



Lab 1 - FlixPicks Product Description

Nicholas VanTol Old

Dominion University

CS 411

Professor Brunelle

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1. Introduction

The way entertainment is consumed has evolved significantly, limited channels and a fixed schedule of what was airing have been replaced by an expansive library of on-demand content. In August 2022, streaming represented 34.8% of viewership, surpassing cable TV for the first time. (Fischer, 2022) Streaming continues to grow at a projected rate of nine percent per year, while cable is only projected at four percent. (Raj, 2023) Streaming services growth comes as the average household already subscribes to 2.8 services, costing \$39 per month. (Glover, 2023) The number of services a household can subscribe to keeps growing as well, as of 2023, there are over 200 paid streaming platforms available globally. (Cook, 2023) This includes popular services such as Netflix, Hulu, and Max. Having 200 streaming platforms gives users an overabundance of options to choose from. Just from the three previously mentioned services, a person would have the option of over 7,500 movies to watch. (Clark, 2022)

After a user has already selected Netflix as the streaming service they will use, on average they will spend an additional 17.8 minutes browsing for something to watch according to a 2016 study. (Mostcaritolo, 2016) The time spent on what to watch is after the user has already decided on what service they are going to use to watch content. In a study from 2020, it was discovered that the average person spends up to 187 hours a year searching for media, about 30 minutes a day. (Ward, 2020)

Currently, users are limited in how they can solve the issue of content selection. Few tools exist, such as IMBD, to solve some of the described issues. No tools exist that solve all of the issues. FlixPicks solves this decision fatigue faced by users. Helping users to decide

what to watch and where to watch. Saving users both time and allowing them to view which streaming services they need, saving them money.

2. FlixPicks Description

FlixPicks is an online application and webpage that consolidates content from the majority of streaming services, creating an aggregated library. By having a library showing all of the content available to you, FlixPicks can offer personalized Taste Profiles. FlixPicks also utilizes machine learning to recommend content regardless of the streaming platform the content is hosted. FlixPicks main goal is to eliminate decision fatigue. FlixPicks has three main tools built to help aid this goal, CineWheel, CineRoll, and CineMap.

2.1 Key Features and Capabilities

FlixPicks offers a library of everything a user can watch, encompassing content from all streaming services they own subscriptions to. The aggregated library is available to both guests and registered users. Taste Profiles are then used for registered users, to further recommend what to watch. A questionnaire is used to set the initial Taste Profile, which is then dynamically updated to reflect what has been watched and enjoyed by the user. If a guest attempts to use a feature that is not available to them, they are prompted to register for an account to get the most out of FlixPicks.

CineWheel creates a random viewing experience, a user can input a selection of content, and allow CineWheel to randomly select what to watch. Everyone from guests to registered users can use CineWheel as it does not require profile-specific data, such as Taste Profiles, to generate the selection. Since no Taste Profile is used and users have to input multiple choices, CineWheel

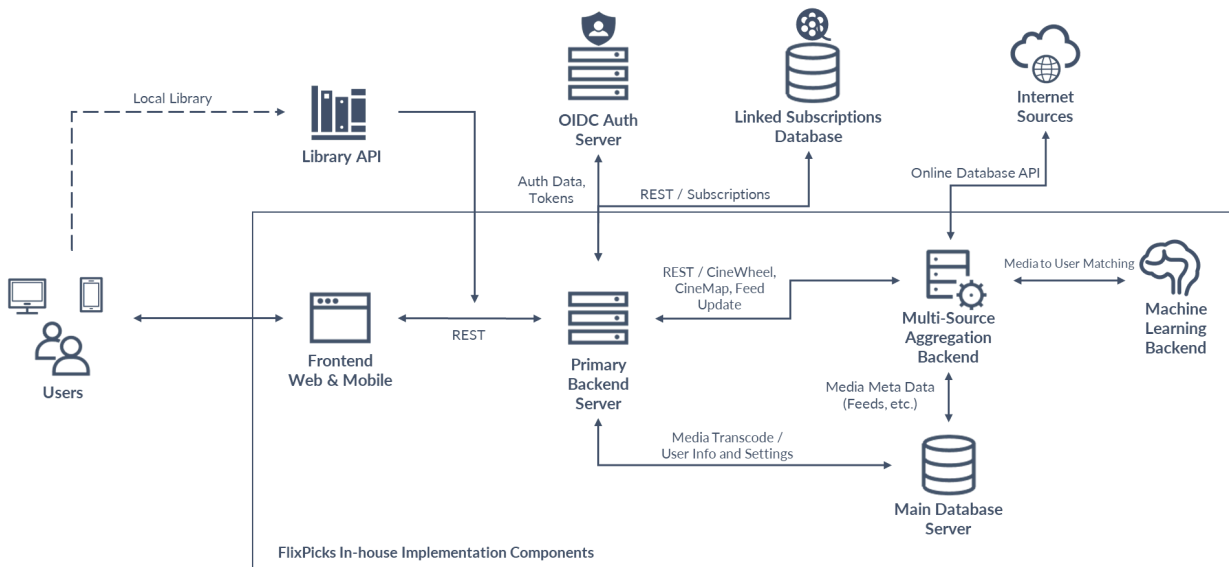
offers the lowest amount of selection help and is best used as a tiebreaker, picking between known shows an individual or group wants to watch.

CineRoll is the most comprehensive tool provided by FlixPicks. Users must be registered, as a Taste Profile that is user-specific is required to make calculations on what a user would enjoy watching. Machine learning is used, taking a user's Taste Profile and recommending what content they would like to watch next. Additionally, the user can add a genre tag, allowing for a specific genre of content to be recommended based on the current mood a user is in. CineRoll is best used when a user needs the most help trying to find content to watch.

CineMap allows for users to interact with the content they are watching. CineMap is an overlay for the media that a person is watching. It allows them to post engagement about the current scene they are watching. A registered user selects the media of the A user's interaction is then associated with the time stamp of the media they are viewing, and is stored in the database. CineMap is a feature that is only available to registered users. The data of the interactions can be viewed by admins and service representatives as a complete data analysis to provide additional information on what is currently popular and why. CineMap also allows users to have an interactive experience, allowing timestamped reactions to be viewed by others.

2.2 Major Components (Hardware/Software)

FlixPicks consists of a web application and browser extension. The browser extension is used to gather data that is then stored in a backend database, while the web application is used to further access this data and provide an interface to allow for the use of the tools. Figure 1 defines the functional components of FlixPicks.

Figure 1*FlixPicks Major Functional Component Diagram*

The user interface is available from any device that can access the internet with a browser that supports the FlixPicks extension such as Chrome. The Web Portal and Browser extension is programmed using HTML, CSS, and JavaScript. The user interface can also be accessed on devices and Smart TV's. For Apple devices swift is used, while Java is used for Android devices.

Data is stored in a MySQL Server, containing the data gathered from third-party APIs, YouTube Data, and 3rd Party Netflix. Apache Tomcat is used for the application server. AWS Machine Learning and Artificial Intelligence are used along with Amazon Personalize to generate personalized recommendations. Version control is done through Git. The repository is stored using GitHub and its features. VSCode and Eclipse are used as the IDEs for project management and issue tracking.

3. Identification of Case Study

The prototype case study consists of a minimal number of users, around ten, with diverse ownership of streaming services and roles. The diverse ownerships include users that own different streaming services, as well as users that include different numbers of streaming services. The differing roles include users who are guests, registered users, admins, and streaming service representatives. A reduction in the library is also seen in the prototype, limiting the number of movies and shows stored to a maximum of 10,000.

The real-world development of FlixPicks is aimed at all households that own any number of subscription services and representatives from all subscription services. Households that have members that travel receive additional benefits as streaming service libraries change based on geographical location. Streaming service representatives gain additional insight into what shows and movies are popular, allowing them to better invest in future content creation and acquisition.

4. FlixPicks Prototype Product Description

FlixPicks prototype includes a majority of the functionality of the real-world product. CineWheel and CineRoll are all fully implemented while CineMap has limited implementation when it comes to exporting and analyzing the data it provides. A Taste Profile is fully implemented, allowing for recommendations to also be fully implemented. Subscription service management is implemented with the exception of user subscriptions being only partially integrated. The prototype implements a simulation of data that will be removed from the real-world product and does not fully have analytics and feedback implemented in the prototype.

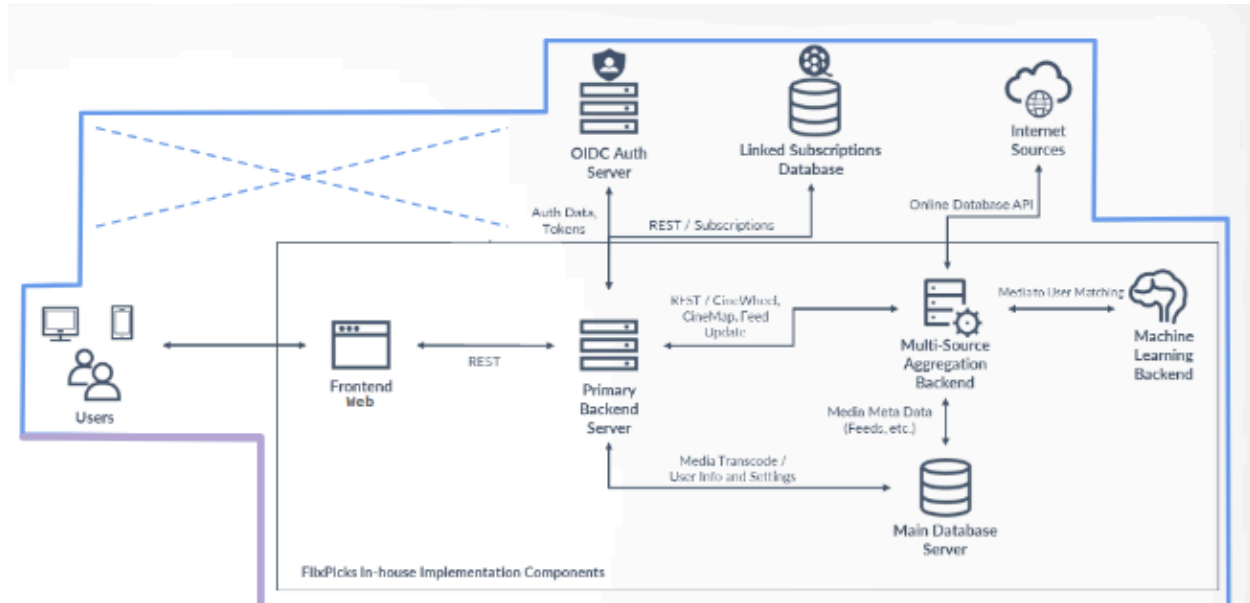
4.1. Prototype Architecture (Hardware/Software)

The prototype is hosted on an Old Dominion University infrastructure. Data is used from third-party APIs to gather data for subscription services. FlixPicks prototype consists of a web

application and browser extension that is used to gather CineMap data. Figure 2 defines the functional components of the FlixPicks prototype.

Figure 2

FlixPicks Prototype Major Functional Component Diagram



FlixPicks prototype uses an ODU Linux-based virtual machine. The prototype backend is developed in Python. SQLite is implemented as the database and Docker is used for facilitating data management. The front end is written in HTML, CSS, and JS and is connected using Flask. GitHub is used for version control. VSCode and Eclipse are used as the IDEs for project management and issue tracking.

4.2. Prototype Features and Capabilities

The prototype of FlixPicks includes full implementations of CineWheel, CineRoll, and Taste Profile. CineMap is limited in implementation with restrictions on data exportation and analysis. All user data is simulated. Movie data can be both simulated or pulled through third-party APIs. Table 1 shows functional differences between features in the real-world product

and the prototype. All features are either partially implemented or fully implemented in the prototype, while additional features are only available in the prototype and are not needed in the real-world product.

Table 1

FlixPicks RWP vs Prototype Table

Category	FlixPicks Feature	RWP	Prototype
Subscription Service Management	Account/Subscription Service Management	Fully Implemented	Fully Implemented
	User Account Creation/Registration	Fully Implemented	Fully Implemented
	User Subscription Integration	Fully Implemented	Partially Implemented
Taste Profile	Taste Profile	Fully Implemented	Fully Implemented
	Taste Profile Form Pop-Up	Fully Implemented	Fully Implemented
	Taste Profile Content-Based Filtering	Fully Implemented	Fully Implemented
	Taste Profile Collaborative Filtering	Fully Implemented	Fully Implemented
Reccomendations	Recommendations	Fully Implemented	Fully Implemented
	Filtered Recommendations (Criteria based)	Fully Implemented	Fully Implemented
Filtering	Browse/Search Filtering	Fully Implemented	Fully Implemented
CineRoll	CineRoll	Fully Implemented	Fully Implemented
CineWheel	CineWheel	Fully Implemented	Fully Implemented
CineMap	CineMap Overlay	Fully Implemented	Fully Implemented
	CineMap Commenting	Fully Implemented	Fully Implemented
	CineMap Export Data	Fully Implemented	Partially Implemented
	CineMap Data Analyzing	Fully Implemented	Partially Implemented
Analytics	Data analytics testing	Fully Implemented	Partially Implemented
	Analytics	Fully Implemented	Partially Implemented
Simulation	Simulation	Eliminated	Fully Implemented
Movie Info	Create/edit Movie Info	Eliminated	Fully Implemented
Reporting	Summary reporting for user/stakeholders	Eliminated	Fully Implemented
Feedback	Feedback	Fully Implemented	Partially Implemented

Restrictions for guest users also apply. Guests only have access to CineWheel and are prompted to register when another feature is attempted to be used. Registered users are given an initial survey to generate Taste Profile results. Data simulation is used to generate the results for this survey in the prototype. User watch history, movies, genres, and interactions are all simulated. Algorithms and machine learning to generate recommendations for users are fully implemented using this simulated data.

4.3 Prototype Development Challenges

A large challenge is the simulation of data. Without patterns generated in the data for watch history and user Taste Profiles, any recommendations would not follow a logical path. This requires fine-tuning and manual configuration of the simulated data sets to ensure proper logic is taking place. Gathering large enough sample sizes for machine learning also comes into play. Large enough datasets will need to be used and algorithms will need to be optimized to only run with properly pruned data to return generated recommendations in a reasonable time. Third-party APIs being used also pose a key risk as these can be changed and come with rules on how the data gathered is allowed to be used and stored. Data management can further become an issue as concurrency issues can occur where the database is updated by multiple users and can impact the data used as recommendations are being made. This can be mitigated in the prototype by staging database calls and using best practices for database management.

5. Glossary

Android: An operating system for mobile devices manufactured by Google, Samsung, and other companies.

Apache Tomcat: An open-source implementation of the Java Servlet, Java Server Pages, Java Expression Language, and WebSocket technologies. Tomcat provides a "pure Java" HTTP web server environment in which Java code can run.

API: An Application Programming Interface is an interface that allows for interactions between multiple software applications or mixed hardware-software intermediaries.

CineMap: CineMap is an optional overlay that allows FlixPicks users to interact, make comments, and view other users' interactions. It shows a timeline that highlights points of interest throughout a movie based on activity.

CineRoll: CineRoll is a FlixPick's feature that generates random selections based on a user's interests. CineRoll uses the Taste Profile to generate selections for a user based on their recommendations.

CineWheel: CineWheel is a FlixPick's feature that randomly selects from a set of user inputted choices. CineWheel is a tool to use for when a user or multiple users in a group are indecisive.

CSS: Cascading Style Sheets is a style sheet language used for customizing the appearance of a document written in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

Git: Software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development.

HTML: Hyper Text Markup Language. HTML is the standard markup language for creating web pages. HTML elements tell the browser how to display the content and define the structure of web pages.

IDE: An integrated development environment is a software application that provides comprehensive facilities to computer programmers for software development.

iOS: An operating system used for mobile devices manufactured by Apple Inc.

JavaScript: A scripting or programming language that allows you to implement complex features and interactivity on web pages.

MySQL: An open-source relational database management system.

Netflix: A subscription-based streaming service that allows members to watch TV shows and movies on internet-connected devices.

Stakeholders: A person with interest or concern in something, especially a business.

Streaming: A method of transmitting or receiving data over a computer network as a steady, continuous flow, allowing playback to start while the rest of the data is being processed.

Taste Profile: A user profile on FlixPicks that has access to their subscriptions, recommendations, and other settings. The Taste Profile recommendations grow as a user makes selections on the website and can be reset at anytime by the user.

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