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Application Information & Rules

Author: Rio Pramana – DTIDSOL-02

Module 1 Capstone Project – Freelancer Management System (FMS)

Background

The **Freelancer Management System (FMS)** is a **CRUD-based terminal application** built using **Python fundamentals**. This application simulates a **real-world freelancer management system**, allowing a company to **hire, manage, and track freelancers and projects** efficiently.

Purpose

The **FCMS** is designed to help businesses:

1. **Manage freelancers efficiently** – Track freelancer information, assign projects, and review performance.
2. **Handle project assignments & budgets** – Ensure that company spending aligns with available resources.
3. **Automate financial tracking** – Monitor freelancer costs and project expenses dynamically.

Unlike simple CRUD applications, **FCMS mimics real business operations**, integrating **budget control and filtering functionalities** to enhance decision-making.

Project Links

1. Project Google Drive (all files in one folder): Click This Link
2. Draw.io files: Click This Link
3. Flowchart images: Click This Link
4. Entity Relationship Diagram: Click This Link
5. GitHub Project (Code): Click This Link

Features & Menu Overview

The **FMS** consists of **three core management sections**:

1. Freelancer Management (Main Features)

a. **Hire Freelancer** – *(**C**reate)*

Adds a new freelancer with basic info such as name, skills, and hourly rate.

b. **Review Freelancer Profiles** – *(**R**ead, with filtering options)*

Displays all freelancers, filterable by freelancer status (available/assigned), with option to see freelancer's detail.

c. **Search Freelancer** – *(Search function)*

Allows searching freelancers by **name** (partial match), **skills** (comma-separated, partial match, OR logic), or **ID** (exact match).

d. **Update Freelancer Information** – *(**U**pdate)*

Edits freelancer details with validation.

e. **Fire Freelancer** – *(**D**elete)*

Removes selected freelancers who **have no active projects**.

f. **View Freelancers Performance Report** – *(**R**ead, with sorting options)*

Displays **total completed projects & earnings** with option to **sort freelancers** based on earnings.

2. Project Management (Complementary Features)

a. **Assign Freelancer to Project** – *(**C**reate + **U**pdate)*

Creates a new project while assigning a freelancer to work on it (with budget validation mechanism).

b. **Mark Project as Completed** – *(**U**pdate)*

Finalizes a project, updates freelancer availability, company's budget and allocated funds.

c. **Review Projects** – *(**R**ead, with filtering options)*

Displays all projects, filterable by project status (active/completed), with option to see project's detail.

d. **Cancel Project** – *(**D**elete)*

Releases allocated funds if a project is cancelled before completion.

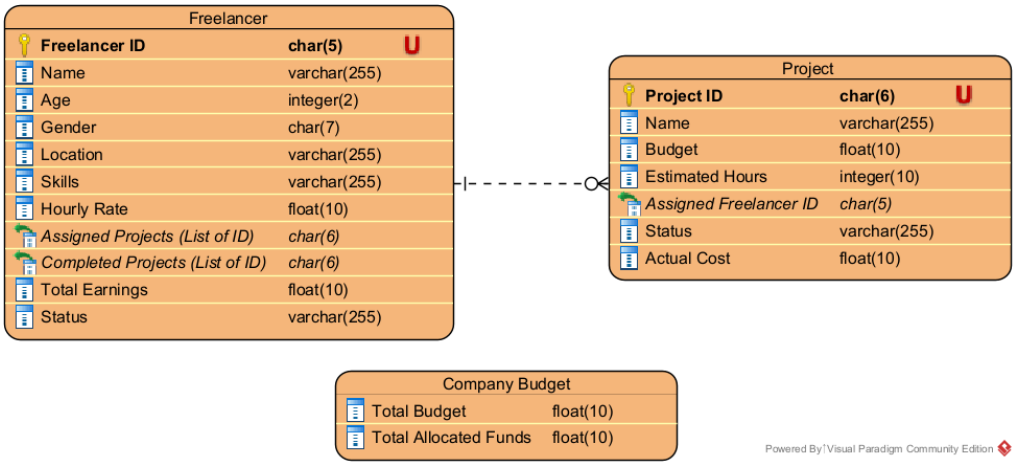
3. Budget Management (Complementary Features)

a. **Adjust Budget** – *(**U**pdate)*

Allows the user to **increase or decrease** the company's budget, ensuring it **never falls below allocated funds**.

Data Structures

This section outlines the **data structures** used in the Freelancer Management System (FMS). Since this project is built strictly using **Python collections**, we model entities as **nested dictionaries and lists** instead of using relational database concepts. For deeper understanding of how each entity relates to each other, please refer to Important Application Rules & Assumptions section of this document.



1. Freelancer Data Structure

Freelancers are stored in a **dictionary**, where each freelancer has a **unique ID** as the key, and their details are stored as values in a nested dictionary.

Example data:

```
freelancers = {
    "FR001": {
        "name": "John Doe",
        "age": 28,
        "gender": "Male",
        "location": "New York",
        "skills": ["Python", "Machine Learning", "Data Analysis"],
        "hourly_rate": 10.0,
        "status": "Assigned",
        "assigned_projects": ["P0001"],
        "completed_projects": ["P0002", "P0003"],
        "total_earnings": 3500.0
    }
}
```

Fields explanation:

Field	Type	Description
freelancer_id	str	Unique ID for each freelancer.
name	str	Freelancer's full name.
age	int	Freelancer's age (must be ≥18).
gender	str	"Male" or "Female".
location	str	Freelancer's city or country.
skills	list (str)	A list of the freelancer's skills.
hourly_rate	float	The hourly rate charged by the freelancer.
Status	str	“Available” or “Assigned”.
assigned_projects	list (str)	List of currently active project IDs.
completed_projects	list (str)	List of completed project IDs.
total_earnings	float	The total earnings from completed projects.

2. Project Data Structure

Projects are stored in a **dictionary**, where each project has a **unique ID** as the key, and project details are stored as values in a nested dictionary.

Example data:

```
projects = {
    "P0001": {
        "name": "AI Chatbot Development",
        "budget": 2000.0,
        "estimated_hours": 40,
        "assigned_freelancer": "FR001",
        "status": "Active",
        "actual_cost": 400.0
    }
}
```

Fields explanation:

Field	Type	Description
project_id	str	Unique ID for each project.
name	str	Project name.
budget	float	Total budget allocated for the project.
estimated_hours	int	Estimated hours required to complete the project.
assigned_freelancer	str	Freelancer ID assigned to the project.
status	str	"Active", "Completed", or "Cancelled".
actual_cost	float	The actual project cost, set after completion.

3. Company Budget Data Structure

The **company's budget** is stored in a dictionary containing **two key fields**: total_budget and total_allocated_funds.

Example data:

```
company_budget = {
    "total_budget": 10000.0,
    "total_allocated_funds": 4000.0
}
```

Fields explanation:

Field	Type	Description
project_id	str	Unique ID for each project.
total_budget	float	The company's total available funds.
total_allocated_funds	float	Funds currently allocated to active projects.

Important Application Rules & Assumptions

1. Budgeting System

a. The app's budgeting system consists of **two parts: Company budget & Allocated funds**.

b. **Hiring a freelancer does not affect any budget/funds**, it only adds the freelancer data to the company's database for management. Only project completion/cancellation affect budget & funds.

c. **Company budget** is pre-determined and changeable. It is **reduced only when a project is completed** (not at assignment).

d. **Allocated funds represent money reserved for ongoing/active projects**. It is **reduced only when a project is completed or cancelled**.

e. The budget cannot be decreased below allocated funds. Allocated funds cannot be greater than the budget.

2. Freelancer Availability

a. Freelancers can **only take one project at a time**. One project can only be assigned to one freelancer.

b. Once a project is completed or cancelled, the freelancer **becomes available again**.

3. Project Cost Calculation

a. The user **sets a maximum budget & estimated completion hours** when creating a project.

b. **Project actual cost = Freelancer hourly rate × Estimated hours**.

c. The user **can only select freelancers with actual cost less than the maximum budget**.

d. If the company can't afford any freelancer, the user must **increase the project's maximum budget or cancel the project creation**.

e. **Every project is fully paid only after completion.**

4. Data Management

a. The system uses **Python dictionaries** as the primary data storage format.

b. Sorting & filtering **are integrated into the relevant menus**.

Terminology

Term	**Definition**
Freelancer	A worker who can be hired to complete projects.
Project	A task assigned to a freelancer with a budget and duration (in hours).
Company Budget	The total money available for freelancer payments.
Allocated Funds	Money reserved for ongoing projects (not yet deducted).
Project Cost	The total amount a freelancer will be paid upon project completion.
Active Project	A project currently in progress (not completed or cancelled).

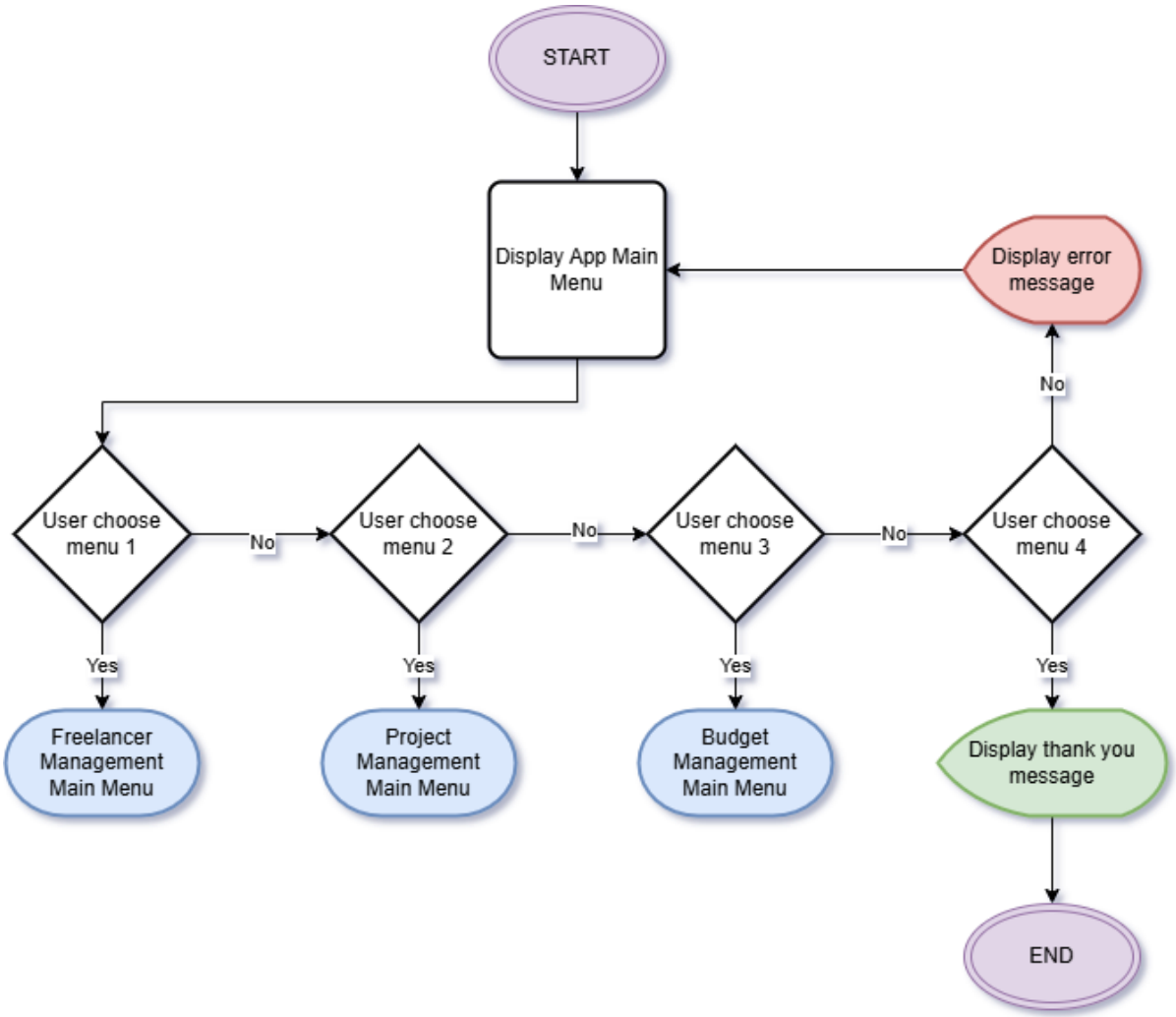
Flowcharts with Explanations

Application Main Menu

This is the **starting point** of the application. The user is presented with the core management options:

1. **Freelancer Management**
2. **Project Management**
3. **Budget Management**
4. **Exit Application**

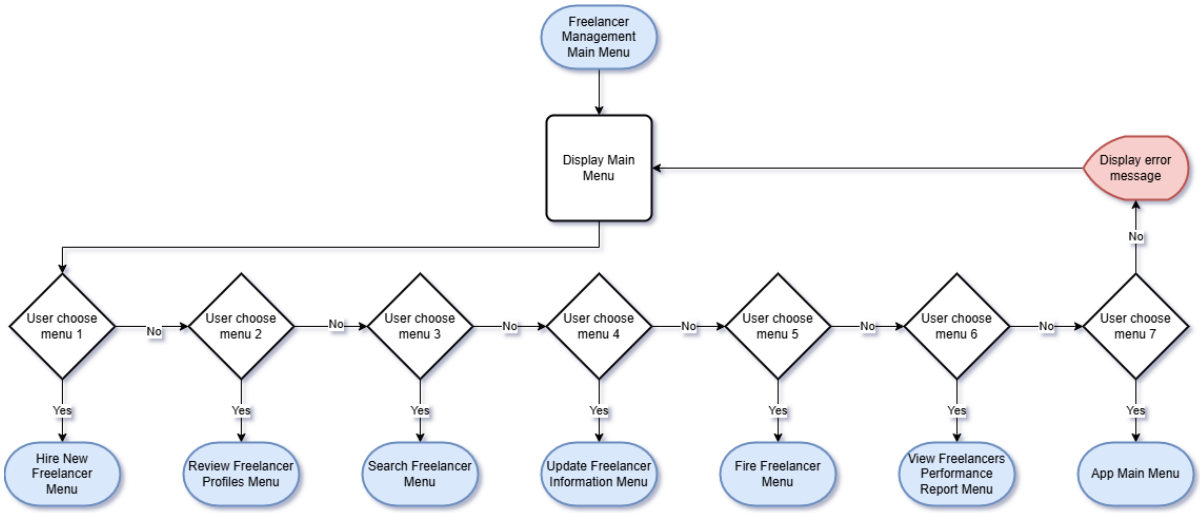
The user selects an option, which directs them to the corresponding submenu. If an invalid option is chosen, an error message is displayed, prompting a retry. Image link: Click Me



Freelancer Management Menus

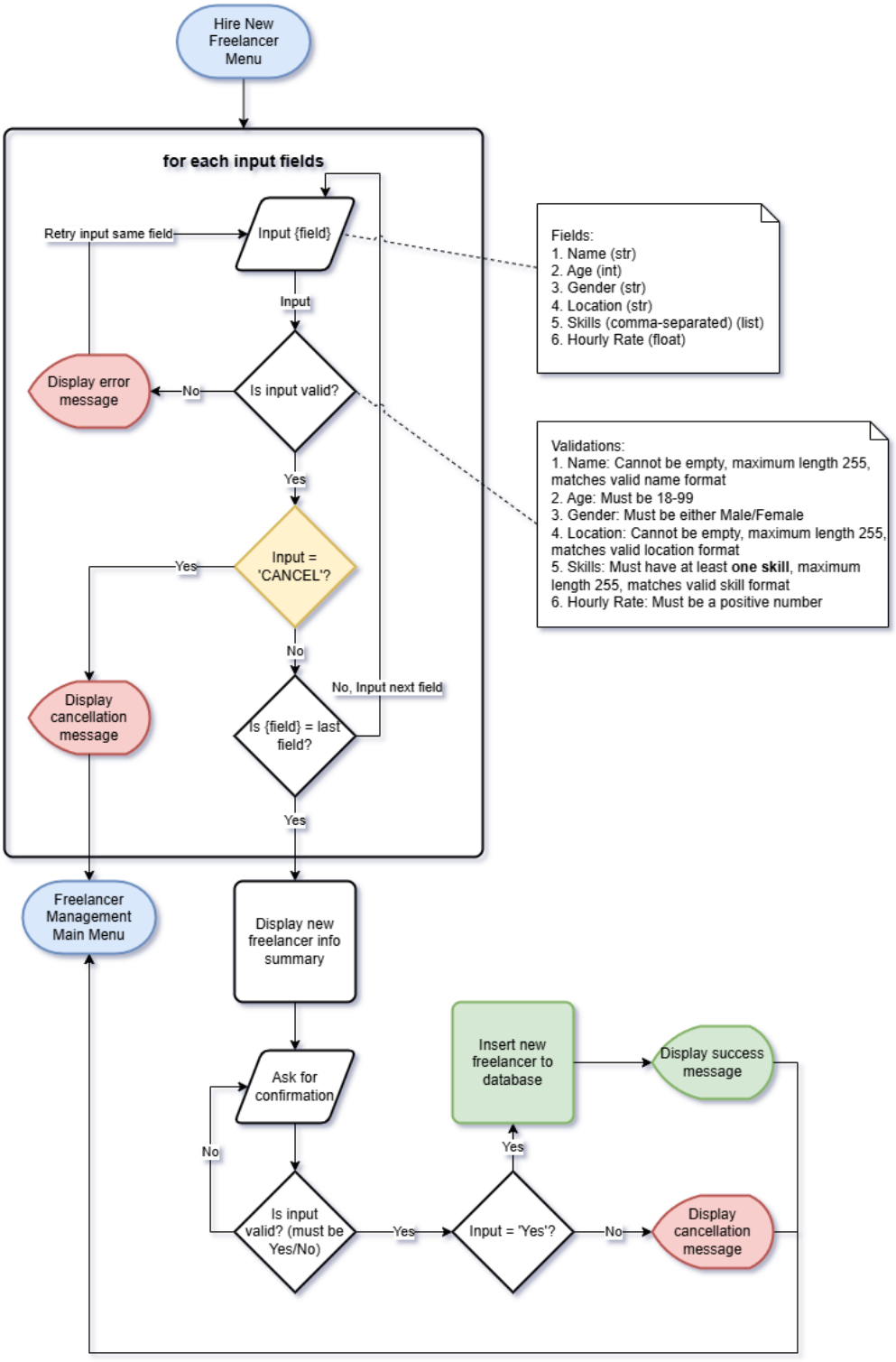
1. Main Menu

This menu serves as the hub for managing freelancers. The user can do all CRUD functions related to freelancers here. Image link: Click Me



2. Hire New Freelancer

The user inputs a freelancer's **basic details**. Each field is validated before proceeding. If the input is invalid, the user is prompted to correct it. After all fields are entered, a **confirmation step** allows reviewing before saving the freelancer. Image link: Click Me

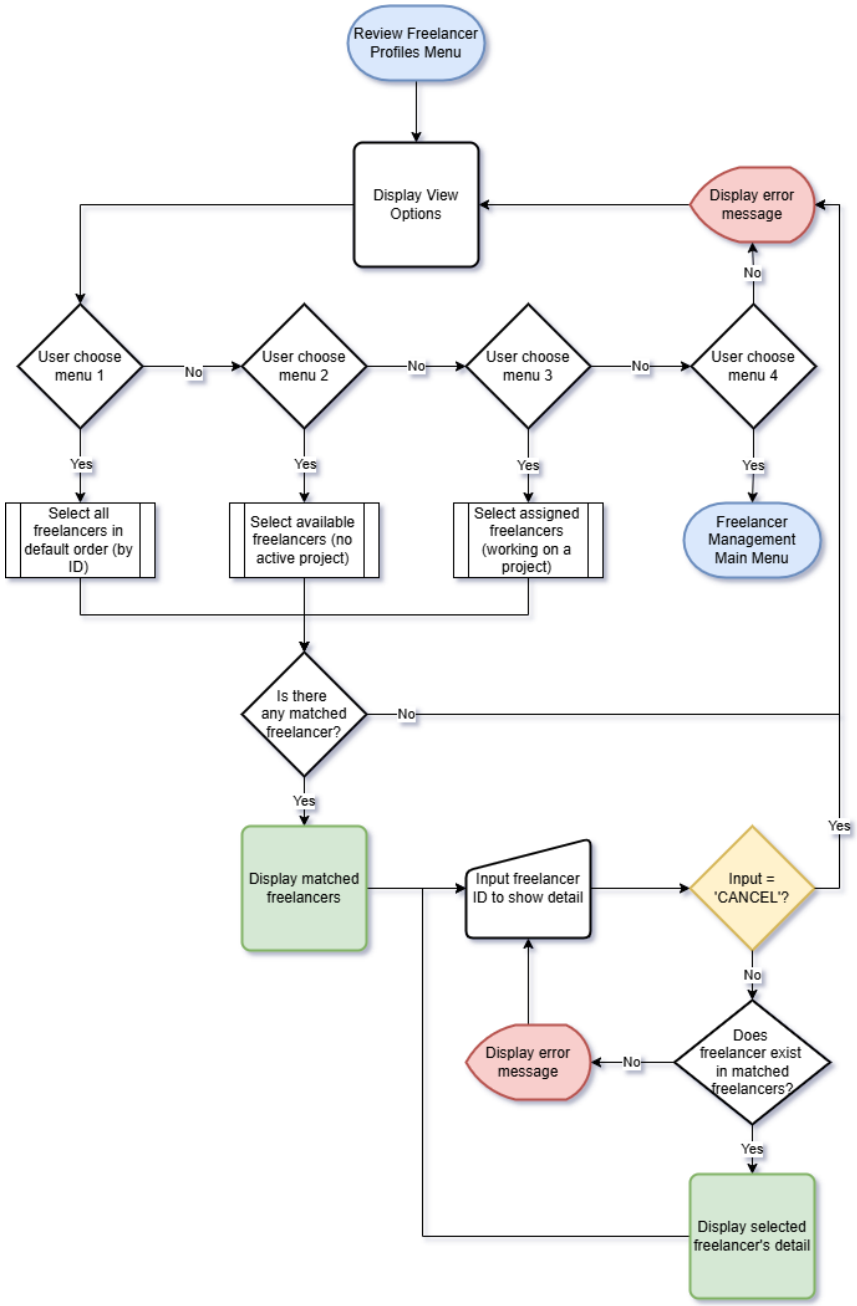


3. Review Freelancer Profiles

This menu allows the user to view freelancers based on different categories:

- **All freelancers** (sorted by ID)
- **Available freelancers** (those without an active project)
- **Assigned freelancers** (currently working on a project)

Only essential freelancer details (e.g. ID, Name, Skills, Hourly Rate, Availability) are displayed in this section. The user can then select a matched freelancer to view its detail. Image link: Click Me

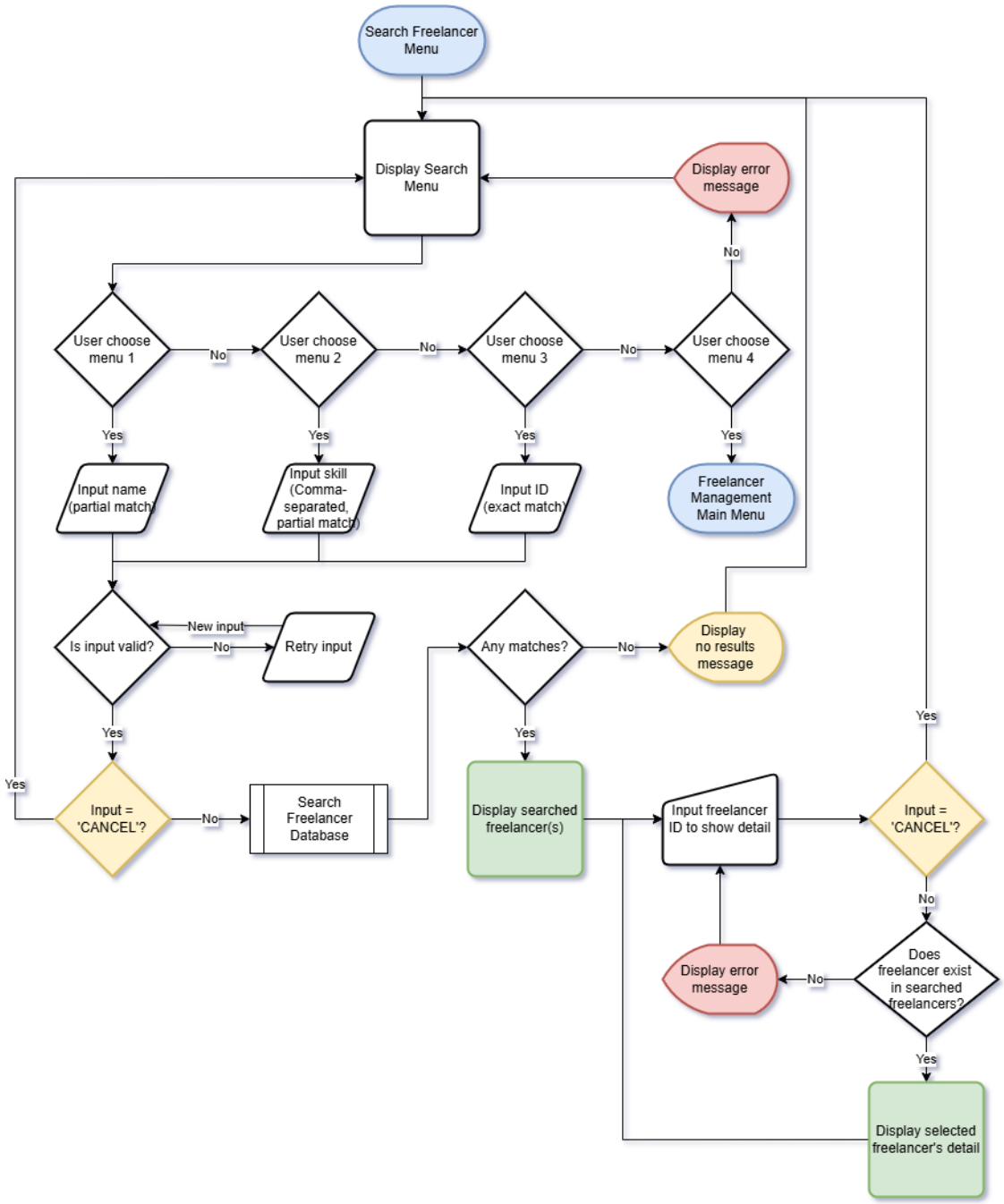


4. Search Freelancer

The user can search freelancers by:

- **Name (partial match)**
- **Skills (comma-separated, OR logic for multiple skills)**
- **Freelancer ID (exact match)**

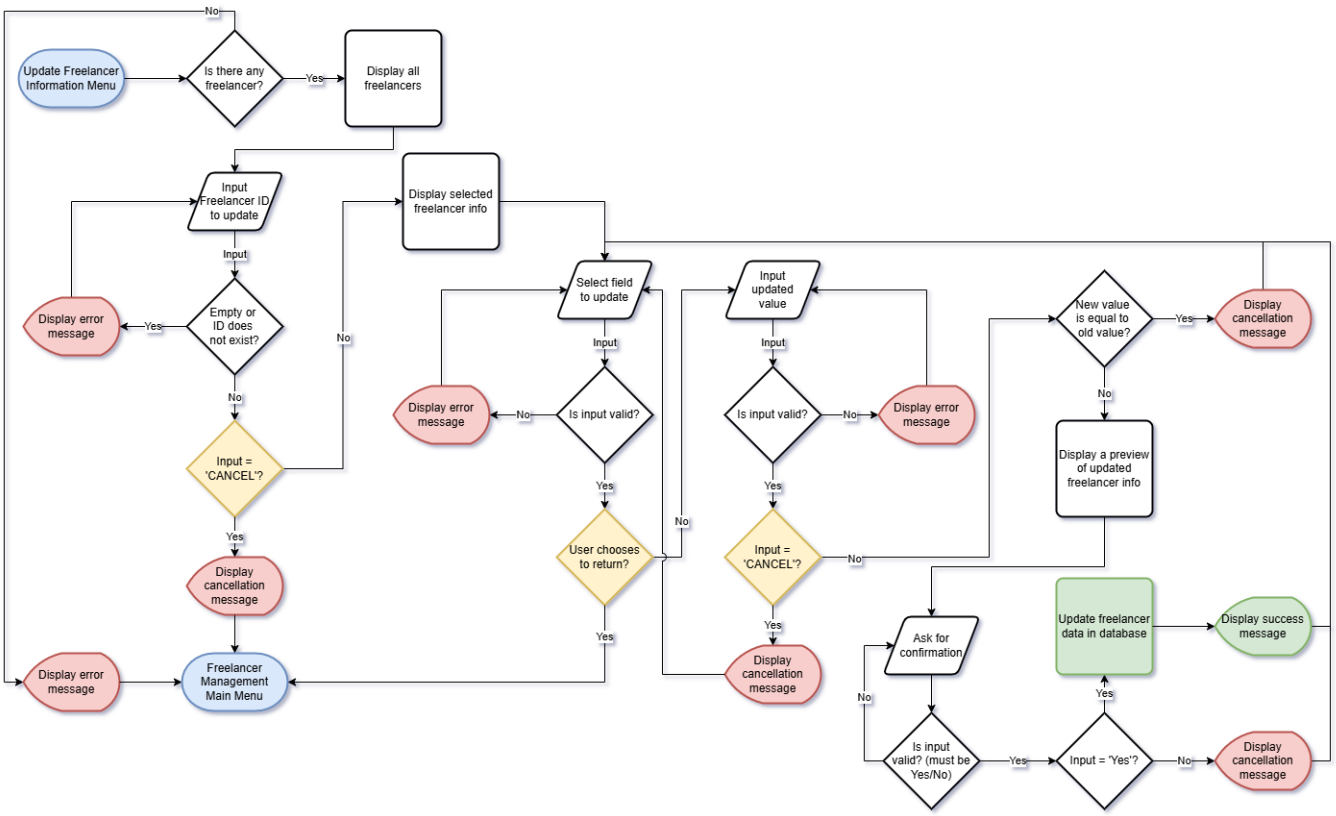
The user can then select a matched freelancer to view its detail. If no freelancer is found, an error message is displayed, and the user can retry or exit the search. Image link: Click Me



5. Update Freelancer Information

The user selects a freelancer by entering their **ID**, after which their **current details** are displayed. The user then chooses which field to update. The new input is validated before applying changes. A final **confirmation step** ensures correctness before updating the database.

Image link: Click Me

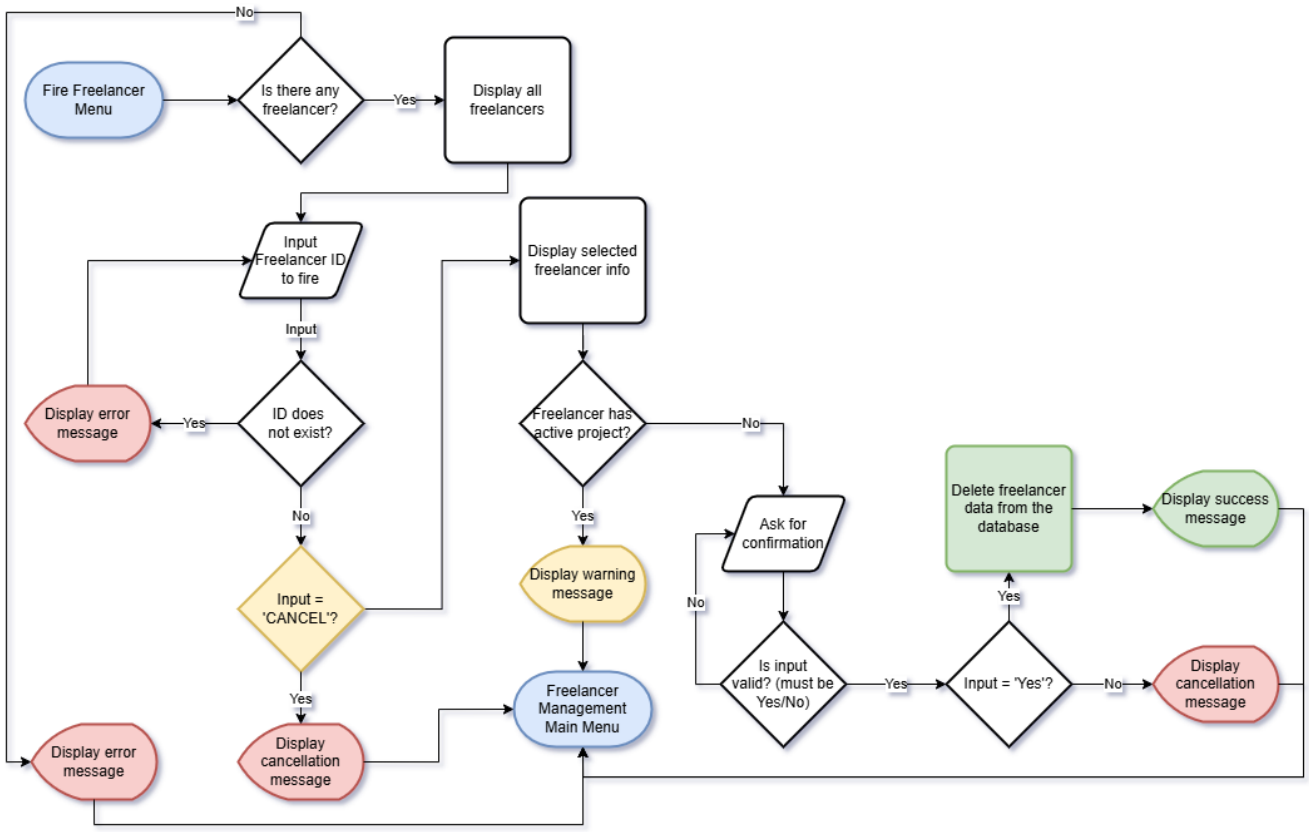


6. Fire Freelancer

The user enters the **Freelancer ID** to remove them.

- If the freelancer has an **active project**, firing is **not allowed**.
- If the freelancer has no active project, a **confirmation step** is required before deletion.

Image link: Click Me

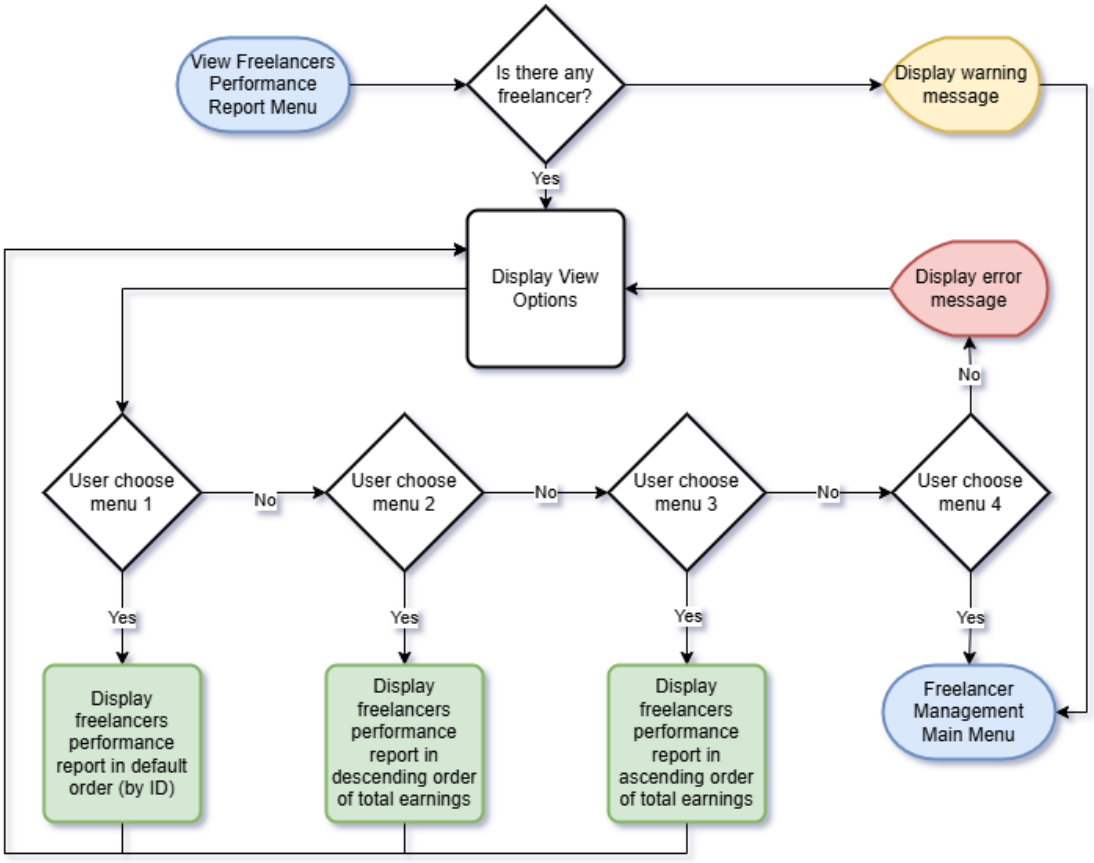


7. View Freelancers Performance Report

This report provides insights into freelancer earnings and project completion history. The user can:

- View freelancers report sorted by ID (default).
- View freelancers report sorted by **total earnings (ascending or descending)**.

Image link: Click Me



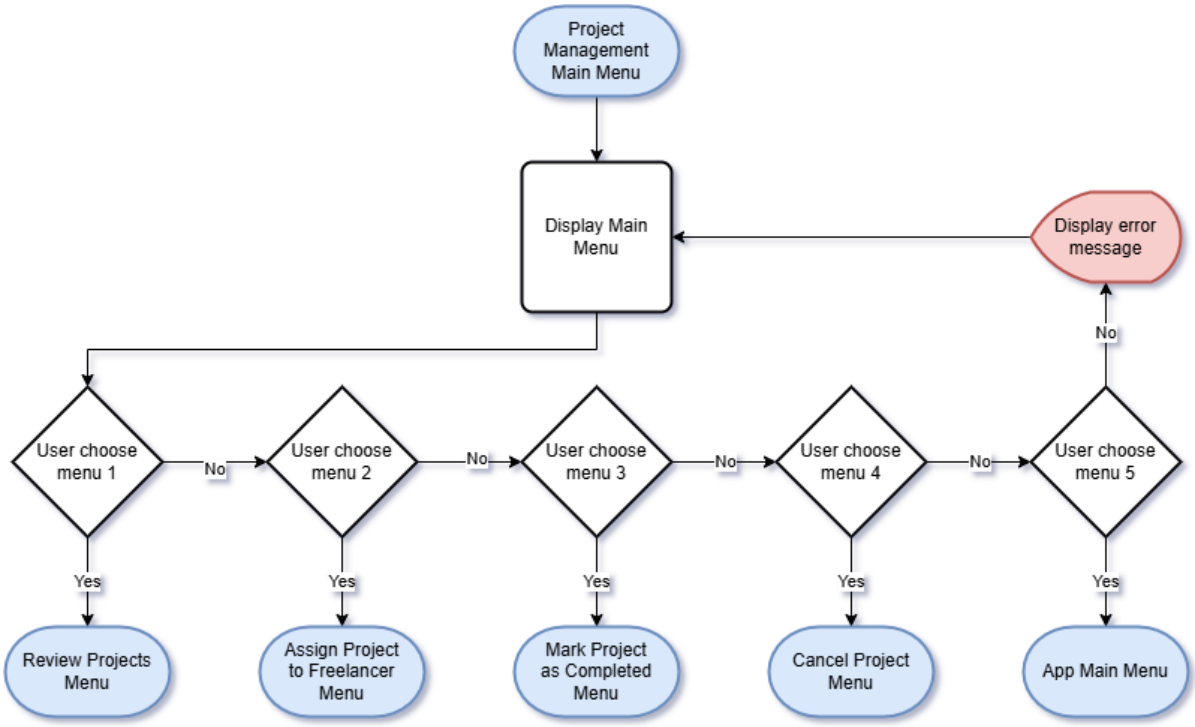
Project Management Menus

1. Main Menu

This menu provides access to all project simple CRUD actions that are related to the app's purpose for freelancer management, including:

- Assigning a project to a freelancer
- Marking a project as completed
- Reviewing projects
- Cancelling projects
- Returning to the **Application Main Menu**

Image link: Click Me

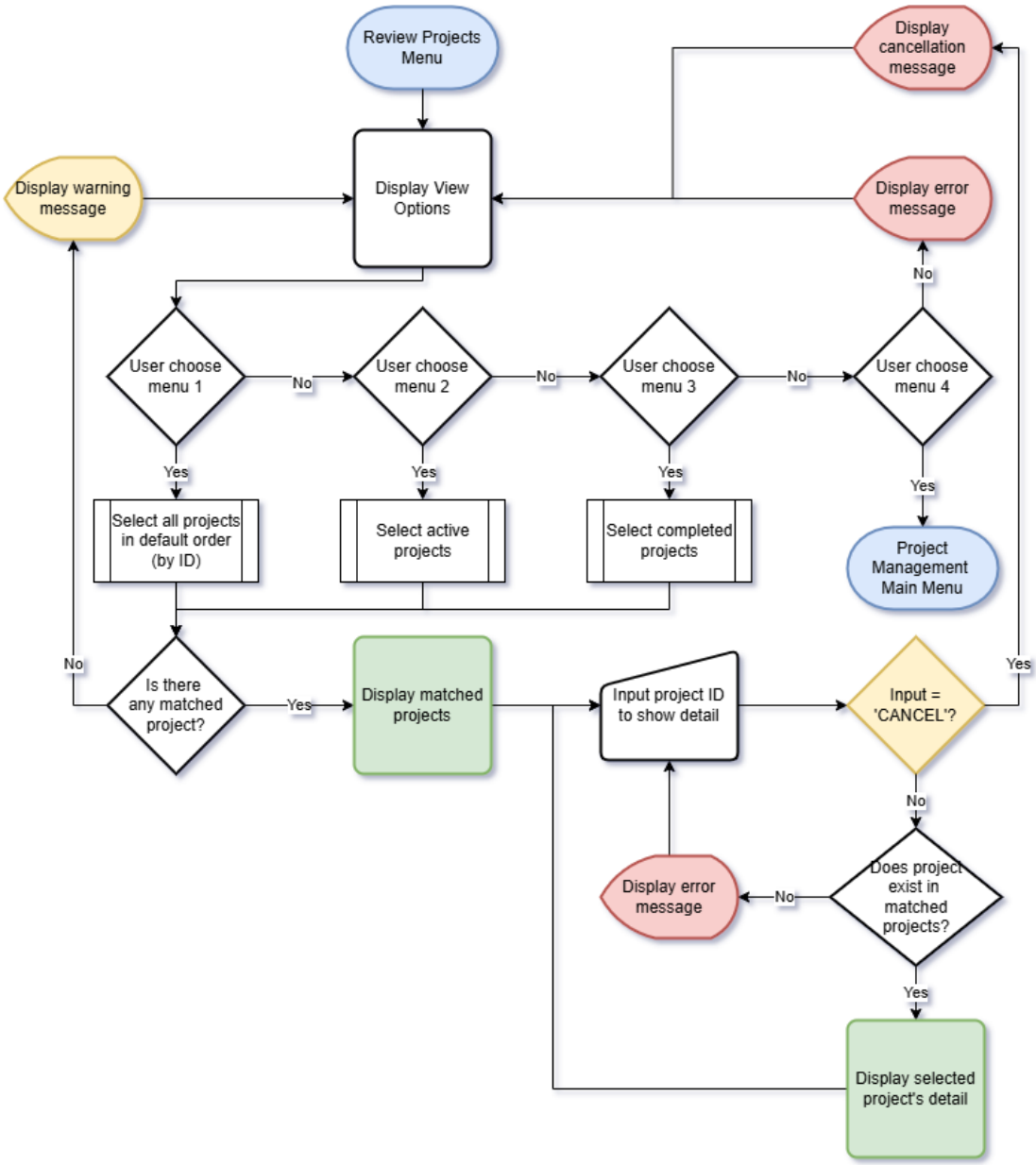


2. Review Projects

The user can view and filter projects by:

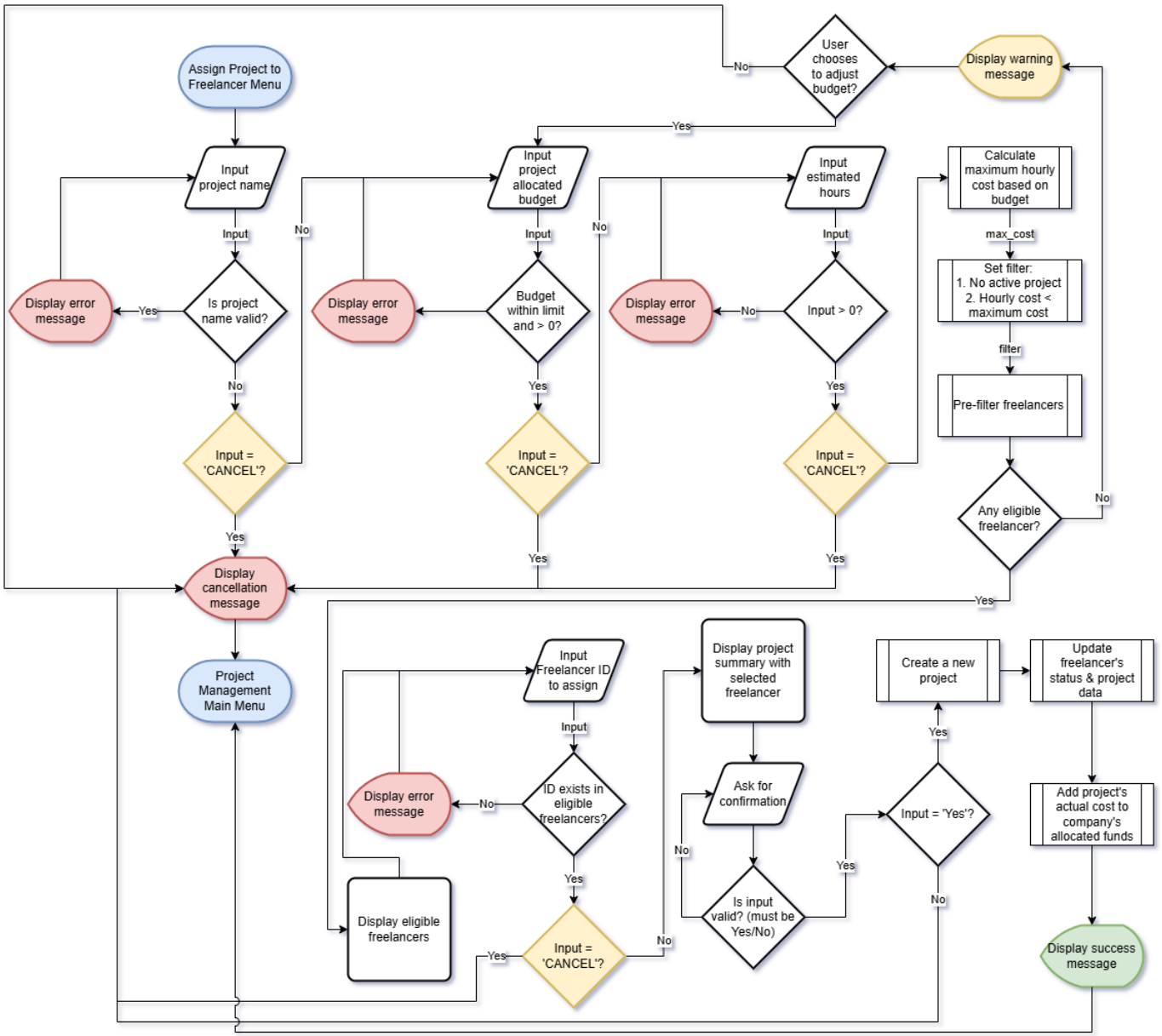
- **All Projects** (no filter)
- **Active Projects**
- **Completed Projects**

The user can then select a matched project to view its detail. Image link: Click Me



3. Assign Project to Freelancer

The user creates a project, entering its details, including name, maximum budget, and estimated hours. A **pre-filtering system** ensures that only **freelancers who are available and whose hourly rate fits within the budget** can be assigned. If no eligible freelancer is found, the user must **adjust the budget or cancel**. Image link: Click Me

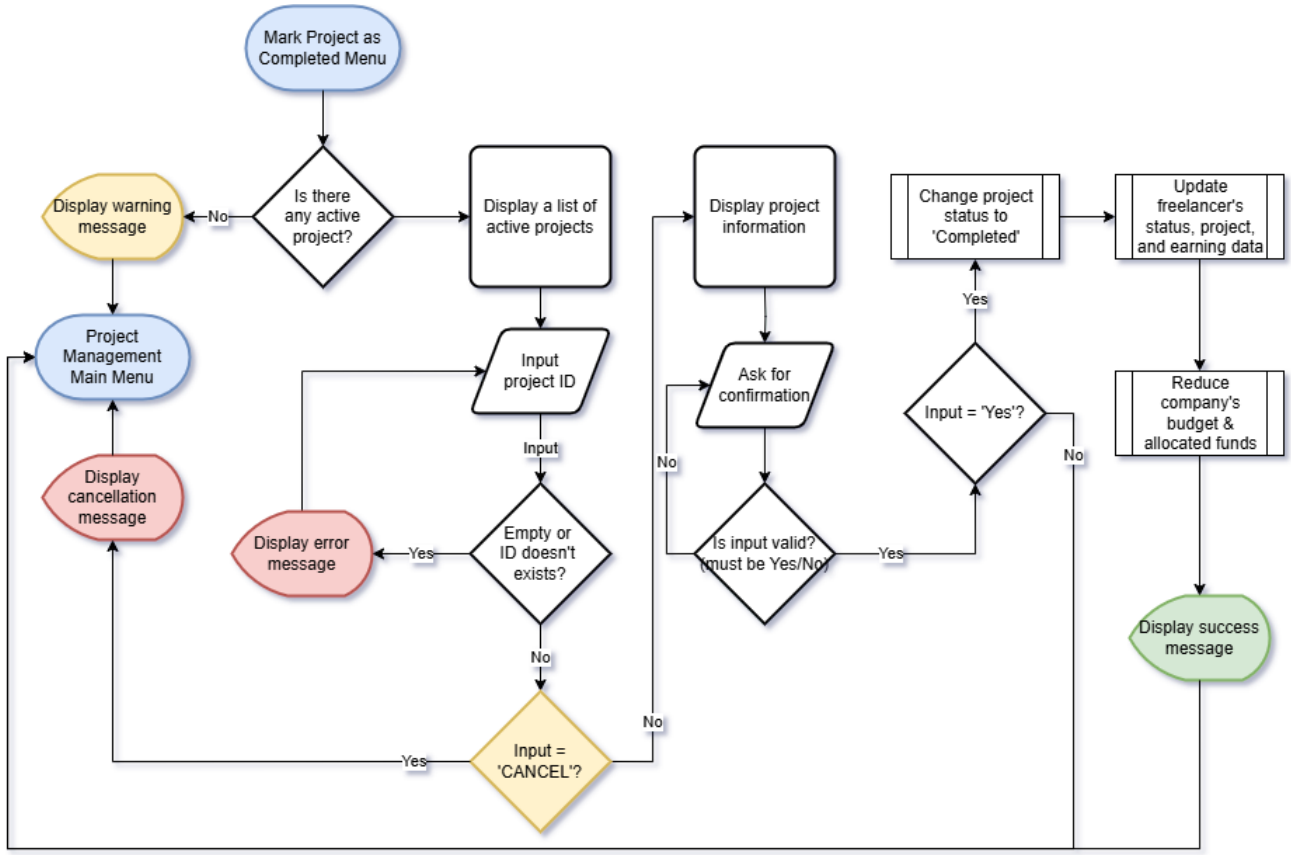


4. Mark Project as Completed

The user selects a **project to mark as completed**.

- The **freelancer becomes available** for new assignments.
- The **company budget & allocated funds are reduced by the project's actual cost**.

Image link: Click Me

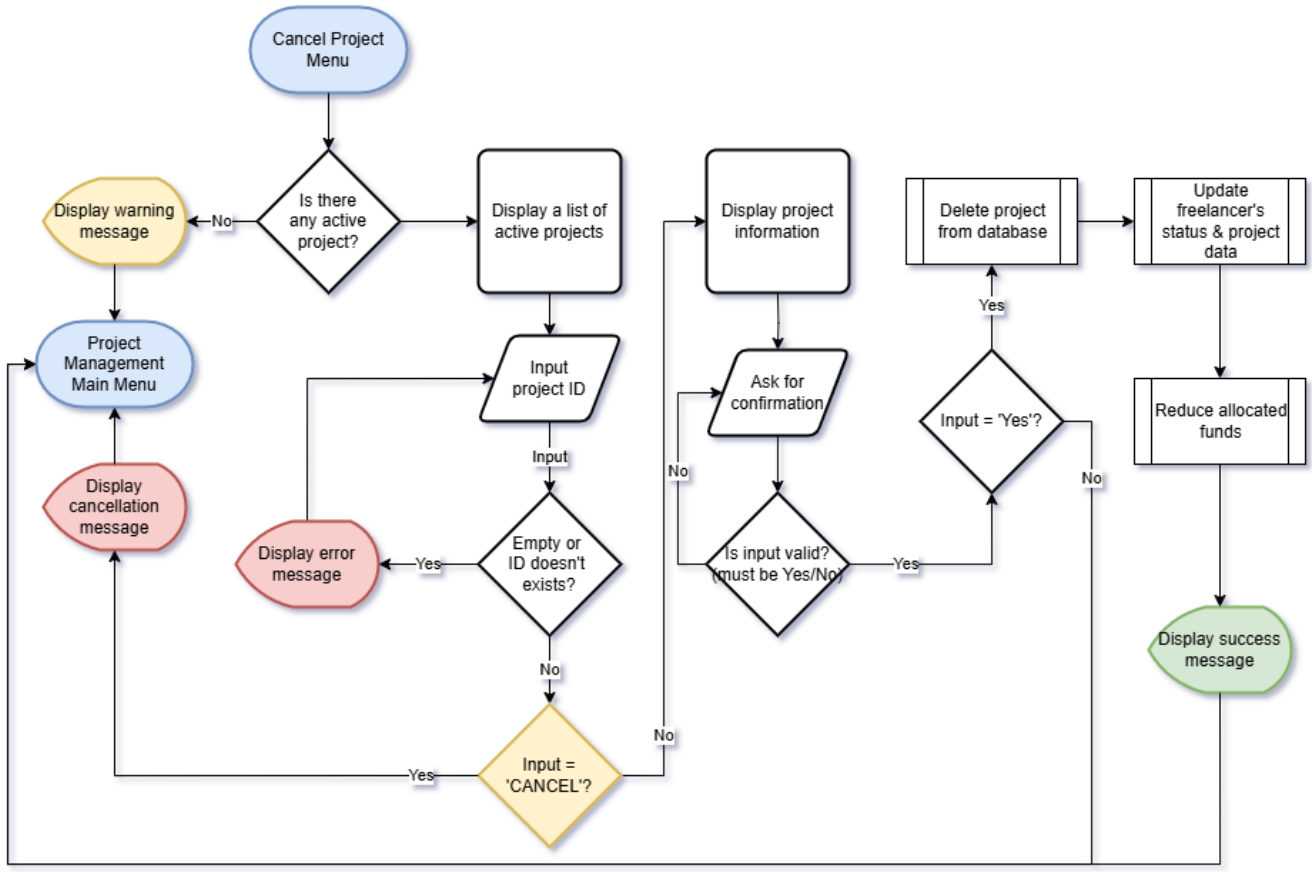


5. Cancel Project

The user can cancel a project.

- **Allocated funds are freed up** if the project is cancelled.
- **Cancelled projects will be deleted from the database.**
- The **freelancer assigned to the project becomes available again**.

Image link: Click Me



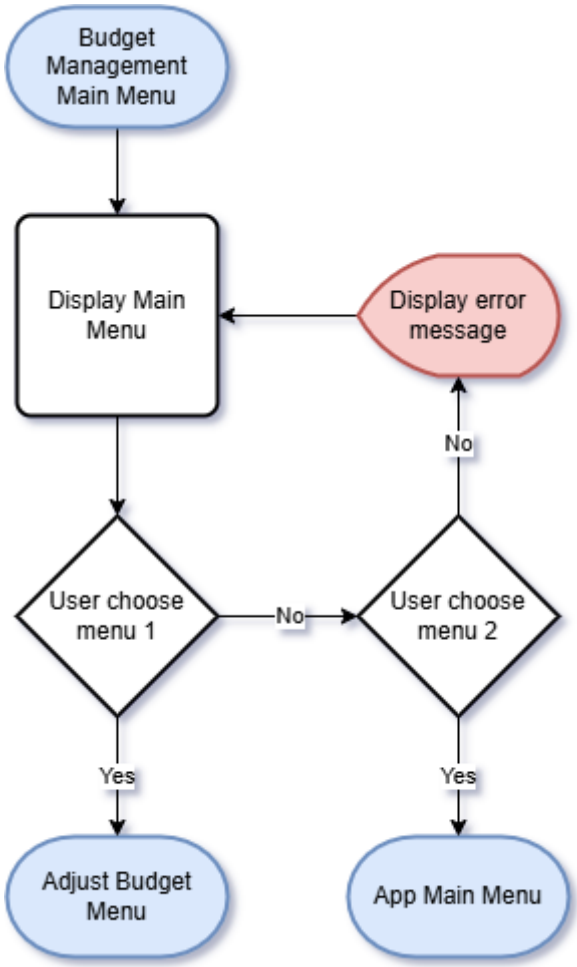
Budget Management Menus

1. Main Menu

This section allows the user to **adjust the company budget**. The user can:

- View the current budget and allocated funds
- Increase or decrease the budget
- Return to the **Application Main Menu**

Image link: Click Me



2. Adjust Budget

This menu allows the user to **increase or decrease** the company's budget.

- The budget **cannot be set below total allocated funds** (the amount already committed to active projects).
- The new budget cannot be the same as the old budget.
- A **confirmation step** ensures changes are intentional.

Image link: Click Me