



CS353 Database Systems

Final Report

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[Web Page](#)

Table of Contents

Table of Contents	2
System description	4
E/R diagram	5
List of tables	6
Implementation details	7
Technologies used	7
Problems	7
Group member contribution	7
Aybala Karakaya	7
Çağla Ataoğlu	8
Efe Şaman	8
Erhan Er	8
Advanced database features	8
Reports	8
Views	8
User's manual	9
User	9
Register	9
Login	9
Homepage	9
Profile page	9
All announcements	9
Saved announcements	9
Announcement details	9
All contests	10
Enrolled contests	10
Contest details	10
Contest leaderboard	10
Challenge in contest	10
Old submissions	10
Old submission details	10
Others' submissions	11
Others' submission details	11
All invites	11
Invite details	11

Company	11
Login	11
Register	11
Homepage	11
My announcements	12
Create new announcement	12
Profile	12
All contests	12
Sponsored contests	12
Contest details	12
Contest leaderboard	12
All invites	12
Invite details	13
New invite	13
Editor	13
Login	13
Homepage	13
New coding challenge	13
New non coding challenge	13
New contest	14
Profile	14
Unverified companies	14
Verified companies	14

System description

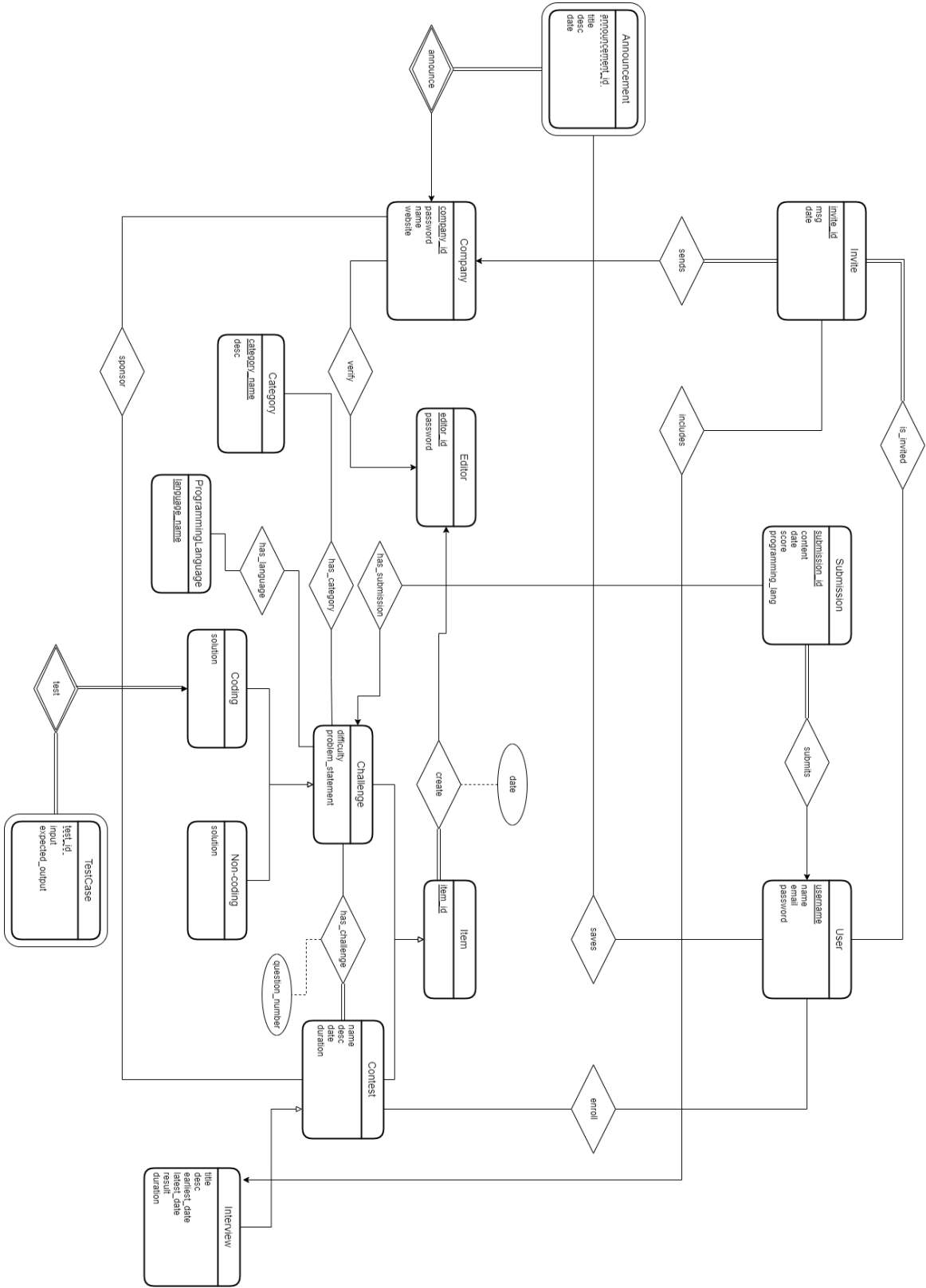
BilkentCodes is a web application for everyone that wants to get better at coding. It provides users with coding and non-coding challenges with a variety of difficulties, categories and programming languages. Users can choose to solve these challenges individually or they can participate in contests, where they need to solve several questions within a time limit.

BilkentCodes allows users to connect with companies as well. Users who are interested in finding jobs, internships or news about programming can see announcements made by companies and save announcements that interest them. BilkentCodes' problem solving system can be used by companies for recruiting. Companies can send invites for a technical interview to users.

BilkentCodes is centered on learning. Users can see old submissions for challenges and go back to previously submitted answers to re-study them. Users can earn points from challenges based on difficulty. With these points, they can see how they rank on contest leaderboards. Contests can be sponsored by companies, who can also see leaderboards so they have the option to reach out to users who scored high on certain contests.

The application is moderated by Editors. Editors are the ones who create challenges and contests. They can verify companies to prevent fake accounts and scammers.

E/R diagram



List of tables

Company(company_id, name, website, password)

Editor(editor_id, password)

verify(editor_id, company_id)

FK: editor_id references Editor

FK: company_id references Company

Announcement(announcement_id, title, desc, date)

announce(company_id, announcement_id)

FK: company_id references Company

FK: announcement_id references Announcement

Item(item_id)

Challenge(item_id, difficulty, problem_statement)

Coding(item_id, solution)

Noncoding(item_id, solution)

Contest(item_id, desc, date, name, duration)

has_challenge(contest_id, challenge_id, question_number)

FK: contest_id references Contest

FK: challenge_id references Challenge

sponsor(company_id, contest_id)

FK: company_id references Company

FK: contest_id references Contest

create(editor_id, item_id, date)

FK: editor_id references Editor

FK: item_id references Item

Category(category_name, desc)

ProgrammingLanguage(language_name)

has_category(challenge_id, category_name)

FK: challenge_id references Challenge

FK: category_name references Category

has_language(challenge_id, language_name)

FK: challenge_id references Challenge

FK: language_name references ProgrammingLanguage

TestCase(test_id, input, expected_output)

test(coding_id, test_id)

FK: coding_id references Coding

FK: test_id references TestCase

User(username, name, email, password)

saves(username, announcement_id)

FK: username references User

FK: announcement_id references Announcement

Submission(submission_id, content, date, score, programming_lang)

submits(username, submission_id)

FK: username references User

FK: submission_id references Submission
has_submission(challenge_id, submission_id)
FK: challenge_id references Challenge
FK: submission_id references Submission
enroll(username, contest_id)
FK: username references User
FK: contest_id references Contest
Invite(invite_id, msg, date)
sends(company_id, invite_id)
FK: company_id references Company
FK: invite_id references Invite
includes(invite_id, interview_id)
FK: invite_id references Invite
FK: interview_id references Interview
is_invited(username, invite_id)
FK: username references User
FK: invite_id references Invite
Interview(item_id, title, desc, earliest_date, latest_date, result, duration)

Implementation details

Technologies used

- Database system: MySQL
- Backend languages: Java and PHP
- Frontend languages: HTML, CSS, JavaScript
- Other: XAMPP, GitHub

Problems

We were not comfortable with PHP as our only experience with it was the programming assignment. We have solved this problem by watching and reading tutorials about the language and reading code written in PHP. Another problem we faced was that some of the criteria given in the evaluation sheet was not present in our initial design. We solved this by extending our design by adding some new features.

Group member contribution

Aybala Karakaya

Implemented the front-end of the user view of all contests, enrolled contests, contest detail, challenge in a contest, leaderboard; the company view of all contests, sponsored contests, contest detail, leaderboard; and the editor view of verified companies, unverified companies, create new contest pages.

Contributed to the project proposal, design report, and final report.

Çağla Ataoğlu

Frontend/UI implementation: user all invites, company all invites, user invite details, company invite details, company new invite, user profile, company profile, editor profile

Helped UI design, helped login/register queries

Reports: Contributed to project proposal, project design report, final report

Efe Şaman

Backend: Helped connect the database to the front end using php. Implemented the register and login features. Helped the query implementations of logging in, registering, challenge fetching, challenge filtering, contest fetching and filtering, announcement fetching. Helped the UI designs.

Reports: Contributed to project proposal, project design report, final report

Erhan Er

UI implementation: Login pages, register pages, home pages, challenge pages, announcement pages.

Backend implementation: Query implementation of home pages, query implementation of challenge pages, query implementation of contest detail pages, query implementation of announcement detail pages.

Reports: Contributed to project proposal, project design report, final report.

Advanced database features

Flexible condition

This query is inserting a new user to the User table and then checks whether that user entered a valid email.

```
$mysqli->query(
    "INSERT INTO User(username, name, email,
password) VALUES " .
    "('$username', '$name', '$email',
'$password')");
    $mysqli->query(
        "DELETE FROM User " .
        "WHERE email NOT LIKE '%@%'"
    );
```

Views

There are 3 different views: user, company, and editor. The user view includes the username, name, and email from the User table. The company view includes the company ID, name, and the website from the Company table. The editor view includes the editor ID from the Editor table.

```
String userView = "CREATE VIEW user_view AS (SELECT username, name, email
FROM User);";

String companyView = "CREATE VIEW company_view AS (SELECT company_id, name,
website FROM Company);";
```



```
String editorView = "CREATE VIEW editor_view AS (SELECT editor_id FROM Editor);";
```

User's manual

User

Register

Enter your preferred username and password along with your name and username to register.

Login

Enter your username and password to login to the system.

Homepage

On the homepage, you can see the challenges. If you click on a challenge, you can see it. If you click on the "Filter" button in the "Challenges" box, you can filter challenges. If you click on the "Random challenge with filters" button, you can see a random challenge based on your filters. You can also see the upcoming contests. If you click on a contest, you can see it. If you click on the "View enrolled contests" button, you can see the contests that you are enrolled in. Additionally, you can see company announcements. If you click on an announcement, you can see it. If you click on the "save" icon next to an announcement, you can save the announcement. If you click on "View saved announcements", you can see the announcements that you saved.

Profile page

In the middle, you can see your username, name and email. Click on "Change password" to update your password. Click on the "View enrolled contests" button to see the contests that you are enrolled in. Click on the "View saved announcements" button to see all the announcements you saved. Click on "View Old Submissions" to see your previous submissions. On the left, click on "Back to homepage" to go to the homepage.

All announcements

On this page, you can see all the announcements. To see the details of an announcement, click on that announcement. Click on the "save" icon next to an announcement to save or unsave that announcement. If the icon is white, it means that the announcement is not currently saved. If the icon is filled, it means that the announcement is saved. Alternatively, you can save an announcement using the detailed page of that announcement. Click on the "Filter companies" button to filter the announcements based on the company that created it. Click on the "View saved announcements" button to see all the announcements you saved.

Saved announcements

On this page, you can see the announcements that you have saved. To see the details of an announcement, click on that announcement. Click on the "save" icon next to an announcement to save or unsave that announcement. If the icon is white, it means that the announcement is not currently saved. If the icon is filled, it means that the announcement is saved. Alternatively, you can save an announcement using the detailed page of that announcement. Click on the

“Filter companies” button to filter the announcements based on the company that created it. Click on the “View all announcements” button to see all announcements.

Announcement details

On this page, you can see the details of an announcement. At the top, you can see the announcement ID and the company that sent the announcement. At the box in the middle, you can see the content of the announcement. On the left, click on “Back to saved announcements” to go to the “Saved Announcements” page. Click on “Back to all announcements” to go to the “All Announcements” page.

All contests

On this page, you can see all the contests. To see the details of a contest, click on that contest. Click on the icon next to a contest to enroll in that contest. If the icon is white, it means that you are not enrolled in that contest. If the icon is filled, it means that you are enrolled in that contest. Alternatively, you can enroll in a contest using the detailed page of that contest. Click on the “Filter” button to filter the contests based on your preferences. Click on the “View enrolled contests” button to see the contests that you are enrolled in.

Enrolled contests

On this page, you can see contests that you are enrolled in. To see the details of a contest, click on that contest. Click on the icon next to a contest to unenroll in that contest. If the icon is filled, it means that you are enrolled in that contest. If the icon is white, it means that you are not enrolled in that contest. Click on the “Filter” button to filter the contests based on your preferences. Click on the “View all contests” button to see all contests.

Contest details

On this page, you can see the details of a contest. At the top, you can see the contest ID and the name of the contest. At the box in the middle, you can see the details of the contest. On the left, click on “Back to enrolled contests” to go to the “Enrolled Contests” page. Click on “Back to all contests” to go to the “All Contests” page. On the right, click on “Go to the challenges” to see the challenges of the contest. Click on “Go to the leaderboard” to view the leaderboard for the contest.

Contest leaderboard

On this page, you can see the ranks of each user that participated in that contest. You can also see your ranking at the bottom of the page. Therefore, you do not need to scroll through every user to see your ranking. Click on the “Back to the Contest” button to see the contest.

Challenge in contest

On this page, you can see a challenge at a contest. At the top, you can see the challenge ID and the name of the challenge. On the top-left side, you can see the remaining time to complete the contest in minutes. Underneath, you can see the problem specification. On the top-right side, click on the “View Previous Submissions” button to see your previous submissions for that challenge. Use the box in the middle of the page to write code to solve the challenge. Choose a programming language from the dropdown menu that is under the challenge title to specify the language that you are using. Click on the “Previous” button to go to the previous challenge in the contest. Click on the “Next/Submit” button to submit the code for that challenge and go to the next one.

Old submissions

On this page, you can see your previous submissions for a challenge. At the top, you can see the name of the challenge. To see the details of a submission, click on that submission.

Old submission details

On this page, you can see the details of a previous submission. At the top, you can see the date of the submission. At the box in the middle, you can see your code. On the left, you can see the details of the problem such as difficulty, language, category, and problem specification. On the top-left, click on "View Solutions" to see the correct solution. You can only view the solution if your submission has passed.

Others' submissions

On this page, you can see the submissions for a challenge that are submitted by other users. At the top, you can see the name of the challenge. To see the details of a submission, click on that submission.

Others' submission details

On this page, you can see the details of a submission that does not belong to you. At the box in the middle, you can see the code submitted. On the left, you can see the details of the problem such as difficulty, language, category, and problem specification. On the top-left, click on "View Solutions" to see the correct solution. You can only view the solution if your submission has passed. On the top-right, click on "View Previous Submissions" to see your previous submissions for that challenge. On the bottom-right, click on "View Others' Submissions" to see other users' previous submissions for that challenge.

All invites

On this page, you can see all the invites that you got. On the left side of a row, you can see the invite ID and the name of the company that sent the invite. On the right side of a row, you can see the result of the invite. The possible results are: N/A, pending, passed, and failed. The explanations of the results are as the following:

- N/A: You have not submitted solutions for the challenges in the invite yet.
- Pending: You have submitted your solutions for the challenges. However, the company has not submitted the result yet.
- Passed: You passed the interview.
- Failed: You failed the interview.

To see the details of an invite, click on that invite. Click on the "Filter" button to filter the invites based on your preferences.

Invite details

On this page, you can see the details of an invite. At the top, you can see the invite ID. At the box in the middle, you can see the content of the invite such as the company that sent it, their message, and the interview details. On the left, click on "Back to inbox" to see all the invites you got. Click on "Go to the interview" to see the challenges in that interview.

Company

Login

Enter your ID and password to login. If you don't have an account, click the register button.

Register

Enter your company's name and a password to register.

Homepage

You can see a list of interview invites you have sent. Click on an invite to view its details. Click the "send new invite" button to send a new interview invite.

You can see a list of upcoming contests. Click on a contest to view its details. Click on "view sponsored contests" to see list of contests you've sponsored.

You can see announcements you've made. Click on an announcement's title to view its content. Click on the "post new announcement" button to create a new announcement.

My announcements

You can see a list of announcements you've made. Click on an announcement to view its content. Click on the "create new announcement" button to create a new announcement.

Create new announcement

Write the title of the announcement in the "title" box and the content in the "content" box. Click the "create" button to create the announcement.

Profile

You can access your profile by clicking the "Your Profile" button at the top right. You can see your ID and name. Below that, click the "change password" button to change your password. At the bottom, use the buttons to view contests you've sponsored, announcements you've made and interview invites you've sent.

All contests

On this page, you can see all the contests. To see the details of a contest, click on that contest. Click on the "Filter" button to filter the contests based on your preferences. Click on the "View sponsored contests" button to see the contests that your company is sponsoring.

Sponsored contests

On this page, you can see contests that you are sponsoring. To see the details of a contest, click on that contest. Click on the "Filter" button to filter the contests based on your preferences. Click on the "View all contests" button to see all contests.

Contest details

On this page, you can see the details of a contest. At the top, you can see the contest ID and the name of the contest. At the box in the middle, you can see the details of the contest. On the left, click on "Back to sponsored contests" to go to the "Sponsored Contests" page. Click on "Back to all contests" to go to the "All Contests" page. Click on "Go to the leaderboard" to view the leaderboard for the contest.

Contest leaderboard

On this page, you can see the ranks of each user that participated in that contest. Click on the envelope icon to send an invite to that user. If the icon is white, it means that you have not sent an invite to that user before. If the icon is filled, it means that you sent an invite to that user before. Click on the "Back to the Contest" button to see the contest.

All invites

On this page, you can see all the invites that you have sent. On the left side of a row, you can see the invite ID and the name of the user that received the invite. On the right side of a row, you can see the result of the invite. The possible results are: N/A, pending, passed, and failed. The explanations of the results are as the following:

- N/A: The user has not submitted solutions for the challenges in the invite yet.
- Pending: The user has submitted your solutions for the challenges. However, the company has not submitted the result yet.
- Passed: The user passed the interview.
- Failed: The user failed the interview.

To see the details of an invite, click on that invite. Click on the “Filter” button to filter the invites based on your preferences.

Invite details

On this page, you can see the details of an invite. At the top, you can see the invite ID. At the box on top, you can see the content of the invite such as the user that received it, the invite message, and the result. At the box in the bottom, you can see challenges in the interview. Click on a challenge to see its details. On the left, click on “Back to inbox” to see all the invites you sent. Click on “Go to the interview” to see the challenges in that interview.

New invite

Write the title of the invite in the “title” box. Select the earliest date for the interview by clicking the “earliest date” box. Select the latest date for the interview by clicking the “latest date” box. Enter the duration of the contest in minutes in the “duration” box. Write the username of the receiver in the “user” box. Write your message in the “message” box. You can see the challenges that are added to the interview at the bottom of the page. Click the “add new challenge” button to add a new challenge to the interview. Click “send” to submit the invite.

Editor

Login

As an editor, enter your given id and password to login to the system.

Homepage

On the homepage, you can see coding challenges. Click on a challenge to open it. Click the “filter” button and select some conditions to filter your search. Click the “create new coding/non-coding challenge” button to create a coding or non-coding challenge. You can see upcoming contests. Click on a contest to see contest details. Click the “create new contest” button to create a contest. On the left, you can see unverified companies. Click the “verify” button to verify a company. Click “view verified companies” to see all verified companies.

New coding challenge

Write the name/id of the challenge in the “name” box. This name has to be unique. From the dropdown menu, select the difficulty of the challenge. “One” is the easiest and “three” is the hardest.

Write the problem specification in the “problem specification” box. Click the “add category” button to add a category or programming language.

Write the solution in the “solution” box. Add test cases by entering the input, the expected output and then clicking the “add new test case” button.
Click the “submit” button to submit the challenge.

New non coding challenge

Write the name/id of the challenge in the “name” box. This name has to be unique. From the dropdown menu, select the difficulty of the challenge. “One” is the easiest and “three” is the hardest.

Write the problem specification in the “problem specification” box. Click the “add category” button to add a category or programming language.

Write the solution in the “solution” box.

Click the “submit” button to submit the challenge.

New contest

Write the name of the contest in the “name” box. Select a date for the contest by clicking the “date” box. Enter the duration of the contest in minutes in the “duration” box. Write the description of the contest in the “content” box.

Click the “add new challenge” button to add a new challenge to the contest. Click “send” to submit the contest.

Profile

You can access your profile by clicking the “Your Profile” button at the top right. You can see your ID. Below that, click the “change password” button to change your password. At the bottom, use the buttons to view challenges you’ve created and contests you’ve created.

Unverified companies

You can see a list of unverified companies. Click the “verify” button next to a company to verify it. Click the “view verified companies” button to see a list of verified companies.

Verified companies

You can see a list of verified companies. Click the “cancel” button next to a company to cancel its verification. Click the “view unverified companies” button to see a list of unverified companies.