Distance Learning

SRS Document

Disclaimer

This Software Requirements Specification document is a guideline. The document details all the high level requirements. The document should be used as a guideline by the students to design the Solution Architecture for the project. The document also describes the broad scope of the project and high level logical object model. But while developing the solution if the developer has a valid point to add more details being within the scope specified then it can be accommodated after consultation.

Distance Learning

Introduction

The purpose of this document is to define scope and requirements of a virtual learning platform for students or professionals seeking convenience of study materials and assignment schedules as they are pre-occupied with challenging commitments be it their on going job or existing curriculum.

This document should be used by the development team to architect the solution the project.

Management Summary

The institute of vocational studies and career strategist has been receiving request for conducting the courses via internet. With the wide spread popularity of the institute getting enrollments would not have been a challenge for online courses. the management invited vendors to set up a website to host the courses especially short terms ones to start with and make it convenient for the users to achieve the following.

1. Students enroll online for courses.
2. Faculty uploads study material and posts results of assignment for online access.
3. The students submit assignments as per schedules defined for the course they are enrolled for.
4. Ease of use for students to access information as per their convenience.
5. Transparent process from enrollment to declaring results.

The proposed solution will be designed & developed to run on IBM WebSphere Application Server and IBM DB2 Universal Database in a 2-tier architecture.

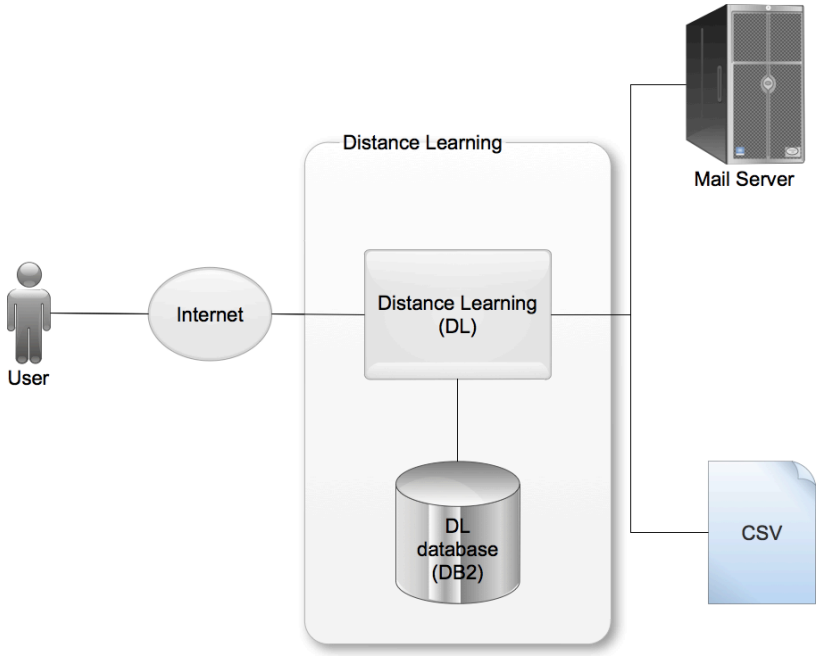
Key Assumptions

1. The system is ideally meant for students and faculty having mobiles for receiving SMS of the information they have subscribed to. For project scope, email id is being used for communicating.

High Level Architecture

Distance Learning high level architecture is illustrated through the context diagram shown below. It will have following categories of users:

1. Student
2. Faculty
3. Administrator



Distance Learning Context Diagram

Distance Learning	A platform for providing courses online with features for faculty and students. End to end workflow of progress of each student is trackable.
Distance Learning Database	Designed to store courses, topics, study material uploads in various formats, assignments, schedules, students, faculty.
CSV	Masters such as Faculty, Courses, Topics are uploaded via CSV
Mail Server	All notifications are routed through the Mail Server

Functional Requirements

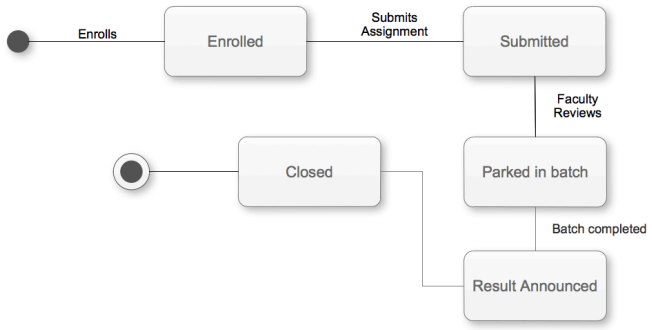
The high level functional requirements for the Distance Learning are outlined in the Use Case diagram described in this section.

Distance Learning will provide a secure user-id/password based secured login mechanism to access its services. The details of this are not outlined here. The development team is expected to create these keeping in mind the general practices followed by the web applications. Login will be a prerequisite to use Distance Learning. Internal users will be provided user id/password pair separately.

Once user logs in, s/he can view the dashboard of Course details with status, Latest comments updated by students on the study material uploaded. This menu options shall primarily come from the use case of the role player.

Workflow Diagram

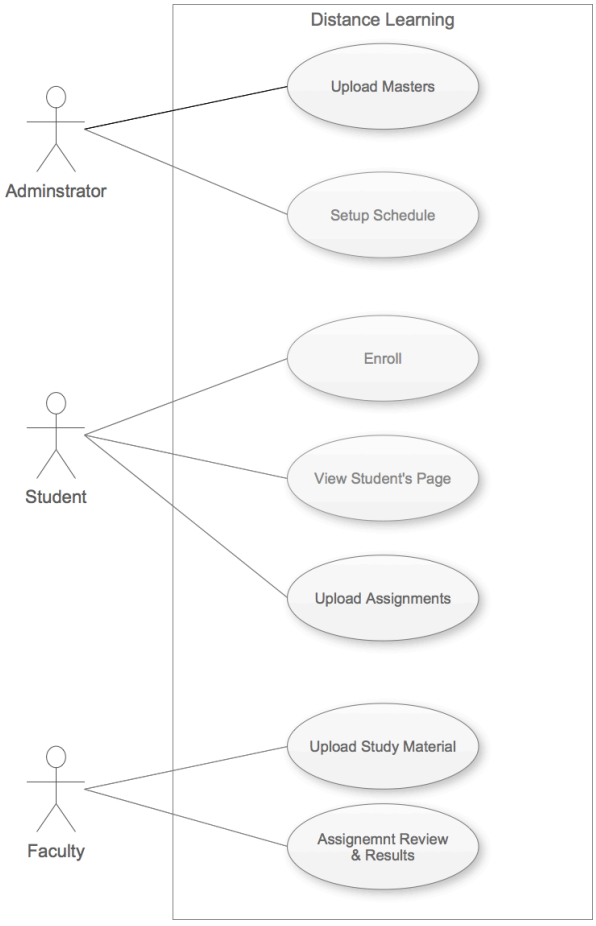
The following figure illustrates the workflow to be followed after enrolling in a course on the Distance learning website.



1. Students enroll via website into a course. Only one course is allowed for enrollment at any given point of time. The workflow moves into enrolled state.
2. Student submits assignments for faculty review. The state of workflow moves into Submitted.
3. The faculty reviews and parks the reviewed assignments as a batch. The state of workflow becomes Parked in batch.
4. The faculty releases the course result once the batch is completed i.e. all students enrolled have submitted the assignments count as per schedule, the batch is synonymous to the course result in this case.
5. The workflow moves to the closed state, none of the role players can modify any content of the course i.e. assignments or review scores.

Use Case Diagrams

The following figure illustrates the Use Case diagram for the system. The MIS use cases are not detailed here.



Use Case Diagram

Use Cases

Upload Masters

Use Case Element	Description
Number	UC.01
Application	Masters in Distance Learning are uploaded using CSV Format. Faculty master will contains columns such as Faculty id, Faculty Name, E-mail id, Mobile Number Course master has columns such as course id, course name, duration (in days), Minimum Qualification (Undergraduate/Graduate/Post Graduate), Course Fee and Session Start Date Course-Topics has columns such as Topic id, Topic Name, Course id, Faculty id
Use Case Name	Upload Masters
Primary Actor	Administrator
Secondary Actor	None
Pre-condition	None
Trigger	User clicks on the **Upload Masters** menu item on the landing page
Basic Flow	System prompts for the file name to be uploaded. Standard file upload dialog is presented to select a file from the local system. • The selected file data is uploaded in the related tables; if an existing record is encountered, the old details are replaced with the new details.
Alternate Flow	• In event of incorrect CSV format, system gives an error and NO data is uploaded. • Operation is cancelled
Output	System displays the number of records uploaded. It also highlights the number of records updated (i.e. already existing ones being replaced)

Enroll

Use Case Element	Description
Number	UC.02
Application	Students enroll for the course online
Use Case Name	Enroll
Primary Actor	Student
Secondary Actor	None
Pre-condition	Authorized user is logged in to the system
Trigger	User clicks on the **Enroll** link on the landing page

Use Case Element	Description
Basic Flow	• The system displays the list of courses with their duration, minimum qualification, course fee and session start date • Clicking on any of the courses will display the topics and faculty assigned to it, back button navigates to the list of courses. • Click on checkbox in front of the courses listed to continue with the enroll process. A form pops up displaying the following data to be captured. • Student Name, Address 1, Address 2, City, Pin Code, Contact Number, Email-id • ID Proof Type (Drivers License, Passport, PAN card, Adhaar Id). • Upload Id Proof copy, ID Number as mentioned on proof uploaded. • Qualification (Undergraduate /Graduate / Post Graduate), Upload Proof of Qualification. User clicks on submit to Enroll in the selected course. The system generates a unique number and mails the details on the email id used for enrollment. This unique number shall be used to access the study material for the course. The enrolled count for the course goes up by 1. The student record follows the workflow state transition as per the workflow diagram mentioned in earlier sections of this document. (In real world application, the enrollment happens with online fee payment, for this project, this feature is not included)
Alternate Flow	None
Output	Email notification to student with enrollment number

Setup Schedule

Use Case Element	Description
Number	UC.03
Application	Schedule for the course related activities is setup when the new session of course commences
Use Case Name	Setup Schedule
Primary Actor	Administrator
Secondary Actor	None
Pre-condition	None
Trigger	The user clicks on the **Setup Schedule** link on the landing page.
Basic Flow	• The system displays the list of courses and the total count of enrolled students for setting up schedule. • The user selects the course for scheduling activities • The user enters start date for the course, system calculates the end date by adding the number of days as mentioned in the course master. • The list of topics under that course are displayed along with the number of hours and the faculty assigned to it. • Two columns appear for user to select the dates for i.e. Study Material Upload and Assignment Upload • Using Date picker the both the dates are selected by the user for each topic. • System will run validation, 1) the dates have to be within the course start and end dates, 2) assignment date has to be at least 1 week post the Study material upload date and 3)None of the dates can be left blank. • Submit button will save the schedule for the course and notify the faculty members attached to course of the upload schedule for each topic. The notification to enrolled students will go for availability of study material dates and assignment submission dates. • This data is published on the web site where all courses are listed.
Alternate Flow	None
Output	Email notifications to Faculty and students enrolled.

Upload Study Material

Use Case Element	Description
Number	UC.04
Application	The Faculty members are required to upload the applicable study material for the course topics.
Use Case Name	Upload Study Material
Primary Actor	Faculty member
Secondary Actor	None

Use Case Element	Description
Pre-condition	User is an authorized role in the system
Trigger	The user clicks on the **Upload Study Material** link on the landing page.
Basic Flow	The system displays list of Courses that are applicable to the logged in faculty member with the overdue dates for upload of material under that course The user selects one of the courses to upload study material. The topics with due dates are displayed in ascending order. The user selects the topic to upload material. A form to upload data is displayed with following data elements. • Title of upload • Attachment User can continue to upload content by clicking on Add more link at the bottom of this form. User can remove the entries by clicking on X appearing on the right side of each of these entries displayed in columns. User clicks on submit to save the uploads into the system. The date time stamp is recorded along with the uploaded content, system flags the study material upload as Yes for the uploaded topics.
Alternate Flow	Pressing Cancel abandons operation, no database gets affected
Output	None

View Student's Page

Use Case Element	Description
Number	UC.05
Application	Students login to view the course related activity.
Use Case Name	View Student's Page
Primary Actor	Student
Secondary Actor	None
Pre-condition	Student is an authorized user of the system
Trigger	The user clicks on the **View Student's Page** link on the landing page.

Use Case Element	Description
Basic Flow	• System displays a dashboard of Course Start Date and End date, Total Count of enrolled students. • The topics are displayed with study material contents in a clickable format. To view any of the content, user is required to enter the unique number provided via email at the time of enrollment. • The assignment submission dates are displayed for each topic. Over dues are marked in red. • Submitted assignment status is displayed as per the workflow diagram mentioned in the diagram in earlier sections. • For each topic, student can leave a comment for the faculty, this appears in the list topics when faculty member logs in.
Alternate Flow	Pressing Cancel abandons operation, no database gets affected
Output	None

Upload Assignments

Use Case Element	Description
Number	UC.05
Application	Assignment is uploaded as per schedule
Use Case Name	Upload Assignment
Primary Actor	Student
Secondary Actor	None
Pre-condition	Student is an authorized user of the system
Trigger	The user clicks on the **Upload Assignment** link on the landing page.
Basic Flow	• System displays the list of topics for the course enrolled. • The student uploads the Assignment for each of the topics as per the due date. • The student can upload Assignments for only those topics whose study material has been uploaded. • On submit the system saves the assignment for the student, the workflow state changes as per workflow diagram.
Alternate Flow	Pressing Cancel abandons operation, no database gets affected
Output	None

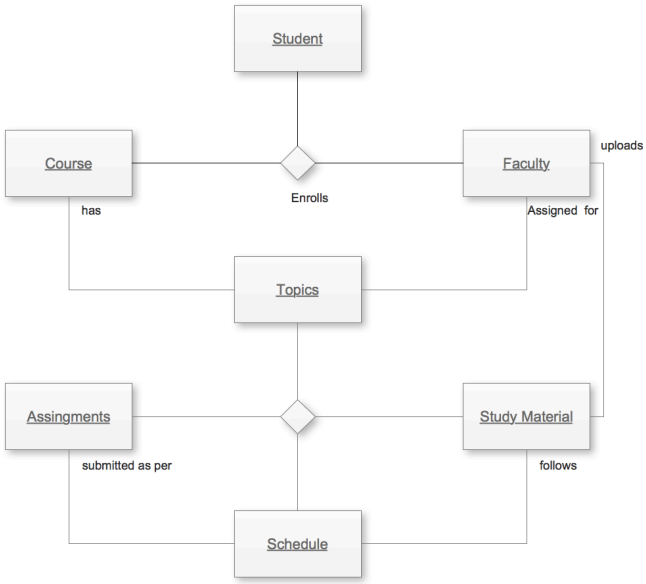
Review & Results

Use Case Element	Description
Number	UC.05
Application	Faculty members review the assignments and parks in the batch till all assignments are received for the last topic
Use Case Name	Review & Results
Primary Actor	Faculty

Use Case Element	Description
Secondary Actor	None
Pre-condition	Faculty member is an authorized user of the system
Trigger	The user clicks on the **Review** link on the landing page.
	• System displays list of assignments pending for review. • User clicks on each assignment and views the content. Assignment is rated as “Pass or Rework”. • The rework rated assignments are notified to the student with comments. • The user continues to review and assign rating. • Each assignment is checked by the system, if its the last assignment in topic and all students enrolled have submitted it. In case this conditions is met, the Faculty is alerted to publish the result. • The workflow state Results announced is reached, no modifications on results is possible by the faculty post this.
Alternate Flow	Pressing Cancel abandons operation, no database gets affected
Output	None

Logical Object Model

A high level logical object model of the system is shown below. During technical design it will be transformed into a physical model covering all system entities. Such a diagram will include their relationship and its cardinality.



Logical Object Model

1. There are number of courses offered by the institute.
2. Each course is conducted via series of topics.

3. The faculty is assigned topic wise to the courses i.e. one faculty could be covering multiple topics in a course or just a single topic or no topic at all.

4. Students enroll into the course online (payment method is not included in the project scope)

5. Faculty uploads Study Material for the topics assigned to them

6. The students submit assignments for the course enrolled into by them.

7. The study material and assignments follow a schedule, any deviations are alerted to the respective owners. This impacts performance.

Database Design Guidelines

This involves the transformation of the use cases, state diagrams, and logical object model into detailed and optimized physical database table designs.

Typically persistent classes will map to table(s) with their attributes as columns of the table. In some cases a high level object may map in to a master-child table. Invoice is one such example where it maps in to "invoice_header" and "invoice_line_item" table.

Associations between two persistent objects are realized as foreign keys to the associated objects. A foreign key is a column in one table that contains the primary key value of the associated object.

Similarly, a standard technique in relational modeling is to use an intersection entity to represent many-to-many associations. Following is a broad checklist for physical database database design:

1. Database must be properly normalized except those instances where de-normalization help improves performance. This option must be used with special care.

2. All persistent classes that use the database for persistency must map to database structures.

3. Many-to-many relationships must have an intersecting table.

4. Primary keys should be defined for each table, unless there is a performance reason not to define a primary key.

5. Indexes should be defined to optimize access.

6. Data and referential integrity constraints should be defined.

Testing Approach

Quality of the software can be achieved with basic hygiene and consistency followed during design and development of User Interface(UI), Navigation, Validations as per the business process requirement.

To ensure the project delivers acceptable quality to the customer, its important to create a checklist of the conventions to be followed across. Common checks as below are for your reference during design and development:

Common Checks	Validation Type
Page Title is valid for the feature being provided on the page	UI
Order of the Data Entry Fields is logical as per the functionality being provided by the feature	UI
Order of the Display only Fields makes viewing and understanding easy for the user	UI
Spellings and Correctness of Label for the Data Entry and Display fields	UI

Common Checks	Validation Type
The labels are not wrapping onto another row thereby adding a blank row on the page	UI
The fields with drop down are displayed in single row instead of drop down coming on the next row	UI
Data Entry field basic validations are working i.e Text field /Numbers / Dates allow data for their type only	Functional
The dates are following a standard format dd/mmm/yyyy on all forms	UI
The color scheme of all forms i.e headers labels , alerts, entry fields are uniform throughout the application	UI
The action buttons for a New Data Entry Form are uniform for all forms that is allowing data entry	UI
The action buttons are performing the desired action e.g. "submit" is creating a new record if there are no errors and recording all the input fields, whereas 'cancel' is not creating a new record in the database	Functional
The links provided on the forms are opening correctly.	Functional
The data feed mechanism for Read and Write files is generating a log with count of entries.	Navigation

Suggested Technical Reading

The project is aimed at making the student understand concepts of Design and Development using IBM Rational tools, Web Sphere Application Server and DB2 Database. The following reading reference is easy to understand and should be read to get a clear understanding of capabilities of the tools and how you would leverage them to execute a project.

Technical Reference	URL to access
RAD - Tackling challenges of software development with Rational Application Developer for WebSphere Software	http://www.ibm.com/developerworks/rational/library/08/0926_ackerman-mahate/index.html
IBM Education Assistant - Rational Application Developer 7.5	http://publib.boulder.ibm.com/infocenter/ieduasst/rtnv1r0/index.jsp?topic=/com.ibm.iea.rad_v7/rad/rad75.html
RSA-Overview of Rational Software Architect for WebSphere Software Version 7.5	http://www.ibm.com/developerworks/rational/library/08/0926_arnold/index.html
Using the new features of UML Modeler in IBM Rational Software Architect Version 7.5	http://www.ibm.com/developerworks/rational/library/08/0926_diu/index.html
Rational Technical Library	http://www.ibm.com/developerworks/rational/library/