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PROIECT DE DIPLOMĂ

Mircea-Denis Brașoveanu

COORDONATOR ȘTIINȚIFIC

[*Titlul științific, prenumele și numele coordonatorului*]

Iulie 2025

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[*TITLUL PROIECTULUI DE DIPLOMĂ*]

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Iulie 2025

CRAIOVA

*„The important thing is not to stop questioning. Curiosity has its own reason for existence.”*

Albert Einstein

**DECLARAȚIE DE ORIGINALITATE**

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Data, Semnătura candidatului,

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**PROIECTUL DE DIPLOMĂ**

|  |  |
| --- | --- |
| Numele și prenumele studentului/-ei: | Brașoveanu Mircea-Denis |
| Enunțul temei: | [*Titlul lucrării / descrierea pe scurt a temei*] |
| Datele de pornire: | [*Descrierea datelor inițiale de la care s-a început activitatea de cercetare/dezvoltare a tezei*] |
| Conținutul proiectului: | [*Descrierea succintă a conținutului fiecărui capitol al lucrării*] |
| Material grafic obligatoriu: |  |
| Consultații: | [*Periodice/zilnice/săptămânale/lunare*] |
| Conducătorul științific  (titlul, nume și prenume, semnătura): | Șef lucrări/Conferențiar/Profesor dr. ing. ................. |
| Data eliberării temei: | 15.10.2022 |
| Termenul estimat de predare a proiectului: | 01.06.2023 |
| Data predării proiectului de către student și semnătura acestuia: |  |

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| Aparatul matematic utilizat | | Simplu  □ | Mediu  □ | Complex □ | Absent  □ |
| Utilitate | | Contract de cercetare □ | Cercetare internă □ | Utilare  □ | Altul  [*se detaliază*] |
| Redactarea lucrării | | Insuficient  □ | Satisfăcător □ | Bine  □ | Foarte bine  □ |
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| Realizarea practică | Contribuția autorului | Insuficientă  □ | Satisfăcătoare □ | Mare  □ | Foarte mare  □ |
| Complexitatea  temei | Simplă  □ | Medie  □ | Mare  □ | Complexă  □ |
| Analiza cerințelor | Insuficient  □ | Satisfăcător □ | Bine  □ | Foarte bine  □ |
| Arhitectura | Simplă  □ | Medie  □ | Mare  □ | Complexă  □ |
| Întocmirea specificațiilor funcționale | Insuficientă  □ | Satisfăcătoare □ | Bună  □ | Foarte bună  □ |
| Implementarea | Insuficientă  □ | Satisfăcătoare □ | Bună  □ | Foarte bună  □ |
| Testarea | Insuficientă  □ | Satisfăcătoare □ | Bună  □ | Foarte bună  □ |
| Funcționarea | Da  □ | Parțială  □ | Nu  □ | |
| Rezultate experimentale | | Experiment propriu  □ | | Preluare din bibliografie  □ | |
| Bibliografie | | Cărți | Reviste | Articole | Referințe web |
| Comentarii  și  observații | |  | | | |

În concluzie, se propune:

|  |  |
| --- | --- |
| ADMITEREA PROIECTULUI  □ | RESPINGEREA PROIECTULUI  □ |

Data, Semnătura conducătorului științific,

**PROJECT SUMMARY**

This project focuses on the development of a mobile delivery application built with React Native, offering separate interfaces for both regular users and administrators. A key feature of the app is a personalized recommendation system, based on a custom algorithm I created. Its purpose is to suggest relevant options to users in a smart and adaptive way, depending on their preferences and behavior within the app.

The idea for this project came from my passion for programming, algorithms, and learning new technologies, as well as my growing interest in how digital tools support the business world. I wanted to build something practical and up-to-date, using technologies that are widely adopted in the industry today.

Throughout the process, I dealt with several challenges, such as ensuring smooth cross-platform performance, managing data efficiently, and integrating the recommendation system without compromising user experience. These were addressed through a mix of research, trial and error, and gradual improvements.

My personal contribution includes the design and implementation of the recommendation algorithm, building both the user and admin interfaces, and choosing the right tools and libraries to make the app scalable and efficient. Besides the technical experience, this project taught me a lot about mobile development, structuring real-world apps, and the balance between functionality and usability.

**Keywords**: React Native, mobile development, smart recommendations, delivery application, algorithm design, user interface, admin panel, cross-platform, business application, modern technologies.**ACKNOWLEDGEMNTS**

I would like to thank my project coordinator, [COORDONATOR], for his support and guidance during this final year. His advice helped me stay on track and complete this project.

I am also grateful to all my teachers from the past four years. Thanks to them, I have learned many important things that I will use in my future career.

Last but not least, I want to thank my family for their constant support and encouragement. They have always been there for me, and I appreciate everything they have done.

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# INTRODUCTION

## Scope

The scope of this thesis is designing and creating a mobile delivery application with React Native. There are two primary sections to the app: one for administrators and one for users. The app's unique feature is its SMART suggestion system, which was developed using a custom-made algorithm to provide users with tailored options based on their activity.

This project covers every step of creating the application, from organizing the structure, selecting the appropriate technologies, creating the user interfaces, and putting the features into use and testing them. The goal is to design an user-friendly software that adheres to current mobile development standards.

The study also looks at how delivery apps' user experience might be enhanced by clever algorithms. The finished item is a working prototype that can be expanded upon.

## Motivation

I have always been interested in algorithms, programming, and learning new technologies, which is why I picked this topic. I liked working on real-world projects during my education; therefore, I wanted my final project to be practical and applicable.

At the same time, I’ve become more curious about how technology is used in the business environment, especially in areas like delivery, where smart systems can improve services and make processes more efficient. I wanted to make something that combined this business viewpoint with my technical expertise.

With this project, I was able to use cutting-edge tools like React Native and create a clever recommendation system from the ground up using my own reasoning. It aided in my development and gave me a better understanding of how software can solve real-life problems.

# THEORETICAL CONTEXT AND TECHNOLOGIES

## React Native

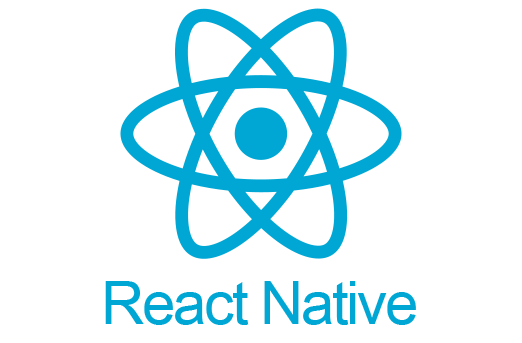


Figure : React Native

React and React Native are two different JavaScript libraries used to build user interfaces. React is mainly used for building web applications, while React Native is used for creating mobile apps. Even though React Native is based on React, they are designed for different platforms and have different purposes.

React Native is a popular mobile app framework based on JavaScript. It allows developers to create mobile apps for both iOS and Android using a single codebase. This means users can build apps for different platforms without writing separate code for each one.

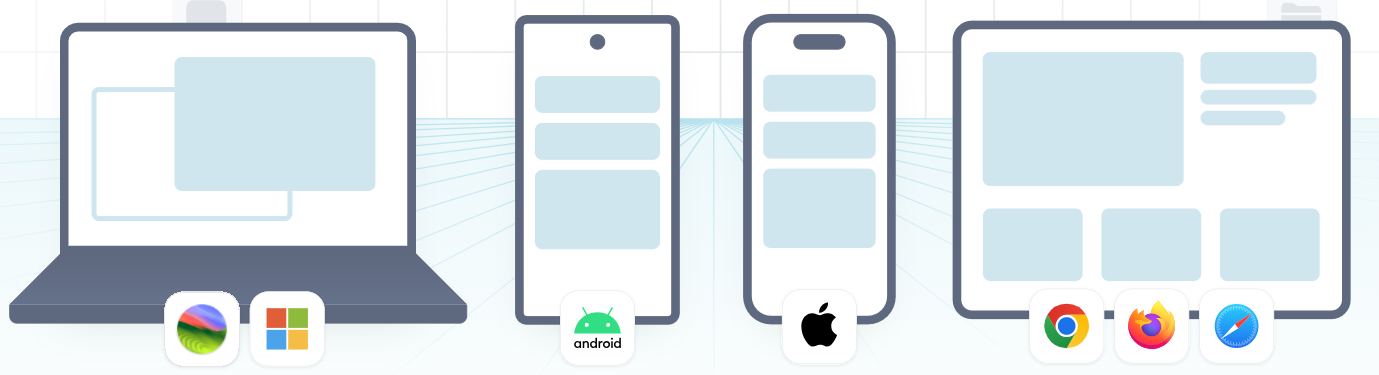


Figure : Cross-platform apps with one codebase [2]

“React Native was released as an open-source project by Facebook in 2015. Since then, it has become one of the most popular tools for mobile app development. It is used in many well-known apps, such as Instagram, Facebook, and Skype.” [1]

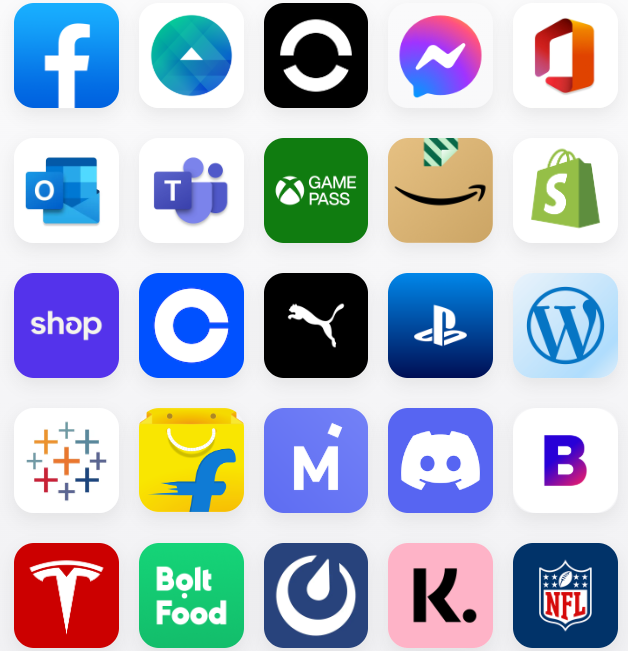


Figure : React Native is being used in thousands of apps [2]

“React Native can be used on its own or within a framework that provides a set of tools and APIs for building production-ready applications. Using a framework such as Expo offers features such as file-based routing, access to universal libraries, and support for creating plugins that interact with native code, without the need to directly handle native files.” [3]

## Expo

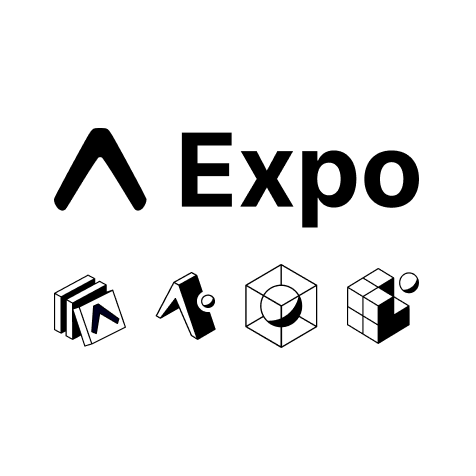


Figure : Expo

“Expo is a framework and platform built around React Native that helps with the development, building, and deployment of apps. It allows developers to create iOS, Android, and web applications using the same JavaScript or TypeScript codebase, with tools that support fast development and testing.” [4]

Expo simplifies the development process with pre-configured tools, libraries, and services.

Expo is a good choose because it assures:

1. Fast Setup: Expo simplifies the initial setup process by removing the need to configure native development environments, allowing developers to focus on core app features.
2. Cross-Platform Support: Applications can be developed using a single codebase with JavaScript and React Native and run on multiple platforms.
3. Managed Workflow: Expo handles many technical details behind the scenes, which is especially helpful for developers with limited mobile development experience.
4. Active Community and Resources: Expo benefits from a strong community and a wide range of tools, libraries, and documentation. [5]

## .NET

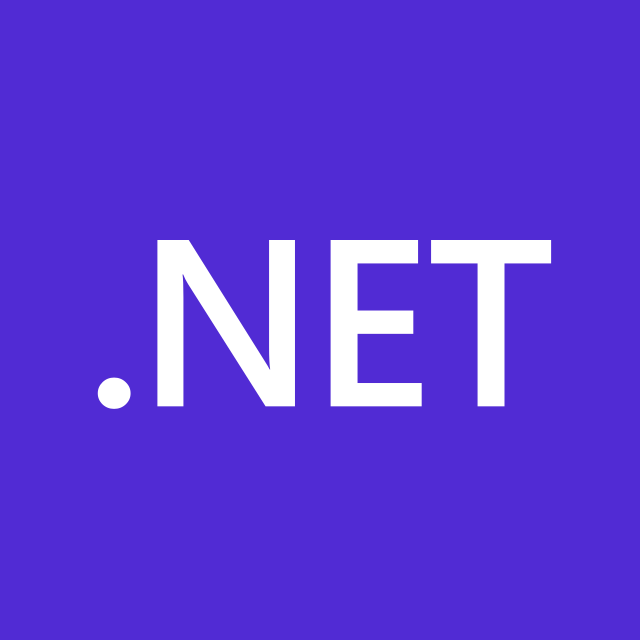


Figure : .NET

“.NET is a free, open-source, and cross-platform framework used to build modern applications and cloud-based services. It supports multiple programming languages, editors, and libraries, allowing developers to build for web, mobile, desktop, games, IoT, and more.” [6]

In this application, .NET was used mainly for the backend, where it helped manage the business logic, user data, and communication with the database.

By using .NET, the backend is able to expose RESTful APIs that allow the React Native mobile app to interact with the server, for example, to register users, process orders, or fetch personalized recommendations.

The main reasons for choosing .NET are:

* Strong support for building secure and efficient web services
* Good integration with databases
* Clean and structured development using C#
* Excellent support and documentation from Microsoft and the developer community

.NET benefits from a vast and mature ecosystem of libraries and tools accessible via NuGet, the official package manager. This enables rapid development by leveraging existing, well-tested solutions for various functionalities, from logging and authentication to data processing and external API integrations, reducing the need to 'reinvent the wheel'.

## Entity Framework



Figure : Entity Framework

Entity Framework (EF) is a modern object-relational mapper (ORM) used in .NET applications to interact with databases in a clean and efficient way. It allows developers to work with data using .NET objects, without writing raw SQL queries. [7]

In this project, Entity Framework was used to create the data access layer, making it easier to manage and query the database. It supports features like LINQ queries, change tracking, data updates, and schema migrations. EF works with different types of databases, such as SQL Server, SQLite, MySQL, and PostgreSQL.

Using EF helped speed up development and ensured that the database logic remained organized, readable, and easy to maintain.

Key Features:

* Cross-Platform: Works on Windows, macOS, and Linux.
* LINQ Support: Allows querying the database using Language Integrated Query (LINQ), making code easier to read and maintain.
* Change Tracking: Keeps track of changes made to objects so that updates to the database can be done automatically.
* Migrations: Makes it easy to apply and manage database schema changes over time. [8]

How EF Core Works:

EF Core uses a special class called DbContext, which acts as a connection between the application and the database. The flow includes three main parts:

1. Model: The C# classes (called entities) represent database tables, and their properties represent the table columns.
2. Context: The DbContext class handles tasks like querying data, adding new entries, updating records, or deleting them.
3. Database Provider: EF Core can work with different types of databases (e.g., SQL Server, MySQL, PostgreSQL, SQLite) using specific database providers. [8]

A key aspect of EF Core is its ability to translate LINQ queries into efficient SQL statements. When a LINQ query is executed against a DbSet, EF Core's query provider analyzes the expression tree and generates the appropriate SQL query, which is then sent to the database. This abstraction allows developers to focus on data manipulation using object-oriented constructs rather than writing database-specific SQL.

EF Core supports different development approaches, including Code-First, where the database schema is generated from the C# model; Database-First, where the model is scaffolded from an existing database; and conceptually, Model-First (less common in modern EF Core, often a variant of Code-First with a designer). This flexibility allows developers to choose the approach that best fits their project's needs.

## SQL Server

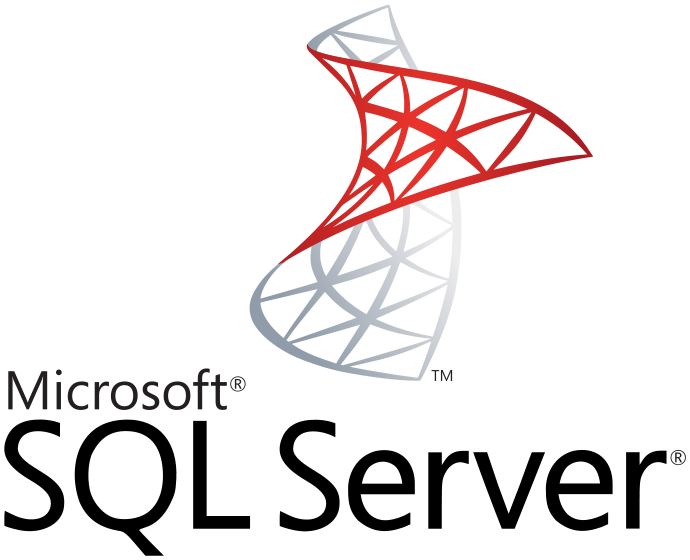


Figure : SQL Server

“Microsoft SQL Server is a popular relational database system. It's designed to handle a wide range of tasks, from managing daily transactions to powering business intelligence and data analytics for companies.

At its core, SQL Server uses Structured Query Language (SQL), the standard language for managing and querying databases. Microsoft's own version, Transact-SQL (T-SQL), allows applications and tools to communicate directly with SQL Server databases.” [9]

Security is a core focus of SQL Server. It includes advanced features like Transparent Data Encryption (TDE) to encrypt data at rest, Row-Level Security to control access to specific rows of data, and robust authentication and authorization mechanisms to protect sensitive information.

SQL Server comes with comprehensive management and development tools, most notably SQL Server Management Studio (SSMS) and Azure Data Studio, which provide graphical interfaces and powerful capabilities for administering, developing, and optimizing databases.

SQL Server offers deep integration with other Microsoft technologies, including Azure cloud services and .NET applications.

## Visual Studio

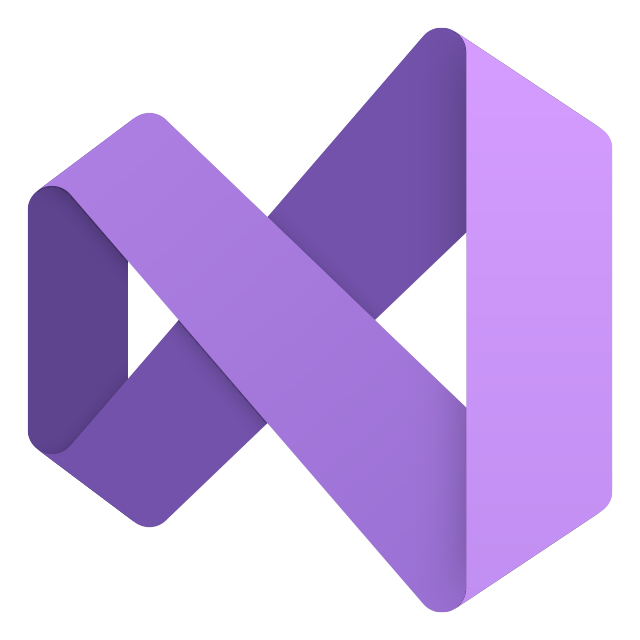


Figure : Visual Studio

“Visual Studio IDE is a comprehensive tool for software development. It lets you write, debug, and build code, and then easily publish your applications. Beyond basic editing and debugging, Visual Studio offers compilers, smart code completion, visual designers, and many other features to streamline the entire development process.” [10]

Visual Studio is highly versatile, supporting a broad range of programming languages beyond C# and enabling development for various platforms including Windows desktop, web, mobile (with Xamarin/MAUI), cloud (Azure), and games.

A significant strength of Visual Studio is its extensive marketplace of extensions. Developers can customize their IDE and add new functionalities, tools, and integrations for almost any need. It also integrates with Git, developers being able to manage their code, track changes, collaborate with teams, and perform operations like committing, branching, and merging directly within the IDE.

Features like GitHub Copilot provide AI-powered code suggestions and completions, directly within the IDE. This means the developer remains in control, guiding the creative process, while Copilot acts as an intelligent assistant, speeding up coding, suggesting boilerplate, and helping explore solutions, thereby embodying the principle: 'You control. AI assists.' [10]

## Visual Studio Code

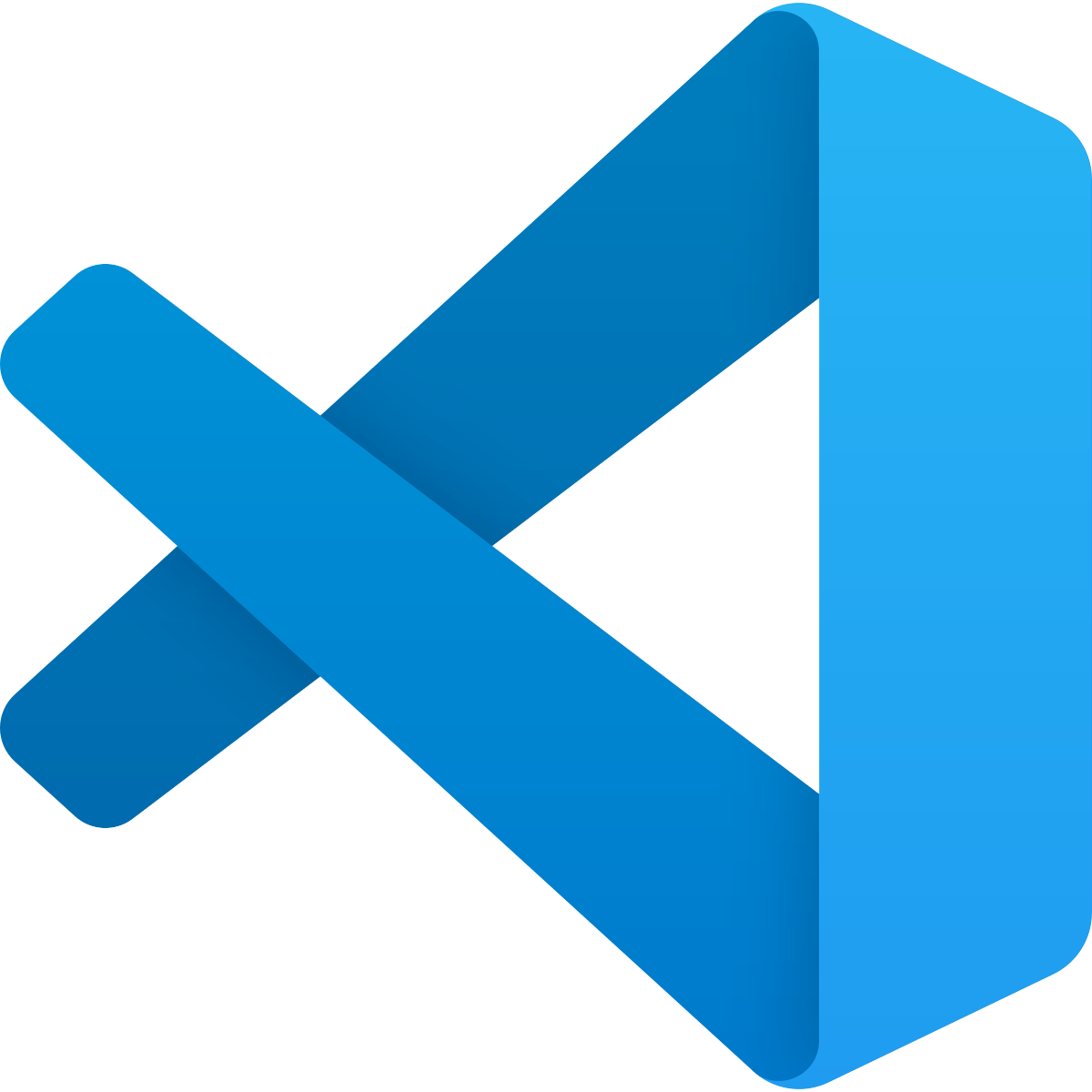


Figure : Visual Studio Code

“Visual Studio Code is a free, stand-alone code editor that runs on Windows, macOS, and Linux. It's a top choice for web and JavaScript developers, offering extensive extensions to support virtually any programming language.” [10]

VS Code has deep, built-in integration with Git, making source code management incredibly intuitive. Developers can perform common Git operations (like committing, branching, and merging) directly from the editor, fostering efficient collaboration and change tracking.

Further enhancing developer productivity, VS Code seamlessly integrates GitHub Copilot. This AI assistant provides real-time code suggestions, completes lines and functions, and can even generate entire code blocks based on natural language comments. It transforms the coding experience by acting as an intelligent pair programmer, embodying the principle that 'You control. AI assists.' by accelerating development while keeping the developer in charge of the final output.

Unlike larger Integrated Development Environments (IDEs), VS Code is renowned for its lightweight nature and fast startup times.

## GitHub

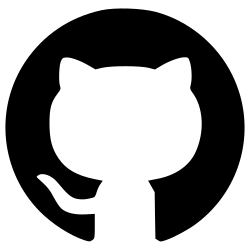


Figure : GitHub

“GitHub is a popular platform where developers can create, store, manage, and share their code. It uses Git for version control, and also offers tools for access control, bug tracking, feature requests, task management, continuous integration, and wikis for every project.” [11]

GitHub is widely recognized as the world's largest hub for open-source projects. It fosters a massive global community of developers, enabling them to discover, contribute to, and learn from millions of public repositories. This collaborative environment is fundamental to the advancement of open-source software.

Further enhancing developer productivity, GitHub integrates GitHub Copilot, an AI-powered coding assistant. This tool provides real-time code suggestions and completions, leveraging the vast amount of code available on GitHub to help developers write code faster and more efficiently.

# Objectives and benchmarks

## Problem Description

## Objectives

## Constraints

## Identifying User Problems

## Functional Requirements

## Non-Functional Requirements

# Software Architecture

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Database Structure

Code Structure

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Languages and Libraries

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# Source Code

# Site-ul web al proiectului

# CD / DVD

Autorul atașează în această anexă obligatorie, versiunea electronică a aplicației, a acestei lucrări, precum și prezentarea finală a tezei.



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