Business Expenses Management Platform Technical Report

I.   System Vision Document

Problem Description

- **Current Issue:** Organizations struggle with managing expenses efficiently across different levels, leading to budget overruns, lack of transparency, and delayed approvals.
- **Impact:** Inefficient expense management affects financial planning, reduces operational efficiency, and can lead to financial discrepancies and compliance issues

System Capabilities

- **Key Features:**
  - User authentication with role-based access (admin, manager, employee).
  - Central fund pool management.
  - Hierarchical budget allocation (company > department > project > employee).
  - Expense submission and categorization.
  - Configurable expense limits for employees.
  - Multi-level approval workflow.
  - Reporting and analytics dashboard.
  - Data persistence using a relational database.
- **Scope:**
  The system will manage the entire expense lifecycle from budget allocation to expense approval and reporting. It will not handle payroll or other non-expense-related f financial transactions.

Business Benefits

- **Efficiency:** Streamlines the expense management process, reducing manual effort and speeding up approvals.
- **Cost Savings:** Helps in monitoring and controlling expenses, preventing budget overruns.
- **Competitive Advantage:** Provides a transparent and efficient expense management system, enhancing financial control and compliance.

II.   User Stories

User Story:
Department Budget Allocation

As a Department Head
I want to allocate and adjust budgets for specific projects within my department
So that I can ensure projects have sufficient funding and stay within financial constraints.
Acceptance Criteria
The department head can access the "Budget Allocation" section from the dashboard.
The system allows the department head to set or adjust budgets for each project.
Budget allocations are restricted so that the total allocated amount does not exceed the department's total budget.
The system displays remaining budget amounts in real-time as expenses are recorded.

User Story:
Project Expense Submission
As an Employee
I want to submit expenses against projects I am assigned to
So that I can accurately track project-related expenses.
Acceptance Criteria
The employee can access the "Expense Submission" section from the project dashboard.
The system restricts submission to employees assigned to the specific project.
Each expense entry includes a submission date, amount, and project ID, which must be validated.
The system prevents expenses that would exceed the remaining project budget from being submitted.

User Story:
Expense Approval Workflow
As a Finance Manager
I want to review and approve or reject submitted expenses
So that I can control project spending and enforce budget limits.
Acceptance Criteria
The finance manager has access to the "Expense Approval" section.
The system displays expenses awaiting approval, including details like submission date, amount, and project.
The finance manager can approve or reject each expense, updating its approval status and approval date.
Only users with the "Approver" role can access approval functionality, enforced by the system.
A confirmation prompt appears before finalizing each approval or rejection. The system displays remaining budget amounts in real-time as expenses are recorded.

User Story:
Role Management for Approval Workflow
As an Admin
I want to assign roles that allow specific employees to approve expenses
So that only authorized personnel can participate in the expense approval process.
Acceptance Criteria
The admin can access a "Role Management" section within the system.

The system allows the admin to assign and update roles for employees (e.g., Approver, Viewer).
Only employees with the "Approver" role are permitted to access expense approval workflows.
The system prompts for confirmation before applying role changes.

User Story:
Real-time Budget Monitoring
As a Project Manager
I want to view real-time budget usage and remaining amounts for each project
So that I can manage resources effectively and prevent overspending.
Acceptance Criteria
The project manager can access "Budget Monitoring" on the project dashboard.
The system displays current budget usage, allocated budget, and remaining budget in real-time.
The system restricts any additional expenses if the remaining budget reaches zero.
Notifications are triggered for the project manager if the remaining budget is low
(e.g., under 10%).

III.   Use Cases (Event Decomposition Technique)

External Events

- Agents wanting transactions
- Agents needing information
- Data changes
- Management requests for information

Use Case Examples

- **Transaction Requests**: If an external agent (e.g., a customer or employee) initiates a transaction, such as submitting an expense, this would require a Submit Expense use case.
- **Information Requests:** For cases where an external agent (e.g., a project manager) requests current budget information, define a View Budget Status use case.
- **Data Change:** If external data, such as employee or project information, changes and requires an update, use cases like Update Employee Information or Update Project Details are appropriate.
- **Management Requests:** For situations where management requires detailed financial reports, define a Generate Financial Report use case.

Temporal Events

- Scheduled management or operational reports
- Reminders and notifications

Use Case Examples

- **Periodic Reports:** Management might need monthly or weekly financial summaries. Use cases like Generate Monthly Financial Summary or Produce Weekly Expense Report can handle this.
- **Automated Notifications:** If there are reminders for budget renewals or expense approvals, define a Send Budget Renewal Notification or Send Expense Approval Reminder use case.

Sate Events

- When a budget is exhausted, it could trigger an alert.
- When an expense is approved, it may prompt further processes.

Use Case Examples

- **Budget Exhaustion:** If a project's budget reaches zero, the system could trigger a Notify Budget Exhaustion use case.
- **Expense Approval Change:** When an expense's status changes to approved, it could initiate a Log Expense Approval use case.

Applying The Perfect Technology Assumption

As specified, exclude system control functions like login or logout from this analysis, as they are infrastructure-level and don't directly relate to core business processes.

Summary of Key Use Cases:

1. **Submit Expense** (*External Event*) - For users submitting expenses related to projects.
2. **View Budget Status** (*External Event*) - For project managers to check remaining budget.
3. **Generate Monthly Financial Summary** (*Temporal Event*) - A monthly report for management.
4. **Send Expense Approval Reminder** (*Temporal Event*) - Notification to approvers for pending expenses.
5. **Notify Budget Exhaustion** (*State Event*) - Triggered when a project's budget is fully used.

Categorized Event Table: Types, Users, and Use Cases

Event Type	User	Event	Use Case
External	Employee	Expense Submission	Submit Expense
External	Project Manager	Request Budget Information	View Budget Status
Temporal	Management	Generate Monthly Financial Summary	Generate Monthly Financial Summary
Temporal	System	Send Expense Approval Reminder	Send Expense Approval Reminder
State	System	Budget Exhaustion Trigger	Notify Budget Exhaustion

Brief Use Case Description Table

Budget Allocation Subsystem

Use Cases	Description
Allocate Budget	Allows department heads to allocate budgets to specific projects, ensuring financial constraints are considered.
Adjust Budget	Enables department heads to adjust budgets within financial constraints, ensuring budget limits are maintained.
Monitor Budget	Enables department heads and finance teams to monitor remaining budget for departments, ensuring budget utilization is tracked.
Enforce Budget Limits	Ensures that budget limits are enforced during allocation, preventing overspending.

Use Cases	Users/Actors
Allocate budget to specific projects	Department Head
Adjust budgets within financial constraints	Department Head
Monitor remaining budget for departments	Department Head, Finance
Enforce budget limits during allocation	System, Department Head

Expense Submission Subsystem

Use Cases	Description
Submit Expense	Allows employees to submit expenses related to specific projects, ensuring entries include required details like project ID, date, and amount.
Track Expense Status	Enables employees and project managers to track the status of submitted expenses, ensuring transparency and visibility.
Validate Expense Entry	Ensures that expense entries are validated for accuracy, including date, amount, and other relevant details.
Restrict Excessive Expenses	Prevents expenses that exceed budget limits from being submitted, ensuring budget constraints are maintained.

Use Cases	Users/Actors
Submit project-related expenses	Employee
Track expense submission status	Employee, Project Manager
Validate expense entry (date, amount, etc.)	System, Finance
Restrict expenses that exceed budget	System

Expense Approval Workflow Subsystem

Use Cases	Description
Review Expenses	Enables finance managers to review submitted expenses, ensuring accuracy and validity.
Approve/Reject Expenses	Allows finance managers to approve or reject expenses, ensuring financial controls are maintained.
View Expense History	Enables finance managers and admins to view detailed expense submission history, ensuring transparency and auditability.
Receive Approval Confirmation	Sends confirmation to finance managers for approval actions, ensuring accountability

Use Cases	Users/Actors
Review submitted expenses	Finance Manager
Approve or reject expenses	Finance Manager
View detailed expense submission history	Finance Manager, Admin
Receive confirmation for approval actions	Finance Manager

Role Management Subsystem

Use Cases	Description
Assign Roles	Enables admins to assign roles for expense approval access, ensuring role-based access control.
Update Roles	Allows admins to update roles for employees, ensuring changes are reflected in the system.
Enforce Role-Based Access	Ensures that role-based access control is enforced for approvals, preventing unauthorized access.
Confirm Role Changes	Sends confirmation to admins for changes in role assignments, ensuring accountability.

Use Cases	Users/Actors
Assign roles for expense approval access	Admin
Update roles for employees	Admin
Enforce role-based access for approvals	System
Confirm changes in role assignments	Admin

Real-time Budget Monitoring Subsystem

Use Cases	Description
View Real-Time Budget Usage	Enables project managers to view real-time budget usage, ensuring up-to-date information.
Display Remaining Budget	Displays remaining budget in real-time, enabling project managers and finance teams to track budget utilization.
Trigger Low Budget Alerts	Triggers alerts when remaining budget is low, ensuring proactive action can be taken.
Restrict Expenses at Zero Budget	Prevents further expenses from being submitted when budget is fully utilized, ensuring budget constraints are maintained.

Use Cases	Users/Actors
View real-time budget usage	Project Manager
Display remaining budget in real-time	Project Manager, Finance
Trigger alerts for low remaining budget	System, Project Manager
Restrict further expenses at zero budget	System

Reporting Subsystem

Use Cases	Description
Generate Budget Allocation Report	Generates a report on department budget allocation, providing insights into budget utilization.
Generate Expense Summary Report	Generates a report on project expenses, providing insights into expense trends and patterns.
Produce Real-Time Budget Monitoring Report	Generates a report on real-time budget monitoring, providing up-to-date information on budget utilization.
View Approval History	Enables finance managers and admins to view approval history of expenses, ensuring transparency and auditability.

Use Cases	Users/Actors
Generate department budget allocation report	Management, Finance
Generate project expense summary report	Project Manager, Finance
Produce real-time budget monitoring report	Project Manager
View approval history of expenses	Finance Manager, Admin

UML Use Case Diagram

1. Budget Allocation Subsystem

- Allocate budget to specific projects
- Monitor remaining budget for departments
- Enforce budget limits during allocation
- Adjust budgets within financial constraints

«extend»
«include»

Actors: Department Head, Finance, System

2. Expense Submission Subsystem

- Submit project-related expenses
- Validate expense entry
- Track expense submission status
- Restrict expenses that exceed budget

«include»
«extend»

Actors: Employee, Finance, Project Manager, System

3. Expense Approval Workflow Subsystem

- Review submitted expenses
- Approve or reject expenses
- View detailed expense submission history
- Receive confirmation for approval actions

«include»

Actors: Finance Manager, Admin

4. Role Management Subsystem

- Assign roles for expense approval access
- Update roles for employees
- Confirm changes in role assignments
- Enforce role-based access for approvals

Actors: Admin, System

5. Real-time Budget Monitoring Subsystem

- View real-time budget usage
- Display remaining budget in real-time
- Trigger alerts for low remaining budget
- Restrict further expenses at zero budget

«extend»

Actors: Finace, Project Manager, System

6. Reporting Subsystem

- Generate department budget allocation report
- Generate project expense summary report
- View approval history of expenses
- Produce real-time budget monitoring report

«extend»

Actors: Management, Finance, Admin, Project Manager