

## **Part - I**

### **Case Studies & Guesstimates for Streaming Industries**

The streaming industry has revolutionized entertainment consumption, offering on-demand access to movies, TV shows, music, and live events. Its importance in today's digital age is underscored by the convenience and personalization it provides, allowing users to enjoy content anytime, anywhere, and on multiple devices. Streaming platforms eliminate the need for physical media, reducing distribution costs and broadening audience reach globally. The industry thrives on innovation, leveraging cutting-edge technology to enhance user experience, content recommendation, and streaming quality.

Data scientists play a pivotal role in shaping the streaming industry. Their expertise in data analytics enables platforms to understand viewer preferences, content consumption patterns, and engagement levels, leading to highly personalized recommendations. They optimize content delivery by analyzing network performance and predicting peak usage times, ensuring seamless streaming experiences. Data scientists also assist in content acquisition and production decisions by analyzing market trends and viewer demand, helping platforms invest in the most promising content. Additionally, they enhance subscription pricing strategies, combat churn through predictive modeling, and strengthen security measures to prevent account sharing and piracy. By leveraging data-driven insights, streaming platforms enhance customer satisfaction, maximize revenue, and stay competitive in an evolving digital landscape.

#### **Product Dissection**



#### **1. Platform Selection**

**Question:** Choose a leading platform from a domain related to the streaming industry. Justify your selection by discussing the platform's popularity, impact, and relevance in its industry.

**Answer: JioHotstar**

**Popularity:** JioHotstar, an innovative evolution of Disney+Hotstar, has rapidly established itself as a dominant force in India's digital entertainment sector. By leveraging Reliance Jio's robust telecom infrastructure and extensive user base, JioHotstar seamlessly delivers high-quality sports, movies, TV shows, and exclusive originals to millions of viewers.

- **Unmatched Sports Streaming:** Exclusive IPL, ICC tournaments, Premier League, F1, and more.
- **Massive Content Library:** Bollywood blockbusters, regional cinema, Hollywood collaborations (Disney, HBO, Warner Bros.).
- **Freemium Model:** Free ad-supported streaming + affordable premium plans.
- **Jio-Powered Reach:** Deep integration with Jio's telecom ecosystem ensures accessibility across India.
- **Localized Content:** Regional films, TV shows, and dubbed Hollywood content cater to a vast audience.

**Impact:** JioHotstar dominates India's OTT space by blending **sports, Bollywood, global content, and affordability**, making premium entertainment accessible to millions.

#### **Revolutionizing Sports Streaming:**

- Exclusive IPL & ICC Cricket World Cup rights transformed live sports consumption.
- **100 Cr plus concurrent viewers during the WTC 2025 Final** set new records.
- Free mobile streaming democratized cricket viewership.
- Expanding beyond cricket—Premier League, F1, Pro Kabaddi, Tennis.

#### **Bollywood & Regional Content Powerhouse:**

- **Largest Bollywood Library** with blockbuster premieres.
- Early digital releases drive premium subscriptions.
- Strong presence in **regional languages (Tamil, Telugu, Bengali, Marathi, Malayalam)** caters to Tier 2 & 3 cities.

#### **Hollywood Tie-Ups & Global Expansion:**

- Exclusive **Disney, HBO, Warner Bros.** content (Marvel, Star Wars, Game of Thrones).
- Dubbed Hollywood films with AI-driven personalized recommendations expand reach.

#### **The Jio Effect – Affordable & Inclusive OTT**

- Deep integration with Jio Fiber, prepaid, postpaid plans boosts accessibility.
- **Freemium model (free + premium)** outperforms Netflix & Prime Video.
- Adaptive streaming with AI-powered content discovery enhances the user experience.

**Relevance:** The Increasing Demand for Affordable OTT Services in India & JioHotstar's Role in Jio's Ecosystem, The Indian OTT market is experiencing unprecedented growth, driven by affordable data, increasing smartphone penetration, and a shift towards digital entertainment. JioHotstar has capitalized on this demand, leveraging Jio's telecom ecosystem to make premium content affordable and accessible to millions.

### ***Rising Demand for Affordable OTT Services in India***

- India's OTT user base is expected to reach 500+ million by 2026.
- Over 70% of digital video consumption comes from mobile users in Tier 2 & Tier 3 cities.
- *Consumers prefer affordable or ad-supported streaming platforms over high-cost global players like Netflix.*

### ***Jio's Data Revolution – The Catalyst for OTT Boom***

- The 2016 Jio revolution made high-speed internet widely available at ultra-low costs.
- India now has the world's cheapest mobile data, enabling mass adoption of streaming platforms.  
Affordable Jio 5G & fiber further boost high-definition content streaming, even in rural areas.

### ***Shift Towards Budget-Friendly & Freemium OTT Models***

- 80% of Indian OTT viewers prefer free or low-cost services over expensive subscriptions.
- Ad-supported AVOD (Advertising Video On Demand) and freemium models are growing rapidly.

### **Competitive Advantage Over Global OTT Players**

#### **Affordable Subscription Plans for the Indian Market**

- JioHotstar's freemium model and competitive pricing outperforms Netflix & Amazon Prime.
- Ad-supported free tier brings in millions of new users without upfront cost.
- Premium plans remain budget-friendly, making it the go-to choice for Indian consumers.

### ***Dominance in Sports and Entertainment Combo***

- Global platforms lack live sports, while JioHotstar owns exclusive IPL & cricket rights.
- The combination of sports, Bollywood, international hits makes it India's most complete OTT platform.

## 2. Core Features and Functionalities

- 1) **Regional Content:** India is known for its linguistic and cultural diversity, JioHotstar offers over 10 languages, Including 8 indian languages. Additionally to attract japanese and k-drama enthusiasts they have included japanese and korean language support which eventually makes them a major player in this competitive industry.
- 2) **Low or No Cost Premium:** After acquisition of jio, subscription costs for jio network users have become significantly lower. During IPL seasons, Users often get free access or heavily discounted plans which allows them to access premium contents at minimal or no cost.
- 3) **Wide Range of Products:** They offer a diverse range of contents including:
  - Tv shows
  - Movie
  - Live Sports
  - Cartoons

This variety attracts users across different needs, increasing its overall viewership.

- 4) **Strong Studio Partnerships:** Jio Hotstar collaborates with leading global studios such as:
  - HBO
  - Disney
  - Start network
  - Peacock
  - Marvel

This partnership enhances the platform's premium content and makes it a global go-to streaming platform for audiences worldwide.

- 5) **Live Channel:** JioHotsar set industry benchmarks by popularizing live streaming of sports, Tv shows and Serials in India. This feature allows users to watch content in real time, even while travelling which increases convenience and engagement.
- 6) **Impact on IPL:** JioCinema and Hotstar have played a significant role in shaping the IPL live-streaming experience. The first season of IPL to be live-streamed on an app was in 2015, and Hotstar was the sole platform broadcasting the matches.

In the 2023 IPL streaming rights auction, JioCinema secured the rights, marking a major shift in the digital broadcasting landscape. Following the merger of JioCinema and Hotstar, they collectively won the auction for ₹23,758 crore. As a result, IPL streaming is now available at little to no cost on their platform, revolutionizing how fans access live cricket content.

- 7) **Multi-Profiles Support:** Userscan create upto 7 profiles under a single hotstar subscription, Making it a cost effective and family friendly option.

- 8) **Kids Space:** Dedicated kids space profile allowing parents to create a child friendly environment. This ensures kids are only accessing contents allowed for their age groups which acts as a virtual wall from inappropriate materials.
- 9) **Advanced Recommendation System:** JioHotstar leverages AI-driven recommendation algorithms to personalize content suggestions based on user preferences. This enhances the user experience, keeping viewers engaged and encouraging longer watch times.

## Contribution to Success and User Engagement

1. **Enhanced User Experience:** JioHotstar's advanced recommendation system and high-quality contents significantly enhance user experience, keeping viewers engaged and encouraging them to return to the platform.
2. **Continuous Content Updates:** The platform regularly produces and releases new series ensuring that users always have new content to watch. This helps maintain audience interest and engagement.
3. **Integration with Star Network:** Star network has a strong legacy in Indian television, with a loyal audience for its shows and series. By making older Star Network series available on JioHotstar, the platform builds an emotional connection with its users, strengthening customer loyalty.
4. **Best in Class User Interface(UI):** Their smooth and intuitive UI makes navigation seamless, allowing users to interact effortlessly with videos. This improves engagement and increases time spent on the platform.
5. **Filter Options:** User can filter content Based on:
  - Genres
  - Ratings
  - Studios
  - Languages
  - Sport categories

This helps viewers quickly find content that matches their preference, Improving overall satisfaction.
6. **Brand Loyalty and Customer Retention:** After Jio's acquisition, JioHotstar became a part of one of India's most influential brands. This association boosted brand loyalty, attracting a wider audience and ensuring strong customer retention.

These user-Centric features makes JioHotstar stand out among numerous streaming platforms in the industry. By continuously improving its platform, it ensures high user engagement and long-term success.

### 3. Real World Problems Solved By JioHotstar

#### 1. Affordable Pricing Concerns

**Problem:** Premium entertainment was previously inaccessible to many due to high subscription costs of traditional TV and global streaming platforms.

**Solution:** JioHotstar offers a freemium model where users can access ad-supported content for free, while paid plans remain affordable compared to competitors. Mobile-specific and regional pricing further reduce costs, ensuring that users from all financial backgrounds can enjoy premium content without a significant financial burden.

#### 2. Content Diversity

**Problem:** Many streaming services primarily focused on Bollywood and Hollywood content, neglecting niche genres and regional audiences.

**Solution:** JioHotstar has built a vast content library that includes Bollywood, Hollywood, regional cinema, documentaries, web series, and exclusive originals. By collaborating with multiple studios and production houses, the platform ensures a rich mix of entertainment, education, and infotainment, catering to different audience interests.

#### 3. Enhancing Language Accessibility and Regional Content Reach

**Problem:** A significant portion of the Indian audience faces difficulties understanding English-dominated content, limiting accessibility. Additionally, regional filmmakers and content creators struggle with nationwide distribution, restricting their reach and revenue potential.

**Solution:** JioHotstar addresses these challenges by offering multilingual dubbing, subtitles, and AI-powered recommendations based on language preferences, ensuring content is easily consumable in Tamil, Telugu, Malayalam, Bengali, and other regional languages. Furthermore, the platform actively acquires and produces regional movies and web series in languages like Tamil, Telugu, Malayalam, and Marathi, providing a stage for local creators to showcase their work to a national and global audience. This approach not only enhances accessibility for diverse linguistic audiences but also boosts regional cinema, enriching the platform's content diversity.

#### 4. Sports Events Accessibility

**Problem:** Live sports events, especially cricket and football, were traditionally available only through expensive TV subscriptions, limiting accessibility for many fans.

**Solution:** JioHotstar has transformed sports streaming by offering free live coverage of major events like the IPL, Cricket World Cup, and FIFA World Cup. Additional features like multi-camera views, real-time statistics, and expert commentary enhance the experience, making sports more immersive and engaging for viewers.

## 5. Scalability Challenge in Streaming Platforms

**Problem:** During high-demand events like the Cricket World Cup, the number of viewers can surge dramatically. Such massive spikes in traffic can lead to buffering, crashes, or service disruptions if the platform is not built to handle extreme loads efficiently.

**Solution:** JioHotstar has built a highly scalable streaming platform to handle massive traffic surges, ensuring a smooth viewing experience even during peak events. It successfully managed **60 crore (600 million) views** during an **India vs. Pakistan** match using **cloud-based infrastructure, adaptive bitrate streaming, CDNs, and AI-driven traffic management**. These technologies dynamically scale servers, optimize video quality, and balance traffic loads, ensuring **low-latency, high-quality streaming** for millions of users.

### How JioHotstar Addresses These Problems

- Offers a freemium model with free ad-supported content and affordable subscription plans, ensuring premium entertainment is accessible to all.
- Provides a vast library including Bollywood, Hollywood, regional cinema, and web series, collaborating with studios for exclusive originals and niche genres.
- Supports multilingual dubbing, subtitles, and AI-powered recommendations, making content accessible in Tamil, Telugu, Malayalam, Bengali, and other Indian languages.
- Offers free live streaming of major events like IPL, Cricket World Cup, and FIFA World Cup, with multi-camera angles, real-time stats, and expert commentary.
- JioHotstar handled **60 crore views** during an **India vs. Pakistan match** using **cloud scaling, adaptive streaming, CDNs, and AI-driven traffic management** to ensure seamless, high-quality streaming.

These features and functionalities collectively address significant real-world problems, contributing to JioHotstar success and high user satisfaction.

# Database Management & Schema Design

## 4. Schema Design

The schema design for **Jio Hotstar** should reflect its core features and functionalities, ensuring efficient data management and enabling the platform to deliver a seamless user experience. Below is an overview of the key entities, attributes, and relationships:

### Key Entities and Attributes

Designing a database schema for a platform like Jio Hotstar (now part of Disney+ Hotstar) involves considering several key entities related to media streaming. A streaming platform typically includes users, content, subscriptions, payments, and user activity. Here's a simplified schema design for such a platform, including the main entities and their relationships.

#### 1. Users Table

This table stores details about users

Column Name	Data Type	Description
id	integer	Primary key, Unique user identifier
username	varchar	User's full name
email	varchar	User's email id
role	varchar	Role of the user
profile_picture_url	varchar	Link to user profile picture
bio	text	User Bio
date_of_birth	date	User date of birth
created_at	timestamp	Date and time when user joined

#### 2. Content Table

This table stores information about media content such as movies, Tv shows.

Column Name	Data Type	Description
id	integer	Primary key, Unique content identifier
title	varchar	Title of the movie or show
type	varchar	Type of content
genre	varchar	Genre of the content
created_at	timestamp	Date and time the content got published



### 3. Subscriptions Table

This table stores user subscription details

Column Name	Data Type	Description
id	integer	Primary Key, unique subscription identifier
user_id	integer	Foreign key, User who subscribed
plan_id	integer	Foreign key, plan that was choosed
start_date	timestamp	subscription start date and time
end_date	timestamp	subscription end date and time

### 4. Plans Table

This table defines different subscription plans available for users

Column Name	Data Type	Description
id	integer	Primary Key, unique plan identifier
plan_name	varchar	name that describes the plan
plan_type	varchar	type of the plan
plan_price	decimal	price of the plan
end_date	timestamp	subscription end date and time

### 5. Payments table

This table tracks the payment made by users

Column Name	Data Type	Description
id	integer	Primary key, Unique payment identifier
user_id	integer	Title of the movie or show
type	varchar	Type of content
genre	varchar	Genre of the content
user_id	integer	Foreign Key, user who accessed the content
created_at	timestamp	Date and time the content got published

### 6. Content Reviews Table

This table stores ratings for content provided by users

Column Name	Data Type	Description
content_id	integer	Primary Key, unique review identifier
user_id	integer	Foreign key, user who gave the review
review_text	text	review provided by user
rating	integer	rating provided by user
created_at	timestamp	date and time the review was added

## 7. Watch History table

This table stores the watch history of users for content they have already watched.

Column Name	Data Type	Description
user_id	integer	Foreign key, user who watched the content
content_id	integer	Foreign key, content that was watched
watched_at	integer	date and time the content got watched

## 8. Recommendations Table

This table stores content recommended for users.

Column Name	Data Type	Description
recommendation_id	integer	Primary key, Unique identifier for recommendation
user_id	integer	Foreign Key, user who got the recommendation
content_id	integer	Foreign key, content that was recommended
recommended_at	timestamp	date and time the content got recommended

## 9. Follows Table

This table stores followers and who they are followed by

Column Name	Data Type	Description
following_user_id	integer	ForeignKey, User who is following
followed_user_id	varchar	ForeignKey, User who gets followed
created_at	timestamp	Date and time when user started followed

## 10. User Interactions Table

This table track users interactions with content

Column Name	Data Type	Description
inetraction_id	integer	Primary Key, unique inetraction identifier
user_id	integer	Foreign Key, unique interaction identifier
content_id	integer	Foreign Key, content which was interacted
rating	integer	Ratings provided by user
like_status	boolean	Liked or not
interaction_date	timestamp	Date and time the interaction occurred

## 11. Ads Table

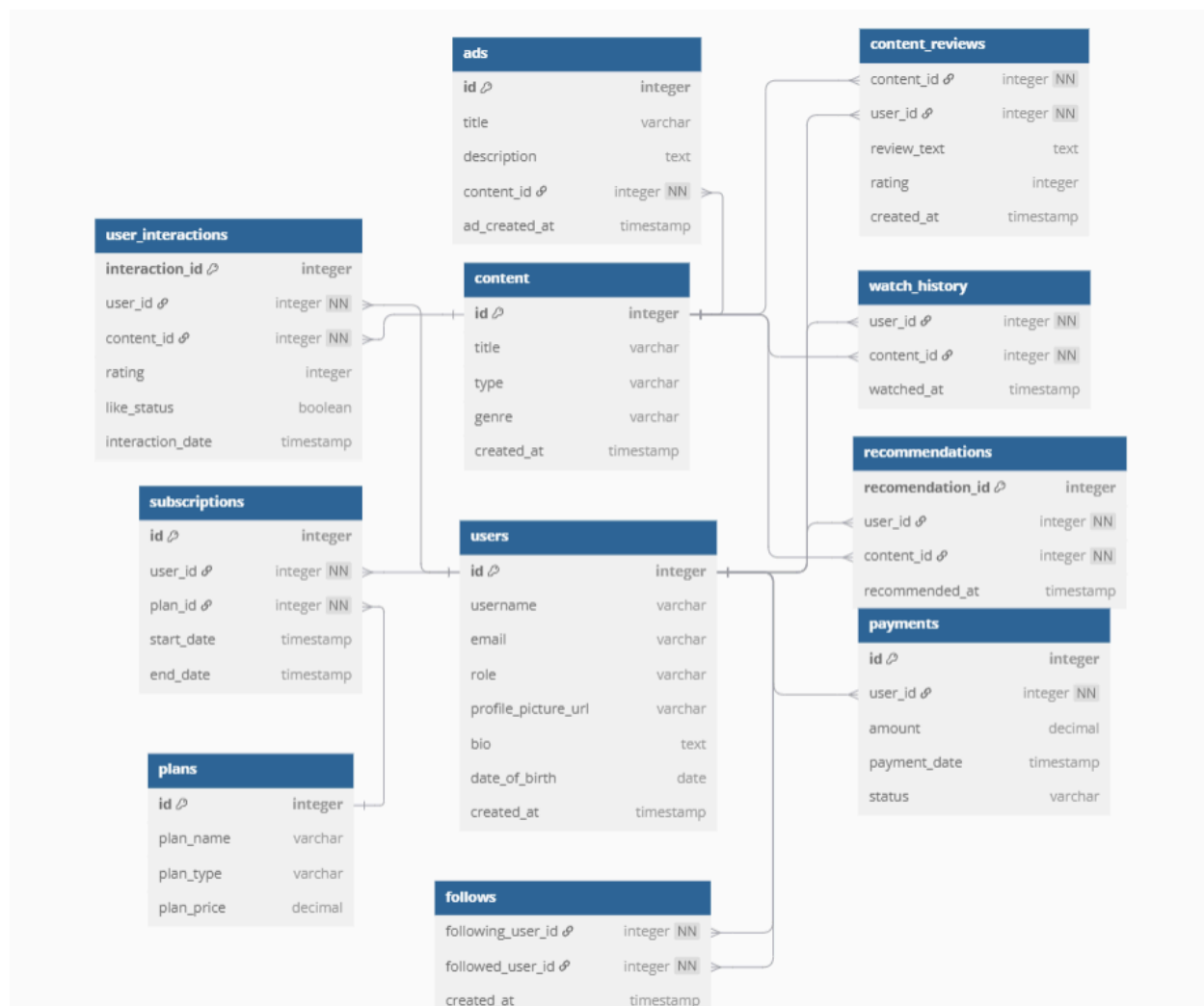
This table tracks details related to ads

Column Name	Data Type	Description
id	integer	Primary Key, unique ads identifier
title	varchar	title of the ad
description	text	description of the ad
content_id	integer	Foreign key, content which ad gets popped
ad_created_at	timestamp	date and time the ad was shown

To visualize the relationships between the various tables in a **streaming platform database schema**, we can create a **schema relationship table** that outlines how the tables are linked via foreign keys and references

Table Name	Relate Table	Relationship Type	Foreign Key(s)
users	user interactions	One to many - One user can make many interactions	id -> user_id
users	subscriptions	One to many - One user can make many subscriptions	id -> user_id
users	follows	One to many - One user can follow many users	id -> following_user_id
users	follows	One to many - One user can be followed by many users	id -> followed_user_id
users	content_reviews	One to many - One user can give multiple reviews	id -> user_id
users	watch_history	One to many - One user can view many contents	id -> user_id
users	recommendations	One to many - One user can get many recommendations	id -> user_id
users	payments	One to many - One user can make several many payments	id -> user_id
content	user_interactions	One to many - A content can be interacted many times	id -> content_id
content	content_reviews	One to many- A content can get many reviews	id -> content_id
content	watch_history	One to many- A content can get many reviews	id -> content_id
content	recommendations	One to many - A content can be recommended many times	id -> content_id
plans	subscriptions	One to many - A plan can be subscribed many times	id -> plan_id
ads	content	Many to one - Many ads can be played on one content	content_id -> id

## 5. ER Diagram Creation



## **Revenue and Profit Growth Strategies**

**Question:** After completing the product dissection and schema design steps for the chosen platform, conduct a comprehensive case study on the above chosen industry. Your goal is to identify and propose strategies to increase the **profit of the industry by at least 25%**.

JioHotstar stands in a strong position in the Indian OTT market due to its vast content library, particularly its dominance in live sports with IPL, and its integration with Jio's extensive telecom network. To achieve a 25% profit growth, a multi-pronged strategy focusing on optimizing revenue streams and enhancing cost efficiency is recommended.

### **Revenue Growth Recommendations:**

- **Strategic Price Optimization:** Implement a moderate price increase (e.g., 10-15%) for the Premium tier, coupled with highlighting the ad-free experience and 4K streaming quality. Conduct thorough market research to assess price elasticity before implementation.
- **Refine Advertising Strategy:** JioHotstar can persuade advertisers to pay more by emphasizing that TV networks charge ₹10-15 crore for a 10-second IPL ad, while Hotstar offers a more cost-effective, targeted, and measurable advertising opportunity with massive digital reach.
- **Active Pursuit of Partnerships:** Expand partnerships with telecom operators beyond Jio to offer bundled subscriptions. Explore collaborations with other Reliance Group companies for cross-promotional opportunities and exclusive content bundles. Partner with content creators and studios to secure exclusive content windows, especially in regional languages.
- **Expand Content Investment:**
  - **Invest Heavily in Regional Content** – Given strong user preference, significantly increase investment in acquiring and producing high-quality original content in key **regional languages** like **Tamil, Telugu, Bengali, and Marathi** to attract and retain a broader audience across India.
  - **Leverage the Booming Indian Anime Market** – With the Indian anime market valued at **\$1,855.4 million in 2024** and projected to reach **\$5,036.0 million by 2032** at a **13.3% CAGR**, JioHotstar can introduce **anime content, collaborations, and dubbing initiatives** to tap into this growing audience.
  - **Live Event Monetization** – Offer Pay-Per-View (PPV) or premium access for high-demand events like **IPL, World Cup, and concerts**.
  - **Gamification & Social Engagement** – Introduce in-app predictions, fantasy leagues, or interactive live chats to boost engagement.

## Cost Reduction Recommendations:

- **Data-Driven Content Acquisition:** Implement a robust content analytics framework to track the performance of all content on the platform. Use these insights to prioritize investment in popular content and reduce spending on underperforming titles.
- **Reduce Auction Spend:** JioHotstar can reduce auction spending by adopting a strategic bidding approach, ensuring they don't overpay for streaming rights. In the 2023 auction, they secured rights for double the amount quoted by the competitor, leading to unnecessary financial strain. A smarter strategy involves setting a clear bidding limit, analyzing market trends, and leveraging exclusive content partnerships to retain viewers without overspending.
- **Negotiate Strategic Licensing Agreements:** Leverage JioHotstar's market position to negotiate more favorable long-term licensing agreements with content providers, potentially exploring revenue-sharing models where feasible.
- **Focus on Original Content Production:** Gradually increase the proportion of original content in the library. While requiring upfront investment, original content offers better long-term cost control and potential for licensing revenue in the future. Prioritize genres that resonate with the Indian audience, such as drama, crime, and regional stories.
- **Optimize Technology Infrastructure:** Continuously evaluate and optimize the streaming technology and infrastructure to reduce bandwidth consumption and delivery costs. Explore the latest advancements in video encoding and CDN management.
- **Enhance Customer Retention:** Focus on improving the overall user experience through platform enhancements, high-quality streaming, and excellent customer support. Implement personalized content recommendations to increase user engagement and reduce churn, thereby lowering customer acquisition costs.

## Roadmap:

1. **Phase 1 (3-6 months):** Conduct detailed market research on price sensitivity and regional content preferences. Optimize advertising strategies with a focus on targeting and innovative formats. Initiate negotiations for more favorable long-term licensing agreements.
2. **Phase 2 (6-12 months):** Introduce the "Sports Premium" tier and explore potential content bundling with other Jio services. Increase investment in original regional content production. Begin a pilot program for partnerships with non-Jio telecom operators.
3. **Phase 3 (12-18 months):** Evaluate the performance of new initiatives and refine strategies based on data. Further optimize technology infrastructure for cost efficiency. Explore expansion opportunities in international markets with a significant Indian diaspora.

Continuous monitoring of key performance indicators (KPIs) such as subscriber growth, churn rate, ARPU, advertising revenue, and content consumption patterns is crucial. Regular data analysis will enable JioHotstar to adapt its strategies and ensure it remains on track to achieve its profit growth objectives in the evolving Indian OTT market.

## **Conclusion:**

Achieving a 25% profit growth for JioHotstar is attainable through a strategic combination of revenue enhancement and cost optimization. By carefully adjusting subscription pricing, introducing targeted premium offerings, refining advertising strategies, pursuing strategic partnerships, and investing in popular regional content, JioHotstar can significantly boost its revenue. Simultaneously, focusing on data-driven content acquisition, negotiating favorable licensing deals, increasing original content production, optimizing technology infrastructure, and enhancing customer retention will contribute to substantial cost savings. The Indian OTT market presents both immense opportunities and intense competition. JioHotstar's ability to remain agile, adapt to evolving user preferences, and make data-informed decisions will be crucial in realizing its profit growth potential and solidifying its position as a leading player in the Indian streaming landscape.

## PART - II

### Guesstimates

**1. What will be the percentage increase in global streaming service subscriptions over the next five years?**

Step	Details	Calculation
Global Subscriptions (2025)	Estimated global streaming service subscriptions in 2025	2.0 billion (Assumed growth from 2024)
Annual Growth Rate	Estimated average growth rate per year	10% (0.1)
Future Subscriptions (2030)	Projected subscriptions in 2030 using compound growth	$2.0B \times (1.1)^5 = 3.22 \text{ billion}$
Increase in Subscriptions	Difference between future and current subscriptions	$3.22B - 2.0B = 1.22 \text{ billion}$
Percentage Increase	Growth percentage over five years	$(1.22B / 2.0B) \times 100 = 61\%$
Final Estimate	Total estimated percentage increase	~60-65%

So, the estimated percentage increase in global streaming subscriptions from 2025 to 2030 is approximately **60-65%**.

**2. How many hours of content will the average person consume per week through digital platforms in 2025?**

Step	Details	Calculation
Global Digital Users (2025)	Estimated number of internet users worldwide	5.3 billion (Projected)
Average Daily Consumption	Estimated daily hours spent on digital content	6 hours/day (includes streaming, social media, etc.)
Weekly Consumption	Multiply daily hours by 7 days	$6 \times 7 = 42 \text{ hours/week}$
Streaming vs. Other Digital Content	Estimate 50% of this time is spent on streaming platforms	$42 \times 0.5 = 21 \text{ hours/week}$ (streaming content)
Final Estimate	Total weekly hours spent on digital content	~42 hours/week (total), ~21 hours/week (streaming)

In 2025, the average person is expected to consume **~42 hours** of digital content per week, out of which **~21 hours** will be from streaming services like Netflix and other OTT platforms.



### 3. What will be the market share of virtual reality (VR) and augmented reality (AR) entertainment experiences in the next decade?

Step	Details	Calculation
Global Entertainment Market (2025)	Estimated total entertainment industry revenue	\$2.5 trillion (Includes streaming, gaming, etc.)
VR/AR Market (2025)	Estimated VR/AR entertainment market size	\$50 billion
Annual Growth Rate	Projected CAGR for VR/AR entertainment	20% per year
VR/AR Market (2035)	Future market size using compound growth formula	$\$50B \times (1.2)^{10} = \sim \$309 \text{ billion}$
Global Entertainment Market (2035)	Estimated total entertainment industry size	\$4 trillion (Assumed 5% annual growth)
Market Share (2035)	VR/AR share in total entertainment market	$(\$309B / \$4T) \times 100 = \sim 7.7\%$

By 2035, Virtual Reality (VR) and Augmented Reality (AR) entertainment experiences are expected to capture **~7-8%** of the global entertainment market, amounting to around **\$300 billion** in revenue.

### 4. How many new films and TV shows will be produced globally per year by 2030?

Step	Details	Calculations
Current Annual Film & TV Production (2024)	Estimated number of films and TV shows produced globally in 2024	1) Films: ~7,000
		2) TV Shows: ~10,000
		Total: ~17,000
Annual Growth Rate	Estimated growth rate based on industry trends, streaming services expansion, and demand rise	Films: 4% per year TV Shows: 6% per year
Projected Production by 2030	Using compound growth formula: Projected Output = Current Output $\times (1 + \text{Growth Rate})^n$ (n = 6 years)	1) Films: $7,000 \times (1.04)^6 = 8,859$ 2) TV Shows: $10,000 \times (1.06)^6 = 14,188$
Total Estimated Production (2030)	Number of films and TV shows produced globally by 2030	Films: ~8,859
		TV Shows: ~14,188
		Total: ~23,000
Final Estimate	Final Estimated total	~23,000

By 2030, globally we can expect approximately **23,000** Films and TV shows cumulatively, in which **8859** as Films and **14188** as TV Shows.

### 5. What percentage of global box office revenue will be generated by international markets in the next five years?

Step	Details	Calculations
Global Box Office Revenue Yearly	Total Box Office Revenue on 2024	1) U.S and Canada - 8.56 Billion 2) International Market - 23.74 Billion  Total - 32.3 Billion
International market spread	Market share on global market	1) U.S and Canada - 26.5% 2) International Market - 73.5%
Annual growth shift	Annual growth shift from first category to second Historically, International market have increased their share by 1-2% annually, while U.S and Canada has seen a corresponding decline	1) U.S and Canada - (-1.5%) 2) International Market - (+1.5%)
Contribution by 2029	After shifting 1.5% on average the international share	1) U.S and Canada - 26.5% - (1.5%*5) = 19% 2) International Market - 73.5% + (1.5%*5) = 81%
Projected Revenue on both category	Revenue on both category by 2029, using formula Projected revenue = current revenue*(1+ Historical revenue Growth) <sup>n</sup>	1) U.S and Canada : 8.56*(1.03) <sup>5</sup> = 9.92 Billion 2) International Market : 23.74*(1.08) <sup>5</sup> = 34.87 Billion
Projected revenue at 2029	Total box office revenue at 2029	1) U.S and Canada - 9.92 Billion 2) International Market - 34.87 Billion  Total - 44.79 Billion
Final calculation	Overall percentage on growth	(44.79-32.3)*100/32.3 = 38.7%

As per this guesstimate we can conclude that by 2029 the annual projected score will be approximately **\$44.79 Billion** which is **38.7%** higher than 2024. The contribution from the U.S and Canada will decrease to 19% whereas international countries will be contributing around 81%.

## PART - III

### Scenario Based Questions

#### Scenario 1:

An entertainment company wants to analyse the behaviour of users who signed up for a premium streaming subscription in the past year. They want to track how many of these users renew their subscription in the months following their initial sign-up.

#### Question 1:

How would you calculate the monthly retention rate for each cohort of users who signed up in different months?

Let 's analyse the retention behaviour of users who signed up for a premium streaming subscription on Jio Hotstar, a streaming service over the past year. The goal is to determine the monthly retention rate for each cohort of users and assess trends in subscription renewals. Understanding retention rates is critical for evaluating user engagement and predicting revenue growth.

## DATA:

	User_ID	Signup_Month	Month_1	Month_2	Month_3	Month_4	Month_5	Month_6	Month_7	Month_8	Month_9	Month_10	Month_11	Month_12
0	1	2024-07	1	1	1	0	0	0	0	0	0	0	0	0
1	2	2024-04	1	1	1	0	0	0	0	0	0	0	0	0
2	3	2024-11	1	1	1	0	0	0	0	0	0	0	0	0
3	4	2024-08	1	1	1	0	0	0	0	0	0	0	0	0
4	5	2024-05	1	0	0	0	0	0	0	0	0	0	0	0

Retention rate analysis is conducted by tracking cohorts of users who subscribed in a given month and measuring the percentage that continued their subscription in the subsequent months.

## Formula:

**Retention Rate=(Users who renewed in month X\*100/Total users in cohort)**

```
# Creating retention Table
cohort_sizes = data.groupby('Signup_Month')['User_ID'].count()
retention_rates = data.groupby("Signup_Month").sum(numeric_only=True).div(cohort_sizes, axis=0) * 100

# Display retention rates by stablizing index
retention_rates.reset_index(inplace= True)
```

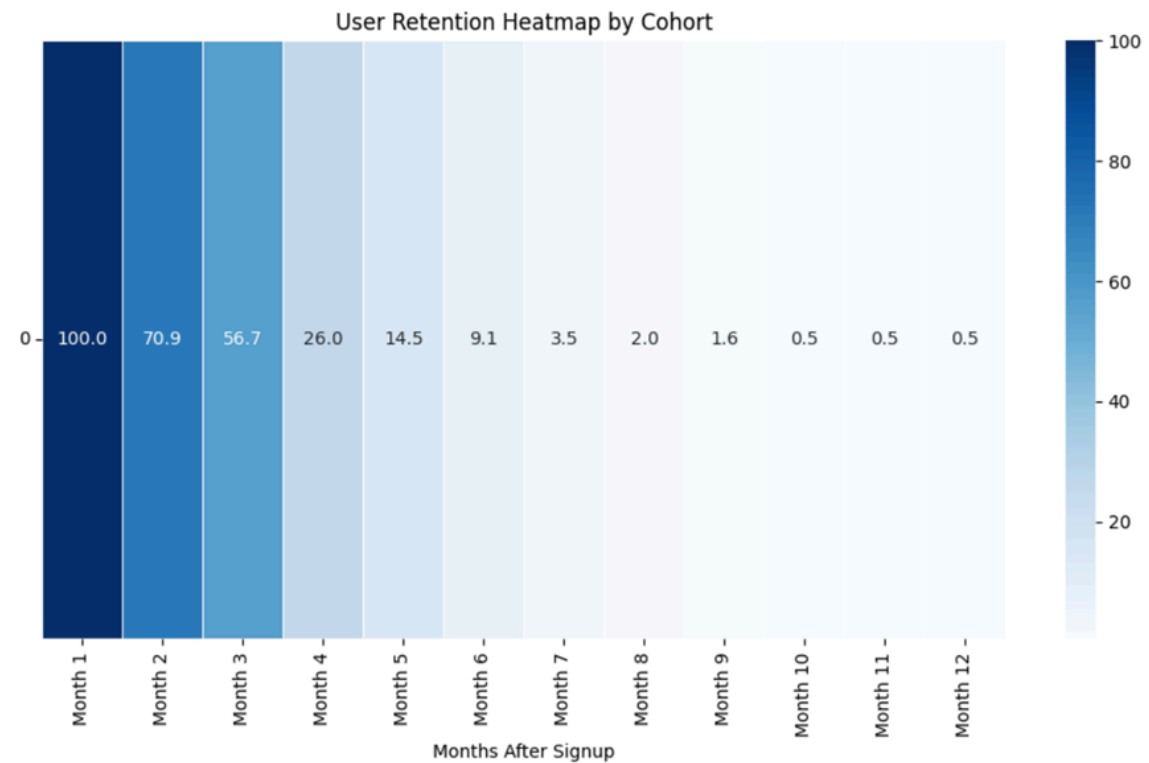
The retention rate was computed for each month following the initial subscription (Month 1 to Month 12).

## Data Analysis:

[Google colab](#)

The analysis included key metrics such as:

- **Initial Subscription Volume:** The number of new subscribers in each cohort.
- **Monthly Retention Percentages:** Percentage of users from each cohort renewing their subscription month over month.
- **Overall Retention Trends:** Identifying patterns in subscriber behaviour, such as sharp drop-offs or steady retention.



## Key Findings:

- **General Retention Trends:**

The highest drop-off typically occurs after the first three months window of subscription. Retention gradually declines over time but only 0.5% customers for 12 months.

- **Comparison Across Cohorts:**

Some cohorts have higher retention rates than others, possibly due to seasonal promotions, content releases, or marketing strategies. Differences in retention rates indicate varying levels of user satisfaction and engagement.

- **Impact of External Factors:**

Content releases, pricing changes, and competitor actions can influence retention patterns. Special events such as live sports tournaments may temporarily increase subscriptions and impact retention rates.

## Question 2:

If you notice that users tend to drop off after the third month, what strategies would you propose to improve long-term retention?

### Strategies to Improve Long-Term Retention:

#### 1. Personalized Content Recommendations

Why? Users might leave because they don't find content they love.

##### Solution:

- Use AI-based recommendation systems to suggest shows based on their watch history.
- Send personalized emails & push notifications with tailored content suggestions.

Example: "Hey [User's Name], we noticed you enjoyed *Mirzapur*! Season 3 is now streaming—watch it today!"

#### 2. Exclusive Loyalty Perks

Why? Users stay longer when they feel valued.

##### Solution:

- Offer discounts on annual plans after 3 months.
- Provide exclusive early access to blockbuster movies or sports events.
- Introduce a VIP loyalty tier where long-term users get extra benefits (e.g., ad-free streaming, exclusive content).

Example: "Congrats! As a loyal user, you get early access to *IPL 2025* before others!"

#### 3. Interactive Engagement & Gamification

Why? Users enjoy interactive experiences beyond just watching.

##### Solution:

- Add gamification features (e.g., earn rewards for watching & sharing).
- Introduce weekly challenges ("Watch 3 movies this week & get a surprise gift!").

- Create interactive live polls & quizzes during IPL matches to boost engagement.

Example: "Vote for the *best IPL moment* and stand a chance to win 1 month of free JioHotstar!"

#### **4. Bundled Subscription Offers**

Why? Users may leave if they feel the subscription is too costly.

**Solution:**

- Offer Jio recharge + Hotstar combo plans (free Hotstar with Jio mobile plans).
- Introduce family/group plans (similar to Netflix).
- Provide discounted long-term plans (e.g., "Pay for 9 months, get 3 months free!").

Example: "Upgrade to a 1-year plan and save 25%—Limited Time Offer!"

#### **5. More Regional & Localized Content**

Why? Users may cancel if they don't find content in their language.

**Solution:**

- Increase regional movie & web series selection.
- Add multi-language support for subtitles & dubbing.
- Promote exclusive regional content to specific audiences.

Example: "Now streaming: Superhit Tamil Thriller! Available in Tamil, Hindi & English."

#### **6. Subscription Pause & Flexible Plans**

Why? Some users cancel due to temporary reasons (travel, exams, budget).

**Solution:**

- Introduce a "Pause Subscription" feature for up to 2 months instead of canceling.
- Offer "Weekend Plans" (subscribe only on weekends).

- Provide Pay-Per-View for premium movies to keep occasional users.

Example: "Going on vacation? Pause your subscription for free & resume anytime!"

## **7. Exit Surveys & Win-Back Offers**

Why? Understand why users cancel & give them reasons to return.

**Solution:**

- Show a 1-question exit survey at cancellation:  
*"Why are you leaving? (Too expensive / Not enough content / Other)"*
- Offer a win-back discount:  
*"Wait! Get 3 extra months FREE if you stay!"*

Example: "We miss you! Resubscribe within 7 days & get 1 month FREE on us!"

## Scenario 2:

A gaming company is testing two different **tutorial designs** for new users in its mobile game. **Version A** is a brief, text-based tutorial, while **Version B** is an interactive, step-by-step guide. They want to see which tutorial leads to better **user retention** and higher **conversion rates** (i.e., users making in-game purchases).

### Question 1: [Colab Link](#)

Design an **A/B test** to evaluate which tutorial version leads to better retention and conversion rates. What metrics would you use to measure success?

In this phase, we aim to determine which version performs better in terms of user retention and conversion rates. To achieve this, we are conducting A/B testing using the chi-square statistical test, which is the most appropriate test to determine the relationship between two categorical variables. Selecting the optimal version is crucial, as game tutorials serve as the initial touchpoint, shaping user expectations and engagement.

### Data:

The data was generated using the random function from the NumPy library. To ensure consistency and reproducibility, we utilized the `random.seed()` method, which allows us to produce the same set of random values each time the code is executed. Also in order to simulate retention and conversion data, `random.choice()` method is used.

```
# Set seed for reproducibility
np.random.seed(42)

# Create synthetic dataset with clear differences
data = pd.DataFrame({
    "User_ID": range(1, 501), # 500 users
    "Tutorial_Version": np.random.choice(["A", "B"], size=500),
})

[ ] # Define different probabilities for each tutorial version
data["Retention_After_1_Week"] = data["Tutorial_Version"].apply(lambda x: np.random.choice([1, 0], p=[0.7, 0.3] if x == "A" else [0.5, 0.5]))
data["Conversion_Within_7_Days"] = data["Tutorial_Version"].apply(lambda x: np.random.choice([1, 0], p=[0.4, 0.6] if x == "A" else [0.2, 0.8]))
```

### Hypothesis:

The null and alternative hypotheses were defined to assess whether there is a significant difference in conversion and retention rates between the two versions. The chi-square test was performed separately for both metrics, aiming to reject the null hypothesis and confirm the alternative hypothesis. This approach helps determine whether the observed variations in user behavior are statistically significant.



### ✓ Retention Rate Hypothesis

**Null Hypothesis ( $H_0$ ):** There is no significant difference in retention rates between Tutorial A and Tutorial B. (Retention is independent of tutorial version.)

**Alternative Hypothesis ( $H_1$ ):** There is a significant difference in retention rates between Tutorial A and Tutorial B.

### ✓ Conversion Rate Hypothesis

**Null Hypothesis ( $H_0$ ):** There is no significant difference in conversion rates between Tutorial A and Tutorial B. (Conversion is independent of tutorial version.)

**Alternative Hypothesis ( $H_1$ ):** There is a significant difference in conversion rates between Tutorial A and Tutorial B.

## Contingency table:

A contingency table was created for both retention and conversion to analyze the distribution of users in each test group. This table helps in understanding how many users were retained vs. not retained and converted vs. not converted in both tutorial versions.

## Chi-Square Test:

The Chi-Square test was conducted using the contingency table created for both retention and conversion. The observed values in the table were compared against the expected values to assess whether the differences between Version A (text-based tutorial) and Version B (interactive guide) were statistically significant.

To make a decision, the p-value obtained from the Chi-Square test was compared with a predefined significance level ( $\alpha = 0.05$ ).

- If  $p\text{-value} \leq 0.05$ , we reject the null hypothesis, indicating a significant difference between the two versions.
- If  $p\text{-value} > 0.05$ , we fail to reject the null hypothesis, meaning there is no significant difference.

This statistical approach helped determine whether one tutorial version had a meaningful impact on user retention and conversion rates.

## Results interpretation:

Retention Contingency Table:		
	Retained	Not Retained
Tutorial A	165	79
Tutorial B	129	127

Conversion Contingency Table:		
	Converted	Not Converted
Tutorial A	94	150
Tutorial B	61	195

Chi-Square Test Results:		
Retention p-value:	0.0001	Significant
Conversion p-value:	0.0006	Significant

Since both p-values (0.0001 for retention and 0.0006 for conversion) are less than 0.05, we reject the null hypothesis in both cases. This indicates that the differences observed between Tutorial A (text-based) and Tutorial B (interactive guide) in terms of retention and conversion rates are statistically significant.

- Retention: Tutorial A has a significantly higher retention rate compared to Tutorial B (165 vs. 129 retained users). This suggests that users who go through the text-based tutorial are more likely to continue using the game.
- Conversion: Tutorial A also leads to higher conversion rates, with more users making in-game purchases compared to Tutorial B (94 vs. 61 converted users).

## Recommendation:

Based on these results, Tutorial A (text-based tutorial) appears to be the better option as it leads to higher retention and conversion rates. However, since interactive guides can enhance engagement, further refinements to Tutorial B (such as optimizing interaction flow or reducing complexity) could be explored to improve its performance.

**Question 2:**

If **Version B** (interactive guide) shows higher conversion rates but slightly lower retention, how would you balance these results when making a recommendation to the business?

**1) Offering exclusive rewards for renewed subscriptions**

- To encourage long-term engagement, players who renew their subscription should receive exclusive in-game rewards such as gaming suits, pets, weapons. This reward creates a sense of progression and exclusivity, motivating users to stay subscribed and continue playing.
- Additionally, once players are invested in collecting special items, they are more likely to spend on additional in-game purchases. By continuously offering attractive incentives, the game can build stronger player loyalty, reducing the likelihood of churn
- Impact:
  - Encourages repeat subscriptions, ensuring long term engagement.
  - Increases the likelihood of players spending more on premium accessories which are in contrast to our free bees.
  - Enhances customer loyalty, reducing churn rates.

**2) Referral program subscription discounts.**

- Gaming is a social experience and players often enjoy playing with friends. A referral program that offers discounts on future subscriptions for both the referrer and the new player can significantly increase engagement. When players bring their friends into the game, it enhances competition, teamwork, and social interactions, making the experience more enjoyable and sticky.
- Referral incentives not only boost retention but also act as a cost-effective acquisition strategy. Instead of spending large amounts on advertising, the game can leverage existing players to organically grow their user base.
- Impact:
  - Boosts user acquisition while keeping existing users retained.
  - Encourages social interactions with the game, increasing playtime and retention.
  - Creates a network effect, making the game more valuable as more friends join.

### **3) Giving daily, weekly bonuses.**

- To build a habit of consistent gameplay, players should receive daily and weekly login rewards such as virtual currency, experience boosts or power-ups. By offering progressively increasing rewards, Players will return everyday to claim their benefits.
- This strategy takes advantage of psychological triggers like streak maintenance, keeping players engaged. This eventually increases spending on the premium contents as they spend a lot of their time in the game.
- Impact:
  - Encourages habit formation, making players return consistently.
  - Increase attachment to the game.
  - Promotes retention growth as users stay engaged for long-term rewards.