Technical Reference

IT Lexicon System

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976-381 Project in Digital Business 1

& 976-481 Project in Digital Business 2

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Introduction to the IT Lexicon

IT Lexicon is a dictionary web application that scrapes data from IT course descriptions from universities in Thailand. IT Lexicon was developed by using MySQL as the database and PHP for back-end development. HTML, CSS, Tailwind CSS, Javascript, and Jquery as front-end development.

IT Lexicon technical reference document purposed to provide the technical reference for IT Lexicon development methodology, which includes system analysis, design, programming languages, tools, database, etc.

Customer Requirement

To develop an IT Lexicon dictionary website with the requirements below:

1. A website has a search ability.
2. The website is beautiful, accurate, and easy to use.
3. A website has a back-end system to manage the database and website.

Summary

The IT lexicon system is a dictionary system that contains IT terms and vocabulary gathered from Thai universities. The mandatory function requirement is:

Front-end

1. Search Function
2. Searched word meaning
3. Searched word origin

Back-end

1. Insert, Update, and Delete
2. Website Management

Design Process

The design process of the IT Lexicon system follows the system analysis process through planning, analysis, design, implementation, and maintenance.

Concept Design

The UX/UI concept design process was done using Adobe XD for design and coloring. The color code used follows:

1. #26619C - The main color theme of the website is blue.
2. #144779 - The secondary color is dark blue.
3. #606060 - Font color is gray.

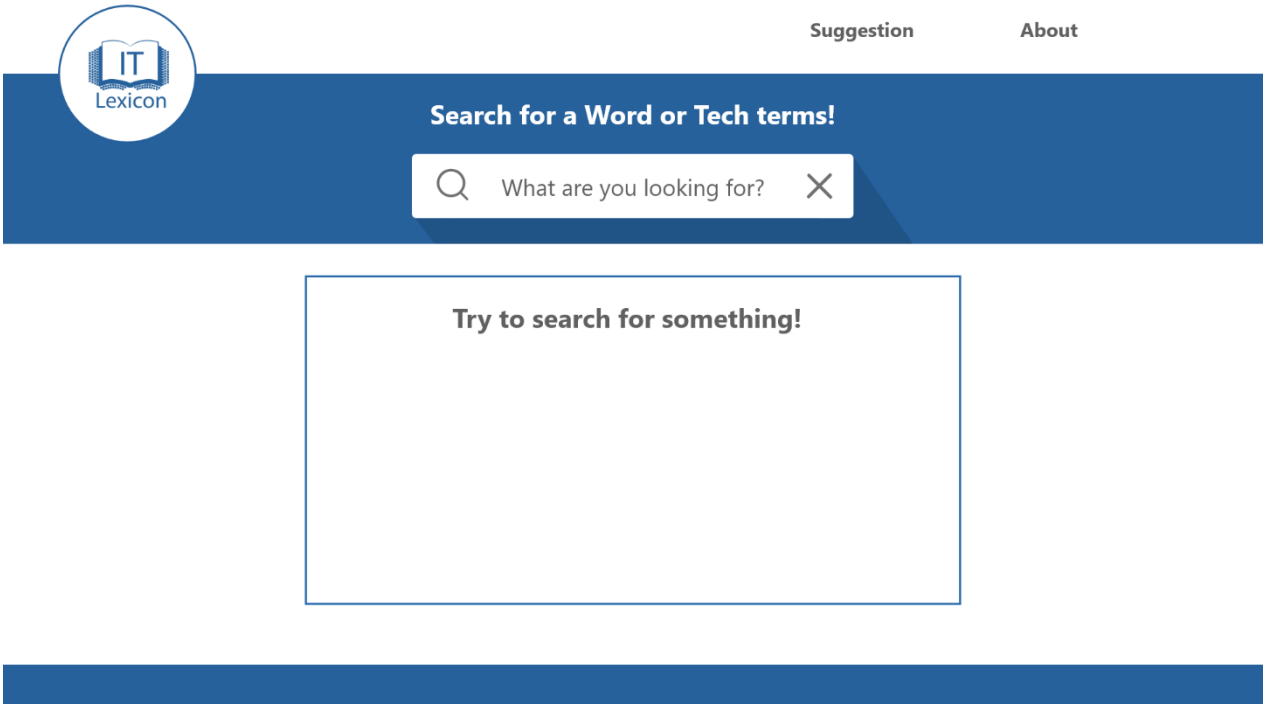


Figure 1.1.1 Main page concept

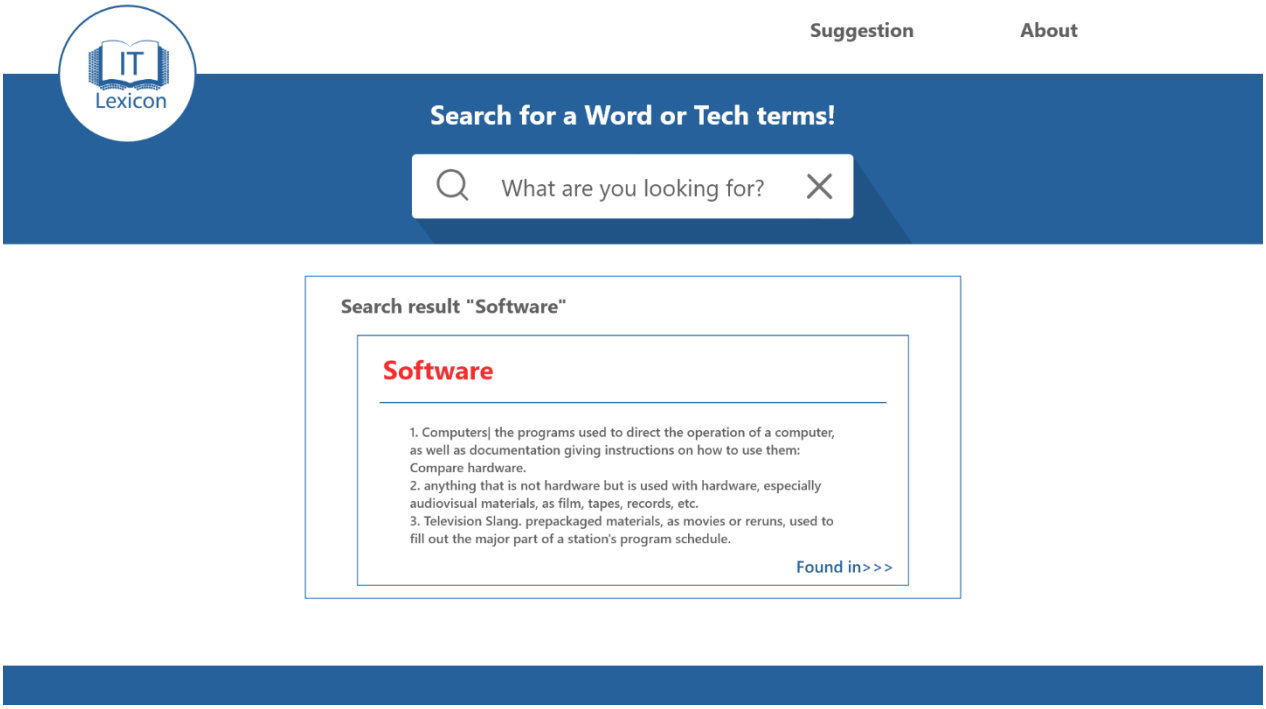


Figure 1.1.2 Meaning page concept

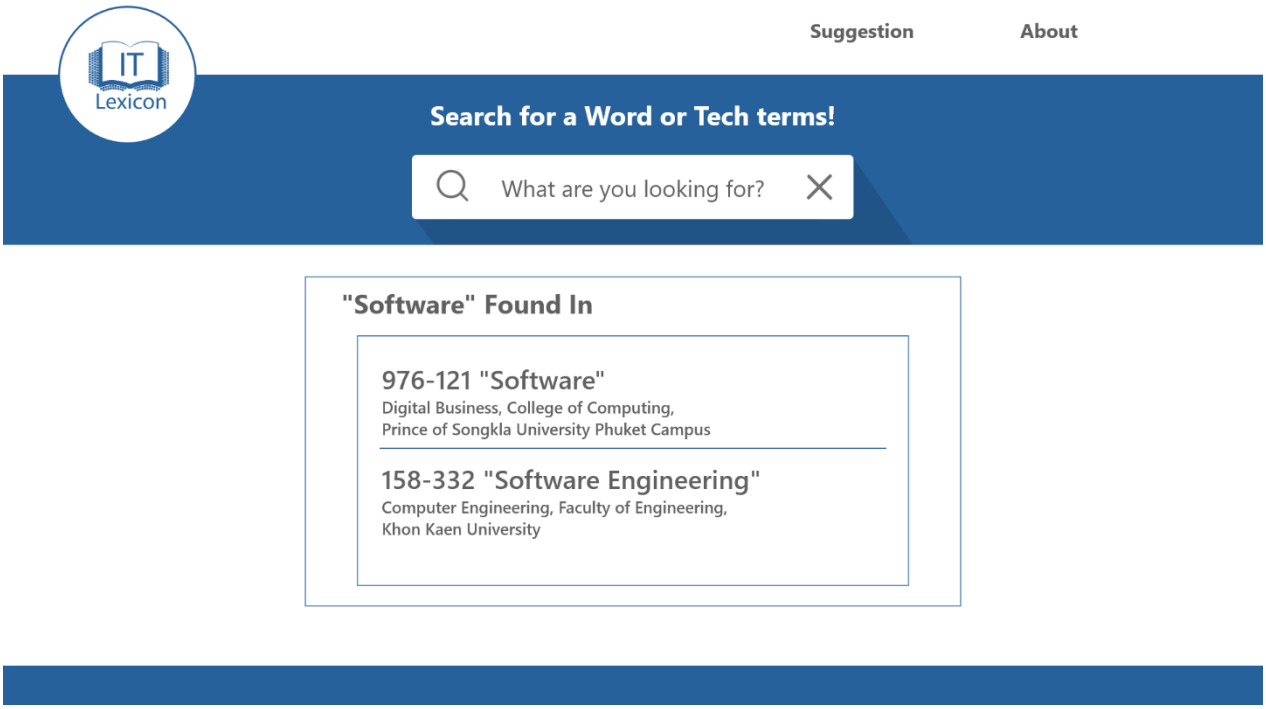


Figure 1.1.3 Found in page concept draft

Context Diagram

Shows outlines of external entities interacting with the internal IT Lexicon system. This context diagram consists of 2 factors User and Administrator.

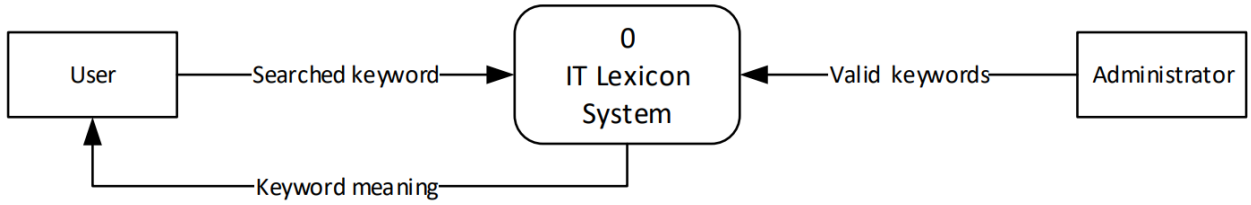


Figure 1.2 IT Lexicon Context Diagram

Level 0 Diagram

Data-flow diagram level 0 shows the overview of the IT Lexicon system. The interaction between entities and how the IT Lexicon system works.

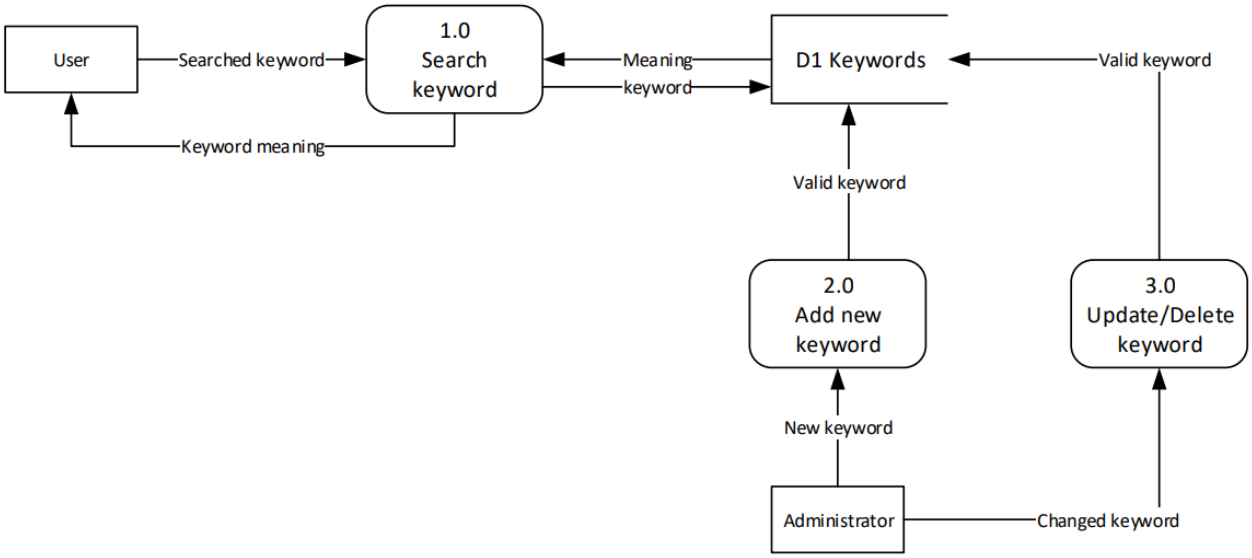


Figure 1.3 IT Lexicon Level 0 Diagram

Usecase Diagram

The IT Lexicon system has 2 users, which are the user and the administrator. The user can access the search, browse keywords, and view keyword meaning functions. The administrator can access the back-end of the system to manage the database of the system.

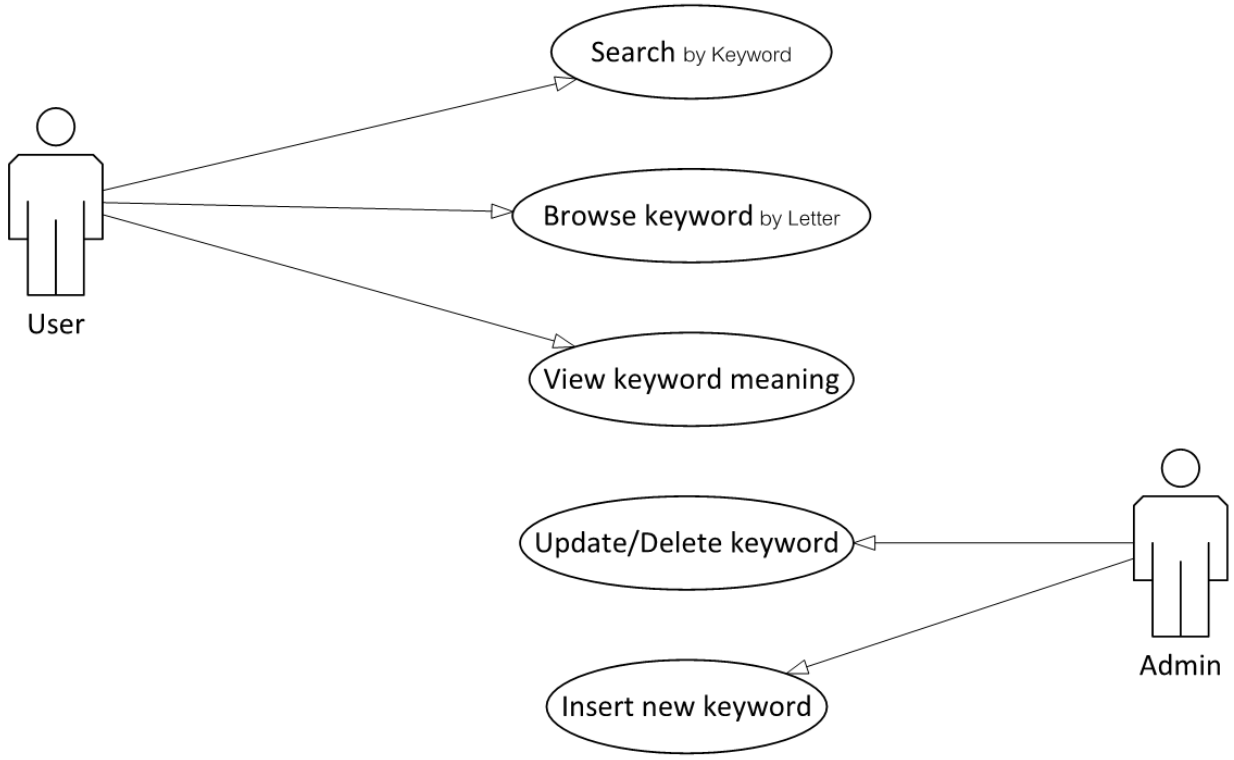


Figure 1.4 IT Lexicon Usecase Diagram

Entity Relationship Diagram

The IT Lexicon system entity relationship diagram consists of 7 entities and is used in MySQL database development to store data and query data for use in the search function.

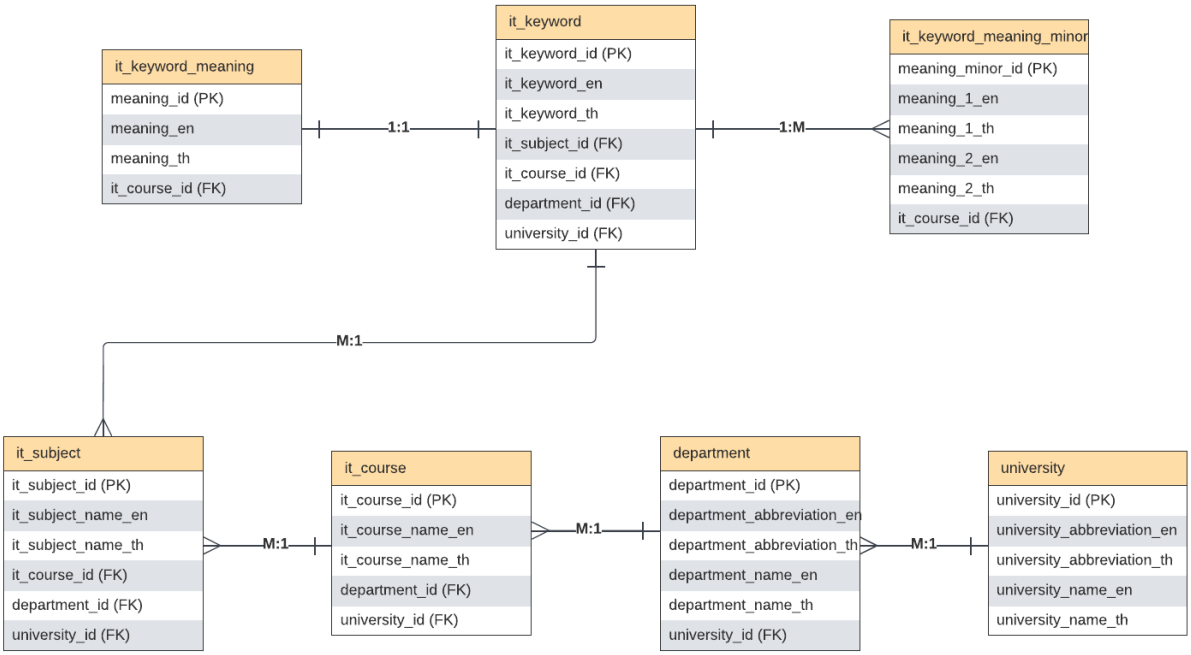


Figure 1.5 IT Lexicon Entity Relationship Diagram

Set-Up

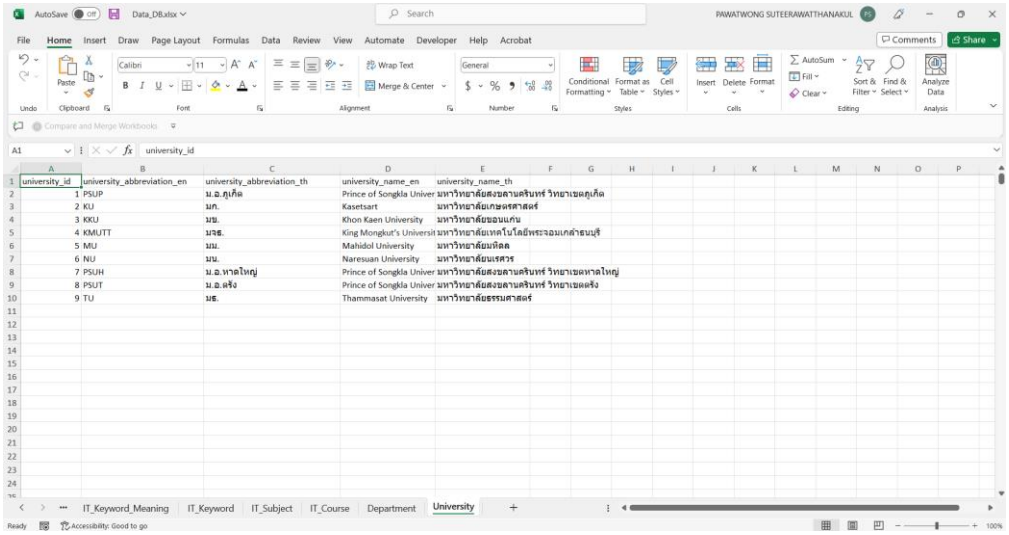
Install and set up the software, programming languages, and tools to use in the IT Lexicon development process. The mandatory software used in the development process is Visual Studio Code. It is a source code editor and has support for many languages, including the IT Lexicon necessary computer language for development, e.g., PHP, JavaScript, and more.

Database set up

There are a few tools for database setup that must be installed first.

Microsoft Excel

Microsoft Excel is used for database mockup and preparation before input into a real database, which is MySQL.



university_id	university_abbreviation_en	university_abbreviation_th	university_name_en	university_name_th
1	PSUP	ม.อ.ภูเก็ต	Prince of Songkla Univer	มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตภูเก็ต
2	KU	มก.	Kasetsart	มหาวิทยาลัยเกษตรศาสตร์
3	KKU	มข.	Khon Kaen University	มหาวิทยาลัยขอนแก่น
4	KMUTT	มจธ.	King Mongkut's Universit	มหาวิทยาลัยเทคโนโลยีพระจอมเกล้าธนบุรี
5	MU	มม.	Mahidol University	มหาวิทยาลัยมหิดล
6	NU	มน.	Naresuan University	มหาวิทยาลัยนเรศวร
7	PSUH	ม.อ.หาดใหญ่	Prince of Songkla Univer	มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตหาดใหญ่
8	PSUT	ม.อ.ตรัง	Prince of Songkla Univer	มหาวิทยาลัยสงขลานครินทร์ วิทยาเขตตรัง
9	TU	มธ.	Thammasat University	มหาวิทยาลัยธรรมศาสตร์

Figure 2.1.1 Excel as Database Mockup and Preparation

Navicat 16

Navicat is a database development tool that allows connecting and managing MySQL databases easier. It comes with lots of features to view, edit, import, export, SQL query builder, etc.

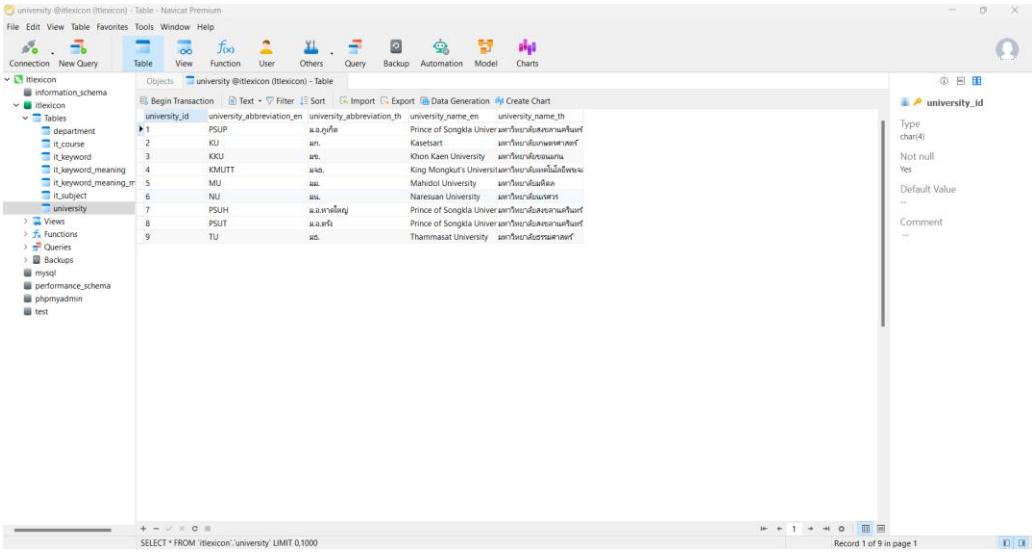


Figure 2.1.2 Navicat Premium in Use of the IT Lexicon System

Python

Python is used in the database scraping process. Transform a PDF file into a text file with PDF Plumber. Python can be installed by searching for the Python extension in Visual Studio Code.

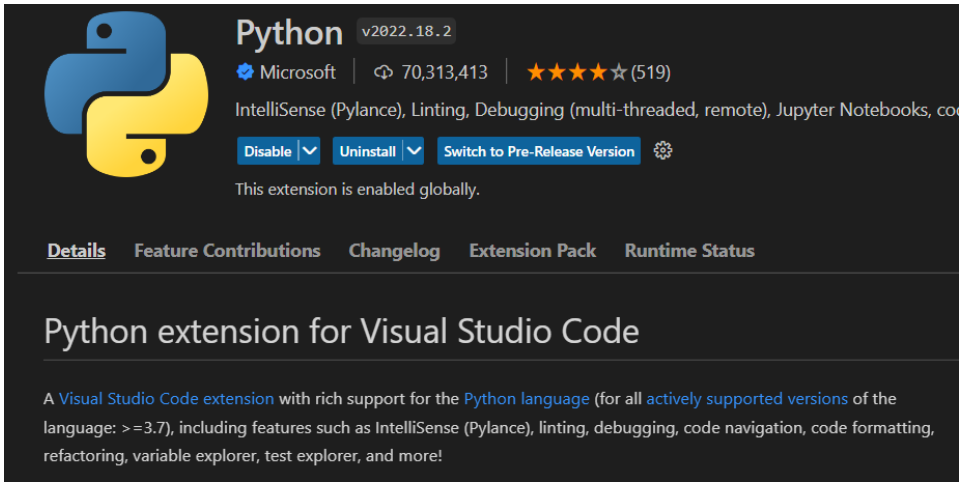


Figure 2.1.3 Python Extension in Visual Studio Code

Back-end setup

The back-end setup is for installing the necessary tools for developing the IT Lexicon system.

XAMPP

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server and MariaDB database. The modules used in the IT Lexicon system are Apache and MySQL modules. The installation manual for XAMPP software can be found at https://www.apachefriends.org/.

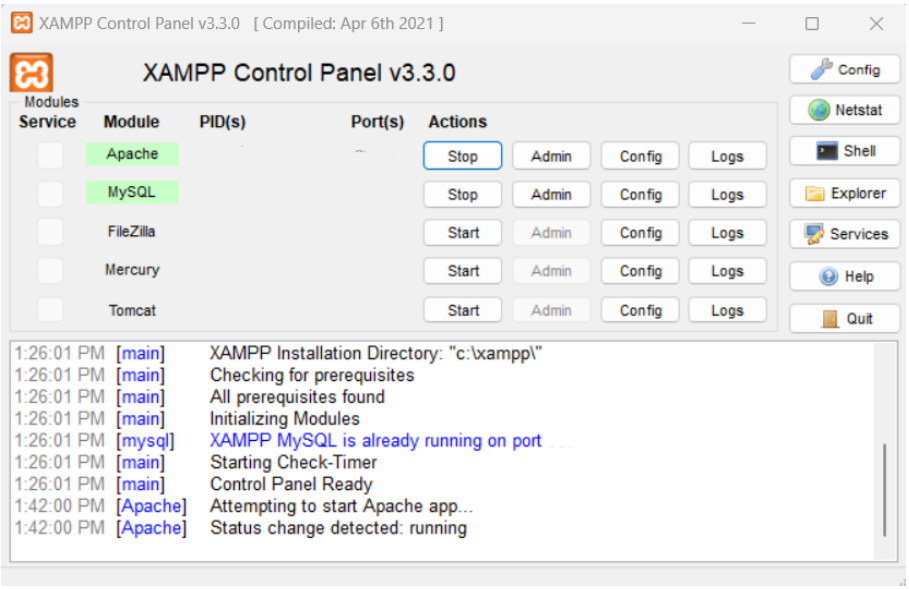


Figure 2.2.1 XAMPP in use for the IT Lexicon System

PHP

IT Lexicon used PHP for back-end development for database connection, query data, and callback. PHP can be installed directly by downloading the PHP extension in Visual Studio Code. The recommended extensions for development are PHP Debug, PHP Intelephense, and PHP IntelliSense.

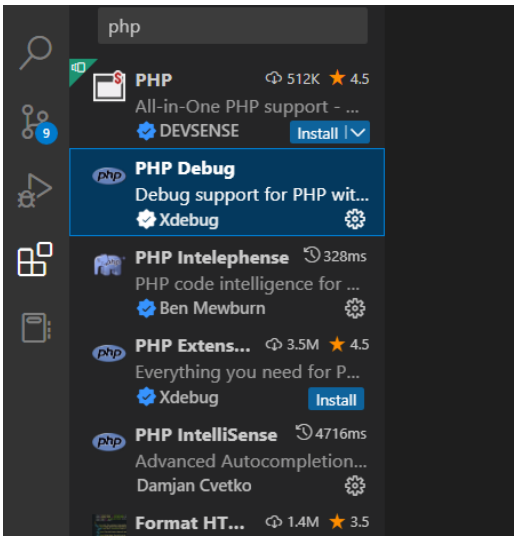


Figure 2.2.2 PHP Extension in Visual Studio Code

Front-end setup

The last setup step is for front-end development. The required setup tools follow:

HTML&CSS

To make development faster and easier, these are all the extensions that I used, which can be installed by searching in the extensions of Visual Studio Code.

Live Server Extension

show real-time website visualization.

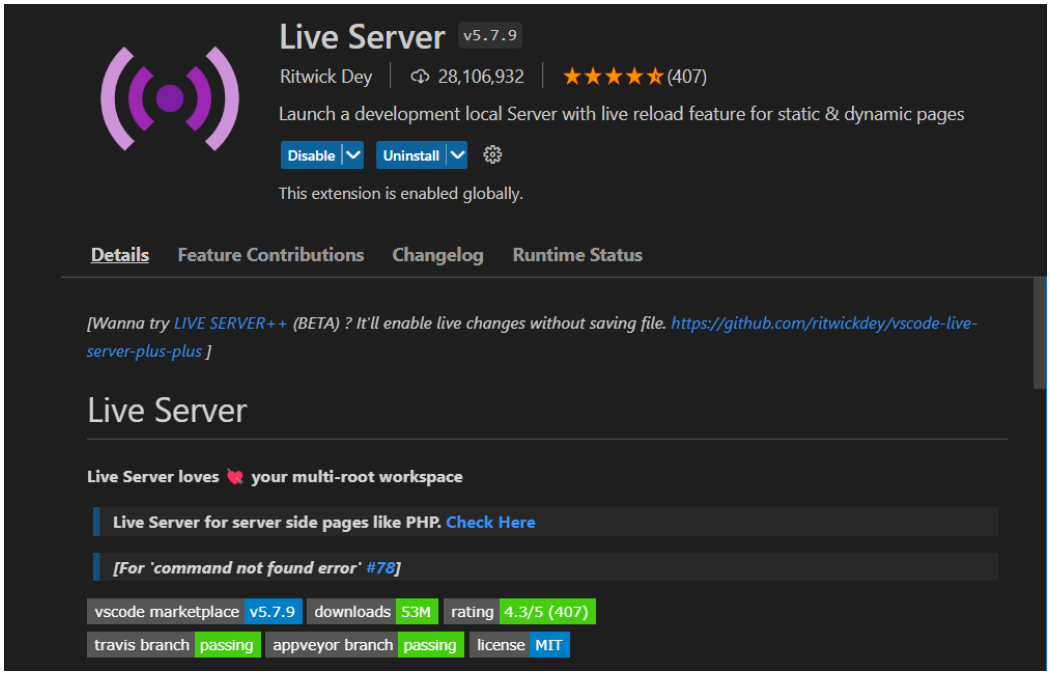


Figure 2.3.1 Live Server Extension

HTML CSS Support

HTML id and class attribute completion.

Figure 2.3.2 HTML CSS Support Extension

Auto Close Tag

Automatically add a close tag to the tag attribute.

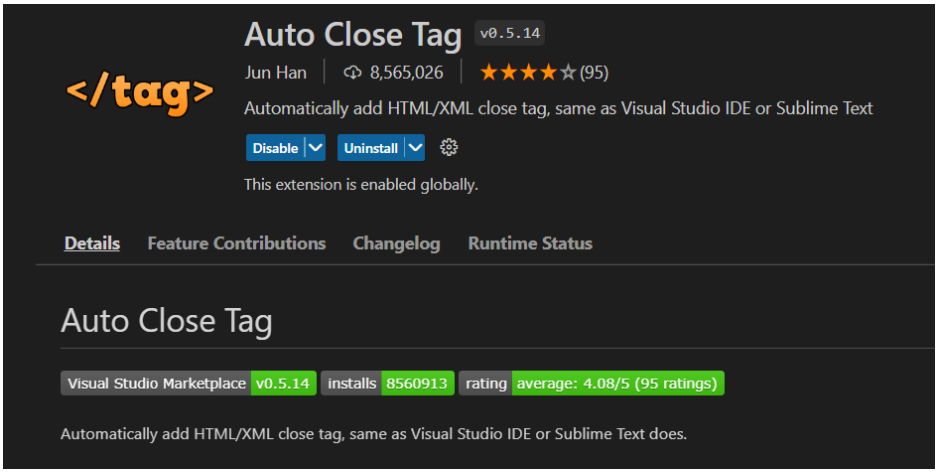


Figure 2.3.3 Auto Close Tag Extension

Tailwind CSS

At the beginning of development, the developer used vanilla CSS, but it didn't satisfy or respond to development enough. Tailwind CSS has come into the development tool since then. Tailwind CSS is also available as a Visual Studio Code extension. The installation manual for Tailwind CSS any version can be found at https://tailwindcss.com/docs/installation/using-postcss.

Figure 2.3.4 Tailwind CSS Extension

Install Node.js first, then Tailwind CSS with the npm command for a simpler installation is recommended

JavaScript&jQuery

jQuery is a fast, small, and feature-rich JavaScript library. jQuery can be installed using the npm command or link it directly to the project using the script in the HTML tag. The jQuery manual can be found at https://blog.jquery.com/2022/08/26/jquery-3-6-1-maintenance-release/.

Figure 2.3.5 jQuery linked to the HTML script

Database

The process of IT Lexicon database development consists of 2 steps Data preparation and data input into the database.

Data Preparation

Data preparation is the step of gathering and cleaning data before inputting it into the database. The preparation of data has 4 steps:

1. Data Scraping
2. Data Cleaning
3. Data Transforming
4. Data Representation

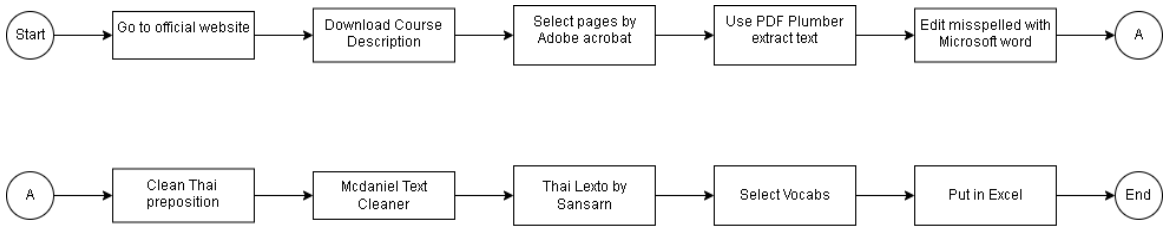


Figure 3.1 Data Preparation Flowchart

Data Scraping

Gather IT course descriptions from selected majors and universities. Download the course description and remove the unnecessary pages from it.

Figure 3.2 Remove any unnecessary pages

Next, extract the text file from the PDF with PDF Plumber, the manual can be found on GitHub at https://github.com/jsvine/pdfplumber.

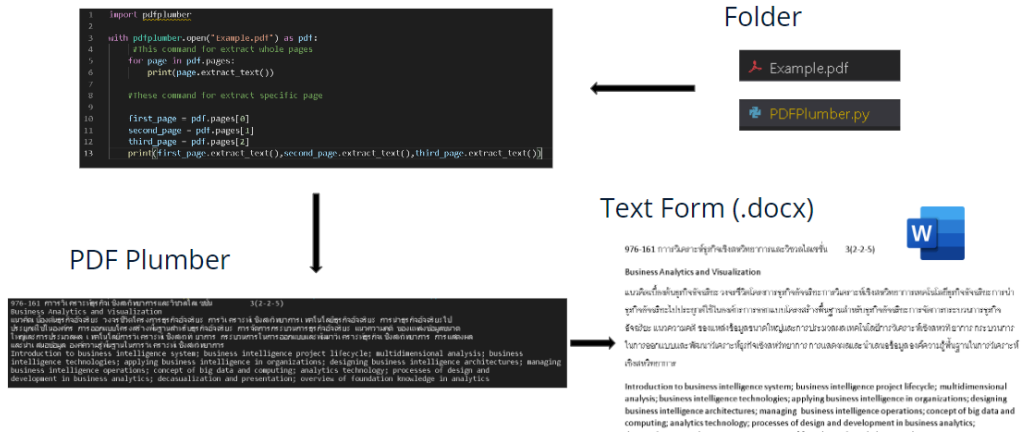


Figure 3.3 Transform PDF file into text form

After the transformation step is finished, the next step is to clean up what is not needed.

Data Cleaning

Some of the text is misspelled and needs to be corrected. Then remove the Thai preposition with the Find and Replace function in Excel. Clean and remove English prepositions with McDaniel Text Cleaner, which is a Web application, can be found at https://mcdaniel.ws/Utility/TextCleaner.

Figure 3.4 Cleaning text forms with McDanie

Next, find the root word and select words with Thai Lexto, which can be found at http://www.sansarn.com/lexto/.

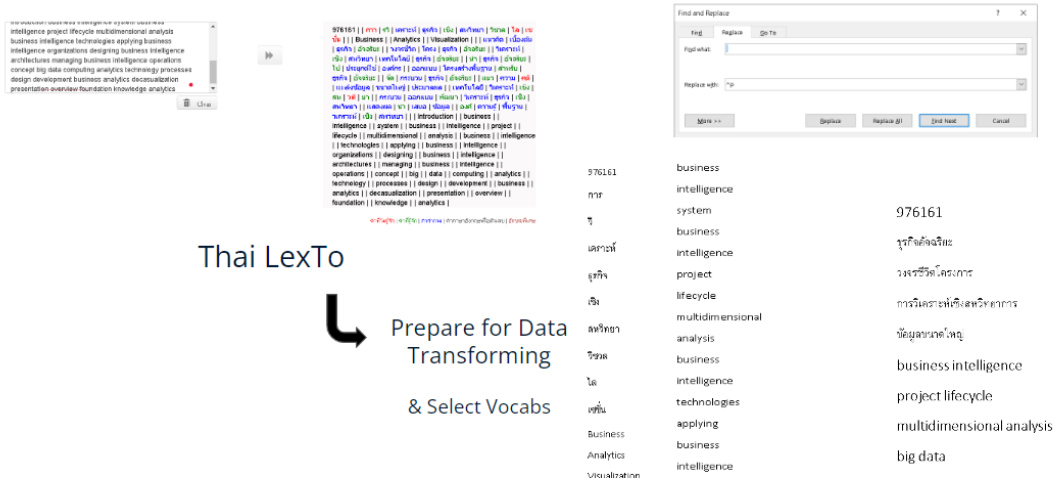


Figure 3.5 Cleaning and Selecting Text

Data Transforming

After the cleaning process is done, put the result into Excel to prepare for the data representation process.

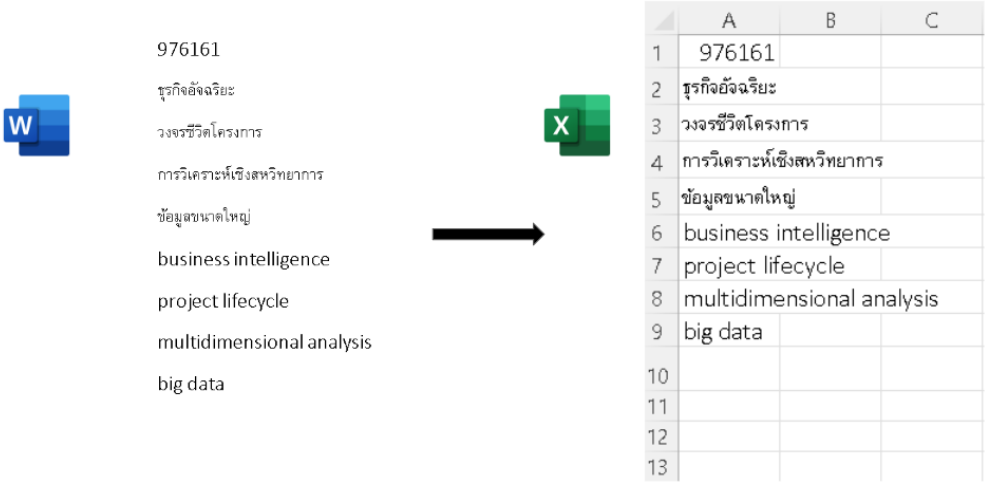


Figure 3.6 Transform selected text from text to Excel

Data Representation

Lastly, put the gathered data into the database preparation Excel sheet. This step will prepare the database for import with Navicat.

	A	B	C	D	E	F	G
1	it_keyword_id	it_keyword_en	it_keyword_th	it_subject_id	it_course_id	department_id	university_id
2	1	Automata	ออโตมาตา	1	3	1	1
3	2	R	อาร์	2	3	1	1
4	3	Calculus	แคลคูลัส	3	3	1	1
5	4	Ethics	จริยธรรม	4	3	1	1
6	5	Intellectual Prope	ทรัพย์สินทางปัญ	4	3	1	1
7	6	Information Techr	ระบบสารสนเทศ	4	3	1	1
8	7	Case Studies	กรณีศึกษา	4	3	1	1
9	8	Information Syste	ระบบสารสนเทศ	5	3	1	1
10	9	Intellectual Prope	ทรัพย์สินทางปัญ	5	3	1	1
11	10	Information Syste	ระบบสารสนเทศ	6	3	1	1
12	11	Feasibility	ความเป็นไปได้	6	3	1	1

Figure 3.7 Database preparation sheet

Insert to MySQL

Import the excel file database into Navicat once the data has been prepared. Create the table with the same name as in Figure 3.1.6 to make importing the data easier. The database runs on localhost with XAMPP.

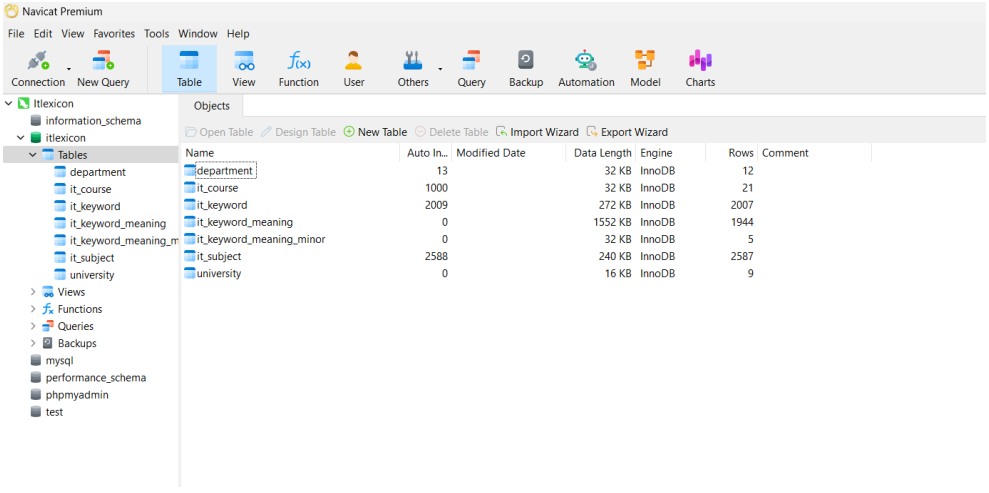


Figure 3.8 Navicat SQL table in the IT Lexicon System

Back-end

The back-end connects the database to the back-end and connects data from the database to display on the front-end page. The back-end of IT Lexicon was developed with PHP for connecting to and querying the database, which was hosted on localhost during the development process.

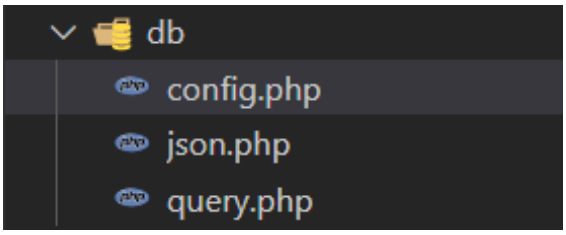


Figure 4.1 PHP file used in IT Lexicon

IT Lexicon system is connecting to the database with IP, username, password, and database name, at the con_a function in the config.php file.

```php
<?php

function con_a()
{
    return mysqli_connect('127.0.0.1', 'root', '', 'itlexicon');
}

function generate_jsonp($data) {
    if (preg_match('/\W/', $_GET['callback'])) {

        // if $_GET['callback'] contains a non-word character,
        // this could be an XSS attack.

        header('HTTP/1.1 400 Bad Request');
        exit();
    }

    header('Content-type: application/javascript; charset=utf-8');
    print sprintf('%s(%s);', $_GET['callback'], json_encode($data));
}

```

Figure 4.2 config.php file

The query.php file is where IT Lexicon stores SQL commands. It may change or add more SQL commands, depending on what result is needed.

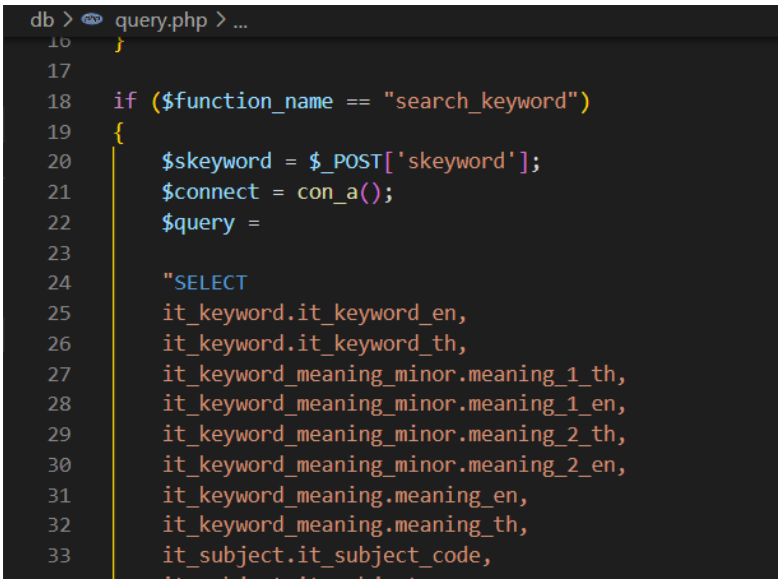


Figure 4.3 query.php file

Front-end

The IT Lexicon system's front-end file folder contains the following items:

1. Img: images and store icons used on a website.
2. Js: jQuery library and Script.js file.
3. Public: contain index.html, alphabet.html, about.html, and output.css
4. Src: input.css for Tailwind CSS
5. config.js: Config and custom Tailwind CSS

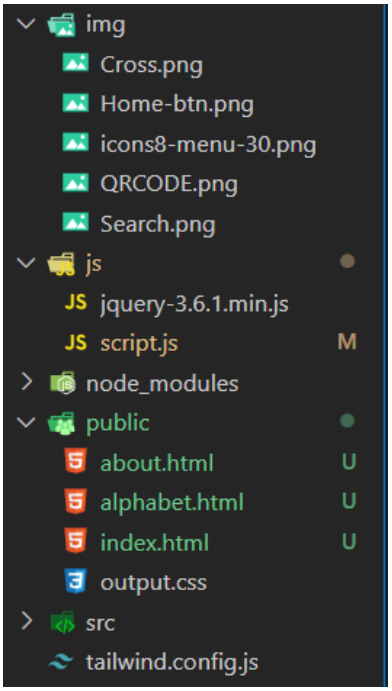


Figure 5.1 Front-end files

Each section or division is detailed in a comment in the code (the green line in the code).

```
</head>
<body class="font-font">
    <nav>
    <a href="index.html">
        <img id ="home" class="hidden md:flex absolute h-auto w-48 mt-1 ml-56" alt="itlexicon-logo" src="../img/Home-btn.png">
    </a>
    <!--Logo-->
    <nav class="h-24 flex justify-end bg-white w-full px-8">
        <div class="mt-2">
        <a href="index.html">
            <img id ="home" class="md:hidden w-20 mr-72 h-auto" alt="itlexicon-logo" src="../img/Home-btn.png">
        </a>
    </div>
        <!--Logo Mobile-->
        <div class="hidden md:flex content-center mr-36 mt-2 pt-7">
        <a class="text-gray text-2xl font-bold mr-24 hover:text-blue-dark" href="index.html">Home</a>
        <a class="text-gray text-2xl font-bold mr-24 hover:text-blue-dark" href="alphabet.html">Alphabet</a>
        <a class="text-gray text-2xl font-bold mr-24 hover:text-blue-dark" href="about.html">About</a>
        </div>

        <div class="md:hidden flex items-center">
            <button id="menu-button" class="mobile-menu-button">
                <img class="h-6 w-6 hover:bg-blue-dark" fill="bg-gray" src="../img/icons8-menu-30.png">
            </button>
        </div>
            <!--button menu mobile-->
    </nav>
```

Figure 5.2 index.html comment

```
var container = $('<p/>');
var text_search = $("#search-box").val();
for (var i = 0; i < msg.length; i++)
   {
    console.log('index: ' + i + ', keyword: ' + msg[i].it_keyword_en + ', meaning: ' + msg[i].meaning_en);
    container.append('"'+msg[i].it_keyword_en +'"'+ '<br>');
    container.append(msg[i].it_subject_code + ', ');
    container.append(msg[i].it_subject_name_en+ ', ' +'<br>');
    container.append(msg[i].it_course_name_en + ', ');
    container.append(msg[i].department_name_en + ', ' +'<br>');
    container.append(msg[i].university_name_en +'<br>'+'<br>');
    /*add query data to container*/
   }

if(msg.length >= 1){
console.log(msg.length);
$('#course-id').empty().append(container);
$("#s-result-worden").text(msg[0].it_keyword_en);
$("#s-result-wordth").text(msg[0].it_keyword_th);
$("#re-en").text(msg[0].meaning_en);
$("#re-th").text(msg[0].meaning_th);
$("#keyword").text('"'+text_search+'"');
$('#result-container').show();
$('#boxresult').hide();
$('#search-box').val('');
/*show what found in database*/
}
```

Figure 5.3 Script.js comment

Script Function

Script.js contains the main and sub-functions of the IT Lexicon inside, or it can be called the backbone of the IT Lexicon system.

Numbers 1 and 2 are the Mainpage function scripts.

Number 3 is a script for UX improvement.

Number 4 and 5 are the script for the Alphabet Search function.

Figure 5.4 Script.js Function

Detail of Function

From figure 5.4, Numbers 1, and 2 are the script for the Mainpage IT Lexicon Search function, where number 1 is a click search and number 2 is a keypress 'Enter' key search.

Figure 5.5 Click Search Function

Figure 5.6 'Enter' Keypress Search Function

Number 3 is a script for UI/UX improvement such as page scroll animation, clearing the search input value, toggling for page, and so on.

```
$(function(){
$('#result-container').hide();
$('#menu-button').click(function(){
    $('#mobile-menu').toggle();
    });
$("#totop").on("click", function(){
    // $(window).scrollTop(0,1000);
    $("html, body").animate({ scrollTop: 0 }, "slow");
    return false;
    });
$('#alpha-terms').click(function(){
    if($('#result-container').hide());

    else if($('#result-container').show())
    $('#result-container').toggle();
    });
$("#btn-clear").on("click", function(){
    $("#search-box").val('');
    $("#search-box").focus();
    });
});
```

Figure 5.7 UI/UX Script

Numbers 4 and 5 are scripts for the alphabet search function. Number 4 is for clicking to show vocabulary starting with the A-Z alphabet, and number 5 is for clicking to search vocabulary and show its meanings.

```
$('.term-click').click(function(){
var text_search = $(this).text()
console.log(text_search)
$.ajax(
    {
       method: "POST", async: false,
       url: "../db/query.php",
       data:
              {
               fc:"text_keyword",
               skeyword:text_search
              },
        success: function(msg){
        var container = $('<div />');
        var alpha_search = $("#dictionary-term").text();
        for (var i = 0; i < msg.length; i++)
           {
            console.log(msg[i].it_keyword_en);
            container.append($('<div class="text-blue-dark lg:text-xl text-base
            $(".btext").empty().html(container)
            $("#alphadis").hide()
           }
         }
        });
    });
    });
```

Figure 5.8 Alphabet Click Function

```
function search_key(text_search){
    $.ajax(
        {
           method: "POST", async: false,
           url: "../db/query.php",
           data:
                  {
                   fc:"text_keyword1",
                   skeyword:text_search
                  },
            success: function(msg){
            var container = $('<p/>');
            {
               console.log(text_search);
                $("#s-result-worden").empty().text(msg[0].it_keyword_en);
                $("#s-result-wordth").empty().text(msg[0].it_keyword_th);
                $("#re-en").empty().text(msg[0].meaning_en);
                $("#re-th").empty().text(msg[0].meaning_th);
                $('#result-container').show();
            }
            }
        });
    };
```

Figure 5.9 Alphabet Meaning Displayed Function