Dev Club Recruitment Test

IIT Delhi

March 18, 2020

1 Introduction

This assignment is aimed to get you familiarized with design and development. At the first glance it may look hard, but do what you can, there is a lot to learn from this assignment. Follow the guidelines, ask clarifications on the slack channel mentioned at the end (We may drop special hints there!!)

Submission Deadline : **28 March 2020 11:55 PM**

2 General Guidelines

- Brain Warm Up Part is **mandatory** for everyone.
- Design and Back-end are different profiles, you are required to **attempt at-least one**.
- We have given choices in some questions, you are required to do at-least one of them. More than that will increase your chances of selection. You can submit any number of questions from the below 2 assignments.
- A super formal report is not required for Design documents. Even flow-charts and documenting your thinking process will do the job.
- Coding Assignments website/app should be hosted (or APK's zipped) and the code should be on GitHub. See the Part IV References and Submission Instructions for help on these topics. Remember, the easier it is for us to run and see your work, the easier it'll be to evaluate.
- Always try and submit (even if incomplete). You will be given points on how much effort you have put in. If something doesn't work search through Stack Overflow. If you still can't figure it out, then document details of what all you did before you gave up on that **BUG**.

Don't care about the end result, just give your best !!

Part I
Brain Warm Up

1 Think

Assume, we need to add the feature of **Download Zip** on our Citadel (Study Portal). Now, this feature will enable the users to download all the material regarding a particular course. Assume the data is stored in a directory tree structure, as it is shown on the website. Now, you have two options (or maybe more) to serve the zip file to the user, when he/she clicks on download zip.

(a) You generate a zip file of the complete folder of the course when, the user clicks Download Zip and then serve the file to the user.

(b) You already saved the zip file of each course stored on the hard disk of the server, and then instantly serve the zip of the course.

(c) There may be some other better method...

Which of these methods do you think is more suitable for our particular need? Why do you think so? Is there another method, which will perform better heuristically?

Keep in mind, the computational load on the server to zip a say 2GB folder for a course, the hard disk limit, changing contents of a course when someone uploads a document and the basics of probability theory.

Part II
Design Assignment

1 Brainstorm

You have to come up with an idea for an application/web app which will be used for the promotion of a particular product. It can be anything, a luxury item or a simple everyday utility. For example:- Nowadays a lot of smartphone manufactures create website to promote a new smartphone. They use interactive and intuitive designs to attract the user and then showcase features to sell the product. Try to come up with a product that you can think around, for example - it would be really hard to create a website for a pencil.

- Ideate the whole application thoroughly, write it down, and make a flow (you can refer to the example mentioned below for the format or make a flowchart)

- List some sections or pages for the application.
- Write a complete documentation (not more than 2 pages) which includes:
  - Thought process for the solution
  - User flow
  - Navigation
  - UI guidelines (Aesthetically pleasing, Ease of navigation, Simple Structure)

One example flow for WhatsApp Chat:

- (Open app first time) On-boarding/Register your mobile number and verify through OTP
- Home screen:
  - Chats
  - Calls
  - Status
  - Camera
- On Chat Home- List of recent chats (tap any of the chat)
- User chat screen
- Back to Chat Home

Think of creative design solutions to attract customers and make them remember the product!

2 Get to work

The most crucial part of any new product launch is publicity and marketing. The best way for a company to do that is by creating a website for that product.
Your task to is to take an imaginary product (it may be tech related or something else) and design a website or an android app for the promotion and sale of that product.

Some possible things, that you can include in the website or the android app, that we can think of are as follows:

- An animated landing page to engage the user

- An about page containing information about the product and the company that created it
- A timeline page - this page could be comprised of the details about how long the product took to develop, you could add animations in order to make this section interactive and enhance the user experience.
- A feature's page comprising of the various salient features about the product. You can use a creative UI to display them.
- A page containing product information. Here you may use charts and tables to display the various specifications of the product.
- A contact page
- A purchase page with buy now button and cart to keep track of the items
- and many more...

Put imaginary data on the website like information about the company or its founders, different product features, specifications, models available for purchase, contact us page, etc. Look up various websites and templates on the internet to have an idea about it. For example, you can showcase some of the product features like Apple iPhone 11. See here.

This section requires you to **either** create the Web Page ,the Android application or an App Design Application (if you are able to figure it out).

Note: There is no limit to your creativity and the marking for this assignment will be done based on the UI entirely. You can use placeholders in the data section(text and images) . It need not be real data.

2.1 Web App

1. Make a responsive web app using HTML, CSS, JavaScript, other designing tools or anything else you are familiar with to make the web app.
2. **Do NOT** use a template from online sources rather try to make your own design as you will have to justify why you chose a particular design.
3. Familiarize yourself with jquery plugins. Use jquery plugins to make the page interactive and dynamic. There are several plugins meant for improving the interface of images, scrolls, popups, form controls, calendars etc. The complete registry of jquery plugins can be found here.

2.2 Android App

1. Make an android app using Android Studio.
2. You can use, the default android activities and add dummy items in the UI.
3. We only want you to create the design, not the functionalities i.e. the front end only.
4. Tutorial on UI design on android. Link

2.3 App Design Software

1. Create the different screens for the web app/android app and connect them through interactions.
2. Example for such an app design website. Link

Part III
Development Assignment

1 Research

Definition: To become an expert on something after having done a Google search and 10 minutes reading on the internet. – Urban Dictionary

This section expects that you spend some time getting familiar with the questions/tech we have posed. You need to submit what you understood, a basic undesrtanding and answers to each part.

1. Research and document how a basic networking system works [Read about reverse tunneling, UDP/TCP, ports on a machine, what setting up a server means etc]. Example IITD proxy system.

   - Write about how does a website work? What process is followed when you type in the URL of a website?
   - Suppose you created an HTML page and wanted to show this to a person using the same WiFi network. How would you accomplish this if you are neither allowed to upload your site nor give the source code through external storage? [Hint: Google setting up a local server using python]
   - Get an overall idea of what is NginX and Apache (no need to dive too deep) and what role do they play in websites.
   - Would the above method work if the person was using his mobile data and you were using IITD WiFi ? Why/Why not ?

2. Do you know about database systems? What are they used for? Consider you are recruited at DevClub and you are said to make a website for managing the database of all IIT Delhi professors. The database includes all the necessary information of the professor including his personal information, all his projects, all his research data. How would you deal with the situation. What amongst SQL type databases or NoSql type databases will be better to model the situation and why? Briefly pen down the design of your database in terms of models/tables you'll have along with what attributes you'll store. Mention points for both why and why not did you use a particular type of the database.

3. Many times in JavaScript, you would need to use the clock for timing difference or, more specifically, a timer. The applications may be to send out an alert, maybe a countdown, testing the performance of your website, setting an animation, or any other crucial time-based action. The simplest way to

implement that would be using setTimeout() and setInterval(). Are these a good choice for all the applications? Find out about them and also explore what other options are available to achieve better results. You may also look into why JS timer's performance is intentionally degraded sometimes for security purposes.

2 Time to Code

You need to implement a Prof Review portal and develop a Web-App for it. This portal will allow students to post reviews/comments about any professor or course. This may help juniors to get a better idea of courses at the time of registration. See ratemyprofessors.com to get a better idea. Try to break your working in steps like the following -

- First design a template layout of your app in an abstract manner, so you know what you are going to code.
- Decide upon an appropriate framework for implementing your app, like react-js, python-django, etc.
- You may start with defining the basic model structures of various object entities which would be existing in the portal (professors, courses, students, reviews, etc. - specified below)
- Then design an appropriate workflow between various entities, about how they interact with one another.
- Finalize the app by debugging the functionality of all the features.

Also draft and submit a design document, stating what is the basic database model or schema of your application and how are you providing access control. Just bullet points clearly stating what and how your system works is fine. Also, make sure to state any special features you want to highlight.

2.1 Specifications

The specifications are as follows:

2.1.1 Minimum requirements

1. The portal should have a registration system for IITD students. You may create a simple registration system, requiring an email,username and a password, or extend it as specified later.

2. There are two kinds of "entities" which are reviewed : Professors, and Courses. There should be a separate page/section for each professor/course, having basic info and reviews of that particular professor/course.

3. Guest users should be able to view reviews on any professor/course. Only registered users should be able to add new reviews of their own.

4. It is up to you to decide what all is contained in a 'review'. Possible fields include a text comment, tags, rating out of 10, etc. You may also include separate ratings on different parameters (such as exam difficulty, pace of course, content quality, etc)

5. Registered users should have a profile page where they can view their basic info and recent activity.

6. Registered users should have the option to post their reviews anonymously, to encourage more users to share their experiences and not be afraid of professors rounding them up.

7. The portal should facilitate quick searching of any professor/ course that a user may want to view. You may create a search bar, or think of a way to categorise content.

2.1.2 Preferred requirements

1. To prevent the users from posting rude/offensive comments (and subsequently professors suing the creators of the portal), there should be a provision for administrators on the portal, whose role will be to monitor and regulate all user activity (details below)

2. The admin should be able to take down any offensive comment, and send an appropriate warning to the concerned user.

3. The admin should also be able to 'ban' any user from the portal. On being banned, the user is de-registered and not permitted to re-register for the 'duration' (see Bonus) of the ban.

4. Since the admin may not have time to check each review individually, the registered users should have an option to report offensive comments. The admin should be able to view all reported reviews separately.

5. The admin should also be able to access recent activity on the portal, such as who posted what, where and when. The admin has the right to view user details even when the review is posted anonymously.

6. It is up to you to decide whether the users should have the ability to create new pages for a professor/course, or only the admin.

7. Think about how you can make the portal both transparent and secure at the same time, while implementing it.

8. You may add other exciting features to the portal. One such example is respect points to users. Users may like/dislike a review, with each 'like' increasing the author's respect points. The respect points of the author can then be displayed along with every review, which will allow the reader to judge the author's credibility.

2.1.3 Bonus

This may lead us to believe your exceptional candidature.

1. Try to verify the email ID during registration. You may also try and prevent the same user from registering using multiple IITD email IDs (e.g. a student can use the IDs cs518XXXX@iitd.ac.in and cs518XXXX@cse.iitd.ac.in to create 2 accounts)

2. The admin should have the choice to ban a user for a specific time (e.g 15 days) or permanently.

3. You may also add an option to link the user account with google,Facebook,etc

2.2 Notes

1. Assume that there are 5 users who are registered on the portal. User i has username $user i$ and password $pass i$. So, user 1 has username $user1$ and password $pass1$.

2. Have an admin with username *admin* and password *admin*.

3. Also, put up some dummy pages with dummy data, for us to be able to check the features of the web app. Include any specifications in your submission notes, if necessary.

4. The UI can be minimal i.e. basic HTML. We will not be grading on the basis of the UI but on your back end functionalities like data handling, access control etc.

Part IV
References and Submission Instructions

1 References

Because we are only Human. –Unknown
If you are stuck somewhere, seek help on Slack Work space

1. GitHub:
   (a) https://try.github.io
   (b) https://www.codecademy.com/learn/learn-git
   (c) https://help.github.com/
   (d) https://learngitbranching.js.org/
2. Basic HTML
   (a) Mozilla Docs
   (b) Guide to Most Tags in HTML:
   https://developer.mozilla.org/en/docs/Web/HTML/Element
   (c) You can try the HTML, JS and CSS you code at https://codepen.io/
   (click New pen) which interactively shows you the result of what you do.
3. CSS:
   (a) http://learn.shayhowe.com/html-css/building-your-first-web-page/
   (b) https://www.w3.org/Style/Examples/011/firstcss.en.html
   (c) https://www.tutorialspoint.com/css/what_is_css.htm
   (d) http://materializecss.com/
4. ReactJS:
   (a) https://reactjs.org/tutorial/tutorial.html
   (b) https://youtu.be/MhkGQAoc7bc
   (c) https://www.freecodecamp.org/news/learn-react-js-in-5-minutes-526472d292f4/
   (d) React Developer Tools for Chrome
5. Django:
   (a) https://docs.djangoproject.com/en/3.0/
   (b) https://www.youtube.com/playlist?list=PL6gx4Cwl9DGBlmzzFcLgDhKTTfNLfX1IK

2 Submission Instructions

Submission Deadline : 28 March 2020, 11:55 PM
Submission Link Check our FB page regularly for updates.

1. Add any extra documents in the GitHub repository itself. You can also add a link to your drive in a text file.

2. You can write your submissions on paper, and then scan them using camscanner or any other application, but make sure you upload only PDF documents and your hand-writing is legible.

3. It is a good practice to use version control system like GitHub for code. All the code should be hosted on GitHub (Make an account if you don't have). Make sure the repository is public and we can see the code. If you fear someone else will copy your code from your GitHub repo, make a private one and later, make it a public repository after the deadline. But make sure, you make it public, otherwise we won't be able to see your code.

4. You can include any other work, that you have done like any other website design, hand drawn stuff in the repo to make your application stronger.

5. Only the last entry will be considered in case of multiple submissions per candidate.

6. BONUS: Take a look at the footer of each page.