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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded.

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1. Introduction

This is the first coursework for the module 'Software Engineering' where we are assigned a task to create to work in a group to design an online system for T-14 Training Academy to manage their business operations even in the current situation of Covid-19 pandemic. In order to create an efficient and functional system, discussions and meetings were held between the group members to discuss the needs and requirements for the system and gather opinions and ideas from each member to analyse and implement them in the system to form a well-organized system.

To operate the business of T-14 Training Academy through online medium, a system named **Training Academy** is developed. The use of the system can be done to register memberships, enrol staff, design exam and practice test papers, generate report, post notices, take exams and purchase football kits. In depth functionality of these functions will be provided in the system. This system is designed to make the overall workflow of the system easier. In order to design the system the use of Project Charter Document, Software Requirement Specification document, Data Flow Diagram, Structured Chart Diagram, Entity Relationship Diagram, Data Dictionary, Process Specs and Module Specs have been done. To develop the diagrams the use of draw.io has been done.

The main aim of this coursework is to create a system which can meet all the requirements of the business. The objective of this coursework is to understand and gain knowledge on Structured Software Engineering and work in a group to meet all the requirements of the task.

2. Project Charter

2.1. Problem statement

The T-14 Training Academy currently manages its business where it registers memberships, enrolls students, takes exams, sell football kits, enrol staffs and many other activities, on-site in the academy. The business is now in need of a system so that all of the business operations can be handled via an online medium so that when the operations cannot run physically due to the current Covid-19 pandemic, there would be an alternate medium to cope with the operations.

2.2. Business Case

The system would allow the training academy to run its operations and provide the services even when physical operation cannot be done. Apart from that, the system will make it easier for users to register for membership or even apply for a position without visiting the academy which can help them save their time. The academy workflow will be more efficient and help escalate the business.

2.3. Goal Statement

The systems goal is to increase efficiency of the business operations by creating an application which meets all the needs and requirements of the business. It aims to provide efficiency to both the admin and the user to operate the necessary tasks via a digital platform.

2.4. Timeline

The estimated time for the project has been calculated to be 4 months starting from 2nd January 2022 to 1st April 2022.

2.5. Scope

The scope of this project is to create system where an admin can enrol staff, conduct mock exams, post exam notices and announcements however the user can register themselves for membership, purchase football kits and the user who are enrolling in intermediate training can take mock exams for which various preparation materials for instance football related videos, practice test papers and the sample question as well in the software. Correspondingly, the trainer/coaches can manage various aspects about the exam in the software like design exam test papers, practice test papers, MCQ questions and subjective question where they can enter the marks for the exams and enter performance score in the system from which they can generate report of the written and physical exams for the final selection of the members.

2.6. Team Members

The members involved in the team are Sakshi Gupta, Poonam Singh Yadav, Punam Thapa Magar and Apson Sapkota.

3. Software Requirement Specification

A Software Requirement Specification (SRS) document is a document which describes the nature of the project and contains the details about what a software is supposed to do and how the software is expected to perform. In simple words, a SRS document is a manual of the project made before starting the actual project. The SRS document contains details about the purpose, scope, functional and non-functional features and software and hardware requirements of the software. (Bandakkanavar, 2018)

3.1. Functional Requirements

Functional requirements are the requirements which indicate what a system must do and how it must function.

1. The user will be able to register membership in the software.
 - 1.1. The user will be able to register via Google, Facebook and outlook.
 - 1.2. The user will be able to choose through age group while registering.
 - 1.3. The user will be able to apply for either basic or intermediate training category.
2. The user will be able to login into their account in the software.
 - 2.1. The user will be able to edit their personal details.
 - 2.2. The user will be able to reset their password if they forget it.
3. The user enrolling in intermediate training will be able to prepare for the exam in the software.
 - 3.1. The user will be able to watch football related videos.
 - 3.2. The user will be able to give mock exams.
 - 3.3. The user will be able to view their mock exam results.
 - 3.4. The user will be able to view sample questions to prepare for exam.

4. The user enrolling in intermediate training will be able to take online exam in the software.
 - 4.1. The user will be able to view the question paper on the exam time.'
 - 4.2. The user will be able to submit their answer paper once they have completed the exam.
5. The user will be able to view their result of the online exam in the software.
 - 5.1. The user will be able to download their result.
6. The user will be able to apply for a vacancy in the software.
 - 6.1. The user will be able to view the positions available.
 - 6.2. The user will be able to send their application.
7. The user will be able to purchase football kits from the system.
 - 7.1. The user will be able to purchase individual items from the football kit.
 - 7.2. The user will be able to browse through the items according to price range.
 - 7.3. The user will be able to browse through the items according to brand.
 - 7.4. The user will be able to get a discount on kits if they are a member of the academy.
8. The user will be able to manage products in the cart and purchase whenever they want to.
 - 8.1. The user will be able to add products in the cart.
 - 8.2. The user will be able to remove products from cart.
9. The user will be able to make payment by choosing from different payment options.
 - 9.1. The user will be able to do online payment.
 - 9.2. The user will be able to do payment on delivery.
 - 9.3. The user will be able to do advance payment.
 - 9.4. The user will be able to do card payment.

10. The trainers/coaches will be able to manage various aspects about exams in the software.
 - 10.1. The trainers/coaches will be able to design exam test papers and practice test papers.
 - 10.2. The trainers/coaches will be able to design MCQ questions.
 - 10.3. The trainers/coaches will be able to design subjective question.
 - 10.4. The trainers/coaches will be able to enter the marks for the exams.
 - 10.5. The trainers/coaches will be able to enter performance score.
 - 10.6. The trainers/coaches will be able to generate report of the written and physical exams.
11. The admin will be able to manage training schedule.
 - 11.1. The admin will be able to upload the training schedule.
 - 11.2. The admin will be able to modify the training schedule.
 - 11.3. The admin will be able to assign the training time to the members and the trainers/coaches.
12. The admin will be able to post exam notices and announcements in the software.
 - 12.1. The admin will be able to upload the exam schedule.
 - 12.2. The admin will be able to release the exam questions according to the exam schedule.
 - 12.3. The admin will be able to upload the results of the exams.
13. The admin will be able to manage staff in the software.
 - 13.1. The admin will be able to upload vacancy posts.
 - 13.2. The admin will be able to view the CV of the people who have applied.
 - 13.3. The admin will be able to accept or reject the applicants.
 - 13.4. The admin will be able to register new staff.
 - 13.5. The admin will be able to unregister staff.

14. The admin will be able to update the products available online in the software.

14.1. The admin will be able to add new products.

14.2. The admin will be able to remove products.

15. The staff will be able to manage membership in the software.

15.1. The staff will be able to renew membership of users.

15.2. The staff will be able to unregister a member upon request.

16. The staff will be able to manage online purchase in the software.

16.1. The staff will be able to contact the user for confirmation of purchase.

16.2. The staff will be able to view user details.

3.2. Non - Functional Requirements

Non-Functional requirements are the requirements which specify the quality attributes of a software system.

1. Design and Implementation

1.1. Internet connection is required to use the application.

1.2. Registering as a member can be done at any time of the year.

1.3. Registration is cancelled if not confirmed.

1.4. Online purchase is cancelled if not confirmed and amount is returned if already paid.

1.5. Location of the training academy is provided.

1.6. Contact details of the training academy is provided.

1.7. User friendly UI design.

1.8. The user is unregistered if they are inactive for a longer period of time.

2. External Interface

2.1. User

- 2.1.1. The software can be used through a mobile application.
- 2.1.2. The software can be used through a web application.

2.2. Software

- 2.2.1. E-sewa can be used for payment.
- 2.2.2. Khalti can be used for payment.
- 2.2.3. Mobile banking can be used for payment.
- 2.2.4. Gmail
- 2.2.5. Facebook
- 2.2.6. Outlook

3. Other non-function

3.1. Every details in the software is made secure.

- 3.1.1. The software asks for 2 steps verification while logging in on a new device.
- 3.1.2. The software removes the banking details after logging out of it.
- 3.1.3. The software sends an alert notification when an account is logged in on another device.
- 3.1.4. The software provides change password option when a user suspects that their account is being hacked.
- 3.1.5. The software asks the user to change their login password every 3 months.

3.2. The software is handled in such a way that it has good performance at all times.

- 3.2.1. The software is updated with new features in some interval of time.
- 3.2.2. The software bugs, if found are fixed on time.

3.3. The software takes users feedback and tries to implement it.

- 3.3.1. The feedback is taken via a Google form.

3.3. Goals of Implementation

Upon implementing the functional and non-functional requirements in the software, a well-organized system will be created which can be operated by admin and trainers/coach. The end users will also get to use features like, registering membership and logging in their account. The user will be provided with materials to prepare for their exam and the exams can also be taken with the use of the software. Moreover, the user will be able to purchase football kits and also get to choose the method of payment.

The software will allow the admin to make various announcements regarding vacancies, trainings, exams and will also be able to operate the online store. The trainers/ coach will be able to design questions and grade the exams and prepare reports with the help of the system. The staffs can also manage the purchase and delivery for the online store.

Overall the software will provide a platform for the T-14 Training Academy to not only expand their business digitally but will also provide end users to get the opportunity to train from distance. It will help the business to function even if there comes a situation of lockdown.

4. Group Tasks

4.1. Environmental Module Specification

4.1.1. Level 0 Data Flow Diagram (Context Level Diagram)

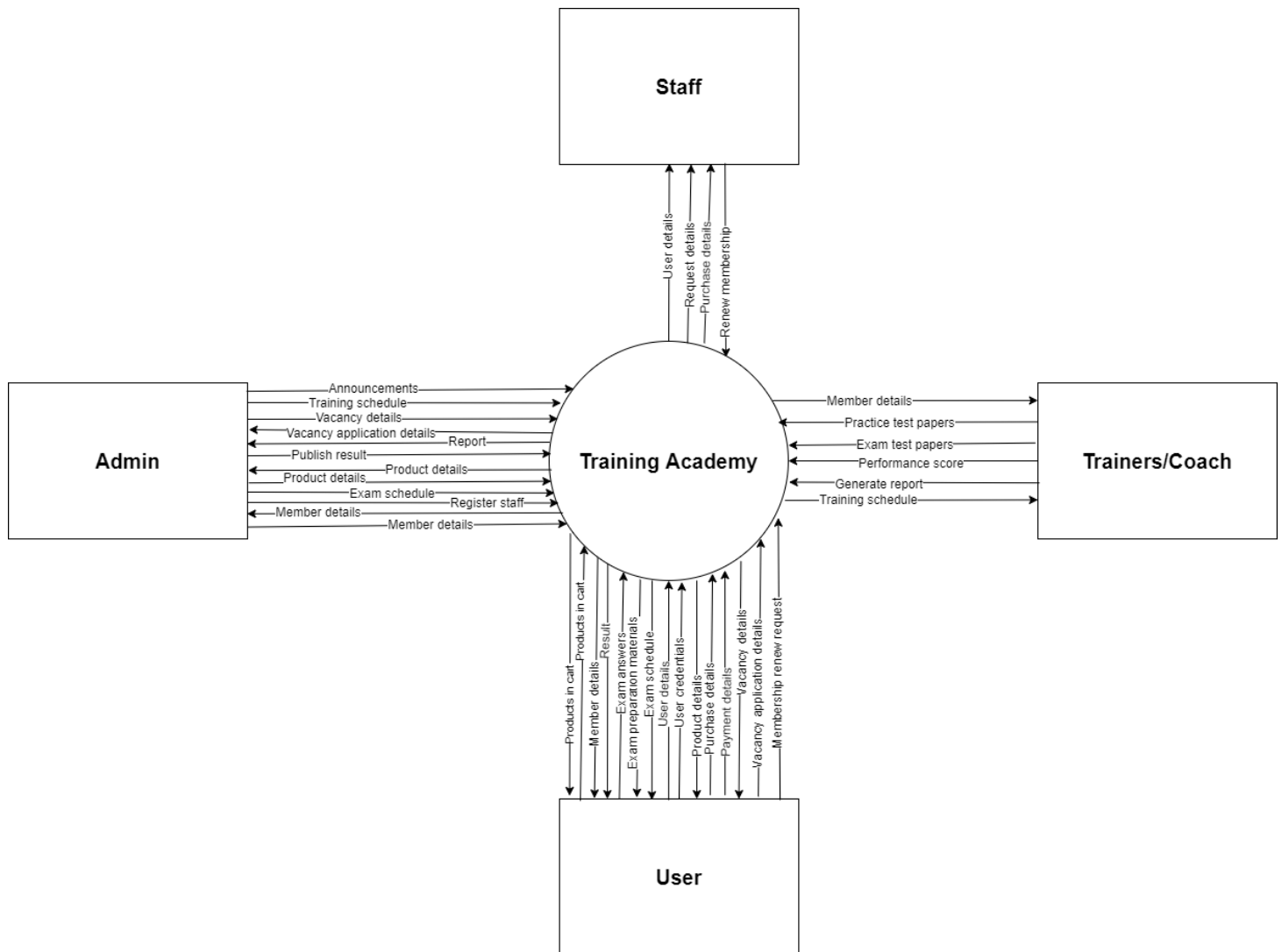


Figure 1. Level 0 DFD of the system

4.1.2. Level 1 Data Flow Diagram

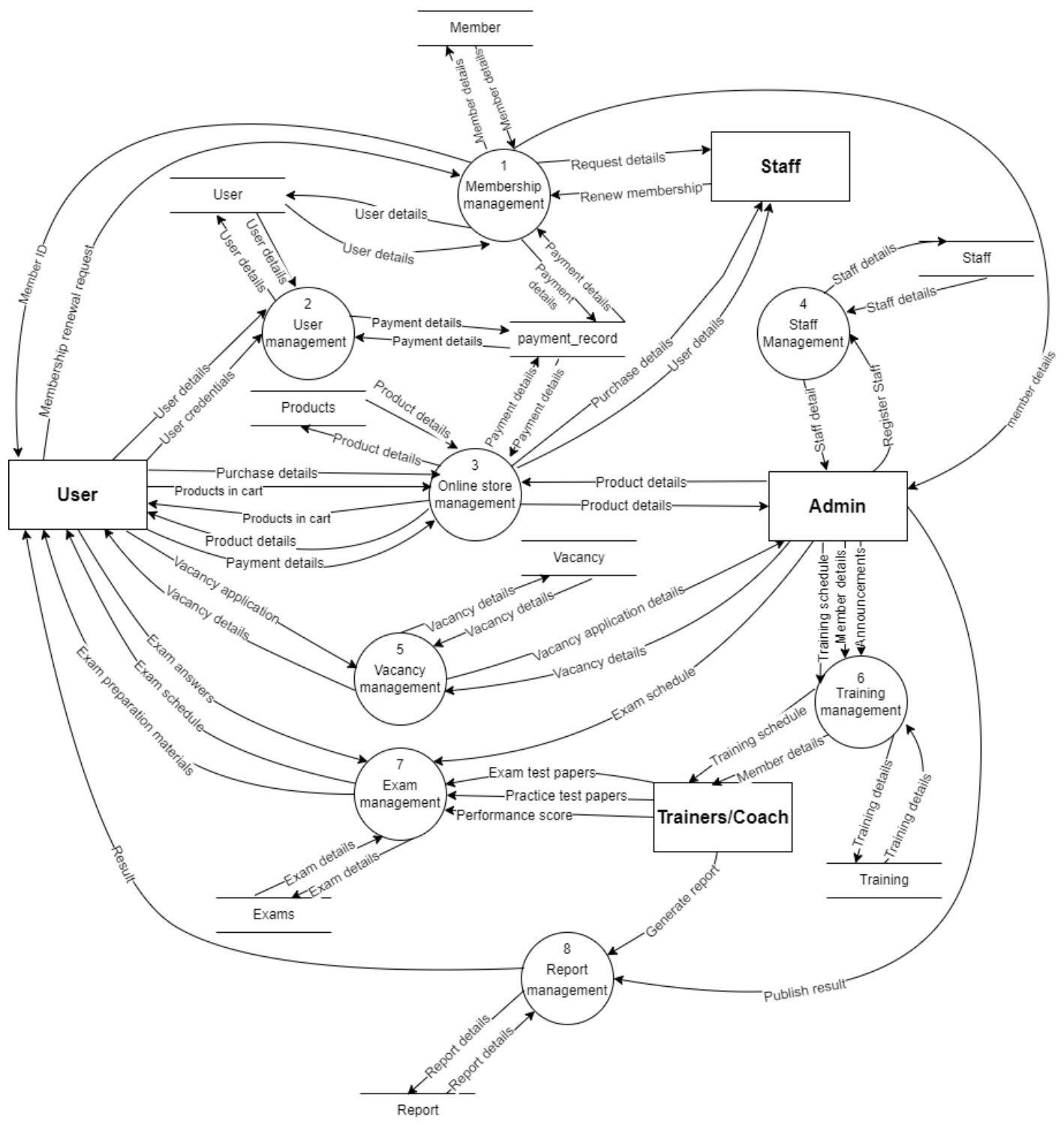


Figure 2. Level 1 DFD of the system

4.1.3. Level 2 Data Flow Diagram

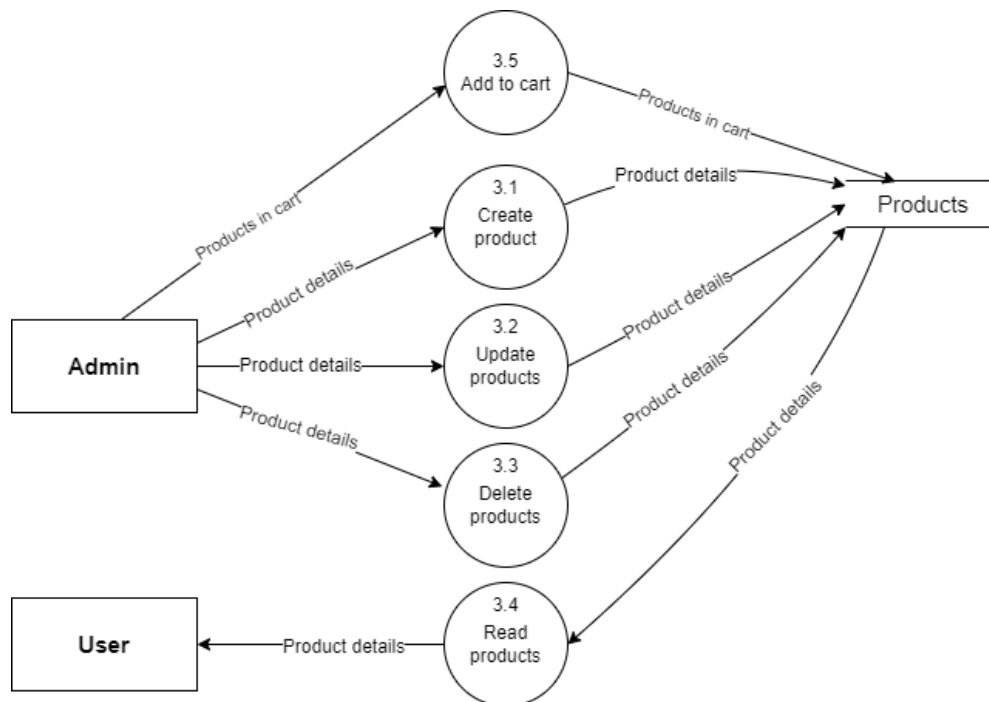


Figure 3. Level 2 DFD of the system (1)

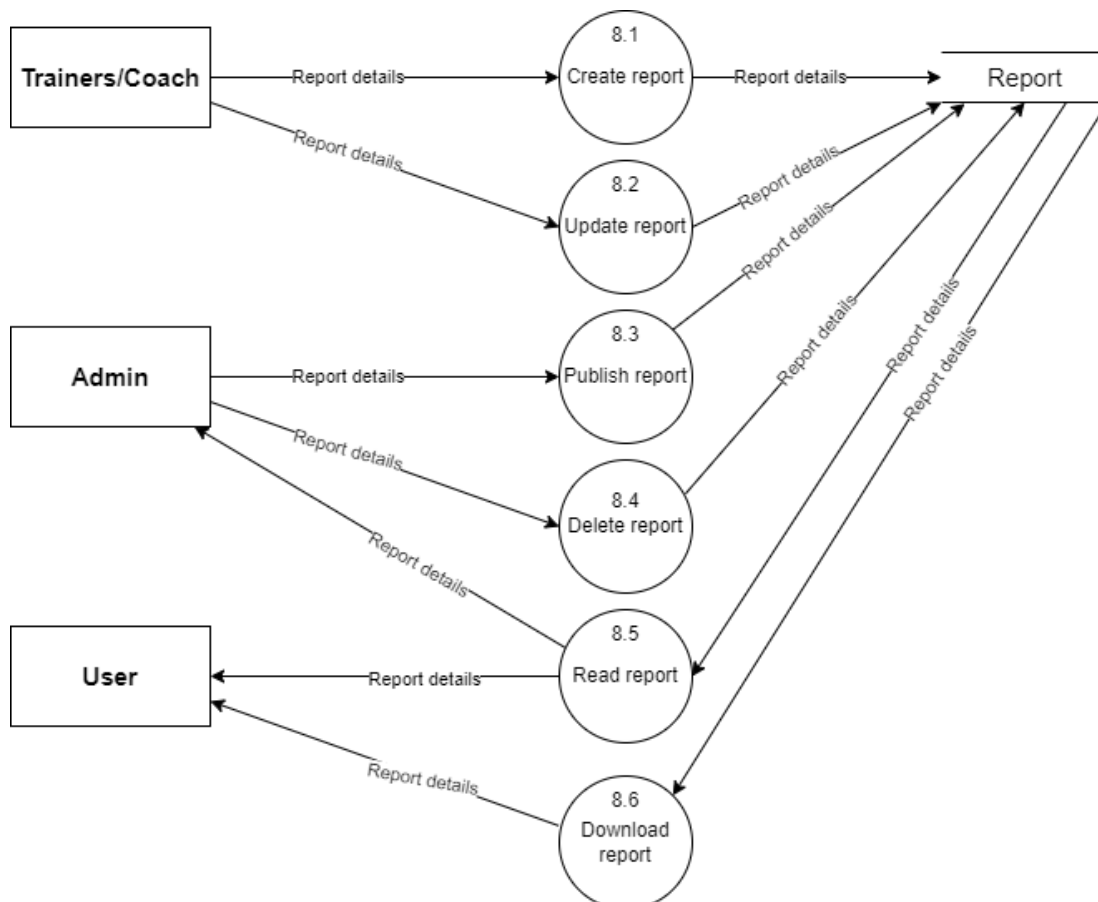


Figure 4. Level 2 DFD of the system (2)

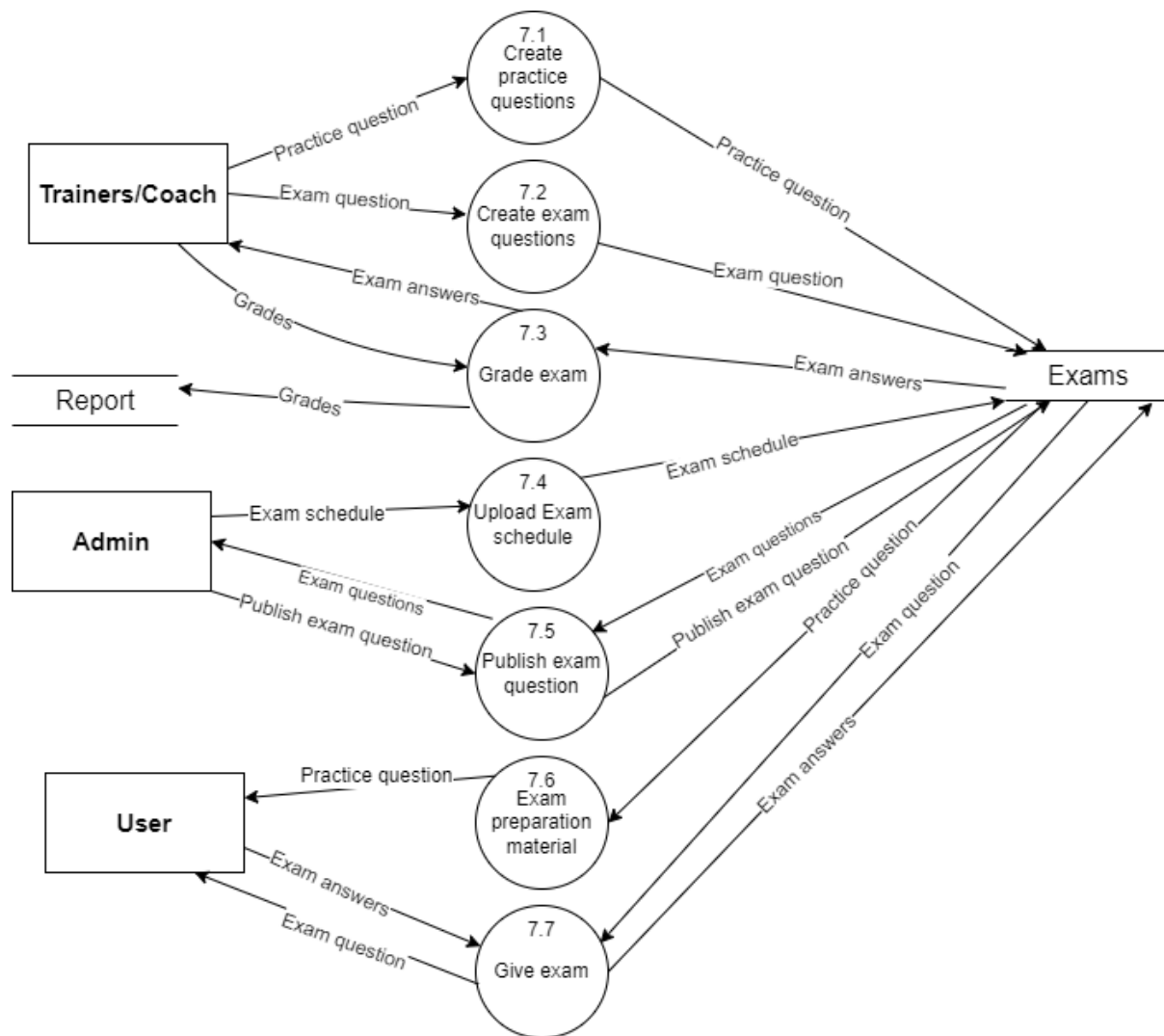


Figure 5. Level 2 DFD of the system (3)

4.2. Internal Model Specification

4.2.1. Entity Relationship Diagram

Entity Relationship Diagram, also known as ER Diagram or ER model is a structural diagram used in database design which represents the logical structure of database in a diagrammatic form. It acts as a blueprint for creating database and helps the designer in creating an accurate design as per the needs and requirements of the company. . An ERD contains different symbols and connectors that visualize the major entities in the system and the inter-relationship between those entities. (visual-paradigm.com, 2021)

An ERD consists of three main components which are:

i. Entity:

An entity is any kind of object or event, real or abstract, where data is stored. An entity can be a single thing, person, place, events or objects. An entity is used to uniquely identify and separate records in a database. (Nalimov, 2021) It is represented by a rectangle in ER diagram

ii. Attribute:

An attribute is a database component which helps describe the characteristics and property of an entity. Attributes describe the instances in the columns of a database. It is represented by an oval in ER diagram.

iii. Relationship:

Relationship is used to connect and show relations between different entities. It is represented by a diamond shape in ER diagram.

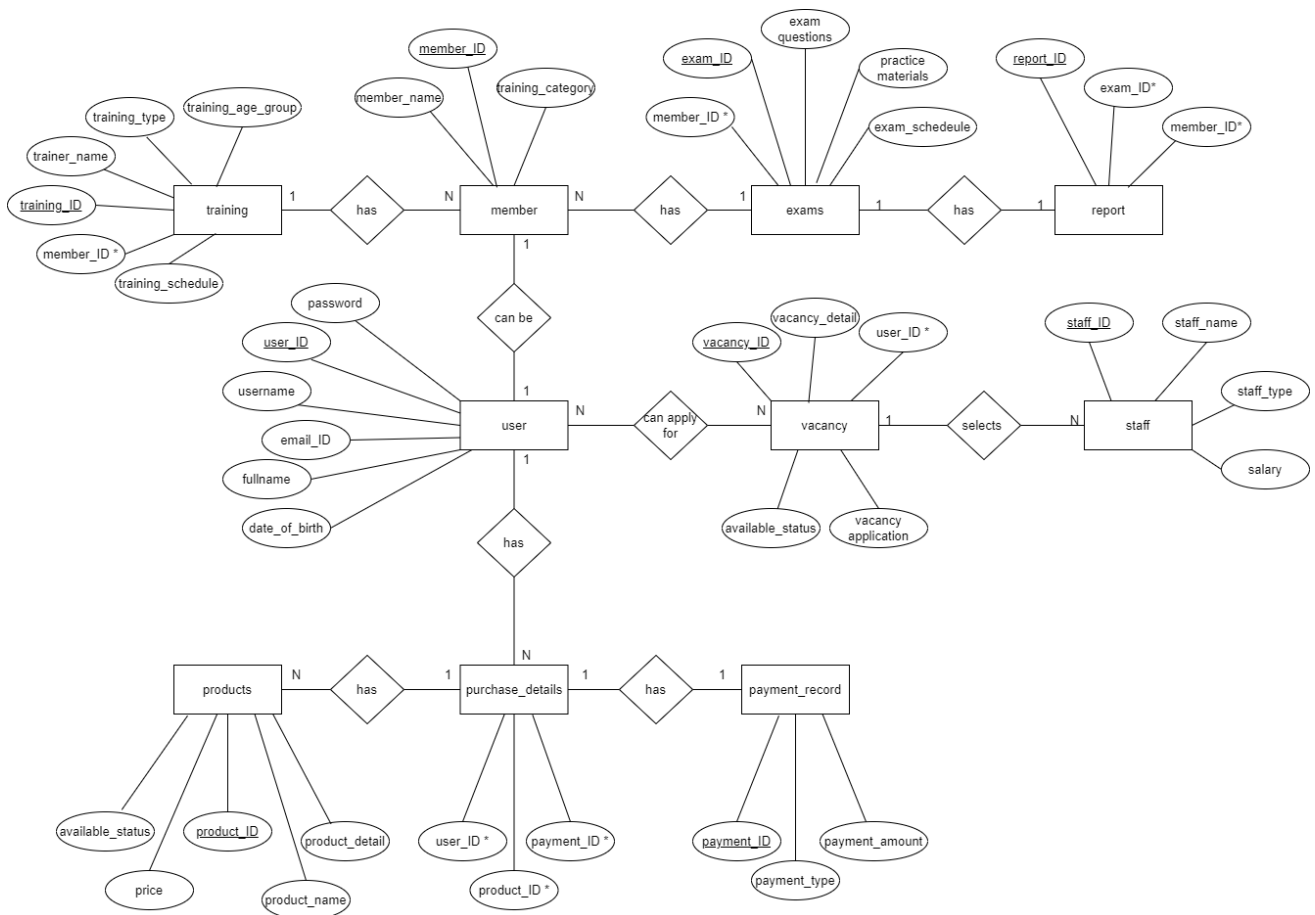


Figure 6. Entity Relationship Diagram of System

4.2.2. Data Dictionary

Data dictionary is the collection of facts and figures of the data elements of databases for instance data type. It is used so as to get a better understanding about incoming and outgoing elements or components of the given database (GeeksforGeeks, 2020). It provides meanings and purpose of data elements within the context of project. Data dictionary can also be known as meta-data.

The data dictionary is assists in in avoiding data inconsistencies and data redundancy and helps define conventions that are to be used across a project. (ucmerced.edu, 2021) It is also significant for maintaining data integrity for numerous databases.

However, an Entity Relationship Diagram focuses on the high-level business concepts, a Data Dictionary provides more detail about each attribute of a business concept. (Brandenburg, 2015)

Data dictionary of the system:

user details = user_ID + username + email_ID + full_name + date_of_birth + password

user credentials = username + password

member details = member_ID + member_name + training_category

exam schedule = exam_date + exam_age_group

exam answers = command

exam preparation materials = practice_questions + football_related_videos

result = command

product details = product_ID + product_name + price + product_detail + available_status

purchase details = user_ID + product_ID + payment_ID

payment details = payment_ID + payment_type + payment_amount

vacancy details = command

vacancy application details = user details + CV

membership renewal request = command

practice test papers = command

exam test papers = command

performance score = command

generate report = performance_score + exam_grade

training schedule = training_type + training_age_group + trainer_name + member_details

request details = command

renew membership = command

announcements = String

publish result = command

register staff = command

report details = user details + grade

4.2.3. Process Specification

Process specification is a method used to document, analyse and explain the decision-making logic. It is like a formula which is used to create output from process input data. Any high-quality and consistent data required clear and complete process specification. A process specification helps reduce uncertainty, allowing an individual or organization to obtain an overview of the system. (techopedia.com, 2019)

Process A

Process Name: Create products

Process Number: 3.1

Input Parameters: Product details

Process Logic:

- i. Admin adds the details of the products.
- ii. Product details are stored in data store.
- iii. If product already exists, an error message is shown.
- iv. If product does not exist, products are added and a success message is shown.

Output Parameters: Successful / Failed

Process Name: Update products

Process Number: 3.2

Input Parameters: Product details

Process Logic:

- i. Admin enters the updated product details.
- ii. Updated product details are stored in the data store.
- iii. If the product exists, the data is updated and a success message is displayed.
- iv. If the product does not exist, an error message is displayed.

Output Parameters: Successful / Failed, Updated product details

Process Name: Delete products

Process Number: 3.3

Input Parameters: Product details

Process Logic:

- i. Admin enters the product details of the products to be deleted.
- ii. Product details are retrieved from data store.
- iii. If the product exists, the product details are deleted and a success message is displayed.
- iv. If the product does not exist, an error message is displayed.
- v. The product data store is updated.

Output Parameters: Successful/ Failed, updated data store

Process Name: Read products

Process Number: 3.4

Input Parameters: Product details

Process Logic:

- i. The user enters the product details for the product they are looking for.
- ii. The product details are retrieved from data store.
- iii. If the product details exist, the user is shown the details of the products they are searching for.
- iv. If the product does not exist, the user is shown a message that the product does not exist.

Output Parameters: Successful / Failed

Process B

Process Name: Create report

Process Number: 8.1

Input Parameters: Examinee details, Grades

Process Logic:

- i. The trainers/coach get the exam papers to be corrected.
- ii. The trainers/coach enter the grades and the examinee details.
- iii. The examinee details and grades are stored in data store.

Process Output: Report

Process Name: Update report

Process Number: 8.2

Input Parameters: Examinee details, Grades

Process Logic:

- i. The trainers/coach enter the grades and the examinee details which are to be updated.
- ii. The examinee details and grades are stored in data store.
- iii. If the examinee details exist, the grades are updated and a success message is shown.
- iv. If the examinee details does not exist, an error message is shown.

Output Parameters: Updated report

Process Name: Publish Report

Process Number: 8.3

Input Parameters: Report details

Process Logic:

- i. The admin retrieves the report from the data store.
- ii. Then the admin publishes the retrieved report.

Output Parameters: Report

Process Name: Delete report

Process Number: 8.4

Input Parameters: Report details

Process Logic:

- i. The admin enters the details of the report which needs to be deleted.
- ii. If the details exist, the report is deleted.
- iii. If the details does not exist, an error message is shown.
- iv. The data store is updated.

Output Parameters: Updated report data store

Process Name: Read report

Process Number: 8.5

Input Parameters: Examinee details

Process Logic:

- i. The examinee enter their details.
- ii. If the examinee details exists, the report is retrieved from data store.
- iii. If the examinee details does not exist, an error message is displayed.

Output Parameters: Report

Process Name: Download Report

Process Number: 8.6

Input Parameters: Examinee details

Process Logic:

- i. The examinee enter their details.
- ii. If the examinee details exists, the report is downloaded from data store.
- iii. If the examinee details does not exist, an error message is displayed.

Output Parameters: Report

Process C

Process Name: Create practice question

Process Number: 7.1

Input Parameters: Practice questions

Process Logic:

- i. The trainers/coach upload the practice questions.
- ii. The practice questions are stored in a data store.

Output Parameters: Practice questions

Process Name: Create exam questions

Process Number: 7.2

Input Parameters: Exam questions

Process Logic:

- i. The trainers/coach upload the exam questions.
- ii. The exam questions are stored in a data store.

Output Parameters: Exam questions

Process Name: Grade exam

Process Number: 7.3

Input Parameters: Grades

Process Logic:

- i. The trainers/coach retrieve the exam answers from the data store
- ii. The exam answers are graded by the trainers/coach.
- iii. The trainers/coach enter the grade.
- iv. The grade is stored in a data store.

Output Parameters: Grade

Process Name: Upload exam schedule

Process Number: 7.4

Input Parameters: Exam schedule

Process Logic:

- i. The admin upload the exam schedule
- ii. The exam schedule is stored in a data store.

Output Parameters: Exam Schedule

Process Name: Publish exam questions

Process Number: 7.5

Input Parameters: Exam questions

Process Logic:

- i. The admin retrieves the exam questions from the data store
- ii. The admin then publishes the exam questions according to schedule.

Output Parameters: Exam questions

Process Name: Exam preparation material

Process Number: 7.6

Input Parameters: exam materials

Process Logic:

- i. The user searches for exam preparation materials
- ii. The exam preparation materials such as practice questions are retrieved from data store.

Output Parameters: Practice question, Exam preparation materials

Process Name: Give exam

Process Number: 7.7

Input Parameters: Examinee details, Exam answers

Process Logic:

- i. The user enters their examinee details.
- ii. The exam questions are retrieved from the data store
- iii. The user upload the exam answers, which are then stored in the data store.

Output Parameters: Exam answers

4.3. Design Specification

4.3.1. Structure chart (Upper Level) for the whole chart

Structure chart is a design of hierarchical structure of modules of a system. It describes the functions and sub-functions of each module of a system to a greater detail by breaking down the entire system into lowest functional modules. (geeksforgeeks.org, 2019). A structure chart is a chart derived from the Data Flow Diagram, which represents the system in more detail than the DFD. At each layer of structure chart a specific task is performed. (tutorialspoint.com, 2021)

Structure chart illustrate the following features:

- i. Partition of program into modules
- ii. Top-down hierarchy of modules
- iii. Link between modules
- iv. Flow of data, control or exceptions

(excelsoftware.com, 2021)

A structure is used to show the relation of processing modules in computer software. It is a chart which is developed prior to writing of program code however it does not express procedural logic. (freetutes.com, 2021)

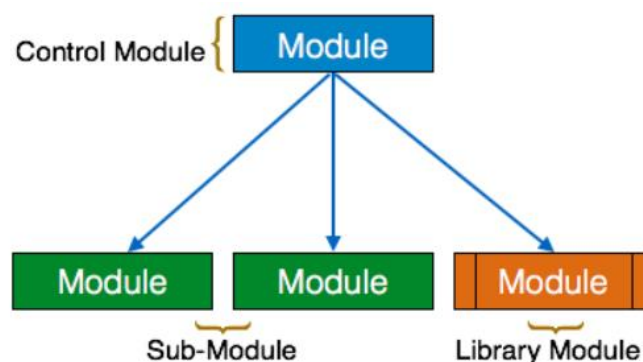


Figure 7. Structure Chart hierarchy

(tutorialspoint.com, 2021)

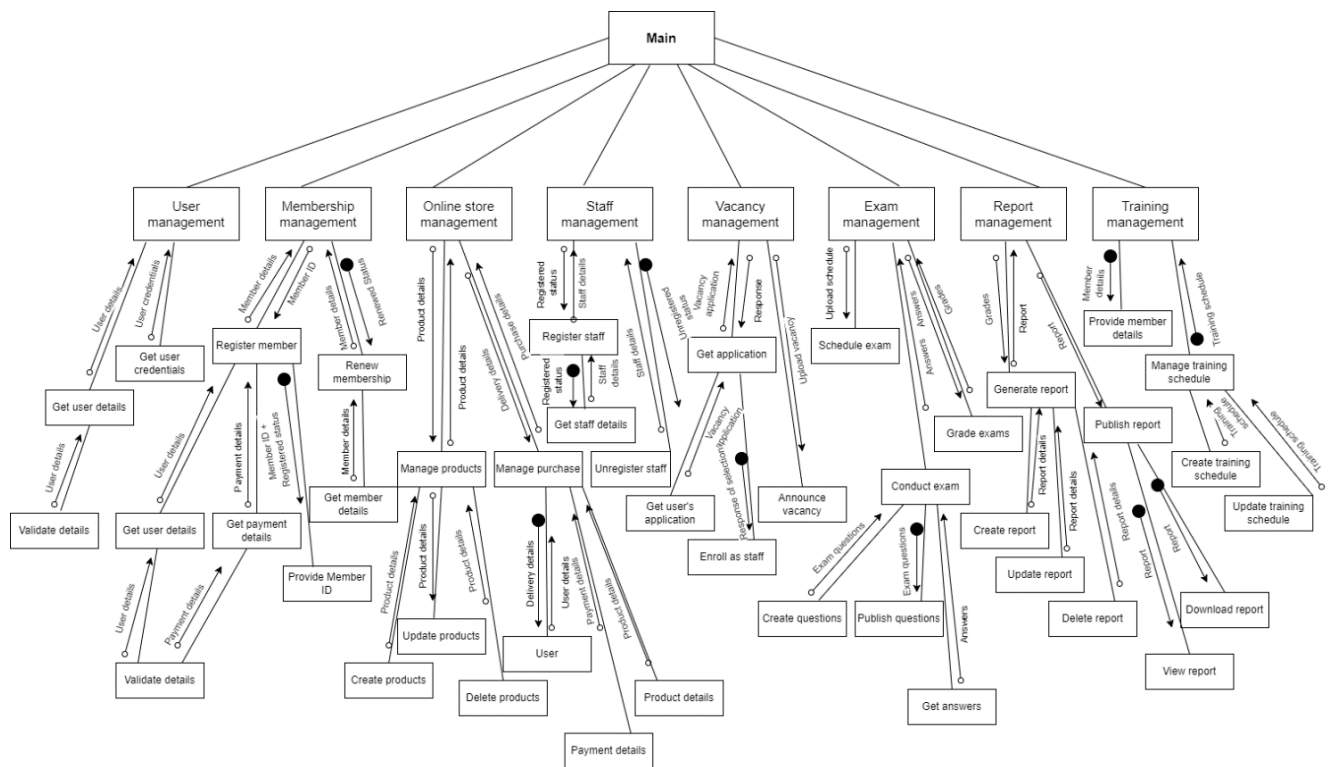


Figure 8. Structure chart of the entire system

4.4. Assignment Diary

4.4.1. Assumptions

The provided specification of the T-14 Training academy were analysed and implemented to design the system, meeting all the needs and required objectives. However, few assumptions were made to enhance the logic aspect and design of the system. Some of the assumptions made are as follow:

- A user can either register membership to enrol in training and purchase products or even to use either one of the function.
- The assumptions for database to store data of the system are:
 - **user:** This database stores the details of the people who have registered for membership. It also stores the details about the age group and training kind the user has joined.
 - **products:** This database stores all the details of the products available in the online store.
 - **staff:** This database stores the details about the staffs working in the academy.
 - **exams:** This database holds the details regarding exam such as questions, exam schedule and the exam preparation materials.
 - **vacancy:** This database holds the records of available vacancies and the vacancy applications.
 - **report:** This database holds the reports of the users who have appeared for the exams.
 - **training:** This database stores the details about training schedule, trainer and members assigned to the trainer.
 - **purchase_details:** This database stores the details of the product and the user who have purchased the product.
 - **payment_record:** This database stores the details of every kind of payment.
 - **member:** This database stores the details of the members.

Furthermore following are the requirements collected by the team from the provided specification based on which the above assumptions have been made:

- Maintain the records of users and staffs
- User must register to start training.
- User Details
 - Full name of user
 - Date of birth
 - Training category
 - Username
 - Password
 - Date of registration
 - Payment type
 - Payment amount
- User applying for vacancy require following details:
 - Full name of applicant
 - CV
- Users can view products from the online store.
- Users can also purchase products from the online store.
- Users can select from different modes of payment.
- Users applying for intermediate training can prepare using the materials provided.
- Users can request to renew membership.
- Users who have appeared for exam can view and download their report.
- Exams are a must for the users to enrol in intermediate training.
- Admin is responsible for publishing exam questions.
- Admin also publishes vacancy announcements.
- Admin published the exam results.
- Admin can manage the training schedule.
- Trainer/Coach can design the mock and actual exam papers.
- Trainers/Coach can grade the exam answer sheets.
- Trainers/Coach are also staff.

- Staff can renew membership upon request by a user.
- Staff handle the online store and handle the purchase details.
- Staff manages the delivery for the online purchase.
- Admin can view the vacancy applications.
- Admin can register a new staff.
- Admin can post any announcement regarding training.
- User needs to do payment while registering.
- Admin is responsible for registering the staffs already working in the academy.
- Admin is responsible for the upload and management of training schedule.
- Membership deactivates if not used for a longer period of time.

4.4.2. Group member responsibilities

Each member of the group played certain role while working on the design of the system. Group members held discussions and interactions about the design of the system and also helped each other review their individual task so that each of the group member would understand the complete workflow of the system. Following are the tasks done by each group member:

Group Members	Responsibilities
Sakshi Gupta	<ul style="list-style-type: none"> • Work on individual task for Register Membership. • Work on Introduction section of the report. • Work on Project Charter for the project. • Work on SRS document for the project. • Work on DFD literature. • Design DFD level 0, level 1 and level 2 of whole system. • Work on Entity Relationship Diagram literature. • Design Entity Relationship Diagram. • Work on Data Dictionary literature. • Work on Data Dictionary of entire system. • Work on Process Specification literature. • Work on Process Specification of Entire system. • Work on Structure Chart literature. • Design Structure Chart of the entire system. • Work on Assumptions section of the report. • Work on Assignment diary section of the report. • Work on summary section of the report. • Provided direction, instructions and guidance to team members. • Compile the individual tasks and group tasks together.

Poonam Singh Yadav	<ul style="list-style-type: none">• Work on individual task for Enrol Staff Members.• Work on Data Dictionary literature.• Work on Structure Chart literature.• Work on DFD level 0 diagram.• Work on project charter.• Work on assumptions section of the report.
Punam Thapa Magar	<ul style="list-style-type: none">• Work on individual task for Report Preparation.• Work on scope section of the project charter.• Work on DFD level 0 diagram.• Work on Process Specification literature.• Work on assumptions section of the report.
Apson Sapkota	<ul style="list-style-type: none">• Work on individual task for Take a Mock Exam.

Table 1. Group member responsibilities

4.4.3. Meeting Minute (Group Meetings)

Date	Time	Location	Discussion
2021/12/20	10:30 am to 11:30 am	Alumni Block	The problem in the coursework was analysed and the tasks were divided among group members
2021/12/21	10:00 am to 11:30 am	Kumari Block	The requirements were discussed and the SRS document was prepared by discussion among team members.
2021/12/23	1:00 pm to 3:00 pm	Online medium	All the members worked on the group tasks to discuss the design of DFD, Data Dictionary and ERD of the entire system.
2021/12/27	11:30 am to 12:00 pm	Alumni Block	The design for structure chart was discussed.
2021/12/29	10:am to 12:30 pm	Online medium	The diagrams and charts were finalised.
2021/12/30	2:00 pm to 5:00 pm	Online Medium	Each member of the team worked on their individual tasks. We reviewed each other's work and improvised on the works.
2021/12/31	2:00 pm to 3:00 pm	Alumni Block	The whole report was assembled by combining the individual works.
2022/1/2	2:00 pm to 4:00 pm	Online Medium	Proof reading, detailed review and report formatting was done by the group members and then the assignment was handed in.

Table 2. Meeting minute

5. Individual Tasks

5.1. Register Membership

5.1.1. Environmental Model Specification

5.1.1.1. Context Level Diagram

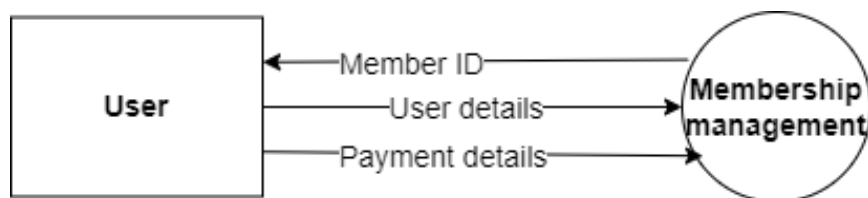


Figure 9. DFD level 0 / Context Level diagram to register membership

The context level diagram also known as DFD level 0 is created in the above figure to represent the process of registering membership. In the diagram a process named membership management is made where the user send their details along with the payment to be registered as a member. Once the registration is completed, the user becomes a member of the training academy and gets their member ID from the system.

5.1.2. Internal Model Specification

5.1.2.1. DFD Level 1

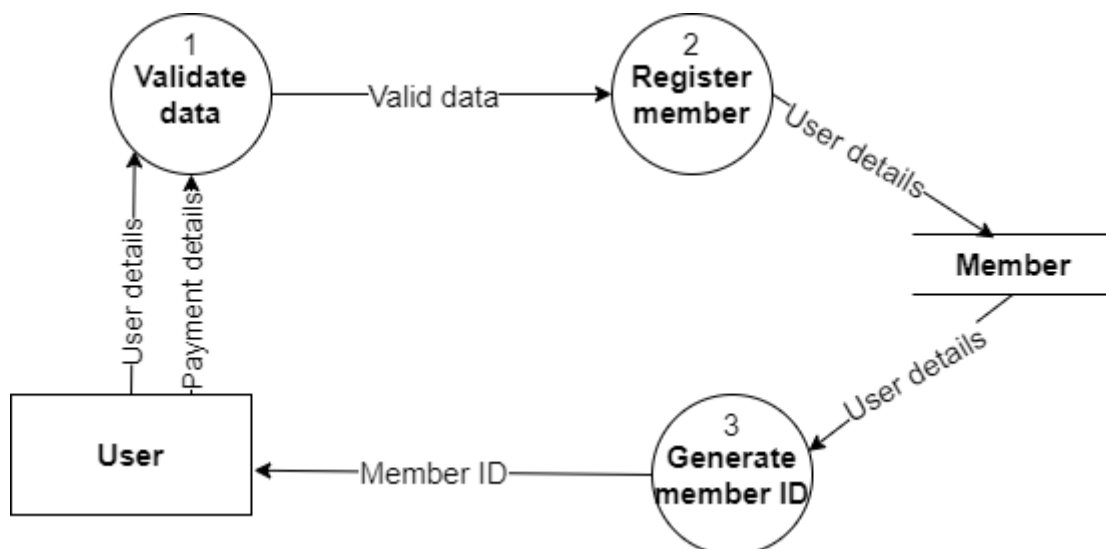


Figure 10. DFD level 1 to register Membership

The DFD level 1 for the registering membership is shown in the figure above. In this diagram, the in-depth process while registering a member is shown. This diagram consists of three processes named, validate data, register member and generate member ID. To be a member the user first has to enter their user details, which is then send for validation. Once the details are validated, the user is registered as a member and the records are stored in a database named member. Then the user is provided with their member ID.

5.1.2.2. DFD Level 2

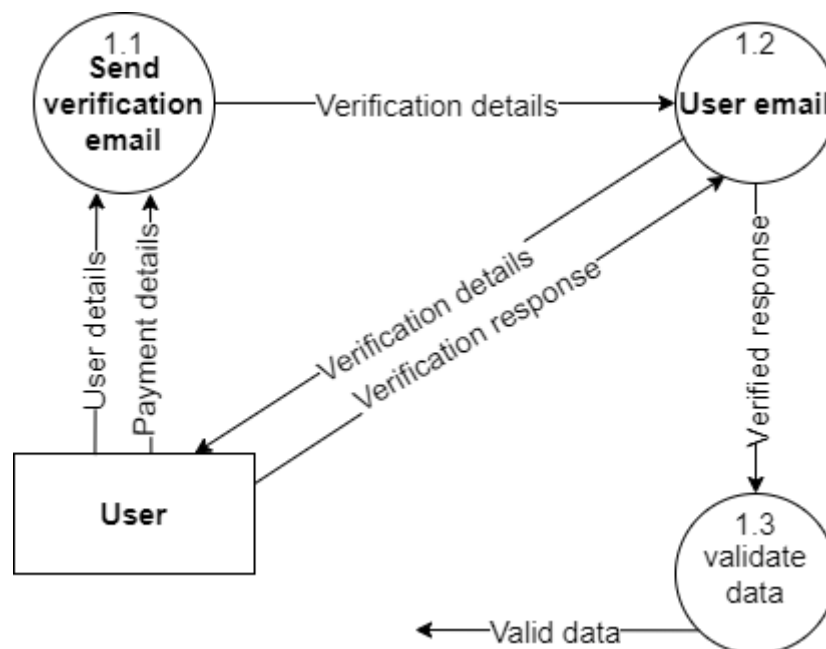


Figure 11. DFD level 2 to register membership (1)

In the above figure the DFD Level 2 for the process validate data of DFD level 1 has been shown. In this DFD the process of validation has been represented. This DFD contains three processes named send verification email, user email and validate data. When the user enters their user details and payment details, a verification email is sent to the email ID that the user has entered. When the user opens and accepts the verification details in their email ID, the response is sent back to the system. Once the system gets the validated response, the data is validated and is now sent for further process.

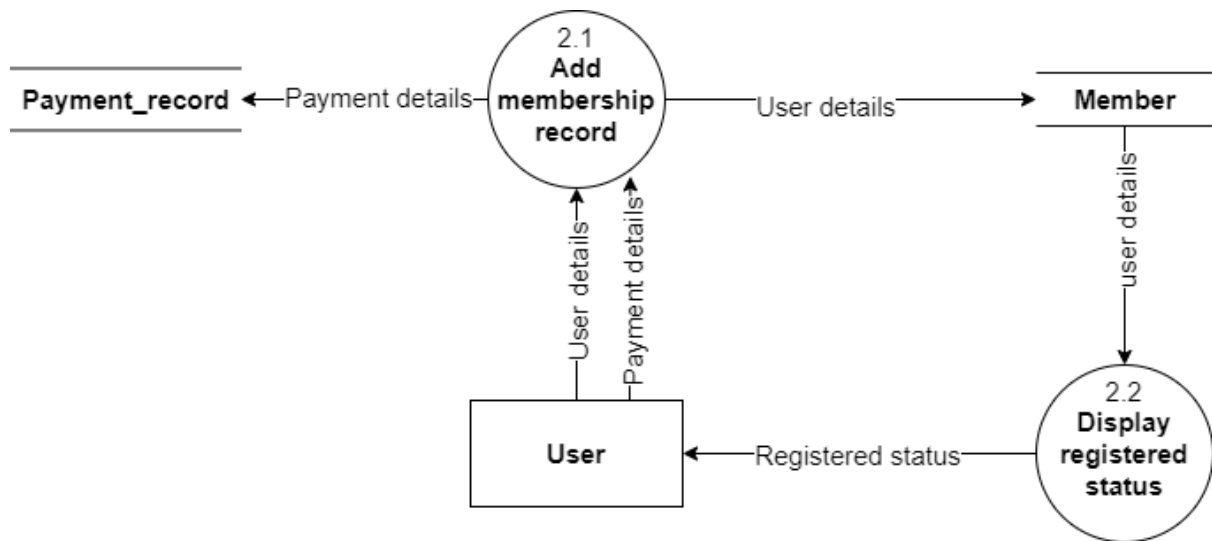


Figure 12. DFD level 2 to register membership (2)

In the above figure the DFD Level 2 for the process register member of DFD level 1 has been shown. In this DFD the process of registering a user as a member has been represented. This DFD consists of 2 processes named, add membership record and display registered status. Once the data of the user is validated, the user is now added as a member. In this process, the payment details are stored in a database named payment_record. The validated user detail is stored in a database named member and then the user is shown a message so as to let them know that they have been registered.

5.1.3. Design Specification

5.1.3.1. Structure Chart

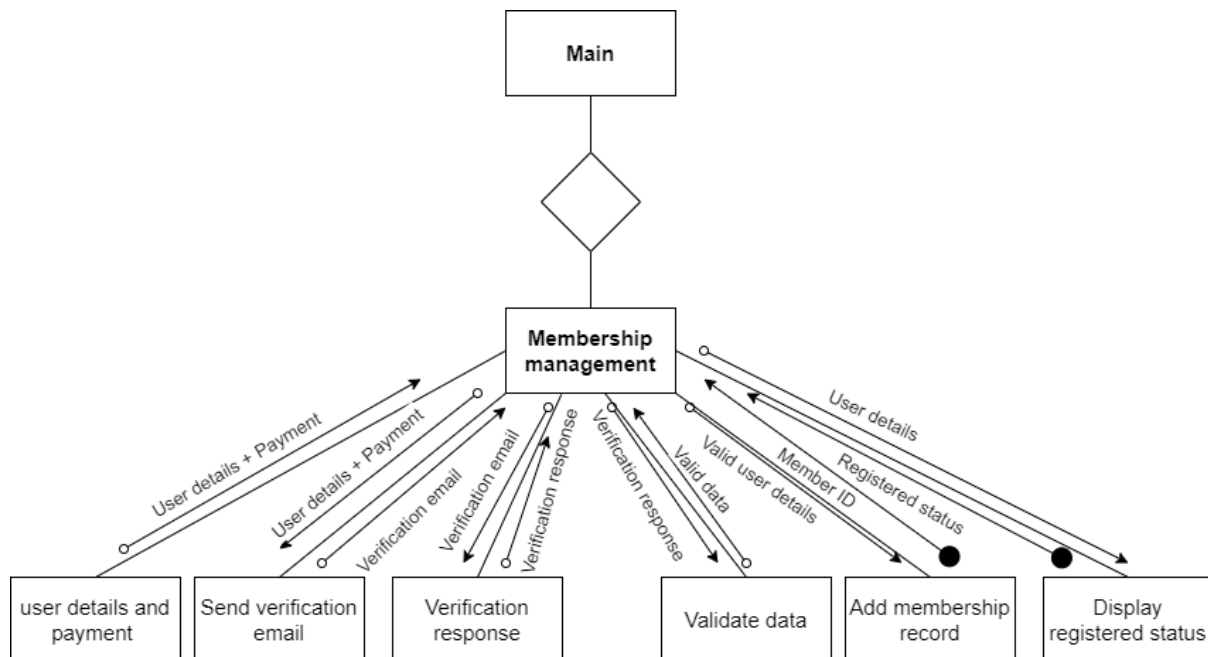


Figure 13. Structure chart to register membership

The above structure chart represents the relation of processing modules for registering membership. We can see that the module register membership has six sub modules where parameters have been passed from one sub module to another to complete the process of registering membership. According to the structure chart, the user details and the payment details are collected first and then is sent for verification. After the verification process has been completed, the data in the parameter are now considered as valid data and hence the user is added as a member and member ID and registered status are given which have been represented by control flow arrows.

5.1.3.2. Module Specifications

MODULE NAME: Register Membership

PURPOSE: This module gets the user and payment details from the user and adds the user details to user database. This module verifies the user details before registering them as a member and returns a member ID once the user is registered as a member.

PSEUDOCODE:

DO

 DECLARE member_details

 SET member_details.user_details EQUAL TO user_details

 IF (validate(user_details))

 SET member_details.id EQUAL TO member_id

 SET member_details.name EQUAL TO member_name

 SET member_details.training_category EQUAL TO training_category

 SET database.payment_records(payment_id, payment_type,
 payment_amount)

 SAVE (user_details, member_id, member_name, training_category) TO
 database.member

 DISPLAY ("Member ID:" member_id)

 ELSE

 DISPLAY ("Please enter valid user details")

END DO

INPUT PARAMETERS: user_details (user_ID, username, password, fullname, date_of_birth), payment_details (payment_id, payment_type, payment_amount)

OUTPUT PARAMETERS: Member ID, "Please enter valid user details"

GLOBAL VARIABLES: Database

LOCAL VARIABLES: member_id, member_name, training_category

CALLS: user_details, payment_records

CALLED BY: Main

5.2. Enroll staff members

5.2.1. Environmental Model Specification

5.2.1.1. Context Level Diagram

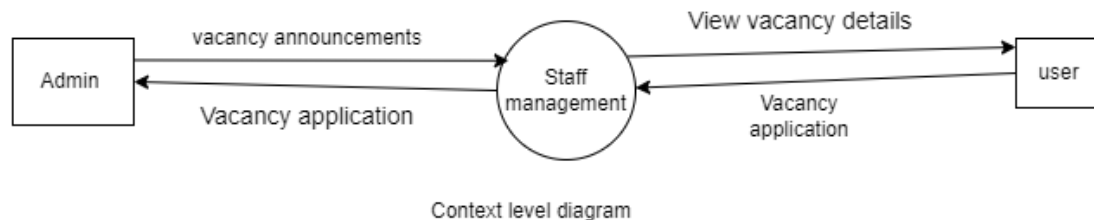


Figure 14. DFD level 0 / Context Level diagram to enroll staff members

Context diagram can also be known as DFD level 0. It is an overall structure of the information where a single process namely staff management represents activities of the system. The vacancy announcements represent data flow from admin to staff management and the details can be viewed by the users whereas user can fill up the application and can sent it to the staff management which can be viewed and considered by the admin.

5.2.2. Internal Model Specification

5.2.2.1. DFD Level 1

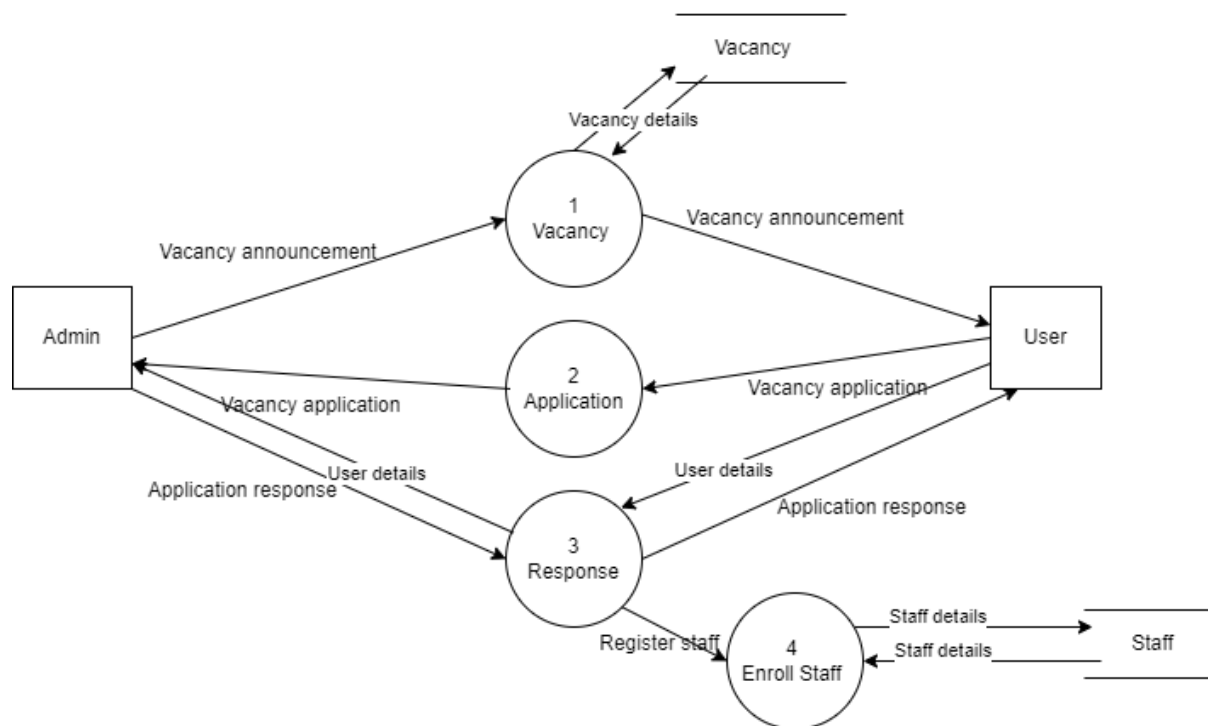


Figure 15. DFD level 1 to enroll staff members

In the level 1 DFD vacancy announcement and application response are sent through vacancy and response process respectively that can be considered by the users. Likewise, user details and the filled application can be sent by the user through response and application process which can be checked by the admin. After the valid details of the user admin registers them as staff and the staff details are saved in the database named staff. Also, the vacancy details are saved in a database named vacancy.

5.2.2.2. DFD Level 2

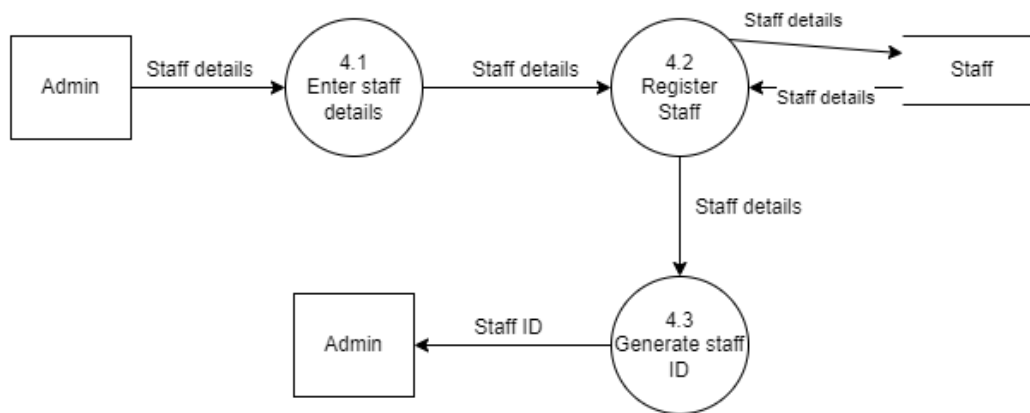


Figure 16. DFD level 2 to enroll staff members

Similarly for level 2 DFD admin sends staff details through enter staff details process. It goes through register staff process and registration is done also data is saved in the database called staff. Then the staff id is generated and again the information is sent back to the admin.

5.2.3. Design Specification

5.2.3.1. Structure Chart

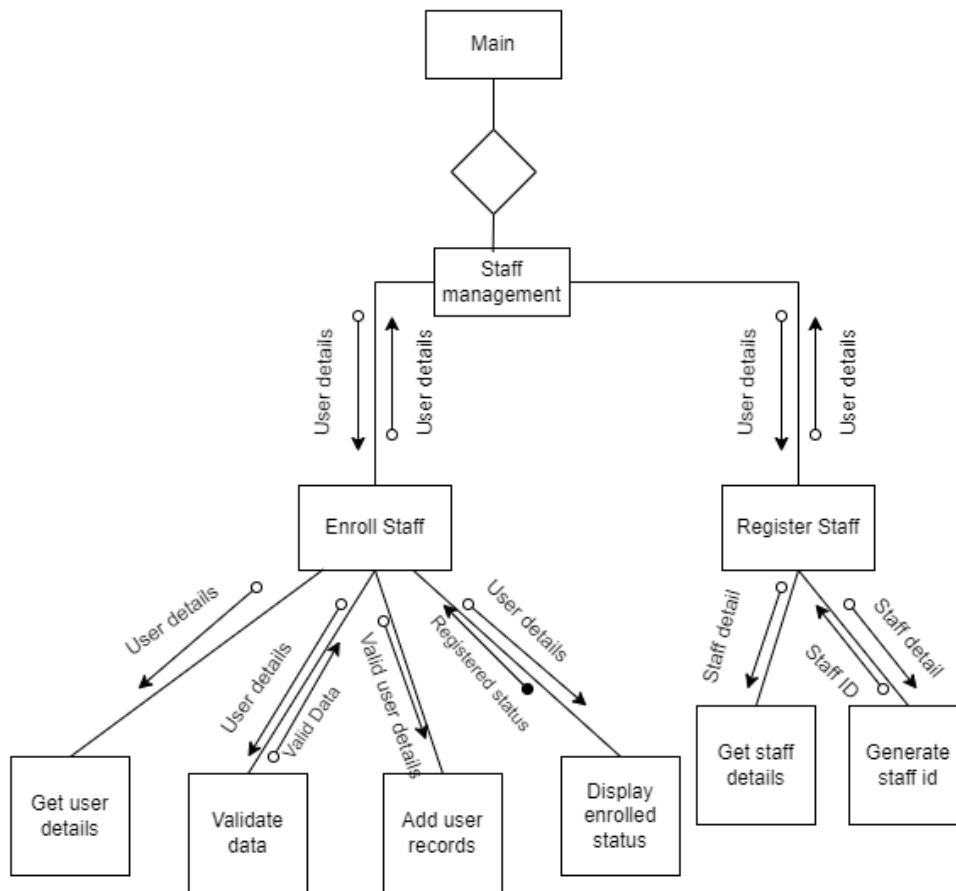


Figure 17. Structure chart to enroll staff members

For the structure chart main module has two sub modules which are enroll staff and register staff. Furthermore, the enroll staff module was again divided in to four sub modules that are get user details, validate data, add user records, display enrolled status. Moreover, register staff has two sub modules name get staff details and generate staff id. The data flows are illustrated with arrow and end with empty circle whereas the control flow is demonstrated with filled circle at the end of the arrow. Significantly, the diamond is presented to invoke module.

5.2.3.2. Module Specifications

MODULE NAME: Enroll Staff members

PURPOSE: The module enroll staff members acquire the user details. It goes through many processes such as vacancy, application, response and enroll staff and stored in vacancy data store and staff data store.

PSEUDOCODE:

DO

 DECLARE staff_details

 SET staff_details.name is EQUAL TO name

 SET staff_details.username is EQUAL TO username

 SET staff_details.password is EQUAL TO password

 SET staff_details.location is EQUAL TO location

 SET staff_details.birthdate is EQUAL TO birthdate

 SET staff_details.qualification is EQUAL TO qualification

 SET staff_details.user_record is EQUAL TO user_record

 IF (validate (name, username, password, location, birthdate, qualification, user_record)

 SAVE (name, username, password, location, birthdate, qualification, user_record) TO database.staff

 DISPLAY ("Registration is successful")

 DISPLAY ("Staff ID is" + Staff_ID)}

 ELSE {"Invalid input."}

END DO

INPUT PARAMETERS: name, username, password, location, birthdate, qualification, user_record

OUTPUT PARAMETERS: message, Staff ID

GLOBAL VARIABLES: Database

LOCAL VARIABLES: name, username, password, location, birthdate, qualification, user_record

CALLS: staff details, user record

CALLED BY: Main

5.3. Report Preparation

5.3.1. Environmental Model Specification

5.3.1.1. Context Level Diagram

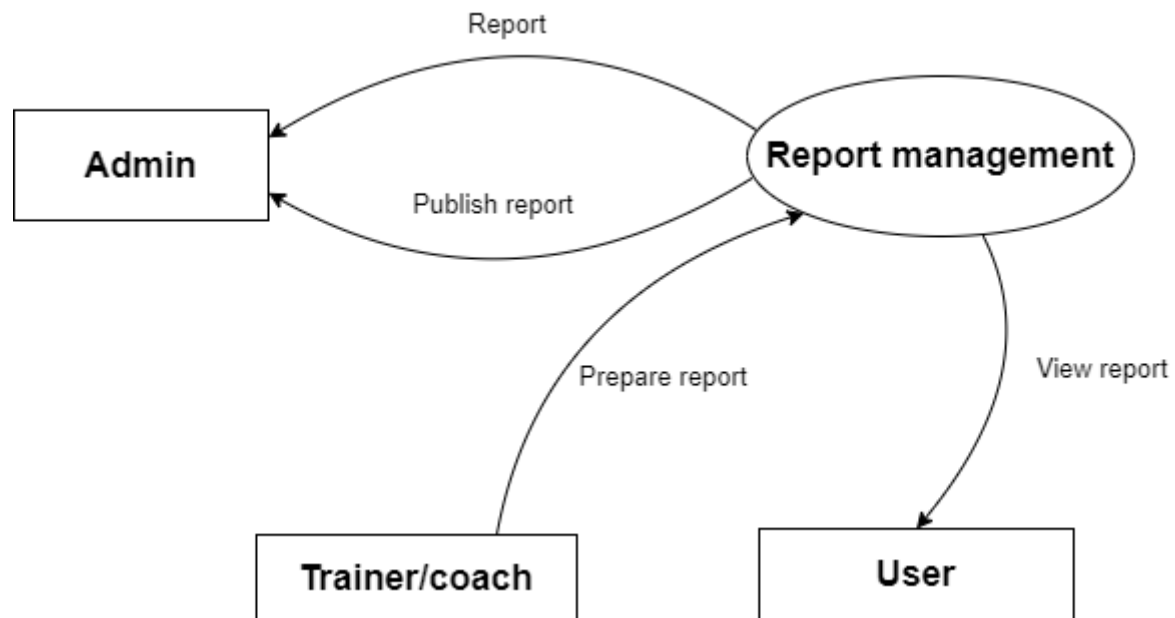


Figure 18. DFD level 0 / Context Level diagram for report preparation

As it is a context level diagram, the process is just one. In our case, it is Report Management. The external entities are: Admin, Trainer/coach, and the user. These are all entities who are engaged with the system. In between the process and the external entities, there are data flows that shows a short depiction of the sort of information traded between the entities and the system. The list of data flows includes: Report, publish report, prepare report, and view report.

5.3.2. Internal Model Specification

5.3.2.1. DFD Level 1

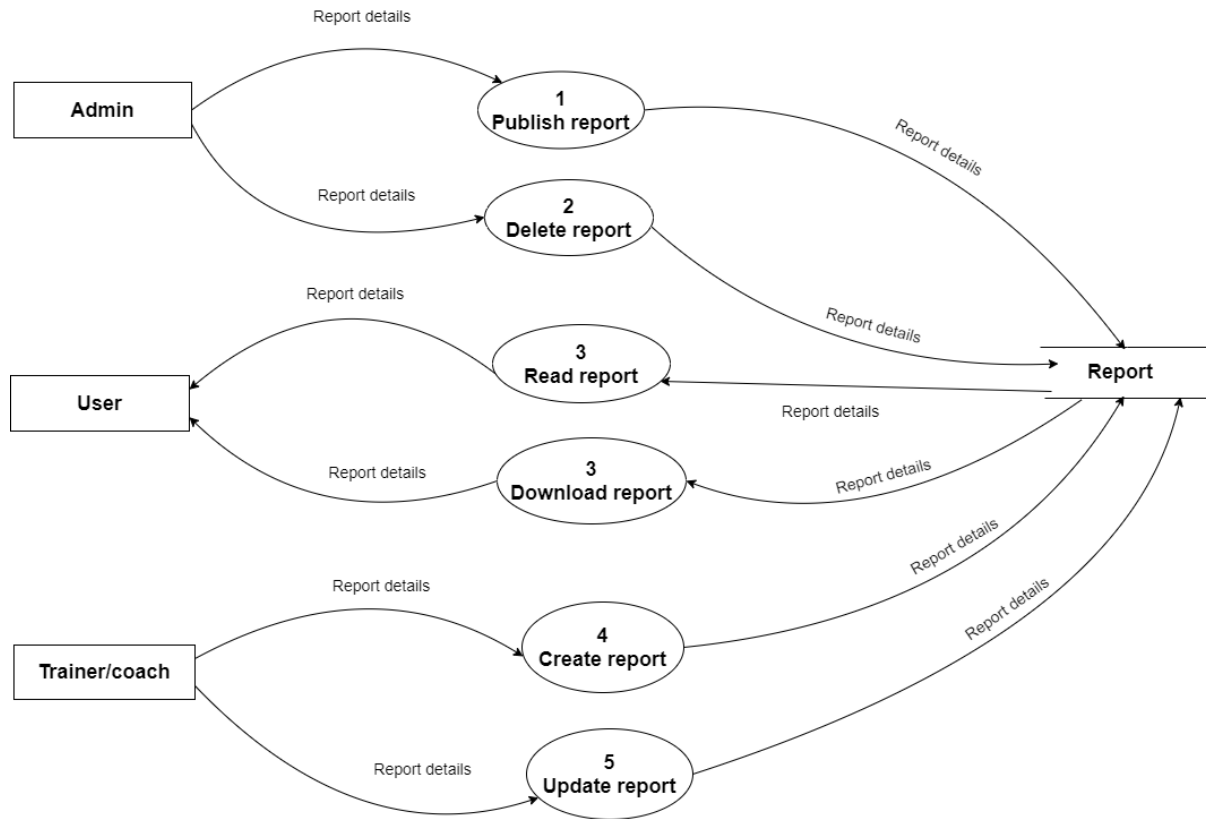


Figure 19. DFD level 1 for report preparation

Here, in the level 1 data flow diagram there are six processes, three entities and one data store. The six processes are: publish report, delete report, read report, download report, create report, and update report and the external entities are admin, user, trainer/coach, and report are the data store. Likewise, report details are the data flow for all processes and entities.

5.3.2.2. DFD Level 2

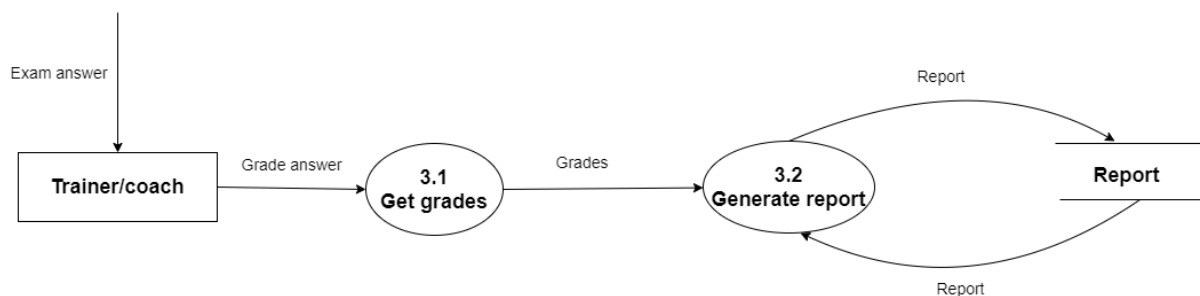


Figure 20. DFD level 2 for report preparation

In the level 2 data flow diagram there are two processes, one entity and one data store. The two processes include get grades and generate report with numbering for a process is 3.1 and 3.2 which further decomposes the child process depicted in level 1 DFD of trainer/coach's process. Moreover, in the above diagram, the trainer/coach gives the marks for the exams and enter performance score in the system from which they can generate report.

5.3.3. Design Specification

5.3.3.1. Structure Chart

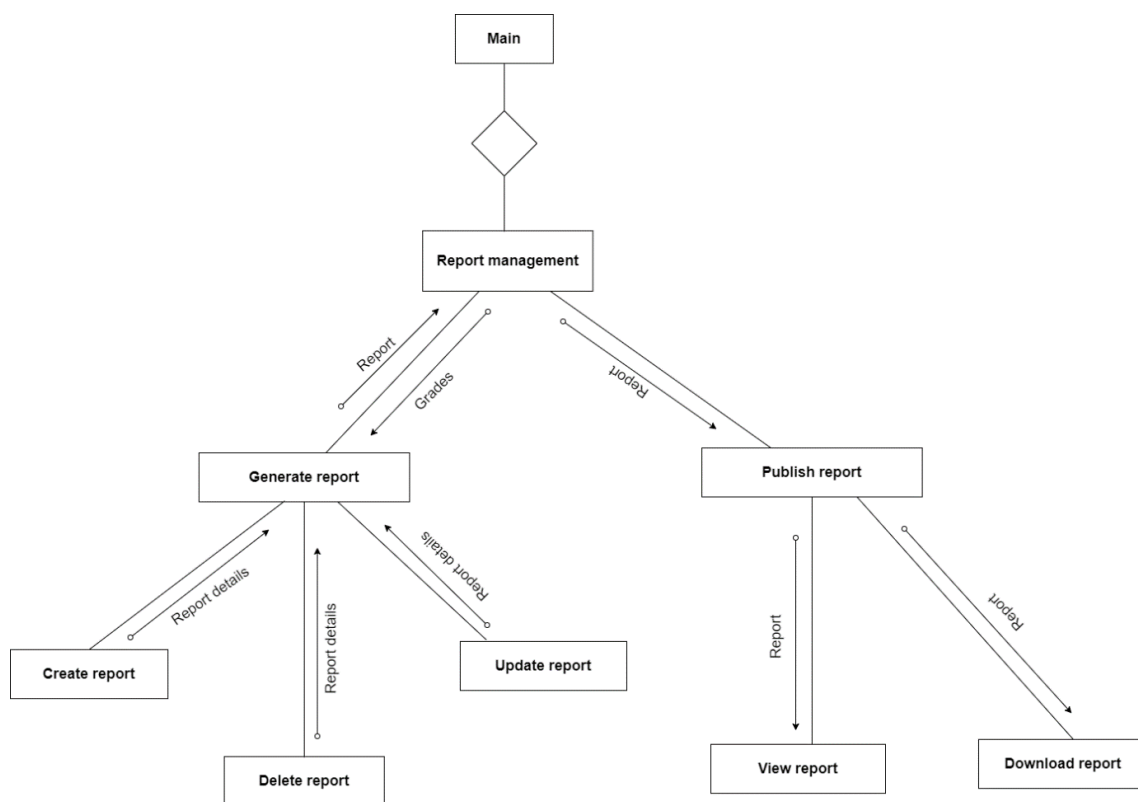


Figure 21. Structure chart for report preparation

As it is a structure chart which slightly represents the processing modules for report preparation. It receives an input which is transformed by a sequence of operation being carried out by two sub modules generate report and publish report where parameters have been passed from one sub module to another to complete the process of report preparation. These two sub modules are further divided into 3-2 sub modules. Moreover, the report is generated first and afterward it was published which have been represented by control flow arrows.

5.3.3.2. Module Specifications

MODULE NAME: Report Preparation

PURPOSE: The purpose of this report is to generate the report of T-14 academy members. To create the report, it collects the data from admin, user and trainer or coach.

PSEUDOCODE:

DO

 DECLARE report_generate

 SET report_generate.report_id EQUAL TO report_id

 SET report_generate.report_name EQUAL TO report_name

 SET report_generate.created_by EQUAL TO created_by

 SET report_generate.released_date EQUAL TO released_date

 IF (valid (report_id, report_name, created_by, released_date)

 SAVE(report_id, report_name, created_by, released_date) TO
 database.report

 DISPLAY ("Report is generated.")

 ELSE

 DISPLAY ("Invalid input.")

END DO

INPUT PARAMETERS: report_id, report_name, created_by, released_date

OUTPUT PARAMETERS: message

LOCAL VARIABLES: report_id, report_name, created_by, released_date

GLOBAL VARIABLES: database

CALLS: Get report details, Display messages

CALLED BY: Main

5.4. Take a Mock Exam

5.4.1. Environmental Model Specification

5.4.1.1. Context Level Diagram

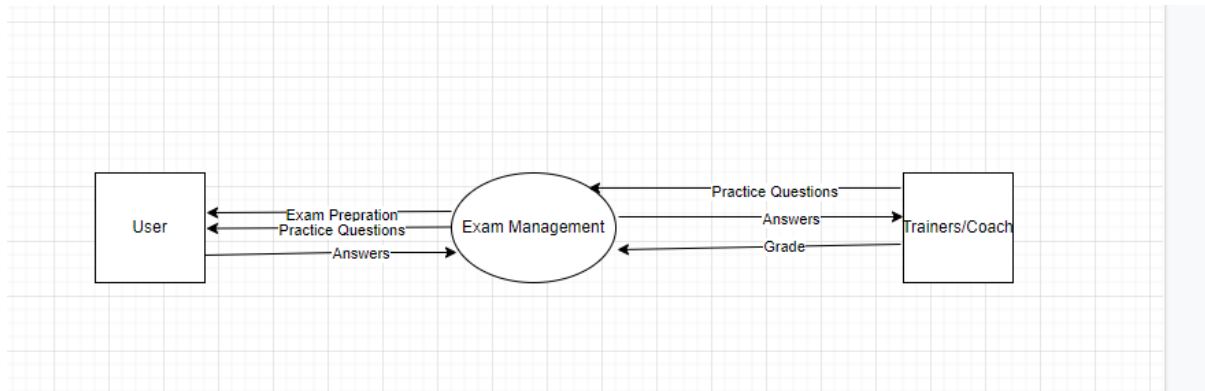


Figure 22. DFD level 0 / Context Level diagram to take a mock exam

This is the zero level DFD of mock exam, where I have elaborated high level process of Examination. It's a basic overview of the whole mock management system or process being analyzed or modeled. The data of Practice questions and grade pass from Trainers/Coach to Exam Management and the data of answers pass from exam management to trainers/coach. Moreover, the data of Exam Preparation, Practice Questions pass from Exam management to User and answers pass from user to exam management.

Process flow of examination management system:

- Managing User
- Managing Trainers or Coach

5.4.2. Internal Model Specification

5.4.2.1. DFD Level 1

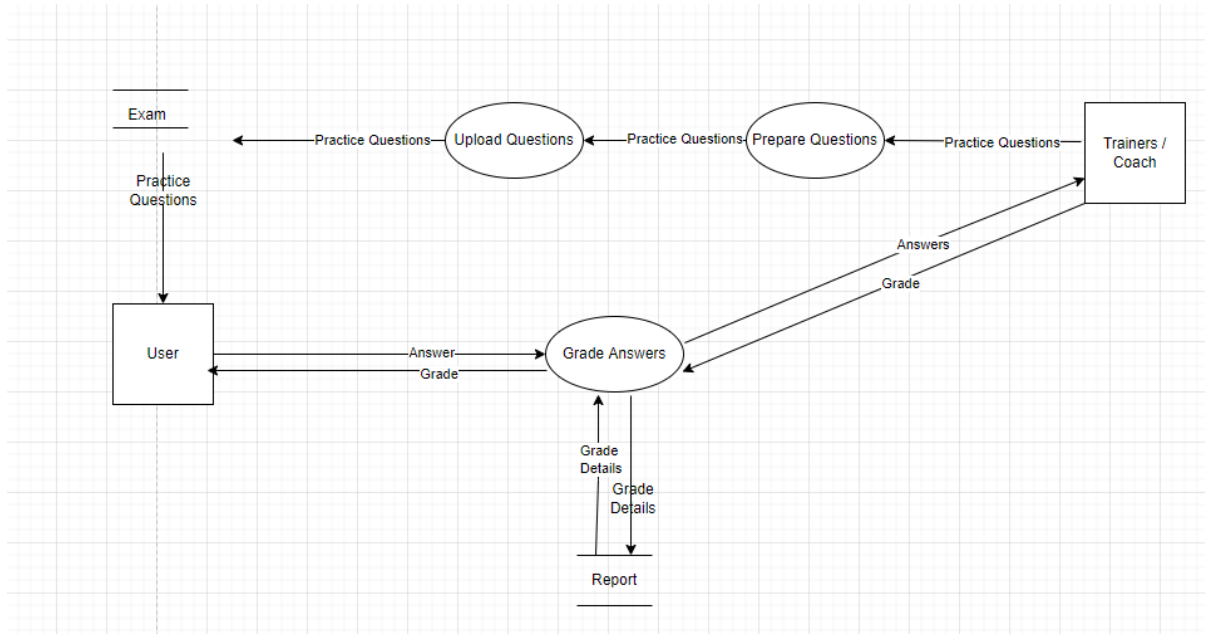


Figure 23. DFD level 1 to take a mock exam

First level Data Flow of Examination Management system elaborates how the system is divided into many parts, each of which deals with one or more data flows or from an external agent, and which provide all of the functionality of the Examination Management System. In this data flow, practice questions is passed from Trainers/Coach, Prepare Questions, Upload Questions, Exams, User. Moreover, user pass the answer data and take grade data to grade answers whereas ,grade answers passes grade details to report and take grade details from report. However, Trainers/Coach takes the answers data and pass grade data to the grade answers.

Process flow in first level data flow diagram:

- Processing Prepare Questions
- Processing Upload Questions
- Processing Grade Answers
- Processing Exam
- Processing Report

The above DFD figure represents that trainers/coach sends the data of practice questions to prepare questions and the data is transmitted to upload questions so on the data is transmitted to the exam. Likewise, the practice question data reaches the user. Then the user transmit data of answer to grade answer and receive the data of grade. More over the grade details data is transmitted to report and finally the answer is transmitted to trainer and grade answer receive grade.

5.4.2.2. DFD Level 2

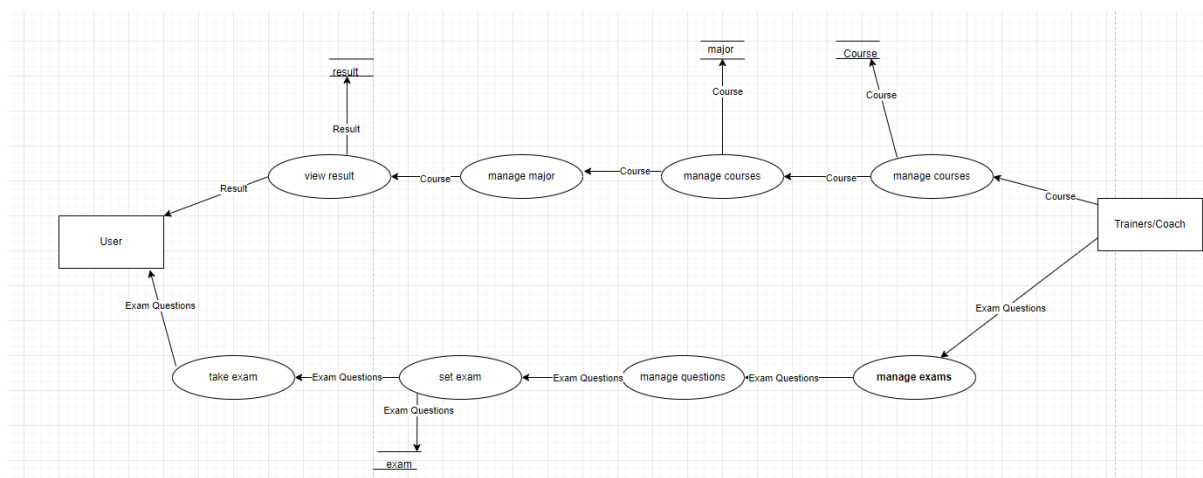


Figure 24. DFD level 2 to take a mock exam

DFD level 2 for taking a mock exam is shown in the figure above.

5.4.3. Design Specification

5.4.3.1. Structure Chart

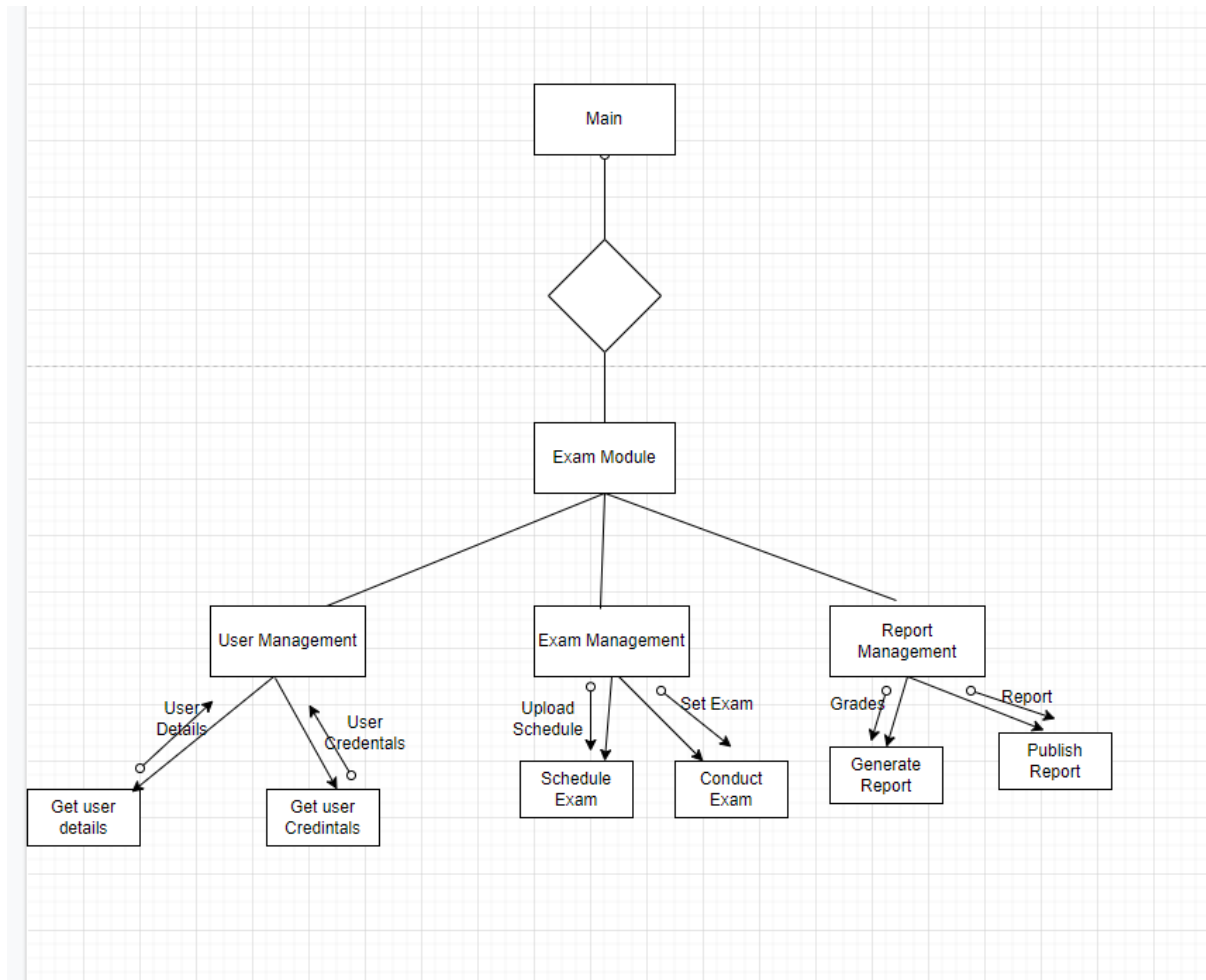


Figure 25. Structure chart to take a mock exam

The above figure of structure chart shows the structure of a exam module. First the system manages user by accessing user details and user credentials. Then the system manages exam by scheduling and conducting it. Moreover, the system manages exam by generating reports and publishing it.

5.4.3.2. Module Specifications

MODULE NAME: To take a mock exam

PURPOSE: The purpose of this is to take a mock exam for individuals registering for intermediate training.

PSEUDOCODE:

DO

 DECLARE exam

 SET exam.id EQUAL TO exam_id

 SET exam.question EQUAL TO question

 SET exam.user_details EQUAL TO user_details

 IF (valid (user_details))

 SAVE(exam_id, question, user_details) TO database.exams

 DISPLAY (exam.question)

 ELSE

 DISPLAY ("Invalid input.")

END DO

INPUT PARAMETERS: user_details, exam_id, question

OUTPUT PARAMETERS: message

LOCAL VARIABLES: exam_id, question

GLOBAL VARIABLES: database

CALLS: user_details

CALLED BY: Main

6. Summary

The design of the system named 'Training Academy' for T-14 training academy was successfully completed by implementing the needs and requirements of the scenario. In the designing process of the system the concepts of Project Charter, System Requirement Specification, Data Flow Diagram, Entity Relationship Diagram, Structure Chart, Data Dictionary, Process Specification and Module Specification were implemented. Doing this project gave us an insight on how the design concepts can be used in a real- world scenario.

The group task for this project consisted of environmental model specification, internal model specification, design specification and assignment diary. The group tasks were focused on the various designs for the overall system. However, the detailed designs have been made in individual tasks which also consists of environmental model specification, internal model specification and design specification. Each member of the group have worked on both the group tasks and individual tasks.

While working on this project some problems were faced which were solved with the help of the group member and our teachers. Doing the coursework, we learned about the different designs involved while working on a project. Although the project was based on the scenario provided to us, there are still many features and functions which can be added upon the user requirement to implement it in the real-world scenario.

Upon the completion of the coursework, along with gaining knowledge and skills on structured software engineering, we also learned the skills like requirement analysis, project management and problem solving. Hence the project is successfully completed by working in a group and meeting the requirements of the scenario.

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