Universidad Distrital Francisco José de Caldas

Engineering School

Systems Engineering

Databases 2

Workshop 1

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1. Business Model Canvas

Short Video Platform (TikTok like) Business Model Canvas

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments

• Influencers and content creators.
 	
• Advertisers and marketing agencies. (e.g. IMS Colombia, Omnicom, Publicis)
 	
• Music labels and entertainment companies (Music Licenses) eg. Universal Music Group.
 	
• Companies and brands that want to sell through advertising.
 	
• Payment processors for creator monetization.
 	
• Regulatory and compliance advisors
	• Implementing and optimizing targeted advertising strategies.
	• Building creator partnerships and brand sponsorship deals
	• Managing community engagement and creator support
	• Managing content moderation and compliance.
	• Conducting market research and trend analysis to enhance user engagement.
	• Optimizing monetization opportunities and revenue streams
	
	Key Resources
	
	• Big Data and real-time analytics infrastructure.
	• Advertising network and brand partnerships.
	• Data insights to enhance personalization and campaign efficiency.
		• **For users:**
		  ◦ Personalized and entertaining short-video experiences.
		  ◦ Real-time interaction with content and communities.
		
		• **For content creators:**
		  ◦ Monetization opportunities thru ads and premium features (direct payments).
		  ◦ Tools and analytics to grow and engage audiences.
		
		• **For advertisers:** Targeted ad placements, influencer marketing opportunities, and real time campaign analytics.
		
		• **For businesses:** Access to huge audiences.
			• **For users:**
			  ◦ Real-time interaction (comments, likes, live streaming).
			  ◦ Support & community (forums, chatbots, customer service).
			  ◦ Personalized recommendations.
			• **For advertisers:**
			  ◦ Metrics to publish their products.
			  ◦ Performance tracking tools.
			
			Channels
			
			• App stores (Google Play & App store)
			• Web platform.
			• Partnerships with influencers and content creators with presence in other social media.
				• General users (Mostly people between 18 and 34 years old that share and interact with content in the platform)
				
				• Content creators / Celebrities (Indivuals whose goal is to grow their audience and generate an income from the content they share in the platform)
				
				• Companies and brands (Organizations using the platform for promotions and content marketing)
				
				• Analysts & Researchers (Companies interested in consumer trends and behavior.)

Cost Structure	Revenue Streams
• Marketing and influencer sponsorships. • Legal compliance and content moderation expenses. • Customer support and community management. • Creator incentive programs and monetization payouts.	• _Advertising:_ Targeted video ads and branded content. • _Creator Monetization:_ Subscriptions, virtual gifts, and in-app purchases. • _Premium Features:_ Ad-free experience, advanced analytics for creators. • _Data & Insights:_ Anonymized data for market research.

Resources:
1. **https://thinkinsights.net/digital/tiktok-business-model#:~:text=TikTok's%20primary%20idea%20was%20fast,%2Dbillion%2Dworth%2Dstartup.**
2. **https://newsroom.tiktok.com/es-latam/tiktok-elige-a-ims-parte-de-aleph-holding-como-socio-exclusivo-para-tiktok-for-business-en-argentina-colombia-chile-y-peru**
3. **https://newsroom.tiktok.com/es-latam/tiktok-universal-music-group-acuerdo-musica-plataforma**

2. Requirements Documentation

2.1. Functional Requirements

1. **Functional requirement #1:** User Registration and Authentication
   a. The system should allow new users to register with username, email, and password.
   b. Registered users must authenticate via secure login (e.g OAuth2).
2. **Functional requirement #2:** Video Upload and Management
   a. Content Creators shall upload video files with metadata (title, description, tags, geolocation).
   b. Creators shall save drafts and publish later from stored drafts.
3. **Functional requirement #3:** Content Interaction
   a. Users shall like, comment on, and share videos; interactions recorded efficiently.
   b. Users shall follow creators and receive push/email notifications on new uploads.

4. **Functional requirement #4:** Search and Discovery
   a. The system shall provide indexed search with filters: categories, hashtags, duration.
   b. The "Trending" feed shall update in real time based on engagement metrics.
5. **Functional requirement #5:** Reporting and Moderation
   a. Users shall report videos; Admin dashboard shall display reports by status.
   b. Auto-moderation via machine learning shall flag inappropriate content for review.
6. **Functional requirement #6:** Monetization and Payments
   a. Advertisers shall create and target ad campaigns by demographics and interests.
   b. The system shall track clicks, impressions; provide real-time analytics to advertisers.
   c. Creator payments (virtual gifts, ad revenue) shall be processed via integrated payment processors.
7. **Functional requirement #7:** Analytics and BI
   a. Admin and Creators shall access dashboards with real-time engagement metrics (views, retention, engagement score).
   b. Business Intelligence module shall generate scheduled reports on user growth and content trends.

2.2. Non-Functional Requirements

1. **Non-Functional requirement #1:** Performance and Scalability
   a. Support 10,000 DAU with < 200ms query latency under peak load.
   b. Horizontal scaling of microservices and database shards.
2. **Non-Functional requirement #2:** Availability and Fault Tolerance
   a. Achieve 99.95% uptime with multi-region deployment and automated failover.
3. **Non-Functional requirement #3:** Data Ingestion and Big Data
   a. Store raw data in a data lake and processed data in a data warehouse.
   b. Constant ingestion pipeline via Kafka or Kinesis for streaming interaction and video metadata.
4. **Non-Functional requirement #4:** Security and Privacy
   a. Enforce OAuth2/JWT for authentication; encrypt data at rest and in transit.
   b. Comply with GDPR/Colombia's data protection regulations.
5. **Non-Functional requirement #5:** Maintainability and Extensibility
   a. Use infrastructure-as-code for deployment; modular microservices architecture.
6. **Non-Functional requirement #6:** Multi-location Access
   a. Distribute storage and compute across multiple data centers for regional proximity.

3. User Stories

3.1. 'User' role

1.

Title: Discover Trending Videos
User Story: **As a** *user* **I want** to discover trending videos quickly **so that** I can stay updated with the latest content and engage with popular discussions.
Acceptance Criteria: **Given** I am a logged-in viewer, **When** I navigate to the Trending feed, **Then** I see the top 20 videos sorted by engagement from the last 24 hours.

2.

Title: Like a Video
User Story: **As a** *user* **I want** to like videos **so that** I can interact with content.
Acceptance Criteria: **Given** I am watching a video, **When** I click the Like button, **Then** my like is recorded and displayed immediately.

3.

Title: Comment on a Video

User Story:

As a *user*

I want to comment on videos

so that I can interact with content and express my opinions in the community.

Acceptance Criteria:

Given I am on a video page,

When I submit a comment,

Then my comment appears in the listing without page reload.

4.

Title: Follow a Creator

User Story:

As a *user*

I want to follow creators and receive notifications when they post new content

so that I can stay engaged with my favorite influencers.

Acceptance Criteria:

Given I view a creator's profile,

When I click Follow,

Then I receive updates for new uploads.

5.

Title: Search for Videos

User Story:

As a *user*

I want an intuitive search function with filters (e.g., categories, hashtags, and duration)

so that I can find content more efficiently.

Acceptance Criteria: **Given** I enter keywords and filters in search, **When** I execute the search, **Then** I get filtered results within 2 seconds.

3.2. 'Content Creator' role

1.

Title: Upload a Video
User Story: **As a** *creator* **I want** to upload videos easily with a seamless process **so that** I can share my content with my audience without technical difficulties
Acceptance Criteria: **Given** I have a valid video file, **When** I initiate upload, **Then** the upload completes with a progress indicator and resumable support.

2.

Title: Save Draft
User Story: **As a** *creator* **I want** my uploaded drafts to be stored **so that** I can edit and publish them later.
Acceptance Criteria:

Given I am editing a video,

When I click Save Draft,

Then the draft is stored and retrievable later.

3.

Title: Publish a Video

User Story:

As a *creator*

I want to publish a video that I previously saved as a draft

so that I can share my content with my audience at the right moment.

Acceptance Criteria:

Given I have a video saved as a draft,

When I open the draft and click the "Publish" button,

Then the video is made publicly available in the feed, and notifications are sent to my followers.

4.

Title: View Upload History

User Story:

As a *creator*

I want to view the history of my uploaded videos

so that I can track my past content and manage it efficiently.

Acceptance Criteria:

Given I am on my dashboard,

When I select "Upload History",

Then I see a paginated list of all uploaded videos sorted by date, including title, upload date, and engagement statistics.

5.

Title: Edit published Video

User Story:

As a *creator*

I want to edit the metadata of a published video
so that I can update information like the title, description, or tags without needing to re-upload the content.

Acceptance Criteria:

Given I have a published video,

When I update the metadata (e.g., title, description, tags) and click "Save",

Then the changes are applied immediately without requiring the video file to be re-uploaded.

3.3. 'Advertiser' role

1.

Title: Create Ad Campaign

User Story:

As an *advertiser*

I want to create an ad campaign with specific targeting parameters

so that I can promote my brand to the right audience.

Acceptance Criteria:

Given I have campaign parameters (e.g., budget, audience, duration),

When I submit the creation form,

Then a new campaign is scheduled with the selected target demographics and settings.

2.

Title: View Real-Time Analytics
User Story: **As an** *advertiser* **I want** to view real-time analytics for my campaigns **so that** I can monitor performance and make timely decisions.
Acceptance Criteria: **Given** I have at least one active campaign, **When** I open the Analytics dashboard, **Then** I see impressions, clicks, and engagement metrics updated every minute.

3.

Title: Edit Campaign Targeting
User Story: **As an** *advertiser* **I want** to update the targeting criteria of my campaign **so that** I can optimize ad delivery based on performance trends.
Acceptance Criteria: **Given** I have an existing campaign, **When** I change the targeting settings (e.g., age, location, interests), **Then** the updates apply to all future ad deliveries.

4.

Title: Export Campaign Report
User Story: **As an** *advertiser*   **I want** to export my campaign performance data   **so that** I can analyze metrics offline or share with stakeholders.
Acceptance Criteria: **Given** I am viewing campaign analytics,   **When** I click the "Export CSV" button,   **Then** I download a report with the selected date range and all relevant metrics (impressions, clicks, conversions)

5.

Title: Pause/Resume Campaign
User Story: **As an** *advertiser*   **I want** to pause or resume my campaigns   **so that** I can control ad spending and timing according to my strategy.
Acceptance Criteria: **Given** I want to control campaign activity,   **When** I click the "Pause" or "Resume" button,   **Then** the campaign's status updates immediately, and ad delivery reflects the new state.

3.4. 'Admin' role

1.

Title: Review Content Reports
User Story:

As an *admin*

I want to review flagged videos

so that I can prioritize moderation based on severity and maintain platform standards.

Acceptance Criteria:

Given reports exist,

When I access the Moderation queue,

Then I see a list of flagged videos sorted by severity level and report frequency.

2.

Title: Approve or Reject Reports

User Story:

As an *admin*

I want to approve or reject content reports

so that I can take appropriate action on flagged content and inform creators of the result.

Acceptance Criteria:

Given a video is flagged,

When I choose "Approve" or "Reject" on a report,

Then the report status is updated and the creator receives a notification with the decision.

3.

Title: Ban A User

User Story:

As an *admin*

I want to ban users who repeatedly violate the guidelines

so that can protect the community from harmful behavior.

Acceptance Criteria:

Given repeated violations are confirmed,

When I select "Ban User" from their profile or report,

Then the user is immediately restricted from accessing the platform.

4.

Title: Monitor System Health
User Story: **As an** *admin*   **I want** to monitor system performance metrics   **so that** I can ensure platform stability and respond quickly to issues.
Acceptance Criteria: **Given** system metrics are being collected,   **When** I check the Health dashboard,   **Then** I see real-time CPU usage, memory load, server uptime, and error rates.

5.

Title: Manage Advertiser Accounts
User Story: **As an** *admin*   **I want** to manage advertiser accounts and billing information   **so that** I can resolve support issues and keep advertiser records up to date.
Acceptance Criteria: **Given** an advertiser requests assistance,   **When** I access their account,

Then I can update their account status, billing information, or resolve disputes.

4. Initial Database Architecture

4.1. High-Level Database Architecture

1. **Ingestion layer:**
   a. Apache Kafka for streaming logs (interactions, uploads) into pipelines.
2. **Storage Layer:**
   a. **Data Lake:** Raw user interaction log files, unstructured logs.
   b. **Operational Databases:**
      i. PostgreSQL for user profiles, relationships, transactions.
      ii. NoSQL database for interaction data and analytics.
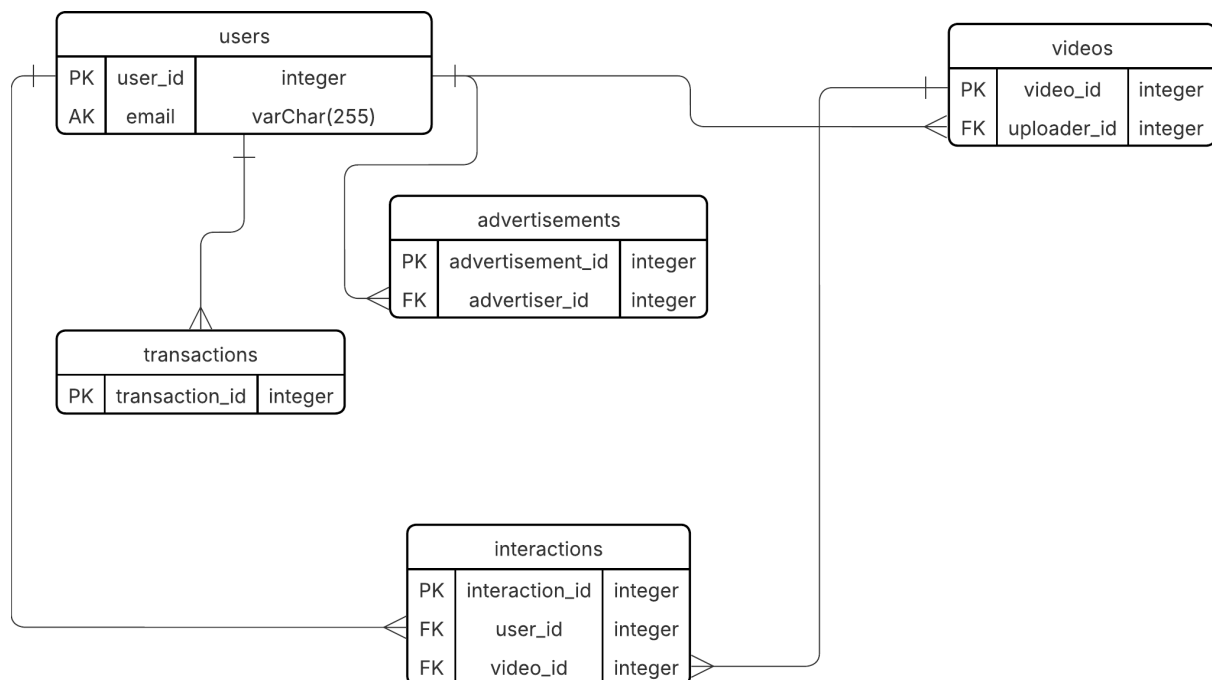3. **Processing and analytics:**
   a. Real-time metrics with Spark Streaming.
4. **Data serving:**
   a. OLAP/Data Marts for BI (Business Intelligence) reporting.

4.2 ER Diagram

Initial propose of ER diagram:

4.3.1 Entities

- **Users:** Stores information about all users of the platform, including general users, content creators, advertisers, and administrators.
- **Videos:** Stores information about the videos uploaded to the platform.
- **Interactions:** Stores data about user interactions with videos.
- **Advertisements:** Stores information about advertisements on the platform.
- **Transactions:** Stores records of financial transactions within the platform.

4.3.2 Relationships

User (1) — uploads —> Video (0..*)

- **Description:** A user can upload many videos

User (1) — performs —> Interaction (0..*)

- **Description:** A user can perform many interactions (likes, comments, shares).

Video (1) — receives —> Interaction (0..*)

- **Description:** A video can receive many interactions.

User (0..) — follows —> Creator (0..)

- **Description:** A user can follow many creators, and a creator can be followed by many users. Note: A creator is also a User.

User (1) — performs—> Transaction (0..*)

- **Description:** A user can perform 0 to many transactions.

User (0..) — *Advertises —> Advertisement (0..)*

- **Description**: A User can create many Advertisements, and an Advertisement can be created by many Users.

5. Github repository

https://github.com/v0lg-s/Workshops.git

6. References

1. Introducción a datamarts. (s/f). Microsoft.com. Recovered from https://learn.microsoft.com/es-es/power-bi/transform-model/datamarts/datamarts-overview

2. Kinesis vs Kafka - A comparison of streaming data platforms. (s/f). Quix.Io. Recovered from https://quix.io/blog/kafka-kinesis-comparison

3. Smallcombe, M. (s/f). SQL vs NoSQL: 5 critical differences. Integrate.Io. Recovered from https://www.integrate.io/blog/the-sql-vs-nosql-difference/

4. Spark Streaming. (2018, mayo 18). Databricks. https://www.databricks.com/glossary/what-is-spark-streaming