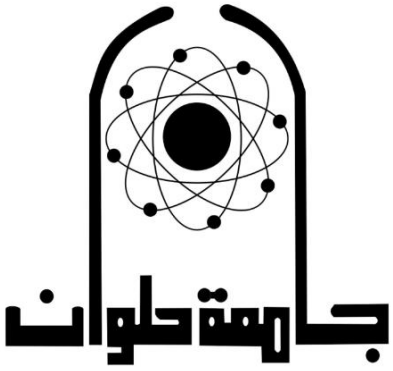


Helwan University

Faculty of Engineering

Computer and Systems Department

Course: Database

Nest Network

Teammates:

Mostafa Alaa Eldin Hassan Mohamed

Youssef Mohamed Ahmed Ismail

Ahmed Mohamed Abdel-Aty

Mohamed Walid Mohamed Atta

Instructor:

Dr. Manal Showman

Dr. Hadeer Ahmed

Teacher Assistant:

Eng. Ahmed Kamal

Summary

Engineering students often struggle when trying to learn various tracks and acquire technical skills such as problem-solving and competitive programming. Our project aims to bridge this gap. Our website connects individuals with different interests, providing them with a clear roadmap to start learning. It offers curated links to courses on topics like embedded systems, cybersecurity, and problem-solving. This enables users to begin training from the basics and progress until they are ready to participate in competitions like the ECPC and train on platforms like Code forces.

Contents:

Introduction:

Are you overwhelmed by YouTube videos? Tired of endless searching? Struggling to find exactly what you need among millions of websites?

Imagine a platform where you can find everything you need for your academic and professional journey from your syllabus and exam preparation resources to summer training programs and self-improvement tracks. Such a comprehensive resource center consolidates all relevant information, making it easier and faster for you to achieve your goals.

The purpose of this project is to develop a user-friendly website that serves as a one-stop solution for academic and career development. The main objectives are to provide easy access to syllabi, exam preparation materials, summer training opportunities, and various self-improvement tracks.

We employed a combination of Flask and Python for the backend, utilizing web scraping to gather necessary data. The frontend was built using HTML, CSS, JavaScript, and Bootstrap, ensuring a responsive and visually appealing user interface. This technology stack allowed us to create a robust and scalable platform that meets the needs of its users.

Technology Stack

Our platform leverages a robust technology stack to deliver a seamless user experience:

- **Flask and Python**: Flask, a micro web framework in Python, forms the backbone of our application, providing the flexibility and scalability required for complex web applications.

- **HTML, CSS, and Bootstrap**: HTML structures the content of our web pages, while CSS and Bootstrap handle design and layout, ensuring a visually appealing and responsive interface.

- **Jinja2 Templating**: Jinja2, a templating engine for Python, is used with Flask to render dynamic HTML content, enabling the integration of backend logic with frontend presentation.

- **Codeforces API and Web Scraping**: The Codeforces API is utilized to access user data, contests, and problem sets, while web scraping techniques gather additional data from the Codeforces website, enriching the platform's content.

- **Automated Database**

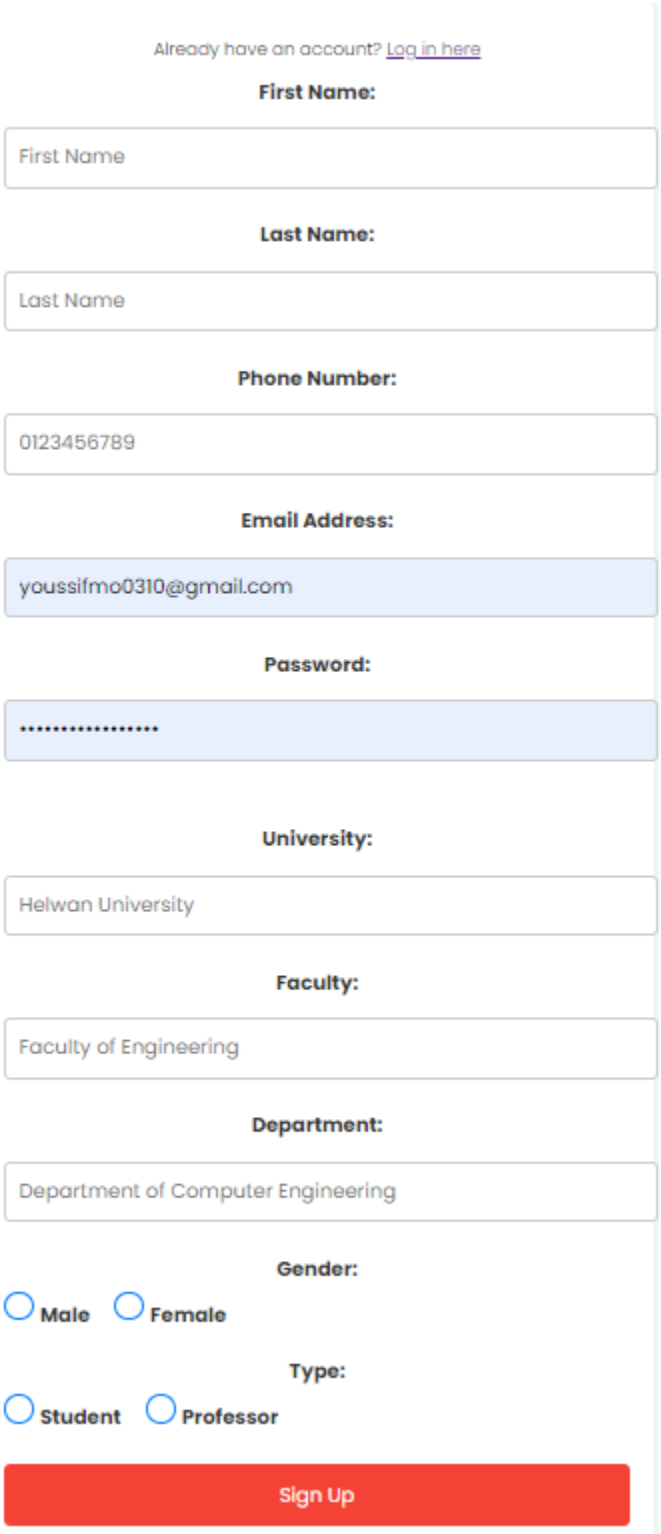
User Authentication

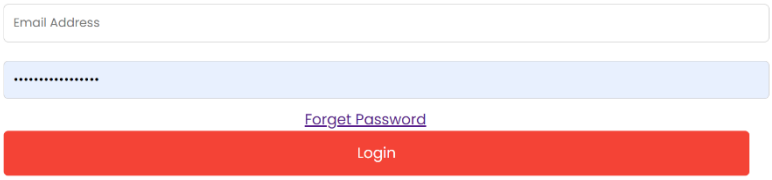
Sign-up and Login Functionalities:

Creating a seamless and secure user experience begins with the sign-up and login processes. By providing users with a straightforward and intuitive interface, we aim to streamline the onboarding experience while prioritizing data security.

During the sign-up process, users are guided through a series of steps where they input their desired credentials, including username, email address, and password. To reinforce security measures, we incorporate password and email validations. Password validation ensures that users create strong and resilient passwords, mitigating the risk of unauthorized access to their accounts. Meanwhile, email validation verifies the format and authenticity of the provided email address, reducing the likelihood of spam or fraudulent accounts.

Upon successful sign-up, users gain access to the platform's full suite of features, empowering them to explore learning resources, engage with the community, and participate in problem-solving activities. The login functionality allows returning users to access their accounts securely, with credentials verified against our database to ensure authenticity.

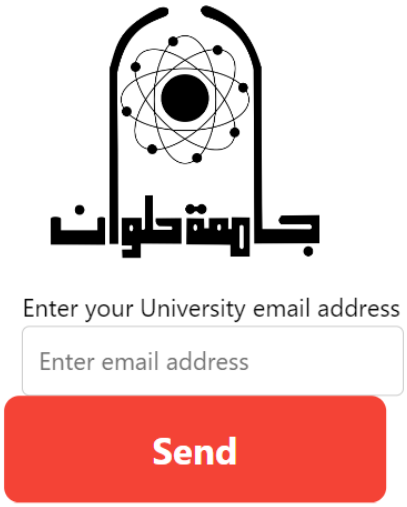




Forgot Password Feature:

In the event that users forget their passwords, our platform offers a robust "forgot password" feature to facilitate account recovery. This feature serves as a crucial safety net, providing users with a straightforward and secure method to regain access to their accounts without compromising security.

When users initiate a password reset request, they are guided through a series of steps to verify their identity. An email containing a unique reset Code is then dispatched to the email address associated with their account. serves as a gateway for users to reset their passwords securely. By leveraging email verification, we validate the ownership of the account and ensure that only authorized users can reset their passwords.



Pages

1-Home Page

The home page serves as the gateway to the platform's offerings:

- **Design and Layout**: The home page features intuitive navigation, announcements, and quick links to key sections, providing users with easy access to relevant content.
- **Key Features and Functionalities**: Users can explore community tracks, syllabus materials, and problem-solving resources directly from the home page, promoting engagement and interaction.

2-Community Page

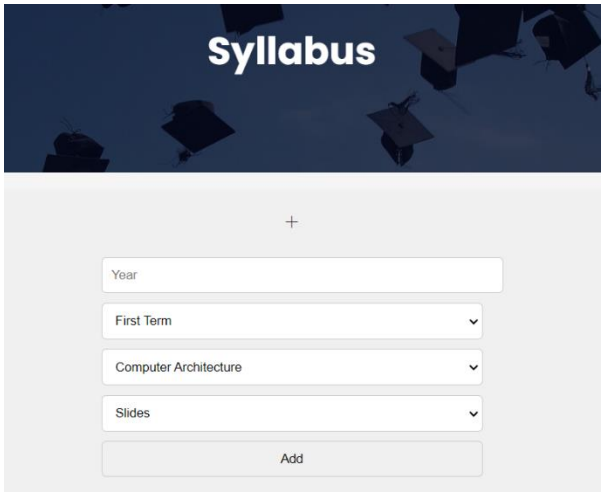
The community page fosters collaborative learning and skill development:

- **Tracks and Learning Paths**: Users can discover various learning tracks tailored to different fields such as embedded systems and cybersecurity, each offering a curated roadmap of courses and resources.
- **Displaying Tracks and Related Content**: Detailed information about each track, including course sequences and prerequisites, empowers users to plan their learning journeys effectively.

3- Syllabus Page

The syllabus page facilitates academic studies data management:

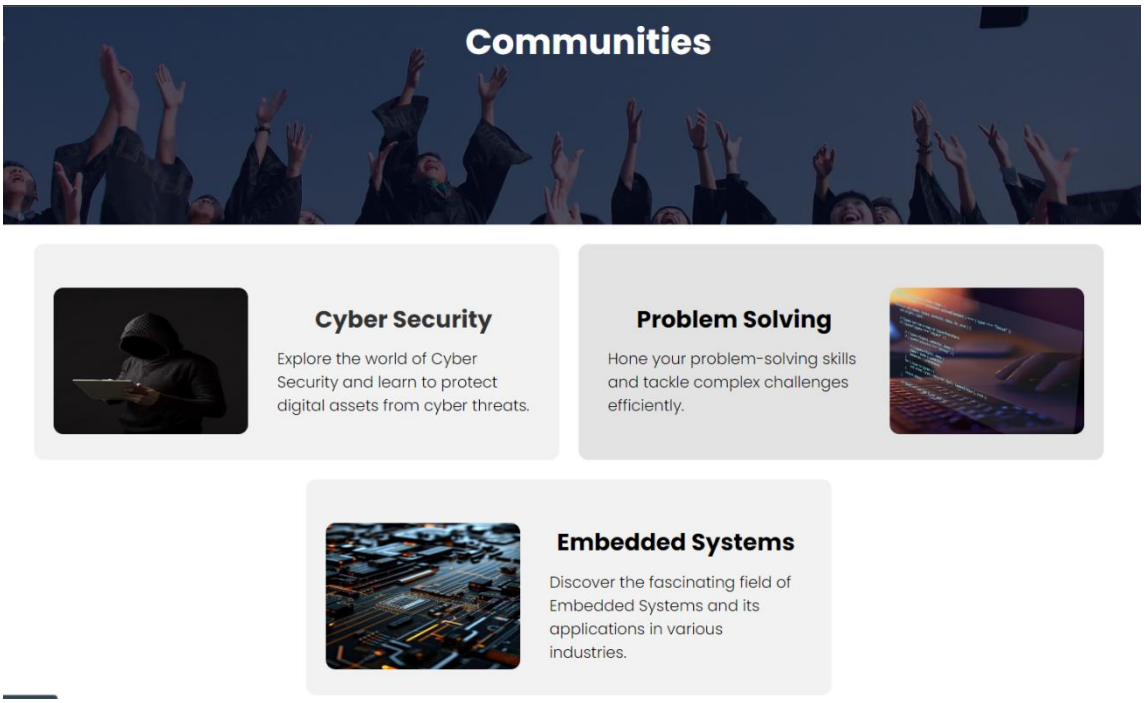
- **Adding and Retrieving Academic Materials**: Users can upload and access slides, sheets, and exams, streamlining the organization and retrieval of study resources.



4-Course-Specific Pages:

Each track on our platform boasts its dedicated page, meticulously designed to provide users with comprehensive insights into the courses offered. These course-specific pages serve as a hub of information, offering detailed overviews of each course within the track.

Lectures: For every course featured within a track, users can access detailed lecture materials. These materials may include lecture notes, presentations, video recordings, or interactive tutorials, depending on the nature of the course content. By providing access to high-quality educational resources, we empower users to engage deeply with course material and enhance their understanding of key concepts.



Roadmap for Each Track:

In addition to detailed course-specific pages, our platform offers visual roadmaps for each track, guiding users through the course sequences and learning paths. These roadmaps serve as navigational aids, helping users chart their progress and make informed decisions about their learning journeys.

Course Sequences: The roadmap outlines the sequence of courses within each track, providing users with a clear understanding of the recommended progression. Courses may be categorized based on prerequisites, difficulty levels, or thematic coherence, allowing users to identify logical pathways for skill development.

Courses for Cyber security (Sample)

Cyber Security Training For Beginners | Edureka

This Edureka video on "Cyber Security Full Course" will help you understand and learn the fundamentals of Cyber Security. This Cyber Security Tutorial is ideal for both beginners as well as professionals who want to master the Cyber Security concepts.

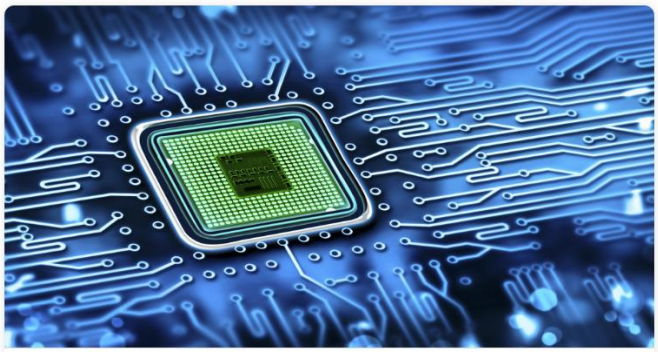
Start Course

Cyber Security Training For Beginners | Simplilearn

We provide a small introduction to cybersecurity, followed by explainers regarding the career scope in this domain and the job roles offered. After covering a few cybersecurity skills, we will learn about ethical hacking and network masking techniques like VPNs and Proxies. Further, we delve into various attacks like DDoS attacks, SQL injection, and cross-site scripting with live demonstrations that you can carry out on your own system for practice.

Start Course

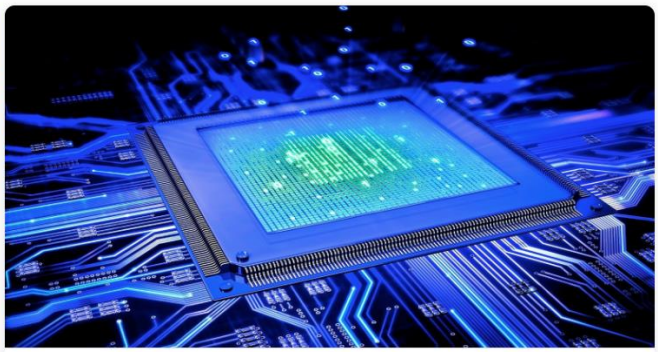
Courses for Embedded (Sample)



Embedded Systems Diploma - Mahmoud Karem

I'm offering a free diploma in Embedded Systems under the umbrella of our university's AZEX team, aimed at spreading knowledge. Learn more about the program and its requirements through our informational video and course outline.

Start Course



Introduction to Embedded Systems

Welcome to the Introduction to Embedded Systems Software and Development Environments. This course is focused on giving you real world coding experience and hands on project work with ARM based Microcontrollers.

Start Course

5-Problem Solving Section

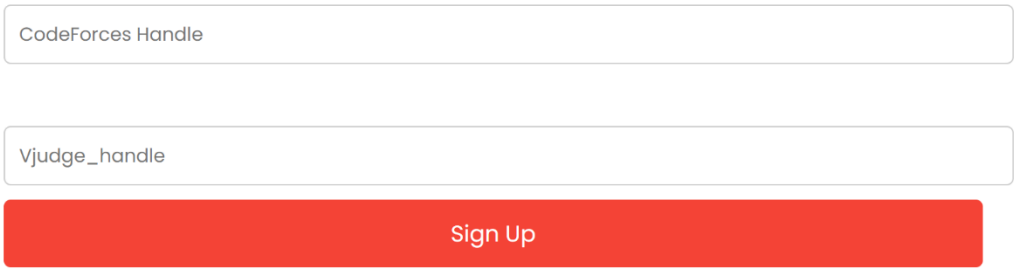
The problem-solving section enhances users' competitive programming skills:

Codeforces Handle Validation and Data Scraping:

The Problem Solving Section incorporates automated processes for validating users' Codeforces handles and scraping relevant performance data. This integration with the Codeforces platform enhances users' competitive programming experiences by providing personalized insights and benchmarks for improvement.

Automated Validation: When users sign up for the problem-solving section, they are prompted to input their Codeforces handles. Our platform then automatically verifies the validity of these handles using the Codeforces API. This validation ensures that users' handles are genuine and associated with active Codeforces accounts.

Data Scraping: Following handle validation, our platform initiates data scraping processes to retrieve users' performance data from Codeforces. This includes metrics such as maximum rating, current rating, contest histories, and participation statistics. By leveraging web scraping techniques, we collect comprehensive insights into users' competitive programming journeys.



Data Visualization:

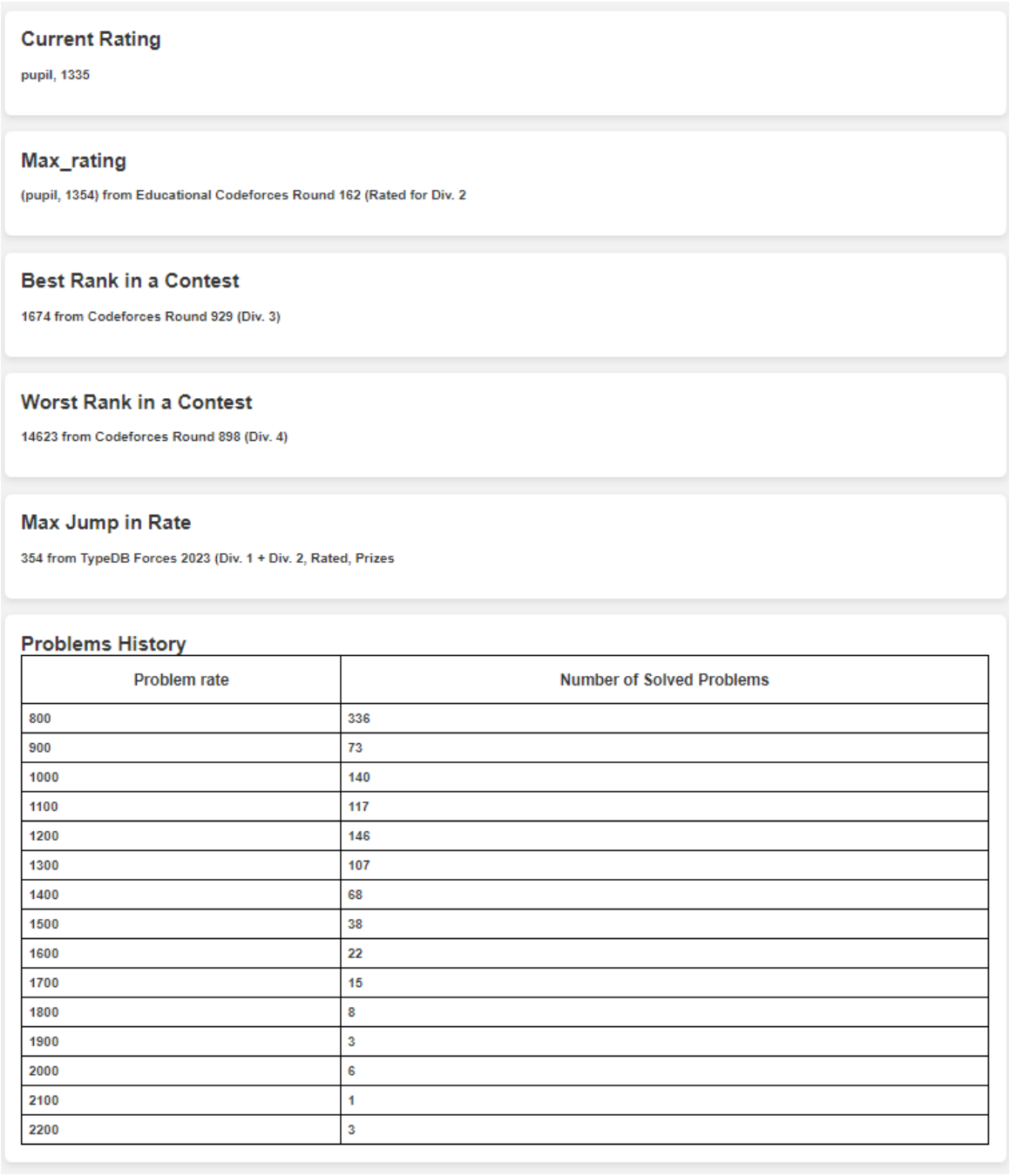
Visual representations play a pivotal role in helping users understand and interpret their competitive programming performance data. Our platform employs various visualization techniques to present users with actionable insights and facilitate informed decision-making.

User Progress: Visualizations of users' progress over time showcase trends in their rating changes, contest participation, and problem-solving achievements. Line charts, histograms, or

interactive graphs may be used to visualize this data, allowing users to track their growth and identify patterns in their performance.

Contest Histories: Users can explore their contest histories through intuitive visualizations, which display information such as contest ratings, rankings, and submissions. Heatmaps, scatter plots, or bar charts may be utilized to represent contest data, providing users with valuable insights into their strengths and weaknesses in different contest environments.

Performance Metrics: Key performance metrics, such as maximum rating achieved, rating fluctuations, and problem-solving statistics, are visualized to highlight users' achievements



Current Rating

pupil, 1335

Max_rating

(pupil, 1354) from Educational Codeforces Round 162 (Rated for Div. 2

Best Rank in a Contest

1674 from Codeforces Round 929 (Div. 3)

Worst Rank in a Contest

14623 from Codeforces Round 898 (Div. 4)

Max Jump in Rate

354 from TypeDB Forces 2023 (Div. 1 + Div. 2, Rated, Prizes

Problems History

Problem rate	Number of Solved Problems
800	336
900	73
1000	140
1100	117
1200	146
1300	107
1400	68
1500	38
1600	22
1700	15
1800	8
1900	3
2000	6
2100	1
2200	3

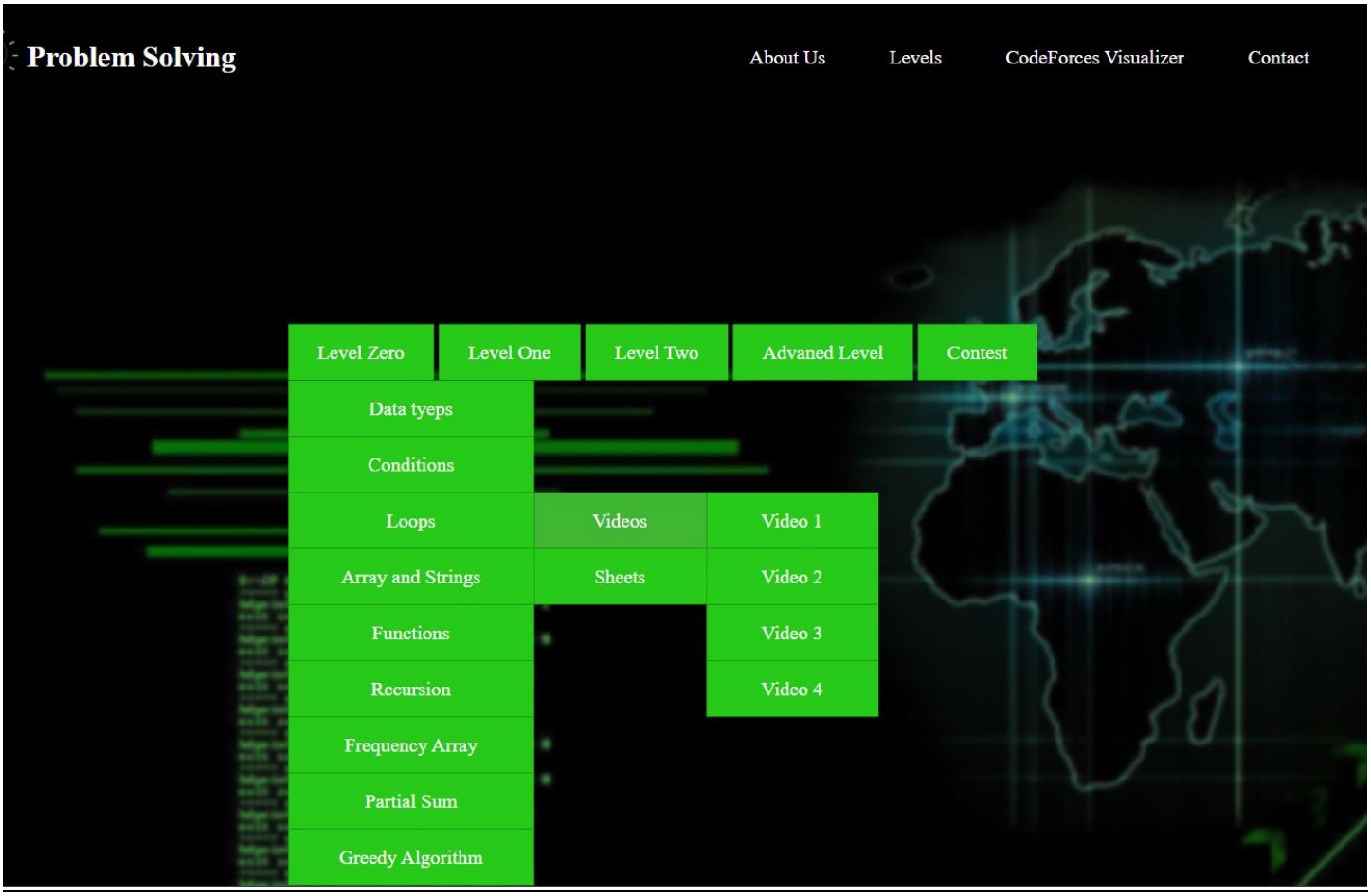
Training Resources and Virtual Contests:

In addition to performance data visualization, the Problem Solving Section offers a wealth of training resources and opportunities for users to hone their competitive programming skills.

Training Sheets and Videos: Curated training materials, including problem sets, solution explanations, and video tutorials, are provided to users to support their learning journey. These resources cover a wide range of topics, from algorithmic techniques to problem-solving strategies, catering to users of all skill levels.

Virtual Contests: Users can participate in virtual contests, which simulate real Codeforces contests and provide opportunities for practice and skill development. These contests are structured to mimic the format and difficulty levels of actual contests, allowing users to test their abilities in a competitive environment without the pressure of live competition.

In summary, the Problem Solving Section of our platform offers a comprehensive suite of features and resources designed to enhance users' competitive programming skills. By integrating automated handle validation, data scraping, data visualization, and access to training resources and virtual contests, we empower users to progress in their competitive programming journeys with confidence and proficiency.



Automated Data base:

1-Codeforces Handle Validation:

- When a user signs up for the problem-solving section of our platform, they are prompted to input their Codeforces handle, which is their unique identifier on the Codeforces platform.
- Our system then automatically verifies the validity of the provided Codeforces handle using the Codeforces API. This API call checks if the handle exists on Codeforces and if it is associated with an active user account.
- If the handle is valid, the user is granted access to the problem-solving section of our platform. If not, appropriate error messages are displayed to the user, prompting them to input a valid handle.

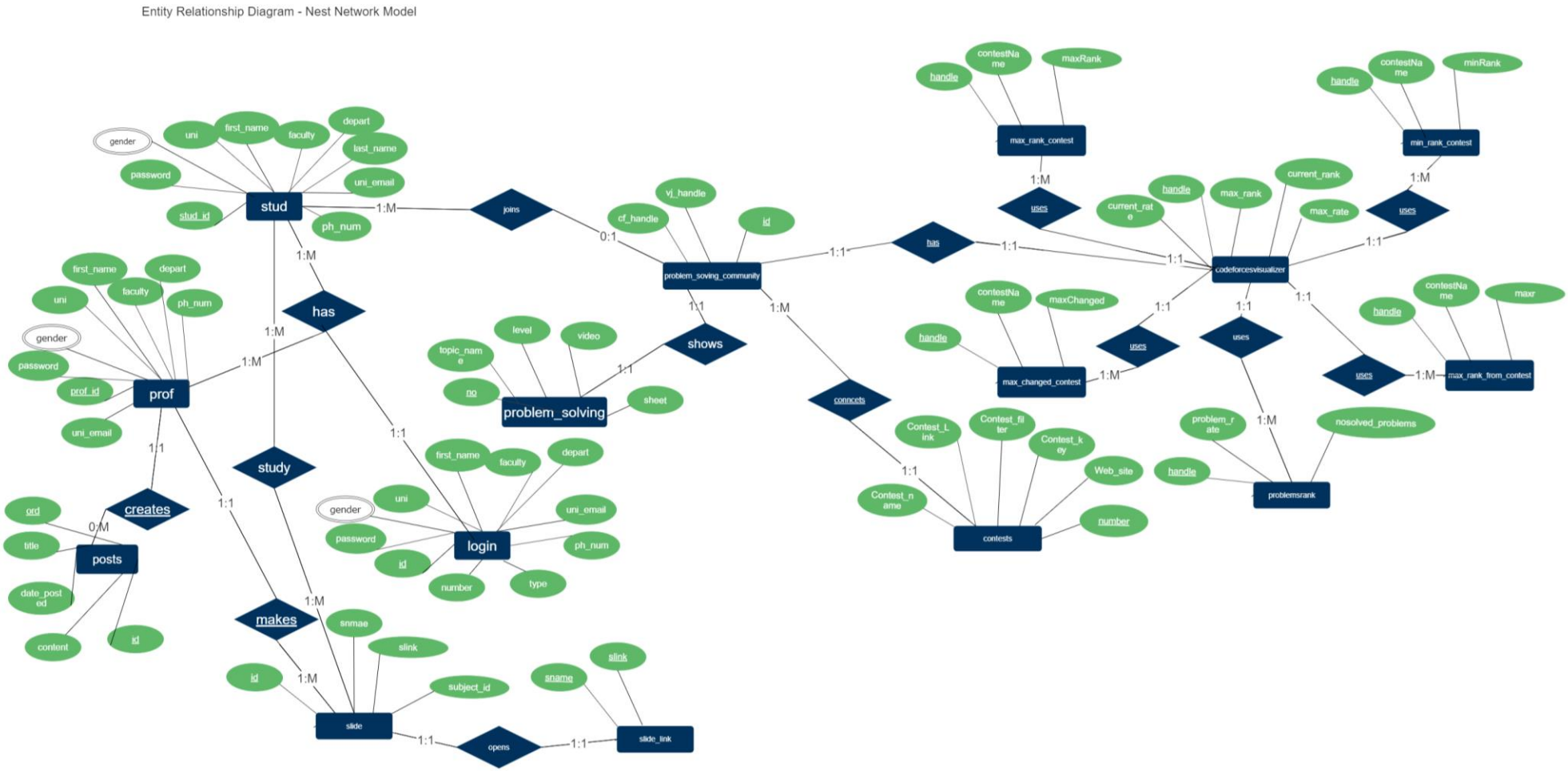
2. Data Scraping from Codeforces:

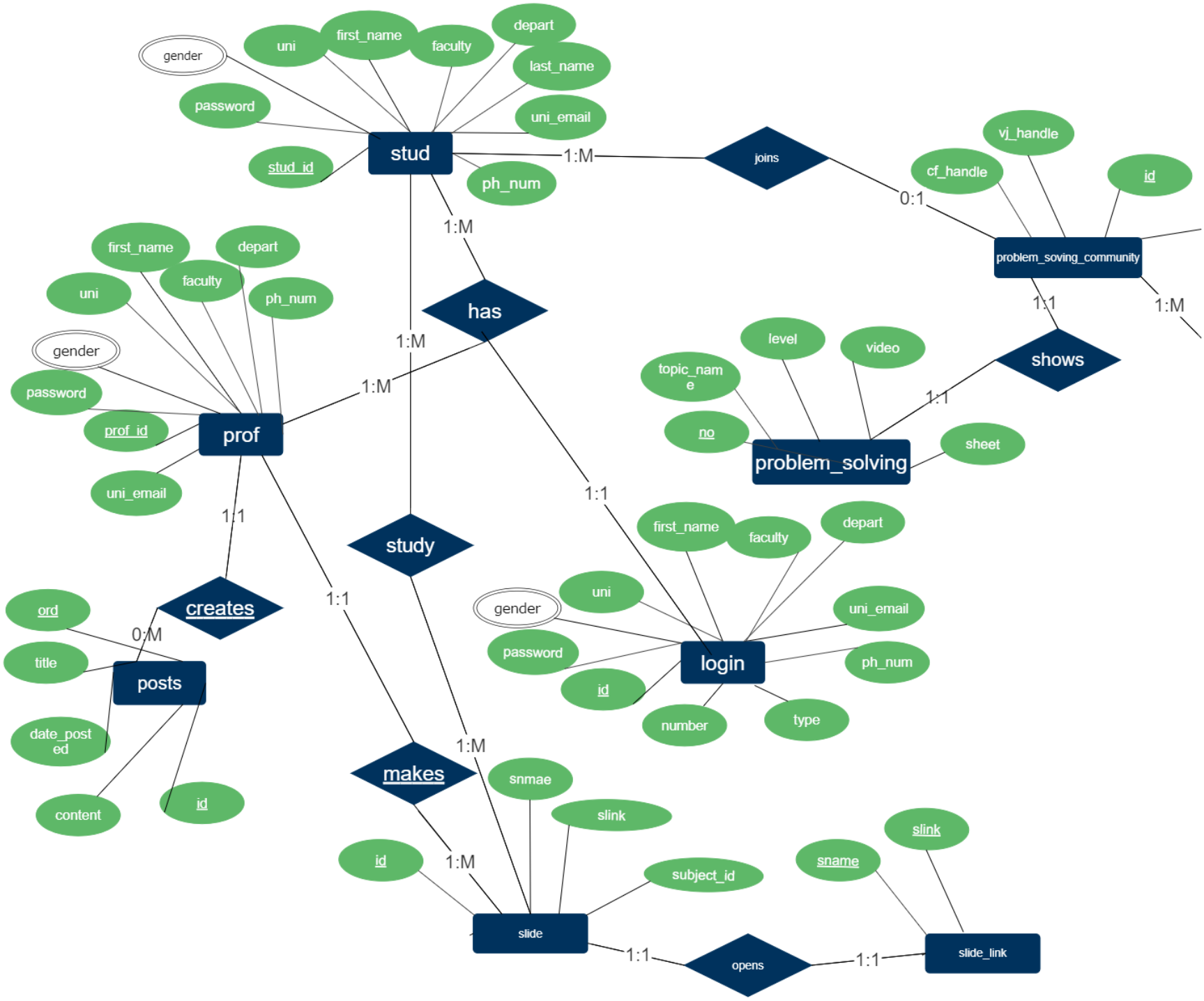
- Once a user's Codeforces handle is validated, our platform initiates automated data scraping processes to collect relevant performance data from the Codeforces website.
- This scraping process gathers a wide range of user-specific data, including maximum rating, current rating, contest histories, participation statistics, and other performance metrics.
- Web scraping techniques are employed to extract this data from the Codeforces website programmatically. This involves parsing HTML content, navigating through web pages, and extracting relevant information using predefined scraping scripts.

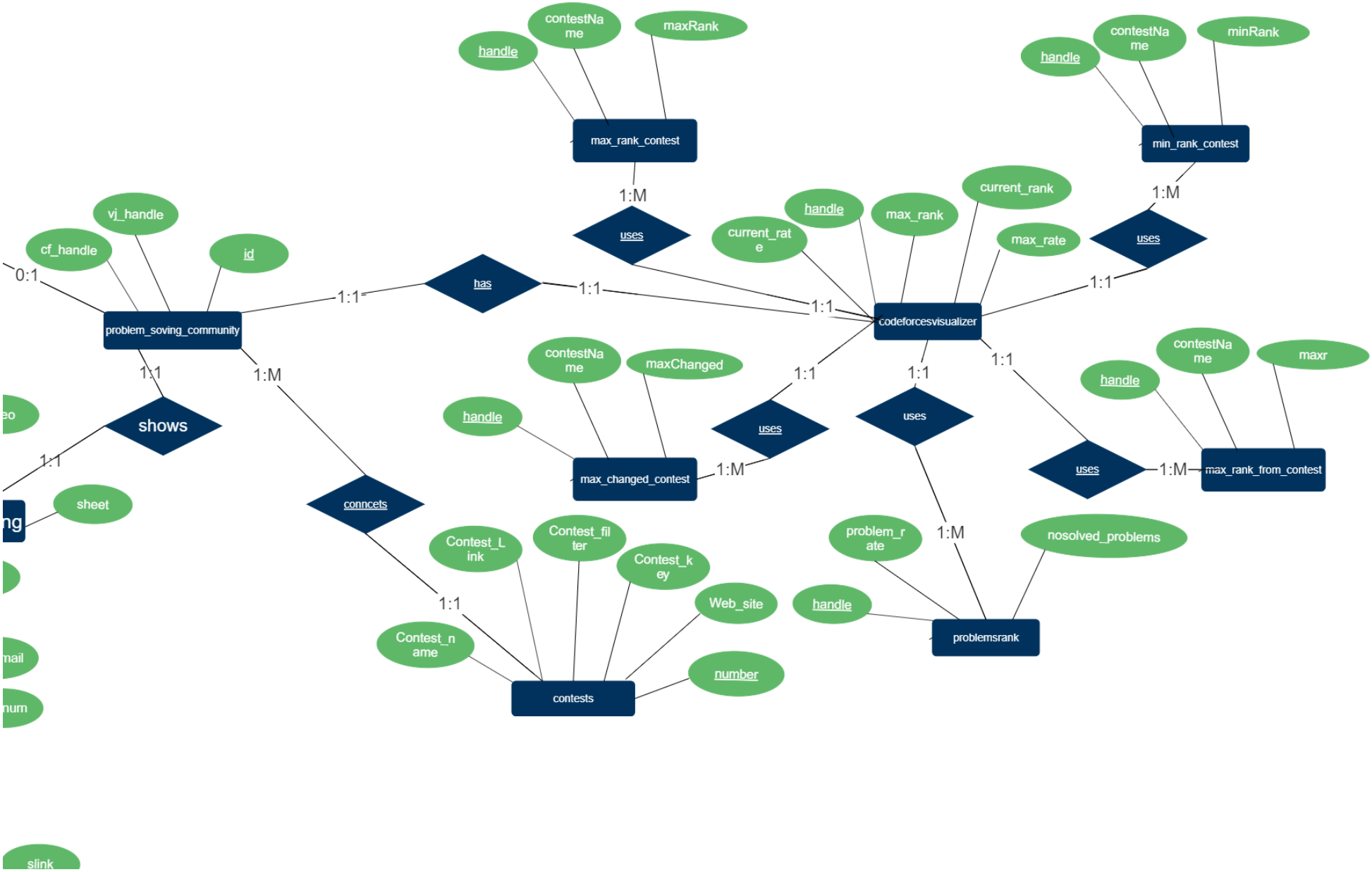
3. Data Storage and Database Automation:

- The collected user performance data is then automatically stored in our platform's database, eliminating the need for manual data entry or user intervention.
- The database schema is designed to accommodate the various types of user data collected from Codeforces, with tables and relationships established to maintain data integrity and support efficient querying.
- Automated database management processes ensure that newly scraped data is inserted or updated in the database seamlessly, keeping user profiles up-to-date with the latest information from Codeforces.
- Caching mechanisms may be implemented to optimize database performance, reducing the frequency of API calls and improving response times for user queries related to Codeforces data.

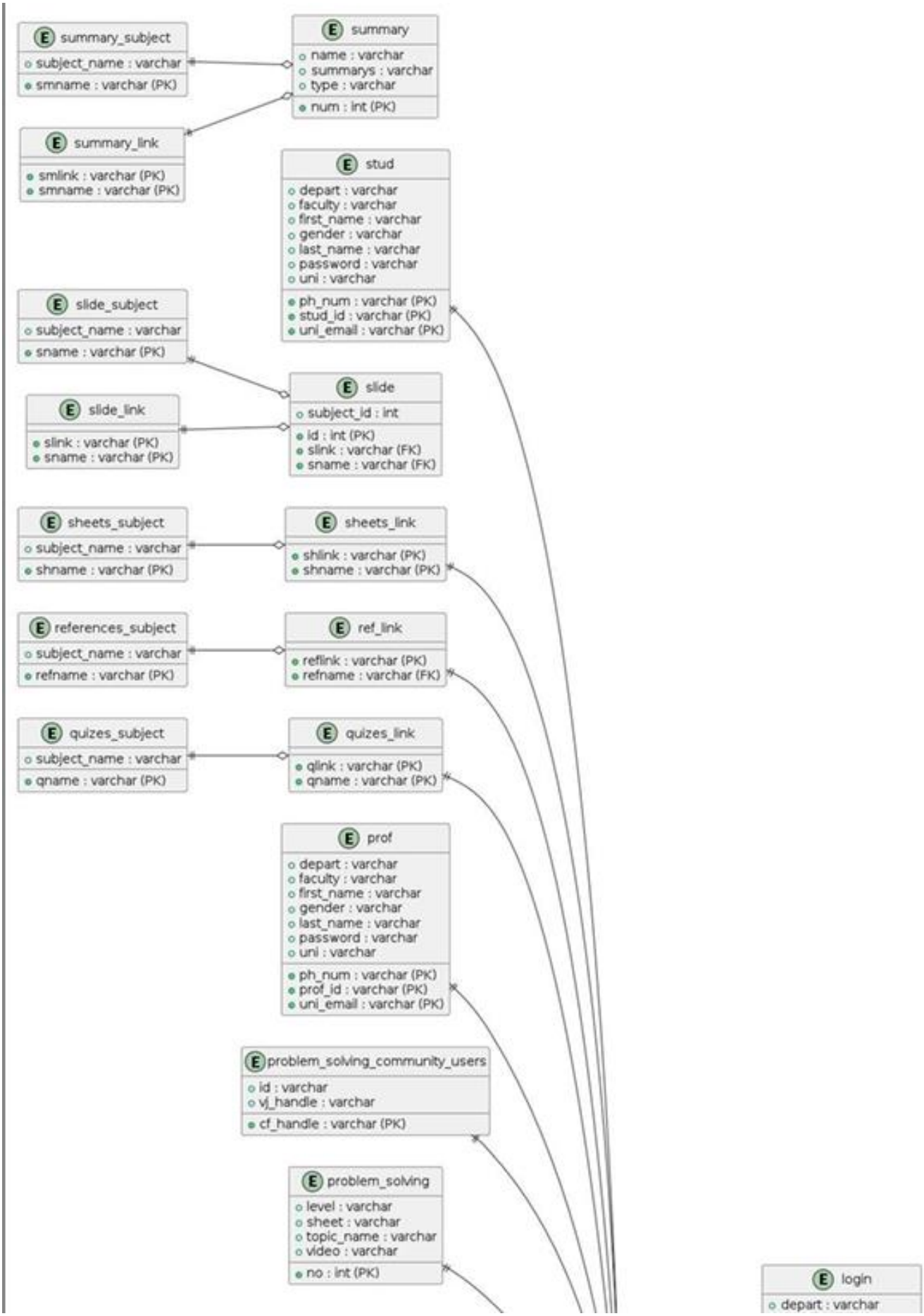
7-ER Diagram

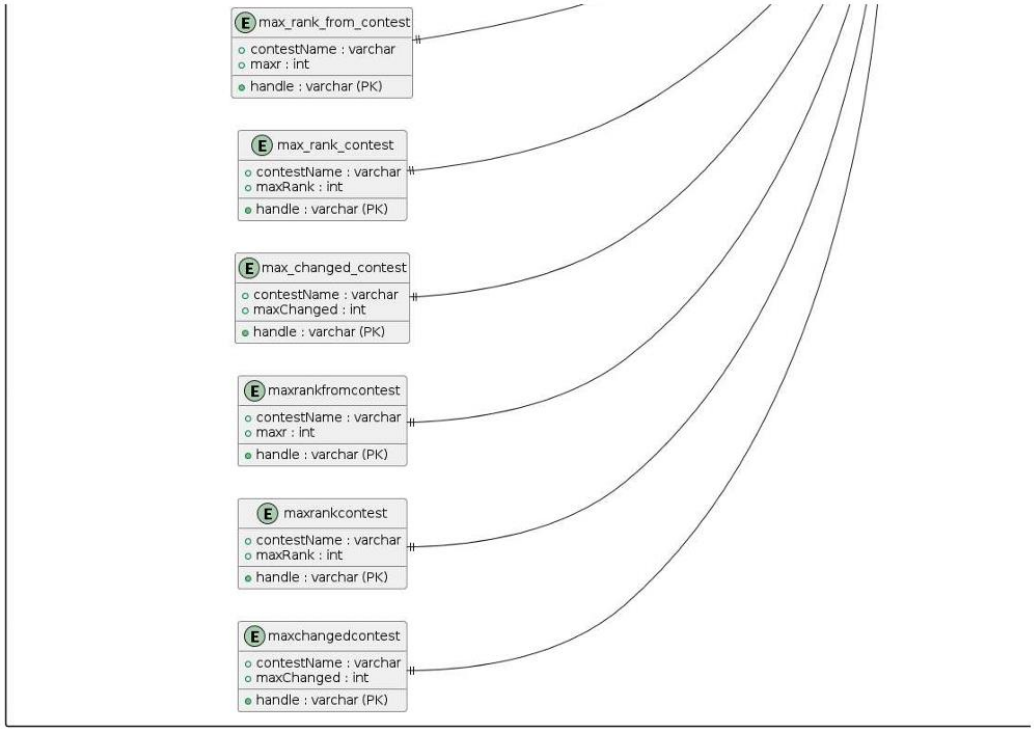

Entity Relationship Diagram - Nest Network Model
stud
gender
uni
first_name
faculty
depart
last_name
password
uni_email
stud_id
ph_num
joins
1:M
0:1
vj_handle
cf_handle
id
problem_soving_community
1:1
1:M
has
shows
conncets
prof
first_name
depart
uni
faculty
ph_num
gender
password
prof_id
uni_email
creates
ord
title
posts
date_post ed
content
id
0:M
study
problem_solving
level
video
topic_nam e
no
sheet
login
first_name
faculty
depart
gender
uni
uni_email
password
id
ph_num
number
type
makes
snmae
slink
id
subject_id
slide
sname
slink
opens
slide_link
has
max_rank_contest
contestNa me
maxRank
handle
min_rank_contest
minRank
uses
current_rat e
max_rank
current_rank
max_rate
codeforcesvisualizer
max_changed_contest
maxChanged
max_rank_from_contest
maxr
Contest_L ink
Contest_fil ter
Contest_k ey
Web_site
Contest_n ame
contests
number
problem_r ate
nosolved_problems
problemsrank


gender
uni
first_name
faculty
depart
last_name
password
uni_email
stud_id
stud
ph_num
1:M
joins
0:1
vj_handle
cf_handle
id
problem_soving_community
1:1
1:M
first_name
depart
faculty
uni
ph_num
has
1:M
gender
password
prof_id
prof
uni_email
1:M
level
video
topic_nam
e
shows
1:1
no
problem_solving
sheet
1:1
1:1
study
first_name
faculty
depart
ord
creates
1:1
gender
uni
uni_email
0:M
title
posts
password
login
ph_num
id
date_post
ed
number
type
1:M
makes
snmae
slink
content
id
id
1:M
subject_id
slink
sname
slide
1:1
opens
1:1
slide_link


contestNa me
maxRank
handle
max_rank_contest
contestNa me
minRank
handle
min_rank_contest
1:M
1:M
uses
uses
vj_handle
cf_handle
id
0:1
has
1:1
1:1
problem_soving_community
codeforcesvisualizer
handle
max_rank
current_rank
current_rat e
max_rate
1:1
1:1
1:1
1:1
1:M
shows
1:1
contestNa me
maxChanged
handle
max_changed_contest
uses
uses
contestNa me
maxr
handle
max_rank_from_contest
uses
1:M
1:M
sheet
conncets
Contest_L ink
Contest_fil ter
Contest_k ey
Web_site
Contest_n ame
number
contests
1:1
problem_r ate
nosolved_problems
handle
problemsrank
1:M
slink

8-Relational Diagram




max_rank_from_contest
contestName : varchar
maxr : int
handle : varchar (PK)
max_rank_contest
contestName : varchar
maxRank : int
handle : varchar (PK)
max_changed_contest
contestName : varchar
maxChanged : int
handle : varchar (PK)
maxrankfromcontest
contestName : varchar
maxr : int
handle : varchar (PK)
maxrankcontest
contestName : varchar
maxRank : int
handle : varchar (PK)
maxchangedcontest
contestName : varchar
maxChanged : int
handle : varchar (PK)

9-Queries

```
CREATE DATABASE hnn;

CREATE TABLE Problem_solving_community_users (
    cf_handle VARCHAR(50) PRIMARY KEY,
    vj_handle VARCHAR(50),
    id VARCHAR(50)
);

CREATE TABLE Codeforcesvisualizer (
    handle VARCHAR(50) PRIMARY KEY,
    max_rank INT,
    current_rank INT,
    max_rate INT,
    current_rate INT,
    FOREIGN KEY (handle) REFERENCES Problem_solving_community_users(cf_handle)
);

CREATE TABLE Max_changed_contest (
    handle VARCHAR(50) PRIMARY KEY,
    contestName VARCHAR(50),
    maxChanged INT,
    FOREIGN KEY (handle) REFERENCES Problem_solving_community_users(cf_handle)
);

CREATE TABLE Max_rank_contest (
    handle VARCHAR(50) PRIMARY KEY,
    contestName VARCHAR(50),
    maxRank INT,
    FOREIGN KEY (handle) REFERENCES Problem_solving_community_users(cf_handle)
);

CREATE TABLE Min_rank_contest (
    handle VARCHAR(50) PRIMARY KEY,
    contestName VARCHAR(50),
    minRank INT,
    FOREIGN KEY (handle) REFERENCES Problem_solving_community_users(cf_handle)
);

CREATE TABLE Max_rank_from_contest (
    handle VARCHAR(50) PRIMARY KEY,
    contestName VARCHAR(50),
    maxr INT,
    FOREIGN KEY (handle) REFERENCES Problem_solving_community_users(cf_handle)
);

CREATE TABLE Problemsrank (
    handle VARCHAR(50) NOT NULL,
    problem_rate INT NOT NULL,
    nosolved_problems INT,
    PRIMARY KEY (handle, problem_rate),
    FOREIGN KEY (handle) REFERENCES Problem_solving_community_users(cf_handle)
);

CREATE TABLE problem_solving (
    no INT PRIMARY KEY,
    topic_name VARCHAR(50),
    level VARCHAR(50),
    video VARCHAR(50),
    sheet VARCHAR(50)
```

```
);

CREATE TABLE Login (
    number VARCHAR(50) PRIMARY KEY,
    id VARCHAR(50),
    first_name VARCHAR(50),
    last_name VARCHAR(50),
    uni_email VARCHAR(50) UNIQUE,
    password VARCHAR(50),
    uni VARCHAR(50),
    faculty VARCHAR(50),
    depart VARCHAR(50),
    gender VARCHAR(50),
    ph_num VARCHAR(50),
    type VARCHAR(50)
);

CREATE TABLE Prof (
    prof_id VARCHAR(50) PRIMARY KEY,
    first_name VARCHAR(50),
    last_name VARCHAR(50),
    uni_email VARCHAR(50) UNIQUE,
    password VARCHAR(50),
    uni VARCHAR(50),
    faculty VARCHAR(50),
    depart VARCHAR(50),
    gender VARCHAR(50),
    ph_num VARCHAR(50) UNIQUE
);

CREATE TABLE Contests (
    Contest_name VARCHAR(50),
    Contest_link VARCHAR(50),
    Contest_filter VARCHAR(50),
    Contest_key VARCHAR(50),
    web_site VARCHAR(50),
    number VARCHAR(50) PRIMARY KEY
);

CREATE TABLE Slide (
    id INT PRIMARY KEY NOT NULL,
    sname VARCHAR(200) NOT NULL,
    slink VARCHAR(1000),
    subject_id INT NOT NULL
);

CREATE TABLE Stud (
    stud_id VARCHAR(50) PRIMARY KEY,
    first_name VARCHAR(50),
    last_name VARCHAR(50),
    uni_email VARCHAR(50) UNIQUE,
    password VARCHAR(50),
    uni VARCHAR(50),
    faculty VARCHAR(50),
    depart VARCHAR(50),
    gender VARCHAR(50),
    ph_num VARCHAR(50)
);
```

```
INSERT INTO contests (Contest_name, Contest_Link, Contest_filter, Contest_key,
Web_site, number) VALUES

('Codeforces Round 501 (Div. 3)', 'https://codeforces.com/contest/1015', 'Div.
3', '3', 'CodeForces', '964'),
('Educational Codeforces Round 48 (Rated for Div. 2)',
'https://codeforces.com/contest/1016', 'Div. 2', '2', 'CodeForces', '965'),
('Codeforces Round 502 (in memory of Leopoldo Taravi',
'https://codeforces.com/contest/1017', 'Div.1 & 2', '1,2', 'CodeForces', '966'),
('Codeforces Round 503 (by SIS, Div. 1)', 'https://codeforces.com/contest/1019',
'Div. 1', '1', 'CodeForces', '967'),
('Codeforces Round 503 (by SIS, Div. 2)', 'https://codeforces.com/contest/1020',
'Div. 2', '2', 'CodeForces', '968'),
('Codeforces Round 504 (rated, Div. 1 + Div. 2, base',
'https://codeforces.com/contest/1023', 'Div.1 & 2', '1,2', 'CodeForces', '969'),
('Yandex.Algorithm 2011: Finals', 'https://codeforces.com/contest/97', NULL,
NULL, 'CodeForces', '97'),
('Codeforces Round 505 (rated, Div. 1 + Div. 2, base',
'https://codeforces.com/contest/1025', 'Div.1 & 2', '1,2', 'CodeForces', '970'),
('Educational Codeforces Round 49 (Rated for Div. 2)',
'https://codeforces.com/contest/1027', 'Div. 2', '2', 'CodeForces', '971'),
('AIM Tech Round 5 (rated, Div. 1 + Div. 2)',
'https://codeforces.com/contest/1028', 'Div.1 & 2', '1,2', 'CodeForces', '972'),
('Codeforces Round 506 (Div. 3)', 'https://codeforces.com/contest/1029', 'Div.
3', '3', 'CodeForces', '973'),
('Technocup 2019 - Elimination Round 1', 'https://codeforces.com/contest/1030',
NULL, NULL, 'CodeForces', '974'),
('Technocup 2019 - Elimination Round 2', 'https://codeforces.com/contest/1031',
NULL, NULL, 'CodeForces', '975'),
('Technocup 2019 - Elimination Round 3', 'https://codeforces.com/contest/1032',
NULL, NULL, 'CodeForces', '976'),
('Lyft Level 5 Challenge 2018 - Elimination Round',
'https://codeforces.com/contest/1033', NULL, NULL, 'CodeForces', '977'),
('Codeforces Round 511 (Div. 1)', 'https://codeforces.com/contest/1034', 'Div.
1', '1', 'CodeForces', '978'),
('Educational Codeforces Round 50 (Rated for Div. 2)',
'https://codeforces.com/contest/1036', 'Div. 2', '2', 'CodeForces', '979'),
('Codeforces Beta Round 78 (Div. 1 Only)', 'https://codeforces.com/contest/98',
'Div. 1', '1', 'CodeForces', '98'),
('Manthan, Codefest 18 (rated, Div. 1 + Div. 2)',
'https://codeforces.com/contest/1037', 'Div.1 & 2', '1,2', 'CodeForces', '980'),
('Codeforces Round 508 (Div. 2)', 'https://codeforces.com/contest/1038', 'Div.
2', '2', 'CodeForces', '981'),
('Codeforces Round 507 (Div. 1, based on Olympiad of',
'https://codeforces.com/contest/1039', 'Div. 1', '1', 'CodeForces', '982'),
('Codeforces Round 507 (Div. 2, based on Olympiad of',
'https://codeforces.com/contest/1040', 'Div. 2', '2', 'CodeForces', '983'),
('Codeforces Round 509 (Div. 2)', 'https://codeforces.com/contest/1041', 'Div.
2', '2', 'CodeForces', '984'),
('Codeforces Round 510 (Div. 2)', 'https://codeforces.com/contest/1042', 'Div.
2', '2', 'CodeForces', '985'),
('Codeforces Round 519 by Botan Investments',
'https://codeforces.com/contest/1043', NULL, NULL, 'CodeForces', '986'),
('Lyft Level 5 Challenge 2018 - Final Round',
'https://codeforces.com/contest/1044', NULL, NULL, 'CodeForces', '987'),
('Bubble Cup 11 - Finals [Online Mirror, Div. 1]',
'https://codeforces.com/contest/1045', 'Div. 1', '1', 'CodeForces', '988'),
('Bubble Cup 11 - Finals [Online Mirror, Div. 2]',
'https://codeforces.com/contest/1046', 'Div. 2', '2', 'CodeForces', '989'),
('Codeforces Beta Round 78 (Div. 2 Only)', 'https://codeforces.com/contest/99',
'Div. 2', '2', 'CodeForces', '99'),
('Codeforces Round 511 (Div. 2)', 'https://codeforces.com/contest/1047', 'Div.
2', '2', 'CodeForces', '990'),
```

```
('Educational Codeforces Round 51 (Rated for Div. 2)',
'https://codeforces.com/contest/1051', 'Div. 2', '2', 'CodeForces', '991'),
('Huawei Honorcup Marathon 1', 'https://codeforces.com/contest/1052', NULL, NULL,
'CodeForces', '992'),
('Codeforces Round 512 (Div. 1, based on Technocup 2',
'https://codeforces.com/contest/1053', 'Div. 1', '1', 'CodeForces', '993'),
('Mail.Ru Cup 2018 Round 1', 'https://codeforces.com/contest/1054', NULL, NULL,
'CodeForces', '994'),
('Mail.Ru Cup 2018 Round 2', 'https://codeforces.com/contest/1055', NULL, NULL,
'CodeForces', '995'),
('Mail.Ru Cup 2018 Round 3', 'https://codeforces.com/contest/1056', NULL, NULL,
'CodeForces', '996'),
('Mail.Ru Cup 2018 - Practice Round', 'https://codeforces.com/contest/1057',
NULL, NULL, 'CodeForces', '997'),
('Codeforces Round 512 (Div. 2, based on Technocup 2',
'https://codeforces.com/contest/1058', 'Div. 2', '2', 'CodeForces', '998'),
('Codeforces Round 514 (Div. 2)', 'https://codeforces.com/contest/1059', 'Div.
2', '2', 'CodeForces', '999');

ALTER TABLE problem_solving
ALTER COLUMN sheet VARCHAR(255);


INSERT INTO problem_solving (no, topic_name,level, video,sheet) VALUES
(1, 'Data_Types', '0', 'https://youtu.be/FBjOHTuOIqo?si=1Et7lmcIgKnDuBJv',
'https://codeforces.com/group/MWSDmqGsZm/contest/219158'),
(2, 'Conditions', '0', 'https://youtu.be/F56Bo4I0GhA?si=V6FLPaZIqFkkwP5u',
'https://codeforces.com/group/MWSDmqGsZm/contest/219158'),
(3, 'Loops', '0', 'https://youtu.be/cgpgpGuXIZk?si=Pi71oZp8NibBlmFw',
'https://codeforces.com/group/MWSDmqGsZm/contest/219432'),
(4, 'Loops', '0', 'https://youtu.be/z6RiKl9-eao?si=UxpPub3oCMwGr6NK',
'https://codeforces.com/group/MWSDmqGsZm/contest/219432'),
(5, 'Loops', '0', 'https://youtu.be/uFI22C5DFnU?si=h6OcRtj3QEv6EdTI',
'https://codeforces.com/group/MWSDmqGsZm/contest/219432'),
(6, 'Loops', '0', 'https://youtu.be/YjiSuzc2pAM?si=Od3mWg8ReETLDdlW',
'https://codeforces.com/group/MWSDmqGsZm/contest/219432'),
(7, 'Arrays_and_Strings', '0',
'https://youtu.be/eEdRb_7nDO8?si=gRYQoeixXhZmylc3',
'https://codeforces.com/group/MWSDmqGsZm/contest/219774'),
(8, 'Arrays_and_Strings', '0', 'https://youtu.be/4394gle-
Juk?si=RZcmdW9YEdJrrZK6',
'https://codeforces.com/group/MWSDmqGsZm/contest/219774'),
(9, 'Arrays_and_Strings', '0',
'https://youtu.be/t3tOvocy9xw?si=vYFLhPqaWomwpJfO',
'https://codeforces.com/group/MWSDmqGsZm/contest/219774'),
(10, 'Arrays_and_Strings', '0',
'https://youtu.be/vIRZCZyx2hA?si=wKiI_3aNSCqOqDBM',
'https://codeforces.com/group/MWSDmqGsZm/contest/219774'),
(11, 'Arrays_and_Strings', '0',
'https://youtu.be/TmU8_LvroSI?si=emCht6EdUvifdKX1',
'https://codeforces.com/group/MWSDmqGsZm/contest/219856'),
(12, 'Arrays_and_Strings', '0', 'https://youtu.be/HOB-
Ey3tEqY?si=KfsefCfCpRZu1w3y',
'https://codeforces.com/group/MWSDmqGsZm/contest/219856'),
(13, 'Functions', '0', 'https://youtu.be/9CeQHw1J2Xs?si=tH-T03O7URBQLeTC',
'https://codeforces.com/group/MWSDmqGsZm/contest/223205'),
(14, 'Functions', '0', 'https://youtu.be/pRVrMNd694I?si=66r1LdVLBpXLnArZ',
'https://codeforces.com/group/MWSDmqGsZm/contest/223205'),
(15, 'Functions', '0', 'https://youtu.be/QjKUXcig4is?si=2YDE6_IWkrrJdzK6',
'https://codeforces.com/group/MWSDmqGsZm/contest/223205'),
(16, 'Functions', '0', 'https://youtu.be/Noi-WtvDKSo?si=Wc4pTio1v1buh_eM',
'https://codeforces.com/group/MWSDmqGsZm/contest/223205'),
```

```
(17, 'Functions', '0', 'https://youtu.be/Rt_LkJ04d7k?si=eIRdwvS9SrtuOulB',
'https://codeforces.com/group/MWSDmqGsZm/contest/223205'),
(18, 'Recursion', '0', 'https://youtu.be/MMY077l9awA?si=5ZZmYltoknzx91oR',
'https://codeforces.com/group/MWSDmqGsZm/contest/223339'),
(19, 'Recursion', '0', 'https://youtu.be/38v5dv7LNJU?si=N3wFB8OQZEUeDeX1',
'https://codeforces.com/group/MWSDmqGsZm/contest/223339'),
(20, 'Frequency_Array', '0', 'https://youtu.be/Y_LiOgx4KCM?si=TkUsxHRg8XNnZC_g',
'https://codeforces.com/group/isP4JMZTix/contest/380288'),
(21, 'Partial_Sum', '0', 'https://www.youtube.com/watch?v=SWZXjW9O9wk',
'https://codeforces.com/group/isP4JMZTix/contest/386415'),
(22, 'Greedy', '0', 'https://youtu.be/HzeK7g8cD0Y?si=3XbGJWi72wapPzO7',
'https://codeforces.com/problemset?tags=greedy'),
(23, 'Stls', '1', 'https://youtu.be/uyQv2MnHMQo?si=_eLPcDA_YqXlPPyH',
'https://vjudge.net/contest/583343'),
(24, 'Stls', '1', 'https://youtu.be/fqJJrwDjEi8?si=bc8yiI9toPyXAcxe',
'https://vjudge.net/contest/585111'),
(25, 'Sorting', '1', 'https://youtu.be/EnodMqJuQEo?si=nXOuquB276DVDMR9', 'null'),
(26, 'Sorting', '1', 'https://youtu.be/pIEGHDZHOCk?si=5rAcuELmeySsz_Zl', 'null'),
(27, 'Sorting', '1', 'https://youtu.be/JecAk1FAOck?si=0GXfb4Zzuh1HyZsF', 'null'),
(28, 'Sorting', '1', 'https://youtu.be/3P43wofKYOM?si=PttXY6A2TWRyFQs4', 'null'),
(29, 'Sorting', '1', 'https://youtu.be/lOB2TIwBiX8?si=6n9NOutWUbpze9l3', 'null'),
(30, 'Sorting', '1', 'https://youtu.be/REOsj0nYWKE?si=BLtYMkk7nujlOT-z', 'null'),
(31, 'Binary search and two pointers', '1',
'https://youtu.be/ji0Ty8wmfLM?si=XOBMldAUNL-keK4Y',
'https://vjudge.net/contest/589623'),
(32, 'Bitmask', '1', 'https://youtu.be/M9OVj7-6Qwo?si=fQehJFu60kieQrp2',
'https://vjudge.net/contest/599361'),
(33, 'Recursion and backtrack', '1', 'https://youtu.be/z-
nkTgkzBEA?si=vHZYs9sqeLCVYlbF', 'null'),
(34, 'Recursion and backtrack', '1', 'https://youtu.be/LJENoaSqDKI?si=AphwYFUzK-
OkvG9j', 'null');

CREATE TABLE Posts (
    ord INT PRIMARY KEY,
    title VARCHAR(100),
    content TEXT,
    date_posted DATETIME NOT NULL DEFAULT GETDATE()
);

INSERT INTO Posts (ord, title, content)
VALUES ('1', 'New Post', 'This is a new post.');


INSERT INTO Slide (id, sname, slink, subject_id)
VALUES ('1', 'slide_name_from_backend', 'link_from_back_end', '1');

select *
from stud
where uni_email = 'given_email_from_back_end'

select *
from prof
where uni_email = 'given_email_from_back_end'

select *
from stud
where stud_id = 'given_id_from_back_end'

select *
from prof
where prof_id = 'given_id_from_back_end'
```

```
INSERT INTO login (number, id, first_name, last_name, uni_email, password, uni,
faculty, depart, gender, ph_num, type)
SELECT '1', stud_id, first_name, last_name, uni_email, password, uni, faculty,
depart, gender, ph_num, 'Student'
FROM stud
WHERE stud_id = 'your_id_from_back_end';

INSERT INTO login (number, id, first_name, last_name, uni_email, password, uni,
faculty, depart, gender, ph_num, type)
SELECT '1', prof_id, first_name, last_name, uni_email, password, uni, faculty,
depart, gender, ph_num, 'Student'
FROM prof
WHERE prof_id = 'your_id_back_end';

delete from login
where id = 'Given_id_back_end'

select * from login

INSERT INTO Codeforcesvisualizer (handle, max_rank, current_rank, max_rate,
current_rate)
VALUES ('cf_handle_value', 'Max_Rank_value', 'Rank_value', 'Max_Rating_value',
'Rating_value');

INSERT INTO Problemsrank (handle, problem_rate, nosolved_problems)
VALUES ('handle from back end', 'problem_rate from back end', 'nosolved_problems
from back end');

INSERT INTO Max_rank_contest (handle, maxRank, contestName)
VALUES ('handle from back end', 'maxRank from back end', 'contestName from back
end');

INSERT INTO Min_rank_contest (handle, minRank, contestName)
VALUES ('handle from back end', 'minRank from back end', 'contestName from back
end');

INSERT INTO Max_changed_contest (handle, maxChanged, contestName)
VALUES ('handle from back end', 'maxChanged from back end', 'contestName from
back end');

INSERT INTO Max_rank_from_contest (handle, maxr, contestName)
VALUES ('handle from back end', 'maxr from back end', 'contestName from back
end');

UPDATE Problemsrank
SET nosolved_problems = 'nosolved_problems from back end'
WHERE handle = 'handle from back end' AND problem_rate = 'problem_rate from back
end';

UPDATE Max_rank_contest
SET maxRank = 'maxRank from back end', contestName = 'contestName from back end'
WHERE handle = 'handle from back end';

UPDATE Min_rank_contest
SET minRank = 'minRank from back end', contestName = 'contestName from back end'
WHERE handle = 'handle from back end';

UPDATE Max_changed_contest
SET maxChanged = 'maxChanged from back end', contestName = 'contestName from back
end'
WHERE handle = 'handle from back end';

UPDATE Max_rank_from_contest
```

```
SET maxr = 'maxr from back end', contestName = 'contestName from back end'
WHERE handle = 'handle from back end';

INSERT INTO Stud (stud_id, first_name, last_name, uni_email, password, uni,
faculty, depart, gender, ph_num)
VALUES ('stud_id_value', 'first_name_value', 'last_name_value',
'uni_email_value', 'password_value', 'uni_value', 'faculty_value',
'depart_value', 'gender_value', 'ph_num_value');

INSERT INTO Prof (prof_id, first_name, last_name, uni_email, password, uni,
faculty, depart, gender, ph_num)
VALUES ('prof_id_value', 'first_name_value', 'last_name_value',
'uni_email_value', 'password_value', 'uni_value', 'faculty_value',
'depart_value', 'gender_value', 'ph_num_value');
```

10- Design and User Experience

The user experience (UX) and interface design of our platform are central to ensuring user engagement and satisfaction. By prioritizing aesthetics, responsiveness, and usability, we aim to create an immersive learning environment that captivates users and facilitates their educational journey.

Use of CSS and Bootstrap for Design:

Custom CSS enhancements and Bootstrap components play a pivotal role in shaping the visual identity and layout of our platform. Leveraging the power of CSS, we implement bespoke design elements and styling tweaks to infuse the platform with personality and flair. From subtle animations to vibrant color schemes, every aspect of the design is meticulously crafted to resonate with users and convey a sense of professionalism and modernity.

Additionally, Bootstrap serves as a foundational framework for ensuring consistency and responsiveness across devices. By harnessing the robust grid system, pre-built components, and utility classes offered by Bootstrap, we streamline the development process and achieve a harmonious balance between form and function. Whether users access the platform on desktops, tablets, or smartphones, they can expect a seamless and visually pleasing experience that adapts effortlessly to their chosen device.

Enhancing User Experience:

At the heart of our platform lies a commitment to delivering an exceptional user experience characterized by intuitive navigation, interactive elements, and user-friendly interfaces. By prioritizing usability, we empower users to explore, learn, and engage with the platform's features effortlessly.

Interactive elements such as buttons, dropdowns, and sliders invite users to interact with the platform in meaningful ways, fostering a sense of agency and control. Intuitive navigation structures guide users through the platform's content logically, ensuring that they can find what they need quickly and efficiently. Clear calls-to-action and visual cues help users understand the next steps they should take, whether it's signing up for a course, participating in a contest, or accessing learning materials.

User-friendly forms, meticulously designed with input validation and error handling in mind, streamline the process of account creation, login, and data submission. By removing friction points and anticipating user needs, we create a frictionless journey that encourages users to immerse themselves fully in the learning experience.

Challenges and Solutions

Technical Challenges Faced:

The development of our platform was not without its challenges, particularly in navigating the complexities of integrating multiple APIs, managing web scraping processes, and optimizing database queries.

Integrating Multiple APIs: Each API comes with its unique set of requirements, endpoints, and data formats, making seamless integration a daunting task. However, through diligent research, documentation review, and iterative testing, we successfully integrated the necessary APIs into our platform, ensuring smooth data exchange and functionality.

Managing Web Scraping Processes: Web scraping involves extracting data from websites programmatically, a process that can be fraught with challenges such as dynamic page structures, rate limiting, and data inconsistencies. To mitigate these challenges, we implemented robust scraping scripts, employed techniques like rate limiting and error handling, and periodically monitored data quality to ensure accuracy and reliability.

Optimizing Database Queries: As the platform's database grew in size and complexity, optimizing database queries became increasingly critical to maintaining performance and scalability. Through query profiling, index optimization, and database schema refinement, we were able to enhance query efficiency and reduce response times, ensuring a seamless user experience even under high loads.

Solutions and Optimizations Implemented:

To overcome these challenges and enhance platform performance, we implemented a range of solutions and optimizations:

Caching Mechanisms: By caching frequently accessed data and query results, we reduced the need for repetitive database queries, thereby improving response times and alleviating database load.

Robust Error Handling: Comprehensive error handling mechanisms were implemented throughout the platform to gracefully handle unexpected errors, provide informative error messages to users, and prevent data loss or corruption.

Database Optimizations: Through careful analysis of database usage patterns and performance metrics, we identified opportunities for optimization, including index creation, query restructuring, and database denormalization. These optimizations improved query performance, reduced latency, and enhanced overall system responsiveness.

Conclusion

In conclusion, our platform represents a significant achievement in providing a comprehensive learning and problem-solving environment. By prioritizing user experience, harnessing the power of technology, and overcoming technical challenges through innovative solutions, we have created a platform that empowers users to pursue their educational and professional aspirations with confidence and proficiency.

Future Improvements and Features

Looking ahead, we envision several opportunities for improvement and expansion that will further elevate the platform's capabilities and enrich the user experience:

Implementing a Recommendation System: Personalized learning paths and course recommendations based on user preferences, performance data, and learning objectives can enhance user engagement and satisfaction, guiding users towards content that aligns with their interests and goals.

Adding Interactive Elements: Incorporating gamification features, interactive challenges, and collaborative learning experiences can foster a sense of community, motivate users to actively participate in the learning process, and make learning more engaging and enjoyable.

Expanding Database and Resources: Continuously expanding the platform's database to include more resources, courses, training materials, and problem-solving resources will enrich the platform's content and utility, catering to the diverse needs and interests of users across different domains and skill levels.