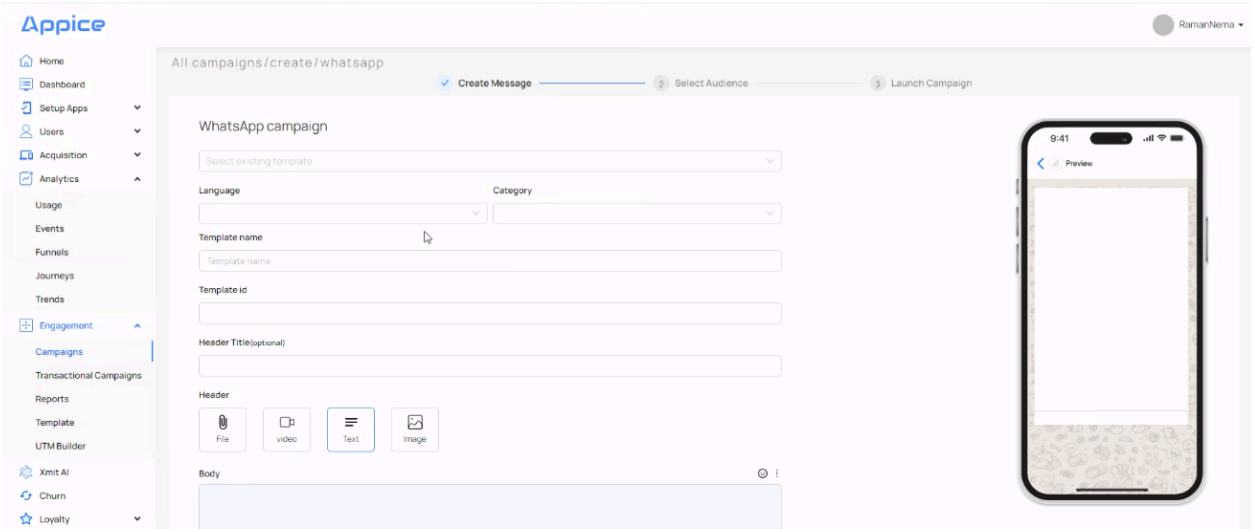
RCS



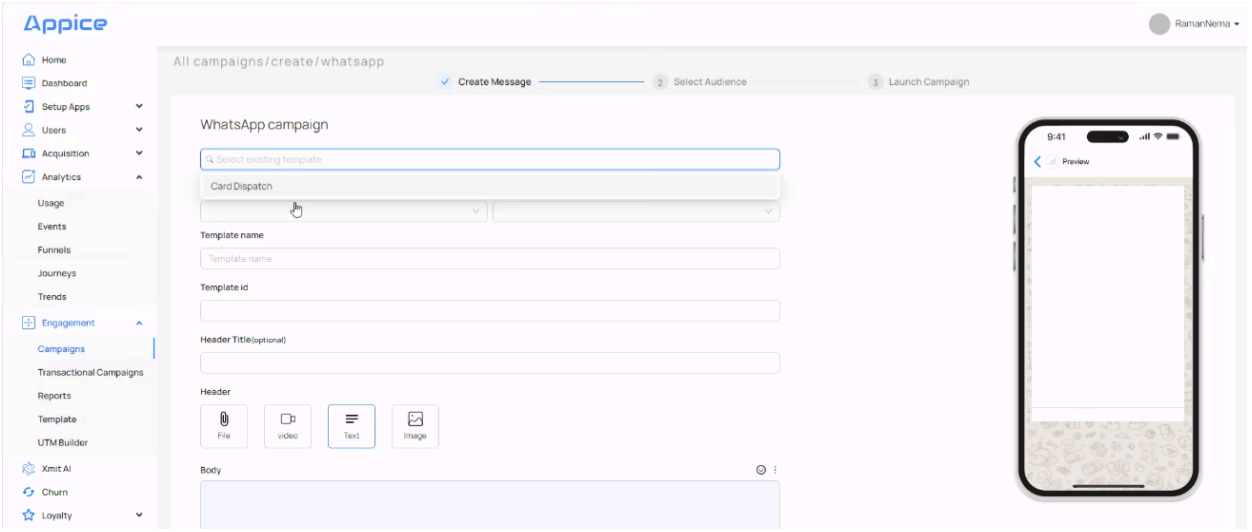
1. Go to Engagement → Campaigns → RCS.



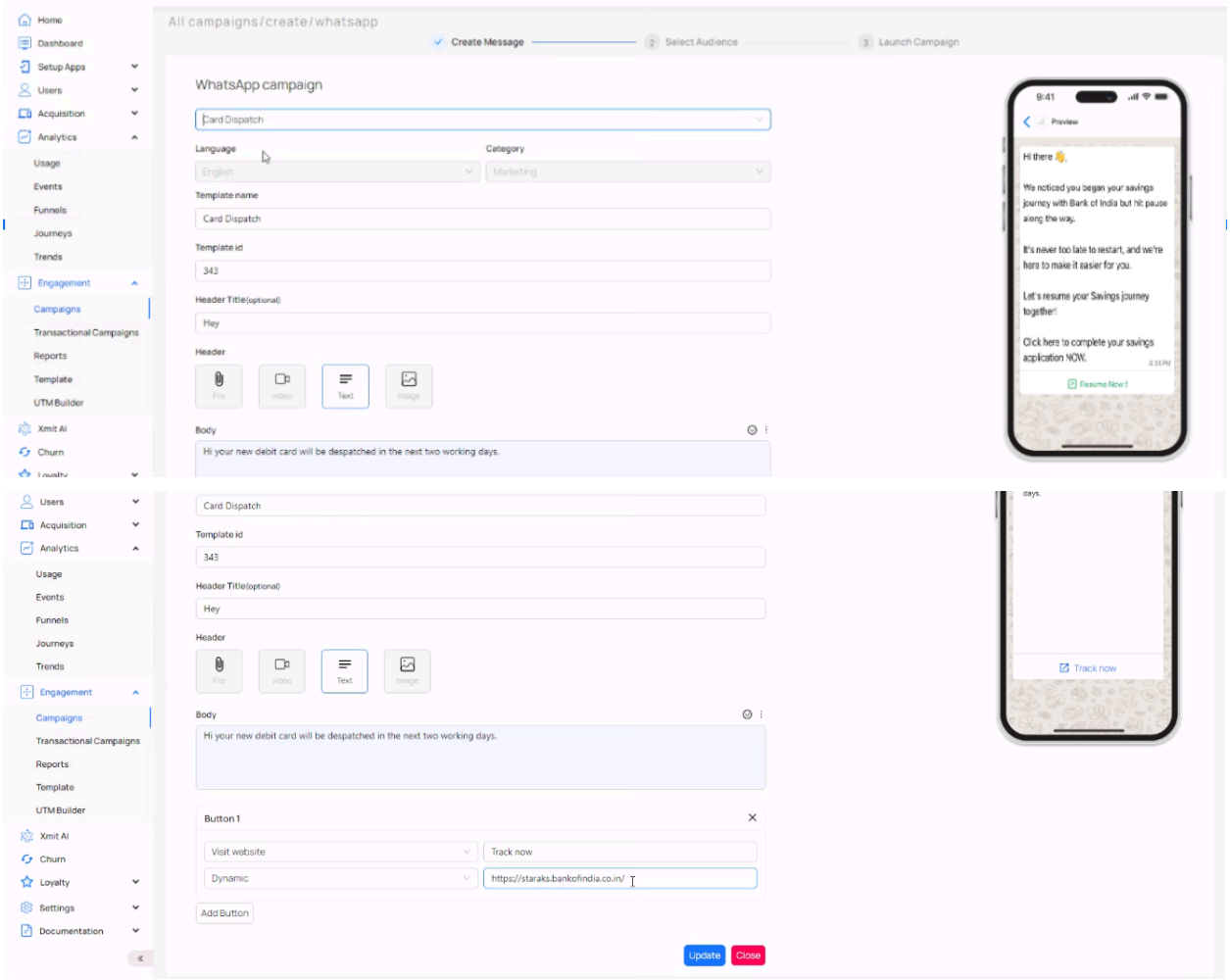
2. Click Create New Campaign.



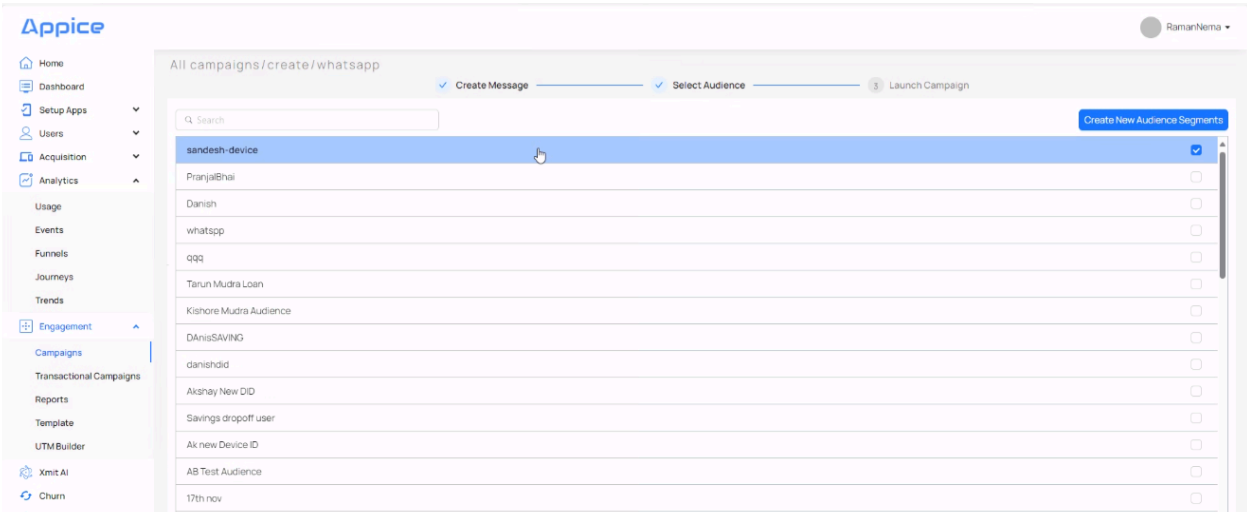
3. Either select an existing template or create a new template.



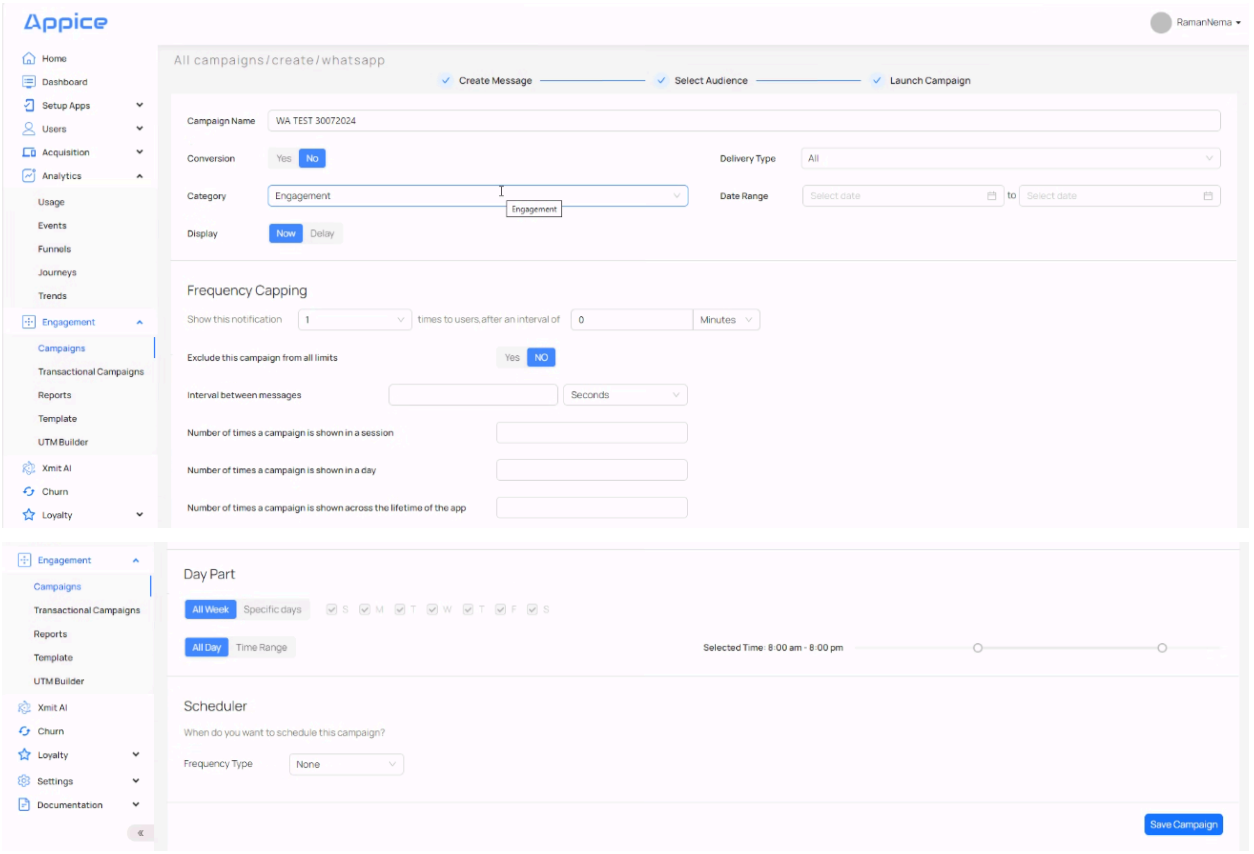
4. Select the existing template.



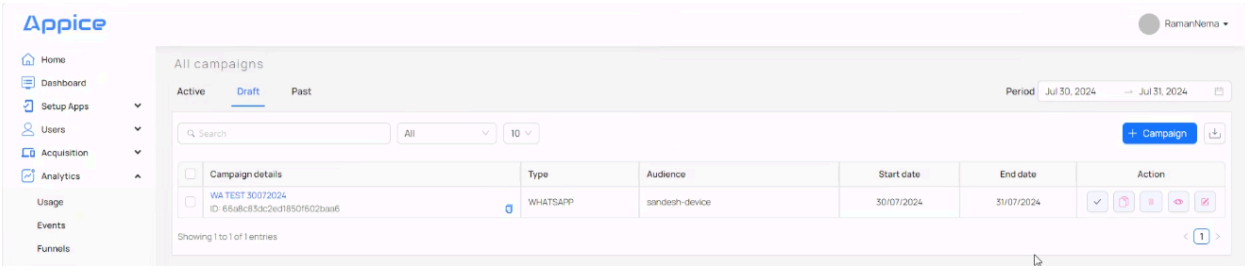
5. Select the Audience segment where you want to send WhatsApp messages to.



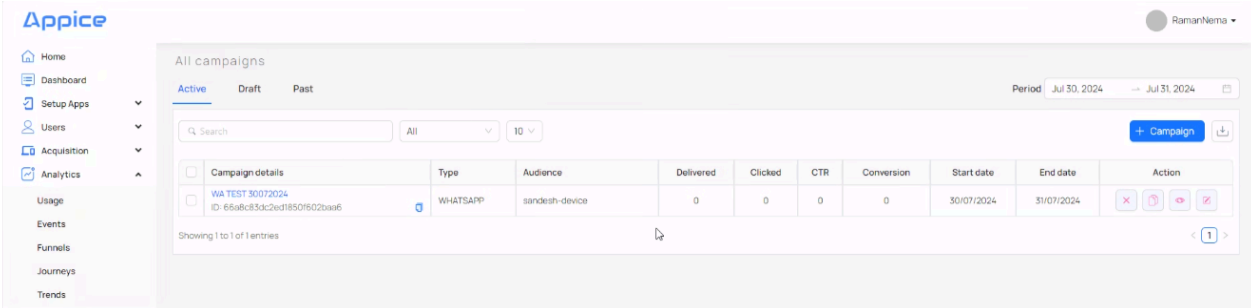
6. Go to Next Tab to put campaign details and Save the campaign.



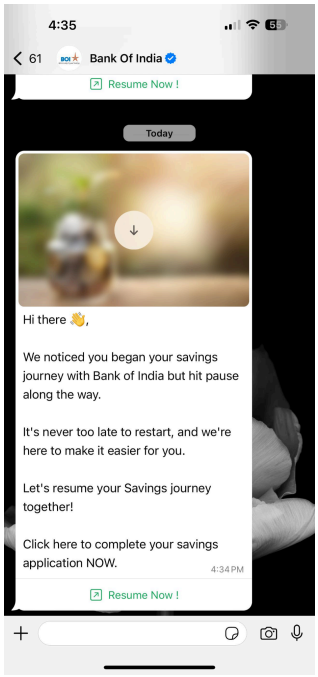
7. Campaign can be seen in Draft campaigns. Click the ‘Active’ button to activate the campaign.



8. On clicking Active, the campaign will be activated and moved to Active campaigns Tab.



9. Notification will be received on the Audience device.



Webhook for callbacks for all channels

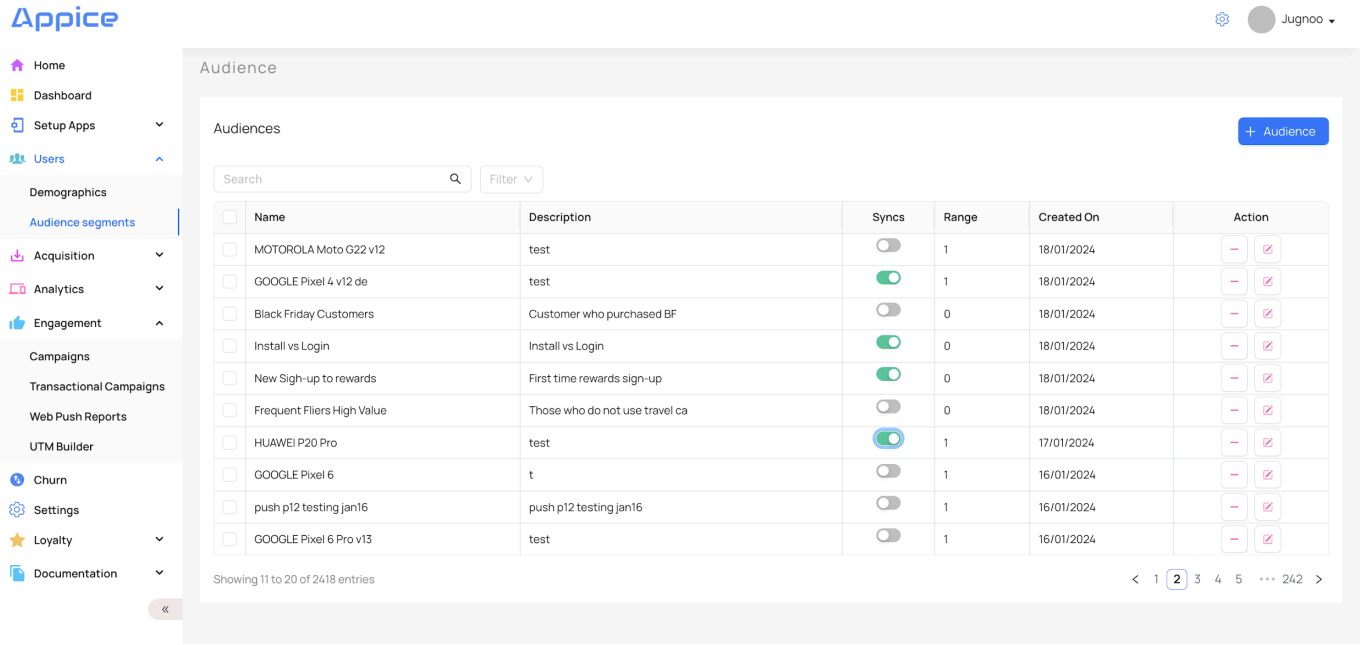
Sometimes depending on the capability of the Gateway providers, we may need to use webhooks to get callbacks for campaign metrics like delivered, opened, bounced and unsubscribed. Here are the steps to follow:

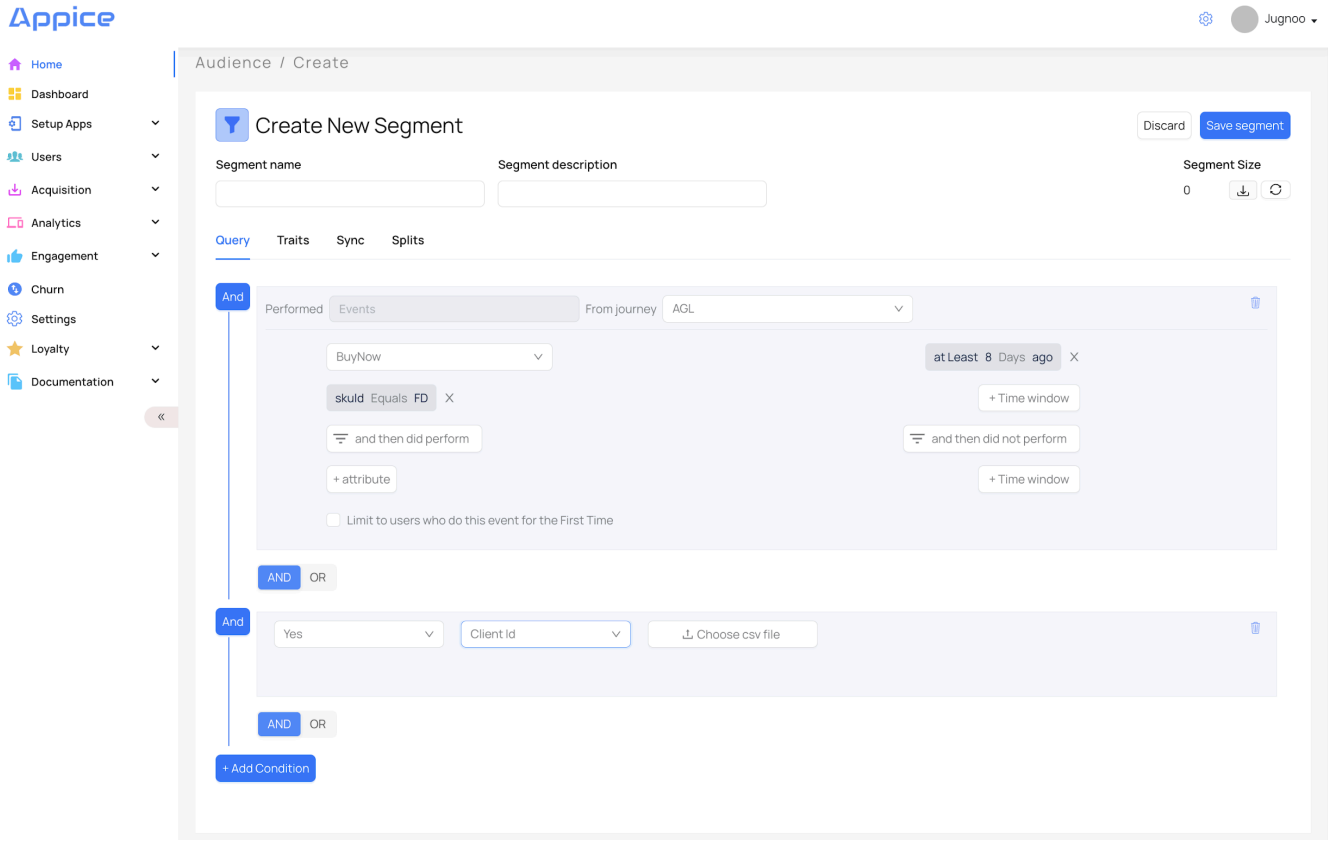
Steps to configure the callback webhook:

- Appice will create **a Webhook**.
- For example: Webhook **API Endpoint:** https://api.appice.io/i/V1/webhook?partnerId=1234&appid=4567
- [vendor] will call this webhook to inform Appice about the events.

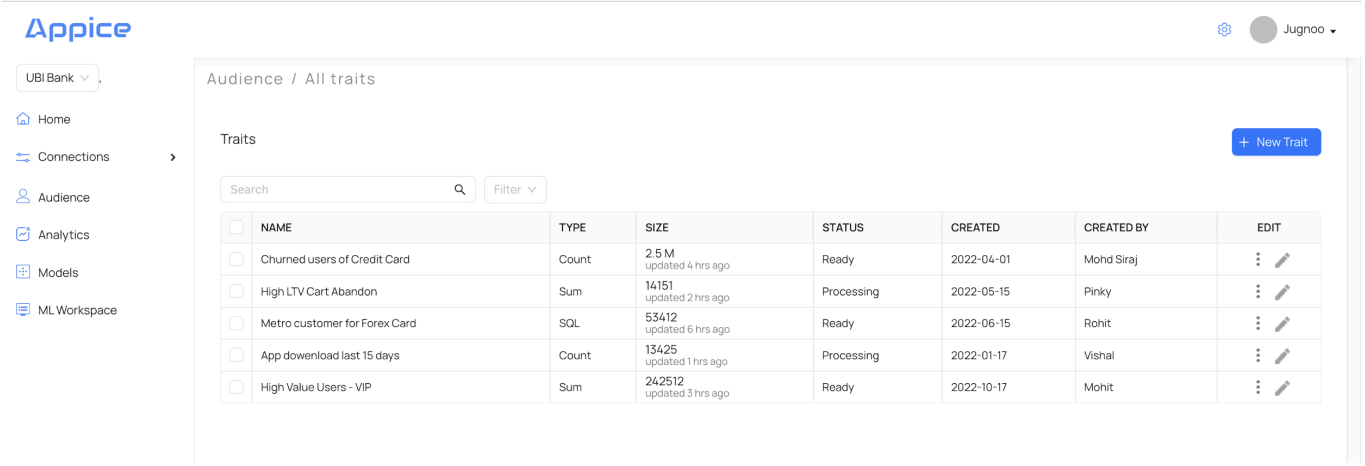
Build Segment

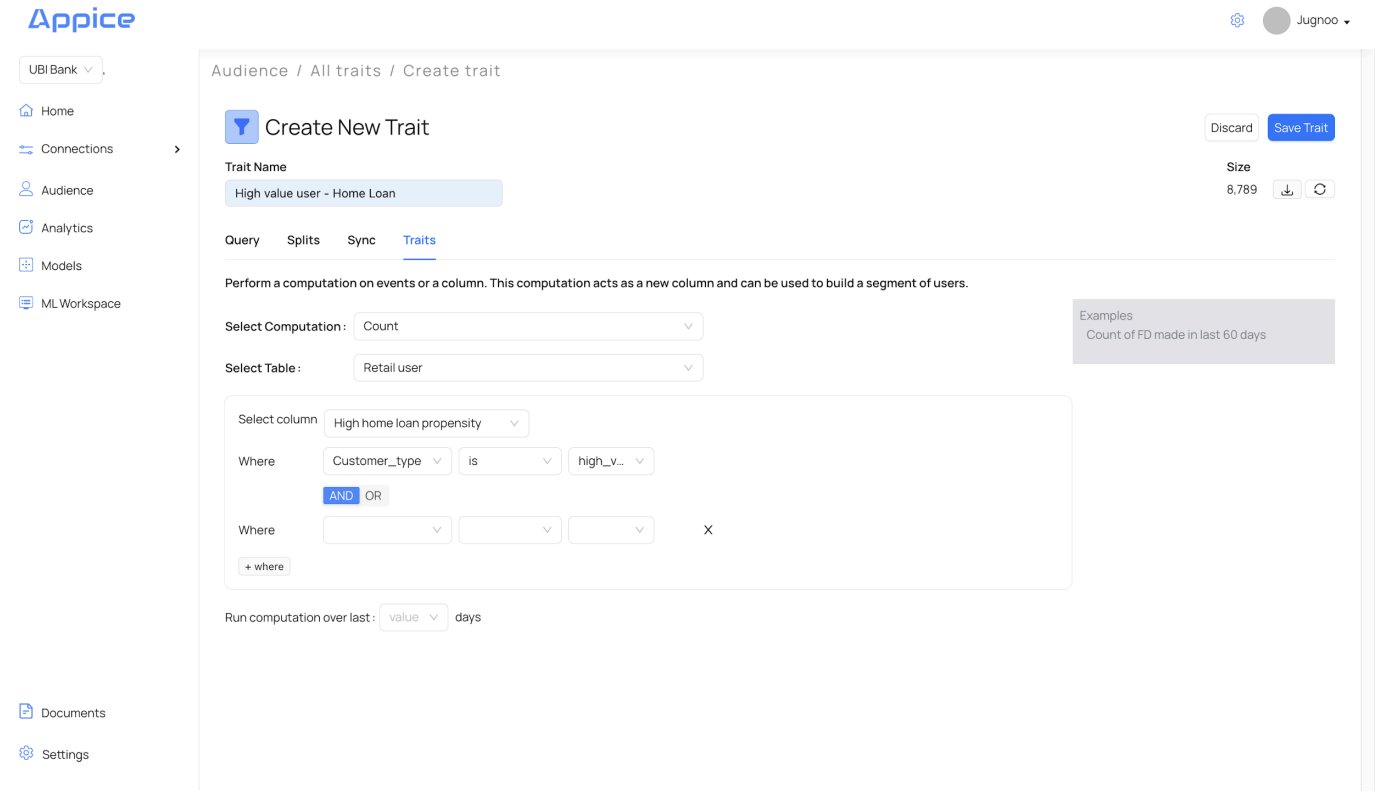
Select prebuilt segments or create new from transactional / behavioural data.





Add Computed Traits or build a new Trait

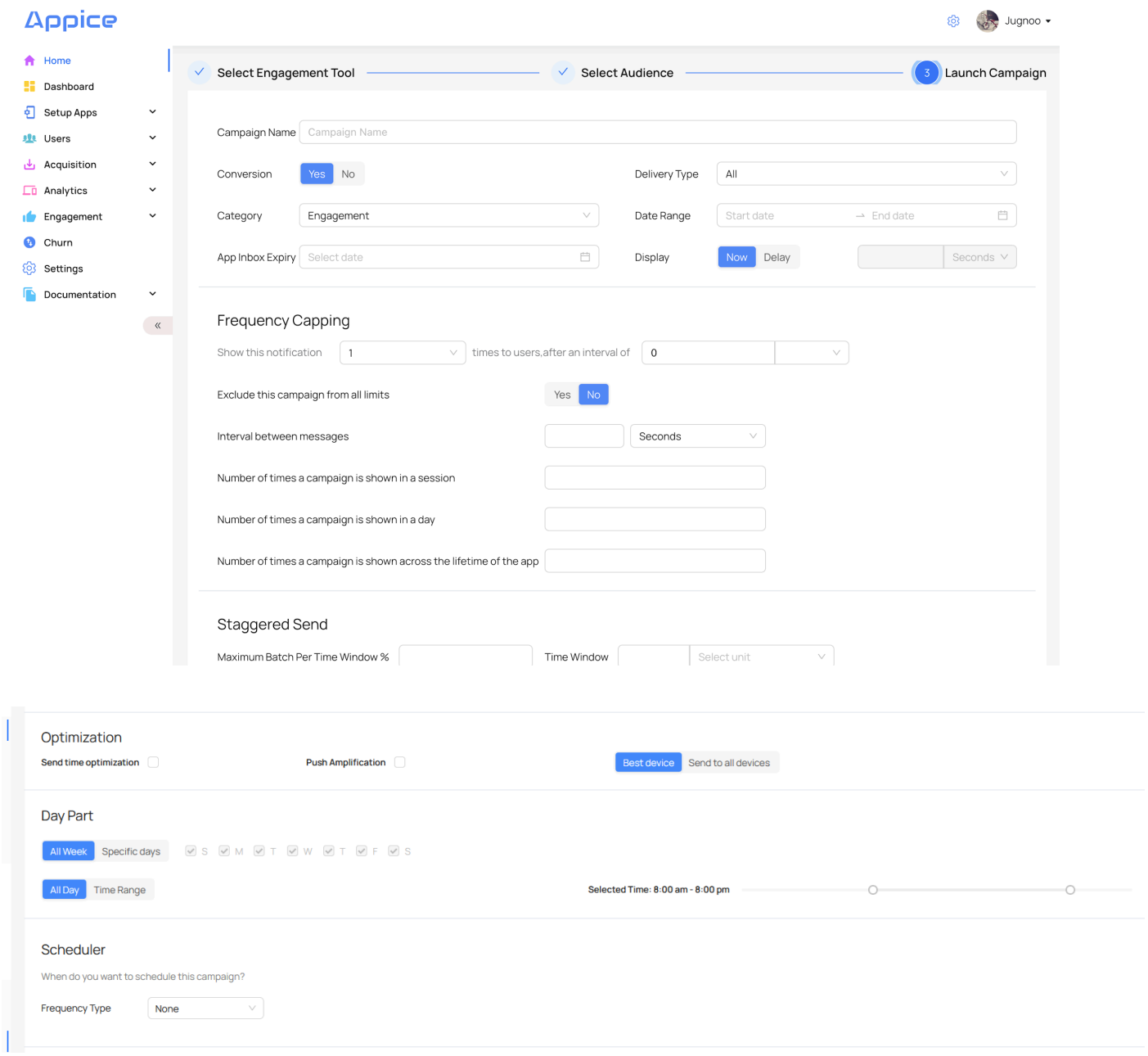




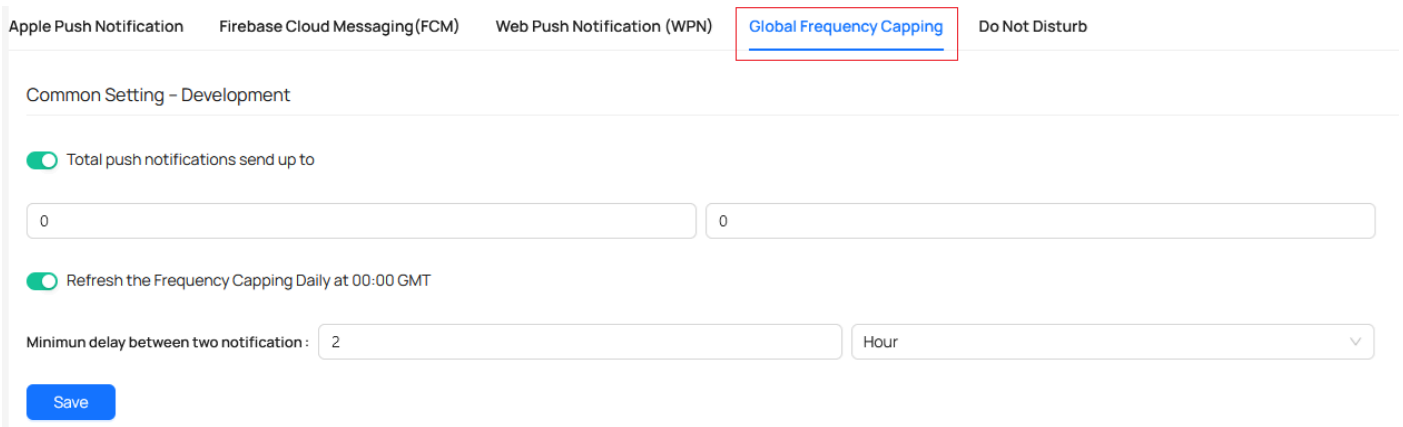
Scheduling

With date, time, frequency settings, day parting, optimization etc.

- Frequency Capping - Number of times the campaign is shown in *x* time limit. This can be set at campaign level or global level.
- Staggered Send - Allows you to send notifications in batches.
- Optimization - Best Time/Best Device is the most optimal time to send a message to each user for a campaign. This optimizes the notification send-time for each user based on their time zone and the period they are most active with your application.
- Day Part - Allows you to send notifications at specific day/time.
- Scheduler - Allows you to schedule your campaigns to send on daily, weekly, monthly or on a continuous basis.

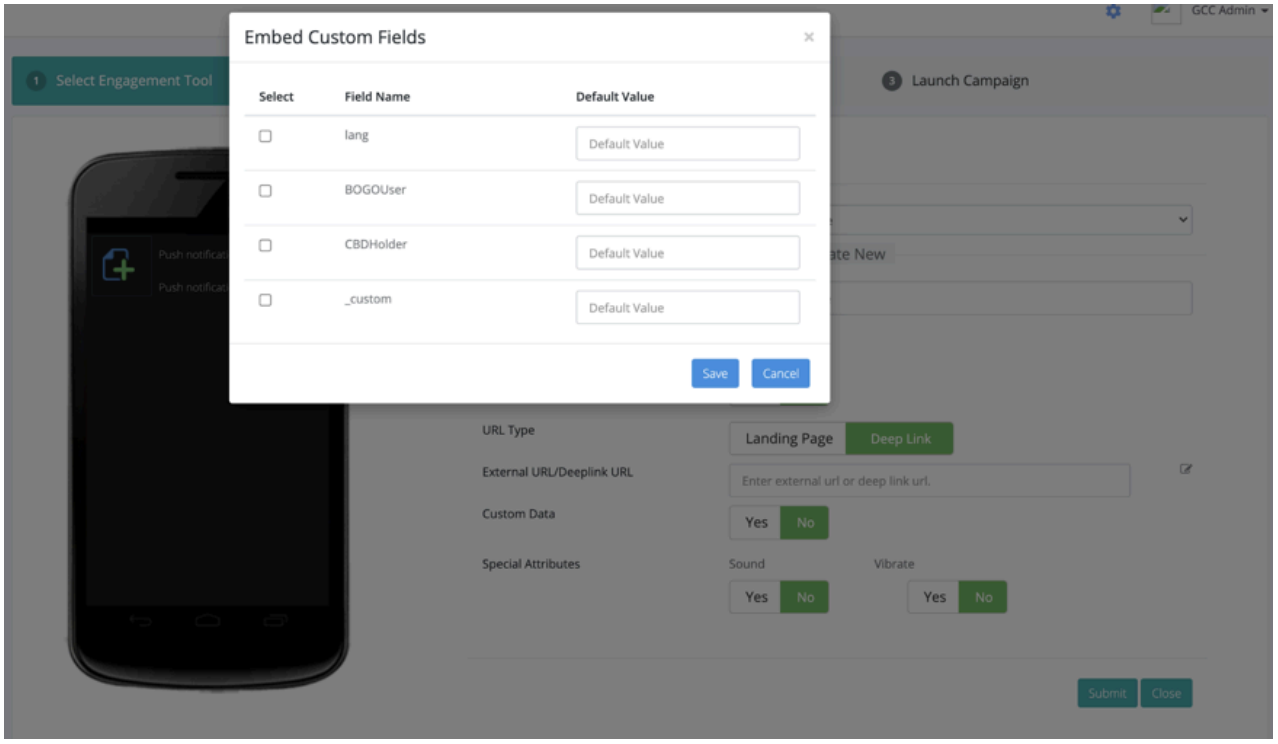


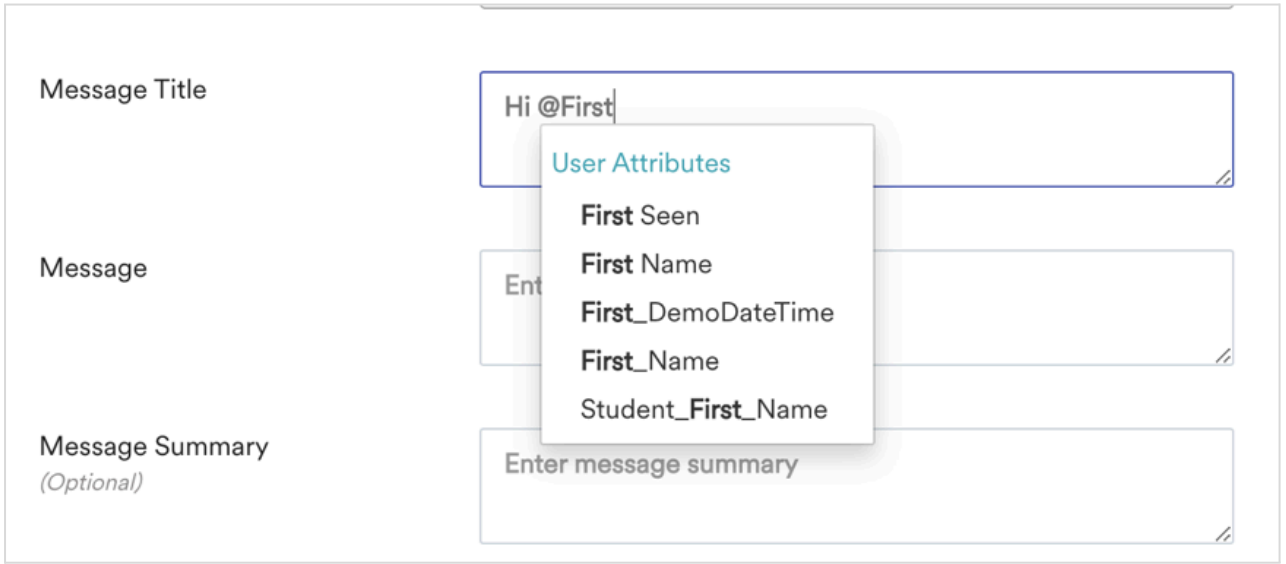
NOTE: Frequency can be handled globally across campaigns from Global Frequency Capping from App Settings:



Language Selection

Custom fields can be added as basis business requirements to execute all possible levels and types of personalization. language based on preference (from the CDP, or based on acceptance and click rate, or defined rules)





Appice

All campaigns/create/push

Create Message — 2 Select Audience — 3 Launch Campaign

Push campaign

Canara Bank-MultiLingual-Home Loan | Language

English × Hindi × Kannada × Marathi ×

Template name: Canara Bank-MultiLingual-Home Loan

Header: Welcome to Canara Bank 22 / 60

Description: Welcome to Canara Bank, an Ideal destination for Personal Banking needs! We offer a wide range of banking services like a savings account, FD, debit card

153 / 160

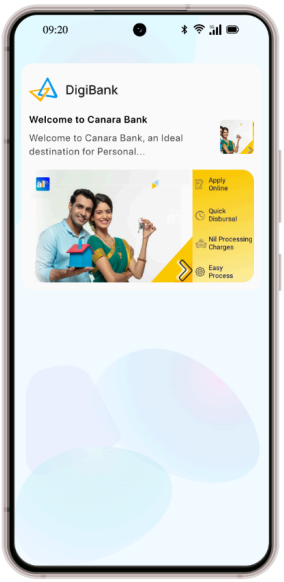
Expanded text: Yes No

Expanded image: Yes No

Buttons: Yes No

Advance settings >

Update Close



Android IOS

All campaigns/create/push

Create Message — 2 Select Audience — 3 Launch Campaign

Push campaign

Canara Bank-MultiLingual-Home Loan | Language

English × Hindi × Kannada × Marathi ×

Template name: Canara Bank-MultiLingual-Home Loan

Header: ಮೇಲ್ಜರ್ಜೆ ಮಾಹಿತಿ 16 / 60

Description: ಈ ಫೈಲಿನಲ್ಲಿ ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಇದೆ. ಪ್ರಾಯಶಃ ಫೈಲನ್ನು ಸೃಷ್ಟಿಸಲು ಉಪಯೋಗಿಸಲಾದ ಡಿಜಿಟಲ್ ಕ್ಯಾಮೆರದಿಂದ ಅಥವ ಸ್ಕ್ಯಾನರ್ ಇಂದ ಈ ಮಾಹಿತಿ ಸೇರಿಸಲ್ಪಟ್ಟಿದೆ.

132 / 160

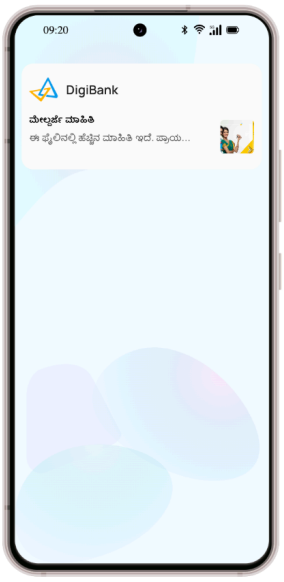
Expanded text: Yes No

Expanded image: Yes No

Buttons: Yes No

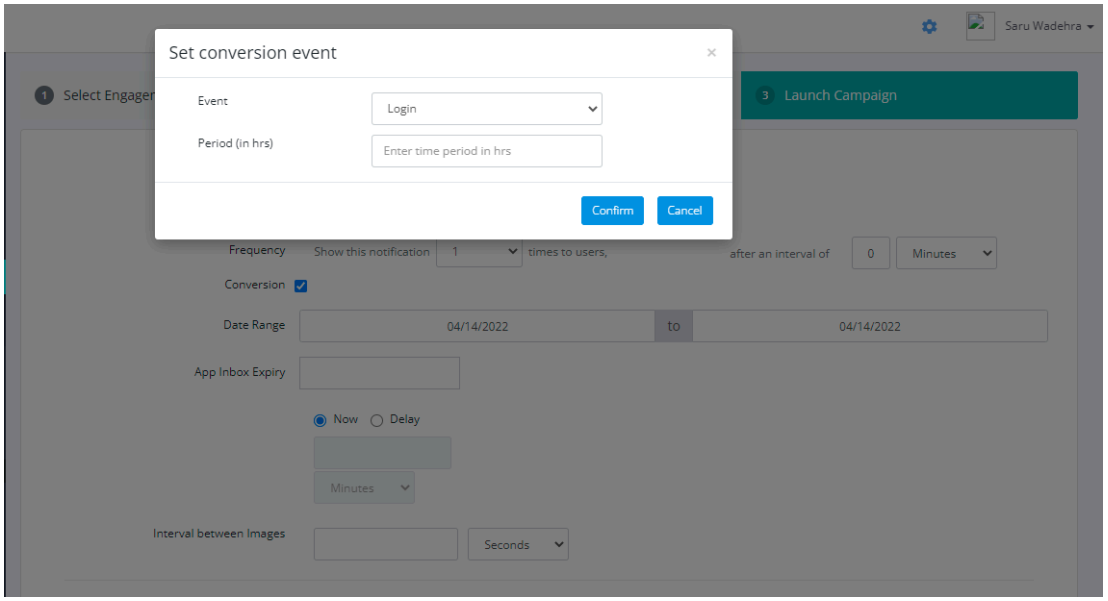
Advance settings >

Update Close

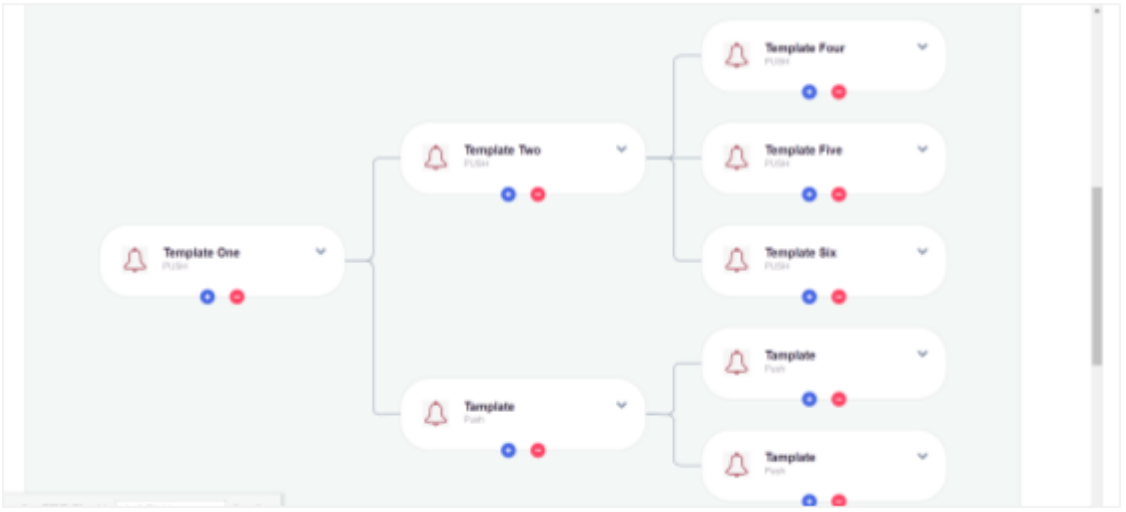


Android IOS

Set conversion events



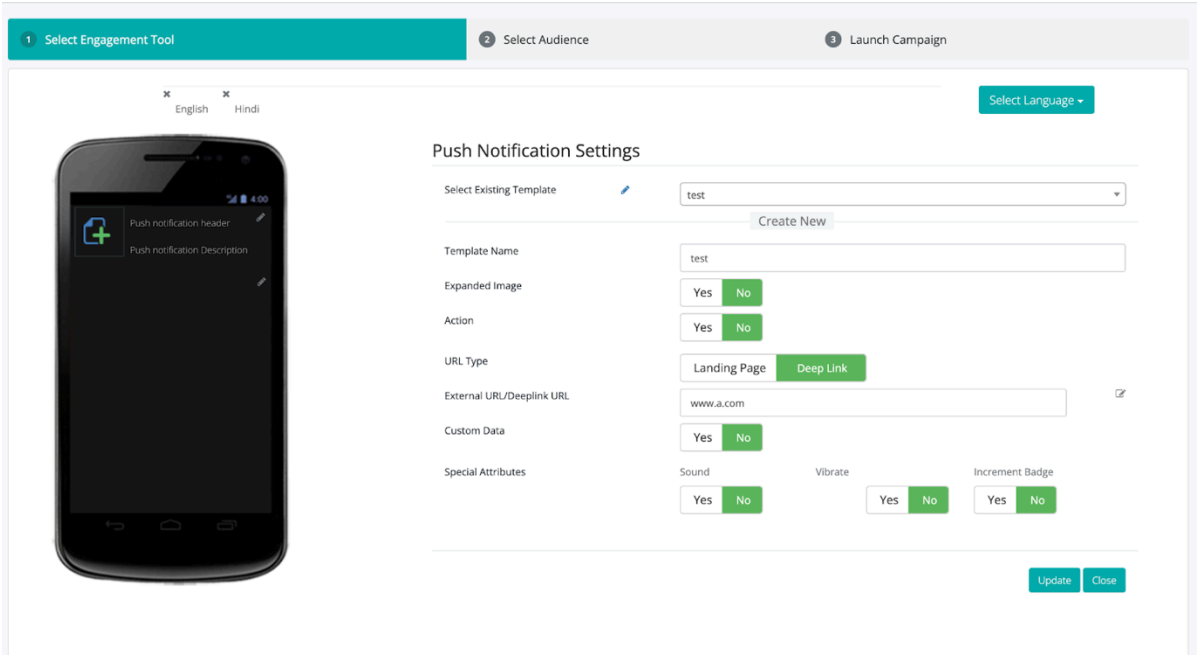
Build Multi Step Campaign



MultiVariate Testing

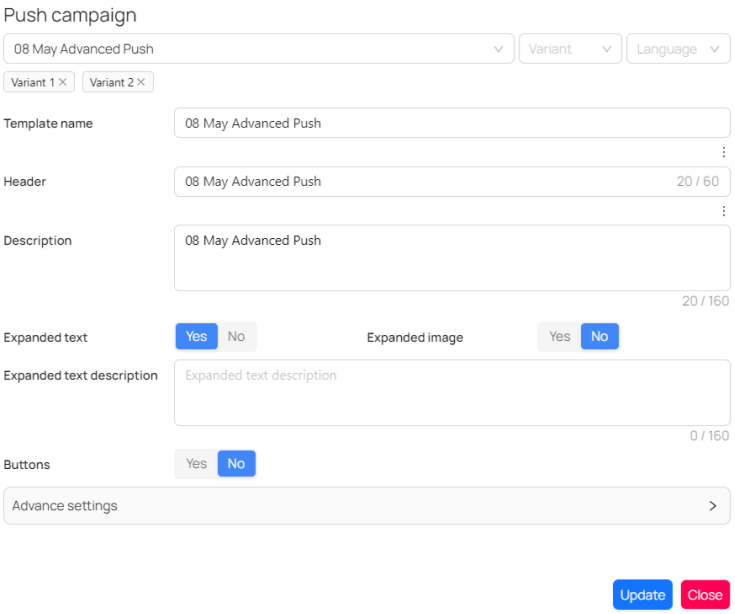
The platform allows operating teams to perform multivariate tests, to figure out which campaign works better. You can build multiple options to target a segment such as – Headlines, Images, Click button colours. The platform then runs these campaigns on a small data-set and basis outcomes, activates the winning campaign on the target base.

Build variants for test:



A/B Testing

A/B testing allows you to compare different versions of any campaign. You can create & try different copy, creatives, CTA, or any combination of these to make sure you have designed the best campaign.

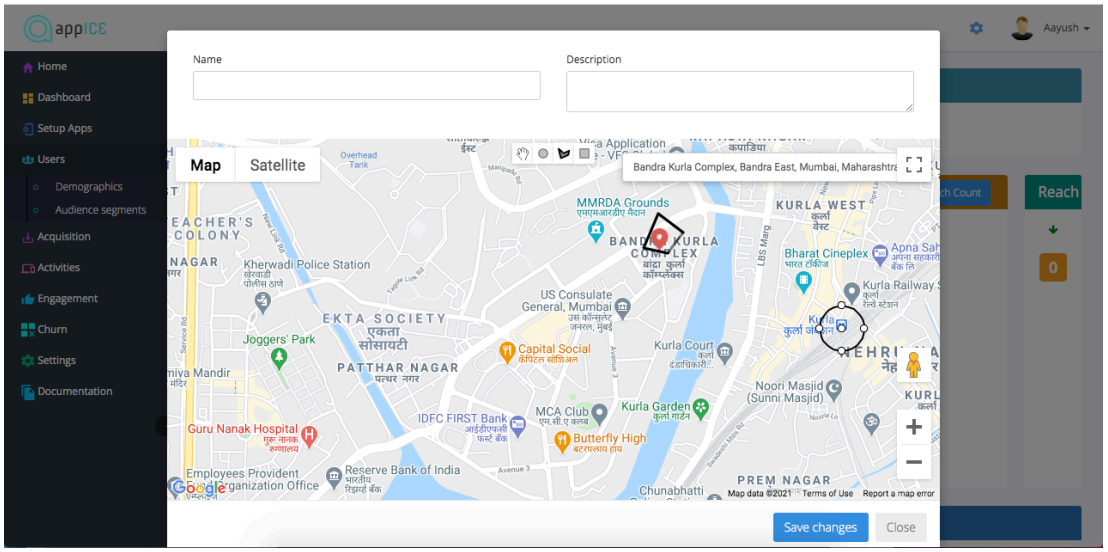


Timezone & Geotagging

Send push notifications according to users' time zone. Make your push messages well-timed for every specific user and, as a result, more appealing.

AppICE SDK captures location coordination (under OS allowed user privacy policies): IP address-based location to send geo-fenced campaigns.

Appice



Digital Asset Manager (DAM) or Content Manager

Appice DAM provides a centralized repository to streamline asset accessibility, ensure brand consistency, and reduce content duplication. Tagging capabilities within DAM systems allow for quick categorization and retrieval based on keywords, campaigns, or asset types, making it easy for teams to find and repurpose content efficiently. This organization helps marketing, creative, and other teams collaborate effectively, save time on asset searches, and maintain a cohesive brand identity across all media channels.

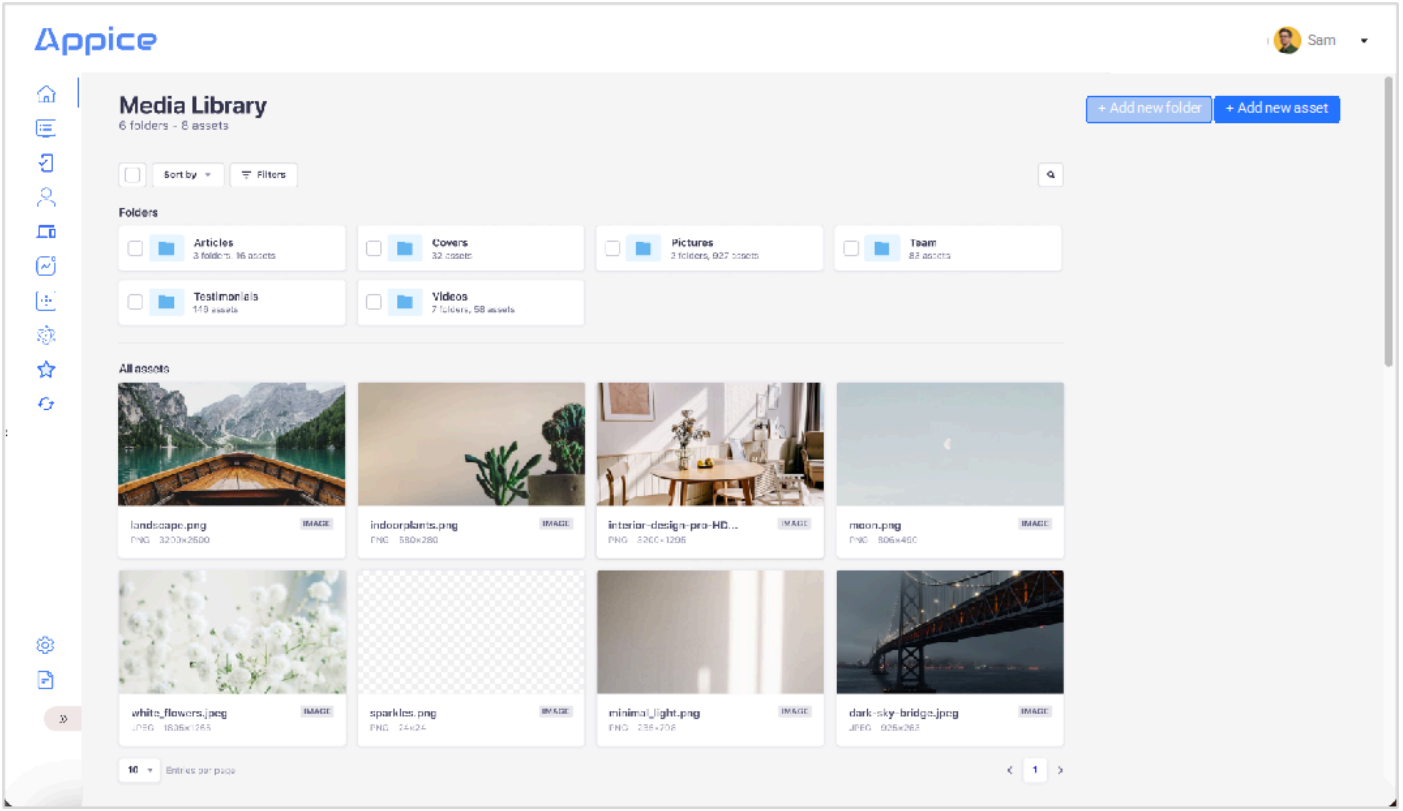
Instant search results - Supporting your need to find the right file fast, you can narrow your search in seconds and enjoy full flexibility when combining different search criteria to find the desired result.

Customizable taxonomy - Add an adaptable folder, category, and metadata filter that reflects the way you work or the latest initiatives the organization is working on. You can also add descriptive tags that make it easier to locate assets using the search function.

Key Features

- Online annotation & proofing: Add comments directly on to digital assets
- AI driven Tag Management: Identify images, edit tags, check negative keywords
- Intelligent search using AI + Human in loop
- Smarter version management: Version control helps designers and brand managers ensure that only the most up-to-date file versions are made available for download
- Templatise communication assets: Streamline creative asset creation

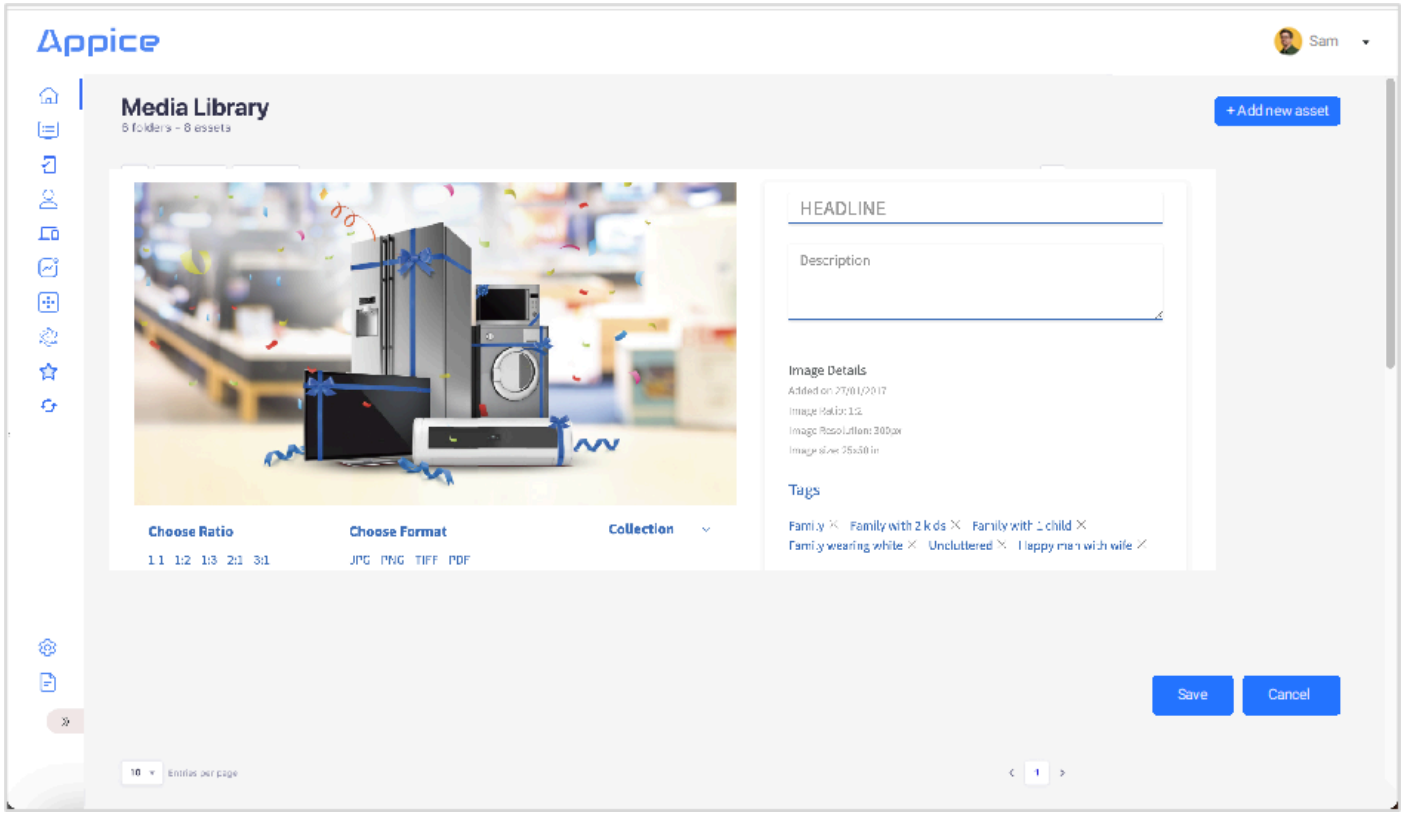
Appice



AI based media asset tagging

The underlying AI identifies thousands of objects such as vehicles, pets, furniture or scenes within an image and generates tags, with a high accuracy level, for images uploaded. The system can group multiple shots of the same product or a brochure in different languages.

The user-focussed content management solution is 100% adaptable to the way you work. Whether its bulk editing of files, on the move adaptations, content clean up or a taxonomy that is totally customizable, our features put you in control and empower brand success.

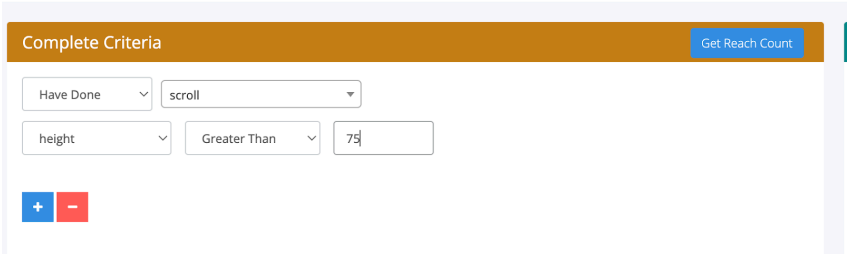


How AppICE manages campaigns components:

DAM Asset	Template ID	Ver No
Image 1: **ID82022jw92**	TID9202	Ver1.1
Image 2: IDwld93kw02j	TID8292	Ver1.12
Deep Link URL https://bank.app/page	TID1192	Ver2.39
CTA_loanapply	TID1139	Ver2.1

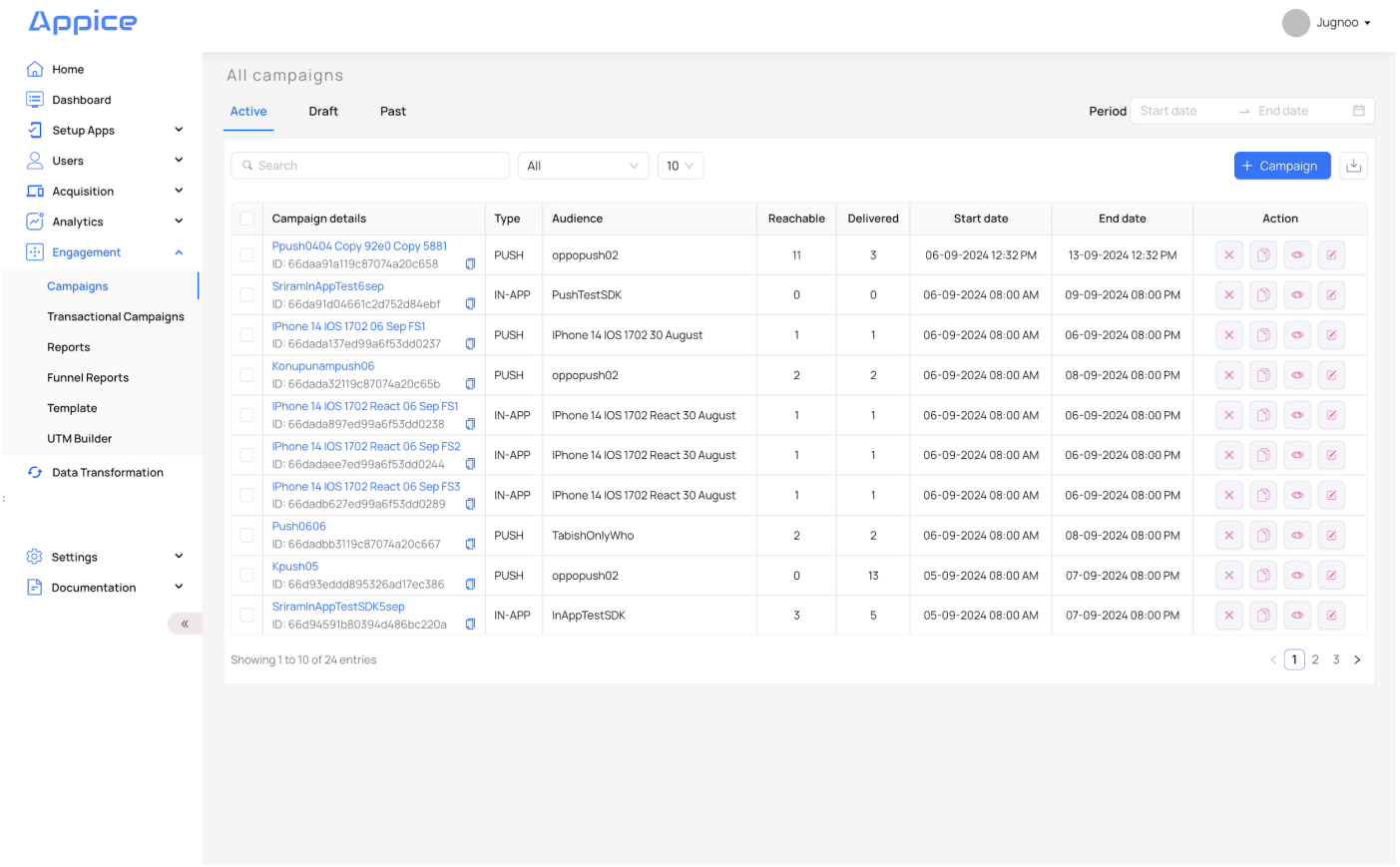
Scroll Data

Scroll depth often is a good indicator of user intent and brand affinity. This data can be used to build segments for targeted, personalized campaigns.

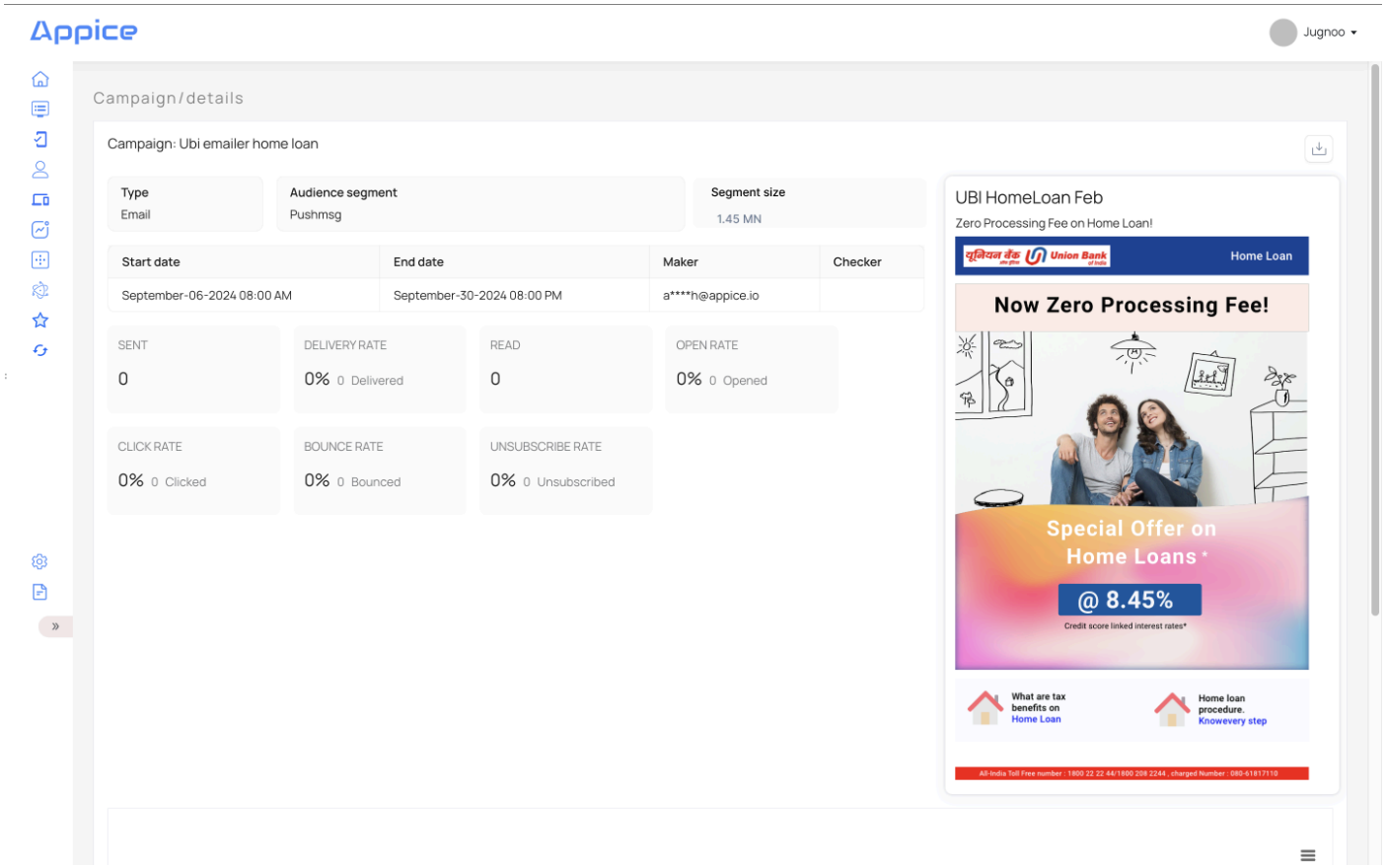


Campaign Metrics

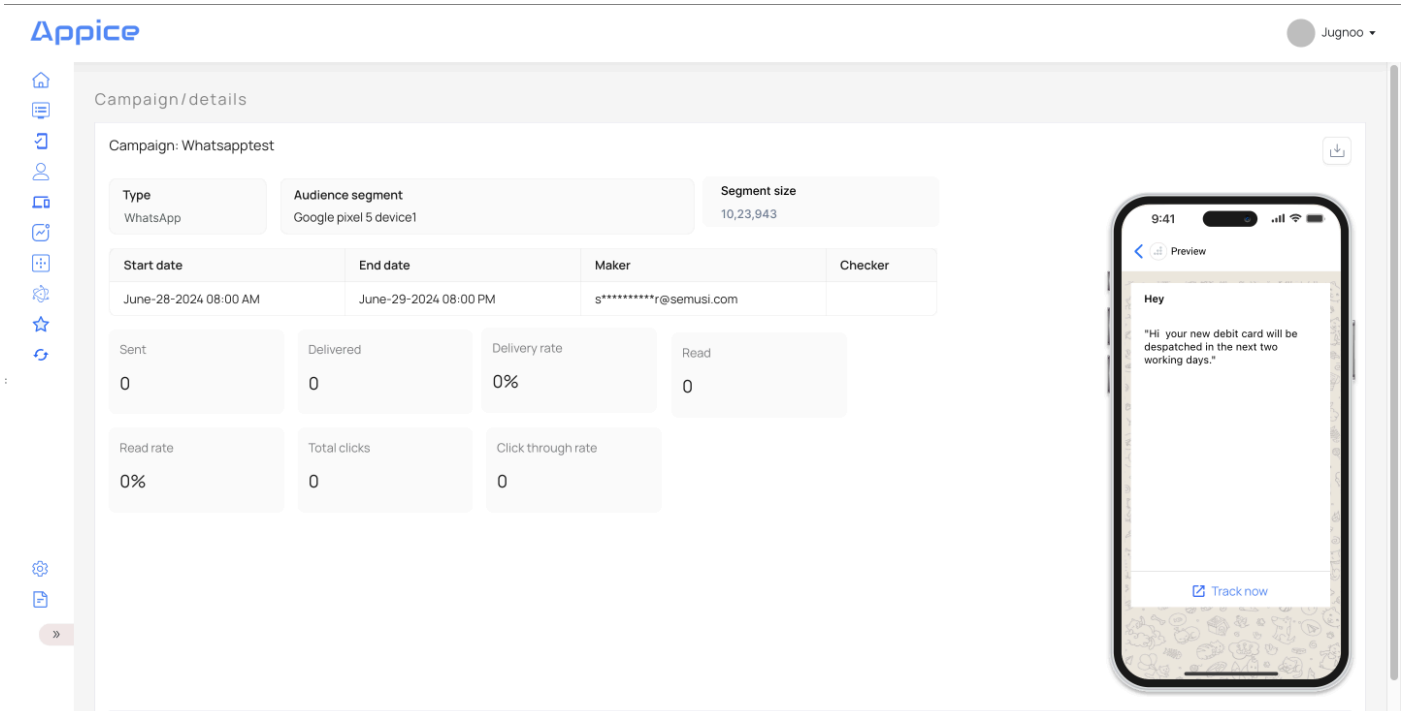
Business users can view campaign metrics for all channels and understand campaign objectives. Each campaign in an individual level can be looked at to see detailed metrics:



Campaign Metrics: Email Drill down



Campaign Metrics: WhatsApp Drill down



Email Metrics

How data from Gateway is used to calculate metrics:

Metrics	Mapping	Formula
Sent	pushedTo	From Gateway API
Delivered	receivedTo	From Gateway API
Delivery Rate		Email delivered÷ Email Sent *100
Read	viewedTo	From Gateway API
Opened	opened	From Gateway API
Open Rate		Email Opened ÷ (Emails sent – Bounces) x 100
Clicked		From Gateway API
Click Rate		Clicks ÷ (Emails sent – Bounces) x 100
Bounced	bounced	From Gateway API
Bounce Rate		Number of emails that bounced ÷ Number of emails sent X 100
Unsubscribe	unsubscribed	From Gateway API
Unsubscribe Rate		(Unsubscribes÷Delivered Emails) x 100

SMS Metrics

How data from Gateway is used to calculate metrics:

Metrics	Mapping	Formula
Sent	pushedTo	From Gateway API
Delivered	receivedTo	From Gateway API
Clicks	clickedTo	From Gateway API
Click rate		Clicks÷ Delivered *100
Conversion rate	conversion	From Appice worker

Link clicks

In order to track link clicks , business users can embed UTM codes in the campaigns. These can be Appice generated UTM code or a 3rd party UTM.

Campaign Reports & Analytics

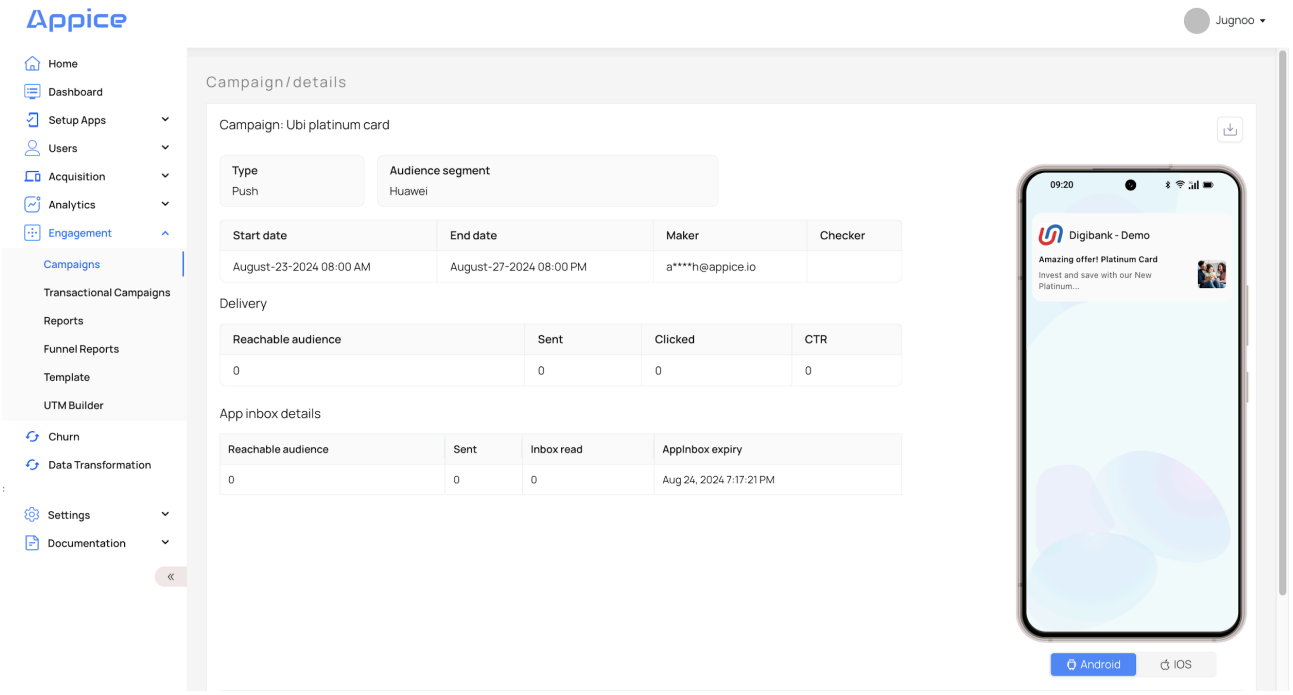
Campaign Analytics		
Push, InApp	Email	WhatsApp
Reachable Audience	Sent	Sent
Sent	Delivery Rate	Delivered
Clicked	Delivered	Read
CTR%	Open Rate	Delivery Rate
	Opened	Read Rate
	Click Rate	Total Clicks
	Clicked	Unique Clicks
	Bounce Rate	CTR%
	Bounced	Click to Open %
	Unsubscribe Rate	
	Unsubscribed	

All reports have additional information on:

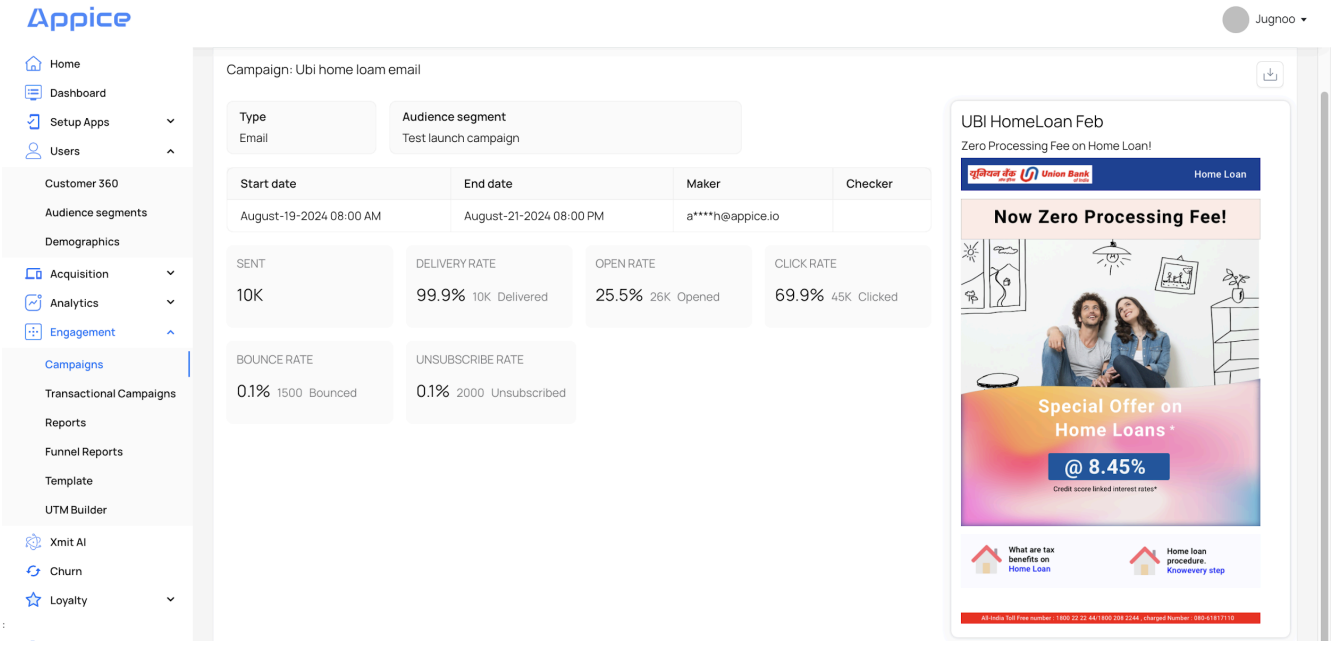
- Campaign Type

- Segment sent to
- Maker email
- Checker email
- Start date, End date

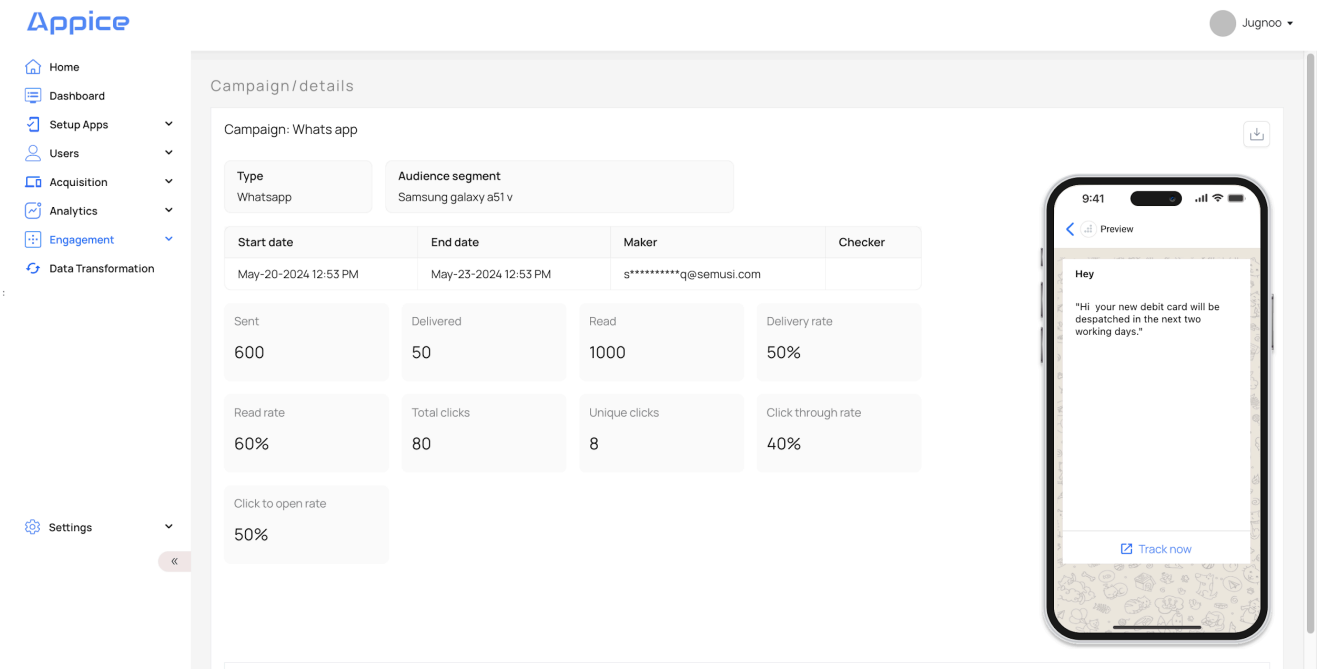
Push Campaign Report



Email Report

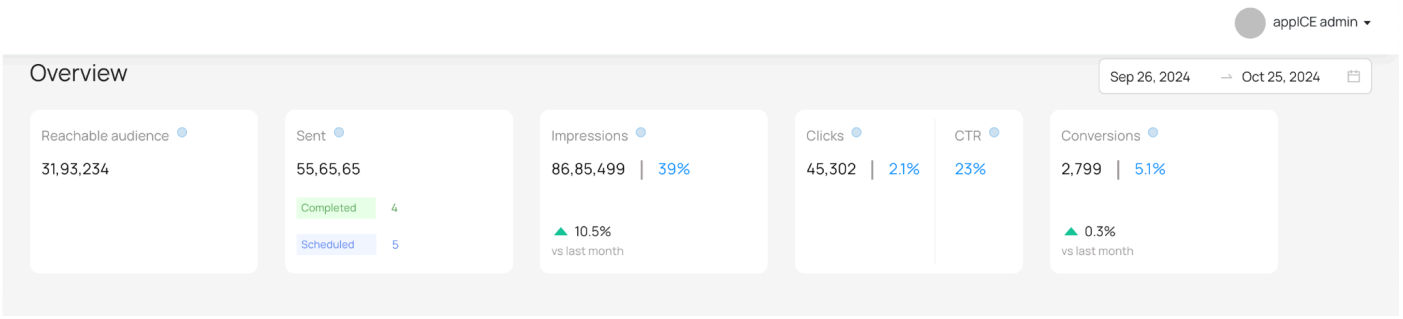


WhatsApp Report



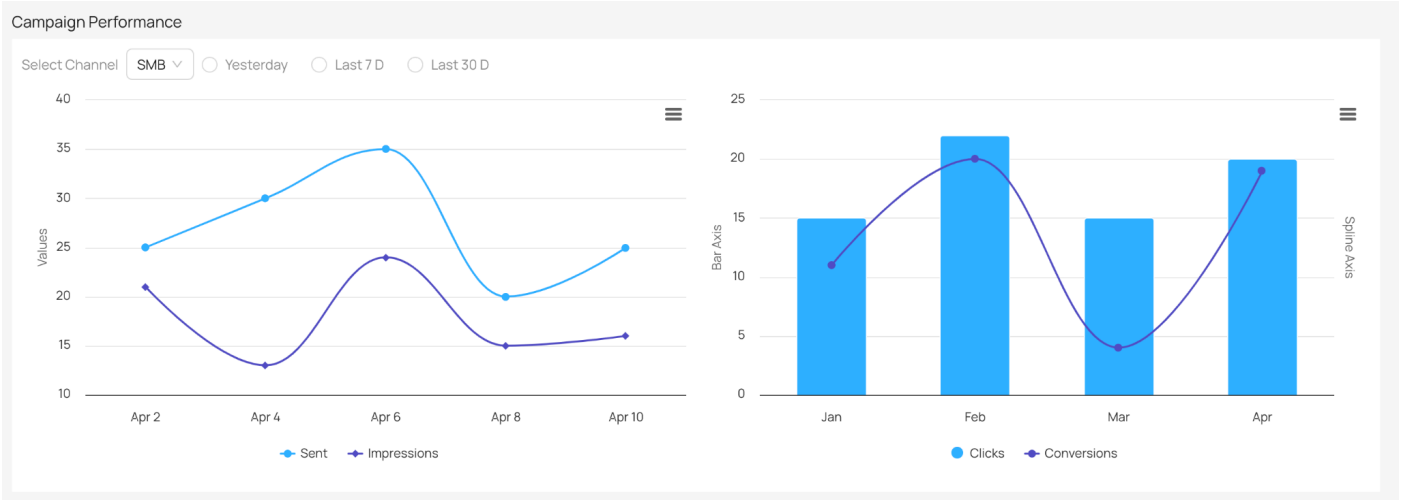
Campaign Interaction Report

Reachable Audience: Audience that qualifies for the campaign for a given channel
Sent: Total number of messages sent for the campaign for a given channel
Impressions: Total number of messages viewed for the campaign for a given channel
Clicks: Total number of clicks or response for the campaign for a given channel
Conversions: The conversion event or activity performed in a given duration for the campaign for a given channel.

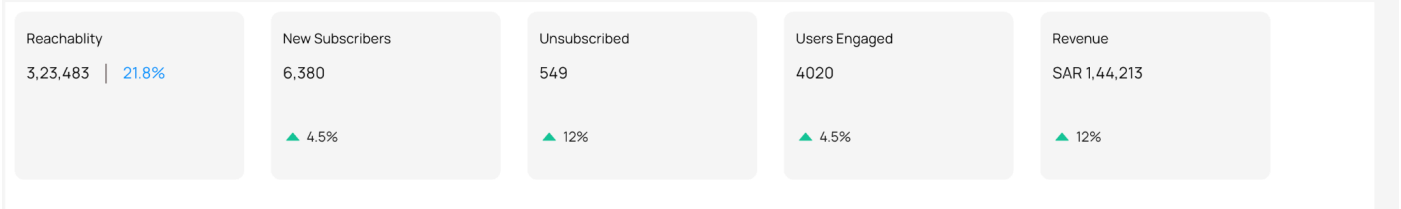


Appice

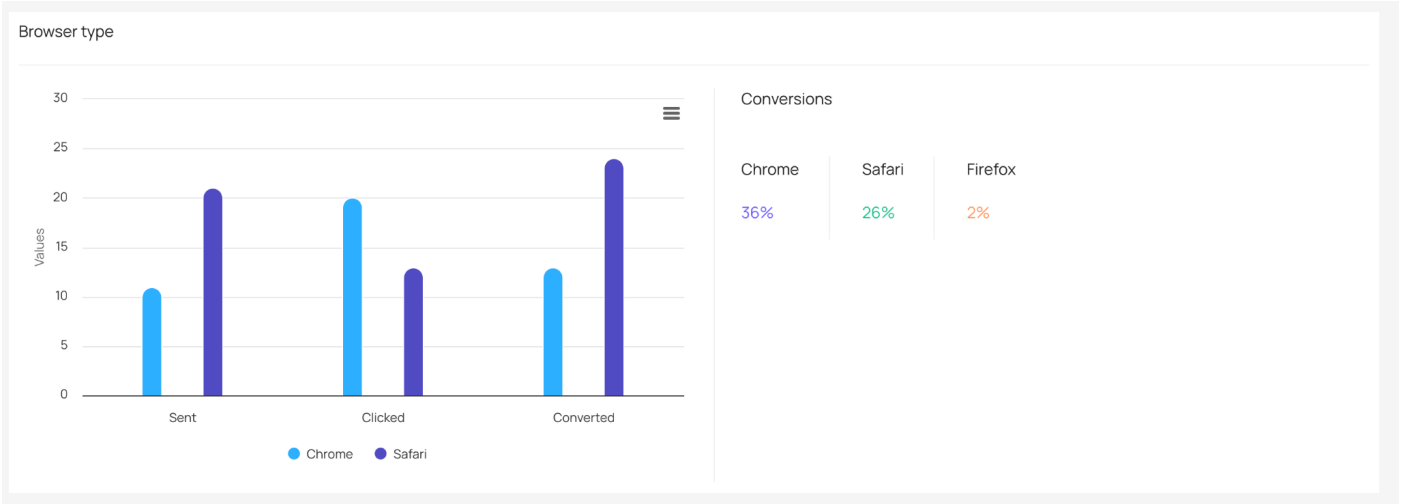
Interaction Report



Impact Report

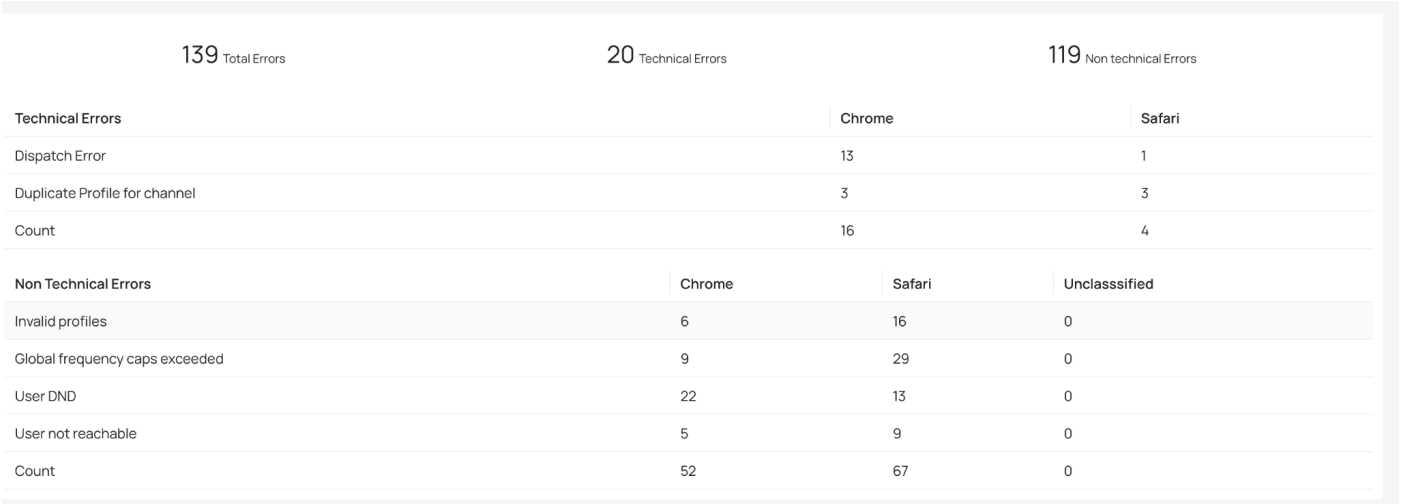


Browser Report



Appice

Technical/Non-Technical Report



139 Total Errors | 20 Technical Errors | 119 Non technical Errors

Technical Errors	Chrome	Safari
Dispatch Error	13	1
Duplicate Profile for channel	3	3
Count	16	4

Non Technical Errors	Chrome	Safari	Unclasssified
Invalid profiles	6	16	0
Global frequency caps exceeded	9	29	0
User DND	22	13	0
User not reachable	5	9	0
Count	52	67	0

User Journey Mapping: Events & Attributes

The process of understanding customer behaviour starts by defining the 'events' and their corresponding 'attributes'. These events are captured by the AppICE SDK which is integrated in the App or Web. The developer team which manages the App, implements the events in the App code. Once implemented, the platform automatically identifies where your customers are in the journey helping you deploy acquisition, conversion and retention strategies.

Data captured via events is used to understand customer behaviour and drive personalisation

All user journeys are mapped basis the use cases.

- Events: Steps which a user takes
- Attributes: Various values which define the event occurrence

Example: A deposit journey

Events & Attributes: < FD Journey >					*Update Date: 5th Nov'2023*
Journey Name	**Event Name**	**Event Description**	**Attributes**		
			Attribute Name	**Sample Values Sent to AppICE**	**Comments - How/When is event generated**
FD Journey	FDStartDeposit	User initiates FD creation journey.	OpenTrigger	Direct, PushNotification, Email, SMS, Banner	source of open
			TriggerValue	0, CampaignID, DeepLinkURL, BannerID	Value of the source
			SourceScreen	Deposits, Quick Tasks	Source of FD opening
	FDValidateKYC	When user validates their KYC.	KYCComplete	True, False	When user clicks on "OKAY" button on pop up of "Complete your KYC"
	FDUpdatePAN	When user updates his PAN.	PANUpdated	True, False	When user clicks on "OKAY" button on pop up of "PAN not available"
	FDCreate	User creates a new FD account.	DepositDetailsFilled	True, False	User clicks on Review button on filling Nominee details
			NomineeAdded	True, False	

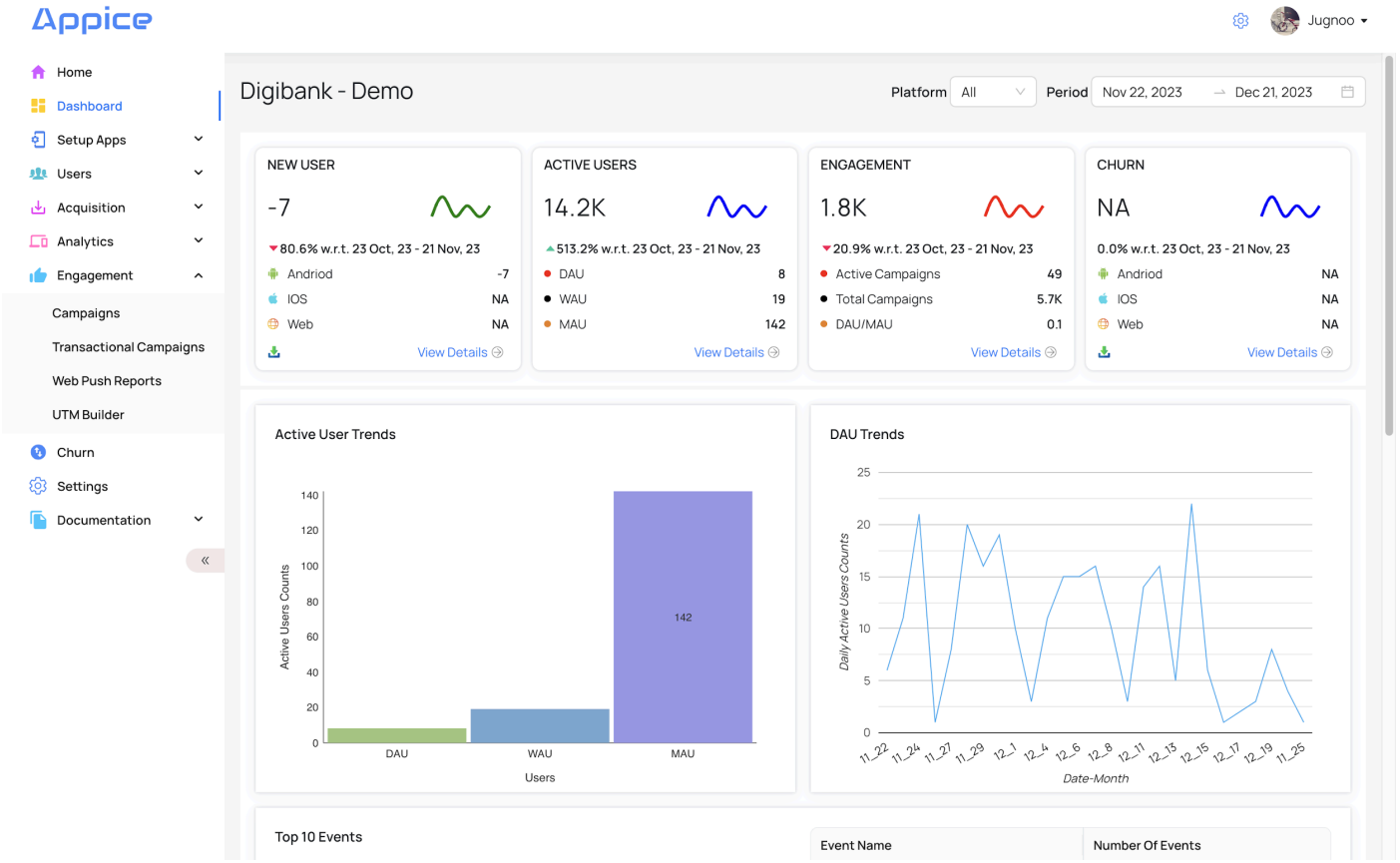
			InsuffcientBalance	True, False	Potential drop-off during the journey.
			DetailsReviewed	True, False	User clicks of Submit button on reviewing details
			FDOpened	True,False	
			DepositAmount	<string>	
			Tenure	<string>	
			MaturityAmount	<string>	
			InterestRate	<string>	
			FailureMessage	<error code>	
	FDStatement	Users click on Statement Tab to email or download their transactions.	Download	True,False	
			Email	True,False	
	FDClose	When user closes FD account	TargetScreen	Details, Requests	
			InitiateClosure	True, False	
			ClosedDate	<date>	
			AccountClosed	True, False	

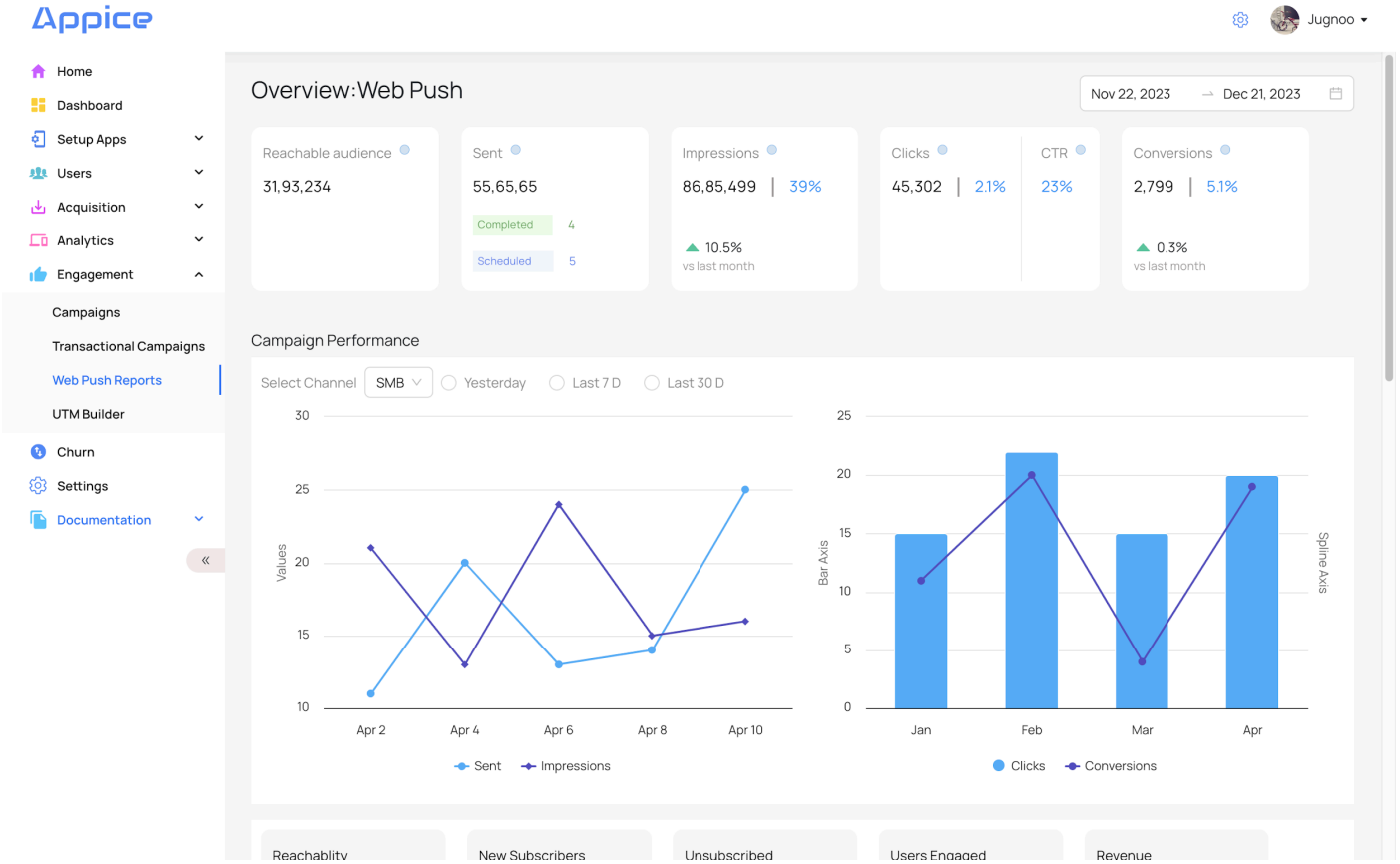
Data Analytics

1. Aggregate Dashboards

Overview of App & Web Performance Data

Appice



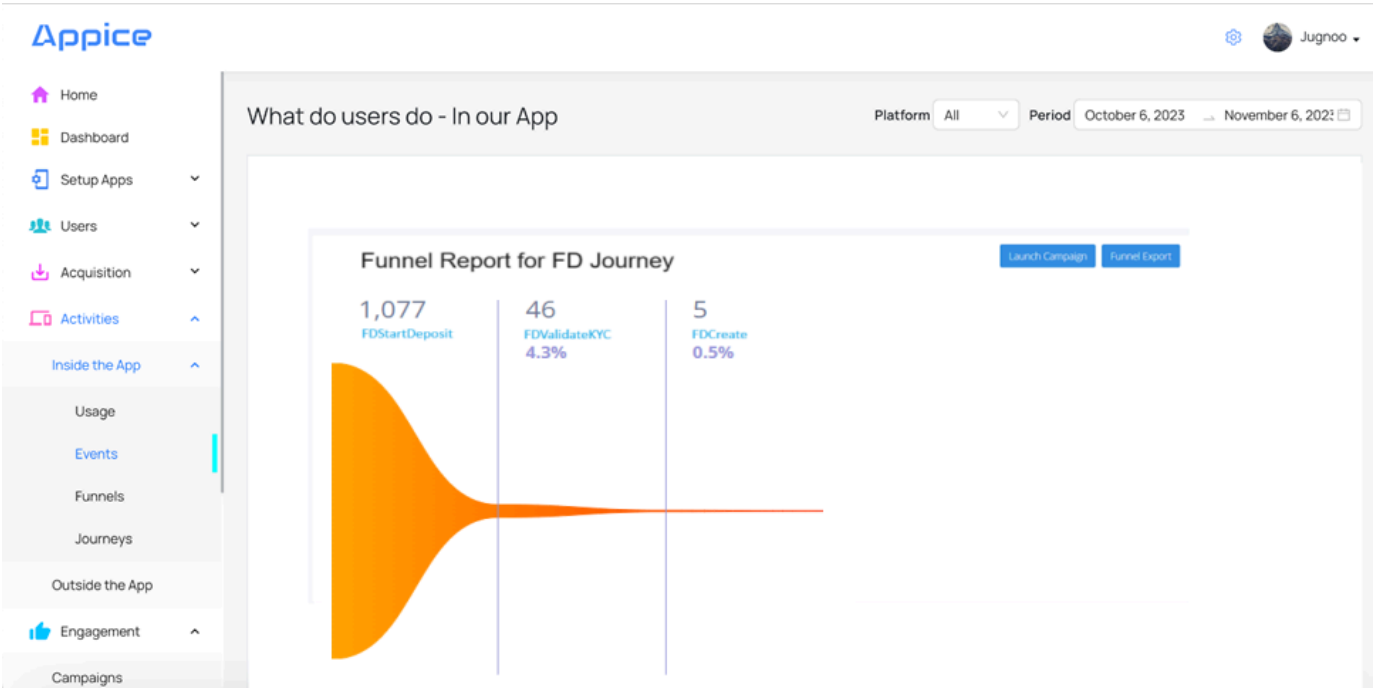


2. Funnels

Understand where a drop-off happens in a user's journey. Using this insight, one can communicate with the customer through various notifications

- How many users complete FD (or PPF) or
- Drop off at KYC validation stage

Event	Attribute	Attribute Value
FDStartDeposit		
FDValidateKYC	KYCComplete	True
FDCreate	FDOpened	True



3. Journeys

One of the most intriguing questions that product managers and marketers face is, 'What are users doing on my app?'

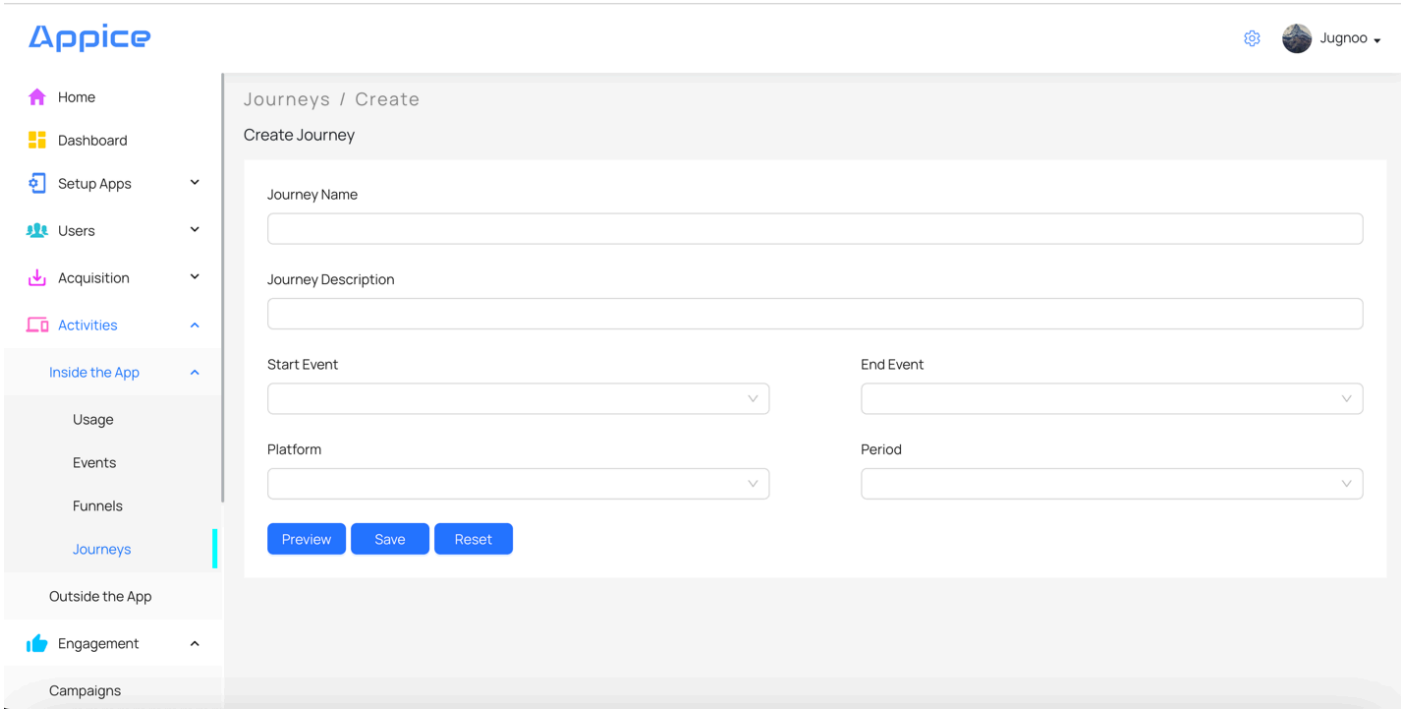
Let's take the simplest form of user journey in a tabular data:

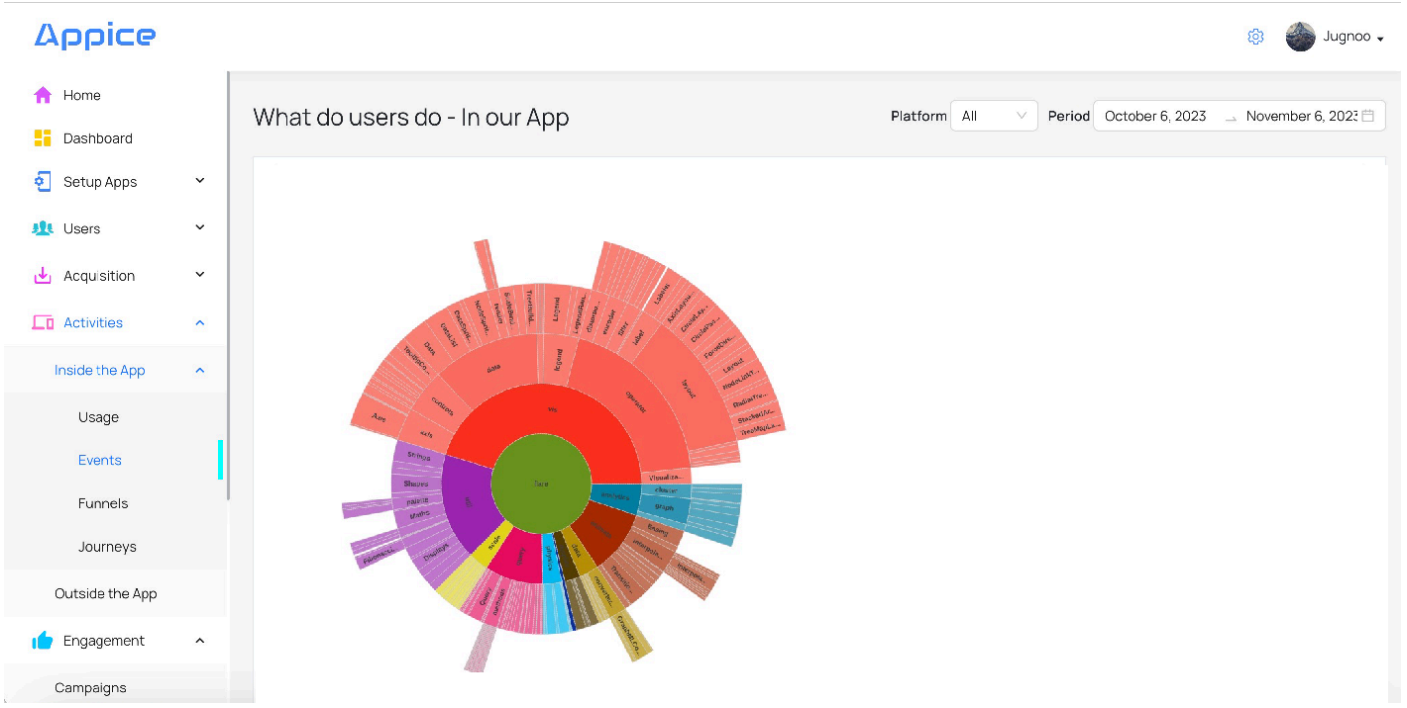
Step I	Step II	Step III	Step IV	Step V	Users
App Launched	App Launched	Category Viewed	Searched	App Launched	4512
App Launched	UTM Visited	Searched	Product Viewed	Product Viewed	3012
App Launched	Searched	Category Viewed	Product Viewed	Added To Cart	422

Step I	Step II	Step III	Step IV	Step V	Users
UTM Visited	App Launched	Product Viewed	Added To Cart	Charged	312
.....	.....	.....	.....	.....	.....

In order to understand how users navigate through the App or website - where do they start the journey and which pages do they end the journey, we represent this data with a Sunburst Chart.

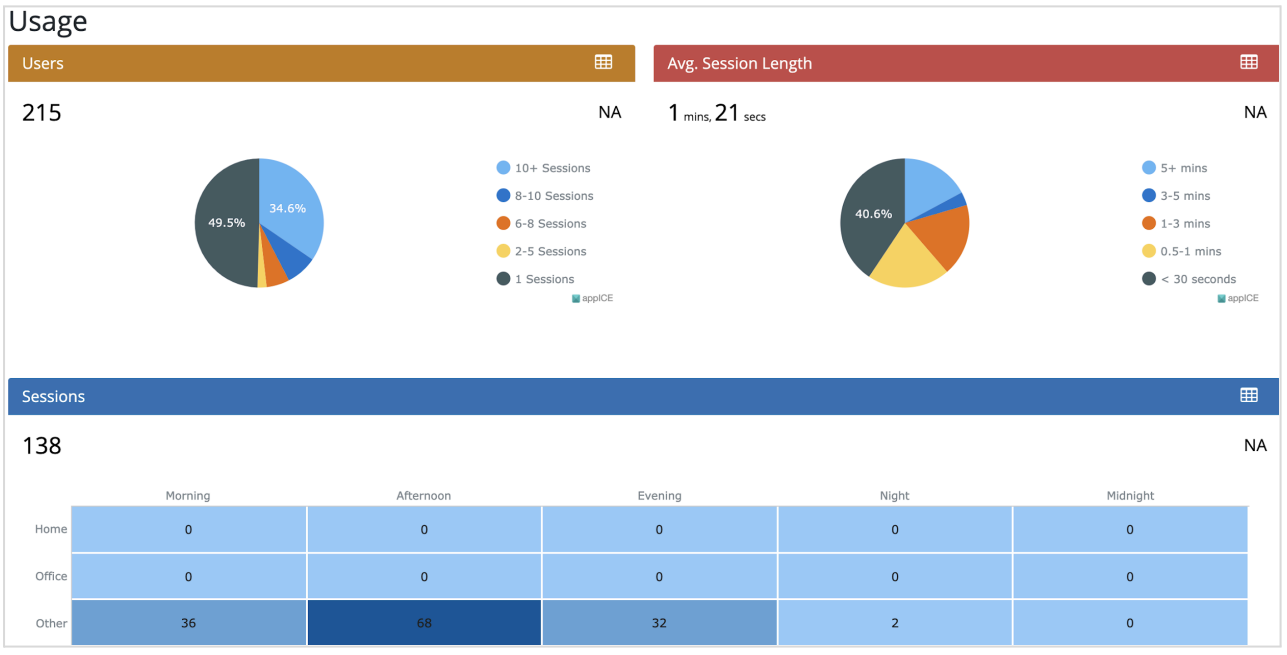
This type of visualization shows hierarchy through a series of rings that are sliced for each category node. Each ring corresponds to a level in the hierarchy, with the central circle representing the root node and the hierarchy moving outwards from it. Rings are sliced up and divided based on their hierarchical relationship to the parent slice.





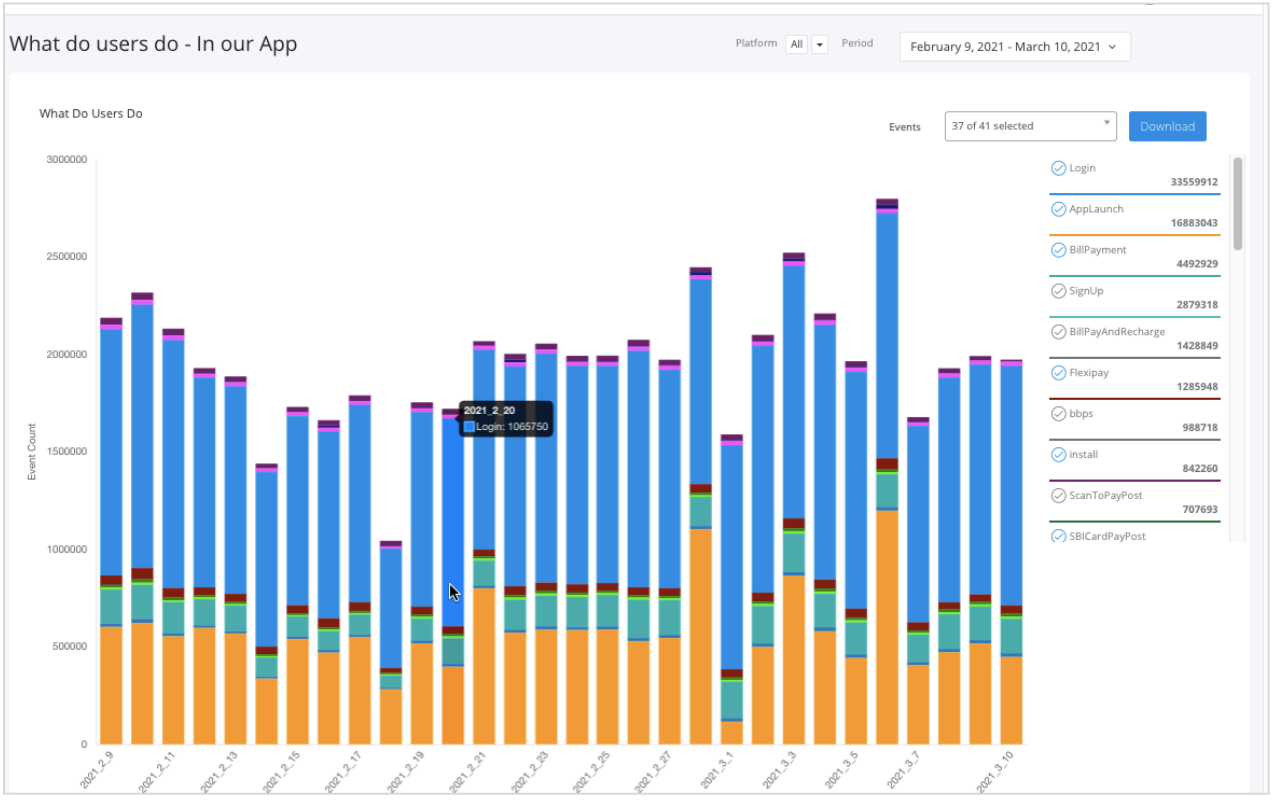
4. Visitor Engagement Overview

Visualize the sessions and user's time spent on the website across unique session counts, time per session and the day parting of the session traffic.



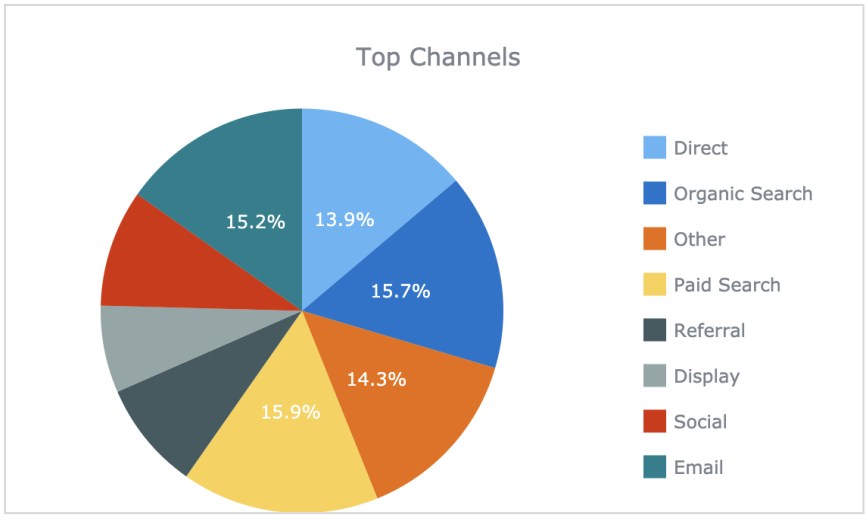
5. Usage Insights

Understand & identify how users navigate your app or website. Which pages, content or sections are browsed or visited x Time x days or any other custom parameter. This helps you plot a series of actions performed by the uses



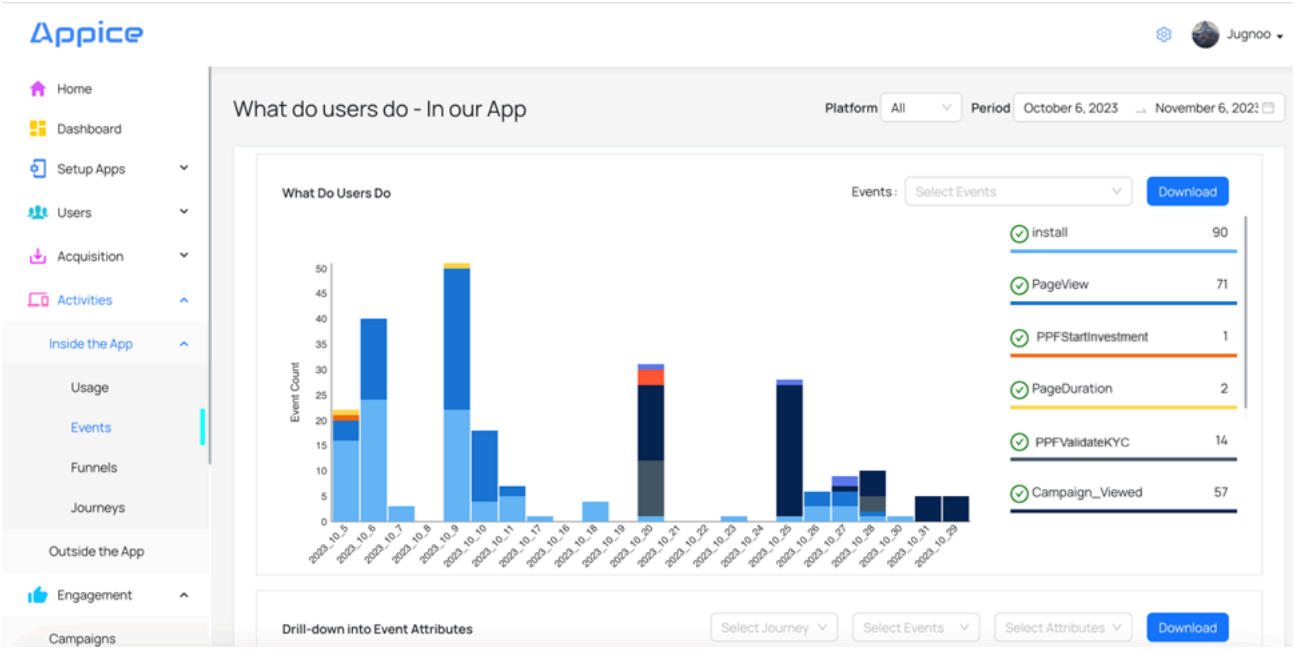
6. Traffic Sources

The traffic patterns can be split across various sources like Direct, Organic Search, Referral, Social, Email etc. This helps business teams allocate optimal resources on the channels that are yielding the maximum traffic or bring up under performing channels.



7. Top 10 Events

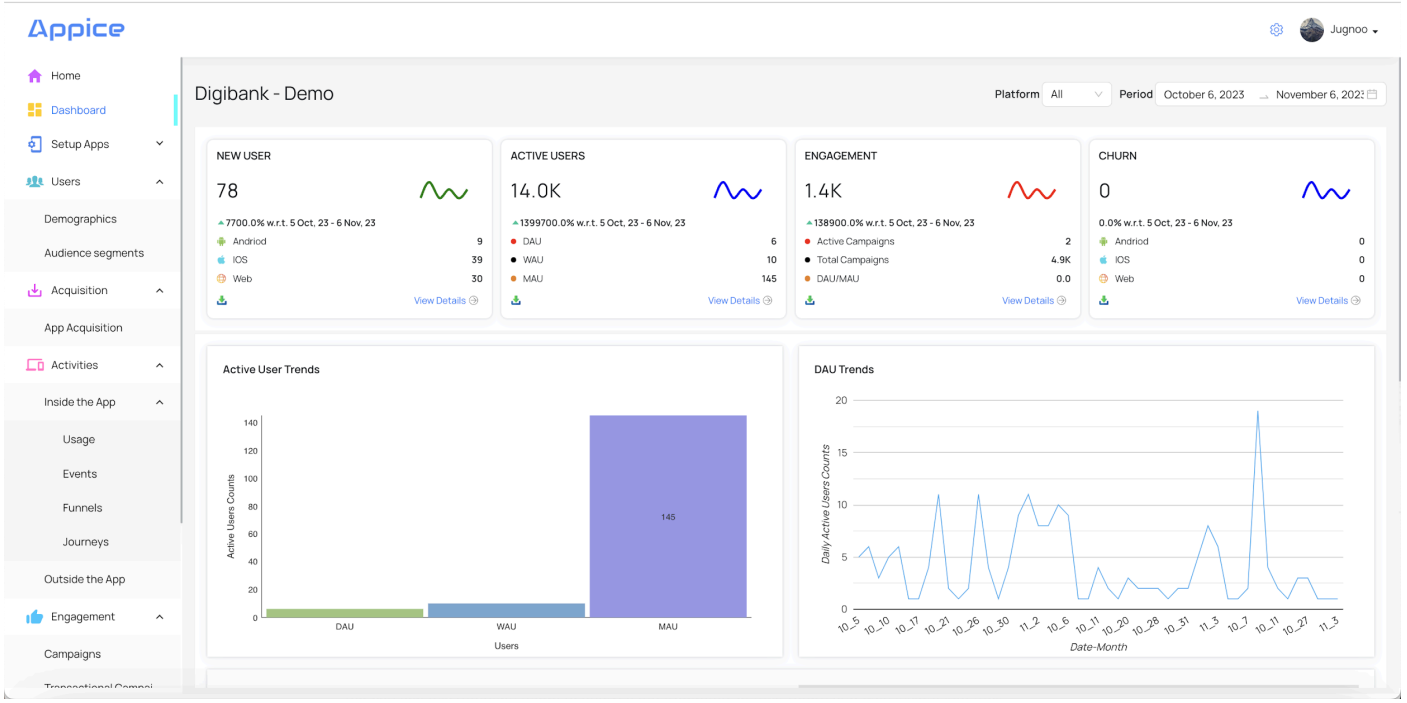
Understand Top 10 events on a daily basis. This data is used to derive insights on what are the most preferred features or functionalities of our App.

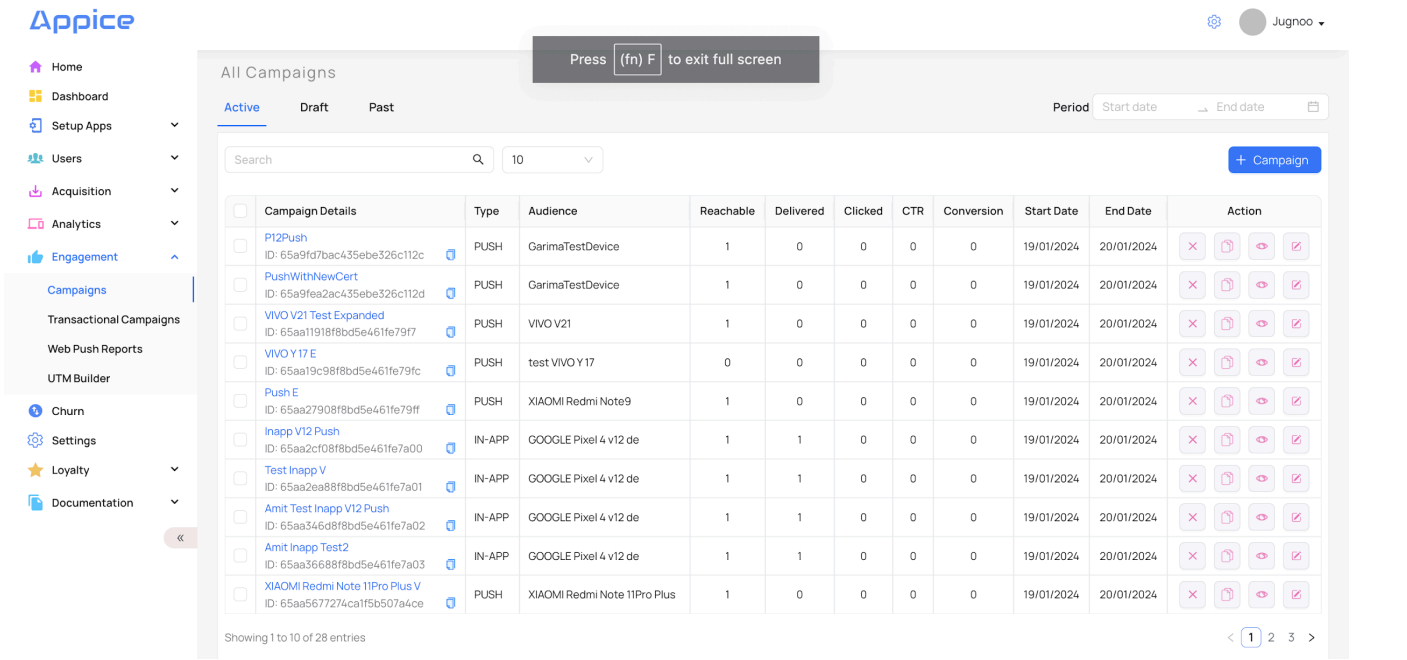


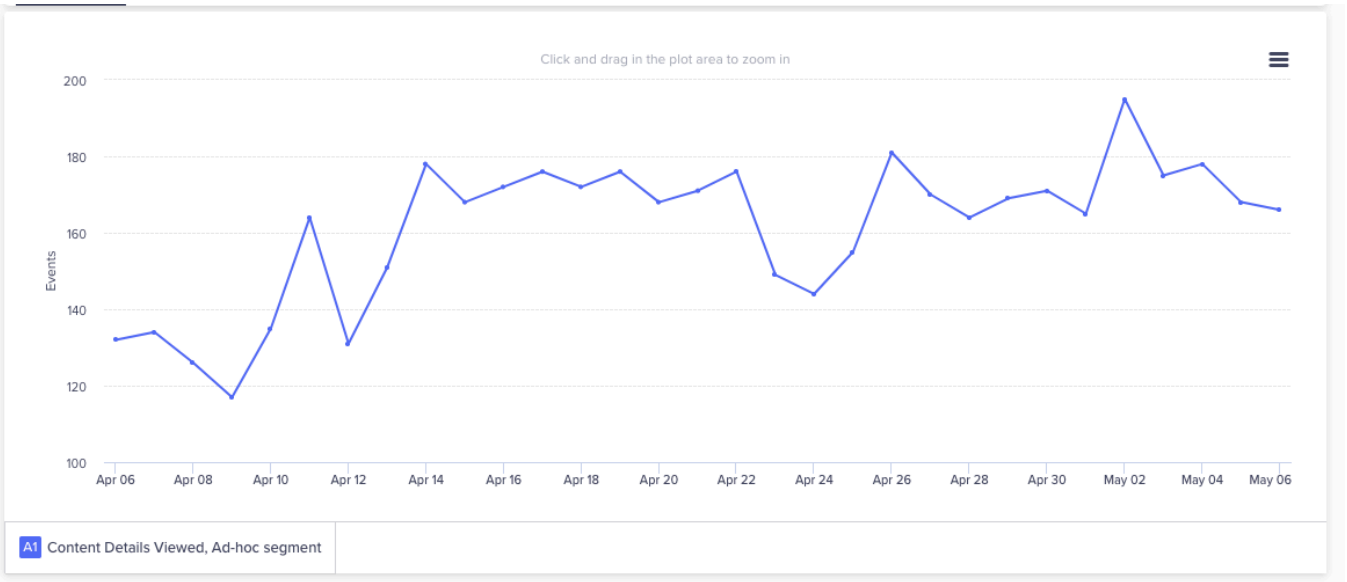
8. Aggregate Trends

- New users trend – by OS
- Daily active users
- Weekly active users
- Monthly active users
- Active user trends
- DAU trend
- Campaign Engagement count, active campaigns, total campaigns

Appice





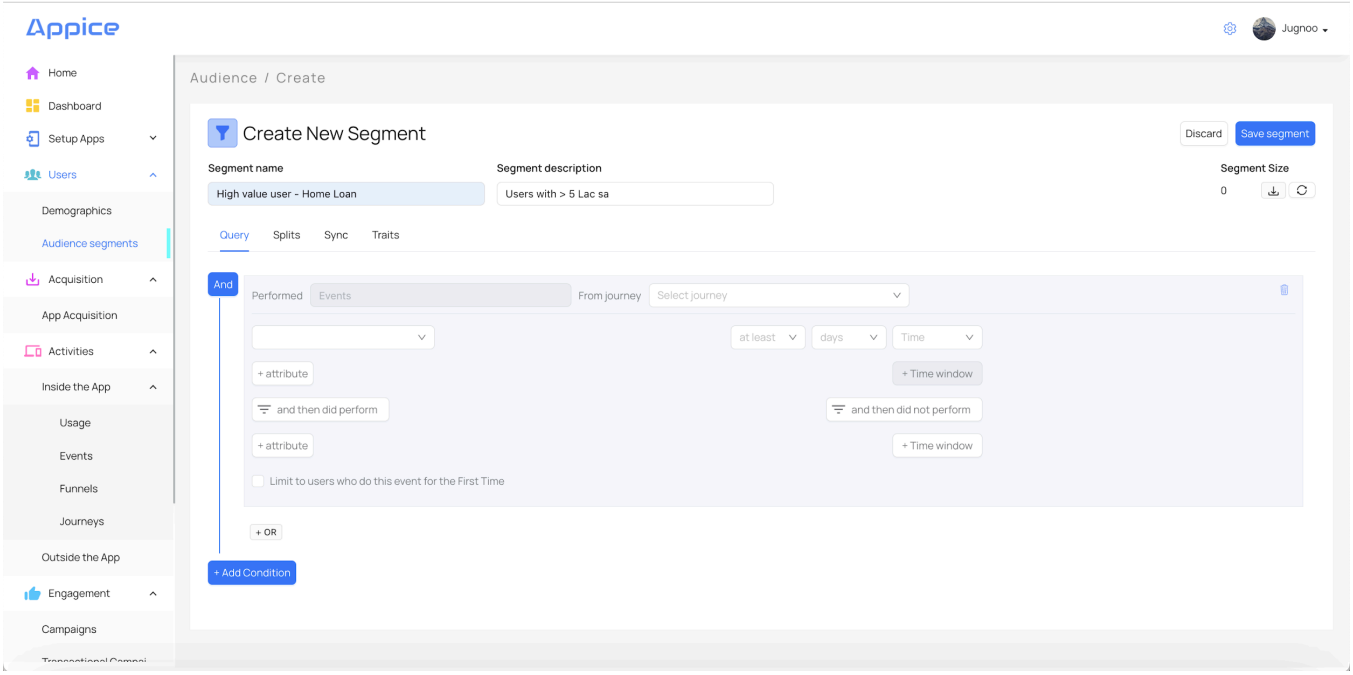


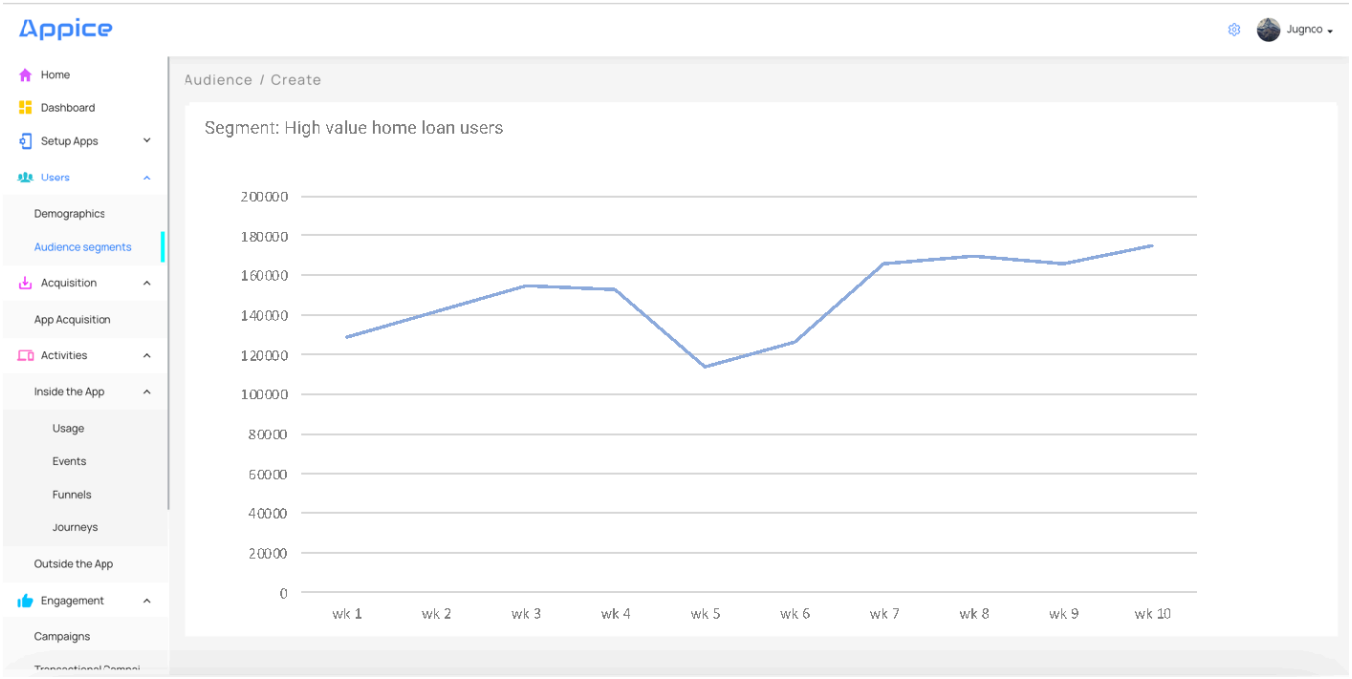
9. Segment Trends

While the segments are created for personalisation, the data of customers in segment is plotted on a weekly basis to show

- How many customers fall in a segment
- Effectiveness of our marketing initiatives

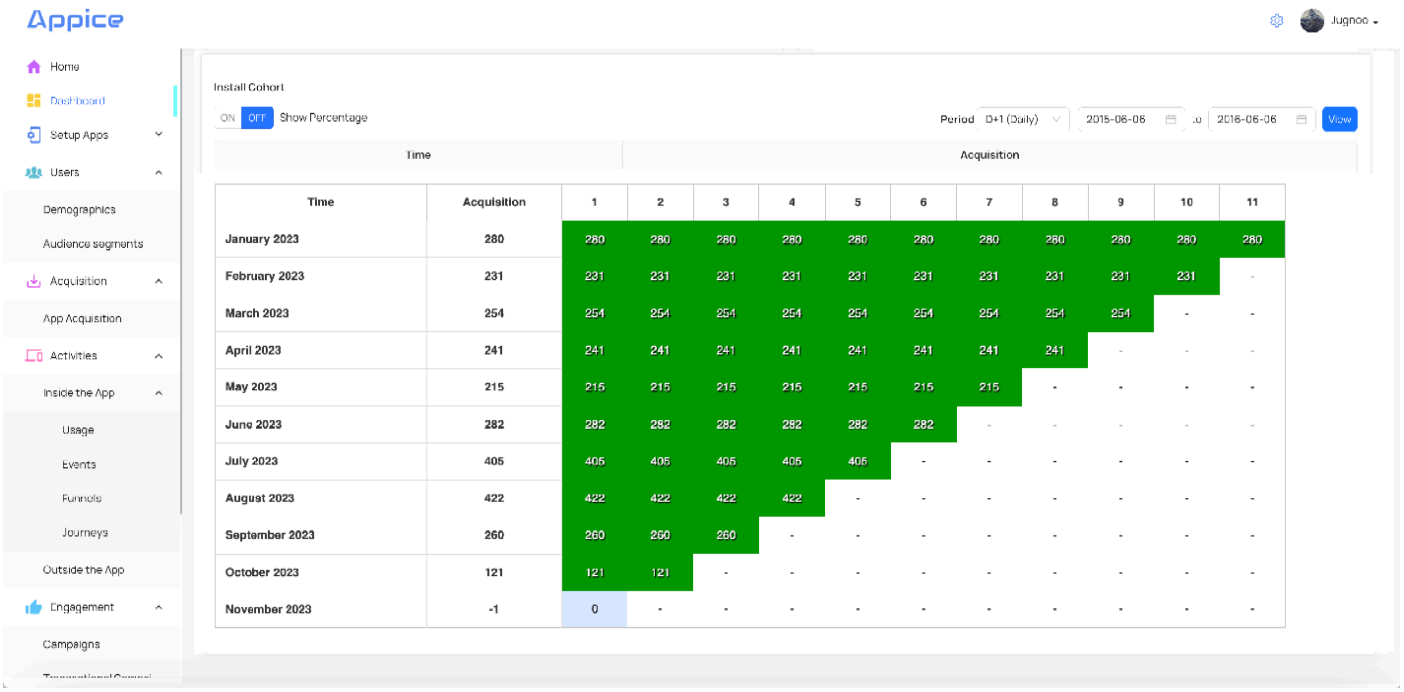
This data is made available for top 10 key segments.





10. Retention Trends

When customers download or register on the App, many do not start active engagement or become regular users. These customers need to be identified in order to increase the retention rate, else they may slip in the category of ‘sleeping users’. Retention trends chart show progress of users on a monthly basis



Time	Acquisition	1	2	3	4	5	6	7	8	9	10	11
January 2023	280	280	280	280	280	280	280	280	280	280	280	280
February 2023	231	231	231	231	231	231	231	231	231	231	231	-
March 2023	254	254	254	254	254	254	254	254	254	254	-	-
April 2023	241	241	241	241	241	241	241	241	241	-	-	-
May 2023	215	215	215	215	215	215	215	215	-	-	-	-
June 2023	282	282	282	282	282	282	282	-	-	-	-	-
July 2023	405	405	405	405	405	405	-	-	-	-	-	-
August 2023	422	422	422	422	422	-	-	-	-	-	-	-
September 2023	260	260	260	260	-	-	-	-	-	-	-	-
October 2023	121	121	121	-	-	-	-	-	-	-	-	-
November 2023	-1	0	-	-	-	-	-	-	-	-	-	-

11. Events Data Reports

1	Aggregate Performance Reports
1.1	New users trend – by OS
1.2	New users trend – by Device
1.3	New users trend – by App Version
1.4	New users trend – by Country
1.5	New users trend – by City
1.6	New users trend – by Platform
1.7	New users trend – by OS Version
1.8	New users trend – by Source
1.9	New users trend – by Carrier
1.10'	Churned users trend – by OS
1.11	Churned users trend – by Device
1.12	Churned users trend – by App Version
1.13	Churned users trend – by Country
1.14	Churned users trend – by City
1.15	Churned users trend – by Platform
1.16	Churned users trend – by OS Version
1.17	Churned users trend – by Source
1.18	Churned users trend – by Carrier
1.19	Churned users trend day-wise
1.20'	Churned users trend time-wise
1.21	Daily active users by time period
1.22	Weekly active users by time period
1.23	Monthly active users by time period
1.24	Active user trends by time period
1.25	DAU trends by time period
2	Demographics (in analytics module)
2.1	User age, gender, income x balance, spends x products (debit, credit , loans, insurance)
3	Acquisition
3.1	Acquisition - by Source
3.2	Acquisition - by OS
3.3	Acquisition - by Location
3.4	Acquisition - by App Version
3.5	Acquisition - by Time-wise
3.6	Acquisition - by Day-wise
3.7	Acquisition - by User Type
4	Usage
4.1	Users by session count
4.2	Average session length
4.3	Users by usage period
4.4	Average time spent

5	Events
5.1	Understand Top 10 events on a daily basis
5.2	Drill-down into events attributes
6	Aggregate Trends
6.1	Daily Logged in user report
6.2	New Installs – Aggregate level
6.3	New Installs – OS, device, model
6.4	New Registrations
7	Retention Trends
7.1	Understand sleeping users
8	Funnels (can be created using behavioural data)
8.1	Understand how many total conversions happen for a particular journey
8.2	Understand where a drop-off happens for a particular journey
8.3	Users by source
8.4	Users by campaign id
9	Journeys
9.1	Understand what users are doing on my app
10	Segment Trends
10.1	Effectiveness of our marketing initiatives
10.2	How many customers fall in a segment
11	Engagement Campaigns
11.1	Campaign performance across channels (Email, SMS, Push, In-App, Web Push, Web Popup)
11.2	Count by click rate
11.3	Count by open rate
11.4	Count by CTR
11.5	Active campaigns
11.6	Draft campaigns
11.7	Past campaigns
11.8	Total campaigns

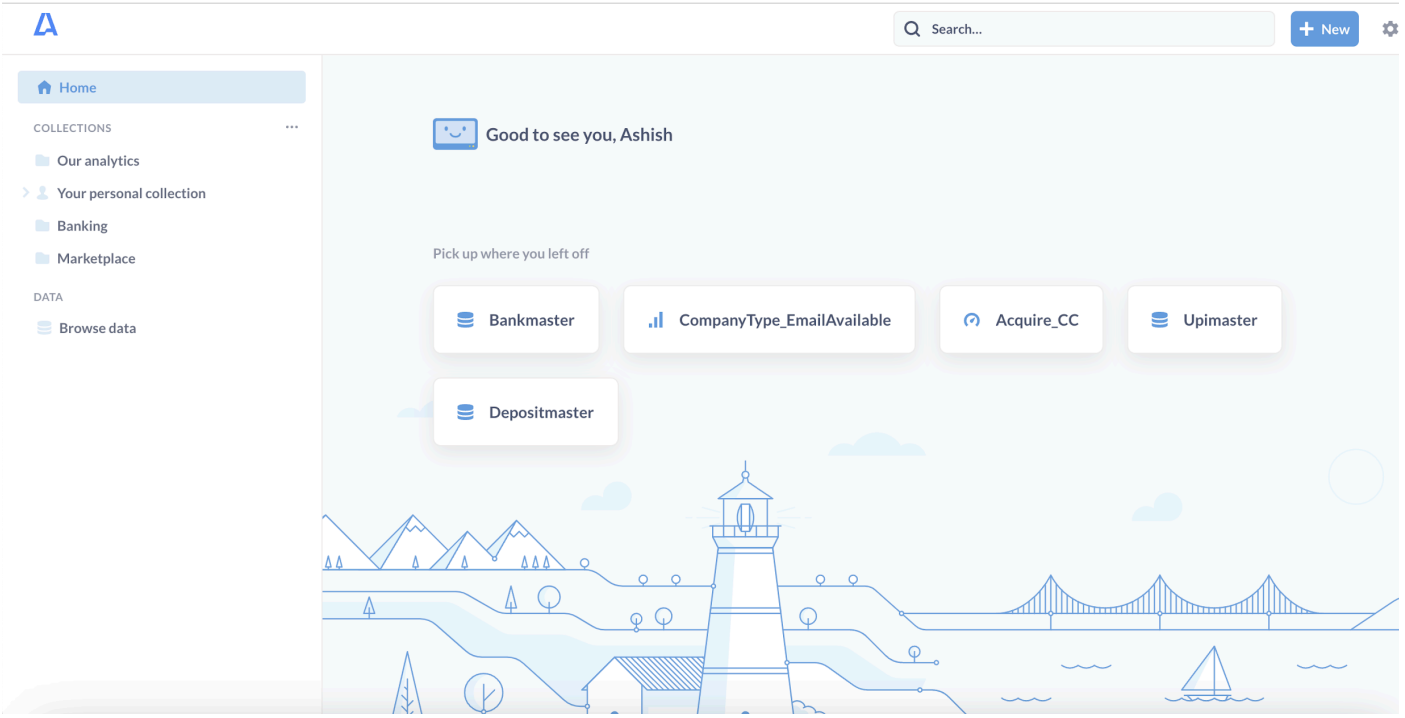
Appice

No-Code Analytics

Visual query builder
Dive deeper with an easy-to-learn visual query builder that brings advanced actions into reach for everyone.

Pre built visualisations
Bring your data to life with 15+ built-in visualizations make it easy to create beautiful live charts and dashboards.

Advanced Analytics
A native SQL editor is available for advanced users. SQL templates and snippets help them share their work with others.

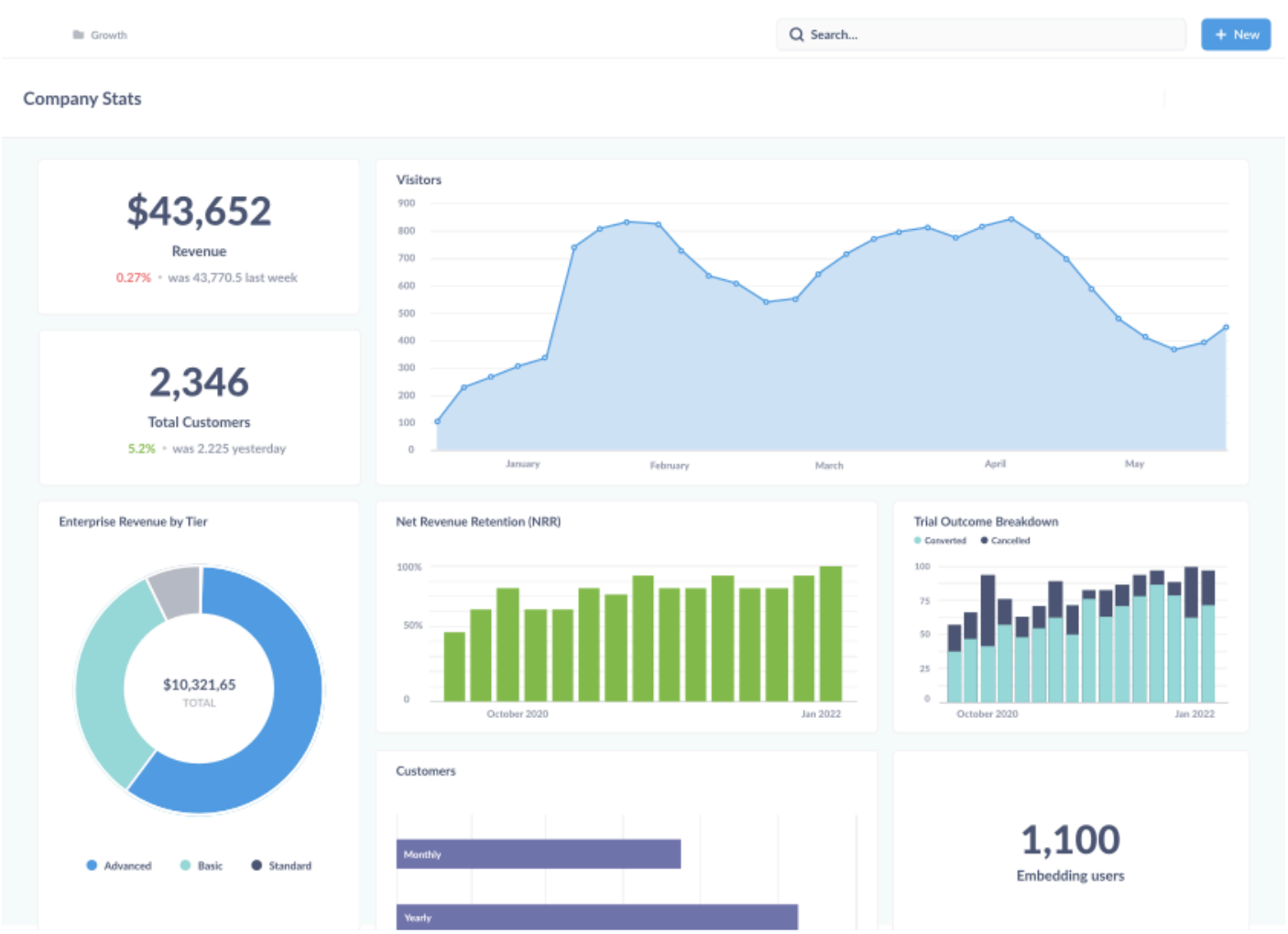


Filters and summarizations
Click and select custom parameters to narrow down and group data from a dropdown menu.

Joins
Use joins to ask questions about data split across multiple models or tables.

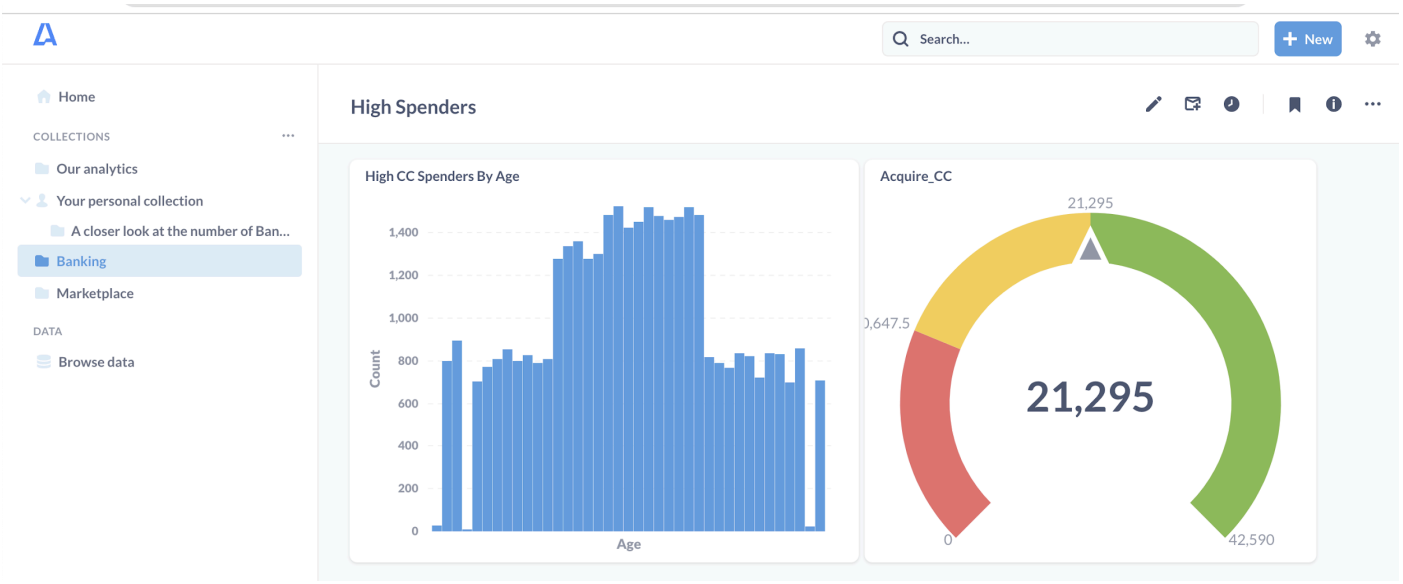
Multi-level aggregation
Get a bit fancier with multi-level aggregation to stack more filters and summarizations step-by-step.

Appice



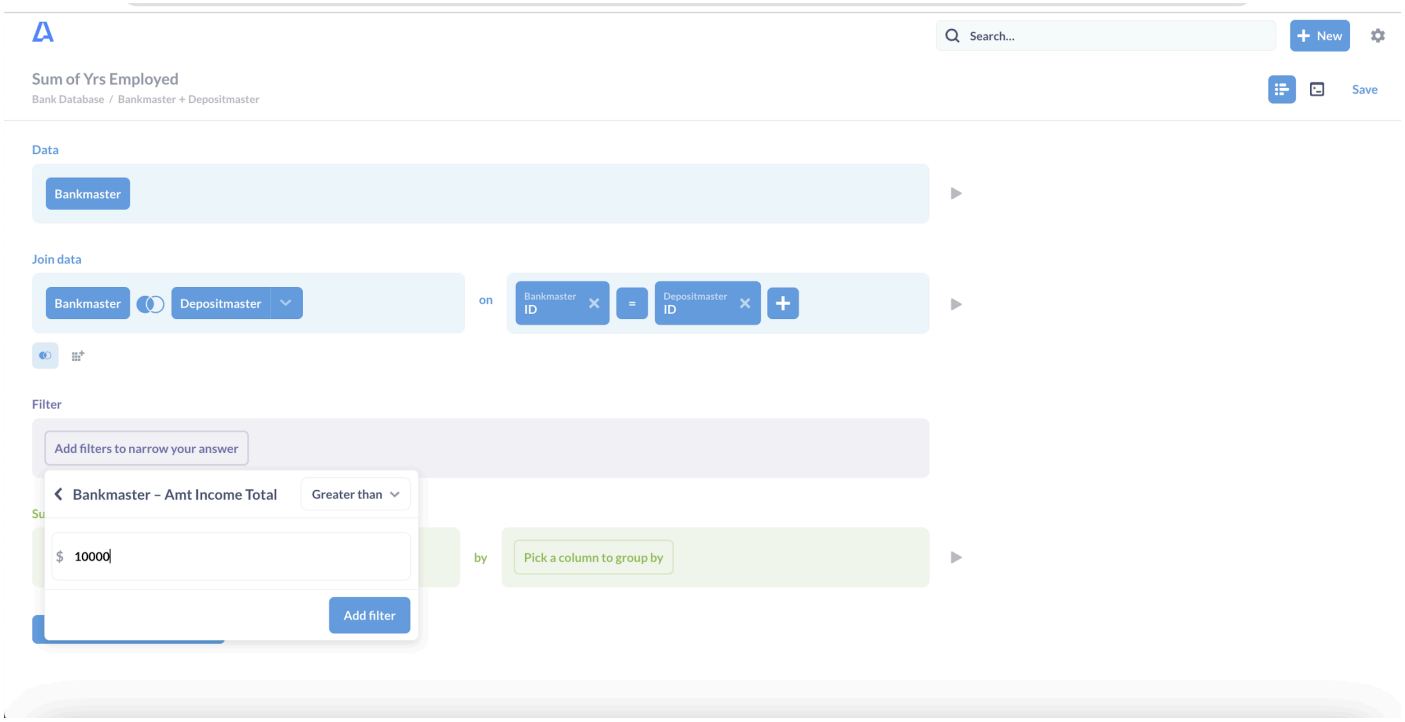
Personalized/Custom Dashboards

Any user or BU can build dashboards as per the KPI's that matter. All visualisation can be changed with a click.



Appice

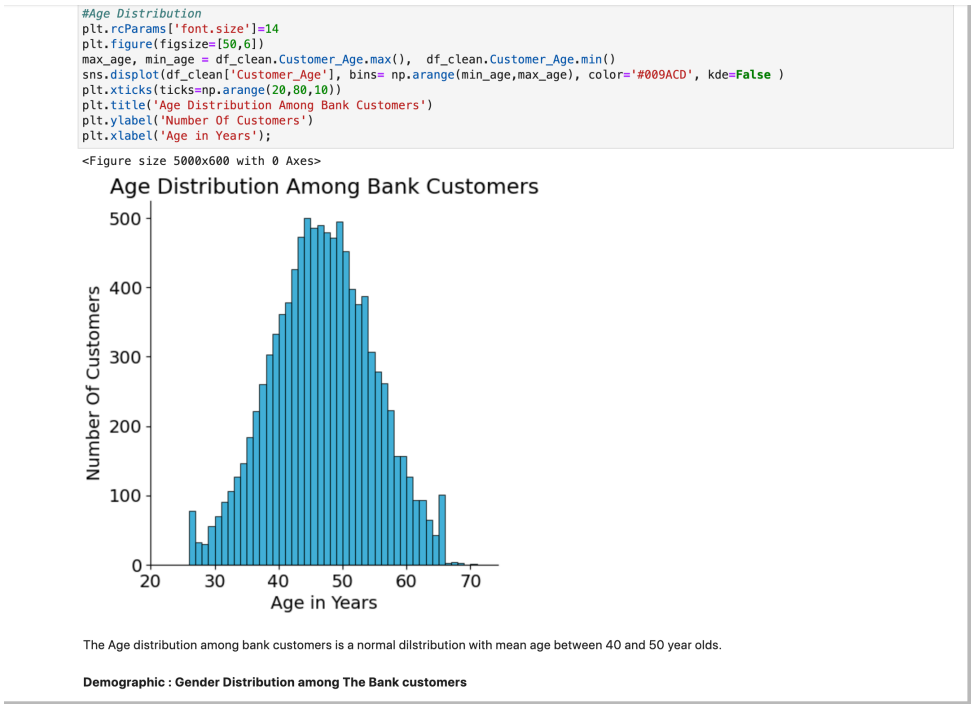
All data ingested in the system can be used to create new reports using multiple dimensions with a powerful underlying analytics engine.



Special Reports from ML Models

The platform builds multiple visualizations/reports during ML EDA stage and for Model Output.

Example: Credit Card Customers
Age Distribution:



```
#Age Distribution
plt.rcParams['font.size']=14
plt.figure(figsize=[50,6])
max_age, min_age = df_clean.Customer_Age.max(),  df_clean.Customer_Age.min()
sns.displot(df_clean['Customer_Age'], bins= np.arange(min_age,max_age), color='#009ACD', kde=False )
plt.xticks(ticks=np.arange(20,80,10))
plt.title('Age Distribution Among Bank Customers')
plt.ylabel('Number Of Customers')
plt.xlabel('Age in Years');
```

```
<Figure size 5000x600 with 0 Axes>
```


The Age distribution among bank customers is a normal dilstribution with mean age between 40 and 50 year olds.

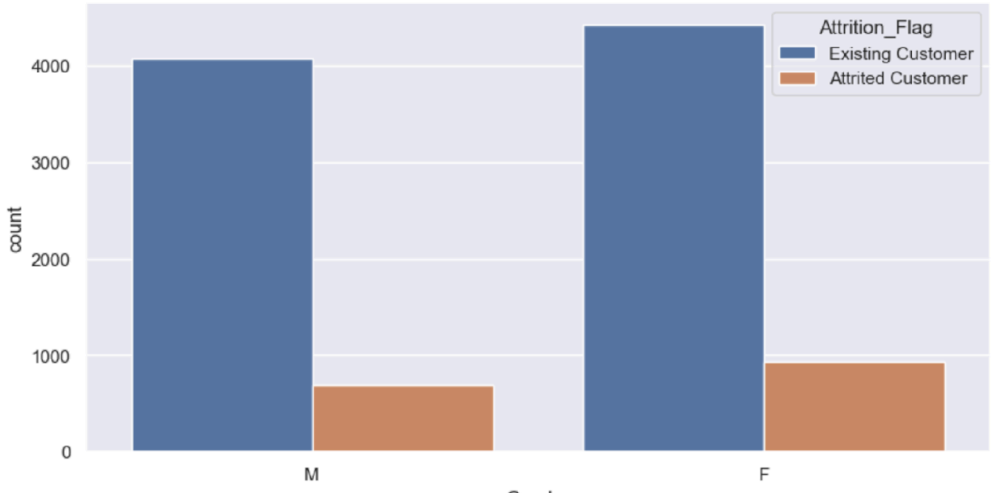
Demographic : Gender Distribution among The Bank customers

Attrition by Gender:

Visualizations For Attrition Flag

Attrition Flag Vs Gender

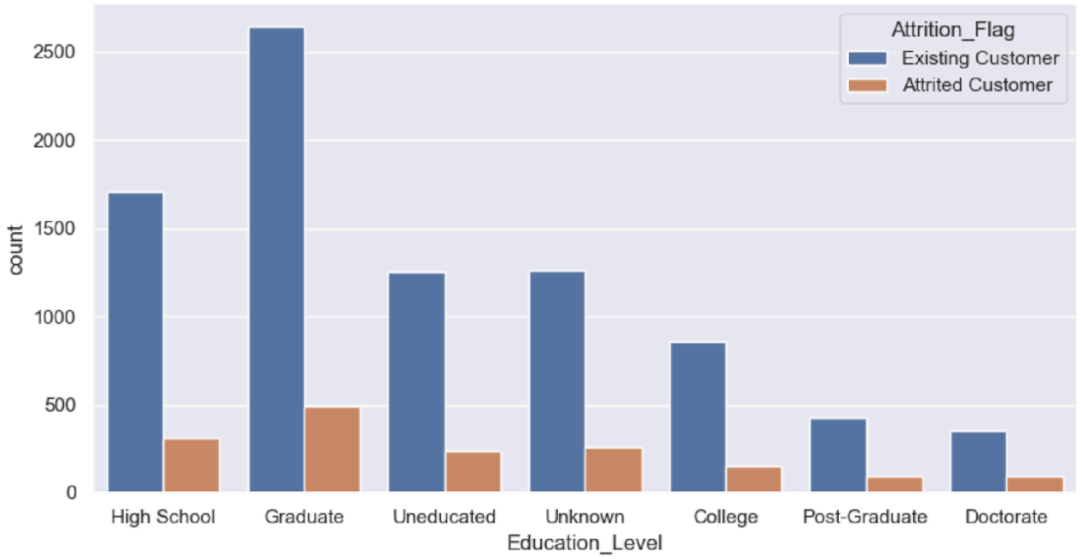
```
fig_dims = (10, 5)
fig, ax = plt.subplots(figsize=fig_dims)
sns.countplot(x ='Gender', hue = "Attrition_Flag", data = data_f, ax=ax)
plt.show()
```



Attrition by Education:

Attrition Flag Vs Education Level

```
fig_dims = (10, 5)
fig, ax = plt.subplots(figsize=fig_dims)
sns.countplot(x ='Education_Level', hue = "Attrition_Flag", data = data_f, ax=ax)
plt.show()
```



Appice

Full stack Error Monitoring & Crash Analytics

Every developer writes tons of bugs. And many of those bugs get shipped to production. That's unavoidable. But thanks to appICE, you can find and fix those bugs before your customers even notice a problem.

- Source maps for JS and Node, symbolication for iOS, and stack locals for Python bug tracking. View actual code in stack traces for over 32 languages and frameworks.
- See error parameters and session information in the crash report.
- Navigate your Issues across multiple projects in a single view. See all Issues across your entire organization, or select a handful of related projects to surface trouble spots.

Go back in time

AppICE's added context and Breadcrumbs include the event history and actions that led up to every bug. No more debugging customer stories about how they clicked the thing and then this other thing did a weird thing.

Contextual Understanding of Errors

Understand the context that contributed to errors with tags and relevant information about your software, environment, and users.

Browser Chrome 52.0.2743 browser.name Chrome

Environment prod Level error Logger javascript

Os Mac OSX 10.11.1 Os.name Mac OS X

Release e18ddd07f08a9e42d1acee5cb1d48793f5c43884

You can also submit optional custom data to provide extra context for bug tracking that is unique to your application and business.

- "How many widgets were visible when the app crashed?"
- "Was their game running in 32 bit or 64 bit mode?"
- "Does this issue only effect rooted phones?"
- "Which clients' users are experiencing this bug?"
- "What was the value of their shopping cart?"
- "Did the waxing gibbous cause the problem?"

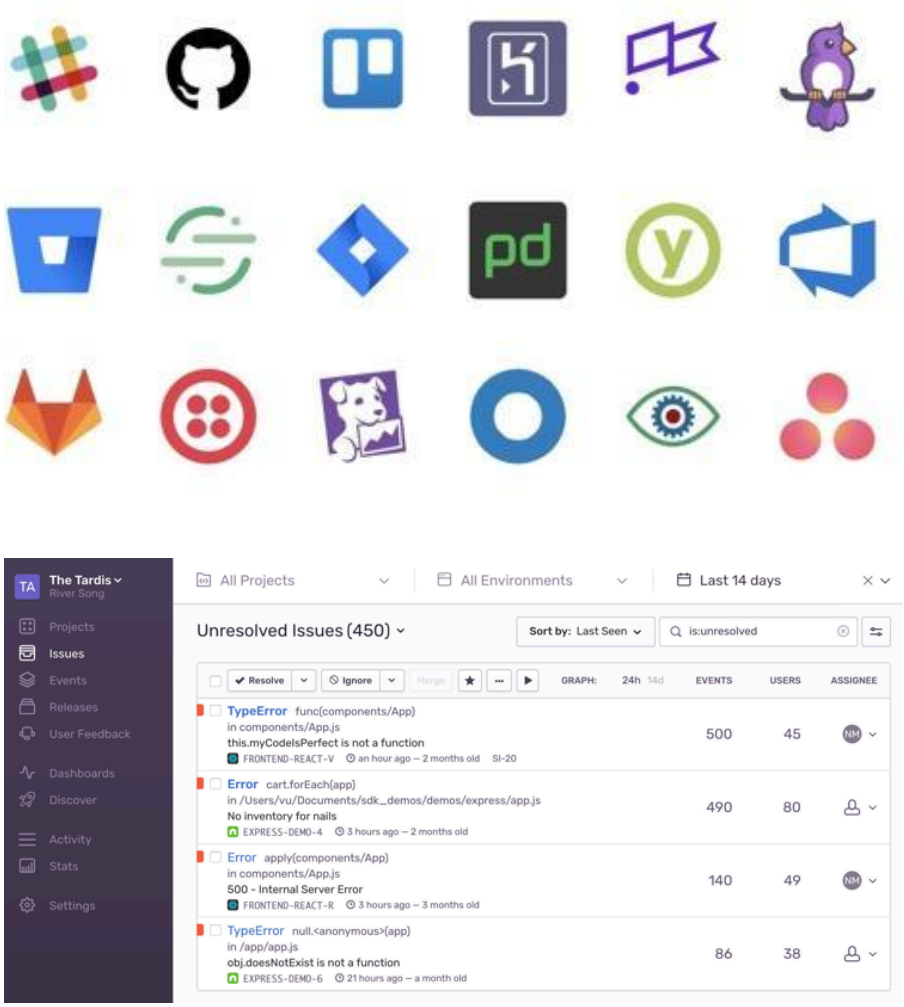
Monitor Every Stage of App Lifecycle

- See the specific commit that caused the bug and resolve the problem in appICE as part of your next release.
- Automatically assign new issues to the engineer or team best suited to tackle the error.

Alerts & Dashboards

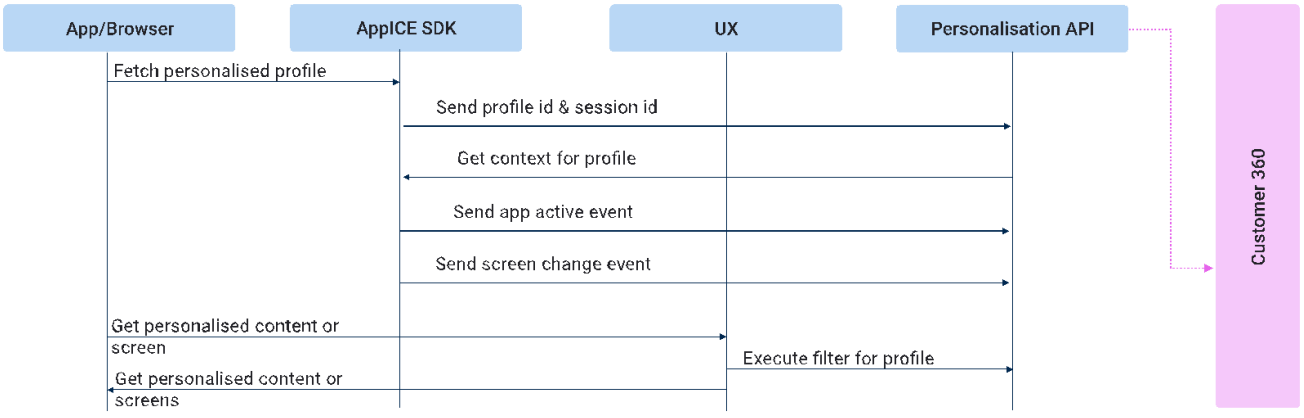
- Visualize errors throughout your organization with Dashboards, including graphs of your spikes, geographic mapping, and errors and events organized by release.
- Use Issue and Events graphs to understand the frequency, scope, and impact of errors.
- Get alerts via email, SMS, or chat when bugs make it into production without disrupting your development workflow.
- Take a deep dive into your data with AppICE's custom query-builder.

Frameworks Supported



SDK for Personalization

For personalization, we create the C360 record, which is available to the UX/SDK via the digital banking API gateway. This information needs to be processed/used by the UX/SDK for personalization.

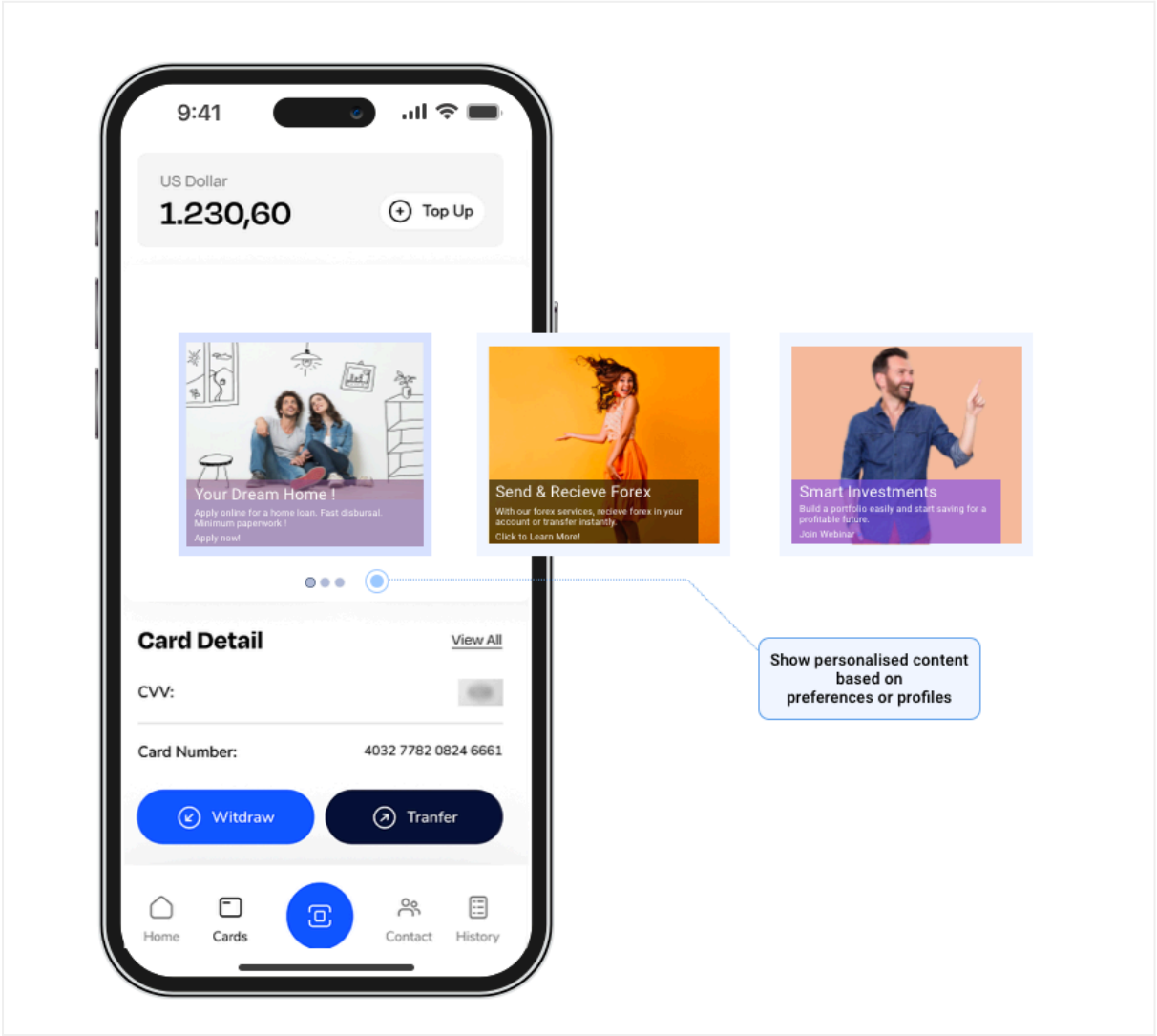


Appice

Personalization

Native Display

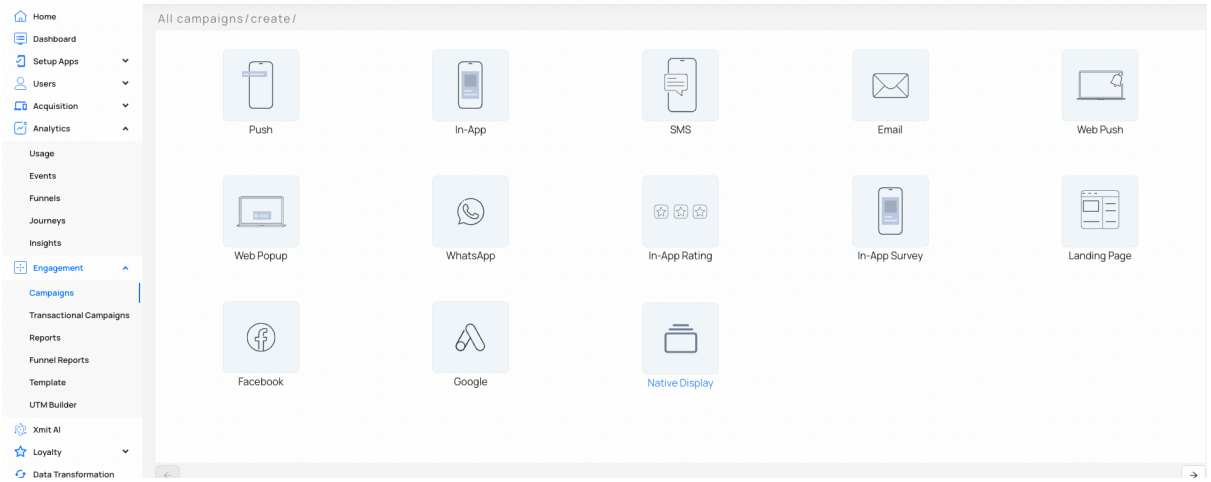
Native Display helps to display content natively within your app - deliver relevant, contextual and personalized content based on customer preferences or profile.



Appice

Steps to setup Native Display

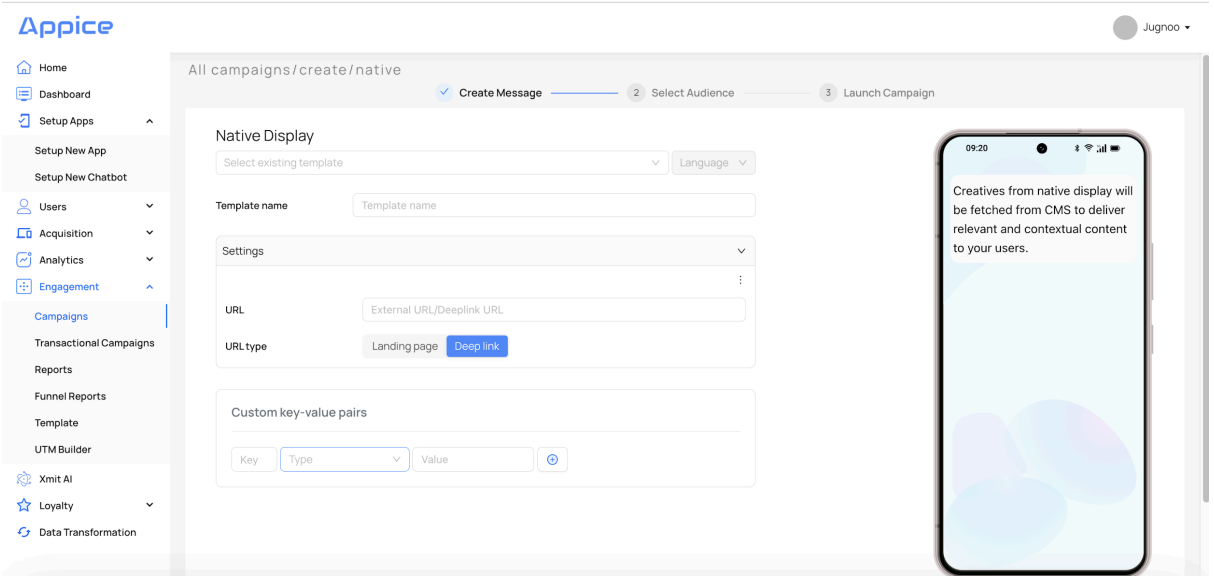
Select the option of Native Display from Campaigns:



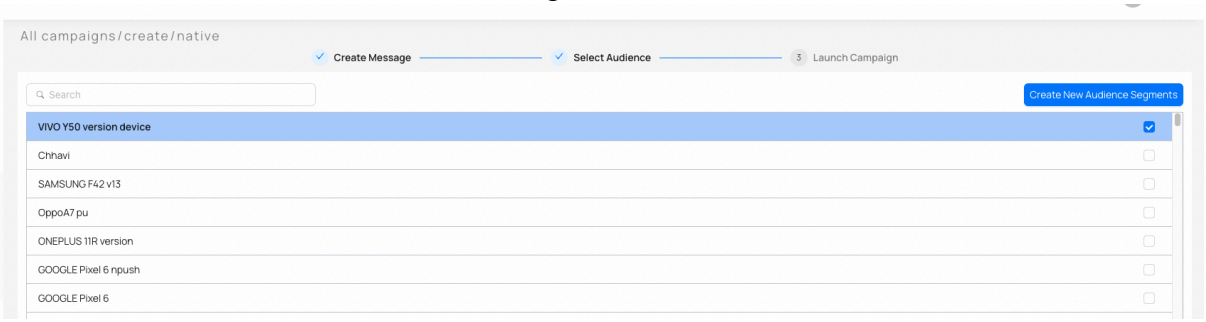
Populate the values:

The custom key-value can have any value.

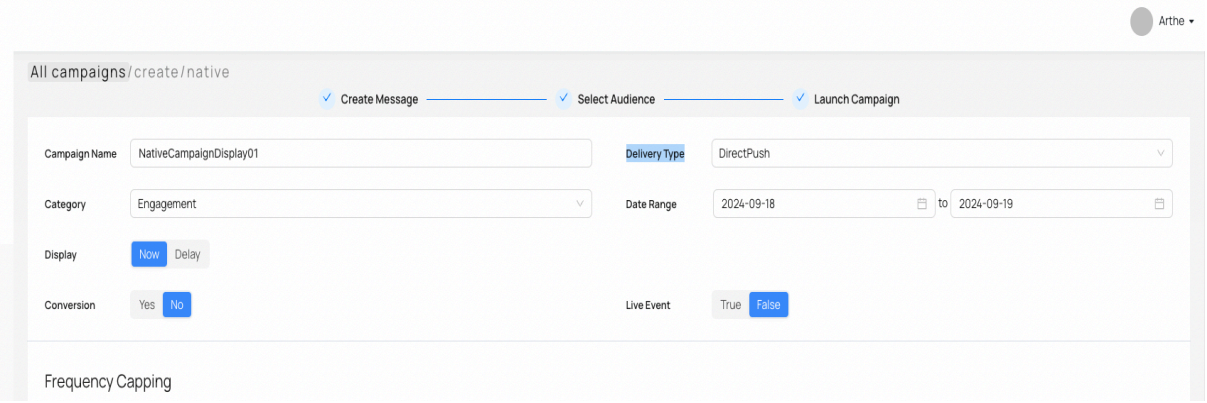
For example, the key could be the title and value could be the header of the content to be displayed. Or you can take Offerid as the key with a value of the particular offer. The app can take the Offerid and fetch the additional details of the offer from a backend system.



Select the Audience that this will be targeted to:

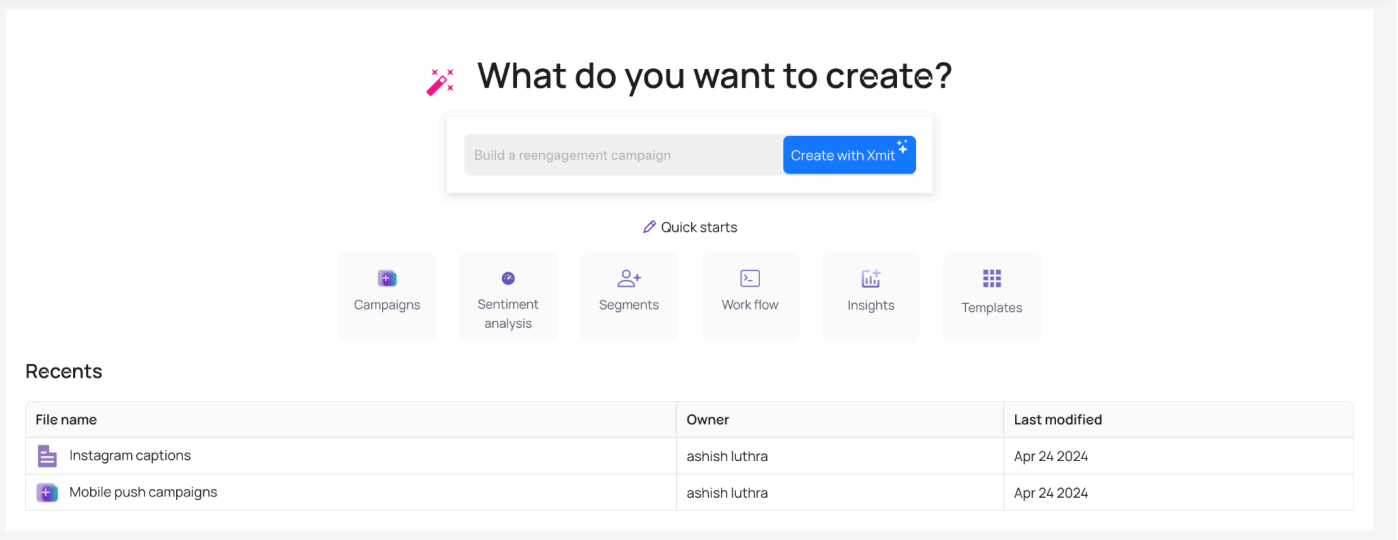


Launch the Campaign:



Generative AI (Gen AI)

Generative AI allows you to create message content and creatives.



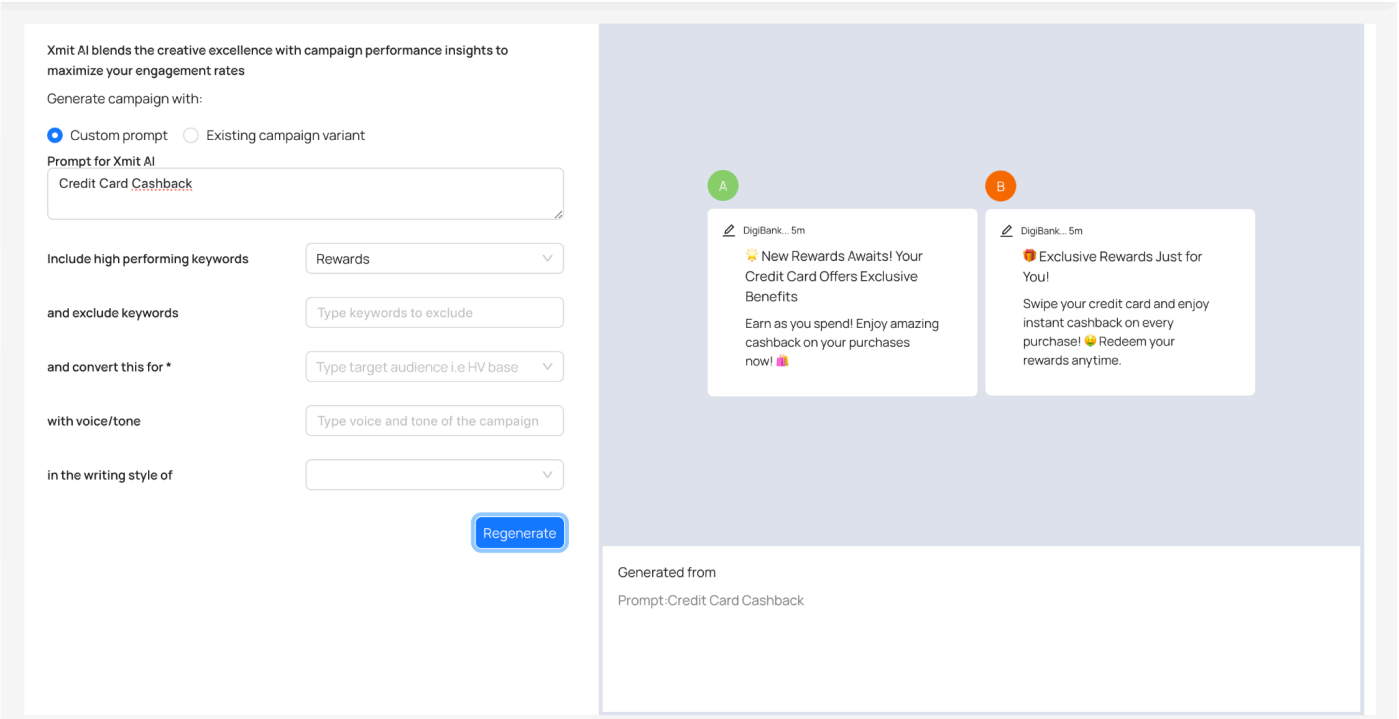
Xmit AI easy-to-use prompt builder saves time.

With Xmit AI, you can spend less time thinking of a prompt that will give you the best copies.

1. You can easily pick filters and criteria to create copies for a specific campaign, use case, and audience using Xmit AI's prompt builder. You can also define the tone and writing style of the content using an intuitive UI.
2. Xmit AI suggests keywords based on their impact on your previous campaigns.
3. Xmit AI understands context, audience, tone, and writing style.
4. Xmit AI lets you regenerate new copy variations with a single click.
5. Xmit AI creates multiple variants for A/B testing in seconds.
6. Xmit AI is a self-learning Generative AI algorithm
7. Xmit AI generates campaigns across multiple channels

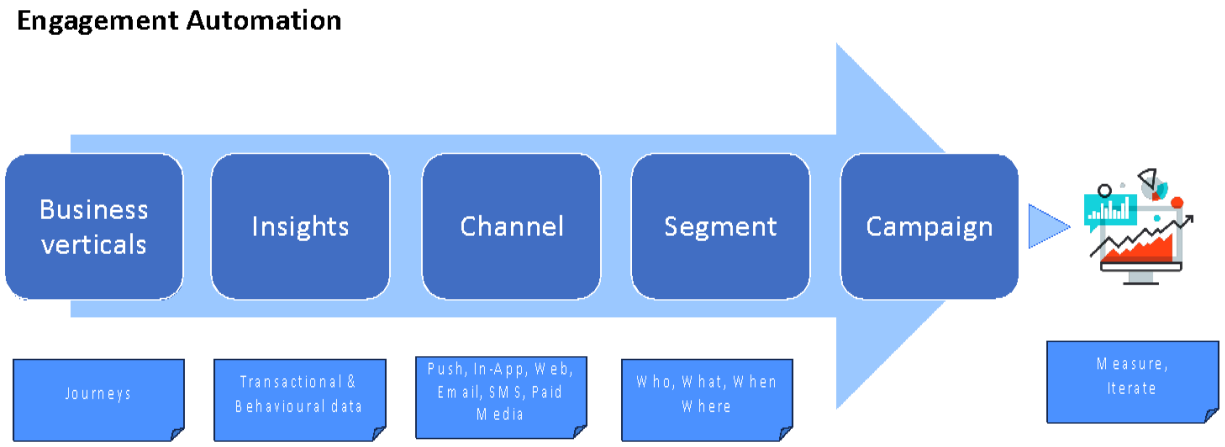
   Marketers can now tap into its advanced AI capabilities to generate highly engaging copy across –

   a. Push Notifications
   b. Emails
   c. SMS
   d. RCS
   e. Whatsapp
   f. In-App Messages
   g. App Inbox
   h. Web display

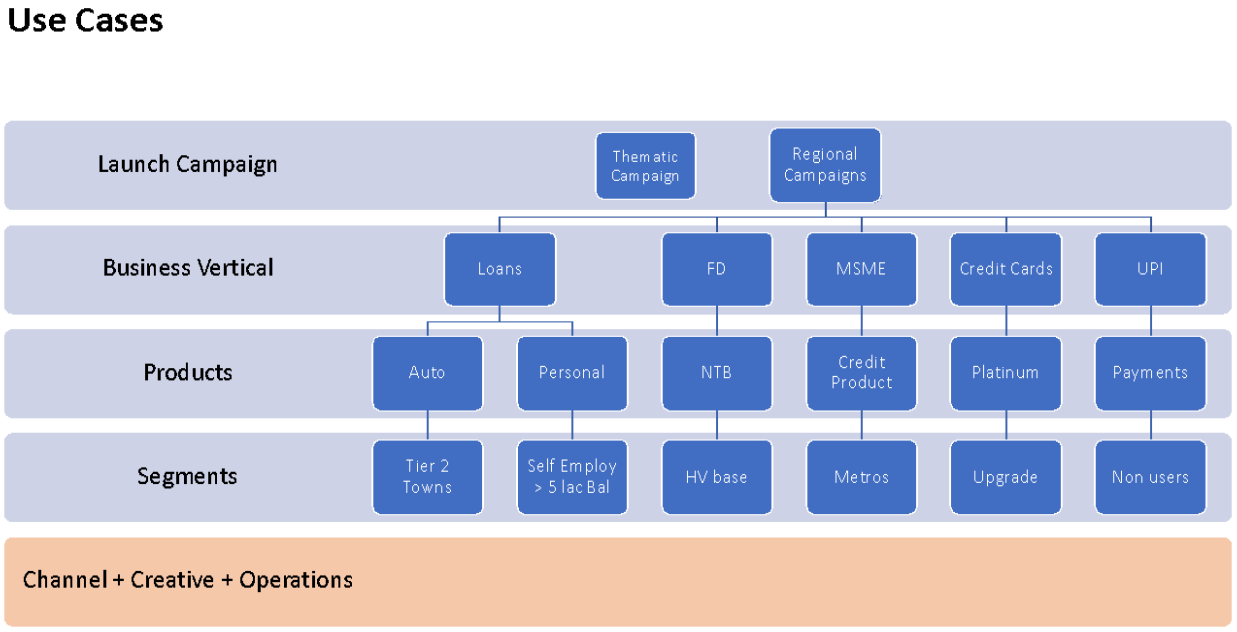


Use Cases

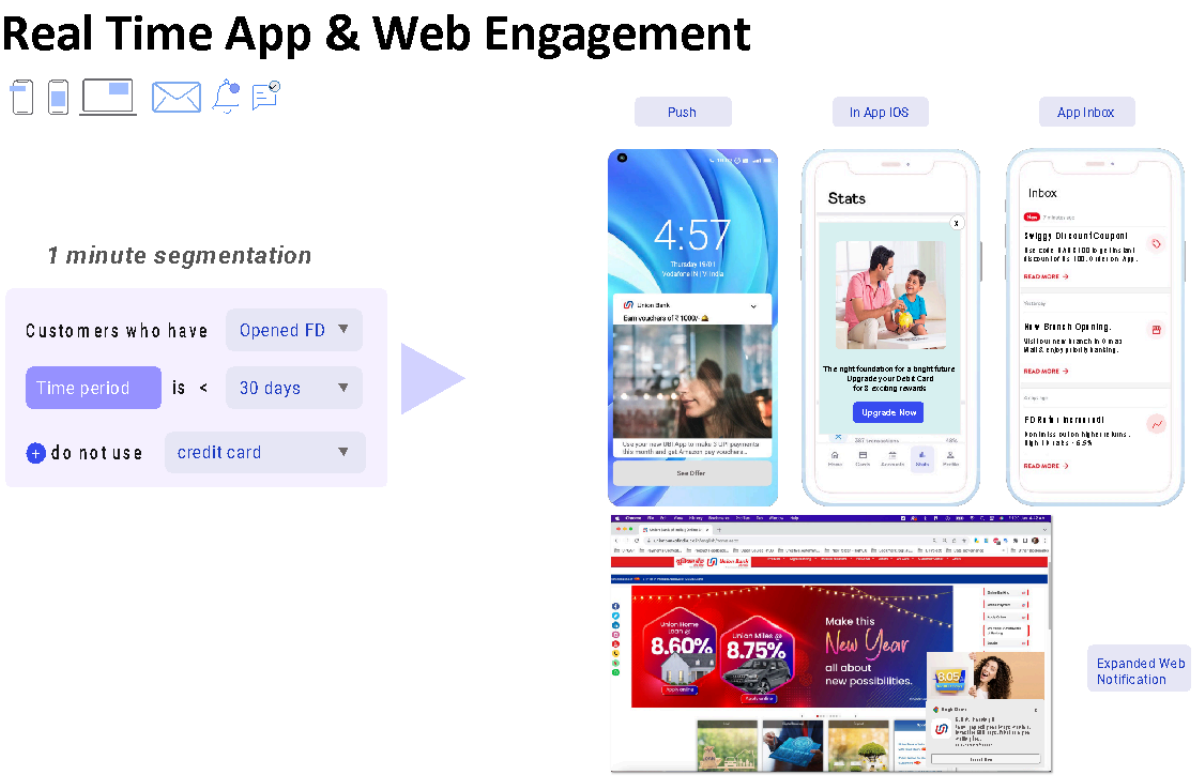
Appice enables various teams and associated vendors to build and operate multiple use cases as per business KPI's.



At a strategic level, use cases can emerge from product, segment ,customer behaviour or competitive environment. We help teams set up initial use cases basis business requirements.



Examples: App & Web Notifications



Examples: By Segment

Customer Type/ Segment	Behaviour/ Use Case	Action
Prospective customer	Product Intent : Web visit >Home Loan browse > Dropoff, Loan calculator dropoff	Next visit > Web notification reminding to apply
Light App user	App Open > RD Apply > Dropoff	Push Notification for reminder.
		In-App Notification on next visit
ETB – HV & Mid Value	Saving Ac Balance > 1.5 lac	In-App Notification for FD
ETB – Low card usage	Does Online money transfer, Low card usage last 3 months	Push Notification to upgrade to new card with special benefits
Prospective User	Web visit >Loan Apply> does not upload documents	SMS/Web Notification as reminder to upload documents
Cross Sell/Upsell	High propensity for product x	Reminder SMS, Email, Push
Sleeping customer	Low usage of product x	Reminder SMS
Cross Sell/Upsell	Customer with good credit score, NBO created	Call customer

Real-Time Events	Trigger for Transactional or Behaviour action	Homepage Banner personalised
Home Loan customer	Personalization Trigger- Low A/c balance	EMI due date notification

Customer Type/ Segment	Use case	Display Text	Variables
Credit Card	Credit card - Payment due	Your credit card bill ﷼XXX is due on DD/MM/YY for card number xxxx 1234	Card number Payment amount Due on
Credit Card	Credit card - Payment overdue	Your credit card bill ﷼XXX is overdue on DD/MM/YY for card number xxxx 1234	Card number Payment amount Due on
Credit Card	EMI due	Your credit card EMI amount ﷼XXX is due on DD/MM/YY for card number xxxx 1234	Card number EMI amount Due on
Credit Card	EMI overdue	Your credit card EMI amount ﷼XXX is overdue on DD/MM/YY for card number xxxx 1234	Card number EMI amount Due on
Credit Card	Credit Card is getting expired; prompt renewal	Your credit card number xxxx 1234 is getting expired on DD/MM/YY	Card number Expiry date
Credit Card	Credit card is expired	Your credit card number xxxx 1234 is expired on DD/MM/YY	Card number Expiry date
Credit Card	Alert for activation of card	Your credit card number xxxx 1234 is yet to be activated.	Card number
Login / Registration	Password/Mpin expiry	Your m-pin is set to expire on DD/MM/YY	Expiry Date of m-pin
Grievance and Chargeback	Update on chargeback		
Debit Card	Debit Card is getting expired; prompt renewal	Your debit card number xxxx 1234 is getting expired on DD/MM/YY	Card number Expiry date
Debit Card	Debit card is expired	Your debit card number xxxx 1234 expired on DD/MM/YY	Card number Expiry date
Debit Card	Alert for activation of card	Your debit card number xxxx 1234 is yet to be activated.	Card number
Loan/OD/CC/RD	Overdue Loan/CC/OD instalments	Instalment of ﷼<XXX> is overdue after DD/MM/YY for your <acc_type> account number <xxxx 1234>	Acc number Acc type Due amount Due on
Loan/OD/CC/RD	Upcoming RD instalments	Instalment of ﷼<XXX> is due on DD/MM/YY for your <acc_type> account number <xxxx 1234>	Acc number Acc type Due amount Due on

TD	Upcoming TDR maturity alert	Your <acc_type> account number <xxx 1234> is getting matured on <DD/MM/YY>.	Acc type Acc number Maturity date
TD	TDR matured but not renewed/credited to operative account	Your <acc_type> account number <xxx 1234> is matured on <DD/MM/YY>. Please renew or encash.	Acc type Acc number Maturity date
Account Servicing	Overdue Re-KYC	Your KYC is expired on DD/MM/YYYY. Please complete Re-KYC to avail all bank services	KYC expiry date
Account Servicing	Cheque book exhausted	Your cheque book for account number <xxxx 1234> is exhausted. Request for new cheque book now.	Acc number
Govt Accounts	Nudge to set SI for customer for Govt a/c	You can set SI for your <Account_type> account <Account_number> for disciplined investment	A/c number Type of Account
Insurance	Nudge to set SI for insurance	You can set SI for your insurance policy <Policy number> for automatic premium payment	Policy Number
Mutual fund	Nudge to set SI for mutual fund	You can set SIP for disciplined investment at regular interval	

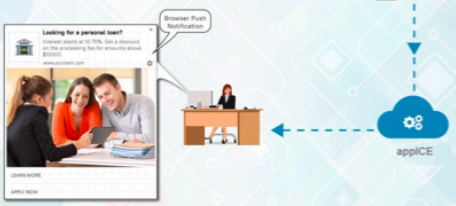
Appice

USE CASE 1:
Prospective User - Website Visit

A prospective user comes to a bank's website, visits the credit card page, and drops off. His activity is recorded in the CDP. The next time the user visits the website again, an onsite notification is shown asking him/her if they are interested in applying for the credit card.

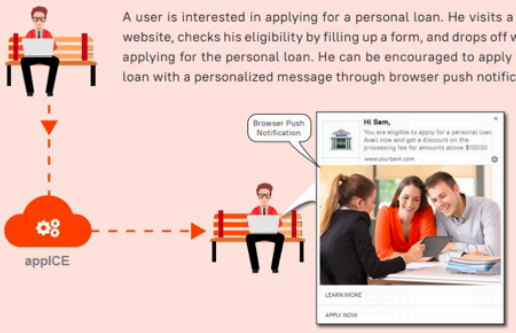
USE CASE 2:
Prospective User - Loan Application

A prospective user visits a bank's website to look for a personal loan. She checks out the interest rate, calculates her EMI, and drops off. The bank's marketers can bring her back to the website by sending her a personalized message via a browser push notification regarding the loan.



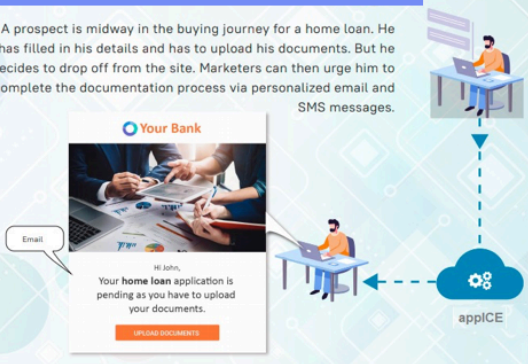
USE CASE 3:
Journey Incomplete - Loan Application

A user is interested in applying for a personal loan. He visits a bank's website, checks his eligibility by filling up a form, and drops off without applying for the personal loan. He can be encouraged to apply for the loan with a personalized message through browser push notifications.



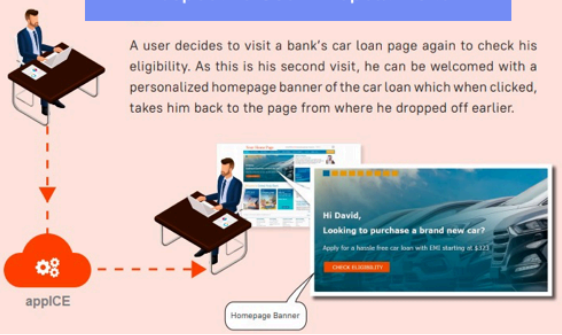
USE CASE 4:
Prospective User - Pending Documentation

A prospect is midway in the buying journey for a home loan. He has filled in his details and has to upload his documents. But he decides to drop off from the site. Marketers can then urge him to complete the documentation process via personalized email and SMS messages.



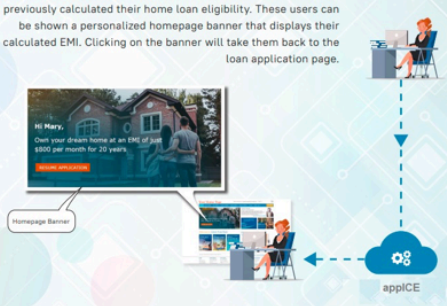
USE CASE 5:
Prospective User - Repeat Visitor

A user decides to visit a bank's car loan page again to check his eligibility. As this is his second visit, he can be welcomed with a personalized homepage banner of the car loan which when clicked, takes him back to the page from where he dropped off earlier.



USE CASE 6:
Prospective User - EMI Calc

There will be users who revisit a bank's website after having previously calculated their home loan eligibility. These users can be shown a personalized homepage banner that displays their calculated EMI. Clicking on the banner will take them back to the loan application page.

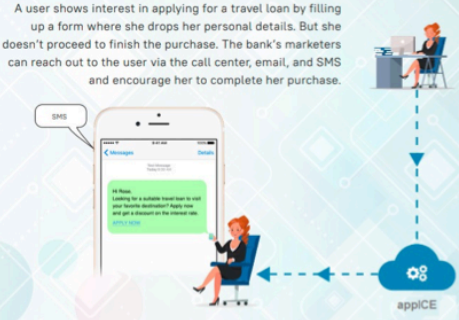


USE CASE 7:
Prospective User - Lead Nurture

A user receives a call from the call center regarding a travel credit card. He shows interest in the card but doesn't apply for it after the call ends. In this case, the user can be shown a personalized SMS with an exciting offer which encourages him to apply for the card.

USE CASE 8:
Prospective User - Form Fill

A user shows interest in applying for a travel loan by filling up a form where she drops her personal details. But she doesn't proceed to finish the purhase. The bank's marketers can reach out to the user via the call center, email, and SMS and encourage her to complete her purchase.



Architecture

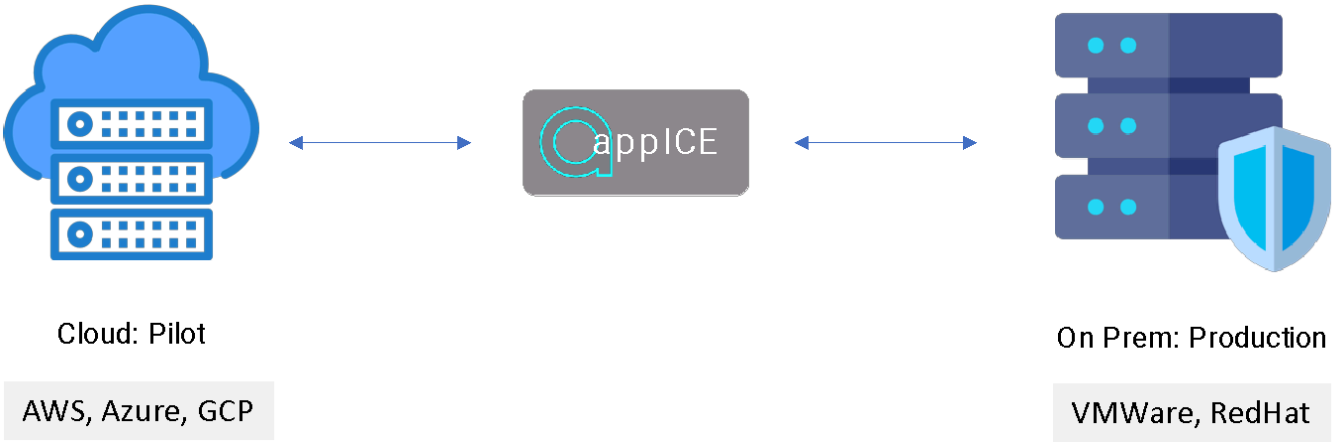
AppICE Data Platform

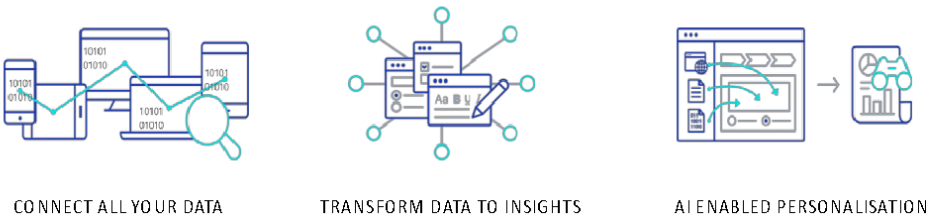
Building actionable intelligence from all customer data and touchpoints, the platform provides enterprise grade infrastructure to handle raw data, events, cohorts, segments and ML based analytics for effective customer engagement strategies.

Hybrid Architecture: Deploy On-Prem or Cloud

We give the flexibility of deploying On-premises or in Cloud.

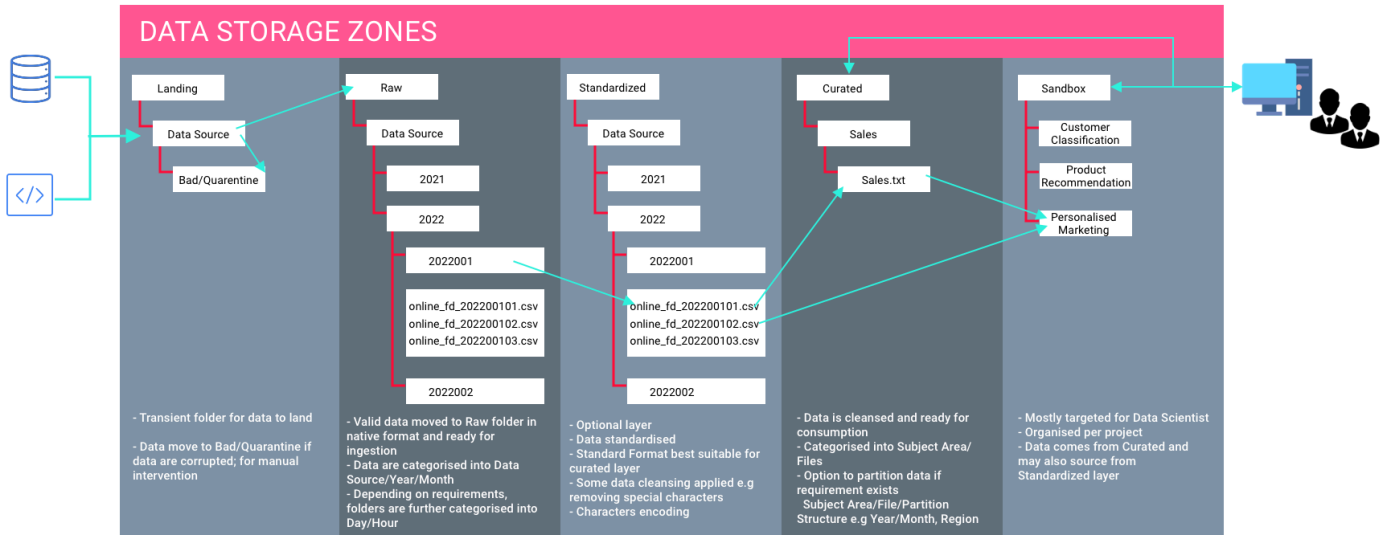
- Cloud: Fast Pilot & Testing
- On Prem: Compliance with ISD & Regulatory norms





Architecture of storage zones

The hierarchical nature of data gets curated into single customer view, segments and cohorts for data-actions in downstream systems.



Listed below are the data structure used in our platform:

1. Customer Interaction Raw Data:

Object Storage Data Format: We use MessagePack as our serialization format. This keeps the extensibility with JSON, by allowing keys to be added/removed. The initial implementation simply is a header followed by MessagePack object with the following structure:

Appice

Metadata JSON

```
{
 "Versions": [
  {
   "Type": 0, // Type of version, object with data or delete marker.
   "V10bj": { /* object data converted from previous versions */ },
   "V20bj": {
     "VersionID": "", // Version ID for delete marker
     "ModTime": "",  // Object delete marker modifie time
     "PartNumbers": 0, // Part Numbers
     "PartETags": [], // Part ETags
     "MetaSys": {}   // Custom metadata fields.
     // More metadata
   },
   "DelObj": {
     "VersionID": "", // Version ID for delete marker
     "ModTime": "",  // Object delete marker modifie time
     "MetaSys": {}   // Delete marker metadata
   }
  }
 ]
}
```

Data JSON


```
{
 "app_key": "a6a3be643daf7d5e240fd89c8edbac40b43f96af",
 "app_id": "5fa41afe6fc1e678a8344311",
 "api_key": "b2a6d1D5929445d6814D699cc1511d57",
 "device_id": "5c8c542a-6c5b-48D0-899d-de1ce1D059d1",
 "appuserid": "",
 "android_id": "",
 "childAppId": "",
 "timestamp": 1639647933,
 "mtimestamp": 1639647933117,
 "duration": 28,
 "sdk_version": "SDK_v2.5.07",
 "sdk_j_version": 2507,
 "app_version": "7.3.9",
 "app_code": "73",
 "begin_session": "1",
 "events": [
  {
   "context": {
    "who": {
     "device": {
      "d": "Vivo Vivo 1726",
      "ma": "Vivo",
      "mo": "Vivo 1726",
      "p": "Android",
      "pv": "8.1.0",
      "sdkv": "SDK_v2.5.07",
      "sdkiv": 2507,
      "c": "Vodafone IN",
      "r": "720x1436",
      "cc": "US",
      "l": "En_US",
      "av": "7.3.9",
      "ac": "73",
      "ap": "com.sample.bankapp"
     },
     "ram": {
      "f": "112852D",
      "t": "384D76D"
     },
     "battery": {
      "pl": "0",
      "h": "2",
      "l": "9",
      "sc": "100",
      "st": "4",
      "v": "364D",
      "t": "24D",
      "pe": "9"
     },
     "space": {
      "i_f": "4D9656D",
      "i_t": "53173728",
      "e_f": "3482160",
      "e_t": "52559328"
     },
     "network": {
      "mcc": "404",
      "mnc": "11",
      "ctype": "WIFI",
      "imsi": "",
      "ope": "Vodafone IN",
      "ntype": "13",
      "ptype": "1",
      "rtype": "false",
      "ssid": "<unknown ssid>",
      "bssid": "02:00:00:00:00:00",
      "level": "65",
      "freq": "2427",
      "isconnected": "1",
      "cid": "",
      "lac": ""
     },
     "refname": "self"
    },
    "when": {
     "timestamp": 1639647933
    },
    "where": {
     "geo": {
      "cty": "Delhi",
      "cc": "IN"
     },
     "location": {
      "place": "other"
     }
    },
    "what": {

    }
   },
   "_tz": 19800,
   "key": "App_Background",
   "sid": "ca5c0991-38f5-44c3-bab0-d4d423e6fba3",
   "timestamp": 1639647932,
   "mtimestamp": 1639647932909,
   "segmentation": {

   }
  }
 ],
 "order_id": 3,
 "message_id": "1639647933148-fa375b9a-fe32-43c9-9dc0-8f0b4fe399aa",
 "uptimestamp": 1639647933
}
```

2. Events Data:

Our approach is incredibly flexible, as there are no restrictions on the custom events and entities designed, neither in number, combinability or number of properties.

hash_id	timestamp	event_name	attributes
328402xjd-2mdi 4d08-bsk3-2021 ee26fc4920e9de	2022-02-02T 13:13:12.537Z	Avail Loan	{ “type” : “Home Loan” }

i. Real Time Segments:

AppICE platform allows business users to build real-time segments from behavioural and transactional data representing a snapshot of users at that “point of time”

ii. Cohorts:

Representing a group of users with similar characteristics that keeps evolving over time

Audience Segment: Sleeping Users

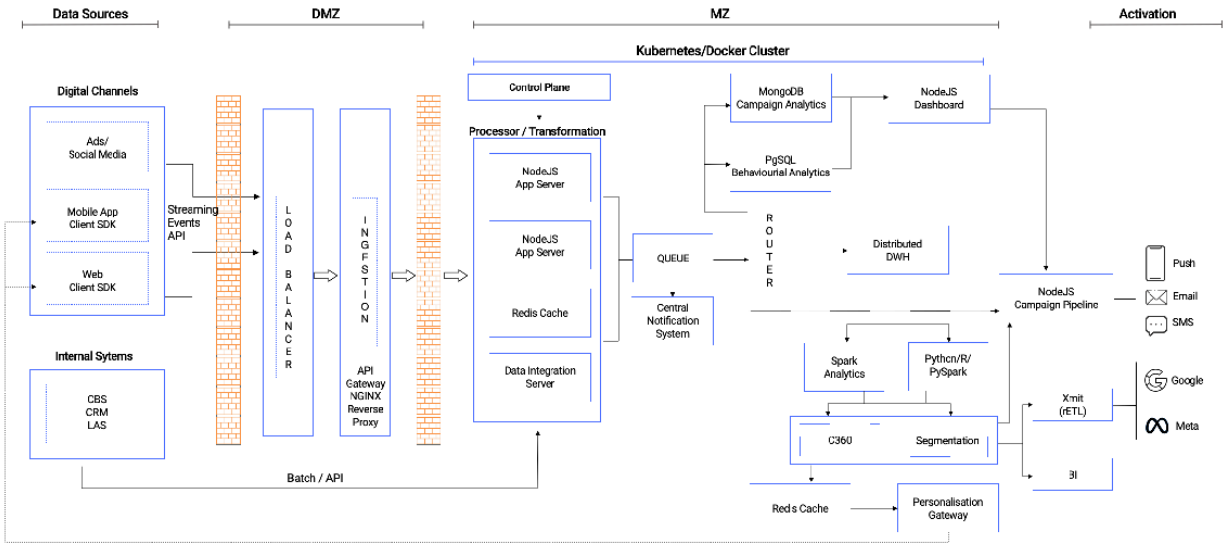

```
{
  "name": "Sleeping Users",
  "description": "Users who
have not used the app for 180
days or more",
  "range": 0,
  "segmentinfo": {
    "who": [
      {
        "operand": "ls",
        "operator": "gte",
        "e_operator": "AND",
        "value": 180,
        "category": "App Usage"
      }
    ],

      {
        "operand": "Login",
        "e_operator": "AND",
        "category": "Events",
        "since": {
          "have": "h"
        }
      }
    ]
  }
}
```


Retention Cohort: Day wise


```
{
  "2023": {
    "1": {
      "1": {
        "in": 4876,
        "un": 231
      },
      "2": {
        "in": 4594,
        "un": 51
      },
      "3": {
        "in": 4295,
        "un": 143
      },
      "4": {
        "in": 5007,
        "un": 12
      },
      "5": {
        "in": 5034,
        "un": 344
      }
    }
  }
}
```

Deployment Architecture

Deployment Architecture:

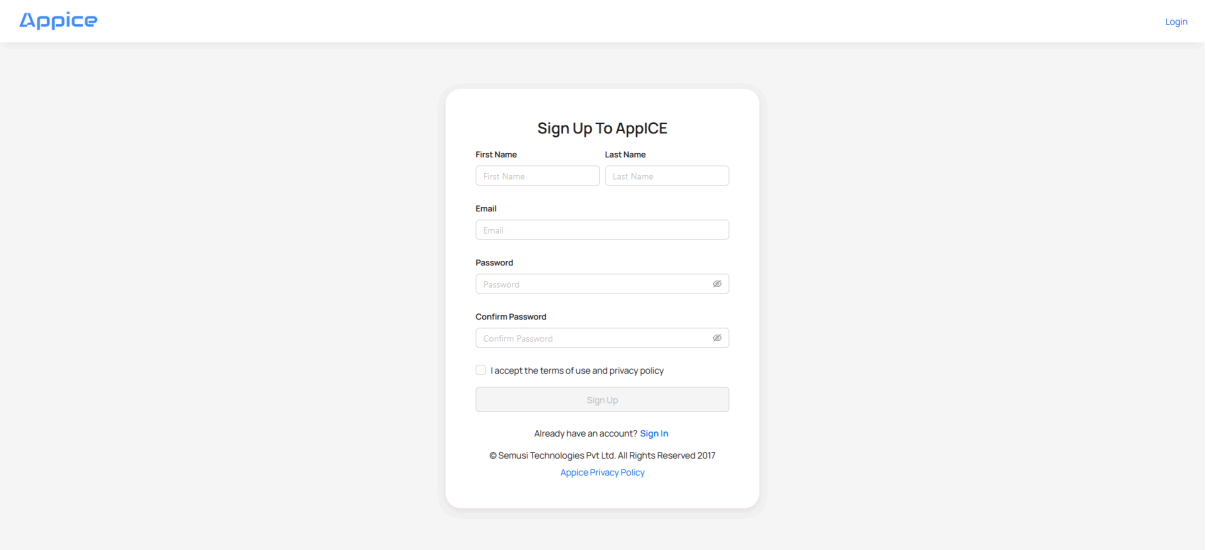


User Management

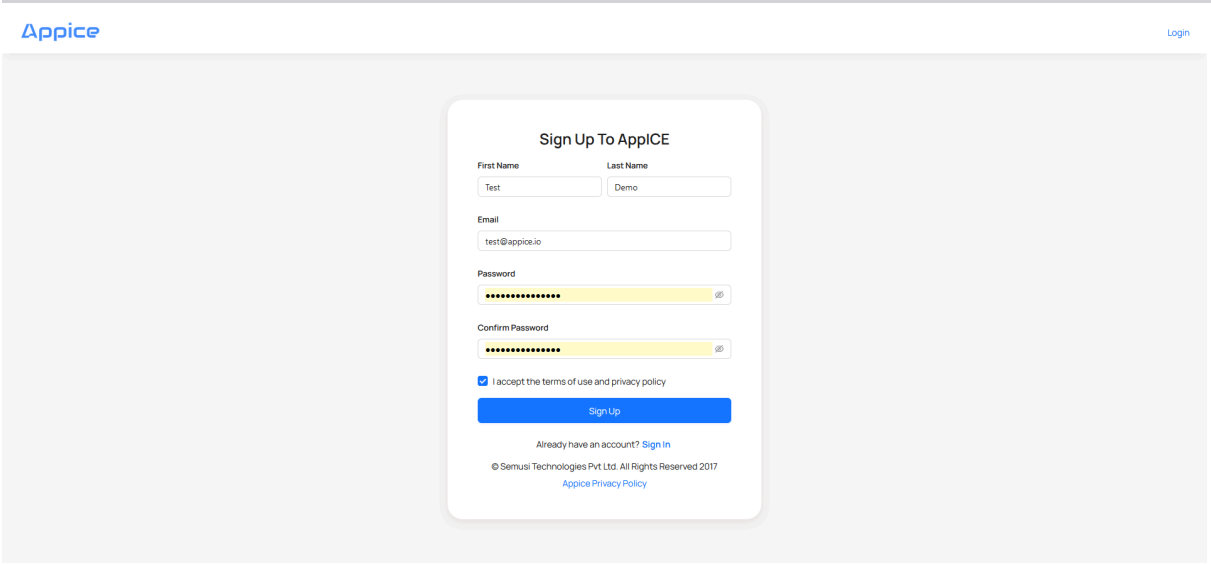
How to Register

Here are the steps to create a user on Appice dashboard:

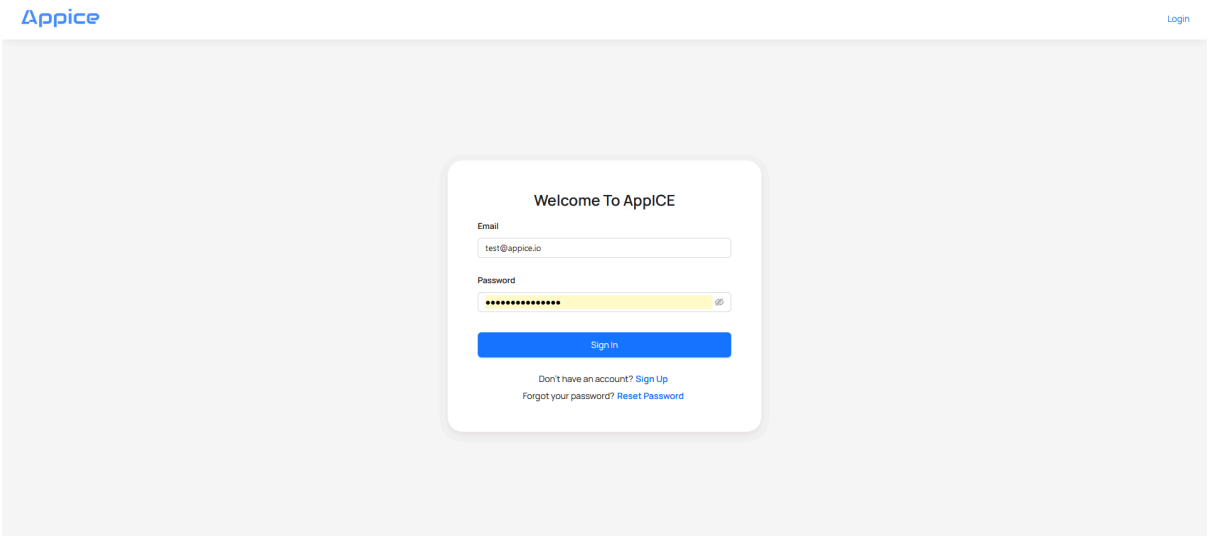
- Users can directly register from the dashboard.
- Users can access the Appice dashboard and click on the Sign Up link to register.



On clicking, it opens the below page. Users can fill their details and click on Sign up.

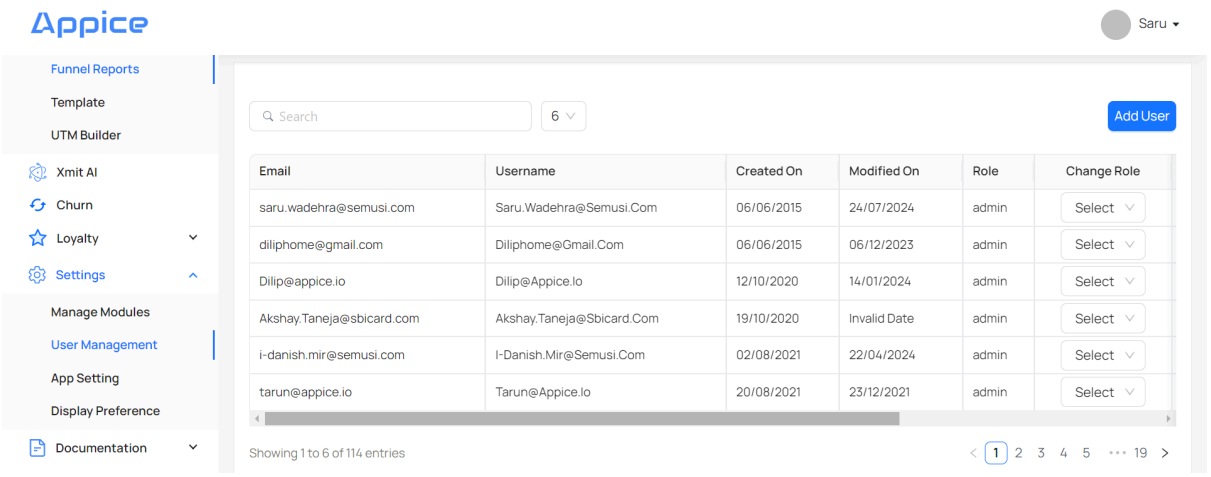


Once users click on Sign up, it takes them to the login page.



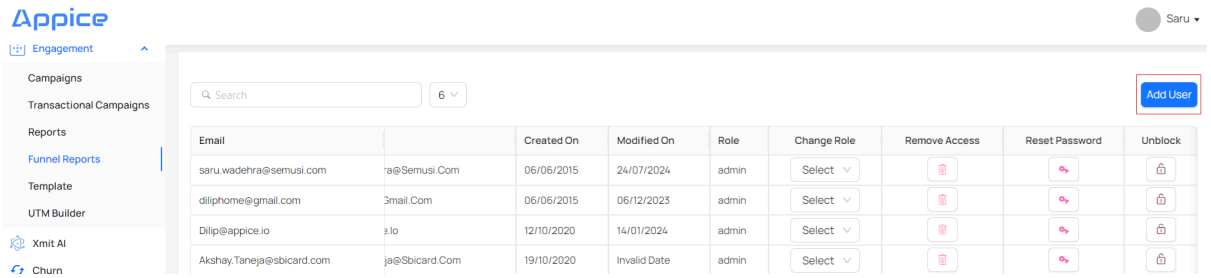
User Creation Process

Once users register from the Appice dashboard, this has to be approved by Admin for users to access this particular app on the Appice panel, by logging into the Appice dashboard and going to **Settings** → **User Management** in the left panel.

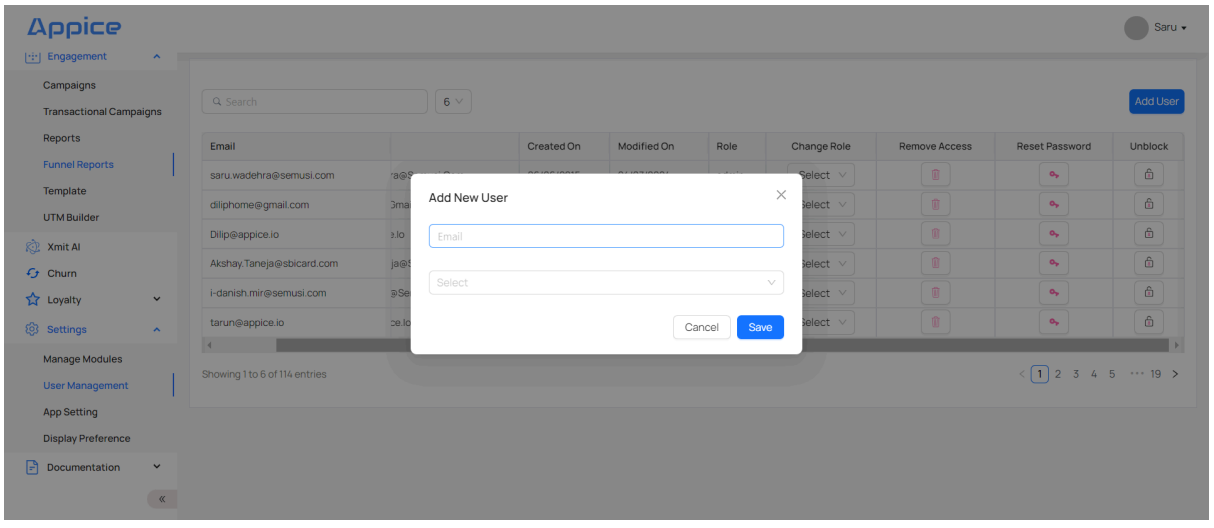


By default, Users are in Not Approved state. These can be Approved by clicking on the **Approved** button.

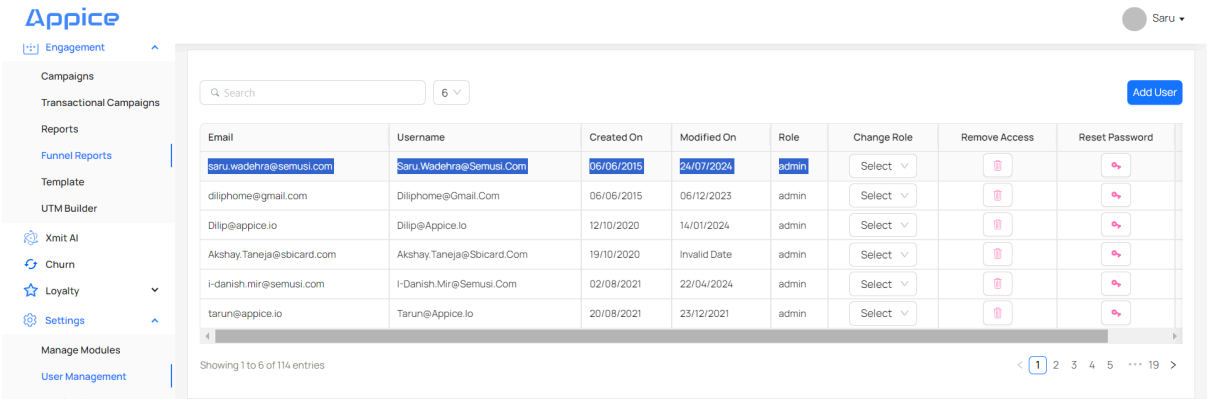
Admin can also assign App and roles to these Approved Users by clicking on the **Add User** button.



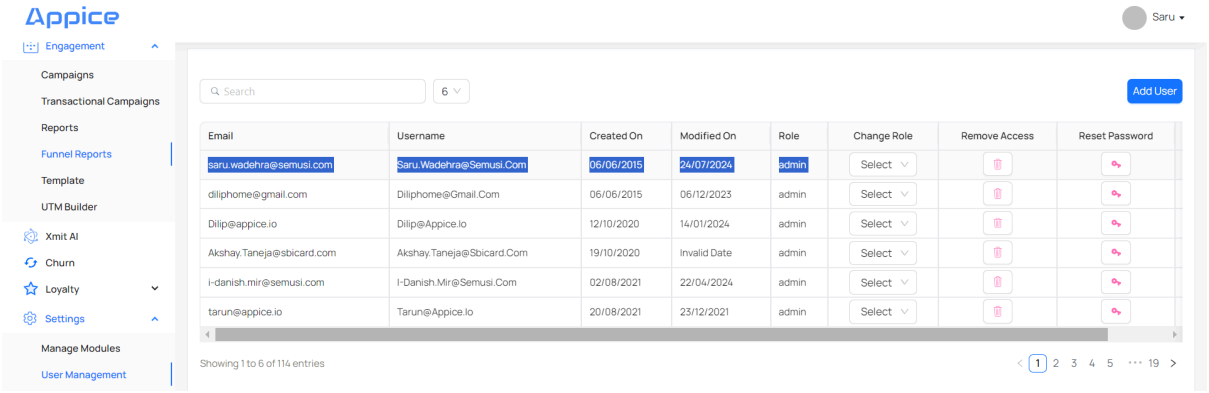
On clicking, it takes to this page where Email has to be provided and Role has to be selected from dropdown.



Click on **Save** button to save the users.



Newly created users can be seen in the Users List, as shown below.



NOTE: New users will not be assigned to any role, whereas existing users may/may not have roles assigned to them.

User Modification Process

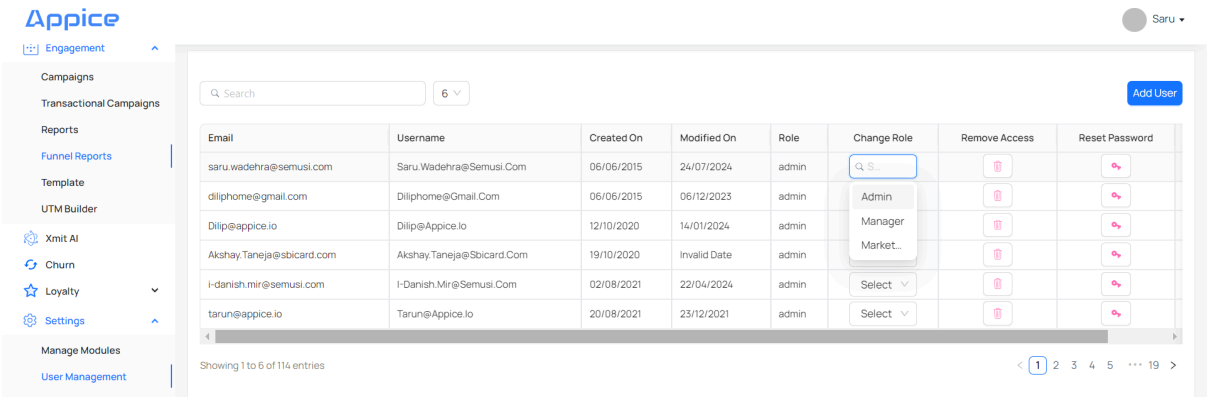
There are two types of modifications possible in Dashboard:

- Change Role
- Remove Access
- Change/Reset Password

i. Change Role

Users can only be modified by an Admin by logging into the account and going to **Settings** → **User Management** section.

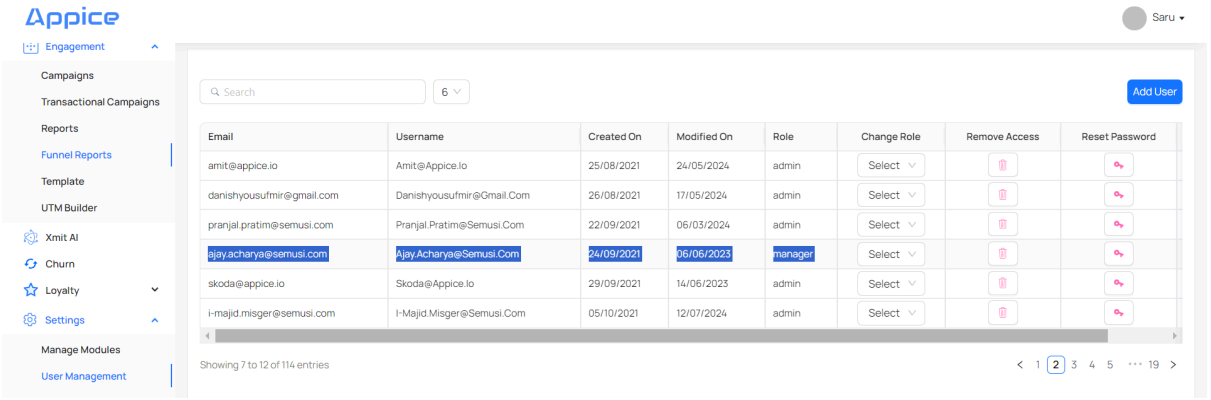
Click the **Change Role** dropdown for the specific User, for which role is to be modified.

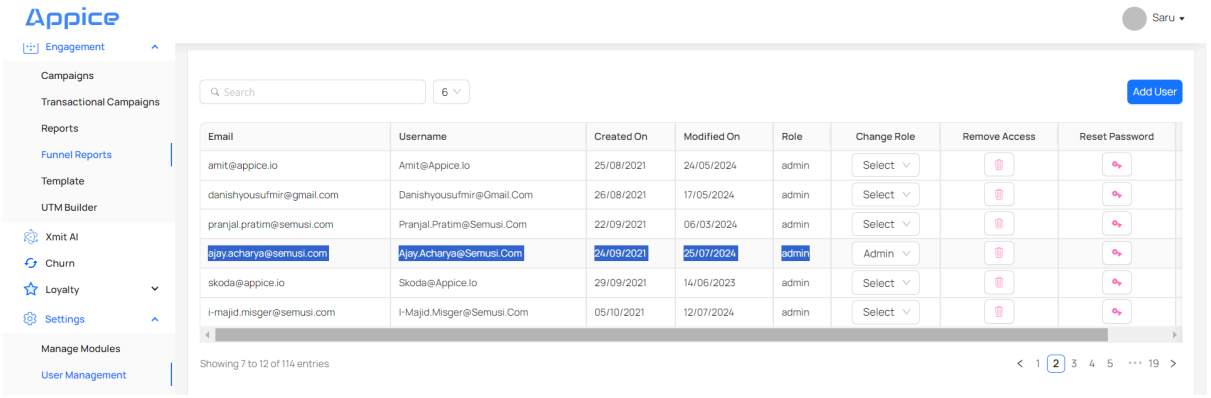


It shows 3 values in the dropdown - Admin, Marketer (or Maker), Manager (or Checker).

- Admin - who has all the rights (create users, create/edit/delete/activate campaigns, enable app settings)
- Marketer - who has rights to create/edit campaigns (also called as Maker)
- Manager - who has rights to create/edit/review/delete/activate campaigns (also called as Checker)

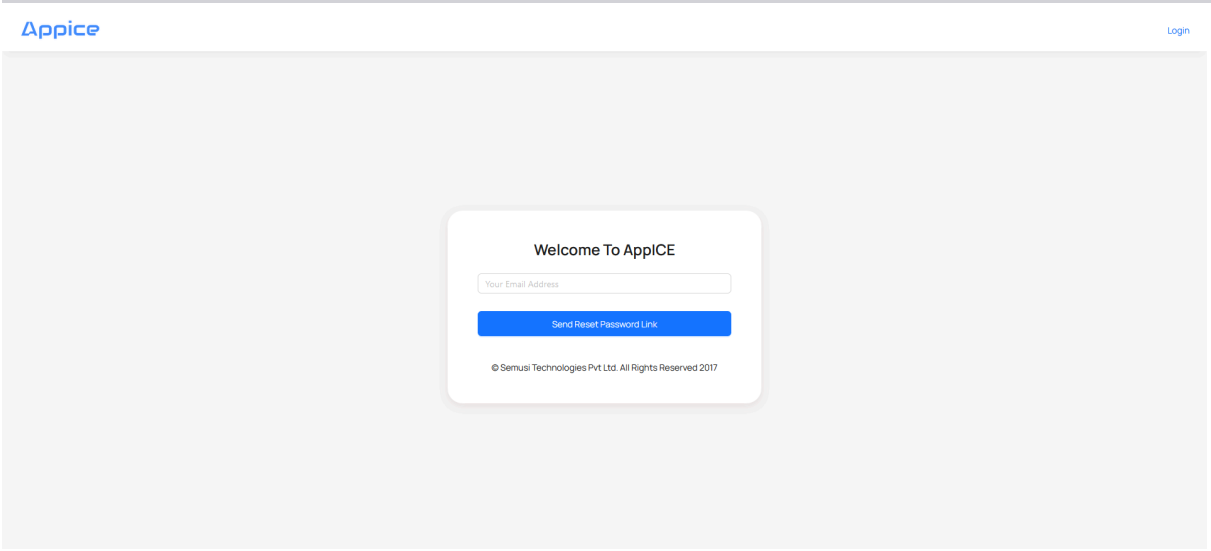
Change the value.



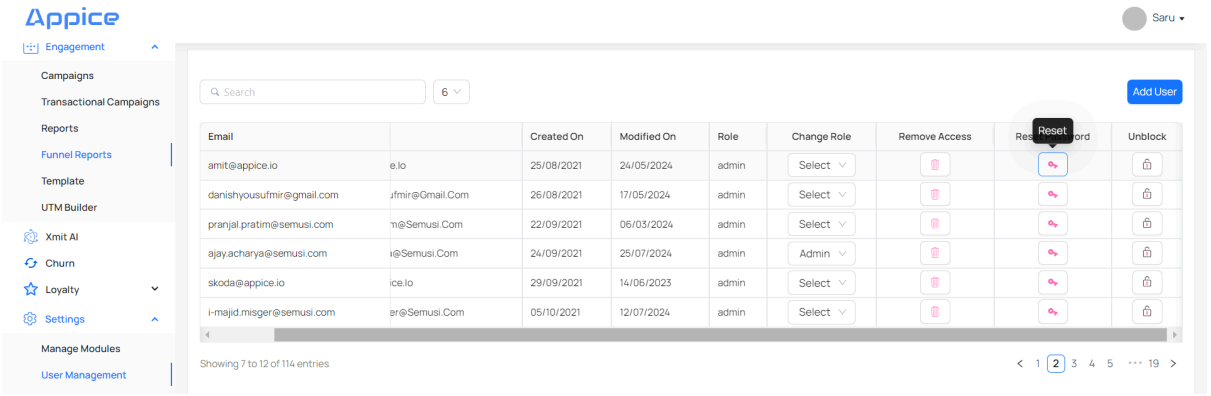


ii. **Forgot/Reset Password**

When the user clicks on Reset Password from the Appice panel, it will ask the user to put in an email ID to reset the password by clicking on link received on their email.

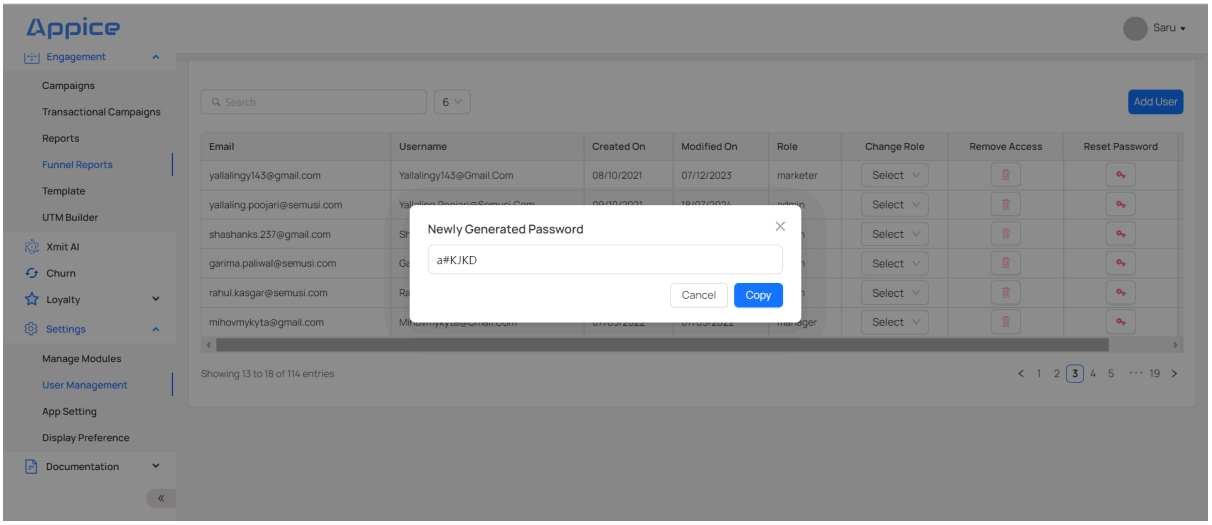


Passwords can also be reset by the Administrator by logging into the Appice panel.



On clicking the Reset icon, it generates a temporary password.

It asks to change the password upon 1st login.



Appice

Appice Security Architecture

We specifically address the sensitivity of data security.

AppICE aims to deliver a highly scalable on-premise platform with high availability, dependability, and the flexibility to enable peace of mind to our customers. AppICE understands that the confidentiality, integrity, and availability of our customers' data is vital to our customer's operations. AppICE recognizes customer Information is a valuable asset of our customers and that AppICE has a duty and responsibility to protect this data and to take steps to ensure that it safe and secure within the AppICE platform.

Security Compliance

AppICE works with an independent ISO 27001 certified security company who perform audits and guidance on the AppICE platform and its security controls. AppICE adopts the ISO 27001 framework as a guide for its security processes and procedures.

AppICE Security

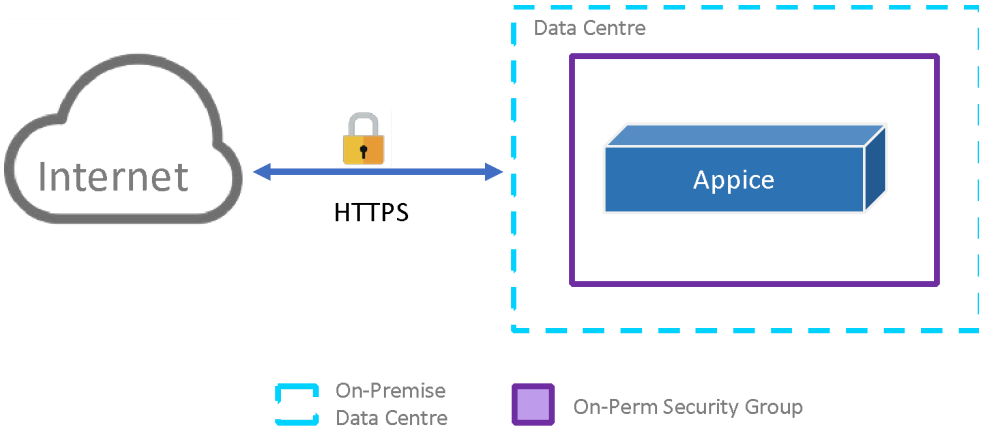
Ensuring the confidentiality, integrity, and availability of AppICE's platform and customer data is of the utmost importance to our customers and therefore to AppICE, so that it can maintain the trust and confidence of its customers.

Applications

All AppICE applications have been architected from the ground up with security as a top priority. Each application goes through rigorous unit, functional, integration and performance testing, to try to ensure it is fit for purpose.

Web Applications

All AppICE web applications are only accessible via HTTPS (HTTP over TLS formally SSL) along with a valid Username and Password combination with Two Factor Authentication where applicable. All access is logged and audited routinely.



APIs

APIs are available via HTTPS (HTTP over TLS formally SSL) protected endpoints that provide secure server to client communication. Basic API authentication credentials over HTTPS is required at all times. Credentials should be kept secret and all times and proper key management procedures should be followed when using them within client applications. See Figure 2 above.

Data Segregation

For operational efficiency, customer data is stored in a multi-tenant system. As described above, all API requests are authenticated using valid tenant credentials. All data is associated with a single tenant (i.e. customer), and access other than by the tenant associated with the data is forbidden. The authentication and authorization mechanisms are regularly tested and verified.

A tenant data is pinned to a region and the data is only replicated to different data centers within that region for redundancy and high availability, but no data will be ever transferred out of that region by AppICE (except for the case where you instruct us in writing to do so). See Figure 3 below for AppICE regions. This applies to Data in Flight and Data at Rest discussed later.

Data in Flight

All traffic entering and leaving AppICE's infrastructure is encrypted using industry standard HTTPS (HTTP over TLS formally SSL) and SSH protocols. This ensures that Man in the Middle attacks are not possible.

Hypertext Transfer Protocol Secure (HTTPS)

HTTPS (HTTP over TLS formally SSL) provides authentication of the web site/api and associated web servers that are being communicated with. AppICE blocks all HTTP connections and redirects traffic to the secure HTTPS endpoints.

Secure Shell (SSH)

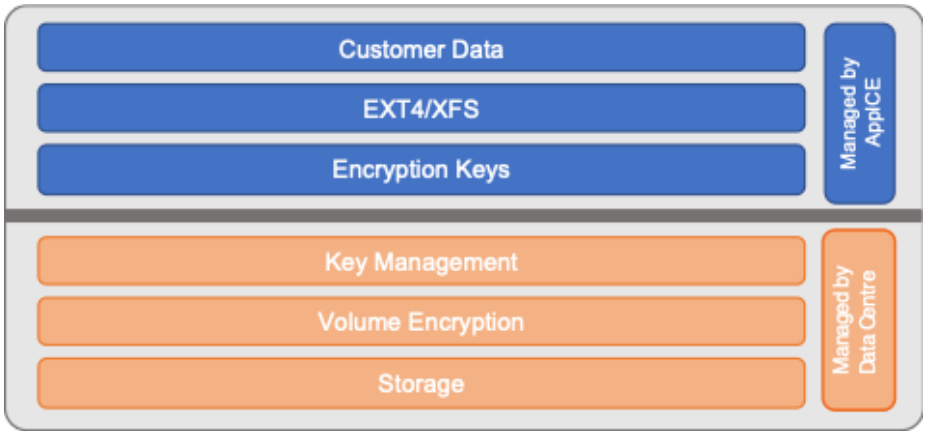
SSH is the only approach for establishing administrative connections to the platform's servers. SSH is a protocol that, like SSL, provides a secure communications channel between the client and the server. AppICE uses SSH version 2 with non-privileged user accounts. SSH access to all servers is securely routed through a central Bastion host.

Data at Rest

All data at rest is encrypted using industry standard Advanced Encryption Standard (AES) 256, a secure symmetric-key encryption standard using 256-bit encryption keys. The encryption keys are kept separate from the data such that in a case of a breach the data cannot be decrypted, as the keys are not stored at rest with the data.

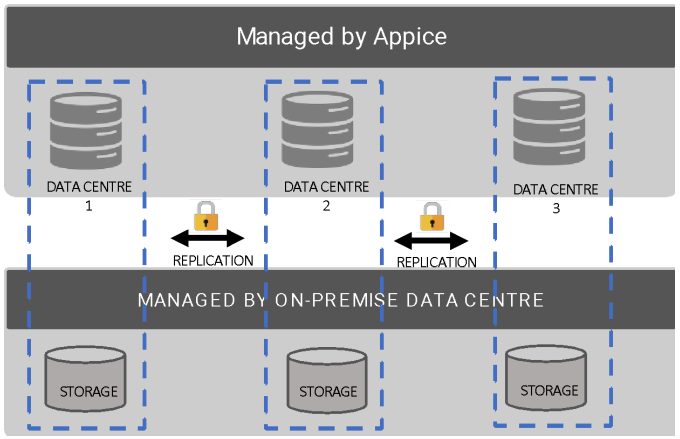
Volume Encryption

Each AppICE instance has local or network attached volume storage. To ensure utmost security, AppICE uses AES to encrypt this storage. This makes it inaccessible to anyone, even if the volume is cloned or physically removed from the data center.



Replication

All customer data held by AppICE is replicated to different data zones to prevent data loss, ensuring that the customer data is highly available, fault-tolerant, safe and secure.



Backup

AppICE uses AES to encrypt all backups similar to Figure 5 above. Each backup is replicated to two different storage facilities and kept for a set period of time.

Decommissioning of Data

AppICE follows strict procedures for decommissioning of data. Decommissioning of data can occur in several cases outlined below.

Termination of Contract

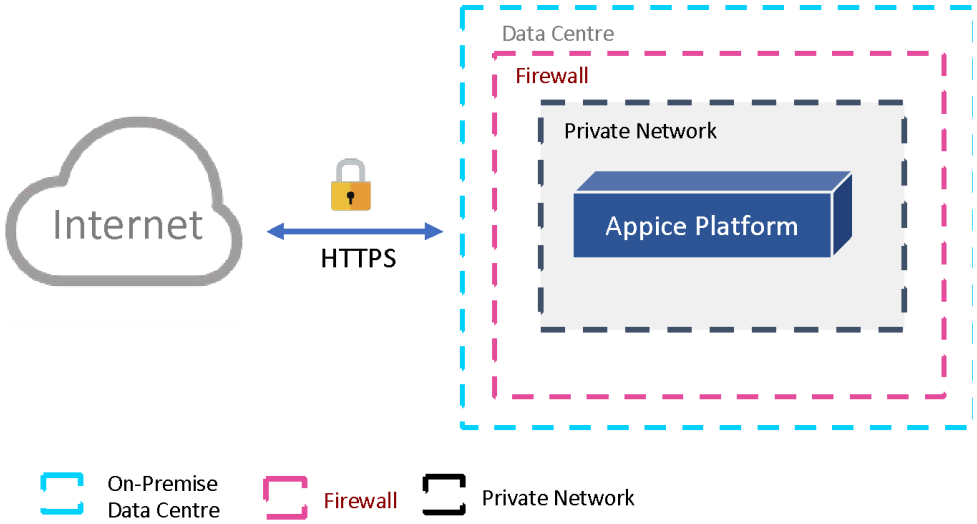
Depending on the terms of the customer contract, a copy of the customer's data will be made available to the customer. AppICE, on termination, will after a certain agreed time period, delete all customer data from its platform.

Server Replacement

When a server is replaced, the customer data stored in associated attached storage or the original server is no longer readable by anyone due to the fact that AppICE encrypts all volumes containing customer data.

Firewalls

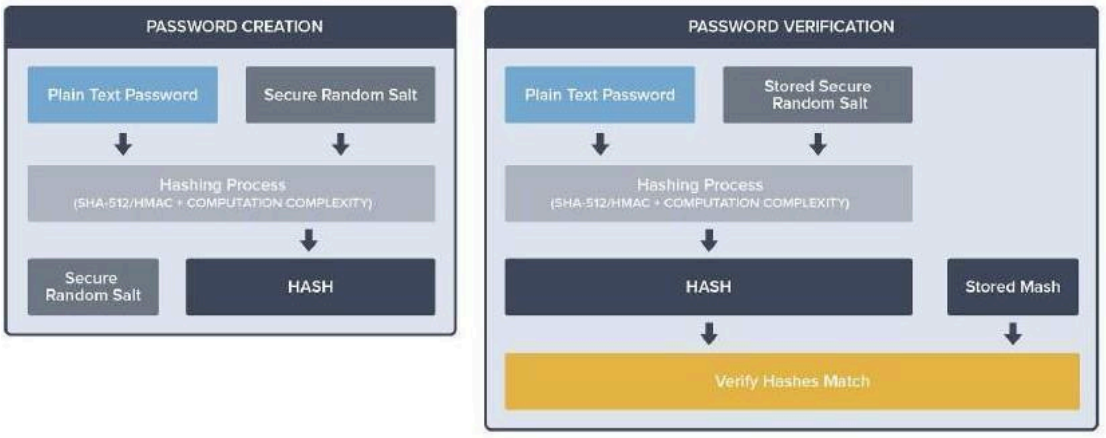
To prevent unauthorized users gaining privileged access to AppICE servers and planting malware or stealing data, AppICE utilizes On-Premise Providers Firewalls to restrict access to servers from trusted IP addresses and networks based on Classless Inter-Domain Routing (CIDR) and AppICE limits inbound traffic to specific ports and protocols and specify which IP addresses can have access.



CREDENTIALS

Passwords

All AppICE passwords are stored securely and never in plain text. AppICE uses High-entropy password security using SHA-512 and HMAC hashing algorithms with large, secure, randomly generated salts. Added computational complexity in hashing is used to make it cost prohibitive to breach even a single password. These measures prevent password hacking techniques such as brute force, rainbow table or birthday attacks



SSH Public/Private Key

All AppICE instances generate new SSH host keys, and trusted public keys are inserted under OS user accounts on first boot. The private keys are kept securely offsite. These public private keys are rotated periodically and only authorised users have access to them.

Two Factor Authentication

Highly sensitive applications require Two Factor Authentication, where users are required to enter their Username and Password as well as a one-time password that is generated using a keyring hardware device or software device.

OPERATING SYSTEMS

AppICE utilizes trusted industry standard Linux operating system, Ubuntu, with long term support. Each operating system is built and maintained in a secure and consistent manner ensuring that they all operate identically, and no rogue servers exist with different application or service packages installed.

Security Patches

There are always new versions, security patches, and upgrades to many components of each platform. AppICE where it is technically feasible will ensure operating systems are kept up to date with the latest versions, security patches and upgrades, ensuring operating systems are free from security vulnerabilities.

Distributed Denial of Service (DDoS) Attacks

Each operating system is by default closed to all traffic by the On-Premise Provider's firewall which is

set up to protect against Distributed Denial Of Service (DDoS) Attacks. It does not have a public facing IP address making it extremely difficult to access the instance from the internet.

Access

At all times, AppICE endeavour's to implement a minimum access necessary approach, where all employees and contractors (i.e. agency workers and individual contractors) have access only to those systems and data that is required for them to be able to do their jobs. Access is promptly revoked when this need no longer exists, even if they continue to be an employee of or are contracted to AppICE. SSH access to all servers is securely routed through a central Bastion host. All electronic access to systems by AppICE personnel is logged and audited routinely. See Security Architecture Overview above for more detail.

DevSecOps

DevSecOps is a set of practices that integrate security into the DevOps process. We ensure that security is not treated as an afterthought but as a fundamental part of CI/CD pipeline. Here are some best practices we follow for implementing DevSecOps using Jenkins, GitLab, and Docker:

- Security as Code:
  - Use version control systems like GitLab to manage infrastructure as code and security policies.
  - Store security configurations alongside application code and infrastructure code.
  - Employ tools like Terraform or Ansible to automate infrastructure provisioning securely.
- Static Application Security Testing (SAST):
  - Integrate SAST tools (e.g., SonarQube, Checkmarx) into your CI/CD pipeline to analyze source code for vulnerabilities.
  - Configure automated scans for code commits and pull requests.
- Dynamic Application Security Testing (DAST):
  - Use DAST tools (e.g., OWASP ZAP, Burp Suite) to scan your running applications for security issues.
  - Automate DAST scans in your pipeline to check for security vulnerabilities in the deployed application.
- Container Security:
  - Regularly scan Docker images for vulnerabilities using tools like Clair or Trivy.
  - Automatically block insecure images from being deployed in the CI/CD pipeline.
- Secrets Management:
  - Store and manage secrets securely using GitLab's Vault integration or Jenkins' secret management.
  - Avoid hardcoding secrets in configuration files or scripts.
- Access Control:
  - Implement fine-grained access controls in Jenkins and GitLab to limit who can perform certain actions.
  - Use Role-Based Access Control (RBAC) to manage user and group permissions.
- Vulnerability Management:
  - Continuously monitor and manage vulnerabilities identified by security tools.
  - Prioritize and remediate vulnerabilities based on their severity.
- Automated Compliance Checks:

  - Implement automated compliance checks to ensure that your infrastructure and application deployments meet security and compliance requirements.
- Logging and Monitoring:
  - Set up centralized logging and monitoring using tools like ELK Stack or Prometheus/Grafana.
  - Monitor for security events and anomalies in real-time.
- Incident Response Plan:
  - Develop and document an incident response plan to address security breaches or vulnerabilities.
  - Test the plan periodically to ensure it works effectively.
- Continuous Training and Awareness:
  - Train your development and operations teams on security best practices.
  - Foster a security-aware culture by conducting regular security awareness programs.
- Third-Party Dependencies:
  - Regularly update and patch third-party dependencies.
  - Monitor for security advisories related to libraries and packages you use.
- Security Testing Environments:
  - Maintain separate testing environments for security testing to avoid disruptions in the main development pipeline.
- Shift-Left Security:
  - Integrate security into the early stages of the development process to catch vulnerabilities as early as possible.
- Automated Remediation:
  - Implement automated remediation for common security issues, such as auto-fixing code vulnerabilities or rolling back deployments.
- Security Policy as Code:
  - Define security policies as code using tools like Open Policy Agent (OPA) and ensure they are enforced throughout the pipeline.
- Continuous Feedback and Improvement:
  - Gather feedback from security assessments and incidents to improve your DevSecOps practices continually.

DevSecOps is an ongoing process, and it requires continuous improvement and adaptation.

DevSecOps Tools

We use various tools available in the market to implement the DevSecOps practice , some of those are as follows.

- Hadolint: Docker file linter, validate inline bash, written in Haskell.
- GitSecret: Checks the any sensitive information sent to repository
- Checkov: To check the file following standard best security practice
- Trivy: To scan the vulnerabilities in image, file system
- Owasp: Penetration testing tool
- Falco: Runtime application self-protection
- ECR scanning: Inbuilt tool by AWS to check image vulnerability
- OWASP Dependency-Check: This tool scans your application's dependencies for known vulnerabilities. It can help you identify and update vulnerable third-party libraries.
- Snyk: Snyk is another tool for identifying and fixing vulnerabilities in open source dependencies. It integrates well with various CI/CD systems, including Jenkins.

- Clair Security Scanner: Clair is a vulnerability scanner specifically designed for container images. It can be used to scan Docker images for security issues, in addition to Trivy.
- Kube-bench: If you're using Kubernetes for container orchestration, Kube-bench can be used to check the security configuration of your Kubernetes clusters.
- Nessus or OpenVAS: These are popular vulnerability scanners that can be integrated into your pipeline to scan your infrastructure and applications for vulnerabilities.
- SonarQube: SonarQube is not only a code quality tool but also includes security scanning for code. It can be integrated into your pipeline to check for security vulnerabilities in your codebase.
- GitLab Container Scanning: GitLab provides its own container scanning features that can be integrated into your GitLab CI/CD pipeline to scan for container vulnerabilities.
- InSpec: InSpec is an open-source testing framework for infrastructure and applications. It can be used to automate security and compliance testing.
- Anchore Engine: Anchore is a container security and compliance platform that can be used to inspect, analyze, and certify container images for security and policy compliance.
- Security Orchestration, Automation, and Response (SOAR) Tools: Tools like Phantom or Demisto can be used to automate incident response and security tasks based on the findings of your security scanning tools.