IIT DELHI

Dev Club Recruitment Test

February 13, 2018

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 : **1st March 2018 11:55 PM**

2 General Guidelines

- Design and Backend are different profiles, you are required to **attempt atleast one**.

- We have given choices in some questions, you are required to do atleast 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 APKs zipped) and the code should be on Github. See the Part III 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 stackoverflow. If you still can't figure it out, then document details of what all you did before you gave up on that **BUG**.

- You should get an overall idea of the assignement beforehand. Download the softwares you would use, on IITD Wi-Fi. You can download some softwares from our website, without spending your proxy. See Part III References and Submission Instructions

Dont care about the end result, just give your best !!

Part I
Design Assignment

1 Start Simple

We have built some web apps, and most of them are not perfect. Your aim, in this part of the problem is to go through these web apps and suggest at least two improvements, that can be done in the following web apps. This improvement can be regarding the design or the UI/UX of the web-app or can be an additional feature(s) you think should be present.

  (a) Citadel

  (b) Omegle

  (c) File Send

2 Brainstorm

You have to come up with an idea for an application/web app which will make life for IITD students easy. It can be anything, a luxury application or it may solve a daily life problem. For example:- We created Citadel (StudyPortal) for IITD students solving the problem of sharing notes and books/study material. Do not make study portal or copy of an already existing application in the campus. Try to come up with something new and feasible.

- 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 features for the application.

- Write a complete documentation (not more than 2 pages) which includes:

  - Thought process for the solution
  - User flow
  - Navigation
  - UI guidelines (Asthetically pleasing, Ease of navigation, Simple Structure)

One example flow for WhatsApp Chat:

- (Open app first time) Onboarding/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 make lives easy!

3   Get to work

We as students of IITD, face a lot of problems as most of the information regarding institute events and other necesary information are all scattered over different websites or our email inboxes.

Consider a hypothetical situation, where there is a single website/app that we can all visit and get to know what happened in the institute during the day, and what is supposed to happen in a few days. Your aim is to design the UI/UX of such a website or an android app.

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

- Seminars or Institute lectures organized by some department or the institute

- Events posted by different clubs like DevClub, Music Club, Dance Club etc.

- Some important notifications like Working Saturday :(or course add-drop deadlines posted by the administration

- Different pieces of blogs/news by BSP, IITD On Air etc.

- and many more...[1]

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[1]You might get more feature ideas from the Campus Bot on Devclub FB page or Devclub organization's repositories on Github.

Put imaginary data on the portal like different events, notifications, contact us page, etc. Look up various websites and templates on the internet to have an idea about it. For example, you can design the upcoming events page, just like the Google image search page. See here.

This section requires you to **either** create the Web App or the Android application, but you are completely free to do both, if you have the time.

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.

3.1   Web App

1. Make a responsive portal using libraries like bootstrap. You may use Django, ExpressJS or anything else you are familiar with to make the portal.

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.

3.2   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

Part II
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 how resource sharing among multiple users, how are link sharing permissions etc. managed. For example in Google Docs/Google Keep.

   - Think about what attributes a file/document needs to have such that it is able to differentiate authentic and inauthentic users.
   - **Bonus**: What would be a good design to handle concurrent/simultaneous editing in google docs? [Note: This is an open ended question with no absolute answer].

2. Read up on relational databases, and MySQL in particular. Understand what is meant by a database schema. Design the database schema for the academics system at IITD. This should include student grades, courses, faculty teaching the courses, etc. Assume that you have a table of student details with fields of name, entry number and any other field you think is necessary already present.

3. 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 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 haved 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.

3 Time to Code

You need to design a Mini Moodle cum Course Registration portal. You need to develop a Web-App for it. You need to also submit a design document, stating what is the basic database model of your application and how are you providing access control. Just bullet points clearly stating what and how your system works is fine.

3.1 Specifications

The specifications are as follows:

1. There will be two types of users, Professor and Student.

2. A professor can create a course, which he wishes to teach in the next semester.

3. A student can see what all courses are being floated, and can register in a course, or drop a course.

4. The professor can post a simple text message, which will be delivered to all students who are presently enrolled in the course.

5. The students, can see the message posted by the professor for the courses they are enrolled.

6. Note that, the message is visible only to the students, who are enrolled in the course, and not to the students who will enroll in the future. Also, the students who have left a course cannot see the messages of that course.

3.2 Notes

1. Assume, that there are 5 professors and 10 students who are registered on the portal. The student i has his user id as $student\_i$ and password as $pass\_stud\_i$. Similarly the professor j has his user id as $prof\_j$ and password as $pass\_prof\_j$. So, student 1 has his id as $student\_1$ and password as $pass\_stud\_1$ and prof 1 has his id as $prof\_1$ and password as $pass\_prof\_1$.

2. The above point implies that there needs to be a login system.

3. The UI can be minimial i.e. basic HTML. We will not be grading on the basis of the UI.

4. Look into the usage of the following technologies :-

   - Firebase: For setting up authentication features. Link
   - Firebase: For setting up database. Link

BONUS: Extend the app to give admin rights to an admin, with userid as *admin* and password as *admin* to be able to create new professors/students within the app.

Part III
References and Submission Instructions

1　References

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

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. Softwares:

   (a) http://devclub.cse.iitd.ac.in/recruitment

2 Submission Instructions

Submission Deadline : 1st March 2018, 11:55 PM
Submission Link Check our FB page regularly for updates.

1. You need to submit one zip file strictly named as
   ENTRYNUMBER_FIRSTNAME_LASTNAME.zip
   for e.g. 2015CS10210_Aman_Agrawal.zip

2. The zip file, needs to contain a pdf file regarding the submissions of all the questions that you have attempted. If you have done, both the design and development part, you need to add two pdf documents. Please add only pdf documents and not word docs or anything else. Export your word document to pdf before sending.

3. 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.

4. 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 [2] 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.

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

6. Only the last entry will be considered incase of multiple submissions per candidate.

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[2]Private repositories on Github are not free ! But they are for students. So Google "Github Student Account" and follow the intstructions.