Report Module Documentation

1. Introduction

The **Report Module** is the dedicated component responsible for data visualization, analysis, and custom reporting within the Timesheet Management System. It empowers authorized users to browse pre-defined labor reports and create bespoke data extracts by selecting specific fields from multiple associated data entities (e.g., employee, department, and account records). This module is critical for supporting business intelligence, payroll processing, project costing, and compliance auditing.

2. Objective (Goals)

The primary objectives of the Report Module are to:

- **Provide Data Flexibility:** Allow users to define, save, and reuse custom report schemas by selecting specific fields across related data tables.
- **Enable Self-Service Analytics:** Reduce reliance on IT or administrative staff for generating routine or ad-hoc data reports.
- **Ensure Data Accuracy:** Generate reports based on the approved, underlying timesheet data.
- **Facilitate Operational Tasks:** Provide tools to schedule and quickly execute reports necessary for payroll and project accounting deadlines.

3. Scope (In-Scope Items)

The Report Module will specifically include the following features, based on the provided UI:

- **Report Browsing:** A main interface for viewing and managing a list of all available and saved reports (schemas).
- **Report Execution:** The ability to run (View) a report and display the resulting data set.
- **Schema Management (CRUD):** Functionality to **Edit**, **Copy**, and **Delete** the underlying structure (schema) of any saved report.
- **Customization Interface:** A dedicated view where users can build a report by dynamically selecting one or more **Tables** (e.g., `employees`, `departments`, `accounts`).
- **Column Selection:** Within each selected table, the user must be able to choose specific **Columns** (fields), such as `first_name`, `last_name`, `id`, `code`, or `number`.
- **Calculated Fields:** Provision to define fields using custom formulas or aggregation logic (implied by the `Calculation` column in the report schema list).
- **Scheduling:** The ability to define a frequency and recipients for automated report generation.

- **Filtering:** The ability to apply conditions and constraints to the data set (e.g., filter by a specific date range or department).

4. Out of Scope

The following functions are explicitly excluded from the Report Module development:

- **Timesheet Data Entry:** The functionality for employees to log hours or submit timesheets.
- **Complex OLAP/BI Tools:** Advanced, multi-dimensional data analysis features, pivot tables, or embedded graphical data visualization (beyond displaying the resulting data table).
- **Data Security/Permissions Logic:** The module assumes that the necessary Role-Based Access Controls (RBAC) defining which data tables a user can access are handled by the core system authentication layer.
- **Master Data Management:** Creating or editing the underlying data (e.g., adding a new employee or department).

These stories cover how users interact with and manage the reports that already exist.

FR ID	Functional Requirement	As a...	I want to...	So that I can...
FR-RM-01	Display report list (Title, Last Viewed, Exec Time).	**Manager**	See the execution time and last viewed date for all my reports	Know which reports are fast/slow and if a required report hasn't been run recently.
FR-RM-02	Allow users to execute a report (View).	**Payroll Admin**	Click the **View** action on the "Weekly Payroll Hours" report	Immediately see the current data set needed for processing.
FR-RM-03	Provide actions for Edit, Copy, and Delete Schema.	**Auditor**	**Copy** an existing "Timesheet Audit" report schema	Modify the copy to track a different specific compliance metric without affecting the original.

FR-RM-04	Provide a Schedule action.	**System Admin**	Set the "Project Utilization Summary" report to run every Monday morning	Ensure the management team receives the data automatically at the start of the week.

Report Customization Interface (FR-RC)

These stories focus on building or modifying the structure (schema) of a report.

FR ID	Functional Requirement	As a...	I want to...	So that I can...
FR-RC-01	Allow user to add multiple **Tables**.	**Project Manager**	Add both the **`timesheets`** and **`projects`** tables to my report	Link the hours recorded to the official project name and budget code.
FR-RC-02	Allow users to select specific **Fields/Columns**.	**Payroll Admin**	Select only the `first_name`, `last_name`, and `employee_id` columns from the `employees` table	Generate a minimal list for data verification before running a full report.
FR-RC-03	Display a running count of selected columns/tables.	**User**	See the count of selected fields update instantly	Quickly monitor how complex my custom report is getting.
FR-RC-04	Provide Select All, Deselect All, and Remove Table links.	**Analyst**	Click **Select All** on the **`accounts`** table	Quickly include all account-related fields and then manually deselect only the two I don't need.

FR-RC-05	Allow user to Save & Apply or Cancel changes.	**User**	Click **Cancel** after making changes to a schema	Discard the modifications if I realize I made a mistake or no longer need the change.
FR-RC-06	Capture and display field metadata (Label, Type, Calculation).	**User**	Rename the default field name `employees.id` to "Personnel ID" in the Label column	Make the final report output clearer and more readable for stakeholders.

Report Filtering (FR-RF)

These stories describe how users constrain the data returned by the report.

FR ID	Functional Requirement	As a...	I want to...	So that I can...
FR-RF-01	Provide a dedicated filter interface.	**User**	See a clear section where I can set conditions before running a report	Easily define exactly which data I want without having to modify the report schema.
FR-RF-02	Support filtering on text, numerical, date, and boolean field types.	**Manager**	Filter by the boolean field `timesheet.is_approved` equals **True**	Only review reports that contain final, approved time entries.
FR-RF-03	Support text operators (Equals, Contains, Starts With, etc.).	**Project Manager**	Filter the `projects.name` field for entries that **Contains** "R&D"	Quickly find all projects related to research and development activities.
FR-RF-04	Provide date range filtering (relative and absolute).	**User**	Apply the relative date filter **"Last Quarter"**	Generate historical data without manually entering

				start and end dates.
FR-RF-05	Allow compound filters using AND/OR logic.	**Admin**	Filter for `department.name` equals **"Sales" AND** `timesheet.total_hours` is greater than **40**	Identify sales employees who have submitted overtime for the week.

Calculated Fields & Aggregation (FR-RA)

These stories detail how users derive new insights from the raw data.

FR ID	Functional Requirement	As a...	I want to...	So that I can...
FR-RA-01	Allow definition of a new column as a Calculated Field.	**Analyst**	Create a new field named "Billed Amount"	Show the hourly charge rate multiplied by the approved hours in the final report.
FR-RA-02	Support standard arithmetic operations.	**Project Manager**	Define a calculation of `(timesheet.total_hours - timesheet.break_hours)`	Accurately report on net productive time for a specific project phase.
FR-RA-03	Support aggregation functions (SUM, AVG, MIN, MAX).	**Payroll Admin**	Apply the **SUM** function to the `timesheet.total_approved_hours` field	Get a total number of approved hours for the entire company during the pay period.
FR-RA-04	Prompt user to select Group By fields when aggregating.	**User**	Use the **SUM** function on the hours field and group by **`project.name`**	See the total labor effort expended on each distinct project, not just a grand total.

FR-RA-05	Allow users to define output format.	**Manager**	Set the format of the new "Billed Amount" field to **Currency**	Ensure the generated report is easy to read and understand from a financial perspective.

User Stories

Requirement ID	**FR-RM-01**
Associated User Story	**As a Manager, I want to see the execution time and last viewed date for all my reports, so that I can know which reports are fast/slow and if a required report hasn't been run recently.**

Specification

Field	**Detail**
Description	The system must display a primary list of all reports (both pre-defined and custom-saved schemas) accessible to the authenticated user. This list must clearly present the **Report Title**, the **Date and Time the report was last executed**, and the **Total time taken for the last execution (Exec Time)** in a readable format (e.g., seconds or milliseconds).
Actor	Any authenticated user with reporting permissions (e.g., Manager, Payroll Admin, Auditor).
Pre-Condition	1. The user must be successfully authenticated and authorized to access the Report Module. 2. At least one report schema must exist and be accessible to the user's role. 3. The report must have been executed at least once to record `Last Viewed` and `Exec Time` metrics.
Post-Condition	1. The Report Module list page loads successfully. 2. The screen displays a filtered list of accessible reports. 3. The `Last Viewed` and

	`Exec Time` columns are populated with the most current data available for each report.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (Access): Only Show What I Can See:** When a Manager opens the Report Module, the system must **only display the reports they are authorized to view**, hiding any reports that belong to other roles or departments they don't manage.
2. **AC-2 (Data Display): Show the Key Info:** For every report listed, the screen must clearly display three separate pieces of information: the **Report's Title** (name), the **Last Viewed Date/Time** (when it was last run), and the **Execution Time** (how long it took to run last time).
3. **AC-3 (Exec Time Accuracy): Tell Me How Fast It Was:** The **Execution Time** displayed must accurately reflect how long the report took to run the *last time it was completed successfully*. This time should be easy to read (e.g., "5.4 seconds" or "1 minute 3 seconds").
4. **AC-4 (Last Viewed Accuracy): Keep the History Current:** The **Last Viewed Date/Time** must automatically update every time the report is run, whether the user clicked "View" or the report was run as a scheduled job.
5. **AC-5 (Default State): Handle New Reports:** If a report is brand new and has **never been run**, the fields for "Last Viewed Date" and "Execution Time" should clearly show **"N/A"** or **"Never Run"** instead of leaving the fields blank.

Requirement ID	**FR-RM-02**
Associated User Story	**As a Payroll Admin, I want to click the View action on the "Weekly Payroll Hours" report, so that I can immediately see the current data set needed for processing.**

Specification

Field	**Detail**

Description	The system must provide a prominent **"View"** action (represented by an eye icon or similar control) for every report schema listed in the Report Module. Executing this action **SHALL** trigger the report generation process based on the saved schema and display the results in a new tabular view for immediate review.
Actor	Any authenticated user with permission to execute reports (e.g., Payroll Admin, Manager, Auditor).
Pre-Condition	1. The user must be successfully authenticated and authorized to access the specific report schema. 2. The report schema must be complete, valid, and saved. 3. The system must have data available in the underlying tables (employees, timesheets, etc.) to populate the report.
Post-Condition	1. The report execution successfully completes. 2. The user is redirected to a results page displaying the output data set in a clear, tabular format. 3. The system captures the execution time for the `FR-RM-01` metric.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **Start the Report:** When a user clicks the **"View"** button, the system must immediately start running the report query and compiling the data. There should be no delay or extra confirmation steps needed to start the process.
2. **Show Progress:** While the report is being built (especially for slow reports), the user **must** see a clear, moving indicator (like a spinning circle or a loading bar) that confirms the system is working on the request.
3. **Display Results:** Once the data is ready, the system must show it in a clean, scrollable table. The headings of this table **must** match the specific **Labels** the user set up in the report customization screen. If the report has many rows, the system should use **pagination** to avoid overwhelming the screen.
4. **No Filters Default:** If the user executes the report without setting any specific dates or filters, the report **must** automatically pull **all relevant data** that the user is allowed to see (based on their role and permissions).
5. **Handle Errors Gracefully:** If something goes wrong and the report fails to run (for example, a database error), the system **must** display a simple, helpful error

message to the user. It **must not** just show a blank page or break the application.

6. **Update Report History:** Every time a report runs successfully, the system **must** automatically update the **"Last Viewed"** date and the **"Exec Time"** (how long it took to run) in the main report list.

Requirement ID	**FR-RM-03**
Associated User Story	**As an Auditor, I want to Copy an existing "Timesheet Audit" report schema, so that I can modify the copy to track a different specific compliance metric without affecting the original.**

Specification

Field	Detail
Description	The system must provide three distinct actions for managing report schemas: **Edit Schema**, **Copy Schema**, and **Delete Schema**. These actions allow users to maintain and customize their available reports. **Copy** must create a completely independent duplicate of the selected report, while **Edit** modifies the original. **Delete** must include a mandatory confirmation step.
Actor	Any authenticated user with reporting permissions (e.g., Auditor, System Administrator, Manager). Permissions for these actions must be controlled by the user's role.
Pre-Condition	1. The user must be successfully authenticated and authorized to access the Report Module. 2. A report schema must exist. 3. The user must have the necessary permissions (e.g., an Auditor might be able to Copy/Edit their own reports but not Delete system-default reports).
Post-Condition	**Edit:** The user is redirected to the customization screen, and saved changes update the original report schema. **Copy:** A new report schema is created with the title "Copy of [Original Title]" and is

	available in the list. **Delete:** The report schema is permanently removed from the system.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (Edit Functionality):** Clicking **Edit Schema SHALL** take the user to the "Customize Report" screen (`FR-RC-01`) populated with the selected report's current table and column configuration.
2. **AC-2 (Copy Integrity):** Clicking **Copy Schema SHALL** instantly create a full duplicate of the selected report, including all tables, columns, labels, calculated fields, and aggregation rules. This new copy **SHALL** be assigned a unique ID.
3. **AC-3 (Copy Naming):** The new copied report's title **SHALL** default to a format clearly indicating its origin, such as "Copy of [Original Report Title]."
4. **AC-4 (Independence):** Once a copy is made, any subsequent edits to the new copy **SHALL NOT** affect the original report schema, and vice versa.
5. **AC-5 (Delete Confirmation):** Clicking **Delete Schema SHALL** trigger a mandatory, non-dismissible modal or prompt that requires the user to explicitly confirm the deletion before the schema is permanently removed.
6. **AC-6 (Permissions Check):** All three actions (Edit, Copy, Delete) **SHALL** be governed by the user's defined roles, and any unauthorized action buttons **SHALL** be disabled or hidden from view.

Requirement ID	**FR-RM-04**
Associated User Story	**As a System Admin, I want to set the "Project Utilization Summary" report to run every Monday morning, so that I can ensure the management team receives the data automatically at the start of the week.**

Specification

Field	Detail
Description	The system must include a **"Schedule"** action available for all reports. This feature allows authorized users to define a **recurring schedule** for report generation (e.g., daily, weekly, monthly). The system must automatically execute the report at the specified time

	and distribute the output (typically as an attachment) to a predefined list of recipients via email.
Actor	Any authenticated user with scheduling permissions (typically System Admin or authorized Manager).
Pre-Condition	1. The user must be authenticated and authorized to schedule reports. 2. A complete and saved report schema must exist. 3. The system's internal email/notification service must be operational to send the scheduled reports.
Post-Condition	1. A new, active **schedule job** is successfully created and linked to the report schema. 2. The report list display updates to indicate that the report is now scheduled (e.g., showing the next run date). 3. The system reliably executes the report at the first scheduled time.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (Scheduling Interface):** Clicking the **"Schedule"** action **SHALL** open a user-friendly interface allowing the user to define the schedule frequency (e.g., Once, Daily, Weekly, Monthly) and the exact time of execution.
2. **AC-2 (Weekly Recurrence):** The system **SHALL** support weekly scheduling, allowing the user to select specific **days of the week** (e.g., every Monday) for the report to run.
3. **AC-3 (Recipient Definition):** The scheduling interface **SHALL** include a required field where the user can enter one or more valid email addresses for the recipients of the generated report.
4. **AC-4 (Format Selection):** The user **SHALL** be able to select the **output format** (e.g., PDF, CSV) in which the report will be attached to the distribution email.
5. **AC-5 (Job Execution):** At the designated date and time, the system **SHALL** run the report query automatically, generate the file in the selected format, and successfully email it to all defined recipients.
6. **AC-6 (Error Notification):** If a scheduled report fails to run (e.g., due to a data error or system failure), the system **SHALL** automatically send an alert email to the **System Admin** detailing the failure reason and time.

Report Customization Interface (FR-RC)

Requirement ID	**FR-RC-01**

Associated User Story	**As a Project Manager, I want to add both the timesheets and projects tables to my report, so that I can link the hours recorded to the official project name and budget code.**

Specification

Field	Detail
Description	The report customization interface **must** allow the user to select and combine data from multiple source **tables** (like 'Employees,' 'Timesheets,' and 'Projects') into a single report schema. The system needs to automatically identify the common linking fields (e.g., matching the `Employee ID` in the 'Timesheets' table with the `ID` in the 'Employees' table) to ensure the data is correctly matched and displayed together.
Actor	Any authenticated user with permission to create or edit reports (e.g., Project Manager, Payroll Admin, Auditor).
Pre-Condition	1. The user must be in the Report Customization screen. 2. At least one primary table must already be selected (e.g., 'Timesheets'). 3. The system's underlying database structure must have defined relationships (keys) between the tables available for reporting.
Post-Condition	1. The user's report schema includes fields from the newly added table(s). 2. The report execution process can successfully join the selected data sets. 3. The user can proceed to select columns from all linked tables.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (Table Selection):** The customization interface **SHALL** provide a clear list or selection tool showing all available report source tables (e.g., Employees, Timesheets, Projects).

2. **AC-2 (Add/Remove):** The user **SHALL** be able to select and add a secondary table to the current report schema, and also remove any added table without affecting the primary table.
3. **AC-3 (Automatic Linking):** When a new table is added, the system **SHALL** automatically attempt to link it to the previously selected tables based on known database relationships (e.g., joining 'Timesheets' and 'Projects' on a shared `Project ID`).
4. **AC-4 (Link Confirmation):** If a link is successfully established, the system **SHALL** provide a visual indicator (e.g., a line connecting the tables) confirming that the tables are linked and ready for use.
5. **AC-5 (Column Availability):** Once tables are linked, the list of selectable **Columns** (`FR-RC-02`) **SHALL** immediately update to include all fields from **all linked tables**, allowing the user to mix and match data points (e.g., select `Employee.Name` and `Timesheet.Hours`).
6. **AC-6 (Error on Unlinked Data):** If the user attempts to execute a report where tables are added but are not correctly linked (or the linking field is missing), the system **SHALL** display an error message and **SHALL NOT** allow the report to run until the linking issue is resolved.

Requirement ID	**FR-RC-02**
Associated User Story	**As a Payroll Admin, I want to select only the first_name, last_name, and employee_id columns from the employees table, so that I can generate a minimal list for data verification before running a full report.**

Specification

Field	Detail
Description	The report customization interface **must** provide a tool (e.g., a checkbox list or drag-and-drop mechanism) that allows the user to individually select which data fields, or **columns**, from the **linked tables** (`FR-RC-01`) they want to include in their final report output. Users must be able to select, deselect, and define the **order** in which these columns will appear in the final report table.
Actor	Any authenticated user with permission to create or edit reports (e.g., Payroll Admin, Project Manager, Auditor).

Pre-Condition	1. The user must be in the Report Customization screen. 2. At least one data table (and preferably all necessary tables) must have been added and successfully linked (`FR-RC-01`).
Post-Condition	1. The user's report schema is updated with the selected columns and their chosen display order. 2. The report can now be executed, and the output will only contain the data from these selected columns.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (List all Available Fields):** The system **SHALL** display a complete list of all selectable fields from **all currently linked tables**. Fields should be clearly labeled (e.g., "Employees > First Name").
2. **AC-2 (Simple Selection):** The user **SHALL** be able to select or deselect any field by a simple action (e.g., clicking a checkbox or dragging the column into an active area).
3. **AC-3 (Required Fields):** If the system requires any field for data integrity (e.g., a foreign key used for linking tables), it **SHALL** be included by default, but the user **SHALL** have the option to hide it from the final report view if it's not needed for analysis.
4. **AC-4 (Ordering):** The user **SHALL** be able to easily define the **left-to-right display order** of the selected columns in the final report output table.
5. **AC-5 (Preview of Selection):** The customization screen **SHALL** display a dynamic, interactive area (like a list of "Selected Columns") showing the current set of chosen columns and their sequence, allowing for easy reordering.
6. **AC-6 (No Duplication):** The system **SHALL** prevent the user from selecting the same column more than once for the same report.

Requirement ID	**FR-RC-03**
Associated User Story	**As a User, I want to see the count of selected fields update instantly, so that I can quickly monitor how complex my custom report is getting.**

Specification

Field	**Detail**

Description	The report customization screen **must** include a set of counters that display the current number of **Tables** and **Columns (Fields)** actively included in the report schema. These counts must be updated immediately whenever a user adds or removes a table (`FR-RC-01`) or selects or deselects a column (`FR-RC-02`), giving the user a real-time status of their report's complexity.
Actor	Any User interacting with the Report Customization screen.
Pre-Condition	1. The user must be in the Report Customization screen. 2. The report must be in an editable state (Draft or being actively edited).
Post-Condition	1. The visual counters displaying the number of selected tables and columns reflect the current configuration of the report schema. 2. The user can successfully rely on these numbers to manage the report's complexity.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (Table Counter):** The customization screen **SHALL** display a dedicated, visible counter showing the exact number of **unique tables** that have been added to the report schema.
2. **AC-2 (Column Counter):** The screen **SHALL** display a second dedicated counter showing the exact number of **columns (fields)** that have been selected for display in the final report output.
3. **AC-3 (Instant Update):** Both counters **SHALL** update immediately (with no noticeable lag) after the user performs an action that changes the count, such as selecting a column or removing a table.
4. **AC-4 (Visibility):** The counters **SHALL** be persistently visible on the screen, even while the user is scrolling through a long list of available fields or tables.
5. **AC-5 (Initial State):** When a user starts a **new report**, the counters **SHALL** correctly display "1 Table" (for the primary table) and "0 Columns" (until the user selects the first column).

Requirement ID	**FR-RC-04**

Associated User Story	**As an Analyst, I want to click Select All on the accounts table, so that I can quickly include all account-related fields and then manually deselect only the two I don't need.**

Specification

Field	Detail
Description	The column selection area **must** provide convenient actions for quickly managing the selected fields. Specifically, the system needs links or buttons that allow users to **Select All** fields within a specific table, **Deselect All** fields within a specific table, and a clear action to **Remove Table** entirely from the report schema. These tools are designed to streamline the process of including or excluding large groups of data points.
Actor	Any User interacting with the Column Selection interface (e.g., Analyst).
Pre-Condition	1. The user must be in the Report Customization screen. 2. At least one table has been added to the report schema. 3. The user is currently viewing the list of available columns for that table.
Post-Condition	1. The set of selected columns is updated instantly based on the bulk action performed (e.g., all columns are checked). 2. The report schema is updated if a table is removed. 3. The column count (`FR-RC-03`) reflects the change immediately.

Acceptance Criteria (AC)

The system must meet the following criteria to fulfill this requirement:

1. **AC-1 (Select All):** For every linked table displayed in the column selection area, the user **SHALL** see a **"Select All"** action. Clicking this action **SHALL** instantly select (check) every available column within that specific table, without affecting other tables.
2. **AC-2 (Deselect All):** Alongside the "Select All" action, the user **SHALL** see a **"Deselect All"** action. Clicking this action **SHALL** instantly deselect (uncheck) every column within that specific table.

3. **AC-3 (Remove Table Link):** For every table added to the schema, the user **SHALL** have a clearly visible **"Remove Table"** action. Clicking this **SHALL** remove the table and all its associated selected columns from the report schema.
4. **AC-4 (Confirmation for Remove):** If the "Remove Table" action is clicked, the system **SHALL** display a brief confirmation message (e.g., "Are you sure you want to remove this table?") before permanently deleting the table and its columns from the report schema.
5. **AC-5 (Real-Time Count Update):** All bulk actions (**Select All, Deselect All, Remove Table**) **SHALL** immediately update the real-time counters for columns and tables (`FR-RC-03`).
6. **AC-6 (Primary Table Restriction):** The system **SHALL NOT** allow the "Remove Table" action to be used on the primary, foundational table of the report. The action should be hidden or disabled for this specific table.

Requirement ID	**FR-RC-05**
Associated User Story	**As a User, I want to click Cancel after making changes to a schema, so that I can discard the modifications if I realize I made a mistake or no longer need the change.**

Specification

Field	Detail
Description	The report editing screen **must** clearly show two main buttons: **"Save & Apply"** and **"Cancel."** The **Save & Apply** button is the "I'm done" button—it makes all your recent changes to the report permanent. The **Cancel** button is the "undo" button—it lets you leave the editing screen and **delete all the unsaved changes** you made, keeping the original report exactly as it was.
Actor	Any user who is changing the settings of a report.
Pre-Condition	1. The user must be actively looking at the Report Customization screen. 2. They must have made at least one change (like adding or removing a column).

Post-Condition (Save & Apply)	1. The report's settings are permanently updated in the system. 2. The user is taken back to either the main Report List or the screen where they can view the actual report data.
Post-Condition (Cancel)	1. **All changes made** since entering the edit screen are immediately removed and **not saved**. 2. The report's settings are exactly the same as they were before the user started editing. 3. The user is taken back to the main Report List.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Save Works):** Clicking **"Save & Apply"** must correctly lock in all current settings (tables, columns, filters) and close the editing screen immediately.
2. **AC-2 (Cancel Works):** Clicking **"Cancel"** must close the editing screen and **must not** save any of the changes made during that session.
3. **AC-3 (Warning on Exit):** If the user tries to click "Cancel" or close the window after making changes, the system **must** show a quick pop-up warning (like, "Warning: You have unsaved changes. Do you want to discard them?") to prevent accidentally losing their work.
4. **AC-4 (Temporary Editing):** While editing, the system must work on a temporary copy of the report settings. The changes are only applied to the real, original report when the user explicitly clicks "Save & Apply."
5. **AC-5 (Button Styling):** The **Save & Apply** button **must look more prominent** (e.g., colored blue or green) than the **Cancel** button (e.g., a simple gray link) to gently encourage the user to save their successful work.

Requirement ID	**FR-RC-06**
Associated User Story	**As a User, I want to rename the default field name employees.id to "Personnel ID" in the Label column, so that I can make the final report output clearer and more readable for stakeholders.**

Specification

Field	Detail

Description	The report customization screen **must** allow users to view and modify key details about each selected data field. Specifically, for every column, the system needs editable fields for the **Label** (the name displayed in the final report) and non-editable information for the **Data Type** (e.g., text, number, date) and an area to apply a **Calculation** (e.g., Sum, Average, Count). This ensures the output is professional and understandable, regardless of the internal system field names.
Actor	Any user building or editing a report schema.
Pre-Condition	1. The user is in the Report Customization screen. 2. At least one column has been selected from the linked tables.
Post-Condition	1. The custom **Label** is saved with the report schema. 2. When the report runs, the output table headers use the custom **Label** instead of the default field name. 3. The **Data Type** and **Calculation** settings for the field are recorded.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Label Editability):** The system **SHALL** provide an editable input field, called **"Label,"** next to every selected column. Users must be able to type any descriptive name they want into this field.
2. **AC-2 (Display in Report):** When the report is run, the column header in the final output **SHALL** exactly match the custom text entered in the **Label** field. The original database name (e.g., `employees.id`) **SHALL NOT** be visible to the report viewer.
3. **AC-3 (Data Type Display):** The system **SHALL** automatically show the original data format (e.g., "Text," "Number," "Date," "Currency") in a non-editable field called **"Type"** next to the column. This helps the user know what kind of data they are working with.
4. **AC-4 (Calculation Input):** The system **SHALL** provide a dedicated area or dropdown menu, called **"Calculation,"** where users can select aggregate functions (like SUM, AVG, or COUNT) if the column's **Type** is numerical or currency.
5. **AC-5 (Default Label):** If the user does not enter a custom Label, the system **SHALL** automatically use a cleaned-up, human-readable version of the original field name as the default Label (e.g., turning `first_name` into "First Name").
6. **AC-6 (Label Validation):** The system **SHALL** prevent the user from saving the report schema if the custom **Label** field is left blank. The user must provide a name.

Report Filtering (FR-RF)

Requirement ID	FR-RF-01
Associated User Story	**As a User, I want to see a clear section where I can set conditions before running a report, so that I can easily define exactly which data I want without having to modify the report schema.**

Specification

Field	Detail
Description	The report viewing screen **must** include a clearly marked, separate interface for setting **temporary filters** on the data. This filter interface allows users to narrow down the results (e.g., only show data from "Q3," or only for "Department X") *without* changing the main report settings (**schema**). The filter conditions should be **applied only for the current viewing session** and should be easy to modify or remove.
Actor	Any user who can view or execute a report (e.g., User, Manager, Payroll Admin).
Pre-Condition	1. The user has selected a report to execute. 2. The system has loaded the report's general view or execution screen.
Post-Condition	1. The report executes using the filter conditions provided by the user. 2. Only data records that match **all** filter conditions are displayed in the results. 3. The applied filters are visible to the user above the report results table.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Visibility and Placement):** The filter interface **SHALL** be clearly visible and easily accessible on the Report View screen, preferably positioned above the main data results table.

2. **AC-2 (Field Selection):** The filter interface **SHALL** allow the user to select *any* field available in the report's underlying schema as a filter condition.
3. **AC-3 (Condition Definition):** For each selected field, the system **SHALL** provide appropriate operators based on the field's data type (e.g., for Date fields: "is before," "is between," "is on"; for Text fields: "contains," "starts with").
4. **AC-4 (Value Input):** The input control for the filter value **SHALL** match the data type of the field being filtered (e.g., a calendar picker for Date fields, a text box for Text fields).
5. **AC-5 (Filter Execution):** After setting filters, the user **SHALL** click a clear action button (e.g., "Apply Filters" or "Run Report") to re-execute the report and display the filtered results.
6. **AC-6 (No Schema Change):** Applying temporary filters **SHALL NOT** modify the permanent report schema stored in the database. When the user closes and re-opens the report, it **SHALL** revert to its default, unfiltered state.

Requirement ID	**FR-RF-02**
Associated User Story	**As a Manager, I want to filter by the yes/no field timesheet.is_approved equals True, so that I only review reports that contain final, approved time entries.**

Specification

Field	Detail
Description	The filtering interface **must** automatically recognize the type of data in the field being filtered (e.g., text, number, date, or boolean/yes-no). Based on the data type, the system **must** then provide the appropriate tools and operators to set the condition. For example, filtering on a Date field should show a calendar, while filtering on a Boolean field should show a simple 'Yes' or 'No' dropdown. This ensures accurate and error-free filtering regardless of the data source.
Actor	Any user who can view or execute a report (e.g., User, Manager, Payroll Admin).
Pre-Condition	1. The user is actively using the filter interface (FR-RF-01). 2. They have selected a field to filter on.

Post-Condition	1. The correct filtering tools (operators and input controls) for the chosen data type are displayed. 2. The report executes successfully using the data type-specific logic.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Text Fields):** When filtering a text field (like 'Employee Name'), the system **SHALL** provide operators such as **"contains," "starts with," "ends with," "equals,"** and **"does not equal."**
2. **AC-2 (Numerical Fields):** When filtering a numerical field (like 'Hours Worked' or 'Pay Rate'), the system **SHALL** provide operators such as **"is greater than," "is less than," "is between,"** and **"equals."**
3. **AC-3 (Date Fields):** When filtering a date field (like 'Timesheet Date' or 'Approval Date'), the system **SHALL** display a calendar picker for the value input and provide operators like **"is on," "is before," "is after,"** and a clear option for **"is between"** two dates.
4. **AC-4 (Boolean Fields):** When filtering a boolean (yes/no) field (like `is_approved`), the system **SHALL** provide a simple dropdown or radio button with only two options: **'Yes' (True)** and **'No' (False)**.
5. **AC-5 (Default Control):** The input control **SHALL** automatically default to the most appropriate method (e.g., a simple text box for text, a date picker for dates) when the field is selected.

Requirement ID	**FR-RF-03**
Associated User Story	**As a Project Manager, I want to filter the projects.name field for entries that Contains "R&D", so that I can quickly find all projects related to research and development activities.**

Specification

Field	**Detail**
Description	When a user chooses to filter a text field (like a name, title, or description), the system **must** provide a full list of logical operators that go beyond a simple "equals." These operators must include actions like **Contains** (finds the text anywhere in the field), **Starts**

	With (finds the text only at the beginning), and **Ends With** (finds the text only at the end). This allows users to search for data when they only know a part of the field's value.
Actor	Any user who can view or execute a report (e.g., Project Manager, Payroll Admin).
Pre-Condition	1. The user is actively using the filter interface (FR-RF-01). 2. They have selected a field with a **Text** data type to filter on.
Post-Condition	1. The report executes using the specific text matching logic (e.g., finding the text "R&D" anywhere within the Project Name). 2. The report results show only the records that satisfy the complex text condition.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Operator Availability):** The system **SHALL** provide the following specific operators for all text fields: **"Equals," "Does Not Equal," "Contains," "Does Not Contain," "Starts With,"** and **"Ends With."**
2. **AC-2 (Contains Logic):** When the user selects **"Contains,"** the system **SHALL** successfully return records where the entered value appears anywhere within the field's text.
3. **AC-3 (Starts With Logic):** When the user selects **"Starts With,"** the system **SHALL** only return records where the field's text begins with the entered value.
4. **AC-4 (Ends With Logic):** When the user selects **"Ends With,"** the system **SHALL** only return records where the field's text concludes with the entered value.
5. **AC-5 (Case Insensitivity):** All text operator matching **SHALL** be case-insensitive by default (e.g., searching for "john" should find "John").

Requirement ID	**FR-RF-04**
Associated User Story	**As a User, I want to apply the relative date filter "Last Quarter", so that I can generate historical data without manually entering start and end dates.**

Specification

Field	Detail
Description	When filtering on any field marked as a **Date** or **Date/Time** type, the system **must** give the user two ways to set the range: **Absolute** and **Relative**. **Absolute** lets the user pick fixed start and end dates using a calendar tool. **Relative** provides preset, dynamic options (like "Today," "Last Week," "This Quarter") that automatically calculate the correct date range based on the current calendar date. This prevents users from having to manually look up specific dates.
Actor	Any user who can view or execute a report.
Pre-Condition	1. The user is actively using the filter interface (FR-RF-01). 2. They have selected a field with a **Date** or **Date/Time** data type to filter on.
Post-Condition	1. The report executes successfully using the date range defined (whether absolute or relative). 2. Only data records that fall within that specific time period are displayed in the results.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Absolute Range):** The filter interface **SHALL** allow users to select an explicit **"Start Date"** and **"End Date"** using a calendar picker, and the system **SHALL** return all data between those two fixed dates (inclusive).
2. **AC-2 (Relative Options):** The system **SHALL** provide a dedicated selection for common relative date ranges, including at least: **"Today," "Yesterday," "Last Week," "This Week," "Last Month," "This Month," "Last Quarter," "This Quarter," "Last Year,"** and **"This Year."**
3. **AC-3 (Dynamic Calculation):** When a relative date range is selected (e.g., "Last Quarter"), the system **SHALL** correctly and dynamically calculate the exact calendar start and end dates (e.g., if today is October 13, 2025, "Last Quarter" should calculate to July 1, 2025 – September 30, 2025).
4. **AC-4 (Default to Current):** If the user clears all filter selections, the report **SHALL** default to an unrestricted date range (showing all time) unless a default range is pre-set in the report schema.
5. **AC-5 (Time Zone Consistency):** All date range calculations (especially for relative dates) **SHALL** be based on a consistent, defined system time zone.

Requirement ID	FR-RF-05
Associated User Story	**As an Admin, I want to filter for department.name equals "Sales" AND timesheet.total_hours is greater than 40, so that I can identify sales employees who have submitted overtime for the week.**

Specification

Field	Detail
Description	The filtering interface **must** allow users to define multiple filtering conditions (rules) on different fields. Crucially, the system **must** allow the user to define the relationship between these rules using either **AND** or **OR** logic. **AND** means a record must meet *all* specified conditions to be included. **OR** means a record must meet *at least one* of the specified conditions. This feature is essential for performing advanced, targeted data analysis.
Actor	Any user who can create or modify reports (e.g., Admin, Payroll Admin).
Pre-Condition	1. The user is actively using the filter interface (FR-RF-01). 2. They have already defined at least one filter rule.
Post-Condition	1. The report executes successfully using the combined AND/OR logic. 2. The report results show only the records that meet the complex, multi-layered criteria (e.g., only Sales employees *who also* worked more than 40 hours).

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Add Multiple Rules):** The system **SHALL** provide a clear, easily accessible action (e.g., an "+ Add Filter" button) that allows the user to define a second, third, and subsequent filter rules.

2. **AC-2 (Logic Operator Display):** For reports with multiple rules, the system **SHALL** display a primary selector (e.g., a dropdown or radio button) to clearly choose the overall logic operator: **AND** or **OR**.
3. **AC-3 (AND Logic Test):** When **AND** is selected, the system **SHALL** only return records that satisfy **ALL** defined filter rules simultaneously.
4. **AC-4 (OR Logic Test):** When **OR** is selected, the system **SHALL** return records that satisfy **ANY** of the defined filter rules.
5. **AC-5 (Clarity of Rules):** Each defined filter rule (Field, Operator, Value) **SHALL** be listed clearly in sequence so the user can easily review the complex logic they have built.

Calculated Fields & Aggregation (FR-RA)

Requirement ID	FR-CC-01
Associated User Story	**As an Analyst, I want to create a new field named "Billed Amount", so that I can show the hourly charge rate multiplied by the approved hours in the final report.**

Specification

Field	Detail
Description	The report customization screen **must** provide a dedicated interface that allows users to define a new column whose value is the result of a mathematical formula. This formula can use existing numerical fields (like `hours_approved` and `charge_rate`), constants, and standard mathematical operators (+, -, *, /). The user **must** be able to name this new column (the **Label**) and select its data type (e.g., Currency, Decimal).
Actor	Any user who can create or modify reports (e.g., Analyst, Admin).
Pre-Condition	1. The user is in the Report Customization screen. 2. The report schema already includes the necessary numerical fields needed for the calculation (e.g., `rate` and `hours`).
Post-Condition	1. A new, permanent column is added to the report schema definition. 2. The report output will include this new column, with

	values calculated row-by-row according to the defined formula (e.g., `Billed Amount = Hours * Rate`).

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Formula Input):** The system **SHALL** provide a dedicated text area or builder interface to input the calculation formula using standard math syntax (e.g., `[timesheet.hours] * [projects.charge_rate]`).
2. **AC-2 (Field Picker):** When building the formula, the system **SHALL** provide a way for the user to **select existing field names** (from linked tables) to ensure accurate syntax and prevent typos in the formula.
3. **AC-3 (Supported Operators):** The formula interface **SHALL** support the four core mathematical operations: **addition (+), subtraction (-), multiplication (*), and division (/)**.
4. **AC-4 (Result Type Definition):** The user **SHALL** be required to select the **Result Data Type** (e.g., Number, Currency, Percentage) for the new calculated field, which determines how the result is formatted in the final report.
5. **AC-5 (Error on Invalid Formula):** If the user inputs a formula that is mathematically impossible (e.g., dividing by zero) or syntactically incorrect (e.g., missing a parenthesis), the system **SHALL** display an immediate, helpful error message and **SHALL NOT** allow the user to save the report schema.
6. **AC-6 (Execution Check):** When the report is run, the system **SHALL** calculate the value for this new column **for every single row of the report** before it is displayed.

Requirement ID	**FR-CC-02**
Associated User Story	**As a Project Manager, I want to define a calculation of (timesheet.total_hours - timesheet.break_hours), so that I can accurately report on net productive time for a specific project phase.**

Specification

Field	Detail
Description	The system **must** fully support all standard mathematical operations, including **addition (+), subtraction (-), multiplication**

	(*), and division (/). Crucially, it **must** also support the use of **parentheses ()** to control the order of operations (e.g., ensuring a subtraction happens *before* a division). This capability is necessary for users to create calculations that accurately reflect business logic, such as calculating net time, profit margins, or percentages.
Actor	Any user who can create or modify reports (e.g., Project Manager, Analyst).
Pre-Condition	1. The user is in the Calculated Field definition interface (FR-CC-01). 2. They are using valid numerical fields in their formula.
Post-Condition	1. The calculated field formula is saved, including parentheses and multiple operators. 2. When the report is run, the system correctly applies the mathematical **Order of Operations** (Parentheses first, then Multiplication/Division, then Addition/Subtraction) to calculate the final value for every row.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Basic Arithmetic):** The formula engine **SHALL** correctly process addition, subtraction, multiplication, and division between any two numerical fields or constants.
2. **AC-2 (Parentheses Priority):** The system **SHALL** correctly execute any operation enclosed in **parentheses ()** before any operations outside of them, ensuring the correct mathematical order is maintained.
    a. *Example Test:* The formula `5 + 2 * 3` should result in 11 (multiplication first), but `(5 + 2) * 3` should result in 21 (addition first).
3. **AC-3 (Field Interoperability):** The formula **SHALL** allow mixing fields from different linked tables (e.g., `[timesheet.hours] - [projects.overhead]`) as long as they are both numerical types.
4. **AC-4 (Syntax Validation):** The system **SHALL** validate the formula for common syntax errors, such as unmatched parentheses, and immediately warn the user before saving.
5. **AC-5 (Decimal Handling):** The system **SHALL** retain precision for calculated results, correctly handling decimal numbers in the final output based on the Result Data Type selected (FR-CC-01, AC-4).

Requirement ID	FR-CC-03

Associated User Story	**As a Payroll Admin, I want to apply the SUM function to the timesheet.total_approved_hours field, so that I can get a total number of approved hours for the entire company during the pay period.**

Specification

Field	Detail
Description	The system **must** allow users to apply standard aggregation functions—specifically **SUM (total), AVG (average), MIN (minimum), and MAX (maximum)**—to numerical fields. This is used when the report is running in a **grouped** or **summary** mode, where the system calculates a single result for an entire set of data (e.g., the total hours for a department, not for a single employee). These functions are vital for generating high-level metrics and key performance indicators.
Actor	Any user who can create or modify reports (e.g., Payroll Admin, Analyst).
Pre-Condition	1. The user is in the Report Customization screen. 2. They are defining a column that is a valid numerical field. 3. The report is intended to be run in a summary or grouped format.
Post-Condition	1. The report schema is saved with the chosen aggregation function applied to the selected field. 2. When the report is run, the system calculates and displays the aggregated value (e.g., the total sum) rather than the individual row-by-row data for that column.

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Function Selection):** The column definition interface **SHALL** provide a clear option (e.g., a dropdown) to select one of the following functions: **SUM, AVG, MIN, or MAX**.
2. **AC-2 (Data Type Restriction):** The aggregation function selector **SHALL only be active and available** for fields that are numerical data types (e.g., hours, rate, amount). It **SHALL NOT** be available for text or date fields.

3. **AC-3 (SUM Calculation):** The system **SHALL** correctly calculate and display the **total sum** of all values in the specified field for the resulting data set.
4. **AC-4 (AVG Calculation):** The system **SHALL** correctly calculate and display the **mathematical average** of all values in the specified field for the resulting data set.
5. **AC-5 (MIN Calculation):** The system **SHALL** correctly identify and display the **lowest value** in the specified field for the resulting data set.
6. **AC-6 (MAX Calculation):** The system **SHALL** correctly identify and display the **highest value** in the specified field for the resulting data set.
7. **AC-7 (Grouping Behavior):** If the user has also defined report grouping (e.g., grouping by 'Department'), the aggregation function **SHALL** calculate the SUM, AVG, MIN, or MAX separately for **each group**.

Requirement ID	**FR-CC-04**
Associated User Story	**As a User, I want to use the SUM function on the hours field and group by project.name, so that I can see the total labor effort expended on each distinct project, not just a grand total.**

Specification

Field	**Detail**
Description	The system **must** provide a dedicated interface that allows the user to select one or more fields to **"Group By."** When a user applies any aggregation function (SUM, AVG, MIN, MAX) to a column, the system **must** recognize that the final report will be run in a summary mode. The Group By fields determine how the data is segmented (e.g., showing the total hours *per department* rather than just *the total hours overall*). The user must be able to select multiple grouping fields for multi-level summaries (e.g., grouping by Department, then by Manager within that Department).
Actor	Any user who can create or modify reports (e.g., User, Analyst).
Pre-Condition	1. The user is in the Report Customization screen. 2. The user has applied at least one aggregation function (SUM, AVG, MIN, or MAX) to a numerical column (FR-CC-03).

Post-Condition	1. The selected fields (e.g., `project.name`) are saved as the grouping criteria for the report schema. 2. When the report is run, the final output will show a summary line for each unique value in the Group By field(s).

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Grouping Interface):** The report customization screen **SHALL** include a separate, clear section (e.g., a "Group By" tab or panel) for selecting fields to group the data.
2. **AC-2 (Required Grouping Prompt):** If the user selects an aggregation function (SUM, AVG, etc.) but has **not** yet selected a Group By field, the system **SHALL** display a helpful visual prompt or message suggesting they select a field to group by.
3. **AC-3 (Multi-Level Grouping):** The system **SHALL** allow the user to select multiple fields for grouping (e.g., first by `Department`, then by `Project Name` within that department), and **SHALL** execute the report based on this defined order.
4. **AC-4 (Result Format):** The final report output **SHALL** clearly display the grouping fields and their unique values, followed by the aggregated (SUM/AVG/MIN/MAX) results for that specific group.
   a. *Example:* A row should show: **Department: Sales**, **Total Hours: 1,500**.
5. **AC-5 (Non-Numerical Grouping):** The system **SHALL** allow grouping only by fields that are Text, Date, or Boolean types (i.e., you cannot group by a numerical field like "hours worked").

Requirement ID	**FR-CC-05**
Associated User Story	**As a Manager, I want to set the format of the new "Billed Amount" field to Currency, so that I can ensure the generated report is easy to read and understand from a financial perspective.**

Specification

Field	**Detail**
Description	The system **must** provide a way for the user to explicitly define how the data in a column should look in the final report output. This formatting control is vital for numerical fields, calculated fields, and

	dates, allowing users to apply standard presentation styles like **Currency ($), Percentage (%), Decimal Places**, or various **Date/Time** formats. This feature ensures that the report is easily digestible by stakeholders without requiring them to interpret raw numbers.
Actor	Any user who can create or modify reports (e.g., Manager, Analyst).
Pre-Condition	1. The user is in the Report Customization screen. 2. A field (either an original field or a Calculated Field) has been selected for the report.
Post-Condition	1. The output format choice (e.g., "Currency") is saved as part of the report schema for that specific column. 2. When the report is run, the data in that column appears with the selected formatting applied (e.g., $1,500.00).

Acceptance Criteria (AC) - What Must Happen When Testing

1. **AC-1 (Format Option):** The column definition interface **SHALL** include a mandatory "Output Format" selector for all numerical and date-based columns.
2. **AC-2 (Currency Format):** The system **SHALL** provide an option to format numerical values as **Currency**, which includes adding a currency symbol (e.g., '$') and defaulting to two decimal places (e.g., $1,250.50).
3. **AC-3 (Percentage Format):** The system **SHALL** provide an option to format numerical values as a **Percentage**, which multiplies the value by 100 and adds the percent symbol (e.g., 0.5 becomes 50%).
4. **AC-4 (Decimal Control):** The system **SHALL** allow the user to specify the exact number of **decimal places** (e.g., 0, 1, 2) to display for any numerical or calculated field.
5. **AC-5 (Date/Time Formats):** The system **SHALL** provide multiple standard date format options (e.g., MM/DD/YYYY, DD-MMM-YY, etc.) for date-type fields.
6. **AC-6 (Calculated Field Default):** For newly created Calculated Fields (FR-CC-01), the system **SHALL** default the format to the most appropriate type based on the formula, but always allow the user to override it.