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**GROUP 15**

**FDM Expenses Manager**

**ECS506U Software Engineering  
Group Project**

**Problem/Domain Analysis Report**

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# 1. Introduction

FDM Expenses Manager, is an expenses tracker system that is intended to be used by FDM employees to submit expense claims for various business charges, and receive a reimbursement equivalent to the capital expenditure. The current expenses system FDM implements is an inefficient and manual approach which, in such a fast-paced environment, results in a slowdown of their operations [1]. This may not only lead to unnecessary costs, but to the extent of having the necessity to replace the current system due to its high inefficiency.

We propose a free software that will provide its users with the ability to submit reimbursement claims for business related expenses such as: overnight stays, business dining, and similar expenditures concerning business related activities. Our proposed application offers a uniform and easy solution to track expenses that are classified as business related purchases, made by FDM employees, which will then be authorised prior to proceeding with the reimbursement. A filtering search system will be in place to allow more flexibility for viewing the types of expenses reimbursed. Additionally, the option to attach VAT and receipts will be in place, providing useful insights aimed at monitoring employees' spending patterns and habits [2] by analysing their expenses claims.

Research [3], [4] suggests that tracking expenses regularly and efficiently is one of the most effective ways to help meet one's financial objectives, as well as keeping oneself accountable through the monitoring of one's spending habits. Although this is highly appreciated in one's personal financial life, it appears it is not yet as popular in the corporate world: more than "46% of companies don't track the cost of expense reports" and "43% manage their expenses manually" [5]. This leads us to believe that getting into the habit of tracking expenses in the work environment is highly beneficial both for the employee as well as the business itself. It provides a way to monitor what employees are mainly spending money on, and help them better budget their allowance, as well as try to reduce their spendings. At the same time, tracking a company's expenses may significantly help the business' financial planning process [4], as it paves a way to easily check and determine the areas most of the business' money is spent on.

Automated expenses tracking may additionally reduce delays in the reimbursement process, along with reducing overall time spent by administrators and supervisors on paper work or manual data entry [3], [6]. On top of that, there is enhanced prevention of fraudulent expenses claims [7] through the monitoring of areas of spending of each employee, and of the legitimacy of each claim submitted.

Although there are currently a number of rival softwares on the market, leading with Pleo, most of them present disadvantages, such as high price points or access only for a restricted number of users. It is our firm conviction that our proposed application is the perfect charge free solution to incorporate a business information system that will improve the expense tracking process, resulting in increased efficiency and reliability of all business operations.

## **2. Customers and users**

The software is designed to be used by any FDM employee who wishes to submit any expense claim for a number of various business expenses (including but not limited to: travel, meals, various business purchases, etc.).

The system also provides to the user the option to submit VATs or receipts to support said claims. Once submitted, the claims will need to be approved by the employee's individual line manager and, if approved, finally sent to be processed by the finance department.

Although all of the users of the system are FDM employees, the line managers are assigned different tasks and hold specific roles in addition to the ones a regular employee can perform, hence their differentiation from regular employees in our proposed system. These two categories act as separate entities within the system.

### **Line Manager**

Line Managers are FDM members whose main duty is approving and reviewing expenses claims submitted by the employees.

A claim is approved only if it is backed up by a formal proof of the expense (such as VAT or receipts), which must be submitted by the employee who is requesting said claim. This is to ensure that the requested claim falls under the correct and legitimate expense category, as well as to certify the business nature of the expense.

If the line manager finds the claim legitimate and approves it, the system will ensure that the formal request is sent to the finance department to be processed and for the reimbursement of the expenses to be completed.

On the contrary, if the line manager finds the claim inadequate (if, for instance, no substantial or credible proof is submitted), they can reject the employee's request and file a formal report. In this case, the claim will not be forwarded to the finance department and no reimbursement will take place. The line manager will then archive the request and file a report on the employee's behalf for future reference.

The line manager needs to ensure that each claim is processed (either approved or denied) within a predetermined period starting from the submission of the claim. Regardless of the outcome of the request, each claim (including any filed reports in the case of rejection) is kept in the system's database for future reference.

## Employees

Employees are the primary users of the software: these can be either part of the internal FDM staff or of the external consultants, which in total amount to over 5,000+ on a global scale.

All employees are provided with a personal business email and corresponding password, which enable them to access and login into the system to access its features. Each employee has their individual account in the system, which stores their information (name, position in the company, business email, etc.) as well as all their submitted requests, both approved and non-approved ones.

Each employee has a personal score, which is calculated based on the percentage of reports filed on their behalf. If their score falls below a certain percentage, appointed by the company itself, the system automatically contacts the employee's line manager to review the employee's profile.

Upon accessing the system, the users can either make a new claim or check on the status of previously submitted requests. An employee can submit a new claim by selecting the appropriate type of expense (travel, meals, etc.) and specifying all the requested information:

- **travel expenses:** expense amount, transportation type (aircraft, bus, train, etc.), dates of travel (date of departure and of arrival), travel motive, travel ticket or booking (as proof)
- **meal expenses:** expense amount, meal type (eg. Business meal, hotel meal (during business travels), etc.), dining location/structure, dining receipt (as proof)
- **overnight stays expenses:** expense amount, structure type (hotel, hostel, BnB, etc.) and name, structure location, check-in and check-out date, motive of stay, booking reference (as proof)
- **other business purchases:** expense amount, motive of purchase, expense type (petrol, work from home equipment, business equipment, etc.), receipt (as proof)

All of these expenses are in accordance with the UK Government guidelines on refundable business and employee expenses [8].

## Internal staff

Internal staff represent some of the primary users of the system and fall under the category of employees. They occupy all of the characteristics of the general employee, as depicted above, with no additional traits in place.

## Consultants

Consultants represent the largest proportion of the employees within FDM, working with clients onsite and globally, and they possess additional traits compared with the rest of the internal staff. They are provided the option to select the *location* to work from, as well as the *currency*, factors which might alter what is depicted on the expense claim form, such as the currency exchange rate.

## Other users

Additional users of the system include all those actors who do not actively make use of the system, but do have some form of interaction with it. These include:

- ***developers / engineers:*** These users have the duty to build and maintain the software, with regular scheduled check ups as well as scheduled maintenance or advancement operations when or if needed. These actors are not primary users of the proposed system, as they simply are called to intervene when necessary and, hence, do not have the same features assigned to primary users.
- ***finance department:*** The finance department receives and processes all of the incoming expense queries who are certified and approved by the line managers, for the corresponding employees. The finance department is responsible for the correct reimbursement of the business expenses that are performed by employees of the firm. This is done by returning the capital expenditure that is depicted on the proof documentation, that has been certified by the line manager. All of the cash transactions from the business to the employees are performed by the finance department. These actors, however, do not actively interact directly with the system.
- ***HR department:*** Human Resources receive reports that line managers file on some employee's behalf when, for example, the employee exceeds their allowance or their score is unsatisfactory. These actors are contacted by the HR department, but do not actively interact with the system on a regular basis.

### **3. The environment**

Currently, competing solutions utilise web applications, with some including the option to use their mobile app if desired. All interfacing is done through said web interface for all users, with data stored on cloud environments, and management is fully automated, with limited control for administrators [9]. They also sometimes provide partner mobile apps that allow employees to interact with the app whenever they have no access to a desktop environment, such as while travelling.

FDM Expenses Manager will be developed in a similar manner, utilising a web-based platform for end-user interfacing. This decision provides the same maximal benefits as done for competitors, mainly to enhance and improve usability for employees.

#### **Web Application**

The main usability benefit is the implementation of platform-independent access to the application [10], suitable for usage by either on-site employees, or off-site consulting populations. A well-designed web application is usable on both desktop and mobile environments, eschewing the need for an extra mobile app. In addition to this, this common point of access among all employees allows for the application to more easily aggregate user data submitted through the app, cutting the need for extra connection infrastructure [10].

#### **Desktop Administrator App**

Where FDM Expenses Manager differs from competitors is the backend infrastructure, to allow for storage and utilisation of the combined data collected by the web application. The database will be stored locally on the closed company network, and will be accessed through a desktop application distributed to administrator roles, such as Line Managers and the Finance department.

Separate web and desktop applications for end-users and administrators provide a degree of separation in infrastructure, as a public access point for the database in the web application would represent a serious security fault [11], one not found in a local application, but only found within the internal company network. Security is especially important in regards to the database, since it holds sensitive user data that is essential for company finance calculations.

The desktop application will also run on the Windows platform specifically, as Windows has been the number one most used operating system on a global scale [12], especially in recent years, as shown in Fig. 1.

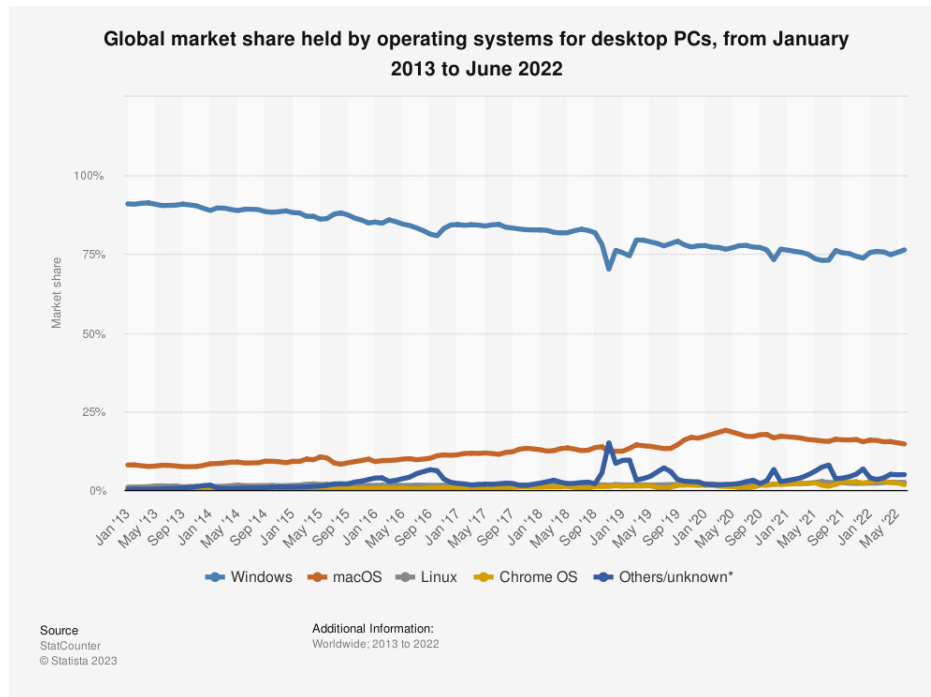


Figure 1: Global market share of operating systems

Moreover, a windows based system may also allow for use of “out of the box” DBMS solutions aimed at saving costs. A multi-platform solution is not considered, since a single-platform solution decreases chances of security risks arising from cross-platform issues [13], and the increased focus for a single platform also decreases the amount of work required for maintenance.



## 4. Tasks and procedures currently performed

The FDM Expenses Manager will be mainly used by Internal Staff, Line Managers and Consultants users along with minor actors that will only interact with the software when necessary, such as developers and FDM finance department.

### Line Managers

- **Approve claim:** The manager will be able to approve or report the submitted expenses requests sent by the internal staff or consultant users the manager is in charge of. When approving expenses, the system will transfer the approved claim to the finance department. The users' and line managers' accounts that made the claim, will be updated to reflect the change. All claims are automatically stored in the system's database.
- **Report claim:** Some employees may falsify expenses for their own benefit or not have sufficient proof to back up their reimbursement claim. Therefore the software will allow the manager user to report inadequate claims. The report will include all information about the transaction along with the manager who reported it and the employee who made said request, this report will then be sent to the HR department, then stored in the system's database.
- **Show claims:** Each line manager oversees multiple employees, hence why they will have the need to be able to easily view and manage all the multiple claims submitted by each of their subordinates. To avoid complications such as missed claim requests due to the large amount of queries submitted, we introduce a way for the line manager to be able to see and keep track of all the current claims submitted, all within the system. Furthermore, the manager will also be able to refer to previous claims (including reported, approved and unread ones).
- **Organise claims / Filter claims:** The line manager can choose to organise, flag and sort the claims they need to process or have previously processed in multiple ways to better organise their workload: they can sort by date of submission, by employee name or email, by claim type, by completion status (approved, denied, not completed) and more.
- **Show users:** Some employees may have a history of not providing evidence of their claims along with multiple cases of misconduct, Therefore we allow the line manager to be able to see all the employees they oversee.
- **Change employee allowance:** a line manager can adjust the allowance given to any of the employees they oversee, if needed/required by the company (for example, if the employee has a history of regularly exceeding their allowance, the line manager can choose to reduce it).

## Employees

- **Logging in:** All users will be allowed to login into their account, where each account will be provided by the company upon hiring. Upon first login users will be asked to change their account password with their own personal password. There will be a different status symbol for either internal staff or consultants. In doing so they will be able to access the users' respective features given the flag they were given.
- **Claim expenses:** Users will be able to claim business expenses they may have incurred. When claiming an expense there will be multiple options where the user will choose and then fill details corresponding to the expense type. Every form will have the option to submit a VAT or receipt which will be used as proof for the claimed business expense.
- **Check previous claims:** When the user claims an expense, the claim will be automatically added onto a list of expenses where the user can check its status on whether it has been "Unread", "Approved" or "Reported" along with the information about the claim. Users will also be able to add in VAT receipts for previously claimed expenses.
- **Organise claims / Filter claims:** every employee can choose to organise, flag and sort the claims they have previously submitted in multiple ways to better organise their workload: they can sort by date of submission, by claim type and more.
- **Display (Remaining) Budget:** Displays the amount of money that a user has left to use to claim expenses. If the user goes over the amount, the system will automatically notify the employee's line manager, who will take necessary actions.
- **Check Score:** Each user can see their current score to better manage their future claims; the score will be based on the number of approved to reported claims ratio (i.e.  $10 \text{ approved claims} / 10 \text{ claims} > 10 \text{ approved claims} / 20 \text{ claims}$ ).
- **Update password:** Employees are able to update their password. This procedure will require them to enter both their old password and new password.
- **Show information:** Employees are able to view their information which contains their personal details such as full name, email address, etc.

## Other users

- **Developers:** They will only update/fix the software if there is a bug identified or for periodical software updates and check-ups. They will not be in charge of maintaining the software daily, therefore they are not primary actors and are not actively involved in the use of the system.
- **Finance department:** They are automatically notified by the system when a line manager approves a claim request, to ensure a fast and direct reimbursement process.
- **The Human Resources department:** Is automatically notified by the system when a line manager files a report for a rejected expenses claim.

## System

- The system ensures that approved claims are automatically sent to the finance department for reimbursement.
- The system ensures that problematic claims are reported to HR.
- Each employee is assigned a weekly budget; if the employee was to exceed said allowance, the system automatically notifies the line manager.
- The system mandates the employee to fill in all the fields of the claims to be able to submit one; this helps ensure that the submitted claims are legitimate [7] and reduces the amount of checks the line manager needs to perform on each claim.
- Employees only fill out expenditure details and other information is auto-generated when claiming an expense (e.g. only expenditure amount and name are to be filled, while fields like name, etc. are filled in already).
- The system allows line managers to use filters on claims, to simultaneously take action on multiple claims and to reduce the number of claims to manually examine with automation of approval/reporting rules of certain expenditures (e.g. auto report when employee exceeds budget).
- The system automatically compiles and generates weekly expenditure sheets, which are sent as weekly recaps to line managers.
- The system automatically generates monthly analytics and expenditure sheets which are automatically sent to the finance department as monthly summaries.

All time expenditure and other stats are accessible through desktop apps for managerial roles.

## 5. Competing software

The below apps were chosen due to their strong enterprise focus and similar scale of operation to our proposed software. The apps below have various advantages and disadvantages that may or may not make them appealing. Our aim is to create a bespoke proprietary solution adapted to FDM's needs, that builds upon these advantages and aims at identifying new ones while reducing or eliminating the downsides of existing apps.

### **Pleo**

Pleo is a company offering various products to help users manage their expenses. These include digital company cards, software for invoices, mileage and reimbursements. According to their reports, "99% of Pleo users feel secure paying with Pleo" and "90% are satisfied or very satisfied using Pleo to pay for expenses" [14].

### **Expenseln**

Expenseln provides software for expense management. These are in the form of a mobile app that can be used to create expenses, approve claims and extract important information from receipts. From the expense data, Expenseln can generate reports that give a breakdown on spending, list the top spenders and other summary information.

### **Rydoo**

Rydoo is aimed at international businesses that may appreciate features such as multicurrency capabilities and per diem rates, allowing expenses to be handled by employees wherever they are located. Rydoo operates at a similarly large scale and on a global spectrum like FDM.

### **Shoeboxed**

Shoeboxed is a more limited application for expense management, dealing with the digitization of receipts. The main features are receipt scanning, forwarding receipts from emails and tracking receipts in the mobile app. They have been recommended by magazines such as Time and PCMag. We chose this for our comparison as it is more limited compared to other software but is still suitable for businesses who deal mainly with paper invoices.

	<b>Pleo</b>	<b>expensein</b>	<b>Rydoo</b>	<b>Shoeboxed</b>
<b>Functionality</b>	<ul style="list-style-type: none"> <li>- Dashboard accessible through web and mobile app</li> <li>- Allows uploading invoices to the system</li> <li>- Scheduling of payments</li> <li>- Invoices scanning</li> <li>- Integrates with other apps</li> </ul>	<ul style="list-style-type: none"> <li>- Dashboard accessible through mobile app</li> <li>- Create expenses</li> <li>- Approve invoices</li> <li>- Receipt scanning</li> <li>- Expense policies are automatically enforced</li> <li>- Integrates with other apps</li> </ul>	<ul style="list-style-type: none"> <li>- Dashboard accessible through web and mobile app</li> <li>- Real-time expense tracking</li> <li>- Automated expense approval</li> <li>- Streamlines reimbursement cycles</li> <li>- Integrates with apps</li> <li>- Ability to snap and store pictures of receipts to prevent loss</li> <li>- Ability to work with either paper or electronic receipts</li> </ul>	<ul style="list-style-type: none"> <li>- Dashboard accessible through web and mobile app</li> <li>- Create expenses</li> <li>- Receipt and document scanning</li> <li>- Generate expense reports</li> <li>- Import receipts from emails</li> <li>- Integrates with other apps</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>- Pricing: Basic plan allows up to 3 users for free</li> </ul>	<ul style="list-style-type: none"> <li>- Support: comprehensive documentation for customers and developers</li> </ul>	<ul style="list-style-type: none"> <li>- Free 14 day trial</li> <li>- Integration with over 35 apps</li> <li>- Ability to track mileage and tax rates for specific countries and regions</li> <li>- Ability to provide per diem rates based on over 20 jurisdictions</li> <li>- Insight reporting, shows overspending activities and identifies cost-saving opportunities</li> </ul>	<ul style="list-style-type: none"> <li>- Pricing: all plans are free to try for 30 days. Custom plans also available</li> <li>- Exclusive feature: it can extract contact details from business cards</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>- Pricing: free up to only 3 user; over £35 for basic plan</li> <li>- No employee performance score</li> </ul>	<ul style="list-style-type: none"> <li>- Pricing: based on number of monthly users but exact cost not listed</li> </ul>	<ul style="list-style-type: none"> <li>- Plans start at \$10 per user pcm which could be quite expensive for larger companies</li> <li>- Max of 15 pages for PDFs or receipts</li> </ul>	<ul style="list-style-type: none"> <li>- Cannot automate company expense policies</li> </ul>

## Summary

In summary, similar competing solutions provide the basic functionality expected for expense management, including invoice creation, approval, document scanning and a dashboard that gives an overview of any outstanding payments.

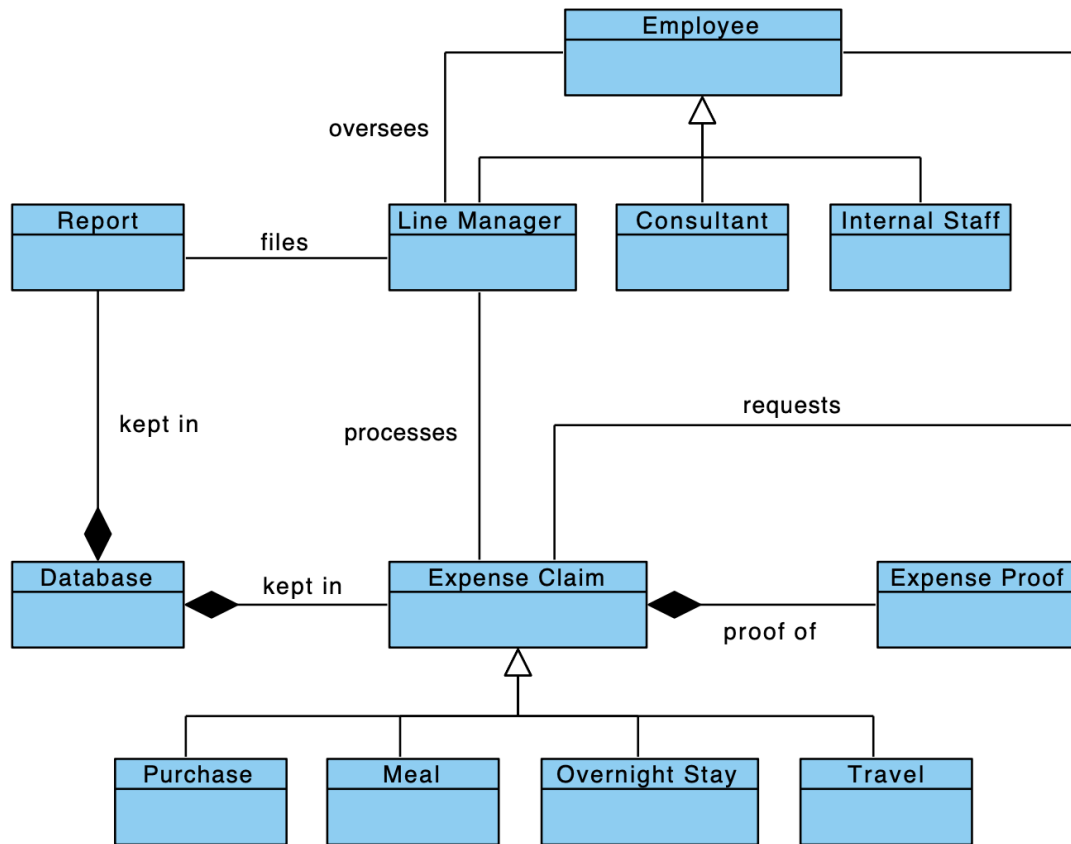
The main downsides to these applications are a higher barrier to entry due to monthly pricing plans and being cloud-based applications, meaning that customers have to rely on the provider's infrastructure, which may not guarantee uptime compared to on-site service hosting.

We will be further extending the functionality of these applications with employee performance scores and notify employees about claim approvals. This will help our solution stand out compared to the more basic ones listed above.

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expensein - <https://www.expensein.com>  
Shoeboxed - <https://www.shoeboxed.com/>  
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## 6. Domain Model



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