

Moodle Plugin for Game Based Learning

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MTP Stage II Presentation

Motivation

- Growth of Internet brings positive as well as negative effect on education
- It gives an opportunity for distance based education and provides support for classroom teaching
- Since online teaching is different from classroom teaching, classical way to evaluate students is not that effective
- Need to find some alternative way to teach and evaluate

Solution to the Problem

Teaching strategies:

- Socratic
- Scaffolding
- Guided discovery
- Game based learning

Selected CMS

- Moodle

Presentation Outline

- Introduction
- Related work
- Moodle internals
- Proposed games
- Future work
- Conclusion

Earlier Attempt

- Web application
- Implements four teaching strategies
- Components : Teacher and Student
- Based on question and answer strategy
- Review and Evaluation

Moodle Games

- Hangman
- Crossword
- Cryptex
- Millionaire
- Sudoku
- The hidden picture
- Snakes and ladder

Useful Features of Moodle

- Users : We can manage users through this option.
- Course : All course related settings can be done from here.
- Plugins : All installed plugins can be seen by clicking on this link.
- Debugging : We can set debugger mode on by clicking on this link.
- XMLDB Editor : All the database related task can be done from here.

Moodle Plugins

- Quiz : supports various types of questions like multiple choice, true false, short answer, matching etc.
- Glossary : used for storing concept and corresponding definition
- Creating new plugin

Proposed Games

- Tic-Tac-Toe
- Guess in Time
- The Weakest Link
- Anagram

What is Tic-Tac-Toe

- Two player game where opponent is computer
- Based on classical Tic-Tac-Toe where both play alternatively
- Aim is to form a consecutive sequence of tiles to get a point
- On selecting a tile some question will be asked
- Right answer will mark that tile otherwise computer will play it's turn
- Game continues till the all tiles are marked

Teacher role

Networking

Home ► Courses ► Miscellaneous ► Networking

Navigation

- Home
 - My home
 - Site pages
 - My profile
 - Current course
 - Networking**
 - Participants
 - Reports
 - General
 - 17 June - 23 June
 - 24 June - 30 June
 - 1 July - 7 July
 - 8 July - 14 July
 - 15 July - 21 July
 - 22 July - 28 July
 - 29 July - 4 August
 - 5 August - 11 August
 - 12 August - 18 August
 - 19 August - 25 August

Adding a new tic to 24 June - 30 June

General

tic name* Network Basic

Tiles on the board(size * size) 6

Number of consecutive marked tiles to earn a point 4

Source of questions Quiz

Select glossary Network basic

Select quiz Introduction

Common module settings

Group mode Visible groups

Visible Show

ID number

Save and return to course Save and display Cancel

Figure: Creation of tic-tac-toe

Student role

The screenshot shows a Moodle course page titled "Networking". At the top right, it says "You are logged in as Admin User". The breadcrumb trail is "Home > Courses > Miscellaneous > Networking > 1 July - 7 July > test1". On the left is a navigation menu with "Home" and "Current course" expanded to show "Networking" with sub-items like "Participants", "Reports", "General", and a list of dates from "17 June - 23 June" to "19 August - 25 August". The main content area features a "Tic Tac" game interface with a 4x4 grid and a "Play" button. To the right of the grid are "Instruction to play Tic Tac game" instructions.

Networking

Home > Courses > Miscellaneous > Networking > 1 July - 7 July > test1

Navigation

- Home
- My home
- Site pages
- My profile
- Current course
 - Networking
 - Participants
 - Reports
 - General
 - 17 June - 23 June
 - 24 June - 30 June
 - 1 July - 7 July
 - test1
 - guess1
 - aria2
 - 8 July - 14 July
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 - 22 July - 28 July
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 - 19 August - 25 August

Tic Tac

Play

Instruction to play Tic Tac game

- There are 4 * 4 tiles in the board.
- Click on any tile to see the corresponding question.
- Answer the question to mark on that tile.
- If answer is correct a 'X' mark will appear otherwise computer will play it's turn.
- After your turns(answering the question) computer will select a tile and mark it as 'O'.
- Your goal is to make 3 and more consecutive tiles marked as 'X'.
- You can see your time and score at the bottom of board.
- Click on play button to start the game.
- After all tiles are marked you will be shown a summary of your attempt.

Figure: Home page of tic-tac-toe

Rules to play the game

Introduction

Related Work

Earlier Attempt
to Build a
System
Moodle Games

Moodle

Proposed
Games

Tic-Tac-Toe
Design Details

Guess in Time
Design Details

The weakest
link
Design Details

Anagram
Design Details

Future Work

Conclusion

- 1 Select any tile by clicking on that. Corresponding question will be appear on the right side of the board
- 2 If want to attempt the question, click on submit button, otherwise select other tile
- 3 If you get the correct answer 'X' mark will appear on that tile and tile will be disabled and your turn is over and computer will make a 'O' mark on it's choice of tile
- 4 Try to mark consecutive tiles in row or column or diagonal in order to get a point
- 5 Play until all tiles are marked

Student role

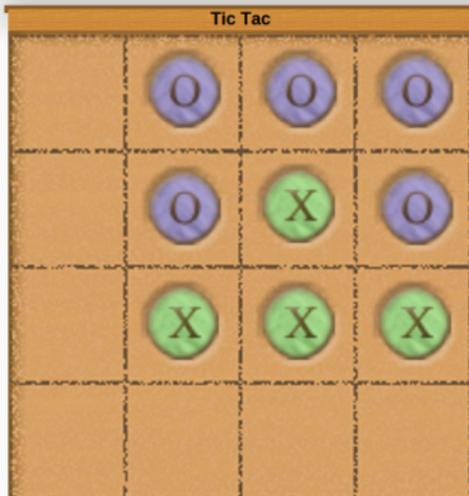
Networking

Home ► Courses ► Miscellaneous ► Networking ► 1 July - 7 July ► test1

Navigation

Home

- My home
- Site pages
- My profile
- Current course
 - Networking
 - Participants
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 - 17 June - 23 June
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 - test1
 - guess1
 - ana2
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 - 22 July - 28 July
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 - 19 August - 25 August



You 1

4:11 / 0:0

1 Computer

Question

A device used in a network to strengthen a signal as it is passed along the network cable.

ENTER

Figure: Question corresponding to tile clicked

Student role

Tic Tac

O	O	O	O
O	O	X	O
X	X	X	X
X	X	O	O

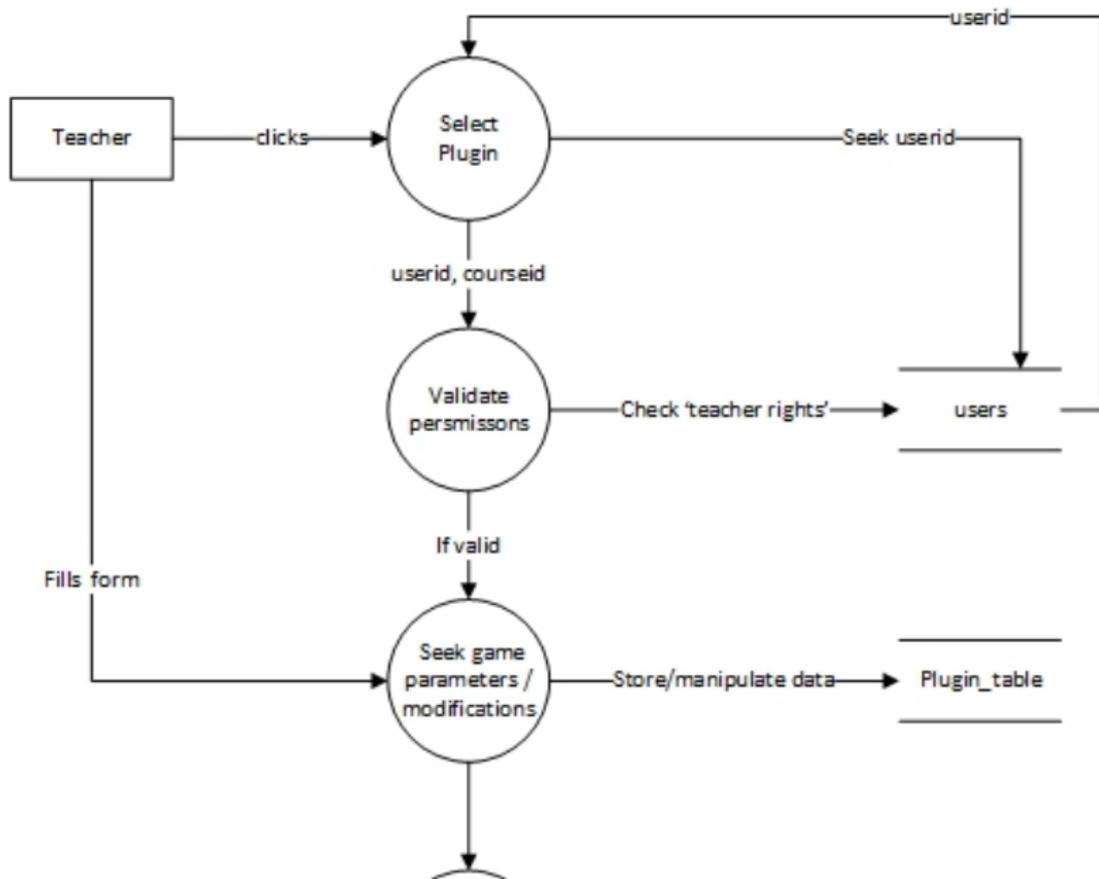
Game finished.

Summary

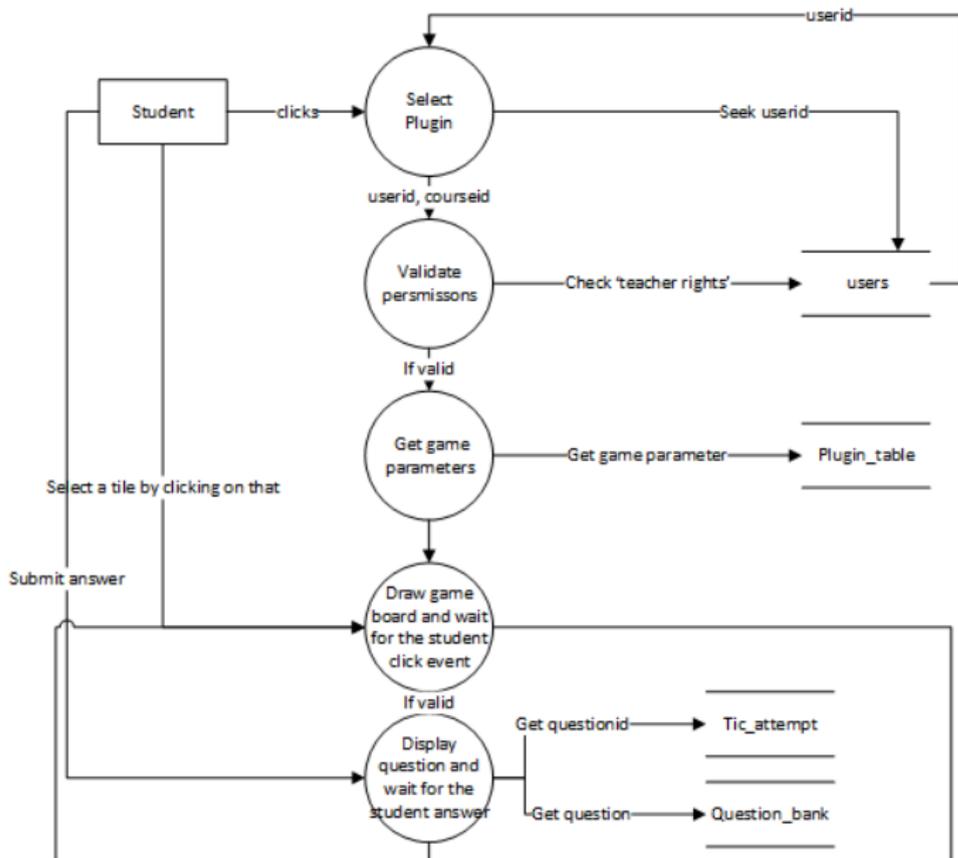
You scored : 3
Computer scored : 2
Time to finish : 296.178 secs
Right answerd : 7
Wrong answerd : 4

You **3** 4:58 / 0:0 **2** Computer

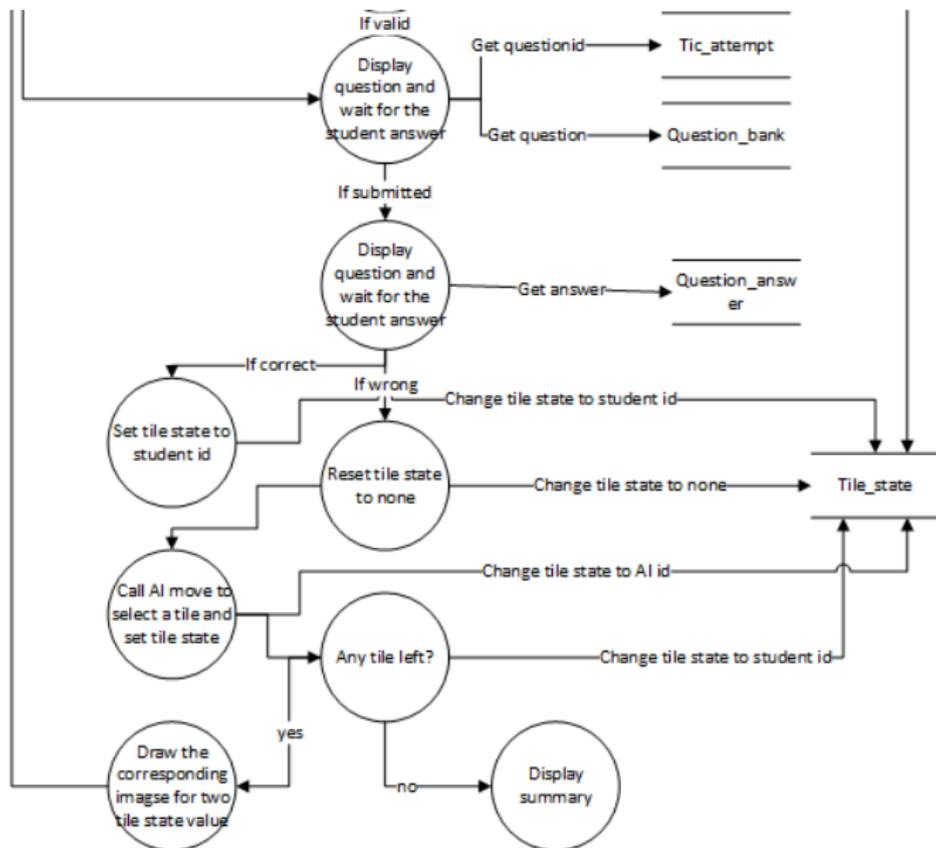
Data flow diagram



Data flow diagram



Data flow diagram



Database design

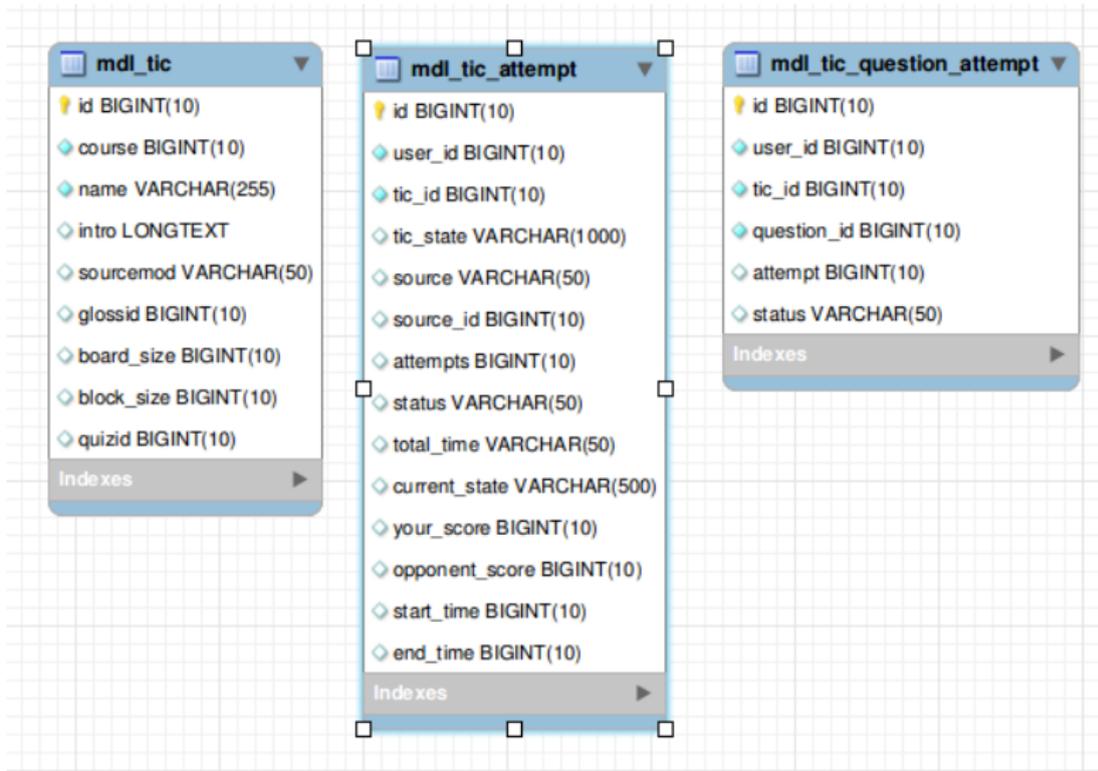


Figure: ER Diagram of tic-tac-toe

Functions

- `addInstance(formData)` : stores the form parameter into database
- `updateInstance(formData)` : smodifies the form parameter into database
- `deletelInstance(formData)` : delete the game instance
- `initGame()` : setting user attempt and questions
- `playGame()` : loads javascript class and shows initial board
- `update()` : updates the game state
- `draw()` : draws the game board
- `check answer()` : sends user response to question class for answer checking
- `reset()` : resets the game state
- `updateScore()` : updates score
- `aiMove()` : calculates AI move
- `getQuestion(tile)` : returns question for corresponding tile
- `checkAnswer()` : checks answer and store it into database for summary

What is Guess in Time

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link

Design Details

Anagram

Design Details

Future Work

Conclusion

- For a different type a question
- Answer the question before the time-limit
- Summary will be displayed with total right answers and not attempted answers

Student role

Home ► Courses ► Miscellaneous ► Networking ► 15 July - 21 July ► Network Layers

Navigation

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- Current course
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 - Reports
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 - 24 June - 30 June
 - 1 July - 7 July
 - 8 July - 14 July
 - 15 July - 21 July
 - Network Layers**

Name the all OSI layers

0:24

Your attempt number : 1

Question : Name the all OSI layers.

5 elements remaining

application layer
data layer

•
•

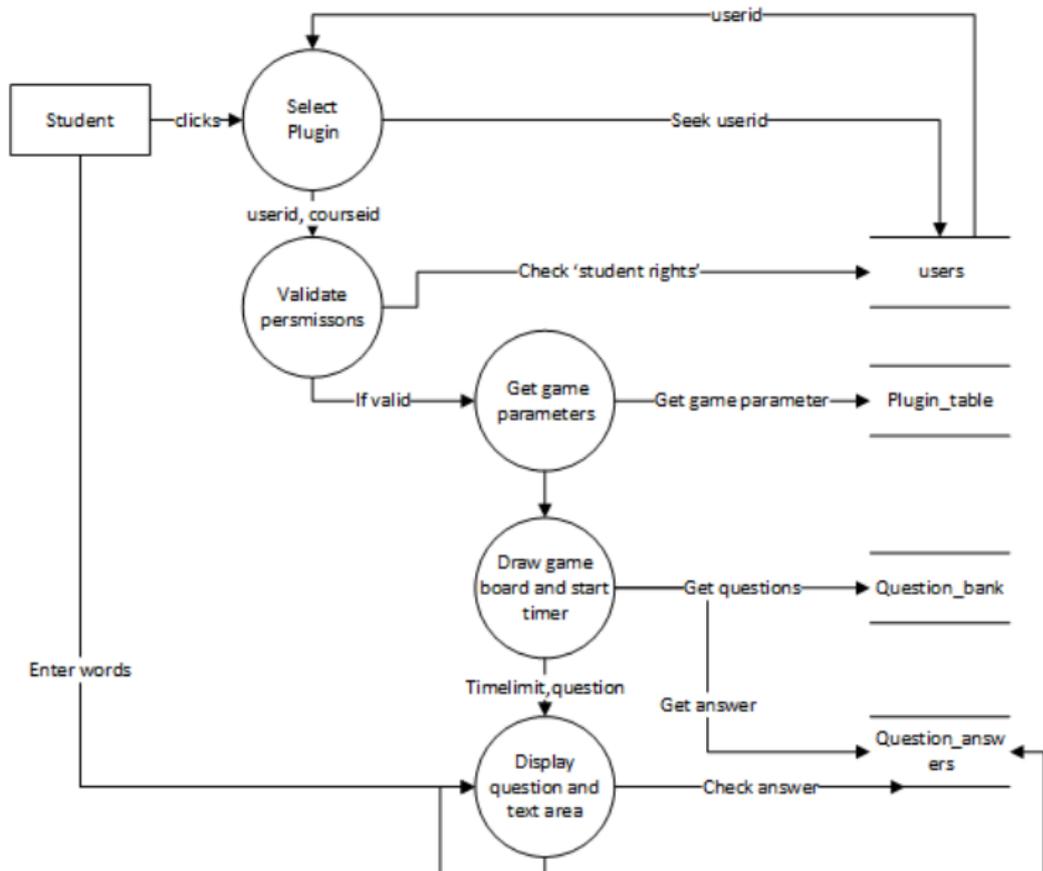
Figure: Intermediate state in guess in time game

Student role

The screenshot shows a Moodle course page for 'Network Layers'. The breadcrumb trail is: Home > Courses > Miscellaneous > Networking > 15 July - 21 July > Network Layers. A navigation menu on the left lists 'Home', 'My home', 'Site pages', 'My profile', 'Current course', and 'Networking' (expanded to show 'Participants', 'Reports', 'General', '17 June - 23 June', '24 June - 30 June', '1 July - 7 July', '8 July - 14 July', and '15 July - 21 July' with 'Network Layers' selected). The main content area contains a question box with the text 'Name the all OSI layers'. To the right of the question box, it displays 'Your attempt number : 1', 'Question : Name the all OSI layers.', and 'Finished!'. Below this, it states 'You named 3 answers in 60 seconds!' and 'You missed the following answers:'. The missed answers are listed as 'session layer', 'presentation layer', 'transport layer', and 'physical layer'. An 'Again?' button is located at the bottom right of the missed answers section.

Figure: Summary of guess in time game

Data flow diagram



Data flow diagram

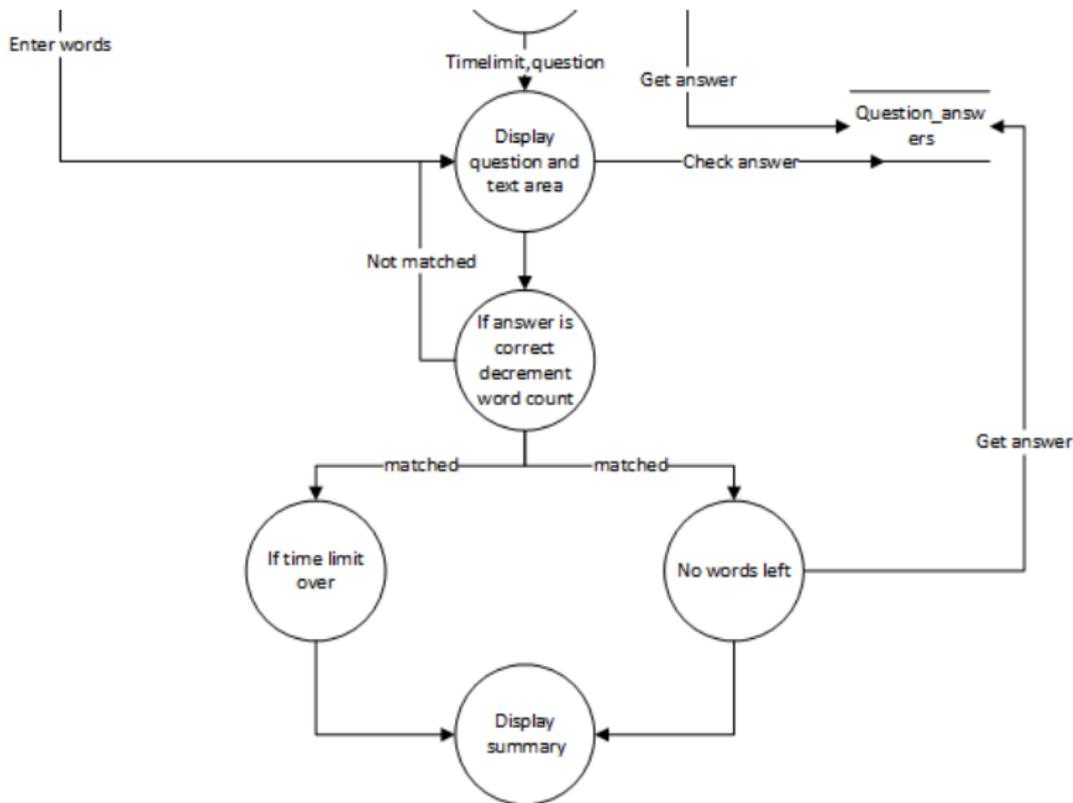


Figure: Data flow diagram of student playing guess in time

Database design

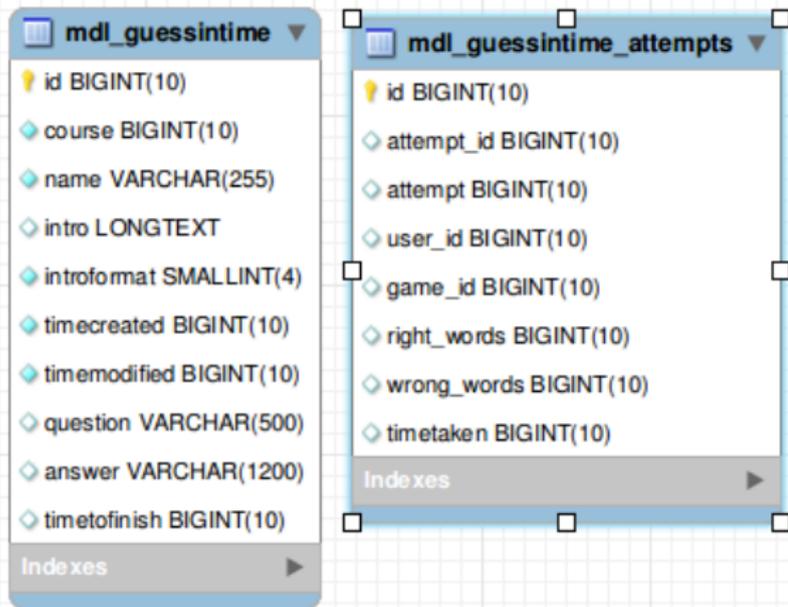


Figure: ER Diagram of Guess in time

Functions

- `addInstance(formData)` : stores the form parameter into database
- `updateInstance(formData)` : smodifies the form parameter into database
- `deletelInstance(formData)` : delete the game instance
- `initGame()` : setting user attempt and questions
- `playGame()` : loads javascript class and shows initial board
- `buildQuiz()` : getting question and answer from the database
- `startquiz()` : starts the game and showing time remaining
- `stopquiz()` : stops the quiz and shows guessed and missed words

What is The weakest link

- A new way to grade students
- A series of questions will be displayed on the screen
- Goal is to maximize your winnings by forming longest chain of correct answers
- In case of wrong answer your winning total becomes zero
- To avoid that you can bank your current winnings and start from initial state

Teacher role

Networking

Home > Courses > Miscellaneous > Networking > 24 June - 30 June > tw1

Updating tw1 in 24 June - 30 June

General

the weakest link name* Network basic

Description

Path: p

Source of questions Quiz

Select glossary Network basic

Select quiz Introduction

Navigation

Home

- My home
- Site pages
- My profile
- Current course
 - Networking
 - Participants
 - Reports
 - General
 - 17 June - 23 June
 - 24 June - 30 June
 - Basic
 - Crossword_bas
 - tw1
 - 1 July - 7 July
 - 8 July - 14 July
 - 15 July - 21 July
 - 22 July - 28 July
 - 29 July - 4 August

Figure: Teacher interface for the weakest link

Student role

The screenshot displays a Moodle game interface. At the top, a breadcrumb trail reads: Home ► Courses ► Miscellaneous ► Networking ► 24 June - 30 June ►. Below this, a 'Navigation' window is open, listing the following items: Home (with a square bullet), My home (with a square bullet), Site pages (with a right-pointing triangle), My profile (with a right-pointing triangle), and Current course (with a downward-pointing triangle). To the right of the navigation window, a message states: 'Congratulations! Game is finished. Your winning total is : 30'.

Figure: Summary of the weakest link

Data flow diagram

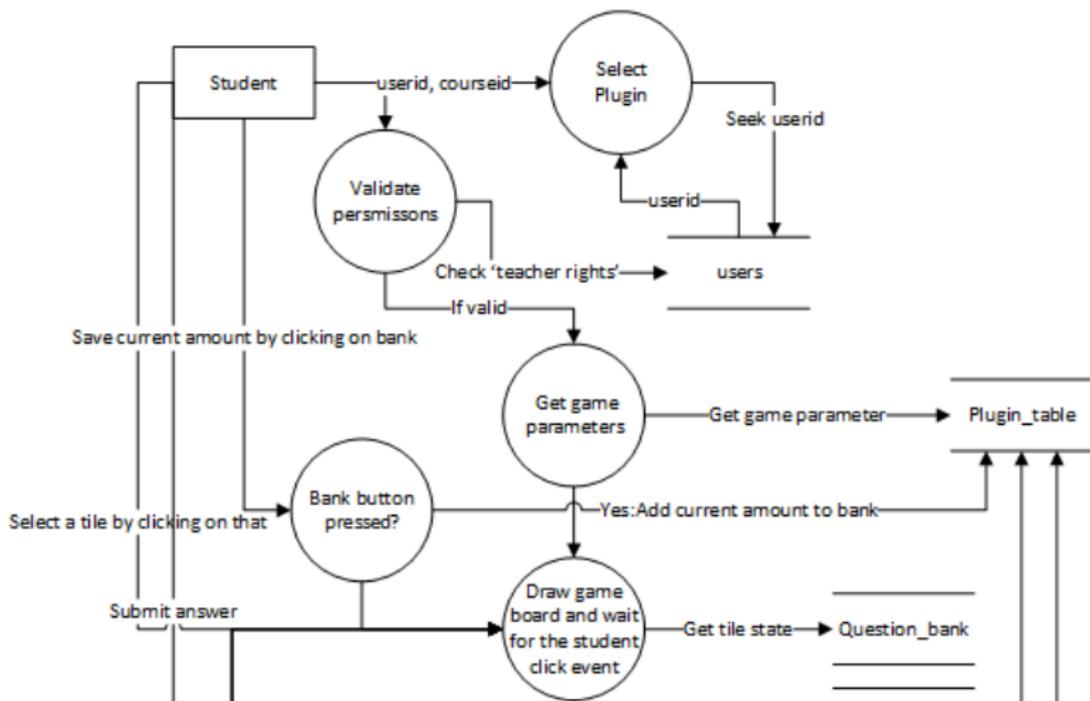


Figure: Data flow diagram of student playing the weakest link

Data flow diagram

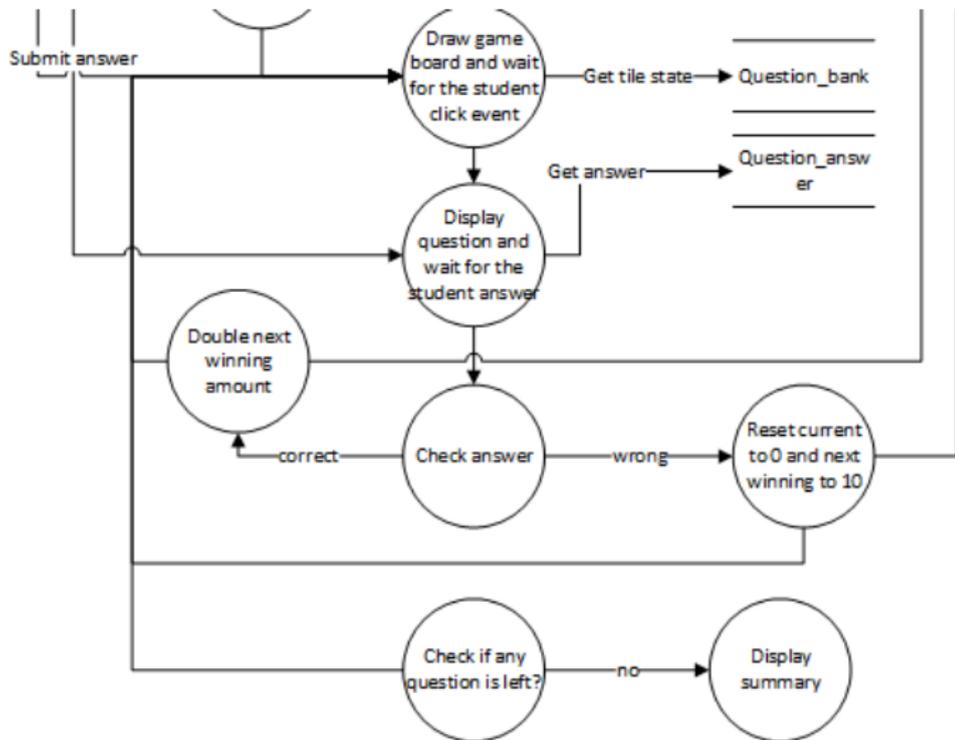


Figure: Data flow diagram of student playing the weakest link

Database design

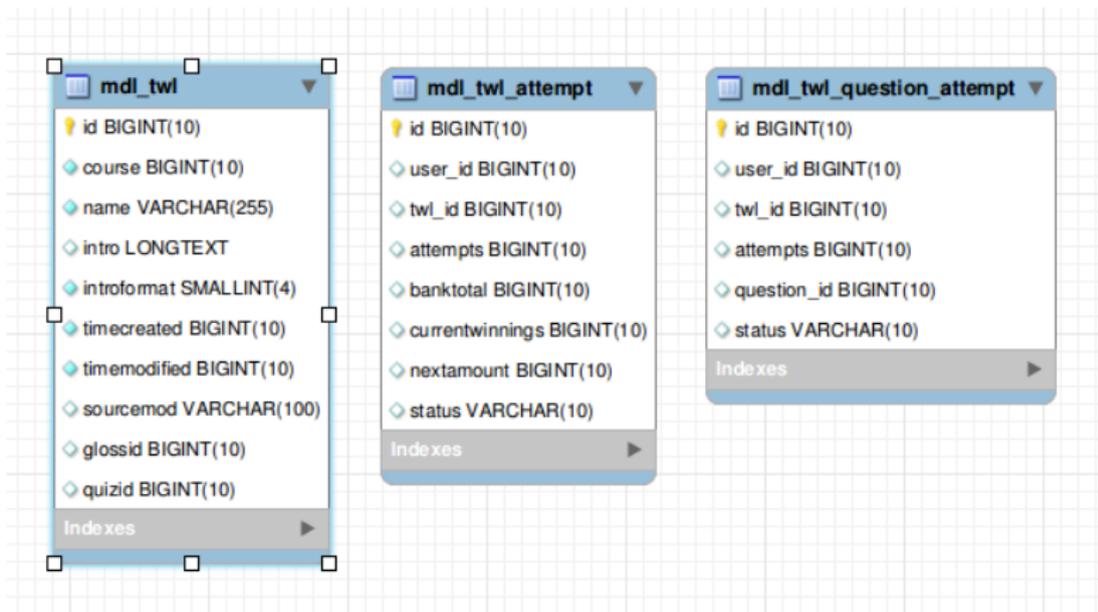


Figure: ER Diagram of Guess in time

Functions

- `addInstance(formData)` : stores the form parameter into database
- `updateInstance(formData)` : smodifies the form parameter into database
- `deleteInstance(formData)` : delete the game instance
- `initGame()` : setting user attempt and questions
- `playGame()` : loads javascript class and shows initial board
- `fetchCurrentState(twl)` : fetches current state
- `checkAnswer(qid, ans)` : takes question id and user answer and returns the correctness
- `endGame()` : calls the summary after no question is left
- `fetchAllQuestions(twl)` : getting all questions
- `bank()` : add current amount to banktotal

What is Anagram

- Questions and answers are already there on the board
- Aim is to reshuffle themselves such that for every question correct answer should be besides that question
- At the end of game summary with correct and wrong attempts will be displayed

Teacher role

The screenshot shows the Moodle teacher interface for anagrams. The page title is "Networking" and the breadcrumb trail is "Home > Courses > Miscellaneous > Networking > 24 June - 30 June > tw1". The navigation menu on the left shows the current course structure, including "Networking", "Participants", "Reports", "General", "17 June - 23 June", "24 June - 30 June", "Basic", "Crossword_bas", and "tw1". The main content area is titled "Updating tw1 in 24 June - 30 June" and shows the "General" settings for the anagram. The "weakest link name" is set to "Network basic". The "Description" field is empty and has a rich text editor toolbar. The "Path" is set to "p". The "Source of questions" is set to "Quiz", the "Select glossary" is set to "Network basic", and the "Select quiz" is set to "Introduction".

Figure: Teacher interface for anagrams

Rules to play the game

- 1 Click on plugin icon
- 2 See the corresponding question or answer written as a text
- 3 Click on the box you want to swap. Scroll up or down with holding left click of mouse. Box can be seen as moving up or down. Drop the box on another box.
- 4 Student can see the two boxes are swapped.
- 5 Repeat the process until arrangement is not proper
- 6 Click on submit to see the summary page

Student role

The screenshot shows a Moodle quiz page. The breadcrumb trail is: Home > Courses > Miscellaneous > Networking > 1 July - 7 July > ana2. On the left is a 'Navigation' sidebar with a tree view showing the current course structure, including 'Networking', 'Participants', 'Reports', 'General', and a list of dates. The main content area is titled 'Sortable Question' and contains five question cards: Q5 (TCP stands for...), Q9 (A security device which inspects traf...), Q7 (A device used in a network to strengt...), Q8 (A formal description of a set of rule...), and Q6 (FTP is which layer protocol?). Below the questions is a 'Submit' button. To the right is a 'Sortable Answer' section with five answer cards: A : Application, A : Protocol, A : 7, A : Repeater, and A : Transmission control protocol. At the bottom right, there is an 'Answers' section listing the correct answers: Application, Protocol, 7, Repeater, Transmission control protocol, and Firewall.

Figure: Intermediate state in anagram

Student role

Home ► Courses ► Miscellaneous ► Networking ► 1 July - 7 July ► ana2

Summary

Correct : 4

Wrong : 2

Question text	Right Answer	Status
How many layers are there in OSI model?	7	Wrong
TCP stands for.	Transmission control protocol	Correct
FTP is which layer protocol?	Application	Wrong
A device used in a network to strengthen a signal as it is passed along the network cable.	Repeater	Correct
A formal description of a set of rules and conventions that govern how devices on a network exchange information.	Protocol	Correct
A security device which inspects traffic entering and leaving a network, and allows or disallows the traffic, depending on rules describing acceptable use of the network, by filtering out unwanted packets.	Firewall	Correct

Figure: Summary of anagram

Data flow diagram

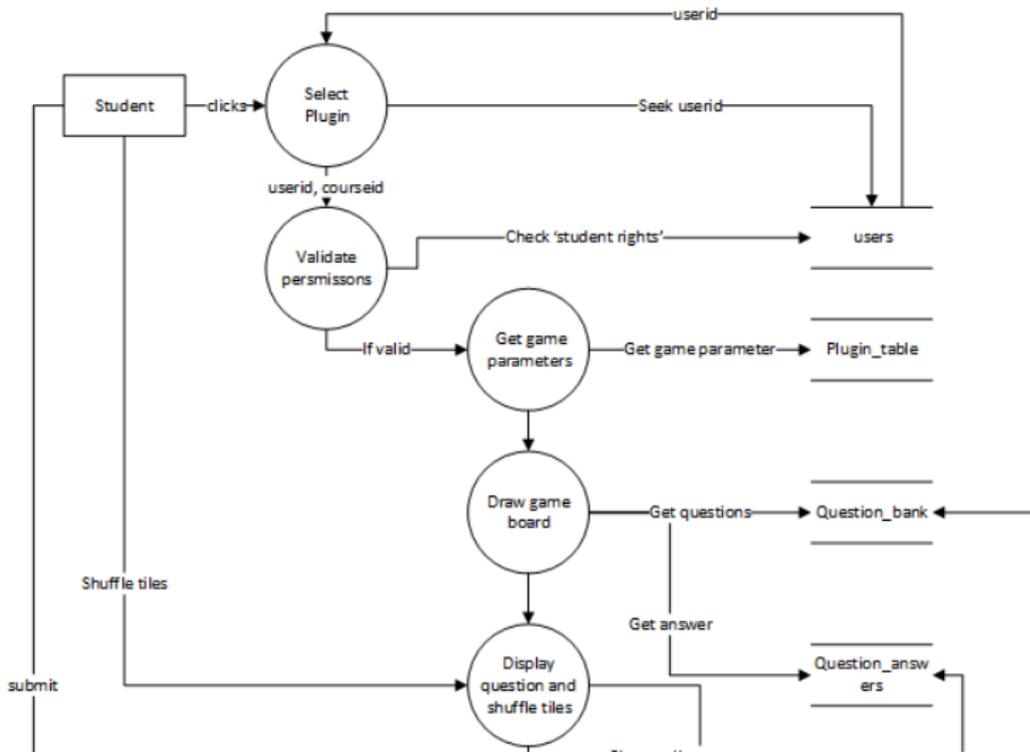


Figure: Data flow diagram of student playing anagram

Data flow diagram

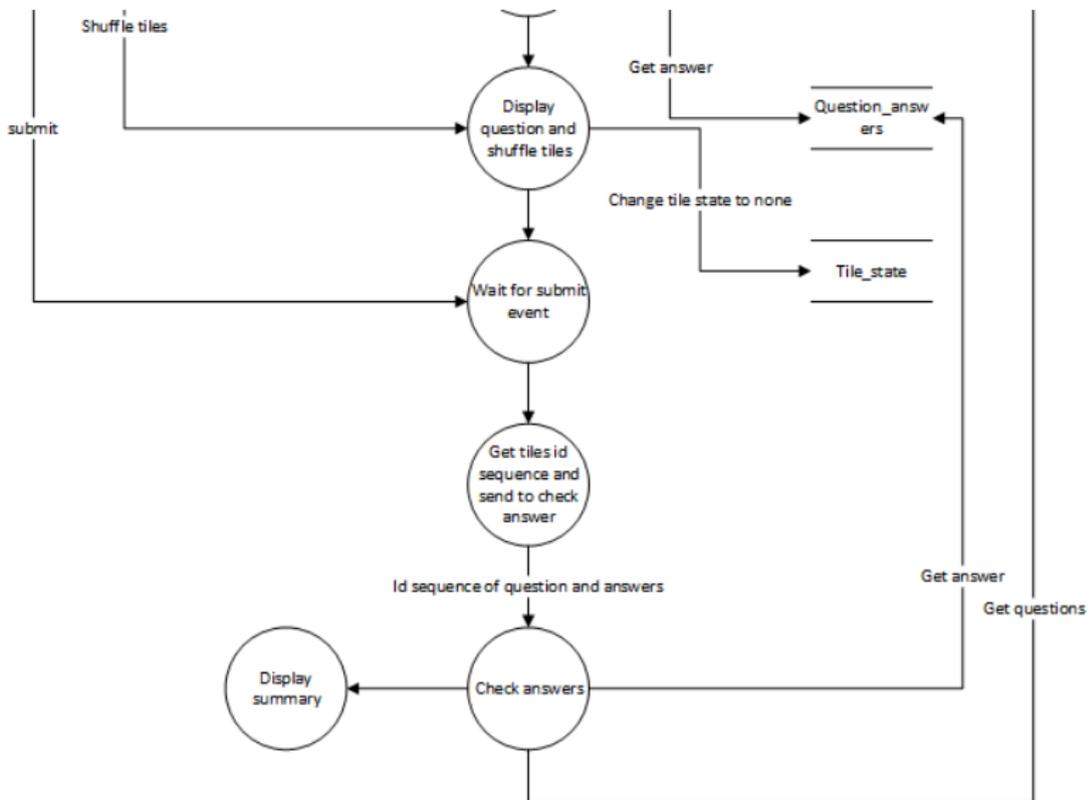


Figure: Data flow diagram of student playing anagram

Kumar, P

Introduction

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Future Work

Conclusion

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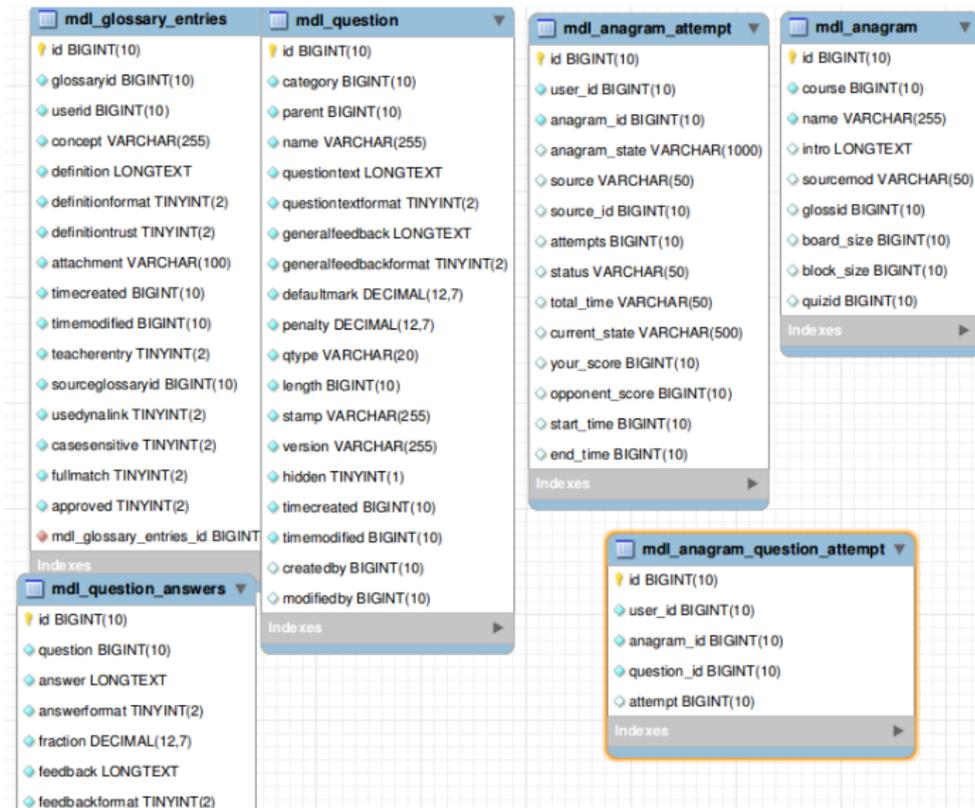


Figure: ER Diagram of anagram

Functions

- `addInstance(formData)` : stores the form parameter into database
- `updateInstance(formData)` : modifies the form parameter into database
- `deleteInstance(formData)` : delete the game instance
- `initGame()` : setting user attempt and questions
- `playGame()` : loads javascript class and shows initial board
- `summaryGame()` : summarises student's attempt in form of correct and wrong attempts for each question

Future Work

- Tic-Tac-Toe Versions
- Network Games : multiplayer support
- Experimental setup

Conclusion

- Game based learning can be a nice way to involve students into education activity
- I developed four such games as a plugin for moodle
- A lot of research should be done to conceptualize these games based on individual subjects

Earlier Attempt
to Build a
System
Moodle Games

Design Details

Design Details

Design Details

Design Details

Thank You

Thank You