

DBAS - IS497 - Final Project - Leetcode Problem Search Engine

Web Application Screenshots:

Registration as a Contributor:

The screenshot shows a Chrome browser window with multiple tabs open. The active tab is 'localhost:8000/register'. The page title is 'Leetcode Problem Search'. The main content area is titled 'Join Today' and contains fields for 'Username*', 'Email*', 'Password*', 'Password confirmation*', and 'Role*'. The 'Role*' field has 'Contributor' selected. A 'Sign Up' button is at the bottom. To the right is a sidebar titled 'Sidebar' with sections for 'Information' and 'Latest Problems'.

Join Today

Username*
new_sample_1

Required: 150 characters or fewer. Letters, digits and @/_/-/_ only.

Email*
new_sample_1@gmail.com

Password*

Your password can't be too similar to your other personal information.
Your password must contain at least 8 characters.
Your password can't be a commonly used password.
Your password can't be entirely numeric.

Password confirmation*

Enter the same password as before, for verification.

Role*
 User
 Contributor

[Sign Up](#)

Sidebar

Information

Latest Problems

Contributor Account Creation and Log In:

The screenshot shows a Chrome browser window with multiple tabs open. The active tab is 'localhost:8000/login'. The page title is 'Leetcode Problem Search'. The main content area is titled 'Log In' and contains fields for 'Username*' and 'Password*'. Below the fields is a 'Log In' button. At the bottom, it says 'Don't have an account? [Sign Up](#)'. A green message bar at the top states 'Account has been created for new_sample_1 ! You can now login'. To the right is a sidebar titled 'Sidebar' with sections for 'Information' and 'Latest Problems'.

Account has been created for new_sample_1 ! You can now login

Log In

Username*
|

Password*

[Log In](#)

Don't have an account? [Sign Up](#)

Sidebar

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Insertion of user details in the database:

User model:

id	password	last_login	is_superuser	username	first_name	last_name	email	is_staff	is_active	date_joined
199	pbkdf2_sha256 \$600000\$v3O WInHjbHniFi8 zV1BRUB\$C2 Gsj+95uNdyJC Uv6YDVJzxId +9q4VAraa2i0 3G+VWg=	2023-05-02 04:15:49.899 458+00	FALSE	new_sample_1			new_sample_1@gmail.com	FA LS E	T R U E	2023 -05-0 2 04:1 5:19. 5790 18+0 0

Person model:

id	email	role	user_id
166	new_sample_1@gmail.com	contributor	199

Contributor Profile:

The screenshot shows a web browser window with multiple tabs open at the top. The main content area displays a profile update form for a user named "new_sample_1". The form includes fields for "Username*", "Email*", and "Image*". The "Username" field contains "new_sample_1" and has a note below it stating "Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only.". The "Email" field contains "new_sample_1@gmail.com". The "Image" field shows a placeholder for "default.jpg" and includes a "Choose file" button with the message "No file chosen". At the bottom of the form is a blue "Update" button. To the right of the form, there is a sidebar with the title "Sidebar" and the sub-item "Information". The browser's address bar shows the URL "localhost:8000/profile/".

Contributor Query and Display of Results:

The screenshot shows a web browser window with the URL localhost:8000/query_and_display/. The page title is "Leetcode Problem Search". The main content area contains a form for customizing queries. The sidebar on the right displays "Latest Problems".

Customise your queries

Is Premium?*

Yes
 No
This field is required.

Title*

Minimum
This field is required.

Difficulty Level*

Easy
 Medium
 Hard
This field is required.

Companies*

Amazon
This field is required.

Related topics*

Greedy
This field is required.

Asked By FAANG?*

Yes
 No
This field is required.

Submit

The screenshot shows the same web browser window after the query has been submitted. The page title is "Leetcode Problem Search". The main content area displays the results table under the heading "Your results!".

Your results!

Problem Title	Problem URL
Minimum Numbers of Function Calls to Make Target Array	https://leetcode.com/problems/minimum-numbers-of-function-calls-to-make-target-array
Minimum Deletions to Make Character Frequencies Unique	https://leetcode.com/problems/minimum-deletions-to-make-character-frequencies-unique

Sidebar
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Contributor has ability to submit data which is inserted in database:

A screenshot of a Chrome browser window showing a form titled "Submit the problem details". The form fields include:

- Title*: Sample Problem 1 (red border, error message: This field is required.)
- Description*: The problem needs to find the maximum of 3 numbers without if-else conditions (red border, error message: This field is required.)
- Is Premium?*: No (red border, error message: This field is required.)
- Difficulty Level*: Easy (red border, error message: This field is required.)
- Solution Link: (empty input field)
- Acceptance Rate*: 45 (red border, error message: This field is required.)
- Frequency*: 356 (red border, error message: This field is required.)

The sidebar on the right shows "Latest Problems".

A screenshot of a Chrome browser window showing a form titled "Solution URL*". The form fields include:

- Solution URL*: https://leetcode.com/problems/sample_problem_1 (red border, error message: This field is required.)
- Discuss Count*: 454 (red border, error message: This field is required.)
- Accepted*: 2.1M (red border, error message: This field is required.)
- Submissions*: 6.7M (red border, error message: This field is required.)
- Companies*: Optera (red border, error message: This field is required.)
- Related Topics: Math (empty input field)
- Likes*: 54353 (red border, error message: This field is required.)
- Dislikes*: 4242 (red border, error message: This field is required.)

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Submissions*
6.7M
This field is required.

Companies*
Optera
This field is required.

Related Topics
Math

Likes*
54353
This field is required.

Dislikes*
4242
This field is required.

Asked By FAANG?
 Yes
 No
This field is required.

Similar Questions

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Thank you for your contribution!

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Entry of the contributor data into the LeetcodeData model:

id	title	description	is_premium	difficulty	solution_link
1827	Sample Problem 1	The problem needs to find the maximum of 3 numbers without if-else conditions	FALSE	Easy	

acceptance_rate	frequency	url	discuss_count	accepted	submissions
45	356	https://leetcode.com/problems/sample_problem_1	454	2.1M	6.7M

companies	related_topics	likes	dislikes	rating	asked_by_faang	similar_questions
Optera	Math	54353	4242	93	FALSE	

Registration as a normal user:

The screenshot shows a Chrome browser window with the URL `localhost:8000/register/`. The page title is "Leetcode Problem Search". On the left, there's a "Join Today" form with fields for Username*, Email*, Password*, and Password confirmation*. Below these are Role* options (User, Contributor) and a "Sign Up" button. A sidebar on the right contains "Information" and "Latest Problems". At the bottom of the form area, it says "Already have an account? [Sign In](#)".

Join Today

Username*
new_sample_2
Required. 150 characters or fewer. Letters, digits and @/_+/-/_ only.

Email*
new_sample_2@gmail.com

Password*

• Your password can't be too similar to your other personal information.
• Your password must contain at least 8 characters.
• Your password can't be a commonly used password.
• Your password can't be entirely numeric.

Password confirmation*

Enter the same password as before, for verification.

Role*
 User
 Contributor

[Sign Up](#)

Already have an account? [Sign In](#)

Sidebar

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User Account Creation and Log In:

The screenshot shows a Chrome browser window with the URL `localhost:8000/login/`. The page title is "Leetcode Problem Search". The main area displays a green success message: "Account has been created for new_sample_2 ! You can now login". Below this is a "Log In" form with fields for Username* and Password*. A "Log In" button is present. A sidebar on the right contains "Information" and "Latest Problems". At the bottom of the form area, it says "Don't have an account? [Sign Up](#)".

Account has been created for new_sample_2 ! You can now login

Log In

Username*
new_sample_2

Password*

[Log In](#)

Don't have an account? [Sign Up](#)

Sidebar

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Insertion of user details in the database:

User model:

id	password	last_login	is_superuser	username	first_name	last_name	email	is_staff	is_active	date_joined
200	pbkdf2_sha256\$600000\$zjKounHgpos8FQB9TpZTSM\$q7fpUFqBafvO/7csU7tOyo1oG0tbQ/dPNyy5iHFZ3A=	2023-05-02 04:46:05.188912+00	FALSE	new_sample_2			new_sample_2@gmail.com	FA LS E	TR UE	2023-05-02 04:45:51.922936+00

Person model:

id	email	role	user_id
167	new_sample_2@gmail.com	user	200

User Query and Display of Results:

The screenshot shows a web browser window with multiple tabs open at the top. The main content area displays a form titled "Leetcode Problem Search". The form includes fields for "Is Premium?", "Title*", "Difficulty Level*", "Companies*", "Related topics*", and "Asked By FAANG?". Each field has a red border and a "This field is required." error message below it. On the right side, there is a sidebar with "Information" and "Latest Problems" sections.

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Customise your queries

Is Premium?*

Yes
 No
This field is required.

Title*

This field is required.

Difficulty Level*

Easy
 Medium
 Hard
This field is required.

Companies*

This field is required.

Related topics*

This field is required.

Asked By FAANG?*

Yes
 No
This field is required.

localhost:8000/query_and_display/

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Your results!

Problem Title	Problem URL
Split Array Largest Sum	https://leetcode.com/problems/split-array-largest-sum
Number of Submatrices That Sum to Target	https://leetcode.com/problems/number-of-submatrices-that-sum-to-target

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Normal User is unable to contribute problems:

localhost:8000/contribute/

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new_sample_2 does not have the privileges of a contributor

Passionate about improving problem-solving skills?



Want to find problems to solve?
[Click Here](#)

Want to help other folks?
[Contribute](#)

Sidebar
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Database Screenshots:

Contributor login configured to restrict application from any db admin privileges.

The screenshot shows a PostgreSQL role configuration interface. The top navigation bar includes tabs for General, Definition, Privileges, Membership (which is selected), Parameters, Security, and SQL. Below the tabs, there are two main sections: 'Member of' and 'Members'. The 'Member of' section lists 'User/Role' entries with checkboxes for 'WITH ADMIN'. Under 'pg_read_all_data' and 'pg_write_all_data', the checkboxes are checked. The 'Members' section also lists 'User/Role' entries with 'WITH ADMIN' checkboxes, which are currently unchecked. A 'Toggle SortBy' button is located below the members table. At the bottom, there are buttons for Close, Reset, and Save.

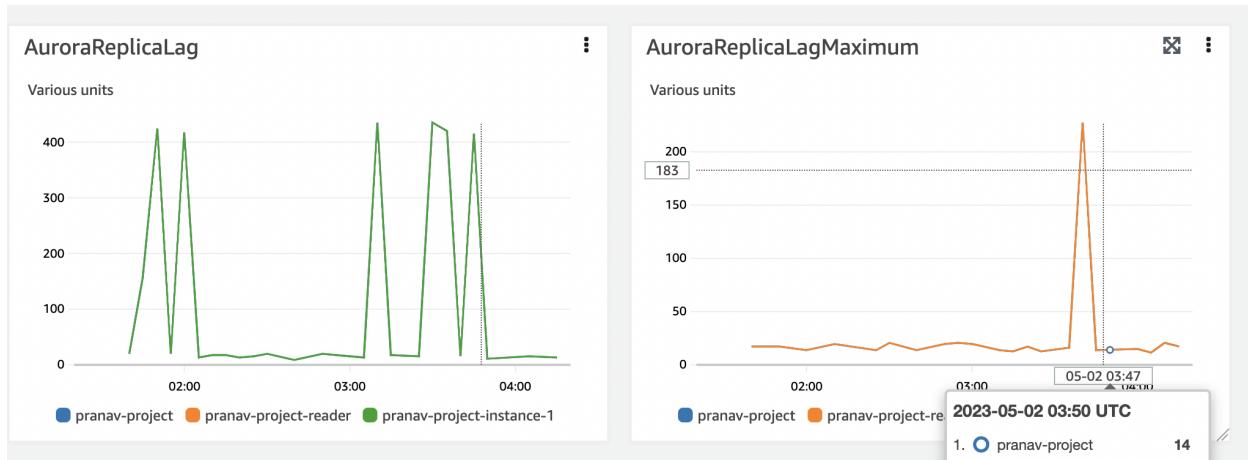
Database entry made as inputs entered at the application UI.

	id [PK] integer	title character varying (100)	description text
1	1826	Sample	Sample
2	1825	Finding MK Average	You are given two integers, `m` and `k`, and a stream of integers. You are required to calculate the average of all integers from the stream that fall within the range [m, m + k - 1].
3	1824	Minimum Sideway Jumps	There is a 3 lane road of length `n` that consists of `n + 1` points labeled A, B, ..., Z. There are some obstacles on the road: represented by lowercase letters in the string `obstacles`. You can jump on any point that is not an obstacle. You can jump one or two points at a time. You have to find the minimum number of jumps required to reach from point A to point Z.
4	1823	Find the Winner of the Circular Game	There are `n` friends that are playing a game. The friends are sitting in a circle. They are numbered from 1 to n clockwise starting from the friend sitting at position 1. There are two possible moves a friend can do:
5	1822	Sign of the Product of an Array	There is a function `signFunc(x)` that returns: `1` if `x` is positive. `-1` if `x` is negative. `0` if `x` is equal to zero.
6	1821	Find Customers With Positive Revenue this Year	SQL Schema
7	1820	Maximum Number of Accepted Invitations	There are `m` boys and `n` girls in a class attending an upcoming party. Each boy can invite at most one girl as his partner. Find the maximum number of accepted invitations.
8	1819	Number of Different Subsequences GCDs	You are given an array `nums` that consists of positive integers. The GCD of a sequence of numbers is defined as the greatest common divisor of all the numbers in the sequence. The task is to find the number of different subsequences of `nums` such that their GCD is greater than 1.
9	1818	Minimum Absolute Sum Difference	You are given two positive integer arrays `nums1` and `nums2`, both of size `n`. The task is to find the minimum absolute sum difference between any element in `nums1` and its corresponding element in `nums2` (i.e., abs(`nums1[i] - nums2[i]`)).

Failover -> Reader instance becomes the new primary and is the writer instance.

Databases		Group resources	C	Modify	Actions ▾	Restore from S3	Create data
	DB identifier	Role	Engine	Region & AZ	Size		
○	pranav-project	Regional cluster	Aurora PostgreSQL	us-east-1	2 instances		
○	pranav-project-reader	Writer instance	Aurora PostgreSQL	us-east-1c	db.t3.medium		
○	pranav-project-instance-1	Reader instance	Aurora PostgreSQL	us-east-1d	db.t3.medium		

Minimal replication lag ~ 200 microseconds.



Snapshots taken to backtrack/backup databases as required.

Manual snapshots (10)			
<input type="checkbox"/>	Snapshot name	DB instance or cluster	Snapshot creation time
<input type="checkbox"/>	pranav13-database-1-snapshot	pranav13-database-1	May 01, 2023, 11:25 (UTC-05:00)
<input type="checkbox"/>	sample-backup-cluster-snapshot	sample-backup-cluster	May 01, 2023, 10:51 (UTC-05:00)
<input type="checkbox"/>	dba-backtracking-sample-snapshot	dba-backtracking-sample-cluster	May 01, 2023, 10:51 (UTC-05:00)
<input type="checkbox"/>	automatedinstance-type-cluster-snapshot	automatedinstance-type-cluster	April 30, 2023, 18:10 (UTC-05:00)
<input type="checkbox"/>	pranav-restored-dbinstance-cluster-snapshot	pranav-restored-dbinstance-cluster	April 30, 2023, 16:48 (UTC-05:00)
<input type="checkbox"/>	automated-backups-instance-cluster-snapshot	automated-backups-instance-cluster	April 30, 2023, 16:46 (UTC-05:00)
<input type="checkbox"/>	dba-backtracking-sample	pranav-project	April 30, 2023, 16:43 (UTC-05:00)
<input type="checkbox"/>	fri-april-28	pranav-project	April 28, 2023, 13:54 (UTC-05:00)

Automated backups windows and restorable option:

Backup		
Automated backups Enabled (7 Days)	Earliest restorable time April 24, 2023, 20:42 (UTC-05:00)	Latest restore time May 01, 2023, 23:23 (UTC-05:00)
Copy tags to snapshots Enabled		Backup window 04:56-05:26 UTC (GMT)

Restore to point in time

You are creating a new DB instance from a source DB instance at a specified time. This new DB Instance will have the default DB security group and DB parameter groups.

Restore time

Point in time to restore from

- Latest restorable time
May 01, 2023, 23:23:39 (UTC-5:00)
- Custom date and time

The date must be before the latest restorable time for the DB instance.

Manual Backup / Native Command Line Backup:

Command to backup the database to our local system: /Library/PostgreSQL/15/bin/pg_dump -h pranav-project-instance-1.clzzjqzfbtse.us-east-1.rds.amazonaws.com -U postgres -f /Users/pranavsekhar/dump_sample.sql leetcode --format=custom

```
(base) pranavsekhar@Pranavs-MacBook-Air-5 ~ % ls -lrt *sql*
-rw-r--r-- 1 pranavsekhar staff 2254769 May 1 09:28 dump.sql
-rw-r--r-- 1 pranavsekhar staff 670879 May 1 09:35 dump_sample.sql
```

Schema used for the data import

```
CREATE TABLE public."leetcode_data"
(
    "ID" smallint NOT NULL,
    "Title" character varying(100) NOT NULL,
    "Description" character varying(10000) NOT NULL,
    "is_premium" boolean NOT NULL,
    "difficulty" character(6) NOT NULL,
    "solution_link" character varying(200),
    "acceptance_rate" decimal NOT NULL,
    "frequency" decimal NOT NULL,
    "url" character varying(200) NOT NULL,
    "discuss_count" smallint NOT NULL,
    "accepted" character varying(10),
    "submission" character varying(10),
    "companies" character varying(5000),
    "related_topics" character varying(300),
    "likes" smallint,
    "dislikes" smallint
    "rating" decimal,
    "asked_buy_faang" boolean,
    "similar_questions" character varying(5000),
    CONSTRAINT "Messages_pkey" PRIMARY KEY ("ID")
);
```

Cost Estimation for Production System:

Cost of Aurora PostgreSQL instance with specifications:

- t3.medium storage type
- Dual core (vCPU: 2)
- Memory: 4 GiB

db.t3.medium
vCPU: 2
Memory: 4 GiB
Network Performance: Low to Moderate

Utilization
With utilization, you still have to stop the instance to get the cost benefit. Utilization only affects OnDemand pricing for instances and not the storage, backups, etc.

100	%Utilized/Month
-----	-----------------

Pricing model
OnDemand

▼ Show calculations

Pricing calculations
1 instance(s) x 0.082 USD hourly x (100 / 100 Utilized/Month) x 730 hours in a month = 59.8600 USD (Aurora PostgreSQL Compatible DB)
Amazon Aurora PostgreSQL-Compatible DB instances cost (monthly): 59.86 USD

Amazon Aurora PostgreSQL-Compatible DB instances cost (upfront): 0.00 USD

Snapshot Export:

▼ Snapshot Export [Info](#)

ⓘ Amazon S3 charges for the exported file are extra and not included in this calculation

Total Size of Backup Processed for Export (GB)
2 per month

▼ Show calculations

Pricing calculations
2 GB x 0.01 USD = 0.02 USD
Snapshot Export cost (monthly): 0.02 USD

Backup storage into S3 Bucket:

▼ Backup Storage [Info](#)

Additional backup storage

2 GB

▼ Show calculations

Pricing calculations

$2 \text{ GB} \times 0.021 \text{ USD} = 0.04 \text{ USD}$

Additional backup storage cost (monthly): 0.04 USD

Storage Costs:

▼ Show calculations

Unit conversions

Baseline IO rate: 1 per second * (60 minutes in an hour x 60 seconds in a minute) = 3600 per hour

Peak IO rate: 1 per second * (60 minutes in an hour x 60 seconds in a minute) = 3600 per hour

Pricing calculations

$3 \text{ GB} \times 0.10 \text{ USD} = 0.30 \text{ USD}$ (Database Storage Cost)

730 hours in a month - 1 peak hours per month = 729.00 baseline hours per month

$3,600 \text{ baseline IOs} \times 729.00 \text{ baseline hours per month} = 2,624,400$ (Monthly Baseline IOs)

$2,624,400 \text{ (Monthly Baseline IOs)} \times 0.0000002 \text{ USD} = 0.52488 \text{ USD}$ (Baseline IOs Cost)

$3,600 \text{ peak IOs} \times 1 \text{ peak hours per month} = 3,600$ (Monthly Peak IOs)

$3,600 \text{ (Monthly Peak IOs)} \times 0.0000002 \text{ USD} = 0.00072 \text{ USD}$ (Peak IOs Cost)

$0.52488 \text{ USD} (\text{Baseline IO Cost}) + 0.00072 \text{ USD} (\text{Peak IO Cost}) = 0.53 \text{ USD}$ (IOs Rate Cost)

$0.30 \text{ USD} (\text{Database Storage Cost}) + 0.53 \text{ USD} (\text{IOs Rate Cost}) = 0.83 \text{ USD}$ (Total Storage Cost)

Total Storage Cost (monthly): 0.83 USD

Final Estimate:

AWS Pricing Calculator > My Estimate

My Estimate [Edit](#) [Export](#) [Share](#)

Estimate summary [Info](#)

Upfront cost	Monthly cost	Total 12 months cost
0.00 USD	60.75 USD	729.00 USD

Includes upfront cost

Getting Started with AWS

[Get started for free](#) [Contact Sales](#)

My Estimate

Service Name		Upfront cost	Monthly cost	Description	Region	Config Summary
<input type="checkbox"/>	Amazon Aurora Postgre...	0.00 USD	60.75 USD	-	US East (N. Virginia)	Quantity (1), Instance ty...