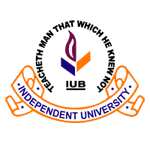
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**Independent University, Bangladesh**

**Department of Computer Science & Engineering**

**SEN 653: Software Quality Assurance, Testing and Reliability**

**(Autumn 2020)**

**Term Paper**

**Test Plan:**

Learning Management System

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# Introduction

An envisioned learning management system for higher education will include courses from different universities around the country, training courses, workshops, seminars by well-known persons with a very reasonable cost so that students can afford from anywhere anytime across the country according to their desire and demands will help to accomplish the initiative. Education will be barrier-free, there will be no restriction on gaining knowledge thus the youth of Bangladesh will be equipped with the knowledge to face the challenges of the 21st Century. It will also promote economic growth by contributing to public-private partnerships, the rapid growth of IT industries, research, and development. More youth will be involved in research and development. The purpose of this project is to test each and every features of lbs in order to guarantee the customer satisfaction.

## Scope

The key features of our LMS are Registration process, Login, Course Registration, Enrolment, User profile. These requirements need to be met in order to guarantee customer satisfaction. So, we will be focusing on these requirements in our quality assurance process. Basically, All the functionalities will be checked to make sure that customers can not find any bugs in our system.

## Goals & Objectives

* Finding defects which may get created by the programmer while developing the software.
* Gaining confidence in and providing information about the level of quality.
* To prevent defects.
* To make sure that the end result meets the business and user requirements.
* To ensure that it satisfies the BRS that is Business Requirement Specification and SRS that is System Requirement Specifications.
* To gain the confidence of the customers by providing them a quality product.

## Roles & Responsibilities

|  |  |
| --- | --- |
| **Roles** | **Responsibility** |
| Author | The role of Author is appointed to the programmer or designer who is responsible for producing the program or document that is being inspected. |
| Moderator | The moderator is the leader of the inspection and s/he is responsible for planning the inspection as well as coordinating it. |
| Reader | The role of a reader is a simple one, but not insignificant. They present the code or document at an inspection meeting, where they read the document one by one. |
| Recorder | The Recorder or Scribe is the participant who is responsible for documenting the defects found during the inspection process. |
| Inspector | During the process of software inspection, inspectors are allotted the task of examining the work product to identify possible defects. |

# Testing Methodology & Strategy

## Overview

Learner wants a perfect Learning management system (LMS), which assed the full cycle of manual testing. The Test Plan has been created to facilitate communication within the team members. This document describes approaches and methodologies that will apply to the unit, integration and system testing of the Learning management system. It includes the objectives, test responsibilities, entry and exit criteria, scope, schedule major milestones, entry and exit criteria and approach. This document has clearly identified what the test deliverables will be, and what is deemed in and out of scope.

## Level of Testing

There are following four level of testing will be conduct in the system:

* Unit Testing,
* Integration Testing,
* System Testing,
* Acceptance Testing

## Usability Testing

Usability testing represents all activities that focus on observing users testing a product or service in certain working conditions. The goal for observer is to watch, listen and take notes while the participants are trying to complete tasks.

The ultimate purpose is to identify usability problems, collect qualitative and quantitative data and to determine participants’ satisfaction and dissatisfaction with the product or service. Generally, the usability testing takes two forms.

**Formative testing:** While the product is still in the development process, with a goal to diagnose the problems and try to fix them before representing it to the consumers.

**Summative testing:** commonly when the product is finished, with a goal to validate if the product meets the consumer’s requirements.

There is some plan for usability testing following:

• Title page

• Table of Contents

• List of Illustration, Abbreviation & Figures

• Executive Summary

• Problem Statement and Test Objectives

• Methodology

• User Profiles

• Participant Incentive

• Screeners

• Scenarios & Tasks

• Evaluation Methods

• Test environment and Equipment

• Presentation of Findings

• Pre-test Questionnaire, Post-task & Post-test Questionnaire

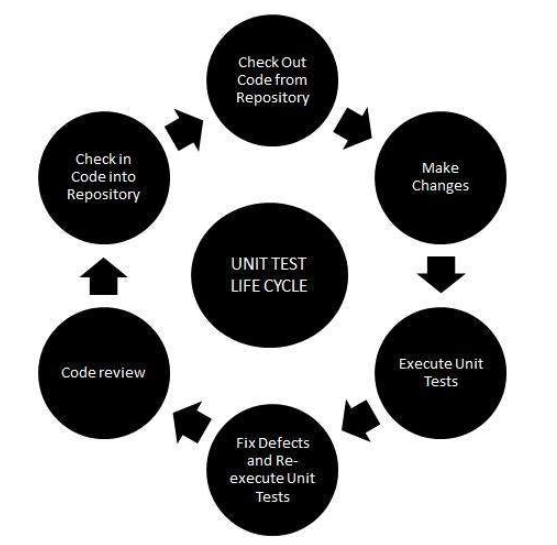
• Recommendations

• Appendices

## Unit Testing

UNIT Testing is a type of software testing where individual units or components of a software are tested. Unit Testing is done during the “**Learning Management system**” development (coding phase) of an application by the developer. Unit Tests isolate a section of code and verify its correctness. A unit may be an individual function, method, procedure, module, or object.

**Life cycle of unit testing:**



## White Box Testing

To focuses on the “**Learning Management System**” internal structure, design and coding of “**Learning Management System**” are tested to verify flow of input-output and to improve design, usability and security. In white box testing, code is visible to testers so it is also called Clear box testing, Open box testing, Transparent box testing, Code-based testing and Glass box testing.

## Black Box Testing

To focuses on the functional requirements of the “**Learning Management System**”. It enables one to derive sets of input conditions that will fully exercise all functional requirements for a program.

## System and Integration Testing

**System Testing:** For a complete, integrated system to evaluate the system's compliance with its specified requirements of “**Learning Management System**”

**Integration:** To constructing the program structure while conducting test to uncover errors associated with interacting. In Report, integration testing includes the testing Report from “**Learning Management System**” respective location(s).

## Performance and Stress Testing

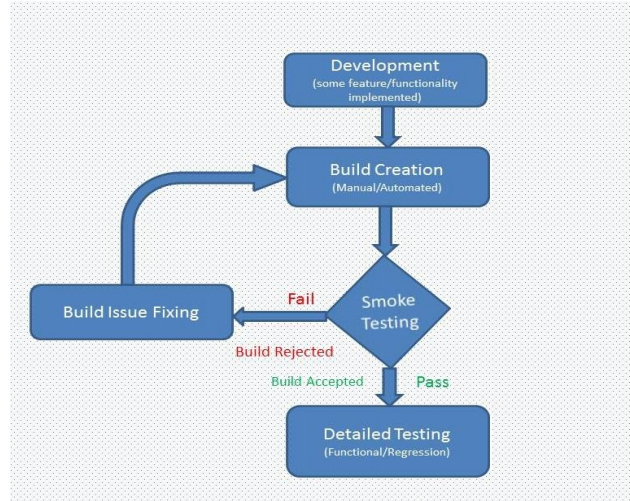
Performance Testing:

* Check the optimal time the page is loaded of **“Learning Management System”**
* Check the operation of the system under load **“Learning Management System”**

## Smoke Testing

The purpose of smoke testing of **“Learning Management System”** to determine whether the new software build is stable or not.

**Deployment Life Cycle for smoke testing:**



**There are three Technique of smoke testing:**

* Manual Approach creating test case for “**Learning Management System**” and run manually.
* Automation Approach run automation tools for “**Learning Management System**”
* Hybrid Approach combination of manual and automation approaches “**Learning Management System**”.

## User Acceptance Testing

The purpose behind user acceptance testing is to conform that system is developed according to the specified user requirements and is ready for operational use. Acceptance testing is carried out at two levels - Alpha and Beta Testing. User acceptance testing (UAT) will be done at the Client.

## Test completion criteria

**Test completion criteria**

* Any blocker issue for a feature will be taken care of immediately before testing the next one.
* The testing of the modules will be completed when the defects are fixed and re-tested.

**Unresolved Issues and Risks**

* These are risks to the schedule, scope, or quality of the test effort.
* The more defects or issues found the more time will be needed for fixing and retesting. This may interrupt the testing schedule as well as delivery within planned timeline of the delivery.
* The feedback (issue fixing/not fixing) from developers on Test defects, issues, remarks need to be well communicated. If not, Project delivery timeline can be hampered.
* If planned/allocated resources are not available for the test, then the testing date and product release date can be hampered.

## Batch & Beta Testing

Before “**Learning Management System**” is finally released to a wide audience. The objective is to uncover as many bugs or usability issues as possible in this controlled setting. Taking feedback from different stack holder for improving the system.

## Final Release Test

Before finally release the **“Learning Management System”** testing full process of the system.

## Test Completeness

When all the testers in your team are exhausted and when all the planned tests have been executed. In quality assurance testing technique in which all scenarios or data is tested for testing. In other word when you get positive result from all the test cases, you can consider completeness of your test

# Test Approach (Testing techniques and models)

## Techniques

### Boundary Value Analysis (BVA)

In boundary value analysis we will test at the boundaries between partitions. It includes maximum, minimum, inside or outside boundaries, typical values and error values.

It is generally seen that a large number of errors occur at the boundaries of the defined input values rather than the centre. It is also known as BVA and gives a selection of test cases which exercise bounding values.

The black box testing technique complements equivalence partitioning. This software testing technique is based on the principle that, if a system works well for these particular values then it will work perfectly well for all values which come between the two boundary values.

**Guidelines for Boundary Value analysis**

* If an input condition is restricted between values x and y, then the test cases should be designed with values x and y as well as values which are above and below x and y.
* If an input condition is a large number of values, the test case should be developed which needs to exercise the minimum and maximum numbers. Here, values above and below the minimum and maximum values are also tested.
* Apply guidelines 1 and 2 to output conditions. It gives an output which reflects the minimum and the maximum values expected. It also tests the below or above values.

**Example:**

In the registration form the user must put a valid email, without accurate email system will not accept request.

Password length must be greater than 6 characters furthermore with special characters.

Length & Email are the boundaries for the system to accept requests.

**Consider Minimum, Just above the minimum, A nominal value, Just below the maximum, Maximum**

Equivalence Partitioning or Equivalence Class Partitioning is a type of black box testing technique which can be applied to all levels of software testing like unit, integration, system, etc. In this technique, input data units are divided into equivalent partitions that can be used to derive test cases which reduces time required for testing because of the small number of test cases.

* It divides the input data of software into different equivalence data classes.
* You can apply this technique, where there is a range in the input field.

**Example 1: Equivalence and Boundary Value**

* Let's consider the behaviour of Registering for courses
* Students can register for 1 to 5 are considered valid. A success message is shown.
* While value 11 to 99 are considered invalid for registration and an error message will appear, **"Only 5 Course can be registered at a time"**

**Here is the test condition**

1. Any Number greater than 5 entered in the Course Registration (let say 11) is considered invalid.
2. Any Number less than 1 that is 0 or below, then it is considered invalid.
3. Numbers 1 to 5 are considered valid
4. Any 3 Digit Number say -100 is invalid.

We cannot test all the possible values because if done, the number of test cases will be more than 100. To address this problem, we use the equivalence partitioning hypothesis where we divide the possible values of tickets into groups or sets as shown below where the system behaviour can be considered the same.

### Decision Table Based Testing

A decision table is also known as the Cause-Effect table. This software testing technique we will use for functions which respond to a combination of inputs or events.

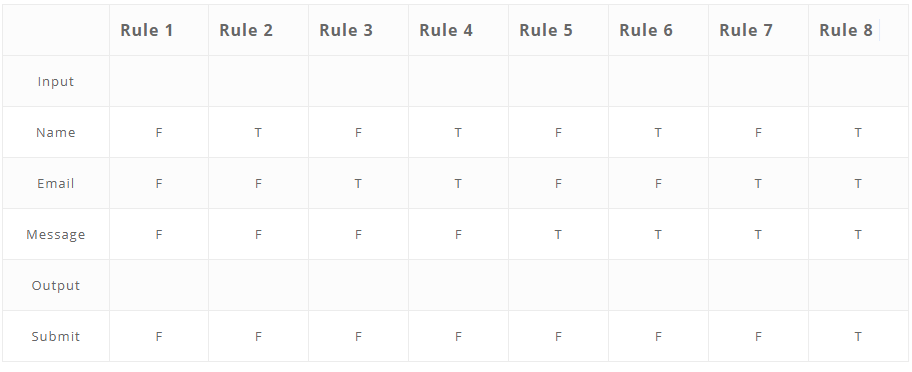
For example, a submit button should be enabled if the user has entered all required fields and disable if not.

For every function, you need to create a table and list down all types of combinations of inputs and its respective outputs. This helps to identify a condition that is overlooked by the tester.

**Following are steps to create a decision table:**

* Enlist the inputs in rows
* Enter all the rules in the column
* Fill the table with the different combination of inputs
* In the last row, note down the output against the input combination.

**Example**: A submit button in a contact form is enabled only when all the inputs are entered by the end user.



### Error Guessing

is a software testing technique based on guessing the error which can prevail in the code. The technique is heavily based on the experience where the test analysts use their experience to guess the problematic part of the testing application. Hence, the test analysts must be skilled and experienced for better error guessing moreover must have the product domain knowledge.

The technique counts a list of possible errors or error-prone situations. Then the tester writes a test case to expose those errors. To design test cases based on this software testing technique, the analyst can use the past experiences to identify the conditions.

**Guidelines for Error Guessing:**

* The test should use the previous experience of testing similar applications
* Understanding of the system under test
* Knowledge of typical implementation errors
* Remember previously troubled areas
* Evaluate Historical data & Test results
* Having Product Domain Knowledge

### State Transition

In State Transition technique changes in input conditions change the state of the Application Under Test (AUT). This testing technique allows the tester to test the behaviour of an AUT. The tester can perform this action by entering various input conditions in a sequence. In State transition technique, the testing team provides positive as well as negative input test values for evaluating the system behaviour.

**Guideline for State Transition:**

* State transition should be used when a testing team is testing the application for a limited set of input values.
* The technique should be used when the testing team wants to test a sequence of events which happen in the application under test.

**Example:**

In the following example, if the user enters a valid password in any of the first three attempts the user will be able to log in successfully. If the user enters the invalid password in the first or second try, the user will be prompted to re-enter the password. When the user enters password incorrectly 3rd time, the action has taken, and the account will be blocked.

### Integrating Manual And Automation Testing Techniques

By this we will get the benefit most by combining the efforts of both-manual as well as automation testing techniques. By integrating automation testing while conducting manual tests, your productivity and efficiency can increase by 10 folds! This is why it is important to recognize and segregate the test case that can be automated.

**Examples of such test cases may include:**

* Test cases that are most often needed
* Test cases which are the most time consuming
* Test cases that have a critical need for accuracy but have scope for human errors

For example, these test cases make up around 25% of your test plan. This will mean a 25% reduction of manual efforts and time consumption, Cloud-Based Testing Technique Cloud based testing includes the use of cloud-based tools for testing web, installed applications and web. These tools are used to match the environments and user traffic with the real-world.

A few tips to effectively implement the cloud-based testing techniques are:

* **Set Objectives-** This testing proves to be advantageous only if you have a clear objective set for your business needs. It requires cooperation between testers and developers for conducting all tests throughout the SDLC.
* **Creating Test Strategy-** Before transporting your project onto the cloud, determine the tests you need to perform, the time they will take and the risks involved in them. This will help you get an estimated idea of the testing budget.
* **Plan the Infrastructure-** Create test strategies that align with the infrastructure requirements needed for building the test environment.
* **Selecting a Provider-** To select the best provider, compare the quality, reliability and security being offered by them.
* **Determine Level of Access-** To conduct cloud-based testing many testers must have access to the cloud. Therefore, determine how many and who all can have access to it, so as to prevent the generation of additional costs from service overuse.

### DevOps Testing

‘*Development and Operations’* is a development methodology that integrates all development functions including development and operations in the same cycle. This methodology when used in software testing facilitates the testers to combine test cases, test automation and test designs so as to verify changes within the code while avoiding the product from crashing during the development phase.

A few DevOps testing technique tips include:

* Test execution must be lean
* Test cases required for particular builds need to be developed
* Standardize all the environment requirements for testing and automate the deployments
* Set exit criteria for every run to facilitate the go/no-go decision for production
* The testers must have the ability to use different types of automation techniques over different cross-platform environments.

### Big Data Testing

Big Data testing helps in ensuring that the quality of data is uncompromising. It’s going to be a widely used testing technique this year because of the decreasing costs of data storage. In this type of testing, testers verify whether the terabytes of data have been successfully processed using supportive components like commodity clusters or not.

A few examples of the test cases in big data testing are:

* Determine if the correct alter mechanisms, such as Mail on alert, are executed.
* Check whether errors and exceptions are properly displayed with appropriate error messages so that error/exception handling becomes easy.
* Implementing integration testing for complete workflow, from data ingestion till its storage or visualization.
* Performance testing for different parameters of processing random data and monitoring parameters like time taken in execution of particular metrics.

### Risk-Based Testing Technique

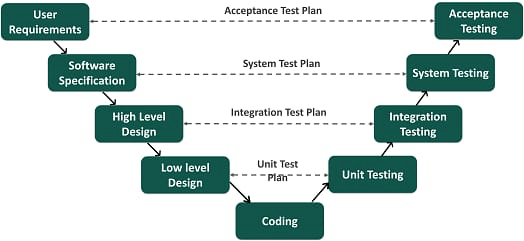
This type of testing is implemented with the aim of finding out the critical errors as soon as possible with least cost. Here, functionalities are prioritized and tested according to the level to which they are error prone.

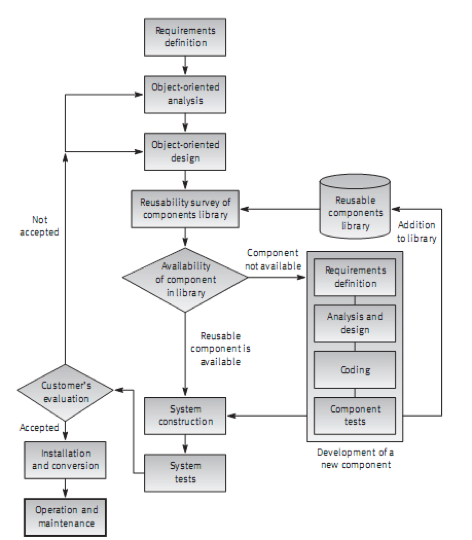
The steps to follow for effective risk-based testing include:

* Identify and prioritize risks
* Create test plans accordingly
* Eliminate or add risks according to results obtained

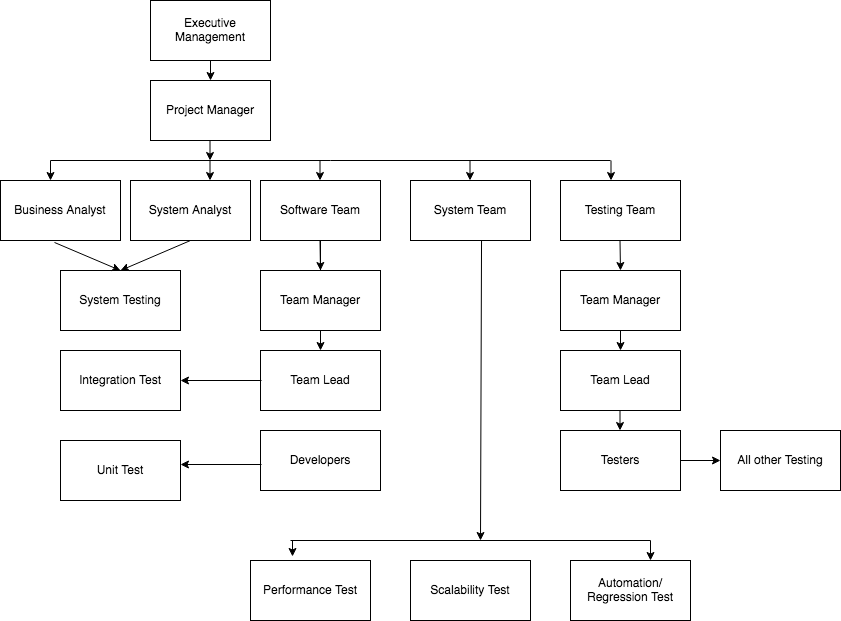
## Models

As per our system we are using the V-Model with OOP approach, In each step of V-model we will go through the OOP model.





# Team organogram



# Hardware & Environment Requirements

### Recommended System Requirements

* A 64-bit operating system like Windows or Linux.
* Latest Browsers.
* Intel Core Intel Core i7 ( 10th generation).
* 32 GB of RAM or more.
* 1 TB of free disk space for installation, plus extra space for temporary files during test runs (see below).
* 1280 × 1024 or higher display resolution.
* Mouse or other pointing device.
* Load balancer
* Test Server
* Few other automation tools...will write

### Test Environment

* System and applications.
* **Test** data.
* Test Database server.
* Configure the environment
* Front-end running **environment**.
* Client operating system.
* Browser.
* Hardware includes Server Operating systems.
* Network.
* Documentation required like reference documents/configuration guides/installation guides/ user manuals

### Types of Testing Environments

* Integration Testing Environment.
* Performance Testing Environment.
* Security Testing Environment.
* Chaos Testing Environment.

### Disk Space Requirements

Test Complete Platform creates and uses temporary files during test runs. The free disk space required by Test Complete Platform depends on your project size. You need at least 500 MB of free space on the system disk to run small projects, and 1–2 GB of free disk space to run large projects.

**Software Environment**

Web Server - Apache

Database - PostgresSQL

OS - Linux

Browser - Chrome/FireFox

PHP: version 7

**Test Bed:**

A test environment that has been prepared with test data. The test data helps you verify test cases that require a certain data setup.

# Milestones / Deliverables

All the functional Requirement

# 

# Assumption & Risk

# Tools

# Approval

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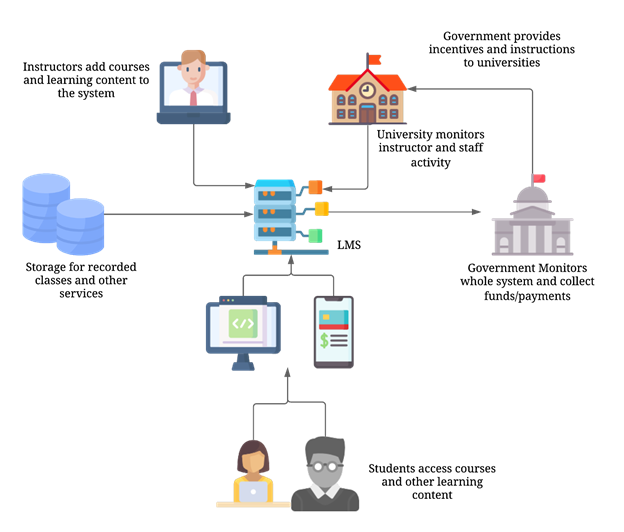
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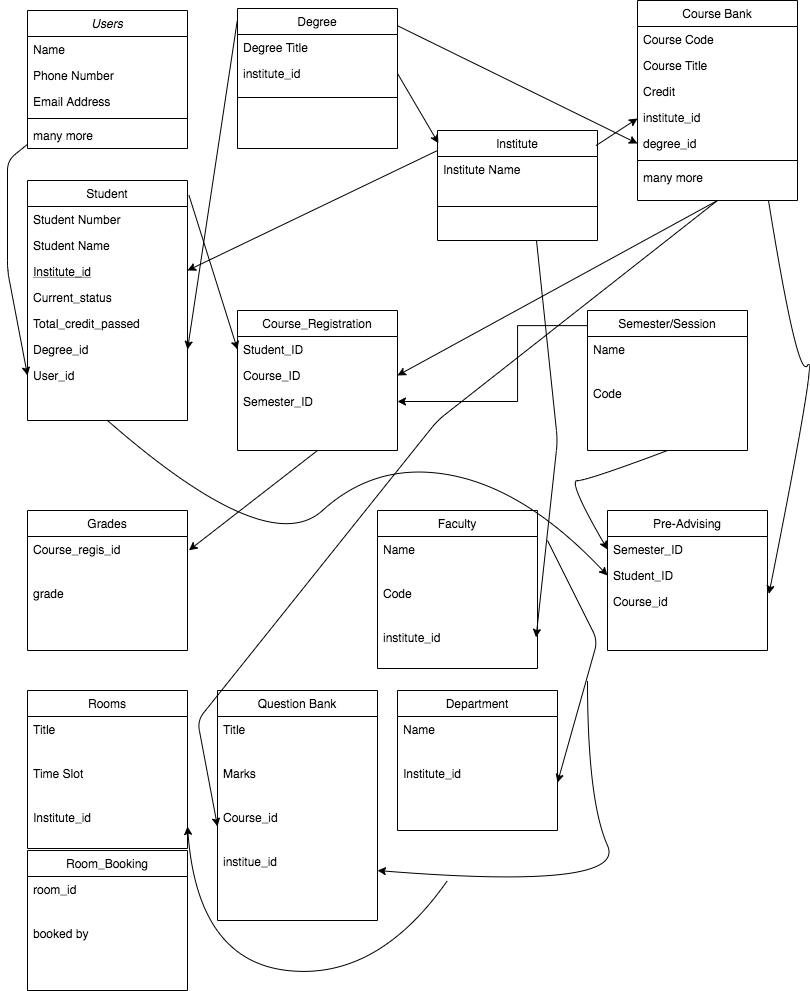
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**Rich Picture**



**ERD**

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