



Your Hub For Knowledge
Your Way For Mastery



SCAN ME

***I'm Glad To Announce And Share With You Details Of My
Graduation Project From Business Information System (BIS),
Faculty Of Commerce And Business Administration Helwan
University***

Project Link: <http://www.k-hub.info/Home>

**** The project is tested on Chrome, Brave & Microsoft Edge (Laptops, PCs) and IOS (Safari)***

**** Please help me in improving the website by reporting any bugs you face (In Navbar click `More` then press `Report A Bug` button)***

Idea

K-Hub Stands For Knowledge Hub, This Website Is A Hub (Large Database) For Knowledge, That Contains A Huge Number Of Resources (Playlists/Videos/Articles/PDFs) Available On The Internet In Tracks Like C++, Java, Linux & SQL To Master Them. In Addition To Creating Communities Of Users Who Share The Same Interests About A Specific Track Or Field, These Communities Help Each Other And Make Learning Process Much More Easier & Fun.

Features In Each Page

- ***Home Page***

- Animated text.
- Animated numbers.
- Live view total number of visitors.
- Live view of the number of online users.
- Live view number of the views of home page.
- Press on team members' picture to navigate to `About Us` Page for that member (Portfolio of each Team member).

- ***Sign Up Page***

- All inputs are required.
- Live Check if inputs contain space.
- Live Check if the Username already exists in Database.
- Live check if the Email already exists in Database.
- Live Check if the phone number already exists in Database.
- Live Check if the password is weak.
- Live Check if the password is matched or not.

- After creating an account an email is sent with a link that contains a token to verify your account.
- If a user forgot his password, he could navigate to `Forgot My Password` page and then type this email then an email will be sent to him with a link of a page in which he can change his password.

- **Sign In Page**
 - Check if the account is not verified.
 - Check if Username/Email is wrong.
 - Check if Username/Email is correct but password is wrong.
 - Remember me button for 7 days (not storing credential data in cookies).
 - Then a One-Time Password [OTP] will be sent via email.
 - This OTP number is:
 - Unique Number.
 - Used on time only then expire.
 - Expired after 5 min of sending it to the user.
- Now the user can use the project's pages that contains main features.
- **In Tracks Page:** C++, Java & SQL and other tracks available on the website are shown, after clicking on `View Information` button for specific track, a page about that track will be shown then the user can navigate to the Roadmap of that track.

- In Roadmap page there is a progress bar to track your progress (out of 100%).
- Each track has a Roadmap that contains many modules, each module will represent a resource (whether Playlists/Videos/Articles/PDF)* as we said, so each track has his own resources, for example if you want to master C++ programming language, then you will start your journey in C++ track which contains many module, where to open one module you have to finish previous one (mark as complete previous module), and so on until you finish the whole track. All these resources will be collected and organized in a roadmap incrementally (from basics till advance) in step-by-step learning curve until the user literally master the selected track.

*Resources & content for each track available in K-Hub can be videos from other websites (ex: YouTube) using just <iframe> HTML tag so we are not going to store videos in database, just URL of Playlist/Video, Articles from other websites, PDFs (e-books, cheat sheet, info graph), this will make learning process much more better as we are not depending on just on type of learning (written as Articles or PDF, watchable as playlists or videos), you will have a mix of different type of resources.

- **In Each Module [X] Page** (X means Playlist, Video, Article or PDF):
 - Add/Update notes specific for that module.
 - View playlist videos (for module playlist page only).
 - Next/Previous buttons (in module playlist only).
 - A Dropdown List to Launch (C++, SQL, PHP) online IDE.
 - Ask For Help Button*.
 - Mark As Complete/Undo.
 - Progress Bar to track your progress in that module.
 - Quiz button when user complete 100% of module (in case of module playlist, the user will have to Mark As Complete many videos to open the quiz).
 - Comment section for each module.
 - Add/Edit/Delete your comment.
 - Add/Edit/Delete your replies for a specific comment.
 - Click on profile picture of comment's user to navigate to their profile.

* One of the most important feature in our project is "Ask For Help" button, this is a button which will be in each module where user will write a title & description for his question about the part, he didn't understand well and choose a tag related to that question from dropdown list (C++, PHP, SQL for example). now user's question will appears in "Help Others" page, where all other users who have chosen the same tag (a tag which represents tracks user is interested about) can view that question, if anyone of them clicked "Help" button there will be a conversation (chat) between the user who has asked the question and the other one who is willing to help him, and then if the user who asked the question has understand the part he was asking about, the one who helped the user will have XP and after helping may people he can get "Helper" badge (will be shown in his profile).

- In Roadmap Page, After completing a module, a quiz button is shown to start a quiz for that module (same as Quiz button in module page) and the user won't be able to start the next module unless the user finishes the quiz successfully (correct answers should be more than 50% of totally number of questions).
- Questions of the quiz are MSQ.
- After finishing 100% of a track, a Certificate will be created for the user with the name of the track, user's name, date and ID code of that certificate.
- **In Live Chat Page:** you can privately chat with other users
 - Chat list page that contains all people you have chatted with them before is shown.
 - End-To-End Encryption of chat messages.
 - Online/Offline status of the other user you are talking with him.
 - Is the other user is typing or not message is shown.
 - Unseen messages in chat list page will be shown.
- **In Profile Page,** users can:
 - View/Add/Update Profile/Cover pictures.
 - Follow/Unfollow button (only appears in others profile).
 - Chat with that user button (only appears in others profile).
 - Add his interests.
 - Edit their profile data (name, address, phone).
 - Change their password (an email is sent to alert user that his password has changed).
 - Their interested tracks are publicly viewed.
 - View Following/Follower list.
 - Their progress in each tracks is also publicly viewed.

- Add post section where you can add a post that contains:
 - Text.
 - Image.
 - Video.
 - Or combination of Text/Text or Text/Video.

- For each post the user can:
 - Like/Dislike the post.
 - Add/Edit/Delete his comments.
 - For each comment, the user can Add/Edit/Delete this replies.
 - Edit the text of the posts.
 - Delete the post.
 - Turn Off comments for that post.
 - Turn Off reacts for that post.
 - Report a post (other users' posts).

- Infinite Scrolling feature so that user can reload only first 10 posts and then the next 10 and so on.
- The user can follow other users in which all their posts will be shown in `News Feed Page`.

- ***All Features Related To The Posts In Profile Page Also Exist In `News Feed Page`.***

- ***Note: All Of The Above Features Don't Reload The Page.***

- Report a bug page so that users can report the bugs they face in K-Hub with the ability to attach a Screenshot of the bug.

- Rate the project page that allow users to write title, description and select 1-5 stars to rate the project.
- Become a contributor page so that other users from different fields can help us in creating their own tracks.
- **Admin Panel:**
 - Add Article/PDF/Playlist/Video.
 - Add quiz question.
 - Add skills.
 - View contribution requests.
 - View rating of the website.
 - View reported bugs.
 - View reported posts.
 - View users' profile.
- **K-Hub Is Deployed Using:**
 - 1- AWS EC2 instance (IaaS) & Route 53
 - 2- Linux OS
 - 2- Docker
 - 3- Jenkins

- **Performance Optimization:**

1. MySQL prepare statement is used.
2. Comments are not fetched from Database until the user click on `view comments` button.
3. Replies are not fetched from DB until the user click on `view Replies` button (same concept as above point).
4. Caching ID of the User of each Comment/Reply that are shown in K-Hub.
5. Images are compressed before storing.
6. Infinite Scrolling to just reload first 10 posts then next 10 not all posts at one time.
7. Playing Videos are automatically paused when they become out of viewport.
8. Manifested JS files (.min.js Extension).
9. PHP 8 (faster than PHP 7 by 10-15%).

- **Upcoming Performance Procedures:**

1. Using Redis to cash Database Queries.

Note : The Maximum Time Complexity Used In K-Hub Was $O(n)$.

- Intensive Pages (Like Chat/Profile/News Feed) Performance Using Lighthouse Extension Were Higher than 90%.

- **Security Safeguards In K-Hub:**

1. K-Hub is hosted on AWS with many security layers to login.
2. Using Linux as the server OS.
3. K-Hub is containerized using Docker (isolated from other processes).
4. Prevent remote file injection.
5. Using SSH (public & private key cryptography) to login to the server.
6. MySQL PhpMyAdmin dashboard is protected with strong password.
7. Inputs are validated from Front-End as well as back-end (PHP).
8. End-To-End Encryption of chat messages.
9. Passwords are salted then hashed before storing them in the Database.
10. Check type, extension & MIME type of inserted Image/Video.
11. Server has a root password that is required to access all root privileges.
12. The user Logs In with OTP (One-Time Password).
13. Verify created account to be able to login (to make sure that email is valid and is really the email of the user).
14. Using MySQL bind parameters & prepare statements (prevent SQL Injection).
15. Remember me feature not storing credential information (as cookies can be easily stolen by hackers).
16. Cross-site scripting (XSS) prevention by filtering the URL.
17. Disable directory listing.
18. Shorten URL to hide name of actual paths and files.
19. An email is sent when user changes his password.

20. Validating GET string query in URL.
21. Using exit() function after header.
22. Hashing names of Images/Videos.
23. Prevent navigating to Xampp dashboard.
24. Prevent users from altering values of GET string query by hashing the GET Values.

- **APIs Used:**

- All of the above features are written from scratch with pure PHP 8 (No Framework is used to master PHP).

2023 Update : K-Hub Back-End will be refactored to Laravel 10 soon.

- The only used API is PHP Mailer API to send Emails.
 - Other APIs are written in PHP so that creating and developing of flutter mobile application will be 70% more efficient, as the developer will just call the APIs and then manipulate JSON data to view them in the app.

- **System Testing:**

- Form Validation: All forms are validated in K-Hub, whether from Front-End using JavaScript & jQuery or back-End using PHP, as we all know back-End validation is better than Front-End one as it is more secured and cannot be bypassed by any user or hacker.
 - Stress Testing AWS EC2 Server: Stress testing allows you to measure your web application's robustness and reliability beyond normal load. It is typically conducted to ensure the server does not crash under high load as well as to expose crashes or hangs due to

concurrency issues, resource exhaustion, deadlocks and other conditions.

• Upcoming Features & Improvements In The Future (Within Next 6 months - 1 Year):

1. SSL certificate (Done).
2. Payment gateway.
3. More capabilities in admin panel.
4. View Users who Like/Dislike post.
5. Upload more than one image in a post.
6. Upload videos for all users.
7. Crop image before uploading Profile/Cover pictures.
8. Upload pictures with higher sizes.
9. Dark Mode.
10. AI to filter bad Comments/Replies.
11. Like/Dislike comments & replies in ModuleX and profile pages.
12. More relevant posts based on advanced algorithms in News Feed page.
13. More reactions like Facebook (Haha – Sad – Angry – Wow- Buttons).
14. Share posts of other users.
15. Save a post of other users' posts.
16. Users can send voice records while chatting.
17. Users can send files while chatting.
18. Report users' chat.

19. Block users.
20. Users will be able to create groups.
21. Discussion section.
22. Search Bar in `Chat List` page to search for the users you chatted with them before.
23. Search Bar in Navbar to search for other users.
24. Notification System.
25. More OOP in the project to organize the code & the structure.

- **Technologies & Tools Used To Build K-Hub:**

- **Front-End:**

- HTML 5
 - CSS 3
 - Bootstrap 5
 - JavaScript
 - jQuery
 - Ajax

- **Back-End:**

- PHP 8
 - MySQL
 - Xampp & Apache Server
 - APIs
 - Postman

- **DevOps:**

- AWS (EC2 & Route 53)
 - Docker
 - Jenkins
 - Linux

- Git Version Control
- GitHub

- **Other Tools:**

- PhpStorm
- Visual studio code
- Microsoft Teams
- Telegram
- WhatsApp
- Postman
- erdplus.com Website
- Database Schema Designer Program
- Visual Paradigm Website
- Draw.io Website
- Microsoft Word
- Microsoft project
- WBS Creator
- PicsArt Application
- Flaticons Website

- **My Responsibilities Were:**

- Team Leader *.
- Back-End Part.
- DevOps Part.
- Database Administrator Part.
- Moderate Contribution In System Analyst Part.
- Moderate Contribution In Business Analyst Part.
- Moderate Contribution In Front-End Part.

**** As A Team Leader I Was Responsible For:***

- Setting Objectives And Determining A Course Of Action For Achieving Those Objectives.
- Organizing Team To Ensure The Accomplishment Of Our Objectives.
- Controlling The Project So That Performance Does Not Deviate From Our Standards.
- Documentation Of The Code.
- Creating Content Of Tracks In K-Hub.
- Integration Of Both Back-End & Front-End.
- Conducting Our Virtual Meetings *.
- Reviewing Tasks (Front-End/System Analysis/Business Planning).
- Preparing The Final Document.
- Working On & Continuous Monitoring Business Planning Part.

**** All of our meetings were Virtual Meetings during the semester (3 months) using Microsoft Teams, we didn't meet physically not even a single meeting.***

This helped us a lot to increase our efficiency and effectiveness, decrease the cost and reduce consuming of the time.

We Shared the code & documents between us using Git Version Control

Front-End Part : Thanks to **@Mirna_Adel** & **@Nardeen_Nadeer** who were responsible for this part ❤️

System Analysis Part : Thanks to **@Ahmed_Farag** who was responsible for this part ❤️

- **All of following diagrams are completed:**
 - Activity Diagram (36 Diagram).
 - Sequence Diagram (18 Diagram).
 - Scenario Diagram (24 Scenario).
 - Use Case Diagram (For Both User & Admin).
 - Class Diagram (52 Table).
 - ERD Diagram (55+ Table).
 - Database Mapping (55+ Table).
 - Site Map Diagram (18 Pages).

- **Project Management:**
 - Gantt Chart.
 - WBS.

Business Planning Part : Thanks to *@Nardeen_Maged* who was responsible for this part ❤️

- **Business Meeting Document:**
 - Main idea
 - Main Features
 - Problems
 - Opportunities
 - Objective
 - Service (Provider, Receiver, Intermediary)
 - Cost, Capital, Resources
 - Improvements
 - Difference
 - Credibility
 - Future Plans

- Promotion
- Revenues
- Market Segmentation
- User-friendly

- Business Plan:
 - Vision
 - Mission
 - First: What Our Website Does?
 - Second: How Our Website Does What It Does?
 - Third: To Whom We Are Provide This Service?
 - Fourth: Why We Do This Service?
 - Objectives
 - Business Model Canvas
 - SWOT Analysis

- Organization & Staff:
 - Short-Term Organization of the business
 - Long-Term Organization of the business

- Executive Summary:
 - Brief Description Of The Business Idea
 - Owners Of K-Hub
 - Start-Up Capital & Source Of Capital
 - Detailed Description Of The Business Idea
 - Problem Definition:
 - Business Idea
 - Philosophy

- Goals
 - Short Term Goals
 - Long Term Goals
- Description Of The Market
- Legal Form

- Financial Plan:
 - Start-Up Capital
 - Sources of Start-Up Capital
 - Debt Service

- Marketing Plan:
 - Marketing Objectives
 - Customer Segmentation
 - Competitors
 - Marketing mix
 - Market Description
 - Market Strategy

- Survey [Google Form]:
 - Survey Questions
 - Google Charts & Statistics
- Financial plan [Revenue & Expenses]
- Action plan [2-5 Years]

- I Want To Thank My Project Team Members For Their Hard Work & Commitment They Showed ❤️
- And Special Thank To My Wonderful IT Supervisor Dr. **@Mohamed_Abdelsalam** Administrator Of BIS Program & My Awesome Business Supervisor Dr. **@Sarah_Shalash**, Thanks For Their Help & Contributions ❤️

Fun Fact ^-^ : More than **20,000** lines of code are written to build K-Hub (Mainly Back-End) & **59** tables in Database Schema (They Are Fully Normalized)