



immersio

A Language Learning App for Language Instructors Team PB-012

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Milestone 2: Design Review 1

Date: December 2, 2021

*Subject to NDA and IP agreement

Agenda

- 
- Project Scope Summary
 - Project changes
 - Constraints
 - Requirements Updates
 - System Architecture
 - Verification & Validation
 - Database Schema
 - Demo
 - Future Schedule
 - Q & A

Project Scope Summary

Audience & Client+

- Digital media and AI startup company
- Existing product:
 - An app for students to learn ancient and endangered languages
- Need:
 - Course creation platform and marketplace for language instructors



Project Deliverables

- Database

- Store content uploaded by instructors
- Store training data for machine learning model



- Web, iOS and Android App

- Provide a course creation interface to instructors
- Allow collaboration by multiple instructors



iOS



Android



Web

- Server

- Allow course creators to interact with database
- Manage co-author permissions, authentication and security



Project Changes & Updates

Our progress so far

- Made architectural design decisions
- Designed and built database schema
- Complete wireframe for the frontend web app
- Updated our requirements
- Updated project timeline and roadmap

Requirement Updates

NF-1 Usability

- NF-1.3 The user satisfaction
- NF-1.4 Clearly marked exit points
- NF-1.5 Intuitive navigation

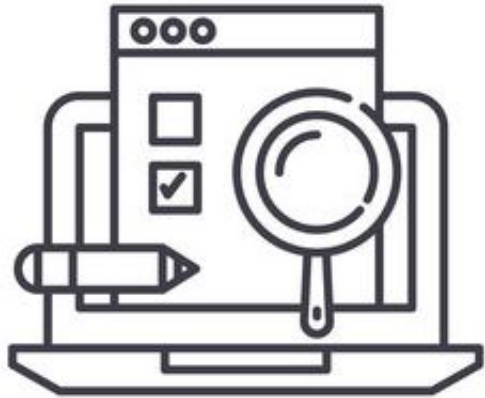
NF-2 Privacy & Security

- NF-2.4 Secure Transfer Protocol
- NF-2.5 Server Verification Endpoint
- C-3** Cross-Compatibility

User Data, Privacy, & Security

- We are currently storing hashed passwords
 - Will implement salting in next Milestone
 - Salt will be based off of
 - UserID
 - Registration Time
 - Password
- Input sanitization will be performed at any place a user can input information:
 - Content
 - Usernames
 - Emails
 - Comments
 - In-App Chat
- User emails will not be shared with others
 - Only usernames
 - Two users cannot have the same username

Verification & Validation



**USABILITY
TEST**



SECURITY TESTING

Design Decisions

Framework Choices & Justification

Web App: React.js

- Choices considered:
 - React.js, Vue.js, Angular.js
- Justification:
 - Single codebase for both the mobile apps and web app
 - High performance
 - More reusability

Android/iOS App: React Native (Javascript)

- Choices considered:
 - Flutter(Dart), Android native (Java), iOS native (Swift/Obj-C)
- Justification:
 - Cross-platform
 - Single programming language
 - Learner app integration

Database Choices & Justification

Database type: NoSQL

- Choices considered:
 - NoSQL, Relational, Graph databases
- Justification:
 - Rapid development due to flexible data model
 - Javascript support

Database Choice: MongoDB

- Choices considered:
 - Redis, Couchbase, Apache HBase
- Justification:
 - Team has prior experience
 - Data stored natively as JSON objects
 - High performance and scalability

Server Choices & Justification

Server Environment: NodeJS

- Choices considered:
 - NodeJS, Python, PHP, Ruby
- Justification:
 - Single programming language
 - Cross-platform
 - Fast performance

Server Framework: Express.js

- Choices considered:
 - Django(Python), Laravel(PHP), Ruby on Rails
- Justification:
 - Runs on top of NodeJS
 - Javascript for whole project
 - Efficient, fast and scalable

Cloud/ML Model Choices & Justification

Cloud Platform: AWS

- Choices considered:
 - Amazon Web Services, Google Cloud, Microsoft Azure
- Justification:
 - Better documentation
 - More learning material
 - Mature product offering

Machine Learning Model: Rasa X

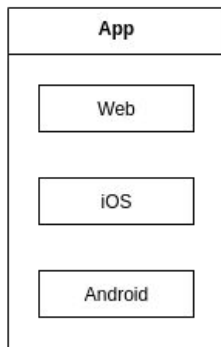
- Choices considered:
 - Rasa X, IBM Watson, Amazon Lex, Microsoft Bot Framework
- Justification:
 - Client already uses it
 - Rasa is open-source
 - Customizable infrastructure

System Architecture

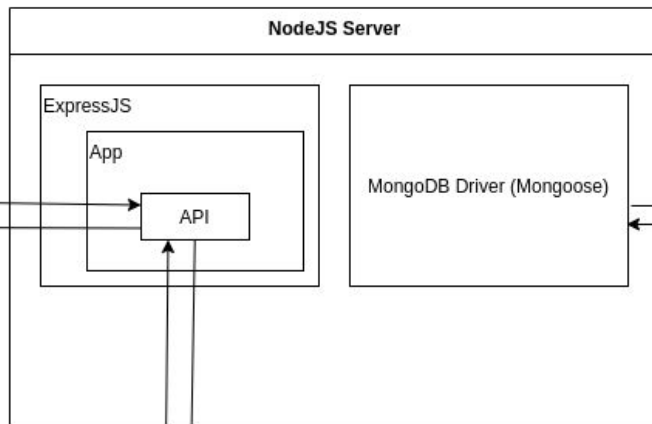
High Level Design Diagram

High-Level Design

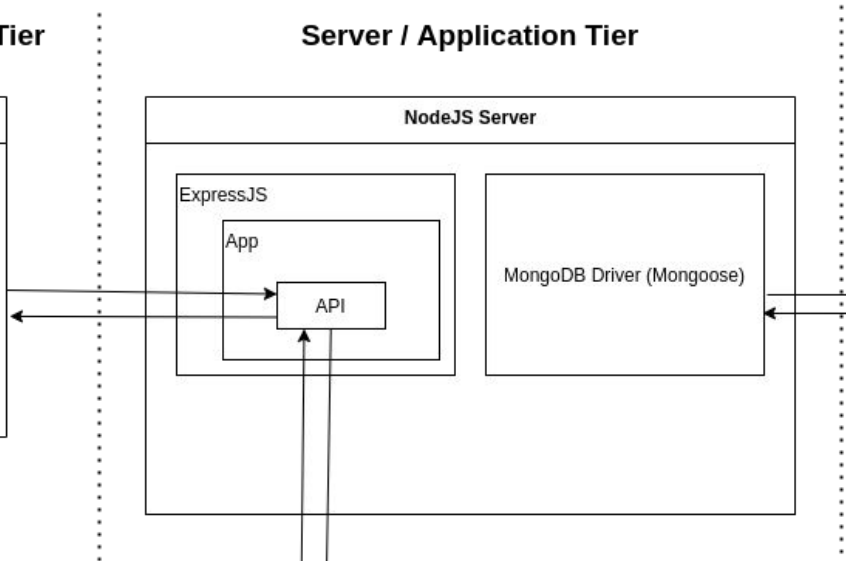
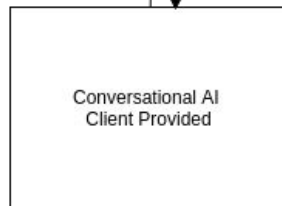
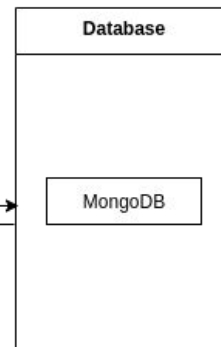
Client / Frontend Tier



Server / Application Tier

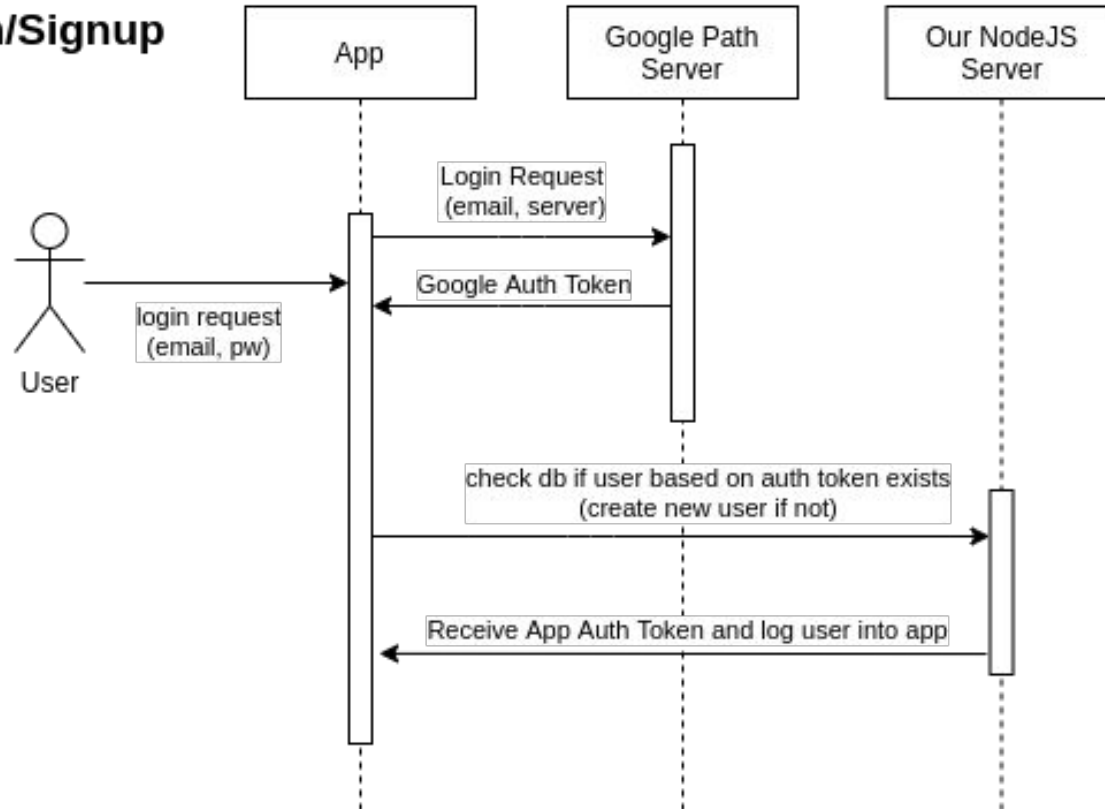


Database



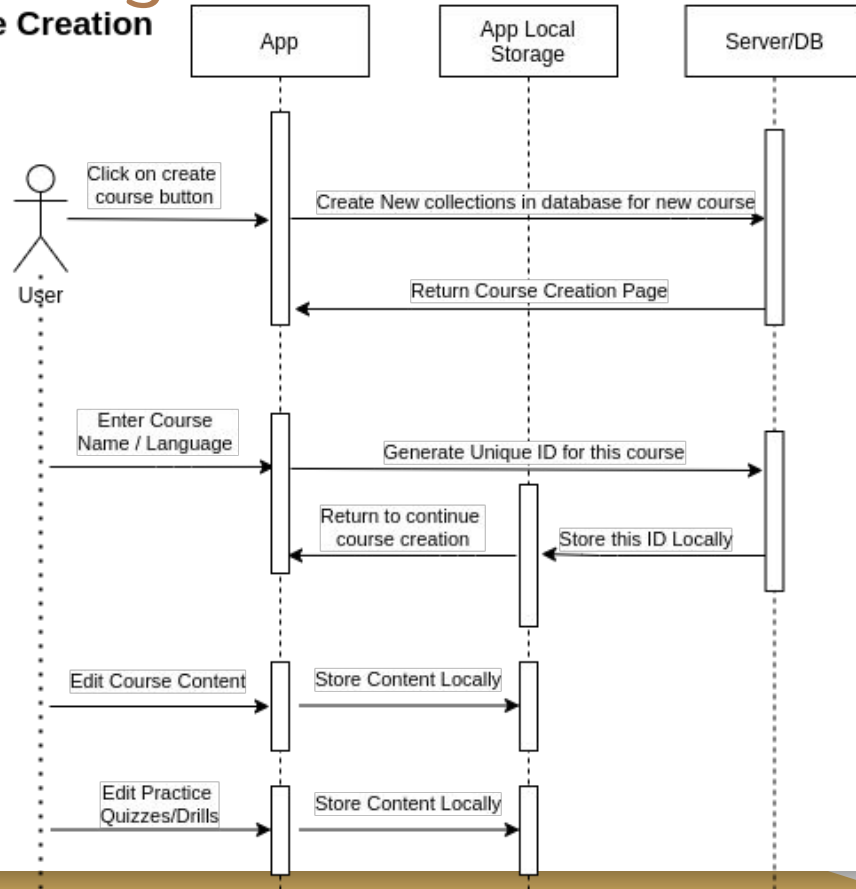
User Flow Diagram 1

Login/Signup



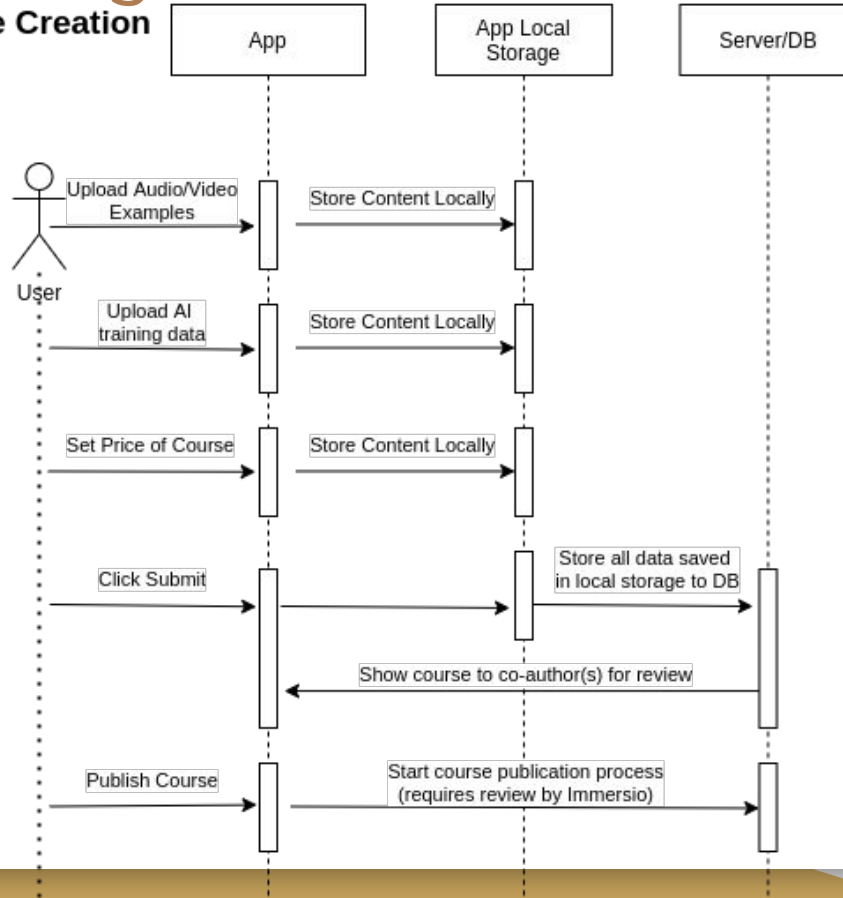
User Flow Diagram 2

Course Creation

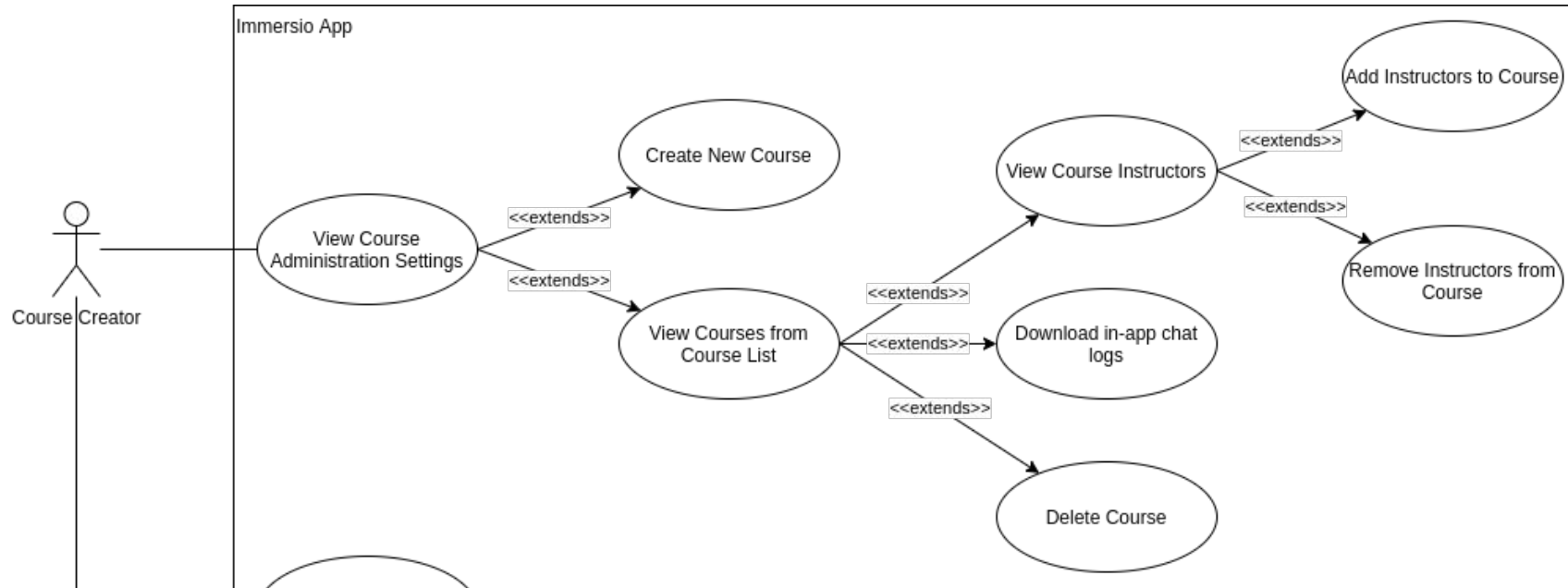


User Flow Diagram 3

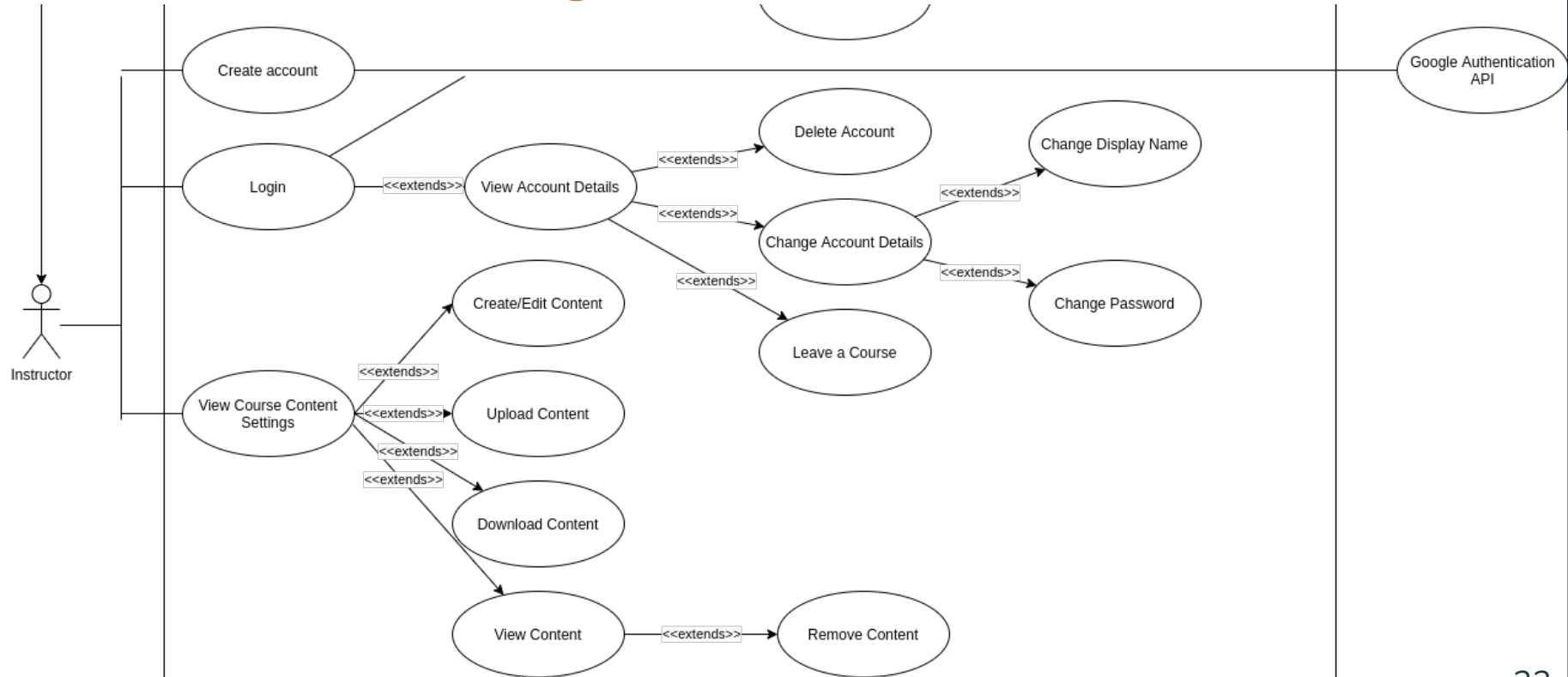
Course Creation



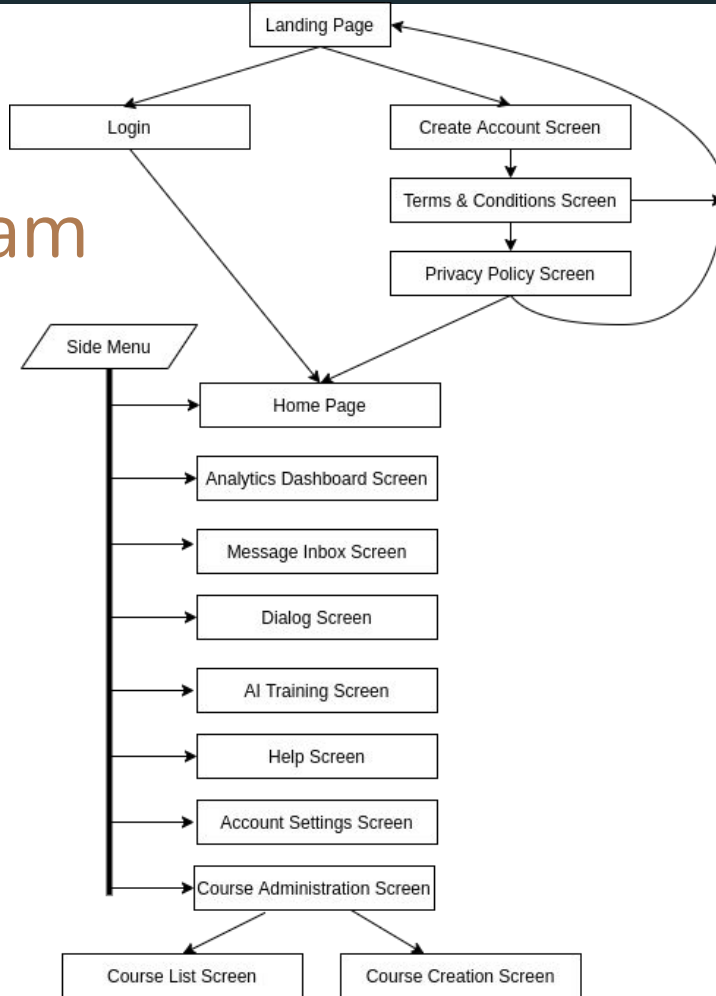
User Case Diagram 1



User Case Diagram 1



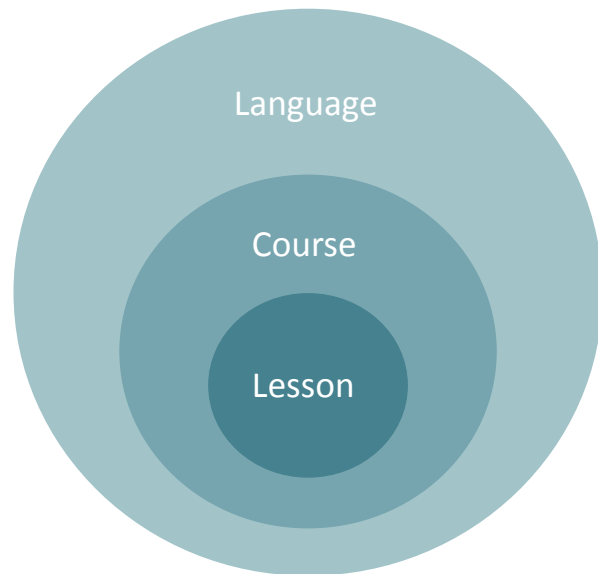
UI Screen Tree Diagram



Database Structure

Database Design - Overview

user	language	course
<u>User_id</u> : String Email: String Hashed_password: String First_name: String Last_name: String Profile_pic: Image phone: String Address_line: String city: String country: String Postal_code: String Created_at: Date Published_course_ids: [String] Currently_logged_in: Boolean	<u>Language_id</u> : String <u>Main_author_id</u> : String Language_name: String Sub_author_ids: [String] All_course_ids: [String] All_ai_ids: [String]	<u>Course_id</u> : String <u>Language_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] All_lesson_ids: [String] learner_ids: [String]
lesson	practice_drill	ai_training data:
<u>Lesson_id</u> : String <u>Course_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] <u>Lesson_title</u> : String <u>Lesson_overview</u> : String <u>Lesson_content</u> : String Lesson_voice_audio: Mixed Lesson_lip_video: Mixed All_drill_ids: [String]	<u>Drill_id</u> : String <u>Lesson_id</u> : String <u>Main_author_id</u> : String Drill_type: String question_desc: String <u>Answer</u> : String Sub_author_ids: [String]	<u>Language_id</u> : String Ai_id: String training_content: String



Database Design - User Collection

user	language	course
<u>User_id</u> : String Email: String Hashed_password: String First_name: String Last_name: String Profile_pic: Image phone: String Address_line: String city: String country: String Postal_code: String Created_at: Date Published_course_ids: [String] Currently_logged_in: Boolean	<u>Language_id</u> : String <u>Main_author_id</u> : String Language_name: String Sub_author_ids: [String] All_course_ids: [String] All_ai_ids: [String]	<u>Course_id</u> : String <u>Language_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] All_lesson_ids: [String] learner_ids: [String]
lesson	practice_drill	ai_training data:
<u>Lesson_id</u> : String <u>Course_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] <u>Lesson_title</u> : String <u>Lesson_overview</u> : String <u>Lesson_content</u> : String Lesson_voice_audio: Mixed Lesson_lip_video: Mixed All_drill_ids: [String]	<u>Drill_id</u> : String <u>Lesson_id</u> : String <u>Main_author_id</u> : String Drill_type: String question_desc: String <u>Answer</u> : String Sub_author_ids: [String]	<u>Language_id</u> : String Ai_id: String training_content: String

user
<u>User_id</u> : String Email: String Hashed_password: String First_name: String Last_name: String Profile_pic: Image phone: String Address_line: String city: String country: String Postal_code: String Created_at: Date Published_course_ids: [String] Currently_logged_in: Boolean

Database Design - Language & Course Collection

user	language	course
<u>User_id</u> : String Email: String Hashed_password: String First_name: String Last_name: String Profile_pic: Image phone: String Address_line: String city: String country: String Postal_code: String Created_at: Date Published_course_ids: [String] Currently_logged_in: Boolean	<u>Language_id</u> : String <u>Main_author_id</u> : String Language_name: String Sub_author_ids: [String] All_course_ids: [String] All_ai_ids: [String]	<u>Course_id</u> : String <u>Language_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] All_lesson_ids: [String] learner_ids: [String]
lesson	practice_drill	ai_training data:
<u>Lesson_id</u> : String <u>Course_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] <u>Lesson_title</u> : String <u>Lesson_overview</u> : String <u>Lesson_content</u> : String Lesson_voice_audio: Mixed Lesson_lip_video: Mixed All_drill_ids: [String]	<u>Drill_id</u> : String <u>Lesson_id</u> : String <u>Main_author_id</u> : String Drill_type: String question_desc: String <u>Answer</u> : String Sub_author_ids: [String]	<u>Language_id</u> : String Ai_id: String training_content: String

language
<u>Language_id</u> : String <u>Main_author_id</u> : String Language_name: String Sub_author_ids: [String] All_course_ids: [String] All_ai_ids: [String]

course
<u>Course_id</u> : String <u>Language_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] All_lesson_ids: [String] learner_ids: [String]

Database Design - Lesson Collection

user	language	course
<u>User_id</u> : String Email: String Hashed_password: String First_name: String Last_name: String Profile_pic: Image phone: String Address_line: String city: String country: String Postal_code: String Created_at: Date Published_course_ids: [String] Currently_logged_in: Boolean	<u>Language_id</u> : String <u>Main_author_id</u> : String Language_name: String Sub_author_ids: [String] All_course_ids: [String] All_ai_ids: [String]	<u>Course_id</u> : String <u>Language_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] All_lesson_ids: [String] learner_ids: [String]
lesson	practice_drill	ai_training data:
<u>Lesson_id</u> : String <u>Course_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] <u>Lesson_title</u> : String <u>Lesson_overview</u> : String <u>lesson_content</u> : String Lesson_voice_audio: Mixed Lesson_lip_video: Mixed All_drill_ids: [String]	<u>Drill_id</u> : String <u>Lesson_id</u> : String <u>Main_author_id</u> : String Drill_type: String question_desc: String <u>Answer</u> : String Sub_author_ids: [String]	<u>Language_id</u> : String Ai_id: String training_content: String

lesson
<u>Lesson_id</u> : String <u>Course_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] <u>Lesson_title</u> : String <u>Lesson_overview</u> : String <u>lesson_content</u> : String Lesson_voice_audio: Mixed Lesson_lip_video: Mixed All_drill_ids: [String]

Database Design - Lesson Collection

user	language	course
<u>User_id</u> : String Email: String Hashed_password: String First_name: String Last_name: String Profile_pic: Image phone: String Address_line: String city: String country: String Postal_code: String Created_at: Date Published_course_ids: [String] Currently_logged_in: Boolean	<u>Language_id</u> : String <u>Main_author_id</u> : String Language_name: String Sub_author_ids: [String] All_course_ids: [String] All_ai_ids: [String]	<u>Course_id</u> : String <u>Language_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] All_lesson_ids: [String] learner_ids: [String]
lesson	practice_drill	ai_training data:
<u>Lesson_id</u> : String <u>Course_id</u> : String <u>Main_author_id</u> : String Sub_author_ids: [String] <u>Lesson_title</u> : String <u>Lesson_overview</u> : String <u>Lesson_content</u> : String Lesson_voice_audio: Mixed Lesson_lip_video: Mixed All_drill_ids: [String]	<u>Drill_id</u> : String <u>Lesson_id</u> : String <u>Main_author_id</u> : String Drill_type: String question_desc: String <u>Answer</u> : String Sub_author_ids: [String]	<u>Language_id</u> : String Ai_id: String training_content: String

practice_drill

Drill_id: String
Lesson_id: String
Main_author_id: String
Drill_type: String
question_desc: String
Answer: String
Sub_author_ids: [String]

ai_training data:

Language_id: String
Ai_id: String
training_content: String

Database Schema - User Model

```
let userModel = new Schema({
  user_id: {type: String, index: true, required: true, unique: true},
  email: String,
  hashed_password: String, // might need to change this
  currently_logged_in: Boolean,
  first_name: String,
  last_name: String,
  profile_pic: Image,
  published_course_ids: [String],
  phone: String,
  address_line: String,
  city: String,
  country: String,
  postal_code: String,
  created_at: {
    timeZone: String,
    dateTime: String,
    date: String
  }
})
```

Demo

Welcome to Immersio

Where people teach, learn and share native stories, wisdoms
through conversational language learning.

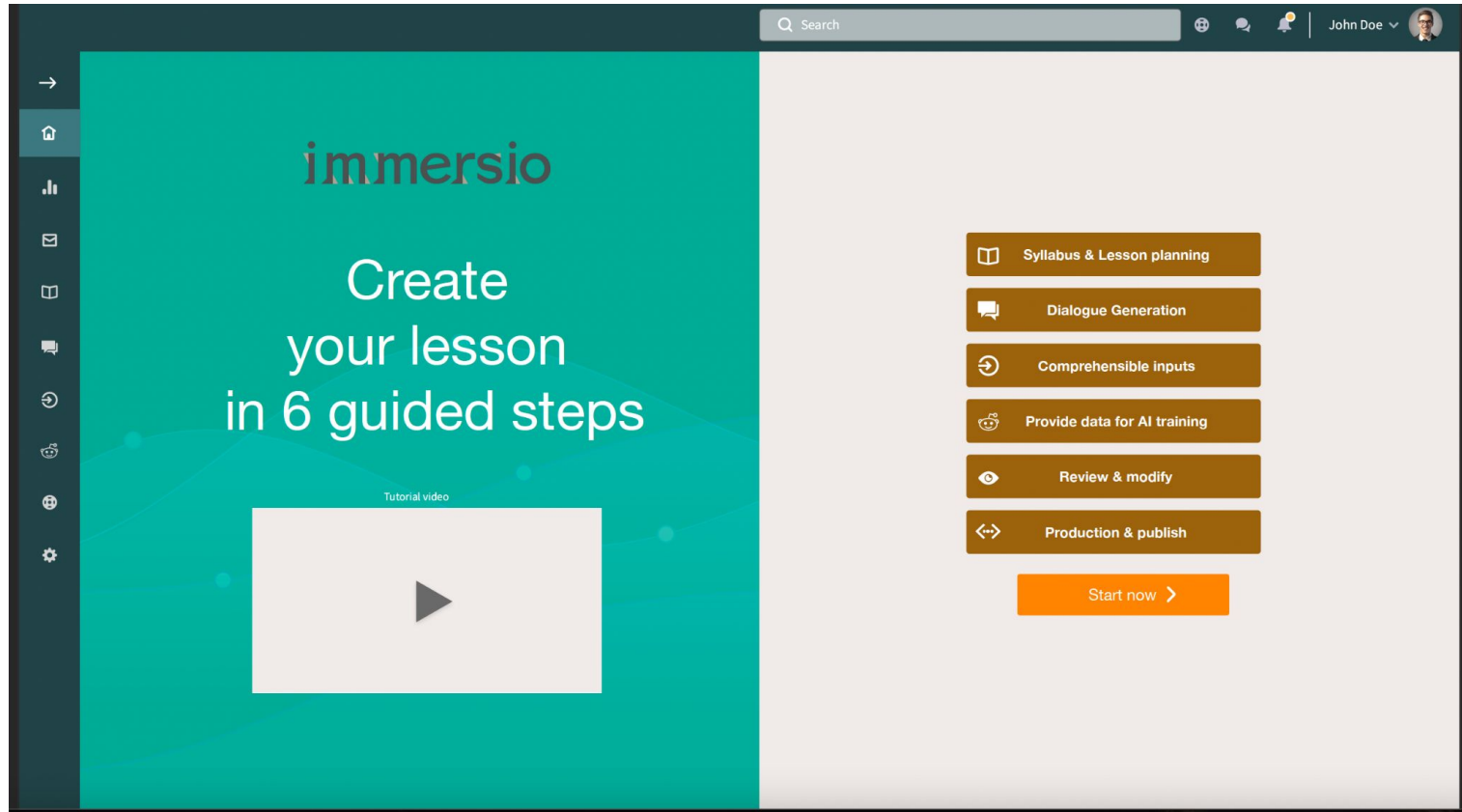
Next >

Are you ...

an instructor?

or

a learner?



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STEP 1: SYLLABUS & LESSON PLANNING

Preview this course

View all syllabuses

In this step, you'll identify the learning objectives, sketch out the number of lessons you'll need to create, and provide learners a general idea of what they should expect at the end of the course. For further information, please watch the tutorial video.

Course infoLesson titles

Course title *

This is the title of your course. You may want to keep your title on one line to maximize the readability, so the ideal length should be less than 50 characters.

Example: Greetings and introduction

Course introduction *

Please give a brief overview of the topics covered in this course as well as the ultimate learning goal.

Example: This course includes a selection of basic Cree dialogues for any Cree new learner. By the end of this course, you will be able to engage in small talk with another person.

Learning outcome *

Please give a summary of what students will learn after completing this course.

Example: By the end of this course, you will be able to hold a brief conversation covering the following topics: Introduce yourself and others | Engage in small talk | Discuss the weather | Discuss traditional activities | Make a phone call | Talk about time

Requirement *

A short list of requirements will be needed to ensure that students are completely informed.

All types of learners

Other information

Fill in any additional information about the course that isn't addressed in the fields above.

Course series *

Select your course series

select

Course language *

Select your course language

select

Co-author (optional)

Select your co-author

select

Suggested participants *

Students will be able to get the most out of the course content if you suggest who should attend.

Course image (optional)

Add a feature image for your course (recommended size: 800px x 600px)

Save

Next >

Course creation step 1

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STEP 1: SYLLABUS & LESSON PLANNING

Preview this course

View all syllabuses

In this step, you'll identify the learning objectives, sketch out the number of lessons you'll need to create, and provide learners a general idea of what they should expect at the end of the course. For further information, please watch the tutorial video.

Course info

Lesson titles

Lesson 1

Example: Greetings and introduction

Lesson 2

Example: Greetings and introduction

Lesson 3

Example: Greetings and introduction

Lesson 4

Example: Greetings and introduction

Lesson 5

Example: Greetings and introduction

Lesson 6

Example: Greetings and introduction

+ Add more lesson

+ Add more lesson

Save

Submit >

Course creation step 1

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John Doe

STEP 2: DIALOGUE GENERATION

Preview this lesson

View all lessons

You will create a dialogue for your lesson in this step, providing context and a brief introduction so that your students have a basic understanding of what they will study. Please watch the tutorial video for more information.

Lesson details

Lesson title *

This is the title of your lesson. You may want to keep your title on one line to maximize the readability, so the ideal length should be less than 50 characters

Example: introducingyourself

Dialogue context *

Please provide an overview of the discussion in this lesson.

Example: Rachel and Ben meet for the first time at a ceremony.

Dialogue introduction *

Please summarise the main points of this lesson's discussion.

Example: Pay attention to how Rachel and Ben introduce to each other and ask where they are coming from.

1. Character

Add more

Character name *

Provide a character name

Example: Rachel

Sentence *

Provide a sentence for the above character

Example: Hi, my name is Rachel? What's your name?

Upload audio file

L1-Rachel1.mp3

Course series *

Select your course series

select

Course *

Select your course

select

Lesson number *

Select or create a tag for your lesson (a short version of your lesson title)

select

Lesson tags *

Select or create a tag for your lesson (a short version of your lesson title)

select

Save

Submit

Course creation step 2

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STEP 3: INPUTS

Preview this input

View all inputs

This step introduces students to new vocabulary, phrases, and structures that are relevant to the dialogue setting. There will be an assignment after each input. For further information, please watch the tutorial video.

WordsPhrasesGrammarsSummaryExtended

Word details

Add drill

Title *

This title is used for searching purpose

Example: New words for "Lesson title"

1. Word

Add more

Word *

Provide a new vocabulary

Example: wǎciye

Explanation *

Provide an explanation for the above new vocabulary

Example: wǎciye can mean hello, goodbye, welcome

Upload audio file

L1-waciye.mp3

Upload audio file

L1-waciye-expl.mp3

Upload image

L1-waciye.jpg

Course series *

Select your course series

select

Course *

Select your course

select

Lesson *

Select your lesson

select

Lesson tags *

Select a tag for your lesson

select

Input type *

Select an input type for your lesson

select

Save

Next

Course creation step 3

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STEP 3: INPUTS

Preview this input

View all inputs

This step introduces students to new vocabulary, phrases, and structures that are relevant to the dialogue setting. There will be an assignment after each input. For further information, please watch the tutorial video.

WordsPhrasesGrammarsSummaryExtended

Word details

+ Add drill

Flashcards

Multiple choice

Drag and drop

Fill in the blank

Sort the paragraph

Title *

This title is used for searching

Example: New words

1. Word

+ Add more

Word *

Provide a new vocabulary

Example: wáciye

Explanation*

Provide an explanation for the above new vocabulary

Example: wáciye can mean hello, goodbye, welcome

Upload audio file

L1-wáciye.mp3

Upload audio file

L1-wáciye-expl.mp3

Upload image

L1-wáciye.jpg

Course series *

Select your course series

select

Course *

Select your course

select

Lesson *

Select your lesson

select

Lesson tags *

Select a tag for your lesson

select

Input type *

Select an input type for your lesson

select

Save

Next >

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STEP 4: AI DATA TRAINING

Preview this input

View all inputs

For AI training purposes, you will provide alternative statements for each sentence in this step. For further information, please watch tutorial video

▶

AI data

Title *

This title is used for searching purpose

Example: AI data for "Lesson title"

1. Dialogue

Add more

Sentence *

Text question for the card

Example:

Alternative *

Example:

Alternative *

Example:

Alternative *

Example:

Add alternative

Course series *

Select your course series

select

Course *

Select your course

select

Lesson *

Select your lesson

select

Lesson tags *

Select a tag for your lesson

select

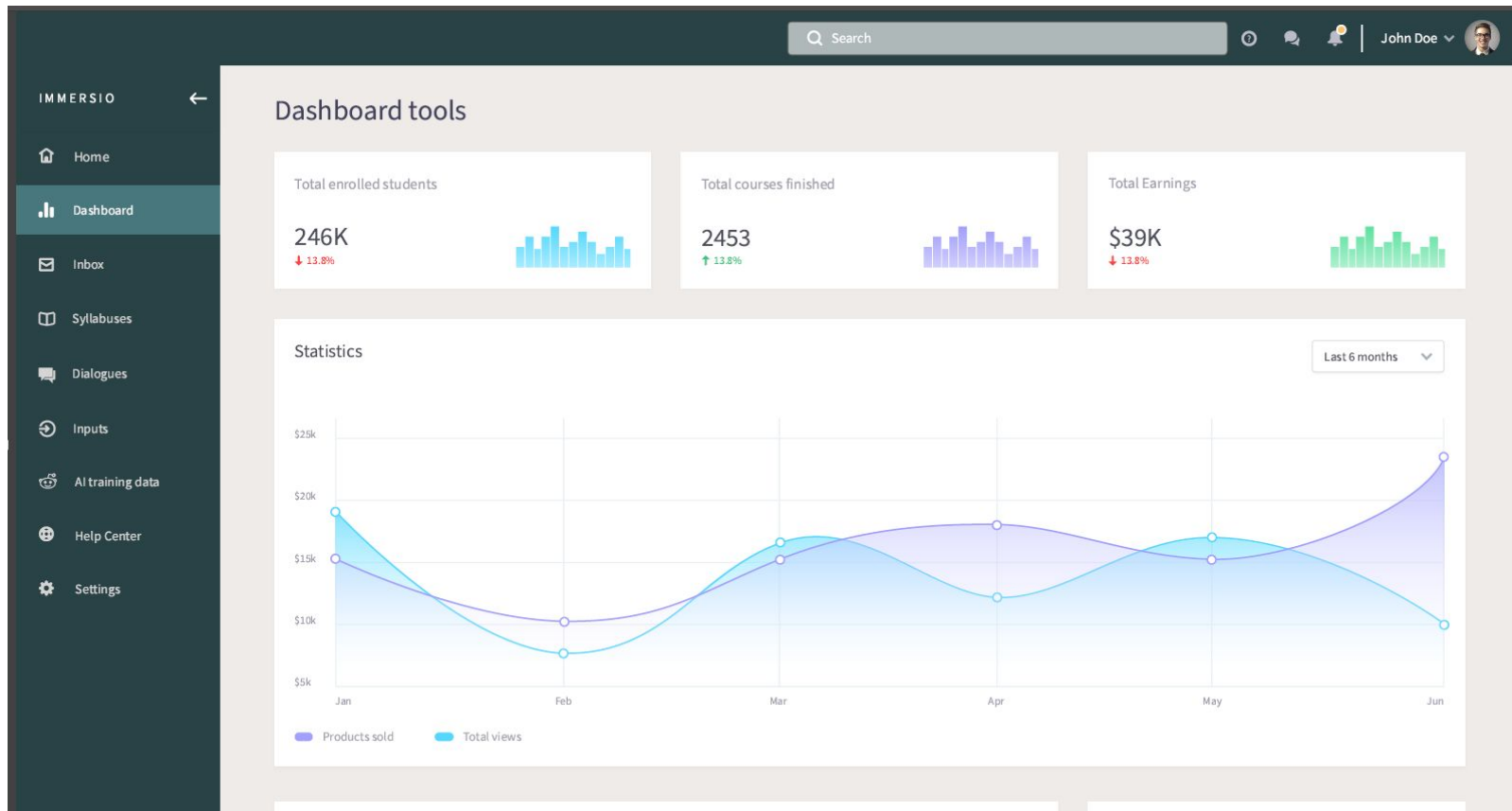
Input type *

Select an input type for your lesson

select

Save

Next >



Lesson title 4Course 1Series 1Sept 17, 2021EditDelete

Show More

+ Add new dialogue

View all dialogues

Manage inputs and drills

INPUT	INPUT TYPE	LESSON	COURSE	DATE CREATED	MANAGE
<div></div> Inputtitle 1	Words	Lesson 1	Course 1	Sept 17, 2021	EditDelete
<div></div> Inputtitle 2	Phrases	Lesson 1	Course 1	Sept 17, 2021	EditDelete
<div></div> Inputtitle 3	Grammar	Lesson 1	Course 1	Sept 17, 2021	EditDelete
<div></div> Inputtitle 4	Summary	Lesson 1	Course 1	Sept 17, 2021	EditDelete

Show More

Total inputs05

On-going02

Submitted03

+ Add new input

View all inputs

Manage AI data training

AI INPUT	LESSON	COURSE	DATE CREATED	MANAGE
----------	--------	--------	--------------	--------

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Add new syllabus

Edit syllabus

Introducing yourself

Lesson details

Lesson 1: Introducing yourself

Lesson 2: Introducing someone

Lesson 3: Small talk - how are you?

Lesson 4: Small talk - where are you from?

Lesson 5: Talk about weather

Lesson 6: Going for a walk

Lesson 7: Going fishing

Lesson 8: Setting snares

Lesson 9: Phone call

Lesson 10: Talking about time

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

5 inputs | 9 drills | 1 quiz

Course details

ILR

INDIGENOUS LANGUAGE REVITALIZATION: Moose Cree

Series: General Communication

Language: Moose Cree

Suggested participant: Everyone

Requirement: No requirement

10 lessons

Total enrolled students

246K

↓ 13.8%

Total lesson finished

2453

↑ 13.8%

Total Earnings

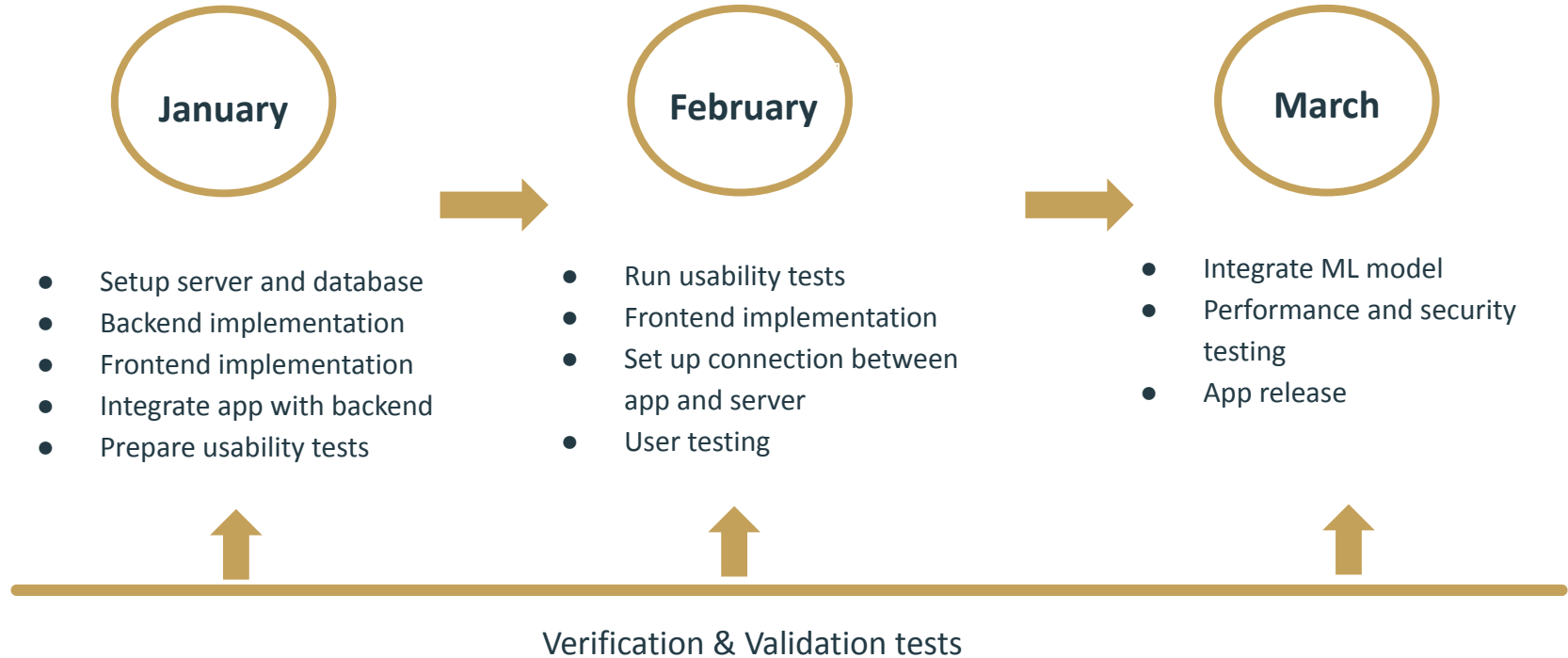
\$39K

↓ 13.8%

More dashboard tools (4) - Preview course content

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Future Schedule



Risks

Domain	Risk	Likelihood	Impact	Risk Index
Technology	Excessive rework	5	5	25
Technology	Product deficiencies	3	7	21
Technology	Premature product construction	3	7	21
Process	Unplanned downtime	4	6	24
Process	Premature, disorganized execution	3	7	21
Process	Inadequate milestone documentation	2	7	14



Q & A



Appendix

Database Schema - Language & Course Model

```
let languageModel = new Schema({
  language_id: {type: String, index:true, required:true, unique:true},
  language_name: String,
  all_course_id: [String],
  all_ai_ids: [String],
  main_author_id: {type: String, index:true, required:true, unique:true},
  sub_author_ids:[String]
})

let courseModel = new Schema({
  course_id: {type: String, index:true, required:true, unique:true},
  language_id: {type: String, index:true, required:true, unique:true},
  main_author_id: {type: String, index:true, required:true, unique:true},
  sub_author_ids:[String],
  learner_ids: [String],
  all_lesson_ids:[String]
})
```

Database Schema - Lesson Model

```
let lessonModel = new Schema({  
  lesson_id: {type: String, index:true, required:true, unique:true},  
  course_id: {type: String, index:true, required:true, unique:true},  
  main_author_id: {type: String, index:true, required:true, unique:true},  
  sub_author_ids:[String],  
  lesson_title: {type: String, required: true},  
  lesson_overview: {type: String, required: true},  
  lesson_content: {type: String, required: true},  
  lesson_voice_audio: Mixed, |  
  lesson_lip_video: Mixed,  
  all_drill_ids: [String]  
})
```

Database Schema - Drill & AI Model

```
let practiceDrillModel = new Schema({
  drill_id: {type: String, index:true, required:true, unique:true},
  lesson_id: {type: String, index:true, required:true, unique:true},
  drill_type: String,
  question_desc: String, //might need change
  answer: {type: String, required: true},
  main_author_id: {type: String, index:true, required:true, unique:true},
  sub_author_ids: [String]
})

let aiTrainingDataModel = new Schema({
  ai_id: String,
  language_id: {type: String, index:true, required:true, unique:true},
  training_content: String
})
```