**Chapter 3**

METHODOLOGY

This chapter contains the project design, program development, operation and testing procedure, and evaluation procedure.

**Project Design**

The system design is composed of Context Level Diagram, Data Flow diagram, Entity Relationship Diagram (ERD), and Flowchart for the DTR Using Face Recognition and Payroll System for Government Institutions.

The system is designed to get the users attendance data using the FIFO algorithm where in the morning only the first log-in data will be inserted to the database and in the afternoon only the first log-in data will be inserted to the database this is to avoid the issue where some employees try to login once, twice or thrice worrying that their attendance data would not be recorded because of a system failure. After a successful login the system will show the user his/her recorded time data notifying her that the recorded is successfully inserted into the database.

Deduction Chart

Messages

Computed Pay slip

Employee Details

Attendance Data

Generated Pay slip

Messages

Payroll Personnel

Employee Details

Deduction Charts

Employee Details

Attendance Data

Generated Pay slip

Messages

Deduction Charts

Attendance Data

Training Data

SMS Notification

Time Data

Human Resource

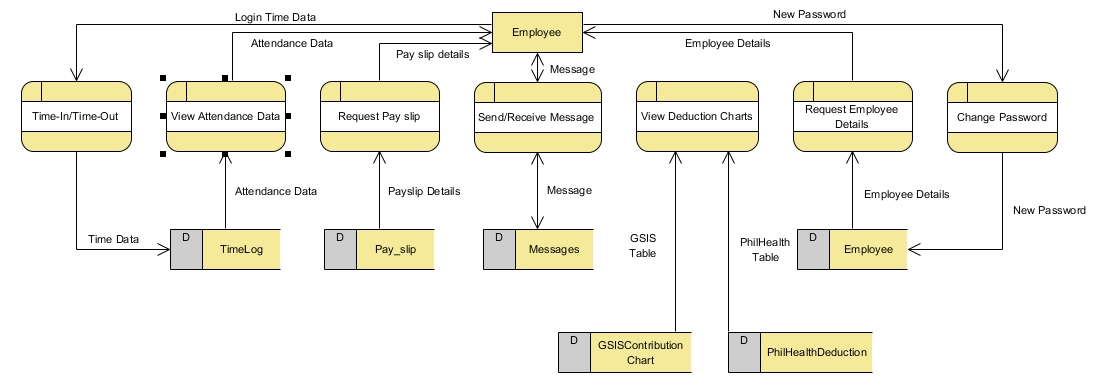
Employee

DTR and Payroll System for Government Institutions

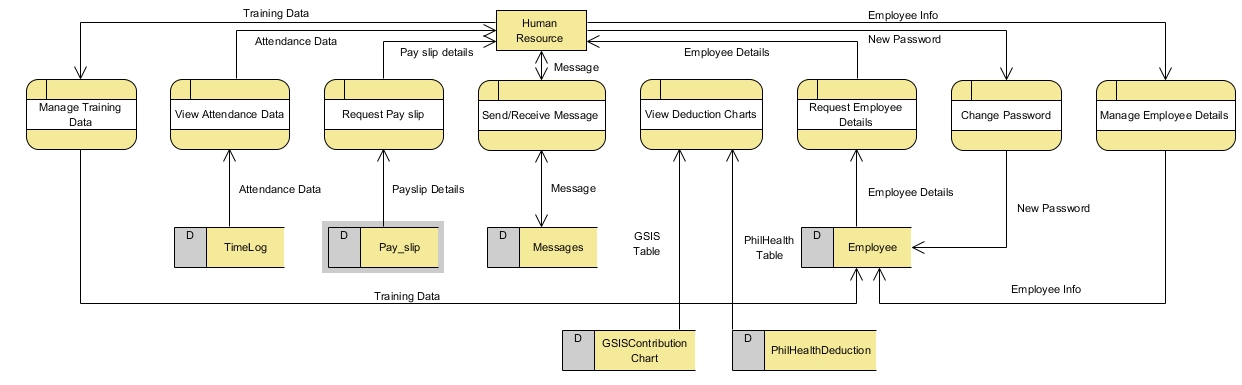
***Figure 2****.* Context level diagram

In Figure 3 an employee is able time-in/time-out of the system using the FIFO algorithm wherein the first time-in data in the morning and the last time-out data in the afternoon will be the only one recorded an employee can also view attendance data, request a copy of their own payslip, view the deduction table, request employee details but the only data that they can change is their password. They can also send/receive message across the server thus communicating with the other employees.

*Figure 3.* Employee DFD

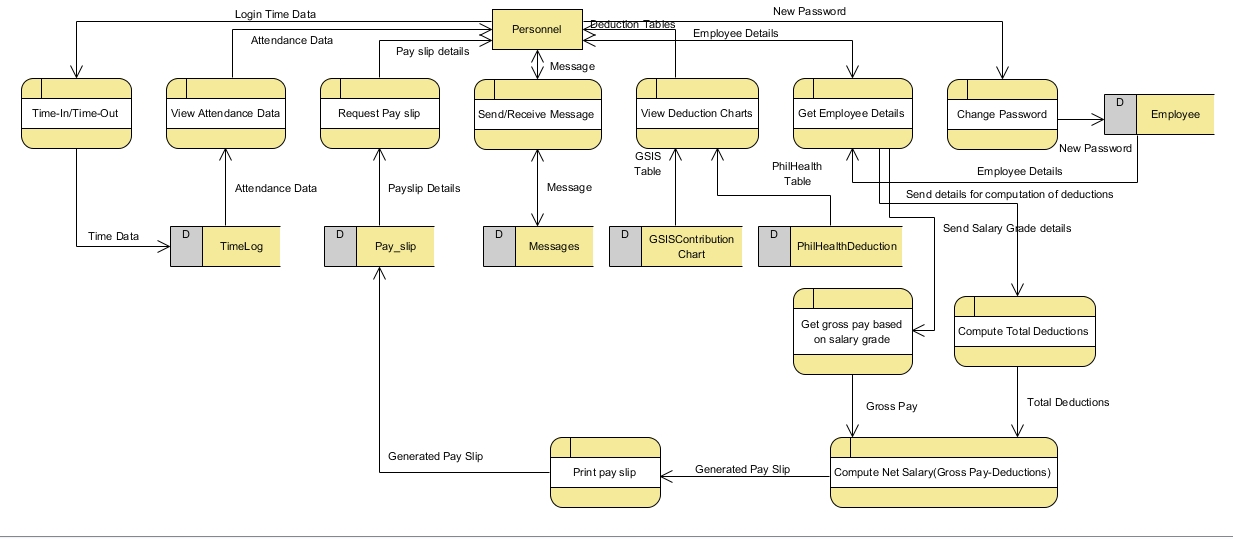


In Figure 4, the personnel is able time-in/time-out of the system using the FIFO algorithm wherein the first time-in data in the morning and the last time-out data in the afternoon will be the only one recorded. they can also view their attendance data, request a copy of their own payslip, view the deduction table, request employee details and lastly compute the necessary details,like gross pay, deduction and net salary, for the generation and printing of pay slip.



*Figure 4.* Human Resource DFD

In Figure 5, the entity "human resource" do the same things as the personnel except for Managing Training Data for face comparison the attendance-monitoring system, adding new employees and updating employee's information

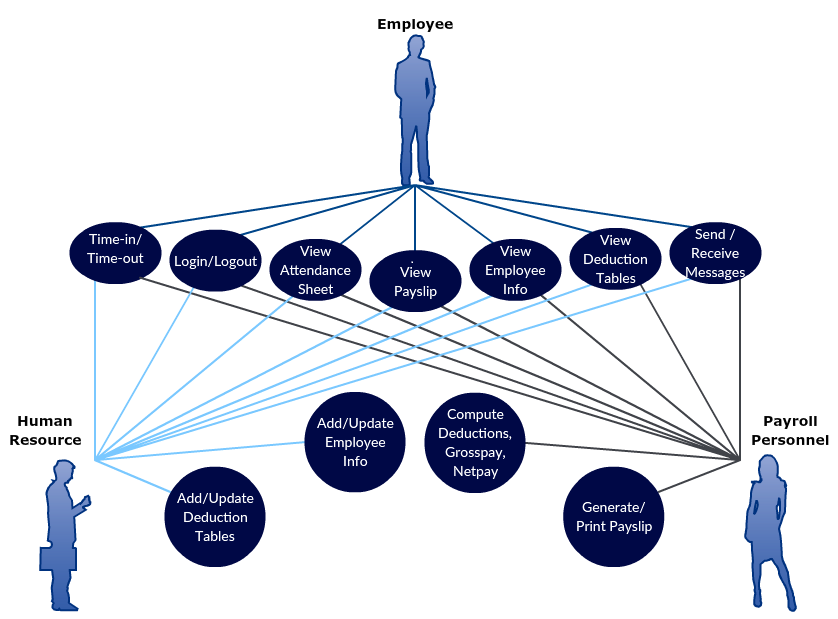


*Figure 5.* Payroll Personnel DFD

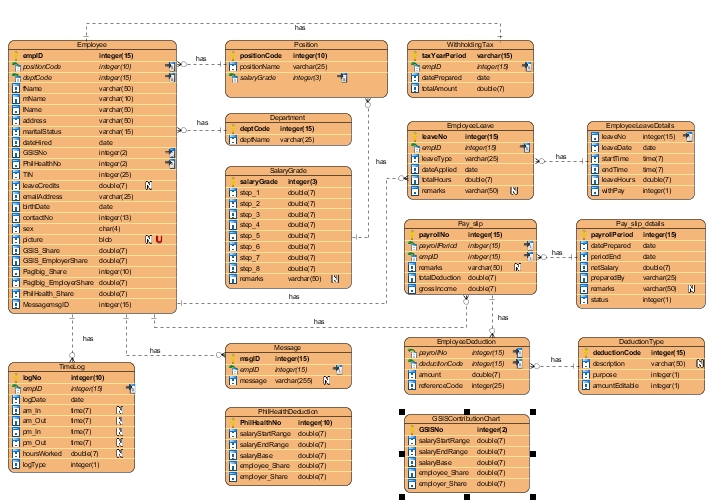
There would be three different types of users for the DTR and Payroll System. These are: Employee, Human Resource, and Payroll Personnel.

In the Daily Time Record System, all of the users are allowed to Time-in/Time-out of the system. While in the Payroll system, all three users are allowed to Log-in/Log-out of the system, View their own attendance data, View their payslips, View Employee information, View the deduction tables, and send/receive messages to each other as well.

Other than the listed cases in which all the users are involved, The Human Resource can also perform adding and updating of Employee information and deduction tables. While for a Payroll Personnel, he/she will be able to Generate and Print Payslips and Compute Deductions, Grosspay, and Netpay.



*Figure 6.* Use Case Diagram



*Figure 7.* Entity Relationship Diagram

**Project Development**

The project development consists of a set of related activities that leads to the production of the system. The researchers chose the Waterfall Model Approach in developing the proposed system, the DTR Using Face Recognition and Payroll System for Government Institutions, as it simple and easy to understand and use, and easy to manage due to the rigidity of the model; each phase has specific deliverables and a review process.. In the Waterfall model approach, the whole process of project development is divided into separate phases, typically, the outcome of one phase acts as the input for the next phase sequentially. All the phases are cascaded to each other in which progress is seen as flowing steadily downwards (like a waterfall) through the phases. The next phase is started only after the defined set of goals are achieved for previous phase and it is signed off, so the name "Waterfall Model". Also, phases do not overlap.

The sequential phases in Waterfall model are:

*Requirement Gathering and Analysis:* All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification doc.

*System Design:* The requirement specifications from first phase are studied in this phase and system design is prepared. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture.

*Implementation:* With inputs from system design, the system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality which is referred to as Unit Testing.

*Integration and Testing:* All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.

*Deployment of the System:* Once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

*Maintenance:* There are some issues which come up in the client environment. To fix those issues patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

**Operation and Testing Procedures**

This section is used to check if the system meets the criteria according to the systems functionality, accuracy, responsiveness and reliability. The researcher will conduct a test on the system as a part of the Operation and Testing Procedures.

**For Functionality Testing:**

1. The researcher will perform the Time-in function by facing the camera.
2. If the system recognizes a match in its records. The system will automatically input the time of the process for the match’s Time-in record for the current day.
3. The researcher will now perform the Log-in function by entering the username and password, in order to check whether his time-in for the day was recorded.
4. If the entered credentials matches the information of any of the users: Employee, Payroll Personal, and Admin, the system will automatically directed to his/her personal account.
5. In the Employee account, there will be Attendance and Payslip options.
6. The researcher will click Attendance and it will be directed to the page, he/she will be able to view his/her daily attendance record up to the current day.
7. The researcher will click Payslip and it will be directed to the page, he/she will be able to view his/her payslip upto the recent payroll period. The user will be notified through a message if there is a new payslip record in his/her account.
8. In performing the Time-out function, the researcher will then face the camera again.
9. If the system recognizes a match in the records again. The system will automatically input the time of the process for the match’s Time-out record for the current day.

**For Accuracy Testing:**

1. The researcher will access the Attendance module.
2. The attendance record for each current day will display the time-in and time-out record of the user for each day, provided that it would be the same time as of when the user timed-in or timed-out his/her attendance.

**For Reliability Testing:**

1. The researcher will access the Payslip module.
2. The payslip record for each payroll period will display the exact amount of his/her salary. Provided that it will also display how that salary did came up depending on his/her attendance and deductions on the payslip.

**For Responsiveness Testing:**

1. The researcher will access the site through a mobile device.
2. The researcher will logon to his/her account the same way he/she does it through a computer.
3. The researcher will check if the site is properly displayed through a mobile device.
4. The researcher will check his/her Attendance and Payslip to check if those modules are working properly just like on the web-based system.
5. The researcher will perform the Logout function.

**Evaluation Procedure**

To measure the system’s performance, an evaluation instrument using ISO 9126 is used. The survey form can be found in the Appendix. The criteria are Functionality, Reliability, Usability, Maintainability, and Portability. The following are the steps done during the evaluation:

1. Evaluation forms is distributed to forty-five (47) CS/IT/IS students and three (3) IT Professionals;
2. Prior to the completion of evaluation forms, the researchers demonstrated how to use the system to the group of evaluators composing of IT Professionals and CS/IT/IS students;
3. After the demonstration, the researcher asked the evaluators to use the intranet based system.
4. Finally, the evaluators will rate the system based on 4 Point Likert Scale. The response was chosen from a scale of 1 to 5, 5 being the highest which means Highly Acceptable, and 1 being the lowest which means Not Acceptable.

**Table 1**

*4 Point Likert Scale*

|  |  |
| --- | --- |
| Item |  |
| 4 | Highly Acceptable |
| 3 | Very Acceptable |
| 2 | Moderately Acceptable |
| 1 | Not Acceptable |

1. Data was tabulated to compute for the mean of each criterion and the overall mean computation for the given criteria.
2. In interpreting the results of the evaluation. The study used the Rating Scale for Interpreting the Evaluation Result.

**Table 2** – Rating Scale for Interpreting the Evaluation Result

|  |  |
| --- | --- |
| Item |  |
| 3.76 – 4.00 | Highly Acceptable |
| 2.76 – 3.75 | Very Acceptable |
| 1.76 – 2.75 | Moderately Acceptable |
| 1.00 – 1.75 | Not Acceptable |

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