C++ Assignment 01: Employee and Trainee Management System

You are going to implement an employee and trainee management System for Company ABC.

There are 2 types of employees in company ABC. They are **salaried employees** and **hourly paid employees**. Each employee has a name, an age and an employee_id. Employee ids follow EM01, EM02, EM03 …. EM67 format and it is unique.
Each salaried employee has a monthly salary and each hourly paid employee has a hourly_rate and hours_worked. The monthly pay for hourly paid employees is calculated as hours_worked*hourly rate.

Also there are **trainees**. Each trainee has a name, an age, training duration and a trainee_id. Trainee ids follow TR01, TR02, TR03 ... TR67 format and it is unique.
They have a monthly allowance instead of a salary.

You can assume there are maximum 100 employees and 25 trainees. Employee id range is EM01 to EM100 and trainee id range is TR01 to TR025. Sample of employee and trainee records are given in the text file "EmployeeNTraineeInfo" according to the below format. You can add more records to test your software further.

Salaried Employee
Employee_id,name,age,monthly_salary
Hourly Paid Employee
Employee_id,name,age,hourly_rate,hours_worked
Trainee
Trainee_id,name,age,monthly_allowance,duration

Following tasks are supposed to be performed by the software.
1. List all the employees in <employee_id, name> pairs and list all the trainees in <trainee_id, name> pairs. – [command - **list_all**]
2. List the monthly pay amount of all the employees and trainees. – [command - **list_monthly_pay**]
3. Get the total number of employees and trainees along with their total pay. – [command - **get_total_pay**]
4. Get the full details of an employee/trainee when given employee id/trainee id. – [command – **get_details <id>**]
5. Remove an employee/trainee when given employee id/trainee id. – [command – **remove <id>**]
6. Exit from software. – [command – **exit**]
7. Print simple instructions on how to use this system [command – **help**]

Your implementation should follow below criteria.

- Maintain employee records and trainee records in **two separate hash maps and the hash map should be your own class**. You are free to decide the internal structure of your hash map.
- When users types the command given in the brackets, the system should perform the respective task. Program should run until user types **exit** command. (loop)
- Pay special attention to identify required classes and their responsibilities.
- Apply Inheritance, Polymorphism, Encapsulation, Abstraction and Templates when applicable.
- Apply correct access modifiers.
- Select correct data structure to store data.

- Use reference variables to minimize data copying.
- Use main method for input/output purposes only (not for application logic). You may use other classes also for output only if it is really needed.
- All the input from user should be validated before querying the data.
- Make sure to handle negative scenarios.

What you need to do:

1st Part:
Come up with an appropriate design for the Employee and Trainee Management System. Your design should support for both the implementations given in the next 2 parts.

2nd Part:
Implement the Employee and Trainee Management system using the guidelines given above. Provide reasons for why hash map is the best data structure for this particular problem.

3rd Part:
If the Company has more than **1 million employees and trainees**, what data structure you suggest? Implement a new system for the same requirements using your new data structure.
Note: Reuse the code from 2nd part whenever possible.

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