

Simple Employee Management System

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## **Introduction**

The Simple Employee Management system is a lightweight CLI-driven application designed to be scalable to small businesses to use in data management of employee records. Made with python and Pandas it ensures a error-free way of redundantly and efficiently saving employee data. Furthermore the code is made to be easily scalable with adding further rows and columns for various data types.

## **Problem Statement**

Small businesses still use pen and paper, or convoluted spreadsheets to keep logs on employee records. This approach leads to several issues:

1. Data Redundancy: There can be duplicate entries for a single person, or multiple persons having the same entry.
2. ID Conflict: Assigning Ids manually is prone to human fault
3. Lack of Security: Unsecure/public spreadsheets or paper is prone to easy editing/vandalism without admin privileges.
4. Inefficiency: Manually searching for every persons on the list is time consuming and redundant.

This program addresses these issues by automating the CRUD (Create, Read, Update) process in a secured CLI environment.

## Functional Requirements

**This program pertains to the following functional requirements:**

- *Add Employee*: The program allows managers to input an employee's name and automatically assigns a unique, random 4-digit ID.
- *Update Employee*: The program allows updates to an employee's name based on their ID, but only after successful administrator password authentication.
- *View All Employees*: The program displays a formatted list of all registered employees.
- *Data Persistence*: All data is saved to employees.csv immediately after modification.
- *Duplicate Prevention*: The ID generation algorithm checks existing records to ensure no ID is reused

## Non-functional Requirements:

-*Usability*: The Command Line Interface (CLI) needs to be simple, with menu-driven navigation and unambiguous prompts.

-*Reliability*: To avoid crashes, the system must confirm the existence of the file before attempting read operations.

-*Performance*: For datasets with fewer than 10,000 records, operations like adding or searching for a user should appear instantly.

-*Portability*: Any system that has Pandas and Python installed should be able to run the script.

## System Architecture:

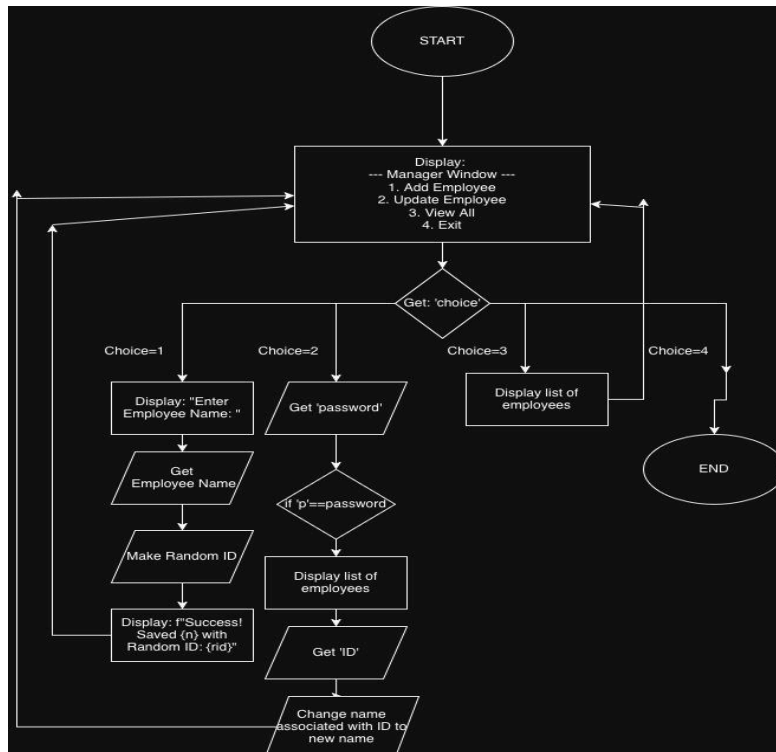
- *Presentation Layer*: The user interface is provided by the Python functions "input()" and "print()."
- *Logic Layer*: Business logic and ID generation constraints are handled by Python functions (add\_user, update\_user, MakeRandomID).
- *Data Layer*: The Data logic is handled by the Pandas library.

## Design Diagrams

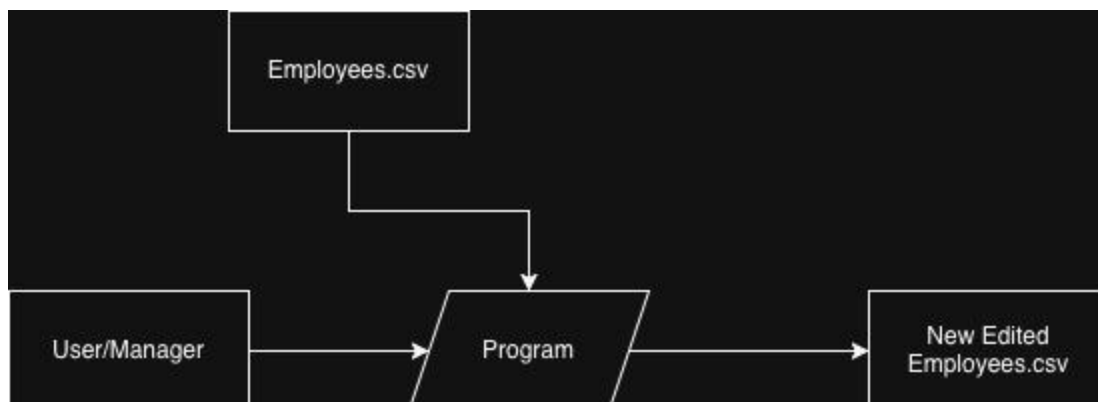
### 1. Use Case Diagram

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32
33     employeeid = MakeRandomID(df)
34
35     #making a new row under the existing columns: Name, and EmployeeID
36     new_row = {'Name': n, 'EmployeeID': employeeid}
37
38     # Add it to the table
39     df.loc[len(df)] = new_row
40
41     # Save
42     df.to_csv(filename, index=False)
43     print("Success! Saved " + n + " with Random ID: " + str(employeeid))
44
45 def show_list():
46     if os.path.exists(filename):
47         df = pd.read_csv(filename)
48         print("-----")
49         print(df)
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```

## 2. Workflow Diagram:



## 3. Sequence Diagram:

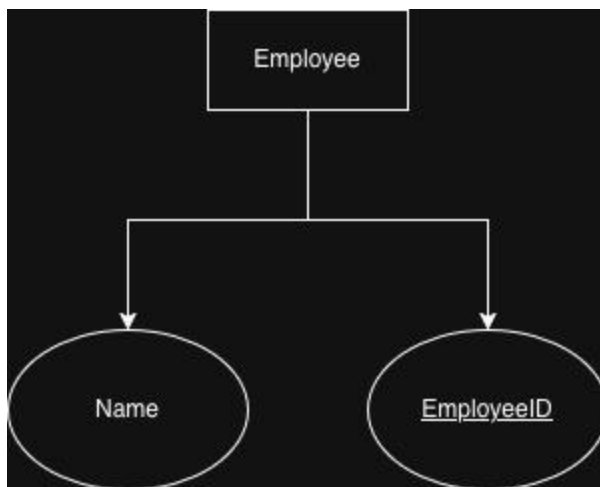


#### 4. Component Diagram:

##### Main program:

- **Manager window (add/update/view/exit)**
- **Password prompt.**
- **Final push to csv file outside python code.**

#### 5. Entity Relationship diagram:



#### Design Decisions & Rationale:

1. ***Python and Pandas:*** Python was selected due to its capacity for quick prototyping. Because Pandas manages data alignment, pretty-printing, and tabular read/write operations more robustly than the native csv module, it was chosen.
2. ***CSV Storage:*** Due to the small project scope and the fact that non-technical users can access the database in Excel if needed, a CSV file was selected over a SQL database.

3. ***Random IDs vs. Incremental IDs:*** Unlike straightforward auto-incrementing integers, random IDs were selected to offer a non-guessable identifier and to show algorithmic logic.

### Specifics of Implementation:

The MakeRandomID function contains the essential logic. To guarantee uniqueness, it uses a while loop:

```
def MakeRandomID(df):  
    #making a random employee id  
    rid = random.randint(1000, 9999)  
  
    if len(df) > 0:  
        while rid in df['EmployeeID'].values:  
            rid = random.randint(1000, 9999)  
  
    return rid
```

In order to improve user experience in between menus, the Main Menu uses os.system to clear the screen while operating inside a while True loop.

### Screenshots:



```

21 def add_user():
22     new_row = {'Name': n, 'EmployeeID': employeeid}
23
24     # Add it to the table
25     df.loc[len(df)] = new_row
26
27     # Save
28     df.to_csv(filename, index=False)
29     print("Success! Saved " + n + " with Random ID: " + str(employeeid))
30
31 def show_list():
32     if os.path.exists(filename):
33         df = pd.read_csv(filename)
34         print("-----")
35         print(df)
36         print("-----")
37     else:
38         print("File not found.")
39
40 def update_user():
41     p = str(input("Enter Password: "))
42
43     if p == password:
44         show_list()
45
46         pid = int(input("Enter the ID Number you want to fix: "))
47
48         df = pd.read_csv(filename)
49
50         # Check if that random ID exists
51         if pid in df['EmployeeID'].values:
52             new_name = input("Enter the correct name: ")
53             df.loc[df['EmployeeID'] == pid, 'Name'] = new_name
54             df.to_csv(filename, index=False)
55             print("Updated successfully.")
56         else:
57             print("ID not found.")
58     else:
59         print("Wrong password.")

```

PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

--- Manager Window ---

1. Add Employee  
2. Update Employee  
3. View All  
4. Exit

Choose option: 3

```

-----
      Name  EmployeeID
0  Jitesh         1122
-----

```

Press Enter to continue...|

## Testing:

1. **File Absence:** Verified that the system handles the initial run (when employees.csv does not exist) without crashing.

2. ***Incorrect Password:*** Tested `update_user` with incorrect passwords to ensure access is denied.
3. ***Data storage:*** Verified that the Employee ID is stored as an integer and the Name as a string.

### **Learnings & Key Takeaways:**

- **Pandas for Persistence:** Acquired knowledge of using `df.to_csv()` and `pd.read_csv()` as a basic database engine.
- **State Management:** Recognized the significance of verifying the current state (existing IDs) prior to creating new data.

### **Challenges faced:**

Managing the file stream was one of the major challenges. The read operation would first fail if the file didn't exist. The addition of `os.path.exists()` checks fixed this. Making sure the clear screen command functions on various operating systems presented another difficulty because Windows requires `cls` while Unix/Linux uses `clear`.

### **Future Enhancements:**

- ***Delete Functionality:*** Add option 5 to remove an employee from the CSV.
- ***GUI Implementation:*** Migrate the code to Tkinter or PyQt for a windowed application.