

CHAPTER 3

GENERAL DESIGN

3.1 General Objectives

The objectives of this study are: (1) to implement a newly structured examination system of College of Medicine; (2) apply the principle and concepts to provide a solution to the existing problems on their generation of examination; (3) provide an automated examination system for the students of College of Medicine.

3.2 Specific Objectives

The specific objectives of the study based on the problems stated are:

1. To reduce time consumption in generating official questionnaire by providing a test bank which consist all the questions of exam.
2. To have an accurate report on their item analysis by following the standards of the general process of generating an item analysis.
3. To create a specific statistical report that will provide an information necessary for the enhancement of the competency of the students.
4. To prevent the chance of the students from cheating by creating different sets for the examination.
5. To avoid misprints and smudged words by automating the examination proper.
6. To promote paperless examination.

3.3 Presentation of Alternatives

3.3.1 Alternative 1: Stand Alone Set-up

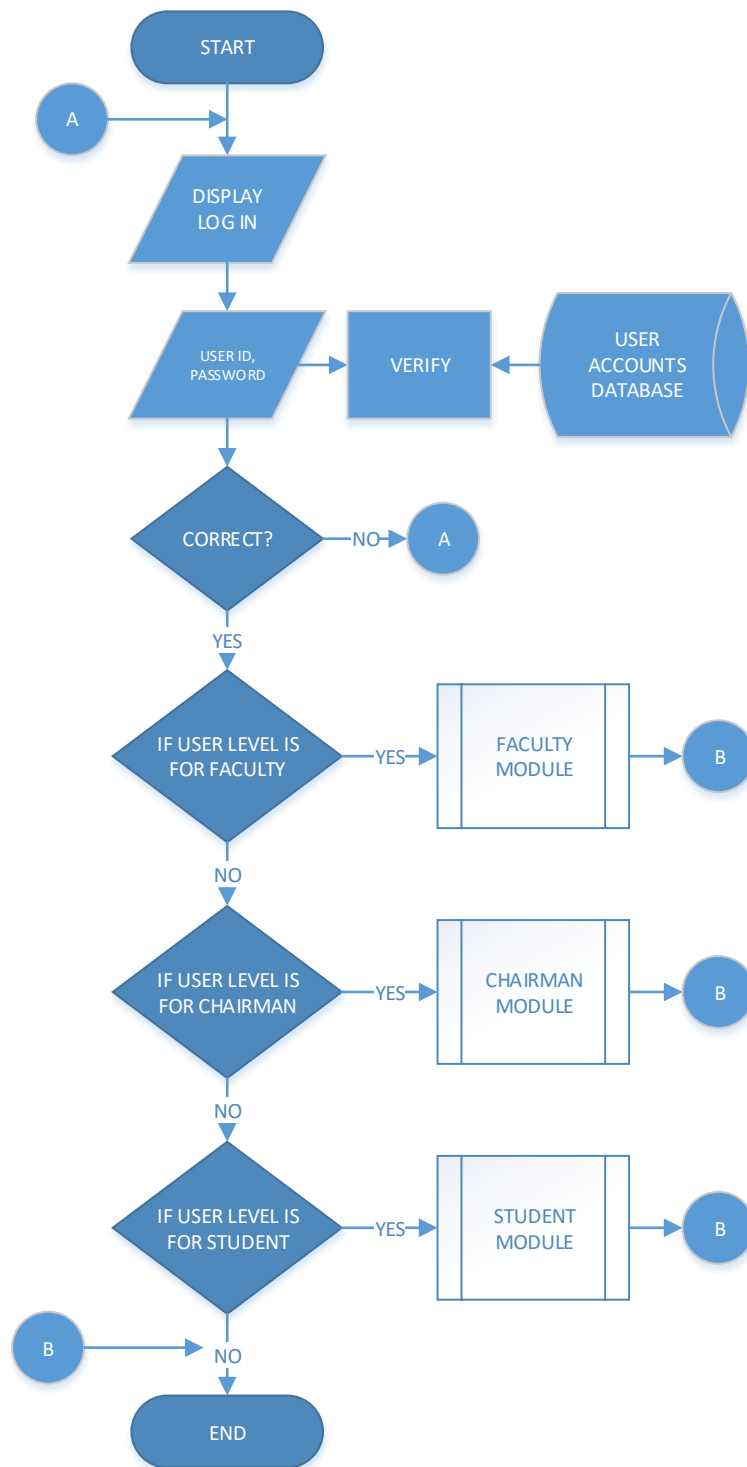
Stand alone is a kind of set-up wherein all terminals are independent from each other and the terminals itself holds all the data. The accessing level and capabilities of a user will be determined by its account level. This proposed set-up will request that each department will have their own terminal to achieve the most efficient time to access, view and edit the data from the system but still the system has the capability to run through one terminal if the college wanted to have it installed to a specific terminal only. The proposed alternative will have the following advantages:

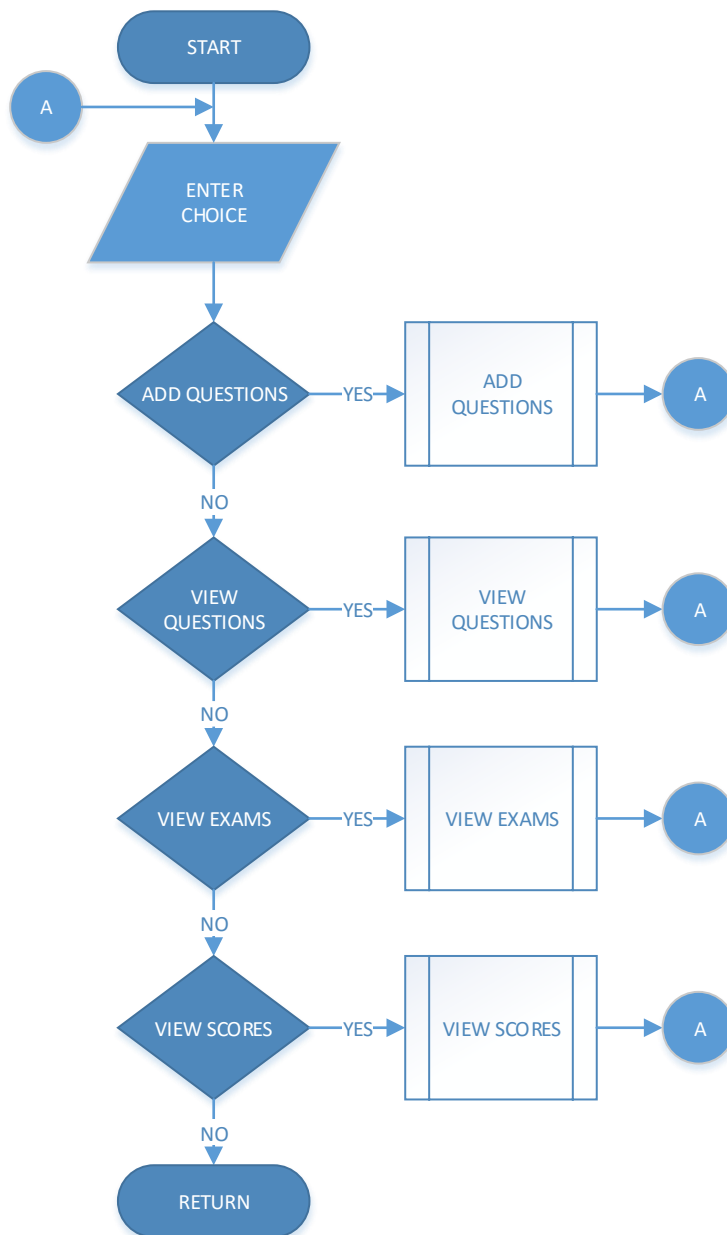
- **Easy access of data needed:** Data collected will be held by each database, thus, retrieving of one data will be independent from others.
- **Less expensive:** stand-alone system will be less expensive when compare to the type of set-up Local Area Network (LAN) or Wide Area Network (WAN).
- **Data security:** Data held by each terminal through their databases will not be accessed by other terminal.

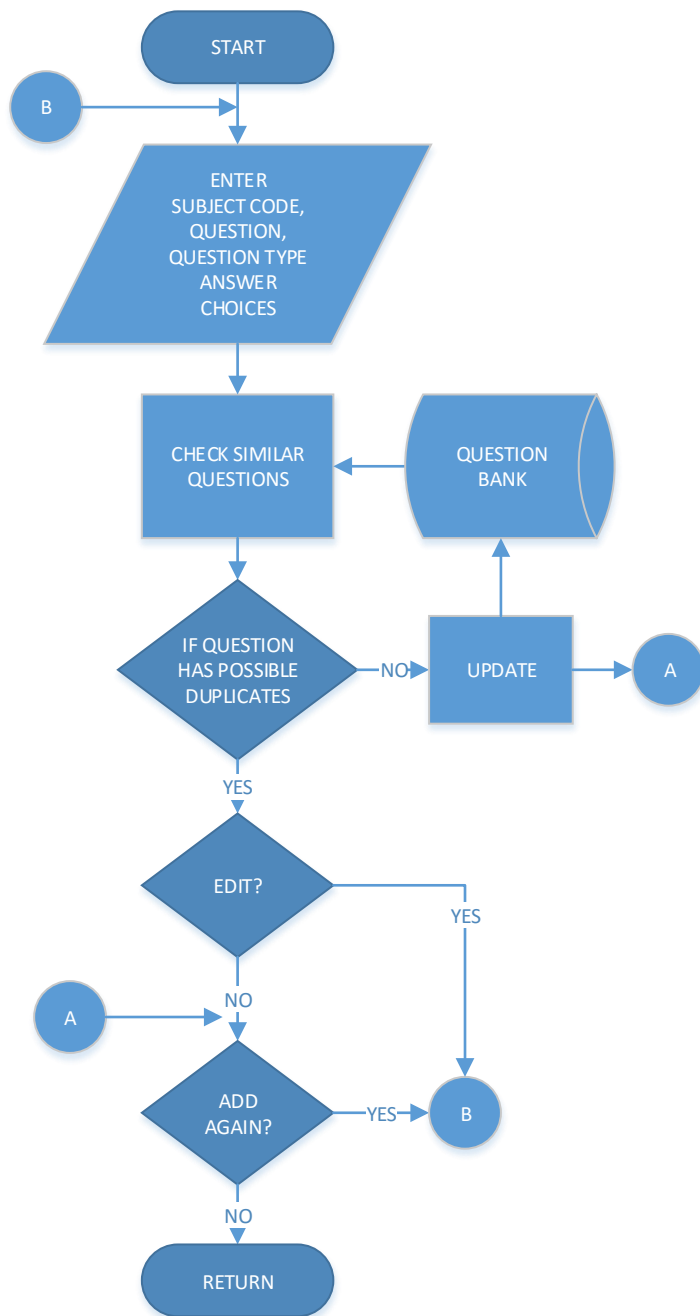
In this proposed alternative, the faculty and chairman respective department can access the system using their log-in username and log-in password. For example, the faculty from Pharmacology Department can access his/her appropriate module in the system after he/she logs-in. The faculty can check the list of records of the students under his/her classes, while the chairman from Pharmacology Department can access all the records of the students under its department.

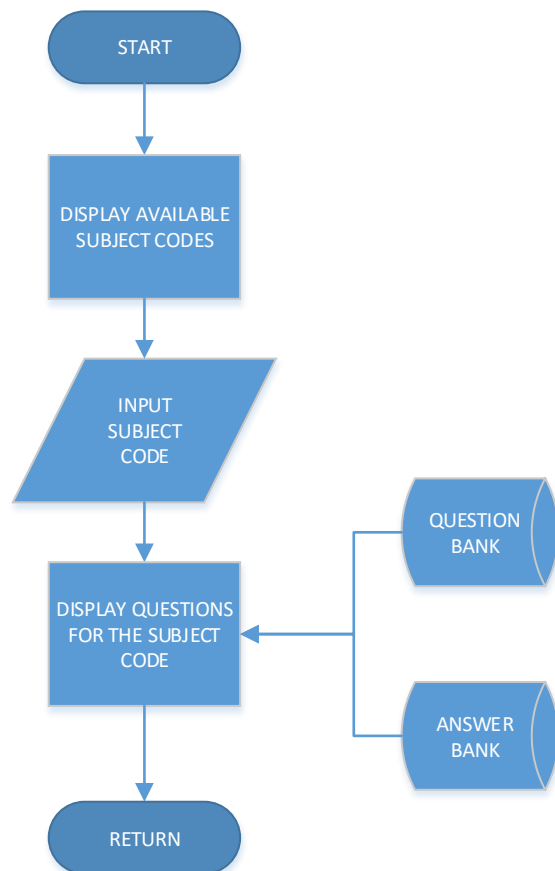
3.3.1.1 Flowchart

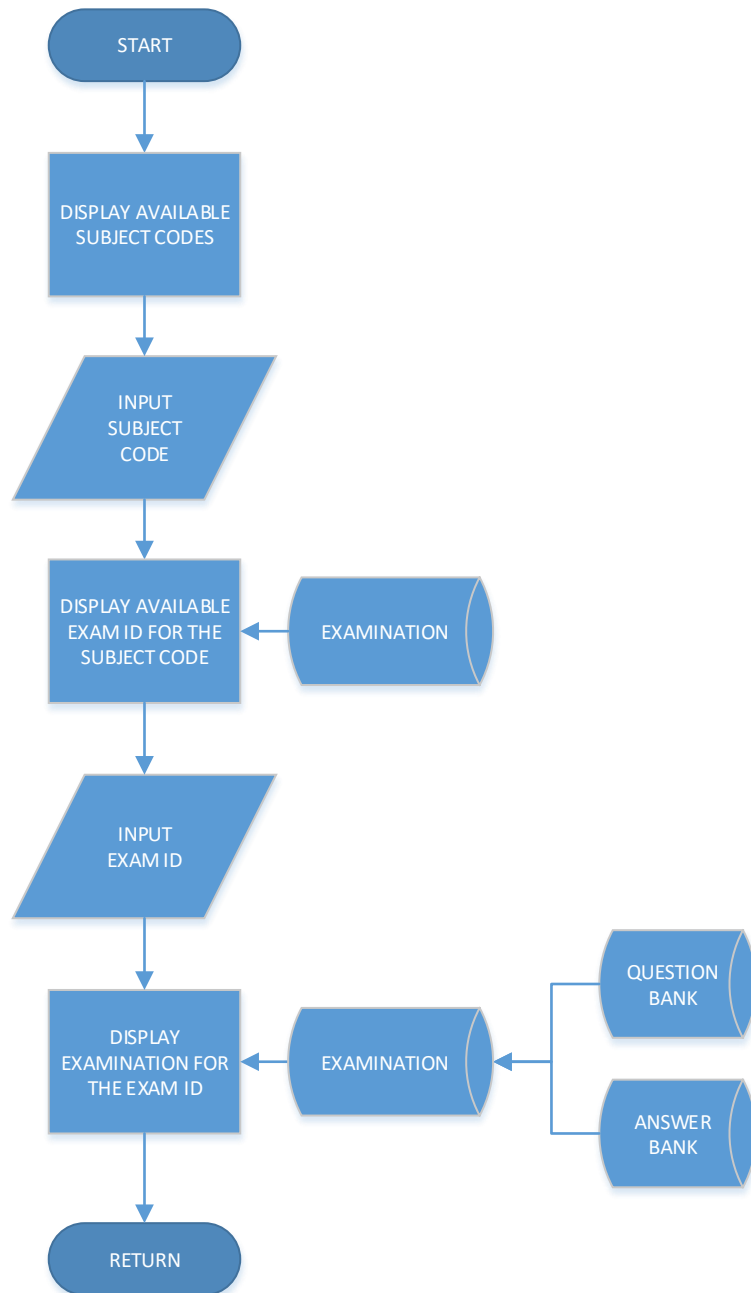
MAIN

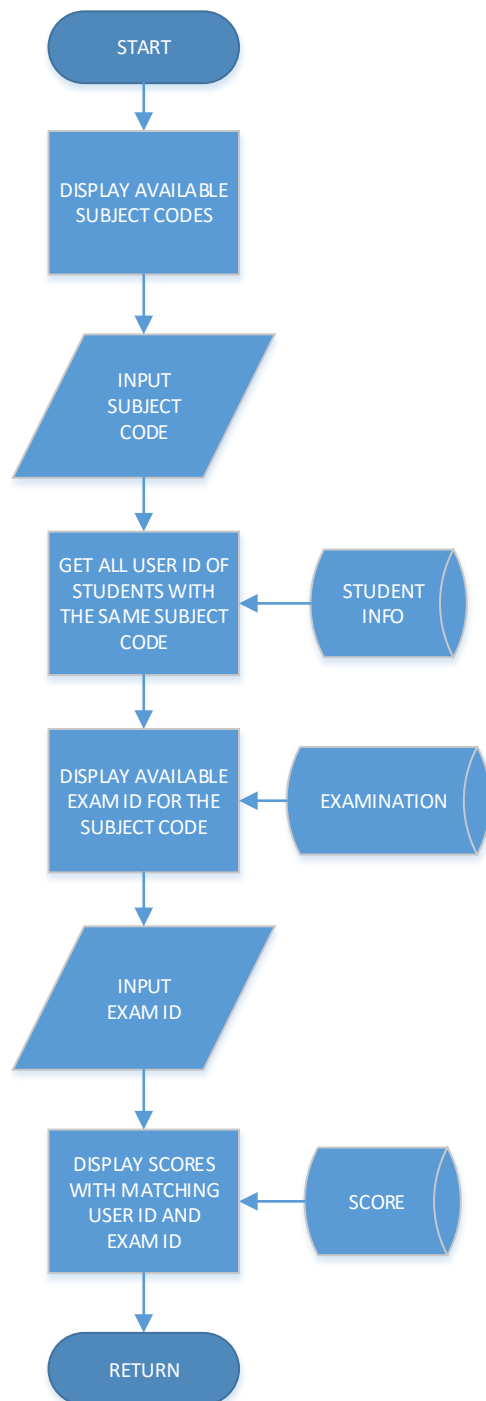


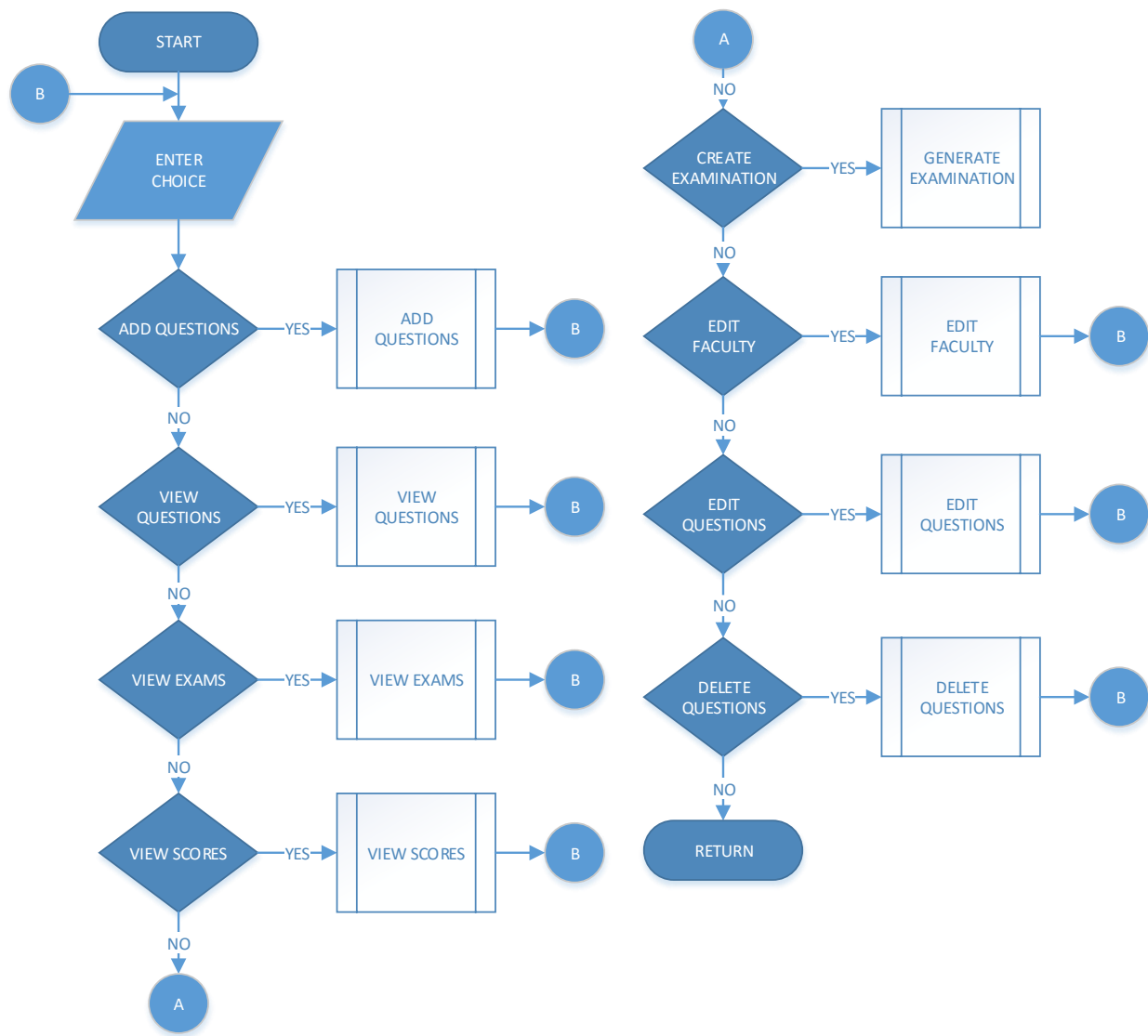
FACULTY MODULE

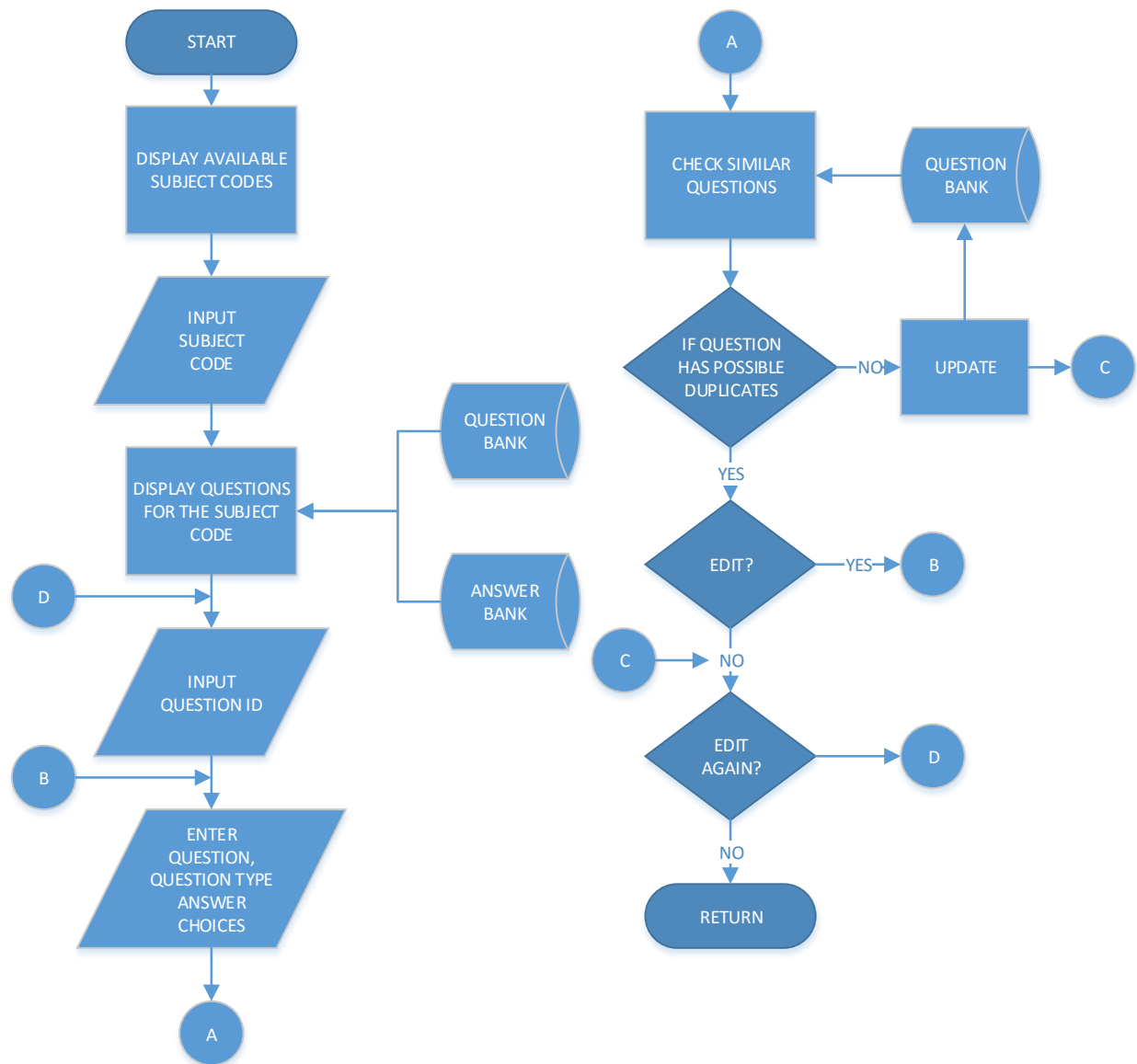
ADD QUESTIONS MODULE

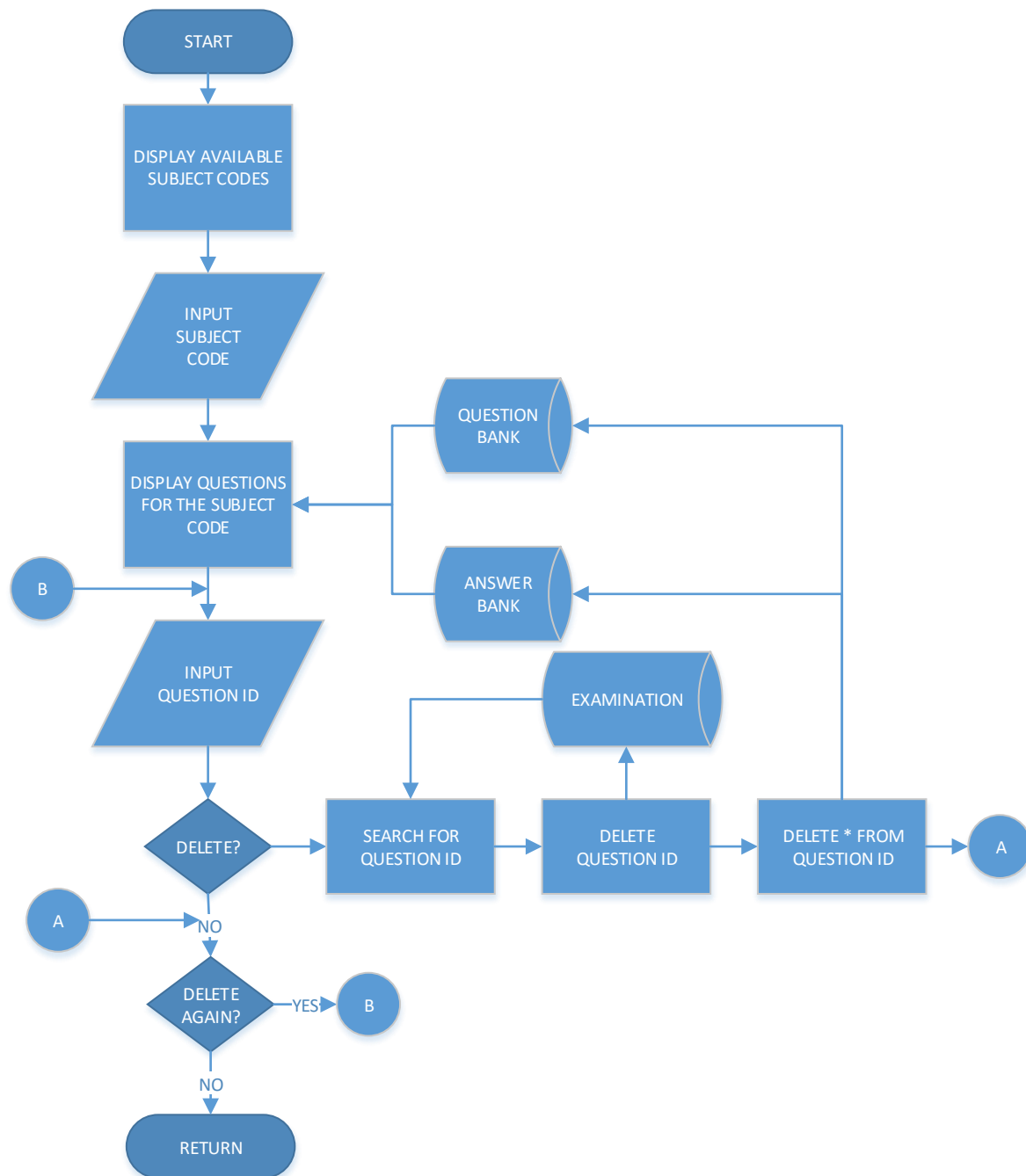
VIEW QUESTIONS MODULE

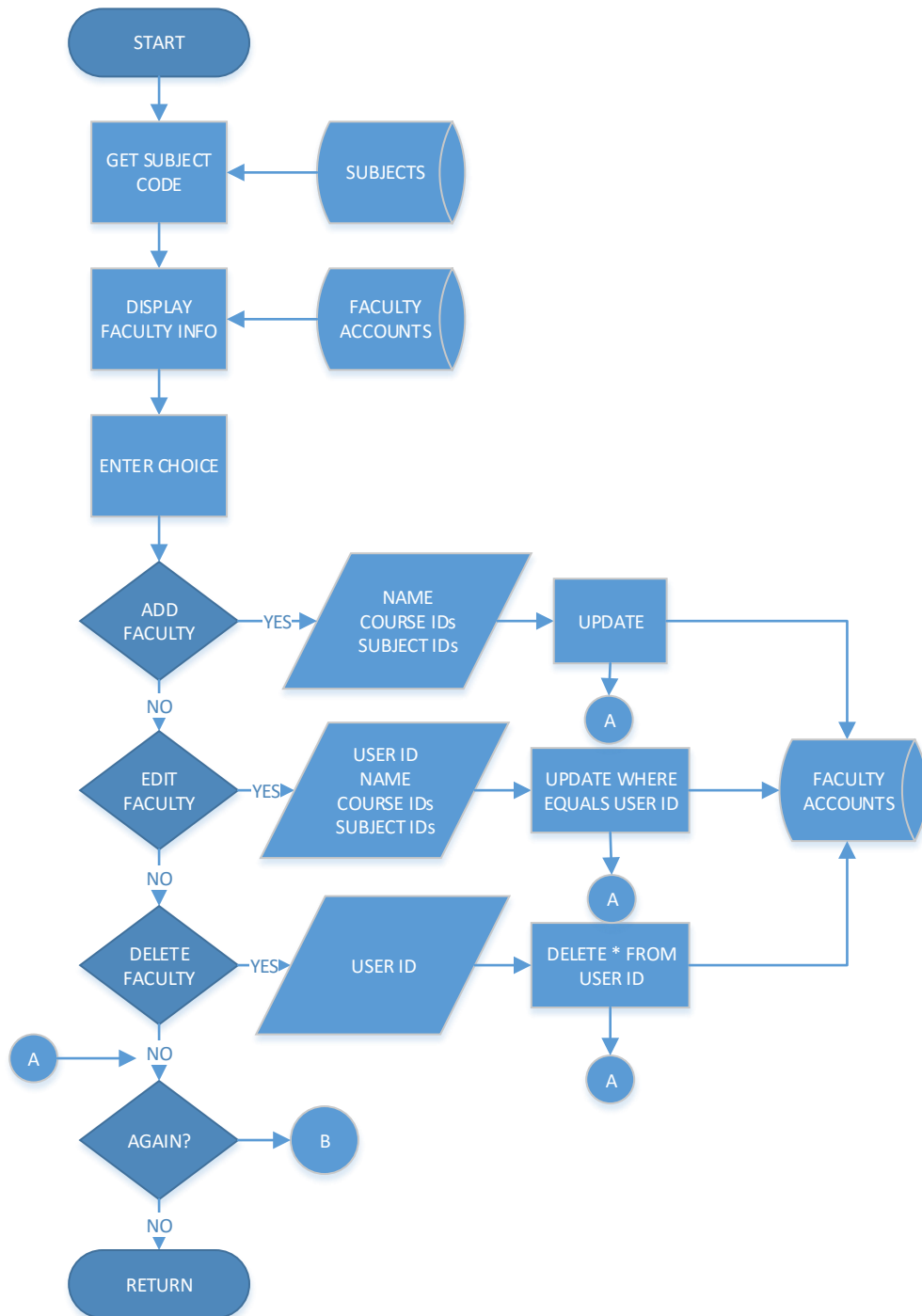
VIEW EXAMS MODULE

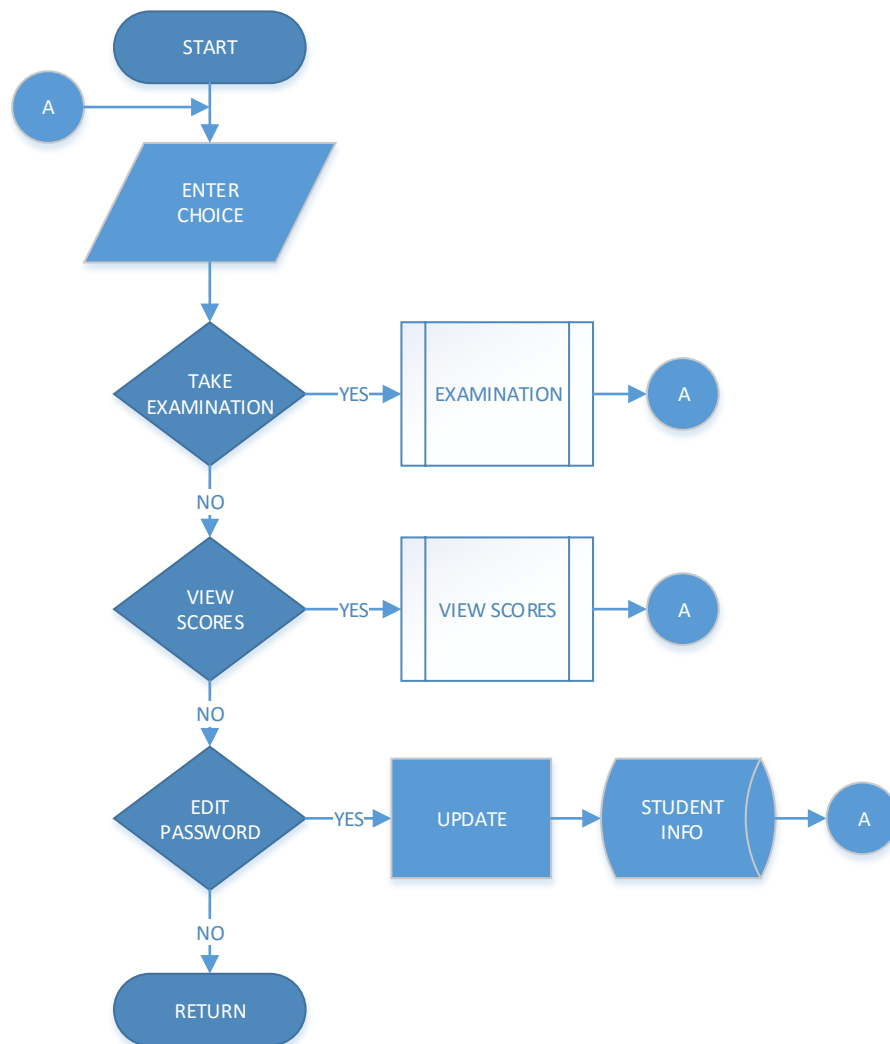
VIEW SCORES MODULE

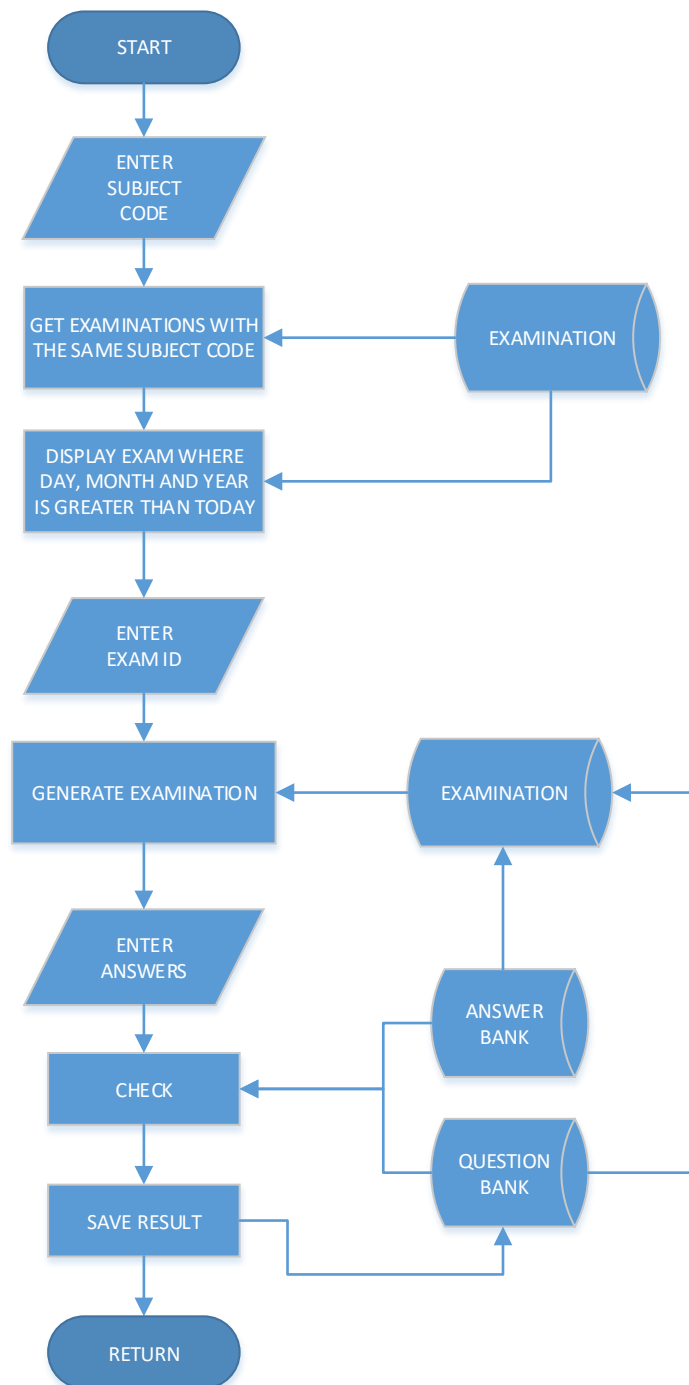
CHAIRMAN MODULE

EDIT QUESTIONS MODULE

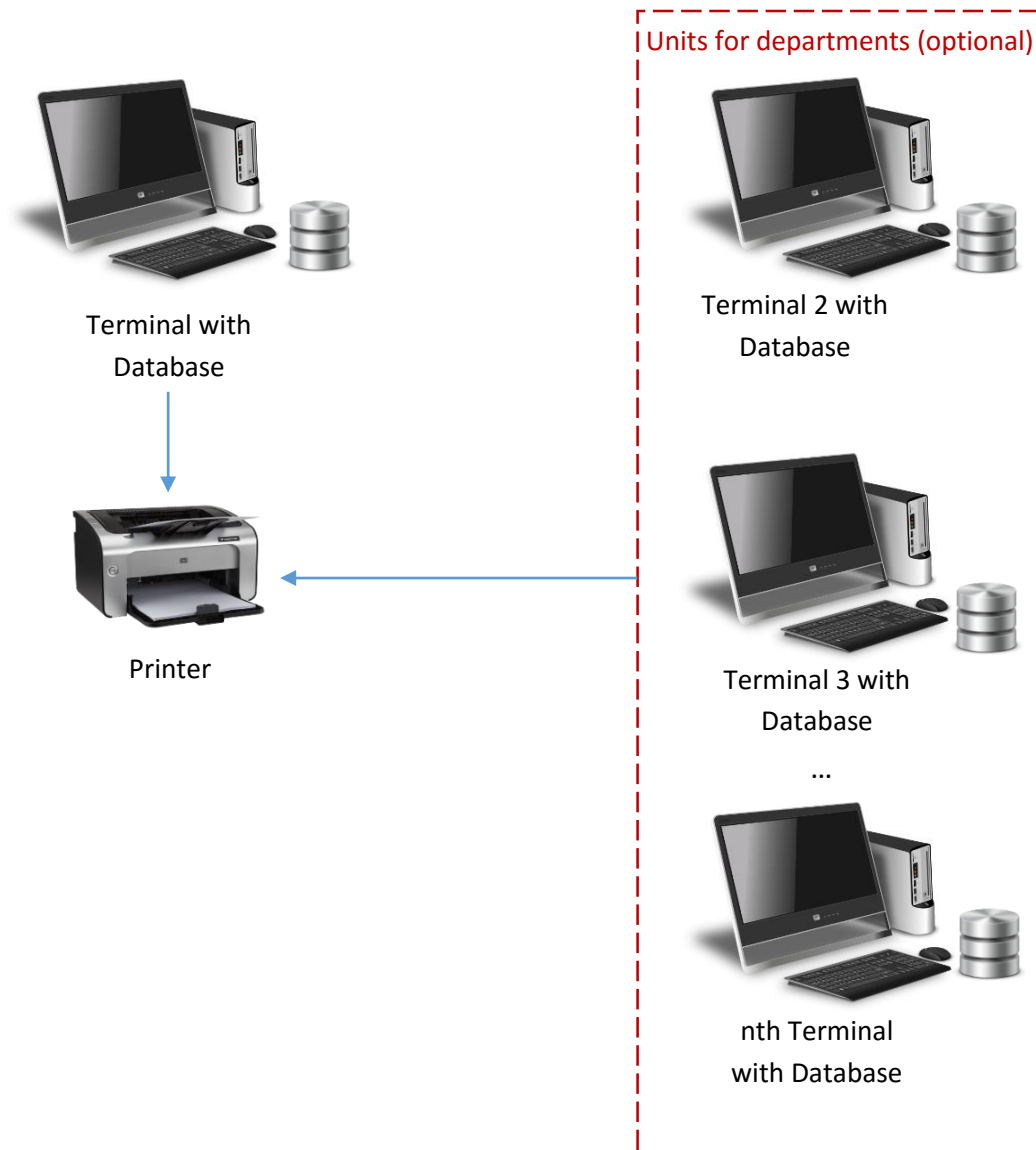
DELETE QUESTION MODULE

EDIT FACULTY MODULE

STUDENT MODULE

EXAMINATION MODULE

3.3.1.2 Physical Element



3.3.1.3 Database/Table:**User Accounts Database**

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
Password	Alphanumeric	16	User's Password
User Level	Numeric	1	Access Level

Faculty Accounts Database

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
User Level	Numeric	1	Access Level
First Name	Alphabetic	30	Faculty's First Name
Middle Name	Alphabetic	25	Faculty's Middle Name
Last Name	Alphabetic	25	Faculty's Last Name
Course IDs	Alphanumeric	100	List of Course Codes
Subject IDs	Alphanumeric	200	List of Subject Codes

Chairman Accounts Database

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
User Level	Numeric	1	Access Level
First Name	Alphabetic	30	Chairman's First Name

Middle Name	Alphabetic	25	Chairman's Middle Name
Last Name	Alphabetic	25	Chairman's Last Name
Department	Alphabetic	45	Name of Department

Student Info Database

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
User Level	Numeric	1	Access Level
First Name	Alphabetic	30	Student's First Name
Middle Name	Alphabetic	25	Student's Middle Name
Last Name	Alphabetic	25	Student's Last Name
Subject IDs	Alphanumeric	200	List of Subject Codes

Subject Database

Field Name	Field type	Length	Description
Course Code	Alphanumeric	10	Course's Code
Course Title	Alphabetic	50	Course's Title
Subject Code	Alphanumeric	10	Subject's Code
Subject Title	Alphabetic	50	Subject's Title
Department	Alphabetic	45	Name of Department

Question Bank

Field Name	Field type	Length	Description
Question ID	Numeric	4	Question's ID Number
Subject Code	Alphanumeric	10	Subject's Code
Question	Alphanumeric	500	Questions that satisfies the Blueprint
Question Type	Alphabetic	30	Question's Type
Difficulty Index	Alphabetic	20	Difficulty Status
Difficulty	Numeric	5	Difficulty Value
Discrimination Index	Alphabetic	20	Discrimination Status
Discrimination	Numeric	5	Discrimination Value
Right Answer	Alphanumeric	30	Right answer of an exam
Wrong Answer	Alphanumeric	30	Wrong answer of an exam
Exam IDs	Alphanumeric	8	Exam's ID Number

Answer Bank

Field Name	Field type	Length	Description
Question ID	Alphanumeric	5	Question's ID
Answer	Alphanumeric	30	Answer of examinee
Choices	Alphanumeric	250	Choices of a question

Examination Database

Field Name	Field type	Length	Description
Exam ID	Alphanumeric	8	Exam's ID Number
Batch Number	Numeric	8	Batch's Number
Department	Alphabetic	45	Name of Department
Course Code	Alphanumeric	10	Course's Code
Subject Code	Alphanumeric	10	Subject's Code
Exam Type	Alphabetic	25	Examination's Type
Year	Numeric	4	Year the exam was taken
Month	Alphabetic	8	Month the exam was taken
Day	Numeric	2	Day the exam was taken
Question IDs	Alphanumeric	5	Question's ID

Sets Database

Field Name	Field type	Length	Description
Set ID	Alphabetic	1	Set's ID
Exam IDs	Alphanumeric	8	Exam's ID Number

Score Database

Field Name	Field type	Length	Description
Exam ID	Alphanumeric	8	Exam's ID Number
User ID	Numeric	5	User's ID number
Score	Numeric	3	Score of the examinee

3.3.1.4 Reports:

Item Analysis - result of the examination including the difficulty and discrimination of each questions.

Statistical Report – report that shows the reliability of an examination.

Questionnaire – list of questions used for the examination

3.3.1.5 Manual Process (Existing):

- Generating Blueprint
- Generating Questionnaire Draft
 - Creating Questions based on the Textbooks
 - Comparing each Questions with the Previous Shifting Exam
 - Finalizing Questionnaire Draft
- Generating Official Questionnaire
 - Consolidating Questionnaire Drafts
 - Comparing each Questions with the Previous Shifting Exam
 - Finalizing Official Questionnaire
- Printing Official Questionnaire copies
- Photocopying Official Questionnaire

3.3.1.6 Requirement Definition:

ITEMS	REQUIRED	EXISTING	NEEDED
Hardware Personal Computer (HP Compaq DC5800 Intel Core 2 Duo E8400 3.0GHz / 2GB DDR2 / 320GB SATA HDD / On Board Video Card 384MB / DVD-ROM with IBM ThinkVision L190p 19-inch LCD Monitor) Software Operating System (Windows 7)	4	0	4
Printer Cannon LBP-6000 Laser Printer	1	0	1

3.3.1.7 Cost and Benefit Analysis:

ITEMS	COSTS
ONE TIME COST	
<ul style="list-style-type: none"> Hardware Personal Computer (HP Compaq DC5800 Intel Core 2 Duo E8400 3.0GHz / 2GB DDR2 / 320GB SATA HDD / On Board Video Card 384MB / DVD-ROM with IBM ThinkVision L190p 19-inch LCD Monitor) (PHP 11,780.00) Software Operating System (Windows 7) (PHP 5, 311.00) 	PHP 68, 364
<ul style="list-style-type: none"> Printer Cannon LBP-6000 Laser Printer 	PHP 3, 200
TOTAL ONE TIME COST	PHP 71, 564
RECURRING COST	
MAINTENANCE <ul style="list-style-type: none"> Money allotted for Computer and Printer Problems 	PHP 1, 000
ELECTRICITY COST <ul style="list-style-type: none"> Monthly cost of computers and printers 	PHP 1,000
PRINTER COST <ul style="list-style-type: none"> Printer ink 	PHP 500
TOTAL RECURRING COST	PHP 2, 500
TOTAL COST	PHP 74, 064

3.3.1.8 Computation for Payback Period

SAVED EXPENSES	COST per YEAR
EMPLOYEE SALARY	PHP 19, 500
PAPER COST	PHP 6, 000
PHOTOCOPY COST	PHP 4, 500
SCANTRON SHEET	PHP 20, 000
TOTAL	PHP 50, 000 per YEAR

$$\begin{aligned}\text{PBP} &= \text{TOTAL COST} / 50,000 \\ &= 1.48 \text{ YEARS}\end{aligned}$$

3.3.1.9 Tangible / Intangible Benefits

1. Easy access of the information of the students.
2. Essential summary of reports.
3. More effective monitoring of the examinations.
4. Delay in making reports will be prevented.
5. Terminates unnecessary workloads.
6. Reduces output of papers.

3.3.2 Alternative 2: Centralized set-up

The second alternative is centralized set-up of the system. This kind of system setup will need the respective lab to have at least one terminal that is connected to the server with the use of RJ-45, commonly known as a telephone jack or computer networking equipment. Each terminal must install the proposed system in order to access it.

The accessibility of the systems depends on the users' level of authorization. Because the system is centralized, the college can access all of the reports of the exam within an area may print it whenever needed.

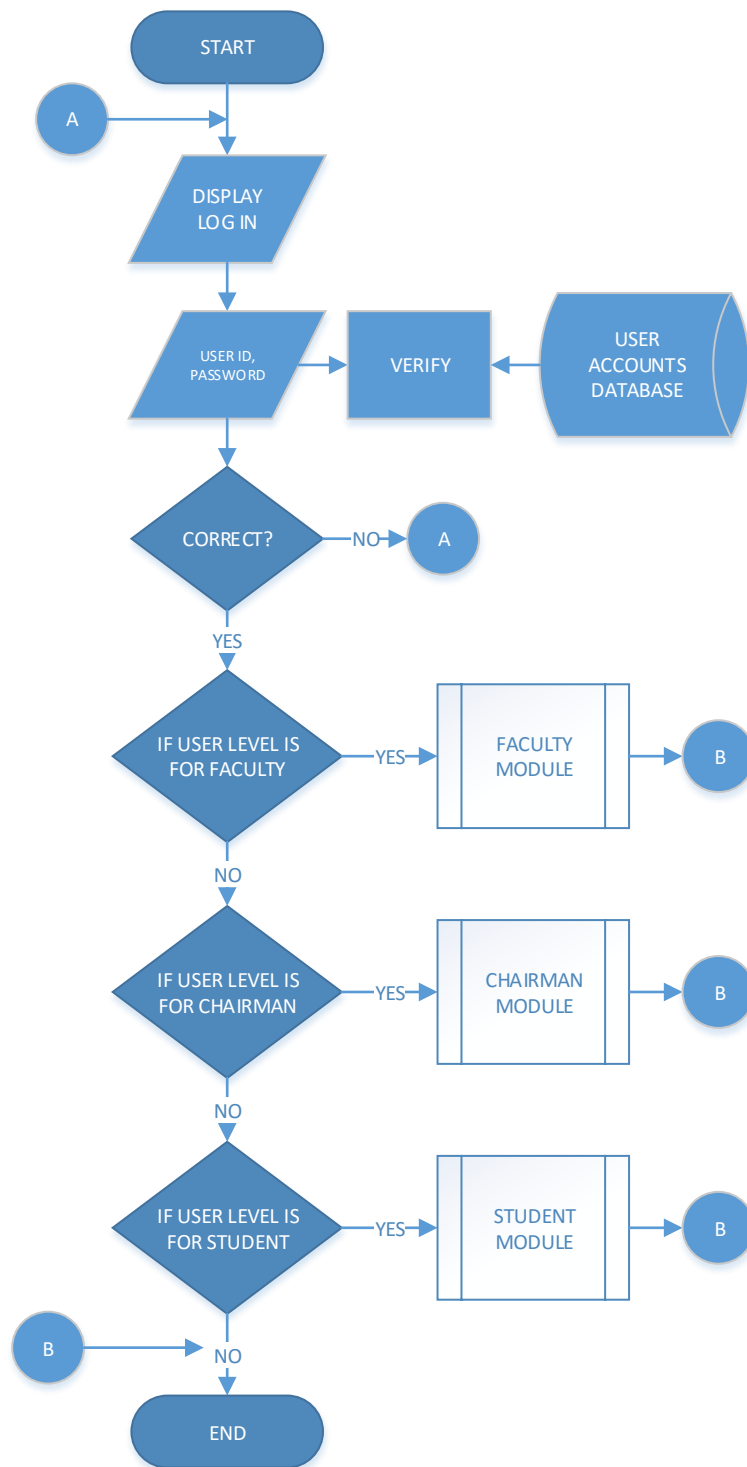
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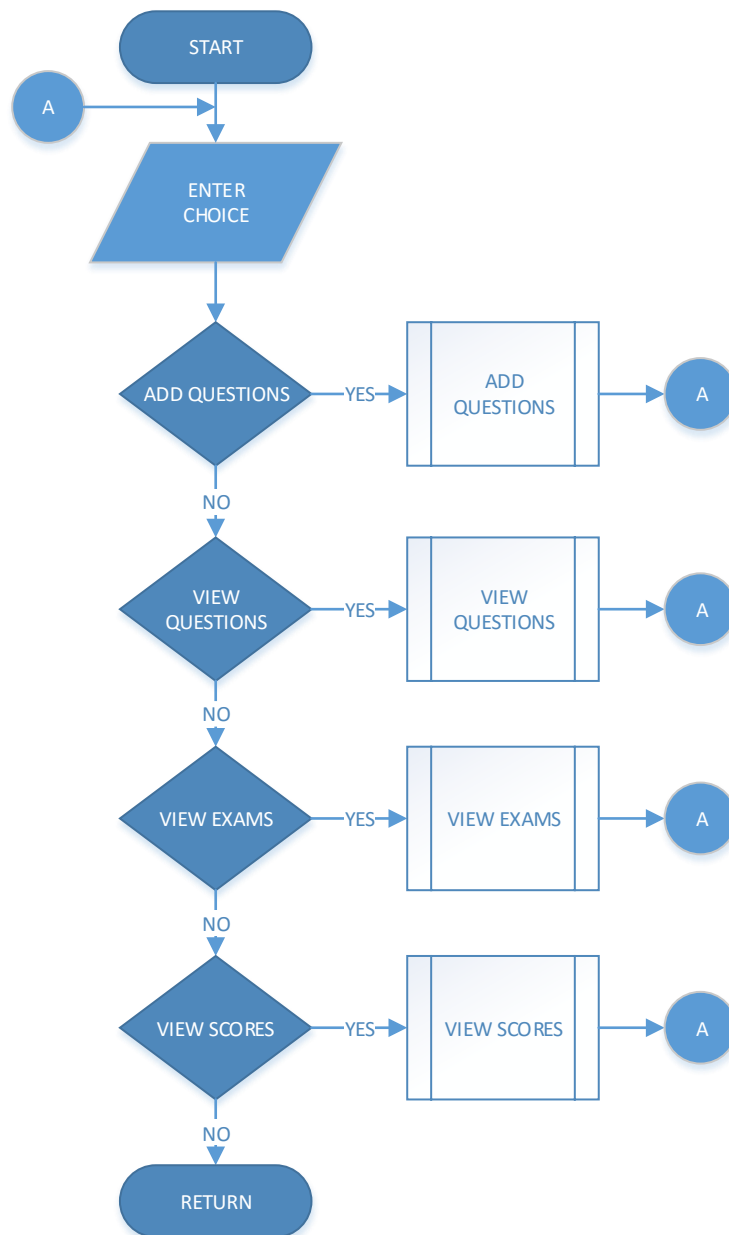
- **Data Security:** only the main server can access the data of an exam.
- **Data Integrity:** the greatest benefit of centralizing a company's data is data integrity. One of the basic rules in database management is that no data will be duplicated as there is only one server. A centralized database means that each faculty has one primary record.
- **Easier Access to Data:** Data can be accessed through different points as long as it is connected to the server.

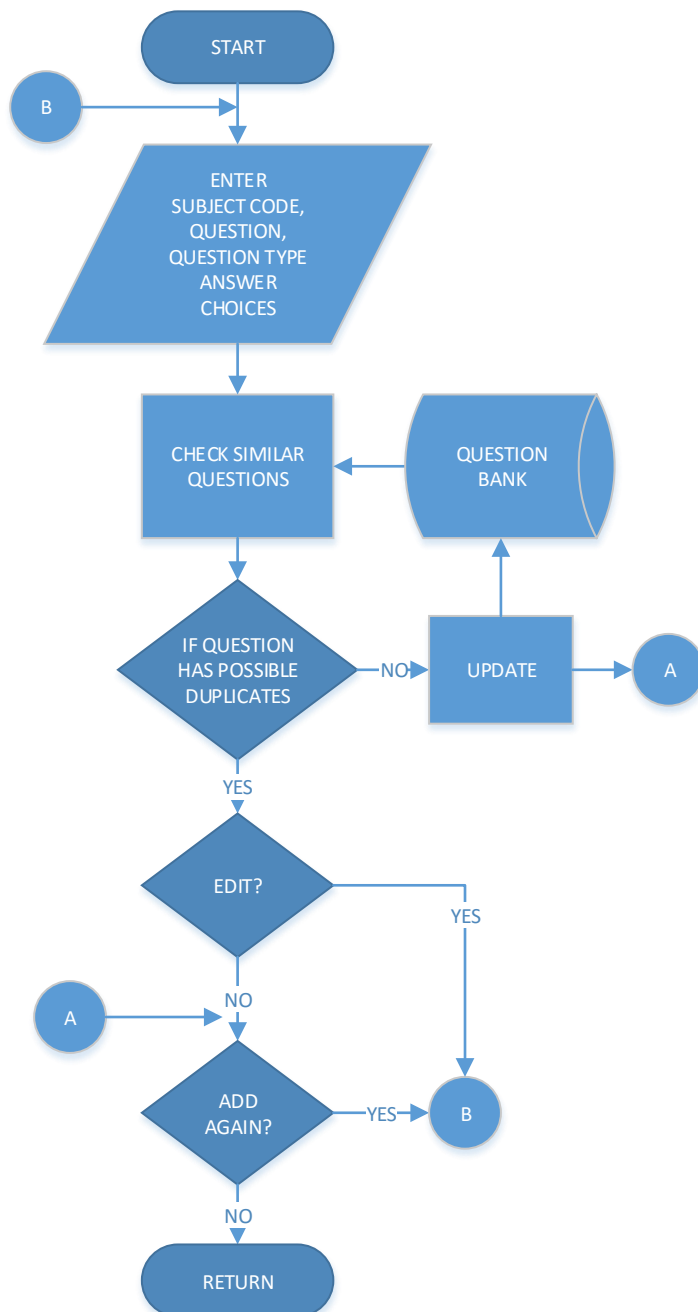
In this proposed set up, the faculty, chairman and students can access the system using their log-in code and password. The students' answers are automatically saved to the server after they finished taking their exam. The faculty and chairman can access.

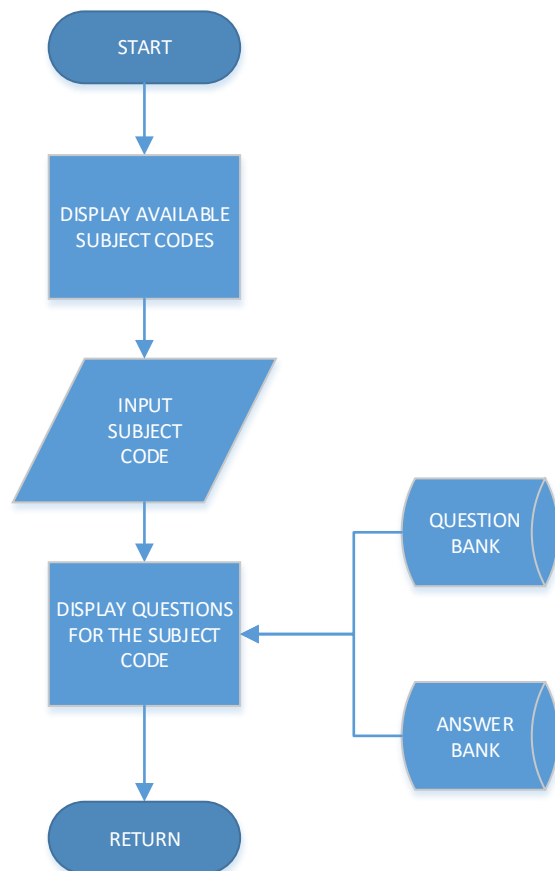
3.3.2.1 Flowchart

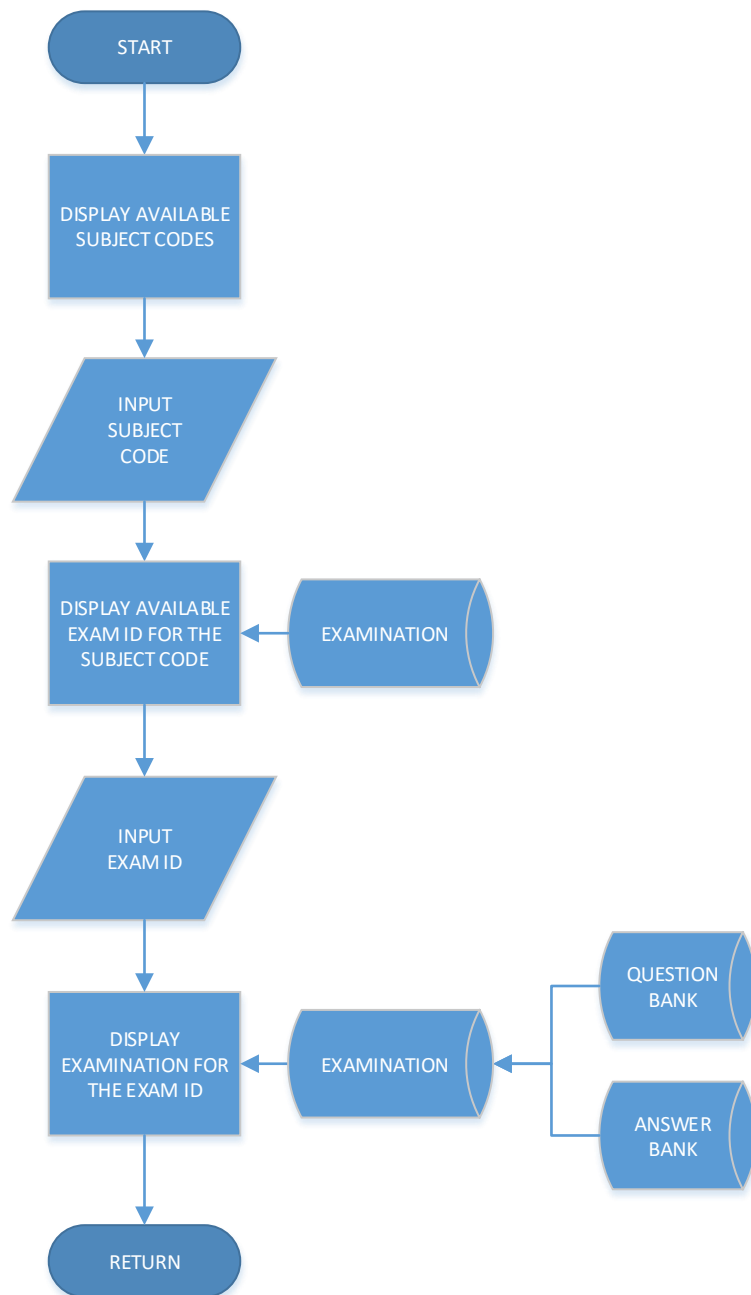
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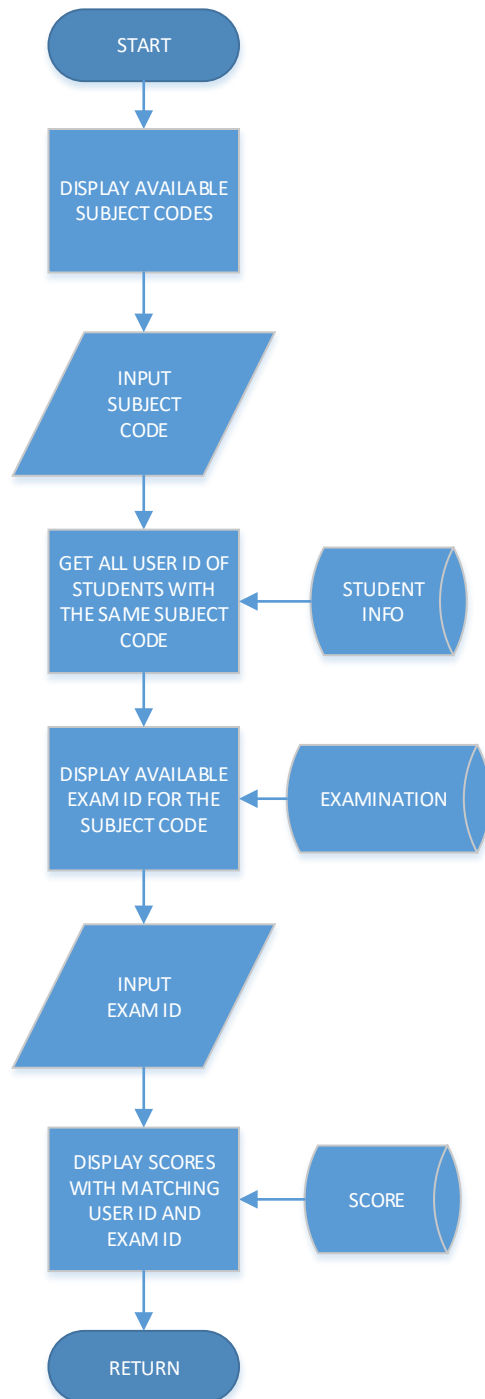


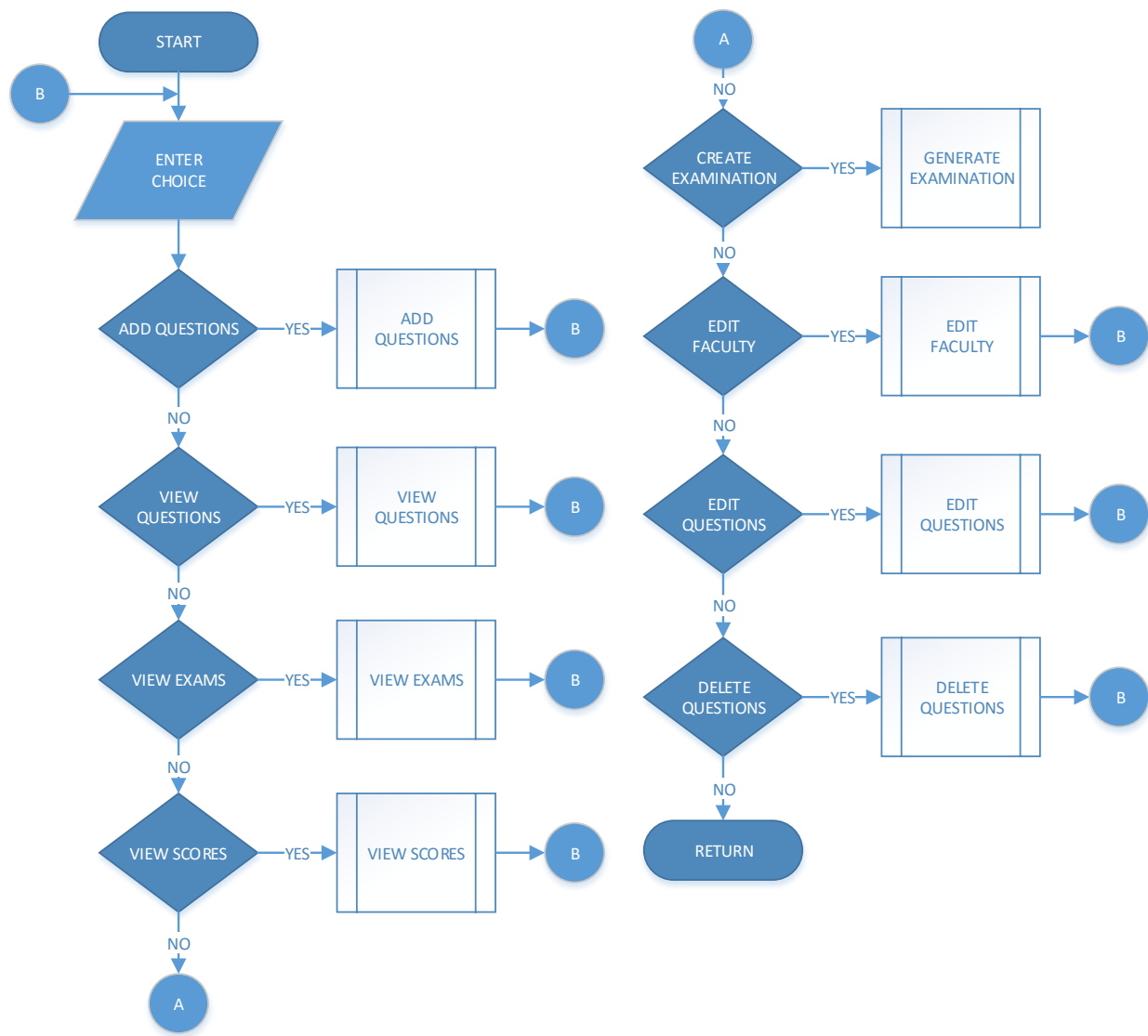
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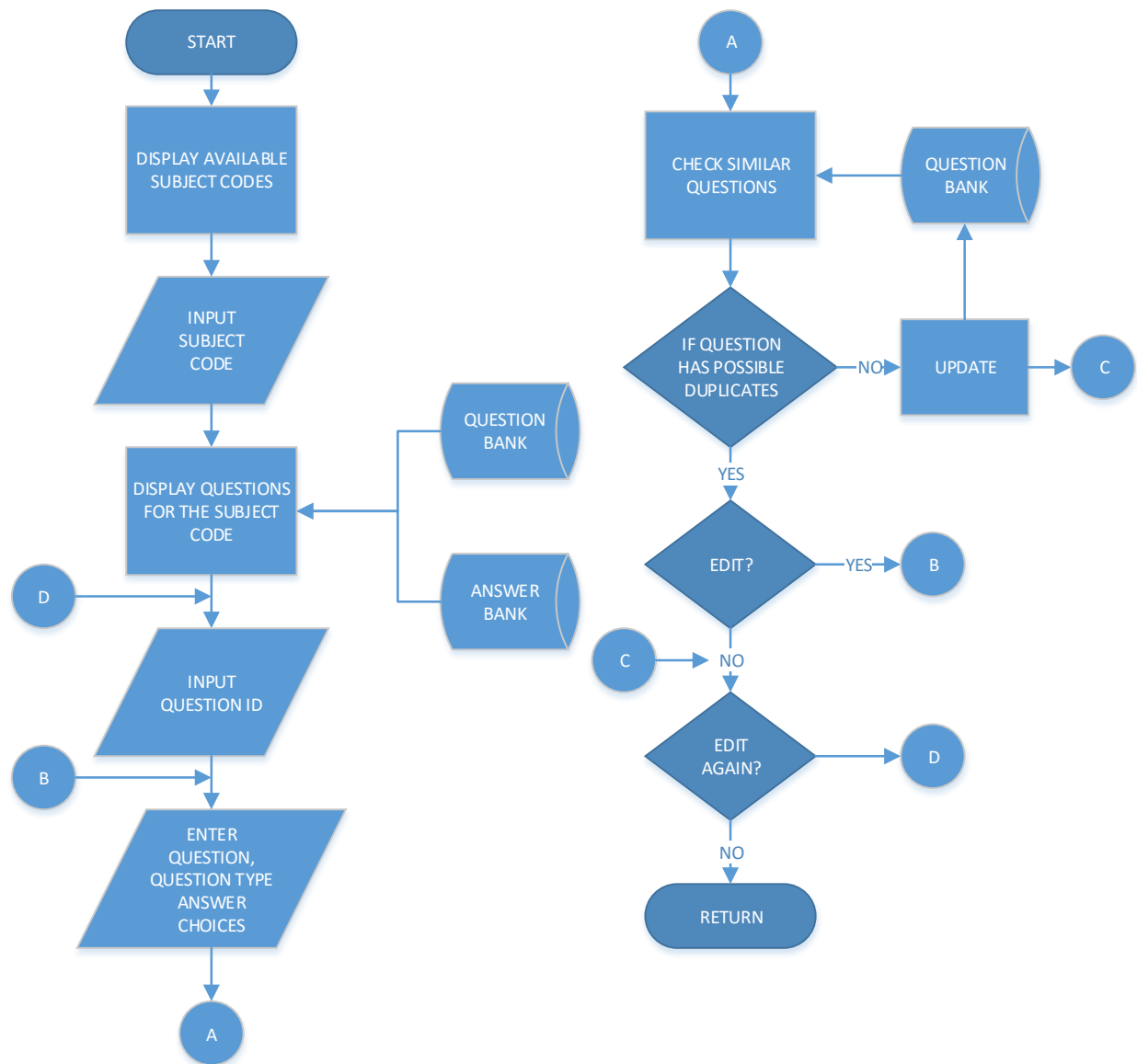
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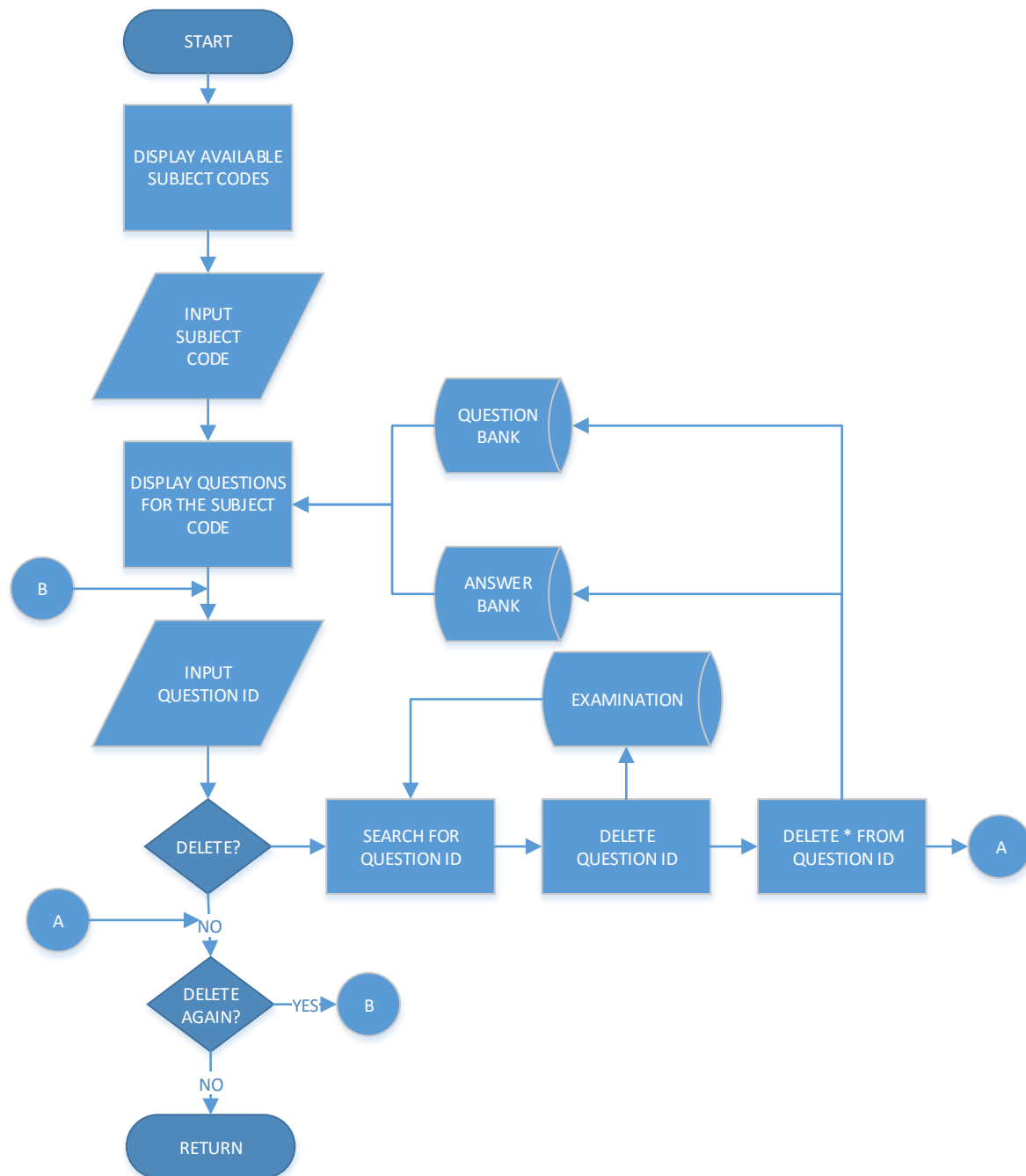
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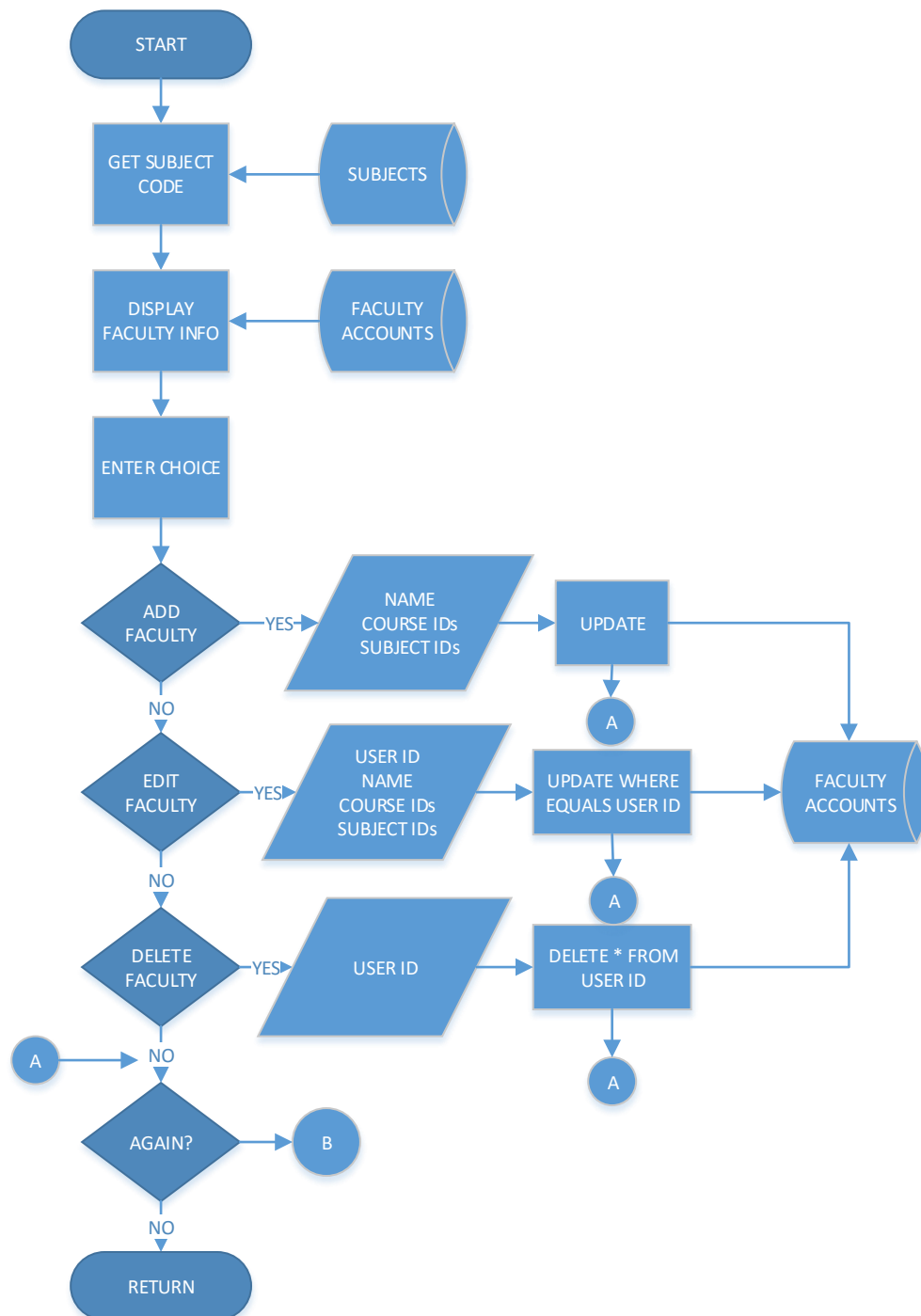
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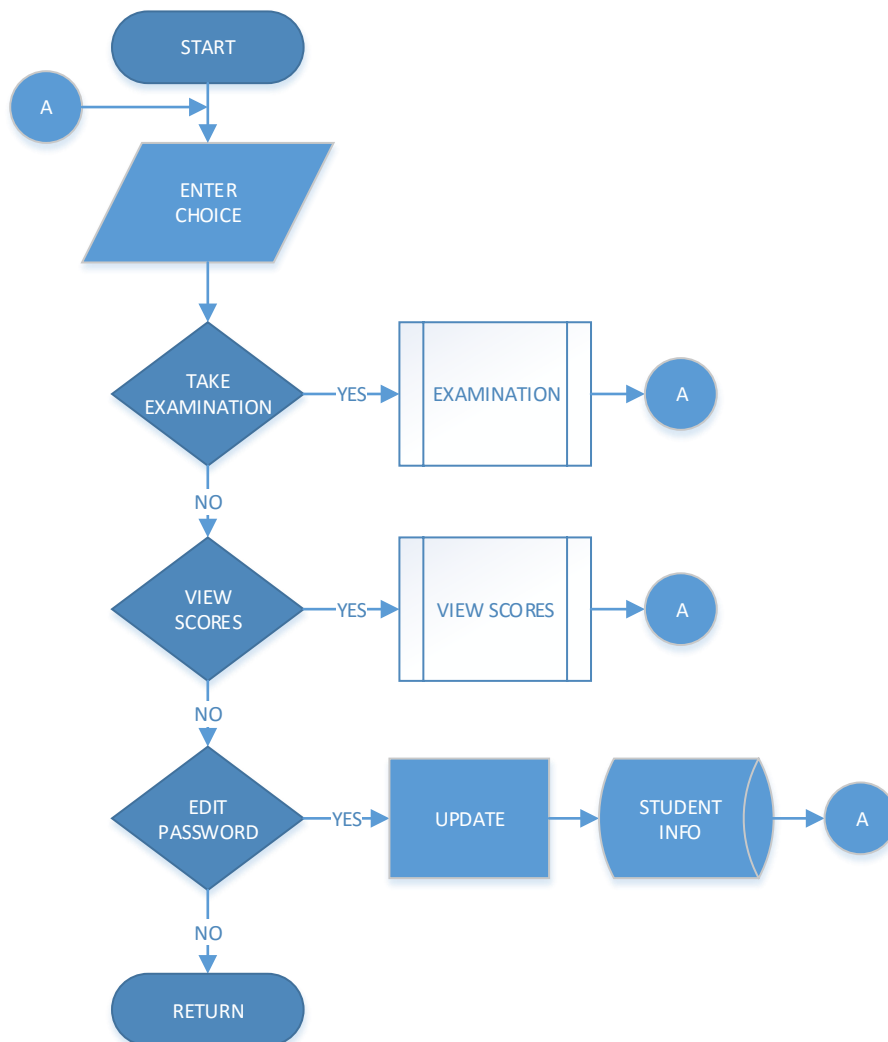
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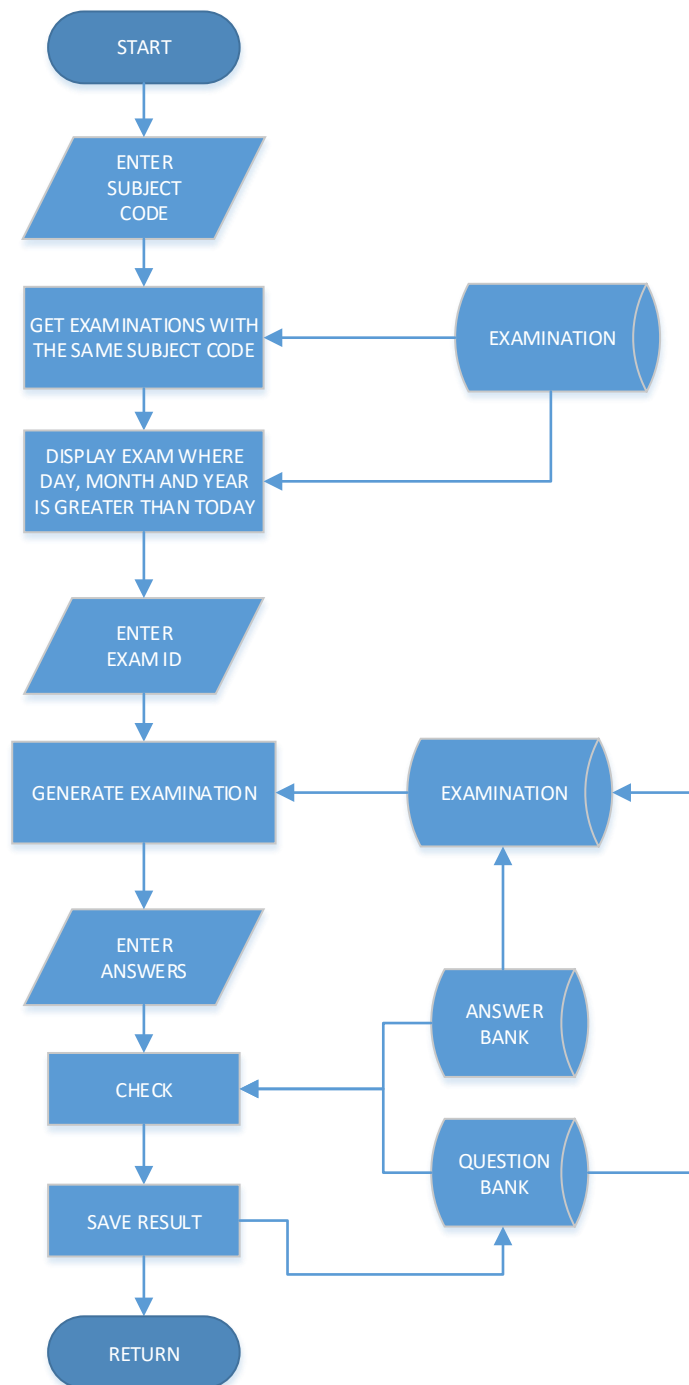
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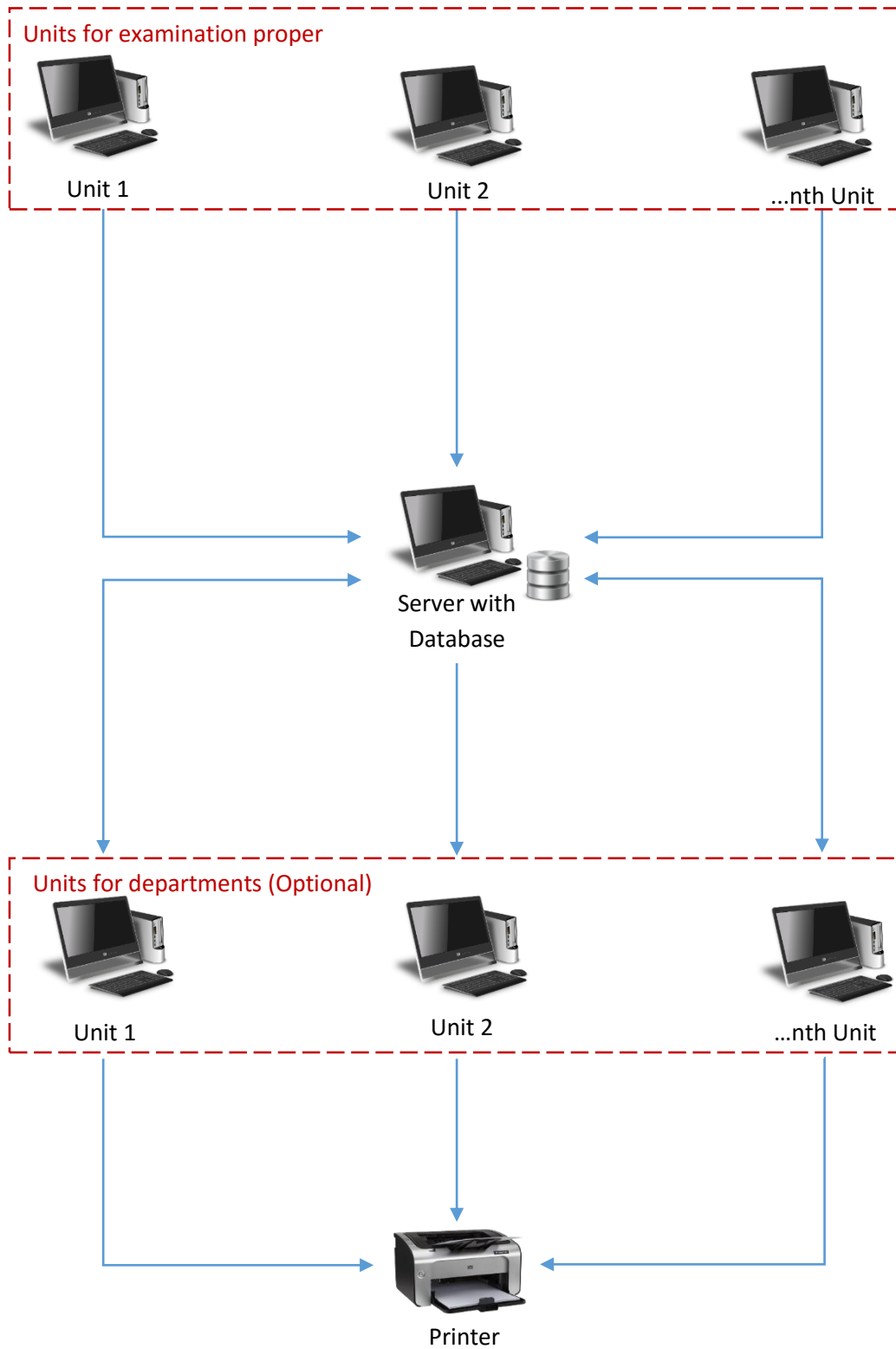
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Course Code	Alphanumeric	10	Course's Code
Subject Code	Alphanumeric	10	Subject's Code
Exam Type	Alphabetic	25	Examination's Type
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Printer Cannon LBP-6000 Laser Printer	1	0	1

3.3.2.7 Cost and Benefit Analysis

ITEMS	COSTS
ONE TIME COST	
<ul style="list-style-type: none"> Hardware Personal Computer (HP Compaq DC5800 Intel Core 2 Duo E8400 3.0GHz / 2GB DDR2 / 320GB SATA HDD / On Board Video Card 384MB / DVD-ROM with IBM ThinkVision L190p 19-inch LCD Monitor) (PHP 11,780.00) Software Operating System (Windows 7) (PHP 5311.00) 	PHP 341, 820
<ul style="list-style-type: none"> Printer Cannon LBP-6000 Laser Printer 	PHP 3, 200
TOTAL ONE TIME COST	PHP 345, 020
RECURRING COST	
MAINTENANCE <ul style="list-style-type: none"> Money allotted for Computer and Printer Problems 	PHP 10, 000
ELECTRICITY COST <ul style="list-style-type: none"> Monthly cost of computers and printers 	PHP 10, 000
PRINTER COST <ul style="list-style-type: none"> Printer ink 	PHP 500
TOTAL RECURRING COST	PHP 20, 500
TOTAL COST	PHP 365, 520

3.3.2.8 Computation for Payback Period

SAVED EXPENSES	COST per YEAR
EMPLOYEE SALARY	PHP 19, 500
PAPER COST	PHP 6, 000
PHOTOCOPY COST	PHP 4, 500
SCANTRON SHEET	PHP 20, 000
TOTAL	PHP 50, 000 per YEAR

$$\begin{aligned}\text{PBP} &= \text{TOTAL COST} / 50,000 \\ &= 7.31 \text{ YEARS}\end{aligned}$$

3.3.2.9 Tangible / Intangible Benefits

1. Easy access of the information of the students.
2. Centralized data is secure and easy to backup.
3. Essential summary of reports.
4. More effective monitoring of the examinations.
5. Delay in making reports will be prevented.
6. The reports and examination is dynamically created, thus minimizing error and human labor.
7. Terminates unnecessary workloads.
8. Reduces output of papers.

3.3.3 Alternative 3: Wireless Network set-up

Wireless Connection set-up is a setup where the system requires a terminal per unit of computer. Every after examination proper the server will save all the students examinations. The said system will follow the standards of the college for checking and computing for the evaluation of each examination.

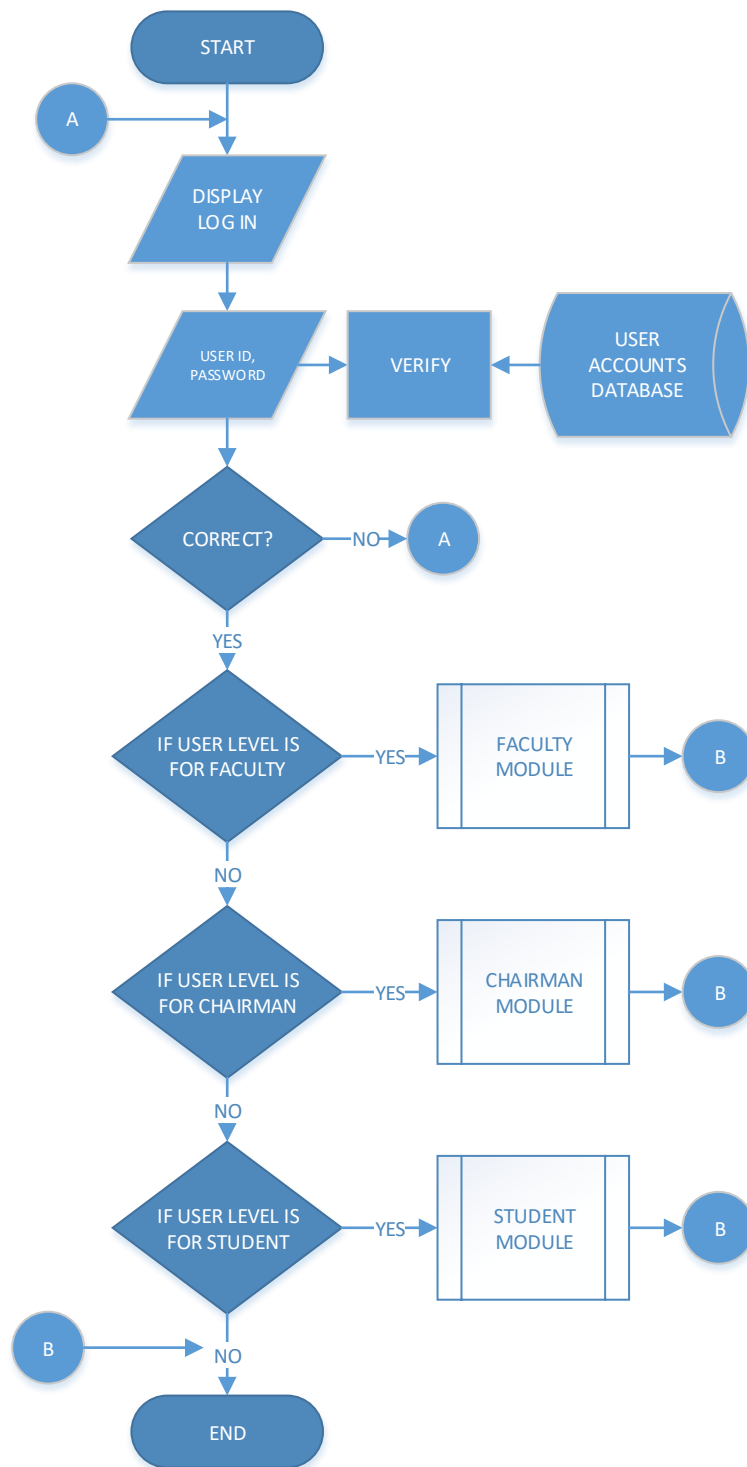
The proposed system can be used as long as the users are connected to the internet. For security purposes, user levels will be used to identify the access level of the user's account. The modules of the system can only be accessed by the user according to their level. Only the chairman can access all the reports of respective department by the use of internet. All reports are available for printing.

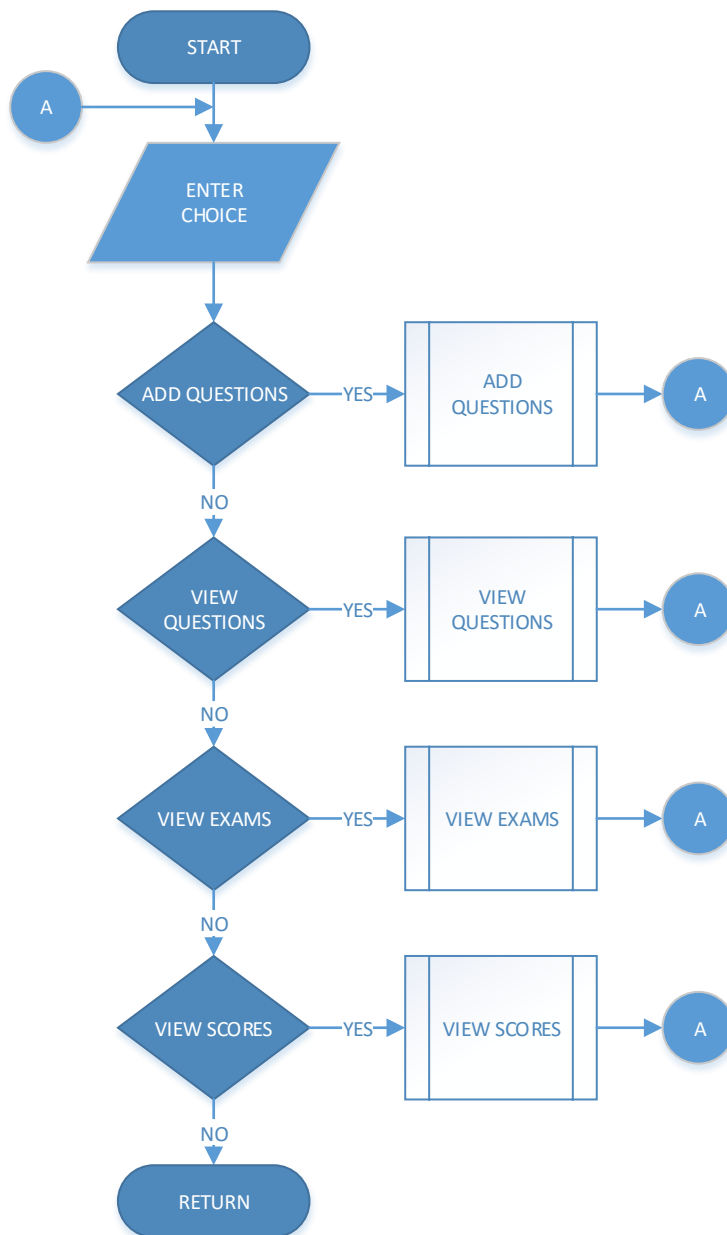
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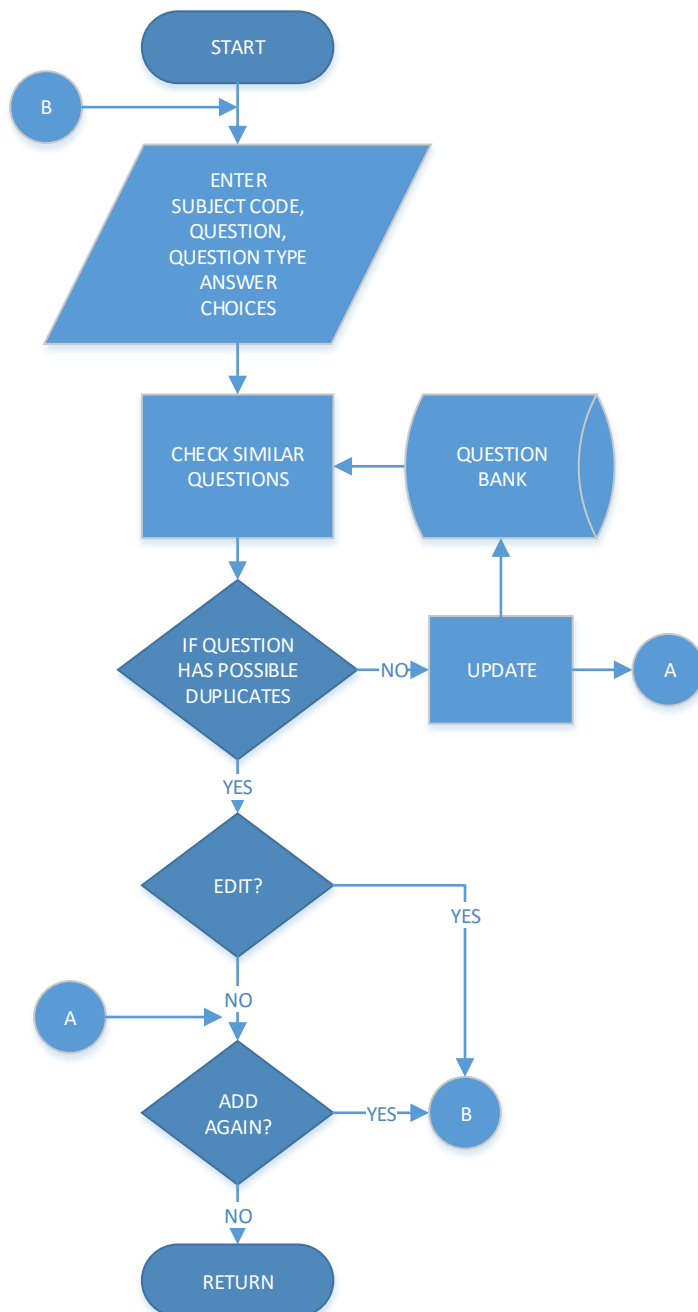
- **Convenience:** as long as there is internet connection and the user is logged in, the system will be available and accessible.
- **Secured:** information is protected against incidence of system failure
- **Portability:** the system can be used as long as the user is connected to the internet and logged in using any computer.

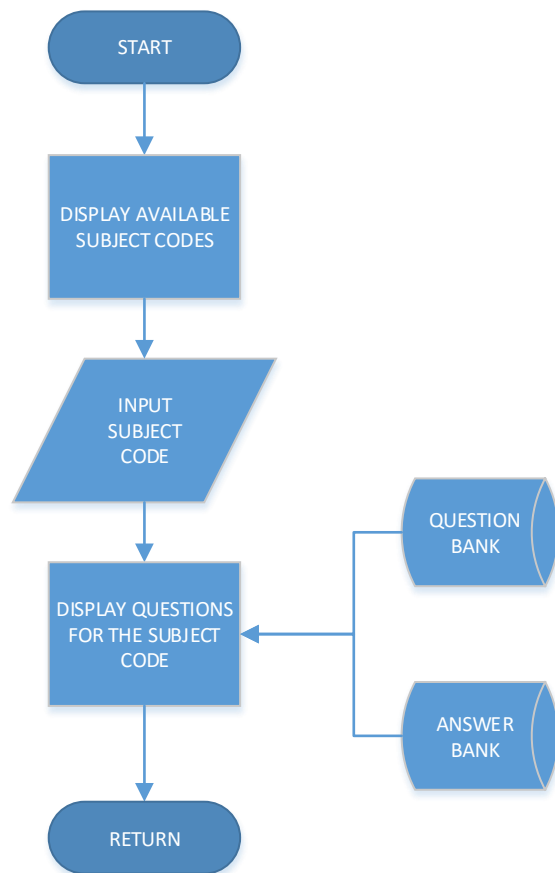
3.3.3.1 Flowchart

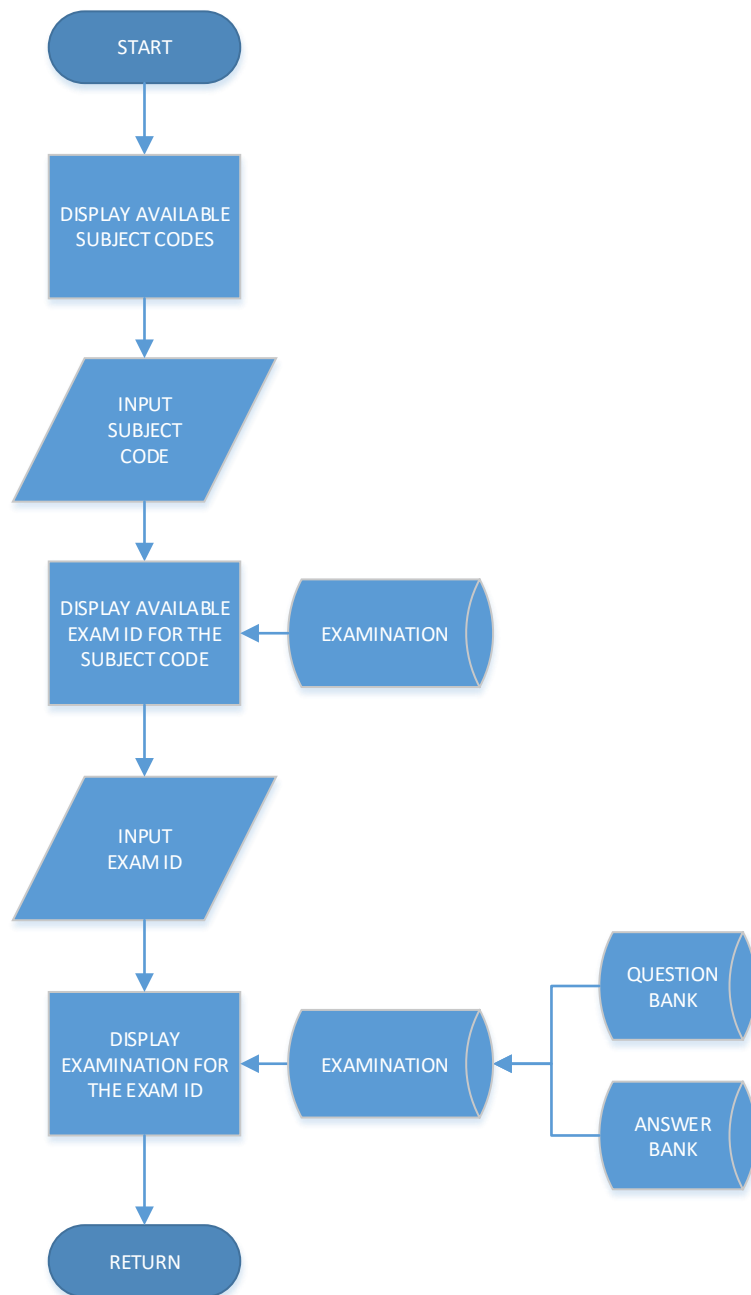
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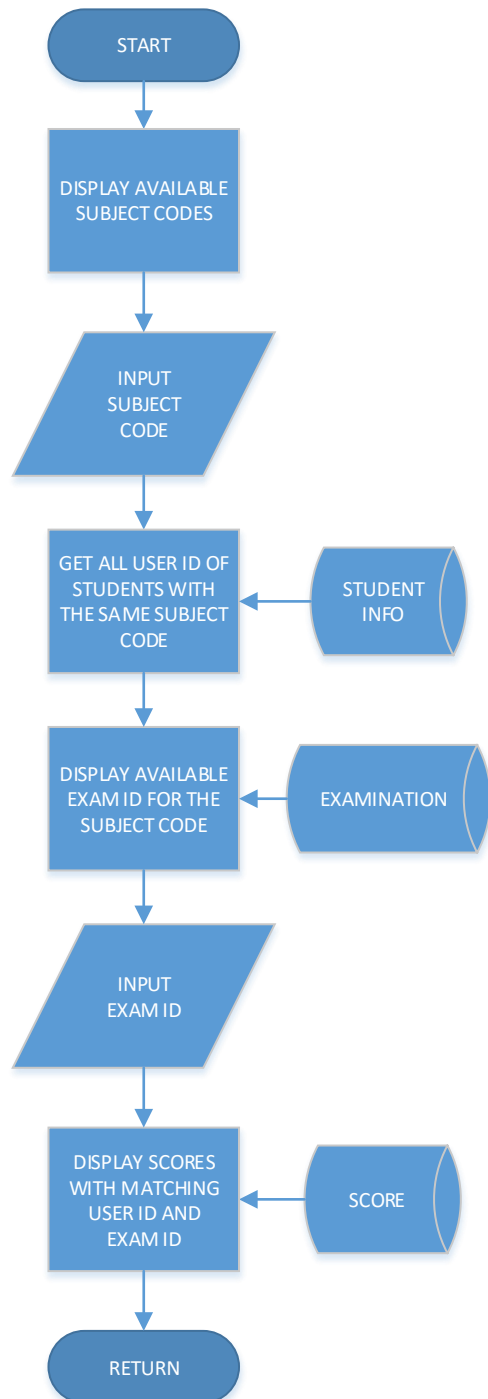


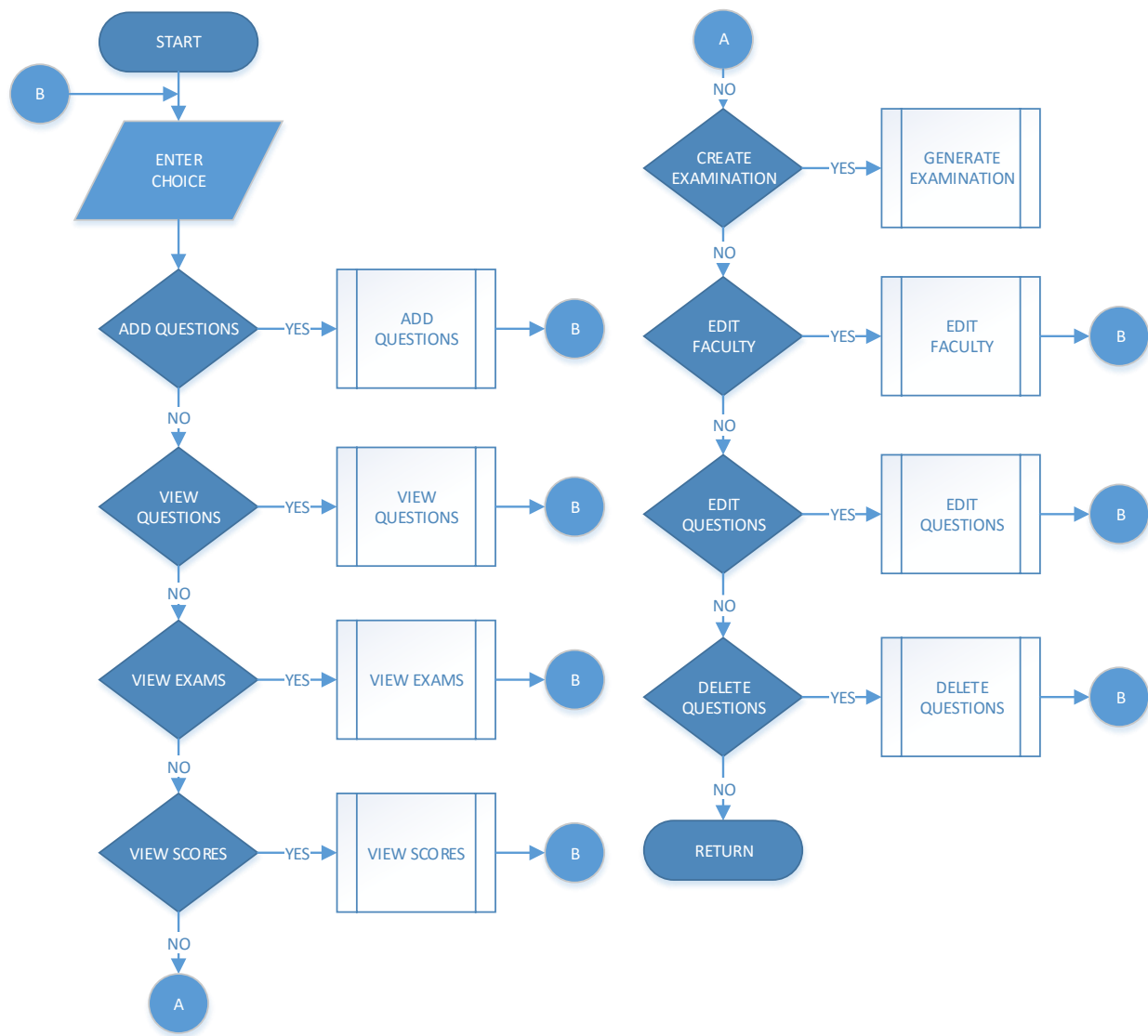
FACULTY MODULE

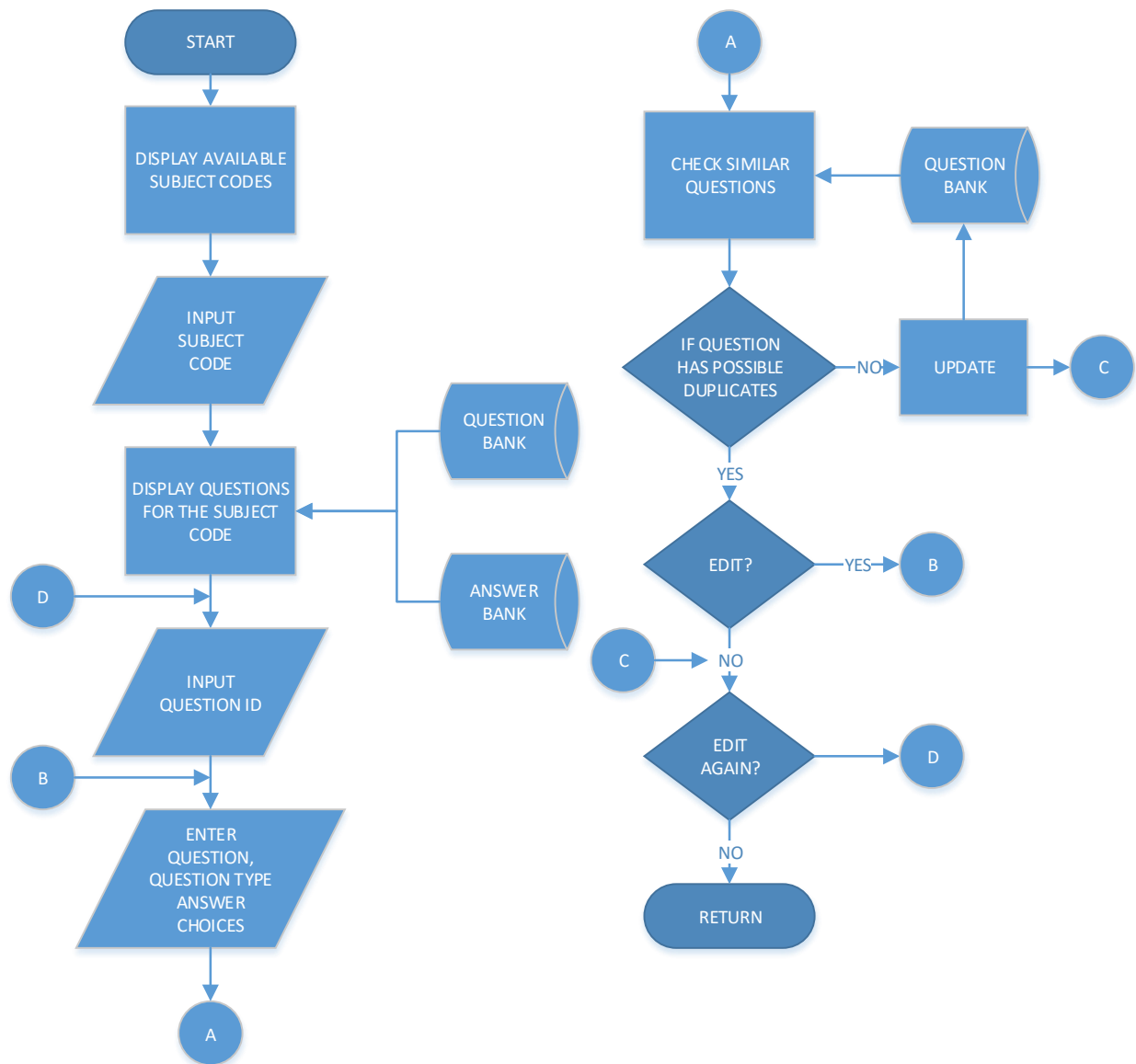
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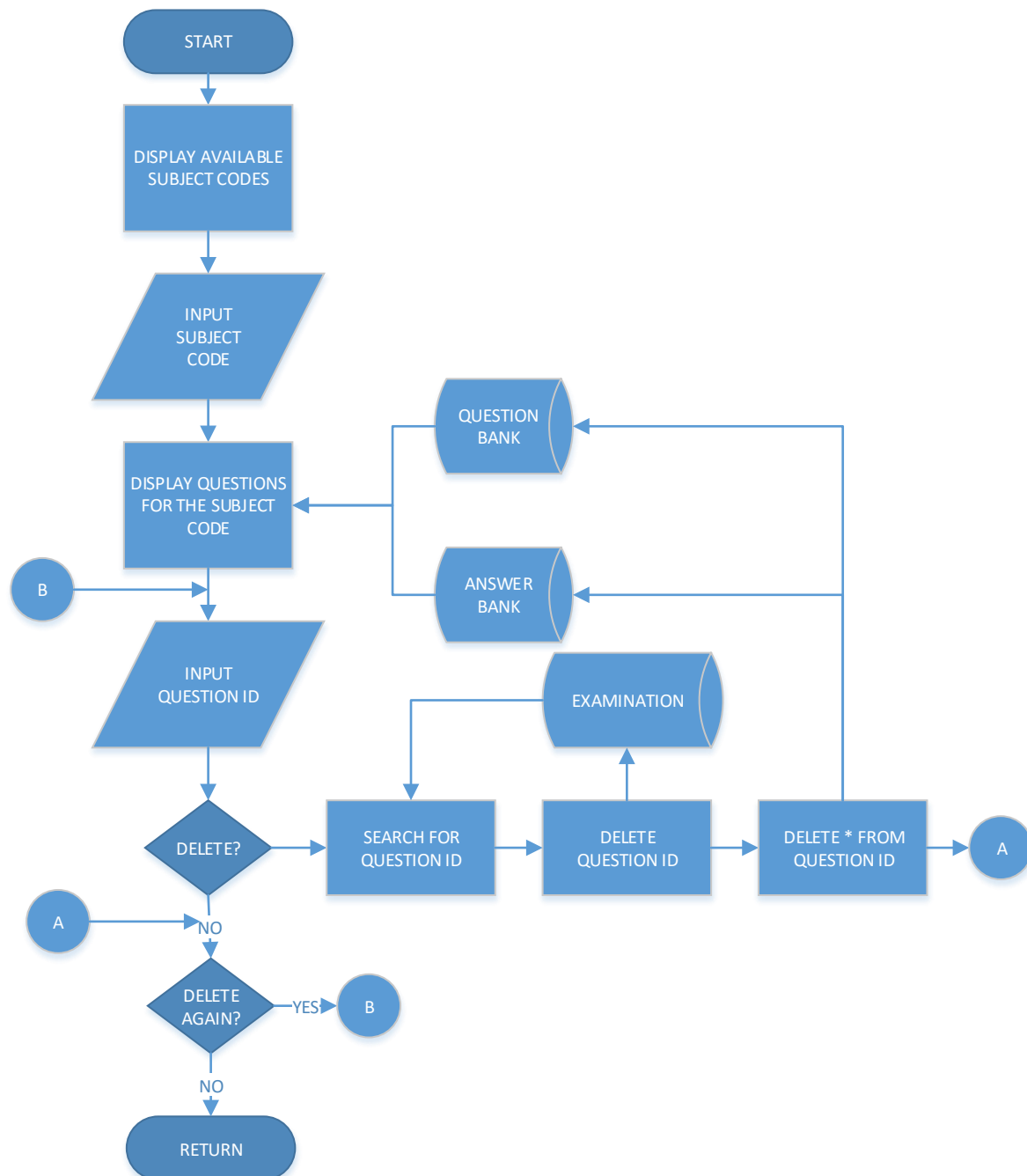
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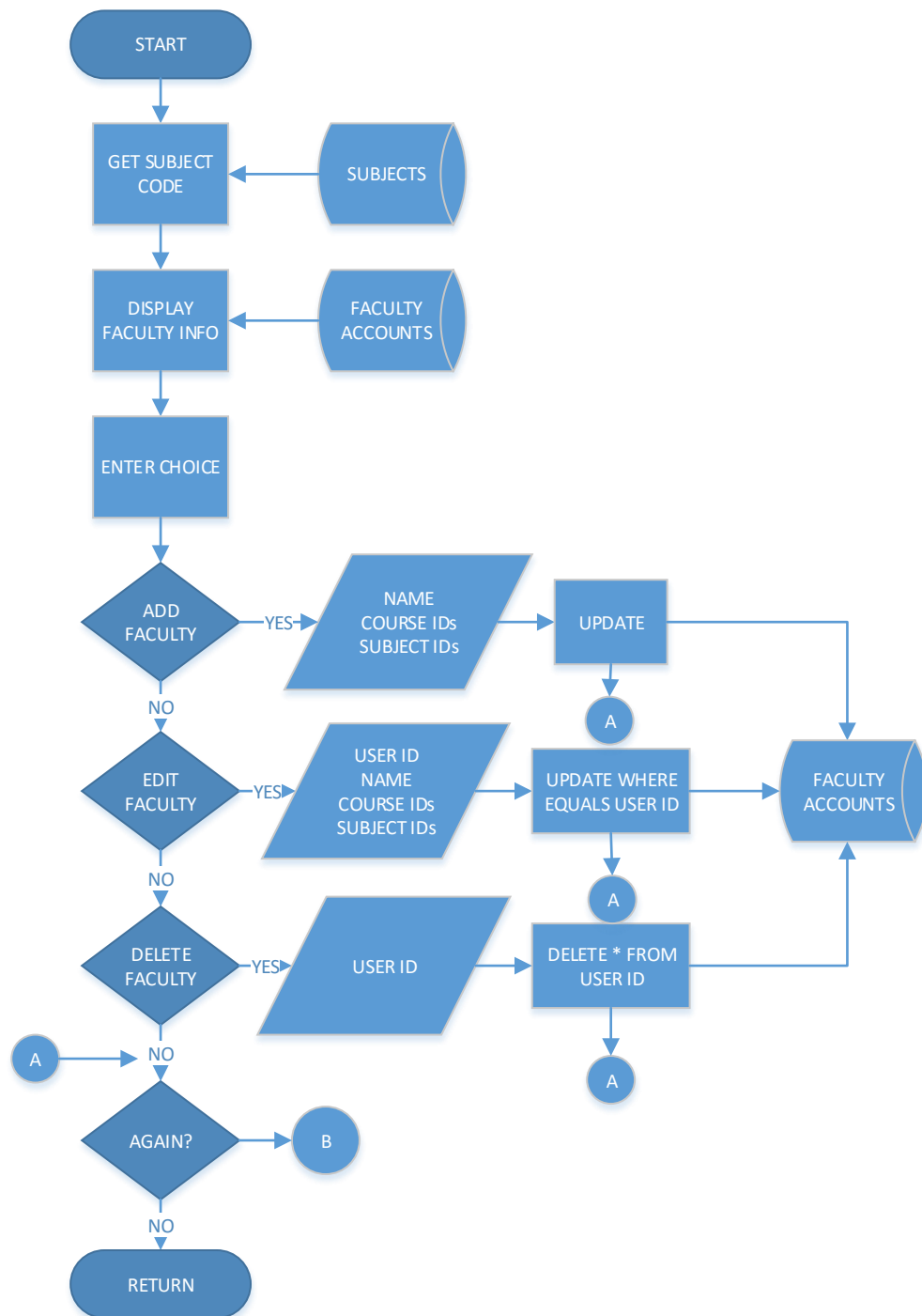
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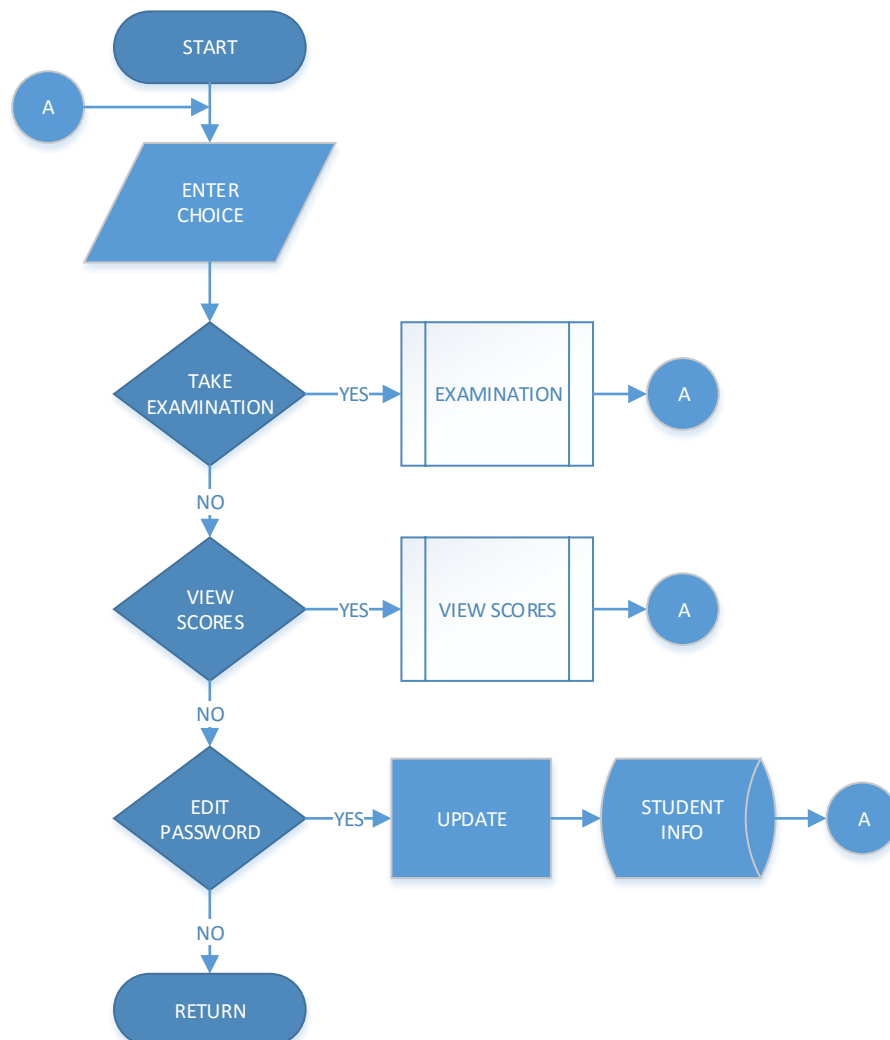
VIEW SCORES MODULE

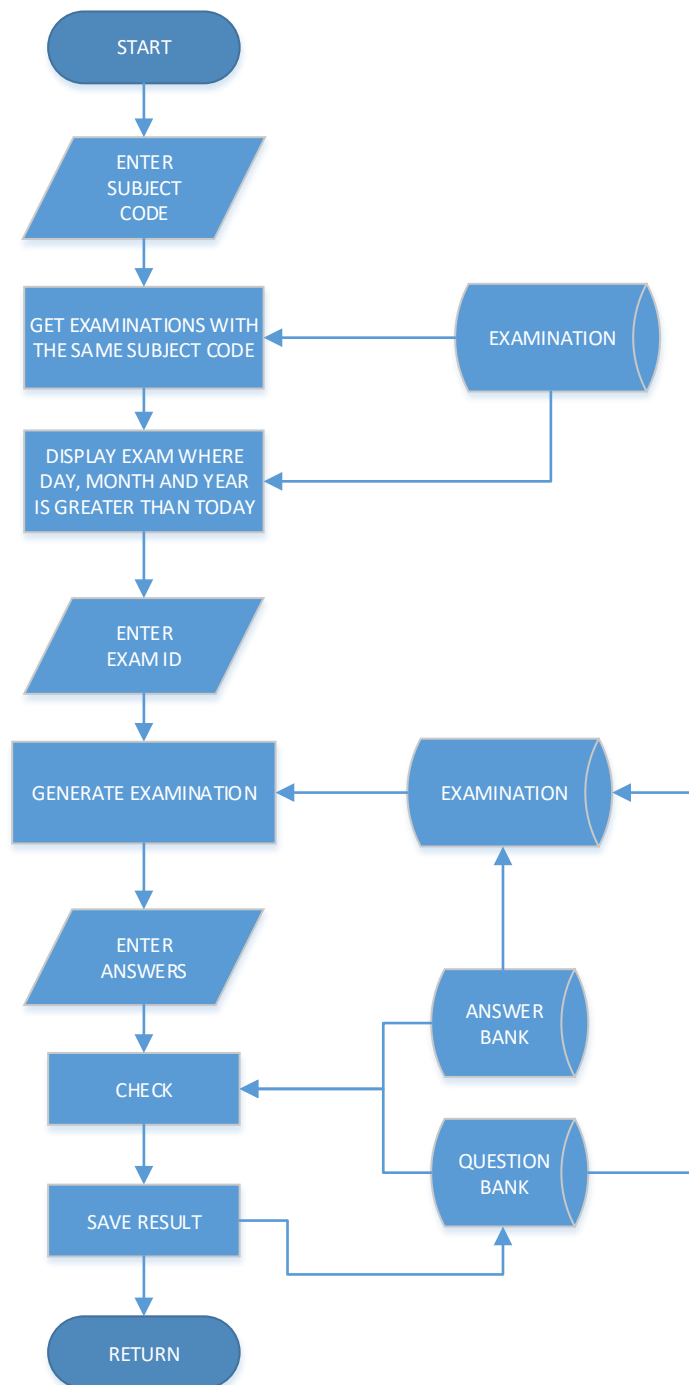
CHAIRMAN MODULE

EDIT QUESTIONS MODULE

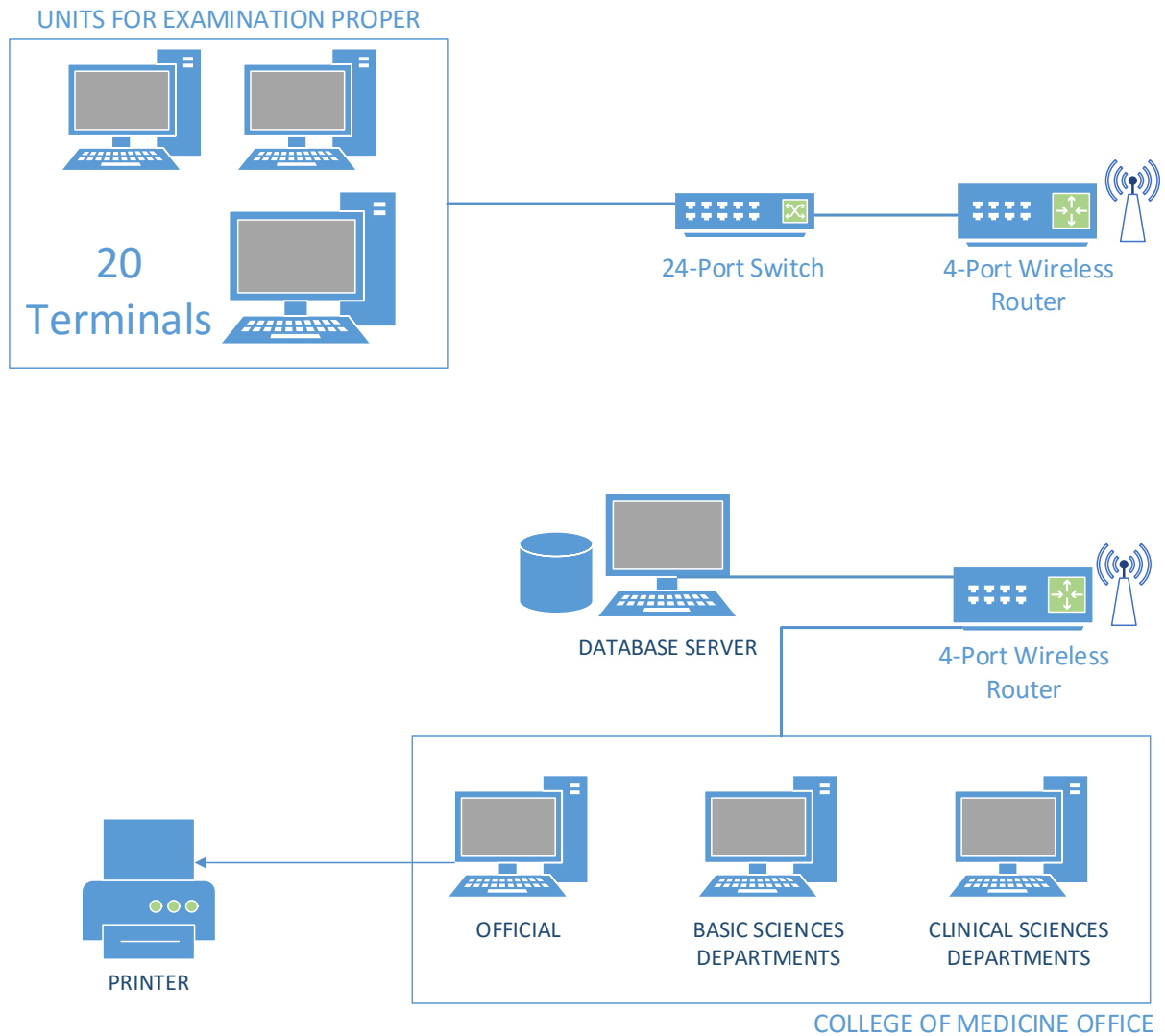
DELETE QUESTION MODULE

EDIT FACULTY MODULE

STUDENT MODULE

EXAMINATION MODULE

3.3.3.2 Physical Elements



3.3.3.3 Database/Table:**User Accounts Database**

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
Password	Alphanumeric	16	User's Password
User Level	Numeric	1	Access Level

Faculty Accounts Database

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
User Level	Numeric	1	Access Level
First Name	Alphabetic	30	Faculty's First Name
Middle Name	Alphabetic	25	Faculty's Middle Name
Last Name	Alphabetic	25	Faculty's Last Name
Course IDs	Alphanumeric	100	List of Course Codes
Subject IDs	Alphanumeric	200	List of Subject Codes

Chairman Accounts Database

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
User Level	Numeric	1	Access Level
First Name	Alphabetic	30	Chairman's First Name

Middle Name	Alphabetic	25	Chairman's Middle Name
Last Name	Alphabetic	25	Chairman's Last Name
Department	Alphabetic	45	Name of Department

Student Info Database

Field Name	Field type	Length	Description
User ID	Numeric	5	User's ID number
User Level	Numeric	1	Access Level
First Name	Alphabetic	30	Student's First Name
Middle Name	Alphabetic	25	Student's Middle Name
Last Name	Alphabetic	25	Student's Last Name
Subject IDs	Alphanumeric	200	List of Subject Codes

Subject Database

Field Name	Field type	Length	Description
Course Code	Alphanumeric	10	Course's Code
Course Title	Alphabetic	50	Course's Title
Subject Code	Alphanumeric	10	Subject's Code
Subject Title	Alphabetic	50	Subject's Title
Department	Alphabetic	45	Name of Department

Question Bank

Field Name	Field type	Length	Description
Question ID	Numeric	4	Question's ID Number
Subject Code	Alphanumeric	10	Subject's Code
Question	Alphanumeric	500	Questions that satisfies the Blueprint
Question Type	Alphabetic	30	Question's Type
Difficulty Index	Alphabetic	20	Difficulty Status
Difficulty	Numeric	5	Difficulty Value
Discrimination Index	Alphabetic	20	Discrimination Status
Discrimination	Numeric	5	Discrimination Value
Right Answer	Alphanumeric	30	Right answer of an exam
Wrong Answer	Alphanumeric	30	Wrong answer of an exam
Exam IDs	Alphanumeric	8	Exam's ID Number

Answer Bank

Field Name	Field type	Length	Description
Question ID	Alphanumeric	5	Question's ID
Answer	Alphanumeric	30	Answer of examinee
Choices	Alphanumeric	250	Choices of a question

Examination Database

Field Name	Field type	Length	Description
Exam ID	Alphanumeric	8	Exam's ID Number
Batch Number	Numeric	8	Batch's Number
Department	Alphabetic	45	Name of Department
Course Code	Alphanumeric	10	Course's Code
Subject Code	Alphanumeric	10	Subject's Code
Exam Type	Alphabetic	25	Examination's Type
Year	Numeric	4	Year the exam was taken
Month	Alphabetic	8	Month the exam was taken
Day	Numeric	2	Day the exam was taken
Question IDs	Alphanumeric	5	Question's ID

Sets Database

Field Name	Field type	Length	Description
Set ID	Alphabetic	1	Set's ID
Exam IDs	Alphanumeric	8	Exam's ID Number

Score Database

Field Name	Field type	Length	Description
Exam ID	Alphanumeric	8	Exam's ID Number
User ID	Numeric	5	User's ID number
Score	Numeric	3	Score of the examinee

3.3.3.4 Reports:

Item Analysis - result of the examination including the difficulty and discrimination of each questions.

Statistical Report – report that shows the reliability of an examination.

Questionnaire – list of questions used for the examination

3.3.3.5 Manual Process (Existing):

- Generating Blueprint
- Generating Questionnaire Draft
 - Creating Questions based on the Textbooks
 - Comparing each Questions with the Previous Shifting Exam
 - Finalizing Questionnaire Draft
- Generating Official Questionnaire
 - Consolidating Questionnaire Drafts
 - Comparing each Questions with the Previous Shifting Exam
 - Finalizing Official Questionnaire
- Printing Official Questionnaire copies
- Photocopying Official Questionnaire

3.3.3.6 Requirement Definition

ITEMS	REQUIRED	EXISTING	NEEDED
Hardware Personal Computer (HP Compaq DC5800 Intel Core 2 Duo E8400 3.0GHz / 2GB DDR2 / 320GB SATA HDD / On Board Video Card 384MB / DVD-ROM with IBM ThinkVision L190p 19-inch LCD Monitor) Software Operating System (Windows 7)	20	0	20
Printer Cannon LBP-6000 Laser Printer	1	0	1

3.3.3.7 Cost and Benefit Analysis

ITEMS	COSTS
ONE TIME COST	
<ul style="list-style-type: none"> Hardware Personal Computer (HP Compaq DC5800 Intel Core 2 Duo E8400 3.0GHz / 2GB DDR2 / 320GB SATA HDD / On Board Video Card 384MB / DVD-ROM with IBM ThinkVision L190p 19-inch LCD Monitor) (PHP 11,780.00) Router TP-LINK TL-WR841N (PHP 995) Software Operating System (Windows 7) (PHP 5311.00) 	PHP 342, 815
<ul style="list-style-type: none"> Printer Cannon LBP-6000 Laser Printer 	PHP 3, 200
TOTAL ONE TIME COST	PHP 346, 015
RECURRING COST	
MAINTENANCE <ul style="list-style-type: none"> Money allotted for Computer and Printer Problems 	PHP 10, 000
ELECTRICITY COST <ul style="list-style-type: none"> Monthly cost of computers and printers 	PHP 10, 000
PRINTER COST <ul style="list-style-type: none"> Printer ink 	PHP 500
TOTAL RECURRING COST	PHP 20, 500
TOTAL COST	PHP 366, 515

3.3.3.8 Computation for Payback Period

SAVED EXPENSES	COST per YEAR
EMPLOYEE SALARY	PHP 19, 500
PAPER COST	PHP 6, 000
PHOTOCOPY COST	PHP 4, 500
SCANTRON SHEET	PHP 20, 000
TOTAL	PHP 50, 000 per YEAR

$$\text{PBP} = \text{TOTAL COST} / 50,000$$

$$= 7.33 \text{ YEARS}$$

3.3.3.9 Tangible / Intangible Benefits

1. Easy access of the information of the students.
2. Networked data is secure and easy to backup.
3. Essential summary of reports.
4. More effective monitoring of the examinations.
5. Delay in making reports will be prevented.
6. The reports and examination is dynamically created, thus minimizing error and human labor.
7. Terminates unnecessary workloads.
8. Reduces output of papers