

# Visual Redesign – For better programming

## I. The Problem

“Before anything else, preparation is the key to success”. As a CS major student, computer algorithms play a crucial role in almost every aspect of life: from coursework to interview and job requirements. If one wants to become a successful programmer, mastering this field is a necessity, and online programming contests provides an easy and efficient way of practicing. From a survey made by freeCodeCamp, these are the top 10 coding contest website in 2017 (<https://medium.freecodecamp.org/the-10-most-popular-coding-challenge-websites-of-2016-fb8a5672d22f>). But there are far more good websites beyond this list. Today I will look into one of those, the Peking University Online Judge, analyzing its existing design shortages, and do a comprehensive responsive redesign.

As a platform dated back to 2003, Peking University Online Judge (Url: <http://poj.org>) has been a famous coding challenge website for a long time. Now it owns over 700k+ registered users, and thousands of daily submissions. However, there are some significant shortages on its visual design that affects its learnability and efficiency. Besides, it somehow lacks responsiveness and visual aesthetics.

## II. Usability Analyze

Starting from a visual designer’s point of view, let’s first look into the website’s usability shortage using the generally-accepted usability criteria:

- o **Intuitive Design**

The webpages contain large amount of small font texts, but don't have apparent layout structure; so, it is not easy for user to quick understand the structure hierarchy.

Online Contests	User
Current Contest	oncelife Log Out
Past Contests	Mail:0(0)
Scheduled Contests	Login Log Archive
Award Contest	

Everything is listed out. Using dropdown and only remain key categories gives better hierarchy

- o **Ease of Learning**

Not easy to learn for new users, because there’s no highlight on core part of website (e.g. coding problems), and its layout is different to other prominent online coding websites.

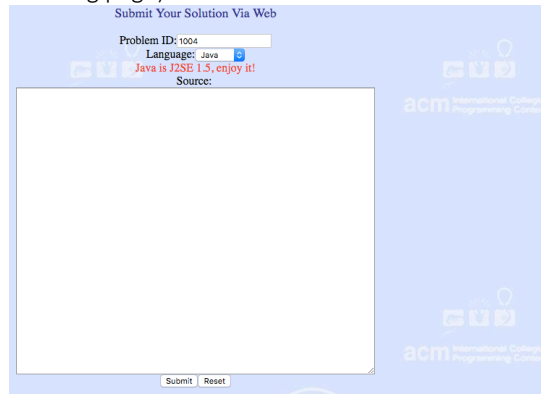
Volume 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

IN Title GO Find problems that your team haven't solved		
ID	Title	Ratio(AC/submit)
1000	A+B Problem	56%(245540/437001)
1001	Exponentiation	24%(42176/174577)
1002	487-3279	17%(53529/299136)
1003	Hangover	48%(63586/130746)
1004	Financial Management	37%(72205/190332)
1005	I Think I Need a Houseboat	43%(46596/107347)
1006	Biorhythms	32%(45153/140672)
1007	DNA Sorting	40%(41881/104645)
1008	Maya Calendar	30%(24633/80217)
1009	Edge Detection	23%(5270/22460)
1010	STAMPS	29%(5596/19182)
1011	Sticks	23%(35497/149455)
1012	Joseph	38%(21159/55395)
1013	Counterfeit Dollar	31%(15180/48023)

All problems are in a large list, no categories or basic introduction (although many problems’ names don’t state themselves)

- **Efficiency of Use**

It lacks some functionality that affect even experienced users (e.g. category of problems, problem description on coding page).



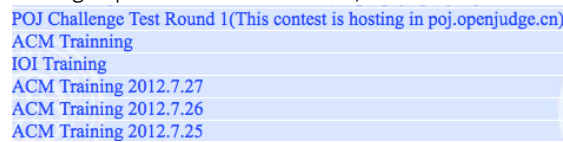
The area on the right, which supposed to be a problem description on the coding page for reference, is a whole blank block for now

- **Memorability**

Most information in lists and table, hard to retrieve and memory the content.

- **Error Frequency and Severity**

Most texts are small and no enough space in lists and tables, so it's easier for user to click a wrong position



There are totally no space between adjacent topics

- **Subjective Satisfaction**

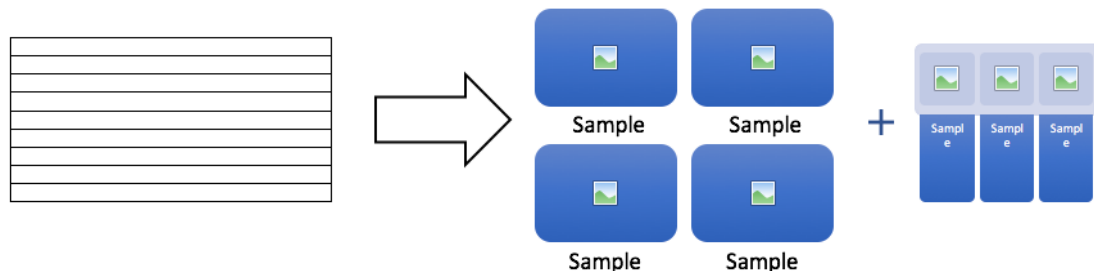
This website lacks efficiency of use, and has a high error possibility; with that the satisfaction will be strongly affected.

### III. Design considerations

When considering the design components, my primary goal is to fix the following problems of the original coding page:

- 1) **Lack of structure and information**

On original pages, almost everything is in plain tables. By changing these tables into dropdowns and panels and adding some necessary statistics or description, I achieve two goals: highlighting the purpose of each area, and allowing user to learn faster.



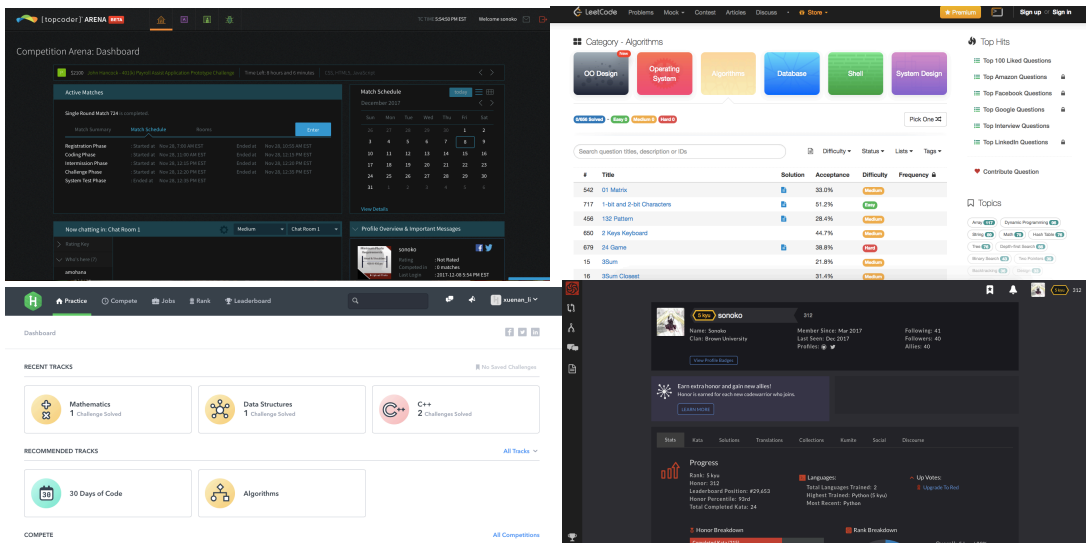
## 2) Unlikeness to its counterparts

As a website serving on very specific purposes, we can confidentially assume that the users own background knowledge on its functionality, and are likely to have usage habit got from using its counterparts. Thus, I was trying to changing its style to matching common representations in online coding websites. Example includes the overall minimalist style, displaying statistical info, or using light color for description and dark one for actual coding area.



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Any problem, Please [Contact Administrator](#)

Screenshot of POJ Homepage

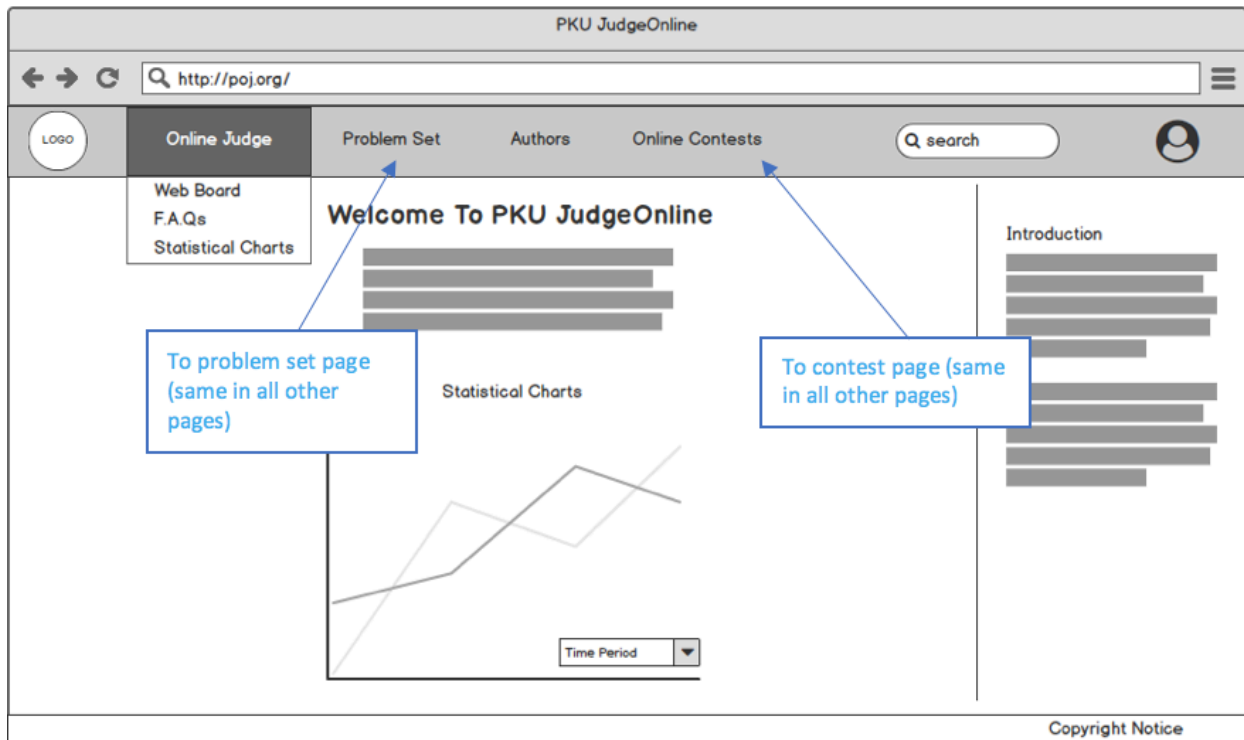


Screenshot of other famous coding websites

## IV. Wireframing

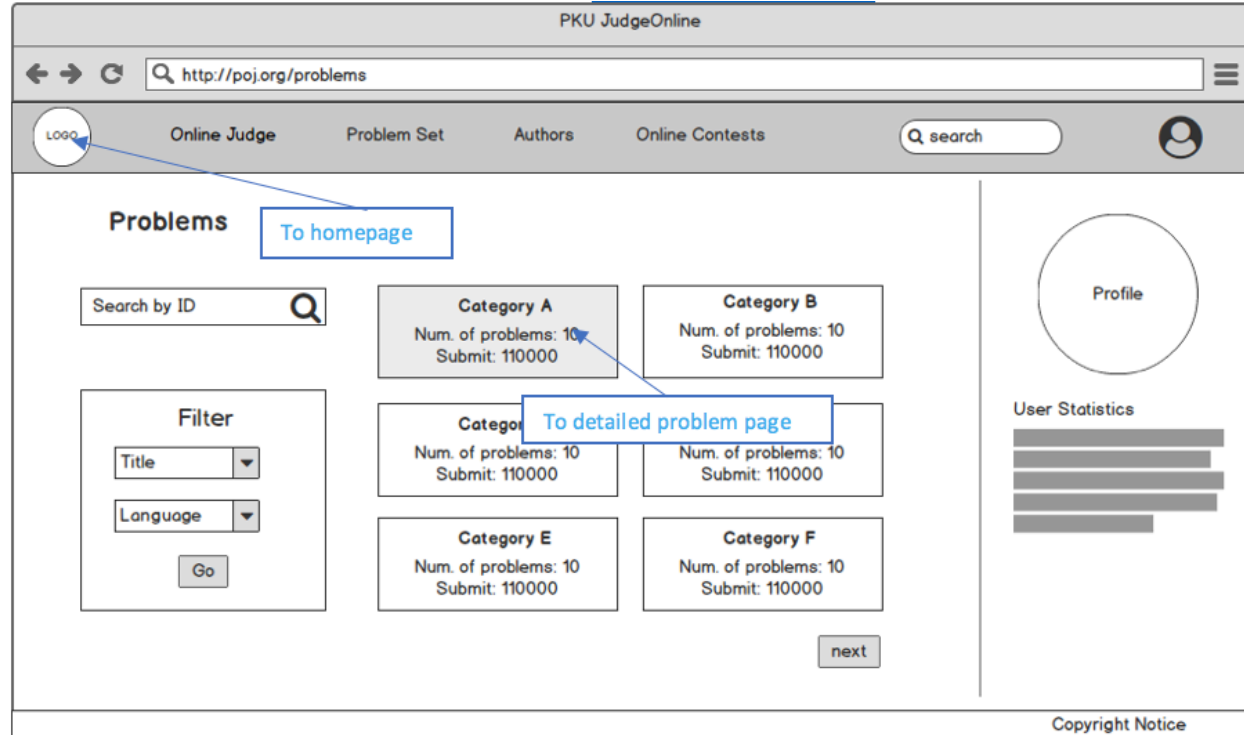
First step of the redesign process is creating wireframes. I redesigned 5 main screens, which are: homepage, problems set page, detailed problem page, coding page, and contest page, and adding comment with arrows to show the navigations between pages. (Design Tool: Balsamiq)

Homepage (<http://poj.org>)



On original homepage, the navigation bar is a table of every options. I change this into dropdowns. I move the statistical chart from one of the subpage to the homepage. Generally, I design in purpose of making it clearer.

#### Problems set page (<http://poj.org/problemset>)



Original page lists all problems in a long list. I modify it into clickable pads based on category. I also add a user profile part for user to see his/her progress so far.

### Detailed problem page (Added)

PKU JudgeOnline

http://poj.org/problems/categoryA

Online Judge Problem Set Authors Online Contests search

#### Problems in category A

Search by ID

Title Language

1022	Packing Unit 4D Cubes	34%(862/2499)	2017-10-15
1023	The Fun Number System	33%(3767/11087)	2017-10-27
1024	Tester Program	35%(1005/2813)	
1025	Department	24%(491/2033)	2017-10-8
1026	Cipher	27%(6215/22428)	2017-11-3
1027	The Same Game	36%(2336/6343)	2017-11-1
1028	Web Navigation	44%(15471/34630)	2017-11-7
1029	False coin	28%(5607/19819)	2017-11-6
1030	Rating	24%(458/1877)	2017-10-3

Return to all categories

#### Similar Problems

Copyright Notice

This page is added by me. It lists all problems in a certain category. And I add a suggestion part to provide similar questions to user based on their current choice.

### Coding page ([http://poj.org/submit?problem\\_id=1059](http://poj.org/submit?problem_id=1059))

PKU JudgeOnline

http://poj.org/problems/0001/coding

Online Judge Problem Set Authors Online Contests search

#### Sample Problem

Language

Problem Description

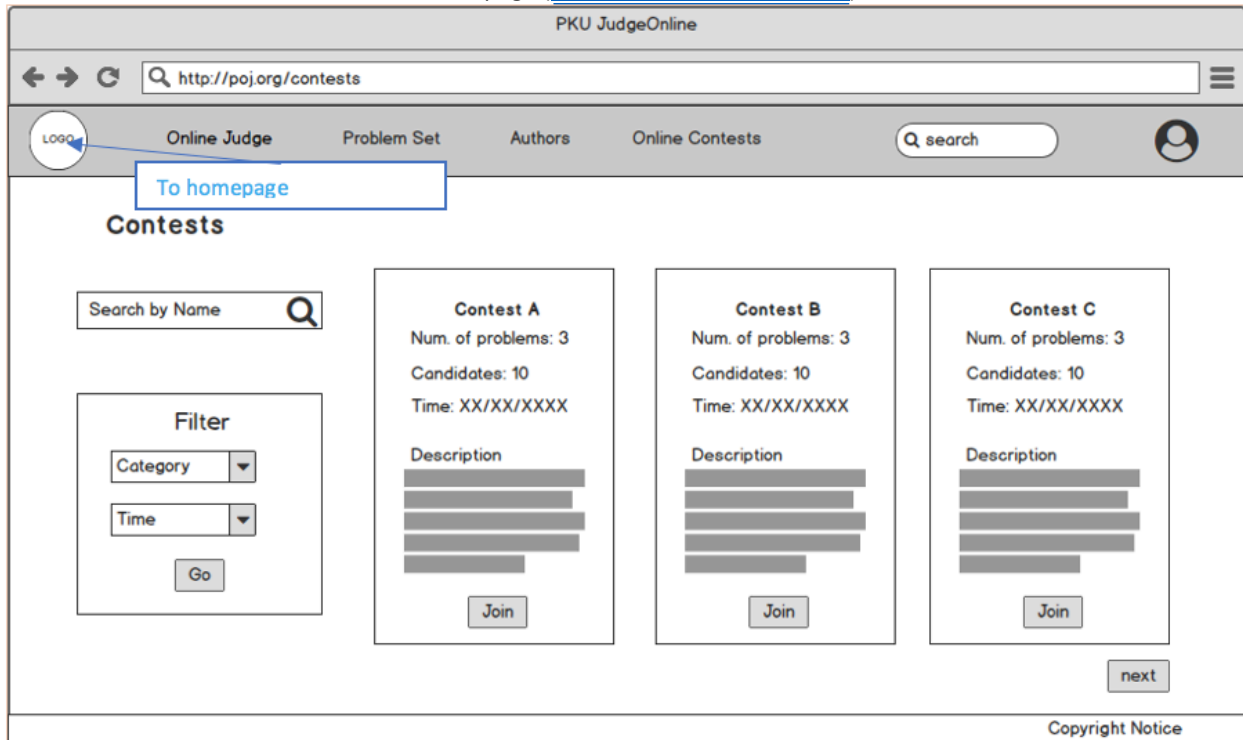
Coding Area

Submit Reset

Copyright Notice

Original coding page doesn't have problem description for reference (problem description is on another separate page). I combine them together.

Contest page (<http://poj.org/pastcontests>)



The original contest page list all contests in a single list. I change them into info pads, therefore there is space for basic description for each contest, which makes user easier to choose which to join.

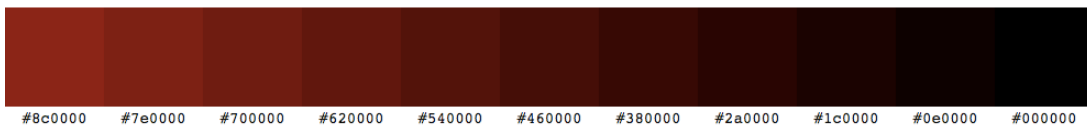
## V. Hi-fidelity Mockup

### Choose a Color Palette

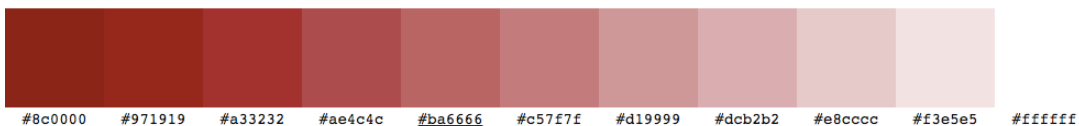
I use color Red #8C0000 as primary color of this whole website, as it is the official color of Peking University. For the palettes, I use a website called Color Hex (<http://www.color-hex.com>) for help, by input the main color onto it. The other colors I choose (e.g. #666666, #f3e5e5 or white and black) are based on main color's shades/tints as well as Color Hex suggestions.

Shades and tints of main color

Shades of #8c0000



Tints of #8c0000



### Mockups

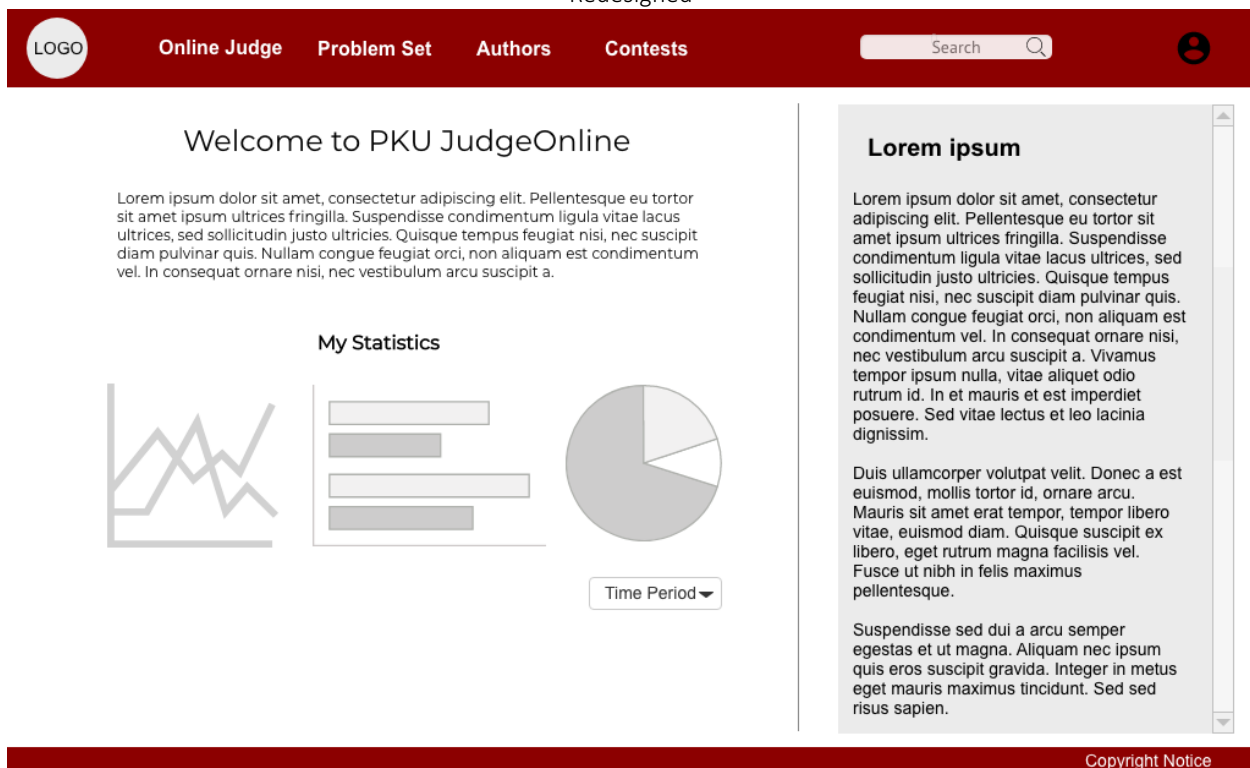
After the initial wireframe, I create mockups that are like real webpages (hi-fidelity model) for these pages. Here are the screenshots of the final mockups, and comparison to the original ones: (Design Tool: UXPin)

## Homepage Original



The original homepage features a blue header with the Peking University logo and the text "JUDGE ONLINE FOR ACM/ICPC". Below the header is a navigation bar with five main sections: Online Judge, Problem Set, Authors, Online Contests, and User. Each section contains sub-links. The Problem Set section includes a search bar for problem IDs. The User section includes a login and registration form. The main content area has a "Welcome To PKU JudgeOnline" message, followed by a paragraph about the problem set and a link to the Peking University ICPC Team Home Page. At the bottom, there are links for Home Page, Go Back, and To top.

## Redesigned



The redesigned homepage features a dark red header with a navigation bar containing "Online Judge", "Problem Set", "Authors", and "Contests". A search bar and a user profile icon are also present. The main content area is divided into two columns. The left column has a "Welcome to PKU JudgeOnline" message, a paragraph of Lorem ipsum text, and a "My Statistics" section with three charts (line, bar, and pie) and a "Time Period" dropdown. The right column has a "Lorem ipsum" section with two paragraphs of Lorem ipsum text. The footer contains a "Copyright Notice" link.

## Problems set page

## Original

Online Judge	Problem Set	Authors	Online Contests	User
<a href="#">Web Board</a> <a href="#">Home Page</a> <a href="#">F.A.Qs</a> <a href="#">Statistical Charts</a>	<a href="#">Problems</a> <a href="#">Submit Problem</a> <a href="#">Online Status</a> Prob.ID: <input type="text"/> <a href="#">Go</a>	<a href="#">Register</a> <a href="#">Update your info</a> <a href="#">Authors ranklist</a> <input type="text"/> <a href="#">Search</a>	<a href="#">Current Contest</a> <a href="#">Past Contests</a> <a href="#">Scheduled Contests</a> <a href="#">Award Contest</a>	User ID: <input type="text" value="once1ife"/> Password: <input type="password" value="*****"/> <a href="#">login</a> <a href="#">Register</a>

Volume [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#) [23](#) [24](#) [25](#) [26](#) [27](#) [28](#) [29](#) [30](#) [31](#)

Search:  IN  Title  Find problems that your team haven't solved

Language: Default

ID	Title	Ratio(AC/submit)	Date
1000	A+B Problem	56%(245540/437002)	2017-12-7
1001	Exponentiation	24%(42176/174580)	2017-12-7
1002	487-3279	17%(53529/299136)	2017-12-7
1003	Hangover	48%(63587/130747)	2017-12-7
1004	Financial Management	37%(72206/190339)	2017-12-7
1005	I Think I Need a Houseboat	43%(46596/107347)	2017-12-6
1006	Biorhythms	32%(45153/140672)	2017-12-6
1007	DNA Sorting	40%(41881/104645)	2017-12-6
1008	Maya Calendar	30%(24633/80217)	2017-12-6
1009	Edge Detection	23%(5270/22460)	2017-12-4
1010	STAMPS	29%(5596/19182)	2017-12-3
1011	Sticks	23%(35497/149455)	2017-12-7
1012	Joseph	38%(21159/55395)	2017-12-7
1013	Counterfeit Dollar	31%(15180/48023)	2017-12-6
1014	Dividing	26%(19090/73223)	2017-12-7
1015	Jury Compromise	26%(8083/30292)	2017-12-5
1016	Numbers That Count	33%(7113/21258)	2017-12-5
1017	Packets	33%(19519/57464)	2017-12-6
1018	Communication System	35%(10582/29751)	2017-12-6

## Redesigned

[Online Judge](#)
[Problem Set](#)
[Authors](#)
[Contests](#)

### Problems

Filter

Title ▼

Language ▼

GO

Category A

Number of Problems: 10  
Total Submit: 10,000  
Difficulty: Easy

Category B

Number of Problems: 10  
Total Submit: 10,000  
Difficulty: Easy

Category C

Number of Problems: 10  
Total Submit: 10,000  
Difficulty: Easy

Category D

Number of Problems: 10  
Total Submit: 10,000  
Difficulty: Easy

Category E

Number of Problems: 10  
Total Submit: 10,000  
Difficulty: Easy

Category F

Number of Problems: 10  
Total Submit: 10,000  
Difficulty: Easy

[Previous](#)
[Next](#)

My Profile

### Introduction

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Pellentesque eu tortor sit amet ipsum ultrices fringilla. Suspendisse condimentum ligula vitae lacus ultrices, sed sollicitudin justo ultrices. Quisque tempus feugiat nisi.

### My Statistics

Time Period ▼

Copyright Notice

Detailed problems page (not present in original website)



[Online Judge](#)
[Problem Set](#)
[Authors](#)
[Contests](#)

## Problems in Category A

Title

Language

ID	Title	Ratio(AC/submit)	Date
1011	<a href="#">Sticks</a>	23%(35497/149455)	12/7/17
1012	<a href="#">Joseph</a>	38%(21158/55394)	12/7/17
1013	<a href="#">Counterfeit Dollar</a>	31%(15180/48023)	12/6/17
1014	<a href="#">Dividing</a>	26%(19090/73222)	12/5/17
1015	<a href="#">Jury Compromise</a>	26%(8083/30292)	12/5/17
1016	<a href="#">Numbers That Count</a>	33%(7113/21258)	12/5/17
1017	<a href="#">Packets</a>	33%(19519/57464)	12/6/17
1018	<a href="#">Communication System</a>	35%(10582/29751)	12/6/17
1019	<a href="#">Number Sequence</a>	29%(11831/40647)	12/6/17
1020	<a href="#">Anniversary Cake</a>	32%(5736/17575)	12/6/17
1021	<a href="#">2D-Nim</a>	45%(1807/3996)	12/4/17
1022	<a href="#">Packing Unit 4D Cubes</a>	34%(868/2507)	12/4/17
1023	<a href="#">The Fun Number System</a>	34%(3776/11104)	12/4/17
1024	<a href="#">Tester Program</a>	35%(1011/2830)	12/4/17
1025	<a href="#">Department</a>	24%(497/2042)	12/7/17
1026	<a href="#">Cipher</a>	27%(6258/22557)	12/6/17
1027	<a href="#">The Same Game</a>	36%(2361/6465)	12/3/17

### Similar Problems

- Lorem ipsum dolor sit amet, consectetur

adipiscing elit. Pellentesque eu tortor sit amet ipsum ultrices fringilla. Suspendisse condimentum ligula vitae lacus ultrices, sed sollicitudin justo ultricies. Quisque tempus

- feugiat nisi, nec suscipit diam pulvinar

quis. Nullam congue feugiat orci, non aliquam est condimentum vel. In consequat ornare nisi, nec vestibulum arcu suscipit a. Vivamus tempor ipsum nulla, vitae aliquet

- odio rutrum id.

In et mauris et est imperdiet posuere. Sed vitae lectus et leo lacinia dignissim.

Copyright Notice

## Coding page

### Original

[Online Judge](#)  
[Web Board](#)  
[Home Page](#)  
[F.A.Qs](#)  
[Statistical Charts](#)

[Problem Set](#)  
[Problems](#)  
[Submit Problem](#)  
[Online Status](#)  
Prob.ID:  [Go](#)

[Authors](#)  
[Register](#)  
[Update your info](#)  
[Authors ranklist](#)  
 [Search](#)

[Online Contests](#)  
[Current Contest](#)  
[Past Contests](#)  
[Scheduled Contests](#)  
[Award Contest](#)

[User](#)  
[oncelife](#)  
[Mail:0\(0\)](#)  
[Login Log](#)  
[Archive](#)

Submit Your Solution Via Web

Problem ID:

Language: [Java](#)

Java is J2SE 1.5, enjoy it!

Source:

[Submit](#) [Reset](#)

[Home Page](#)
[Go Back](#)
[To top](#)

### Redesigned

LOGO

Online JudgeProblem SetAuthorsContests

Search

LOrem ipsum

LOrem ipsum dolor sit amet, consectetur adipiscing elit. Pellentesque eu tortor sit amet ipsum ultrices fringilla. Suspendisse condimentum ligula vitae lacus ultrices, sed sollicitudin justo ultricies. Quisque tempus feugiat nisi, nec suscipit diam pulvinar quis. Nullam congue feugiat orci, non aliquam est condimentum vel. In consequat ornare nisi, nec vestibulum arcu suscipit a. Vivamus tempor ipsum nulla, vitae aliquet odio rutrum id. In et mauris et est imperdiet posuere. Sed vitae lectus et leo lacinia dignissim.

Duis ullamcorper volutpat velit. Donec a est euismod, mollis tortor id, ornare arcu. Mauris sit amet erat tempor, tempor libero vitae, euismod diam. Quisque suscipit ex libero, eget rutrum magna facilisis vel. Fusce ut nibh in felis maximus pellentesque.

Suspendisse sed dui a arcu semper egestas et ut magna. Aliquam nec ipsum quis eros suscipit gravida. Integer in metus eget mauris maximus tincidunt. Sed sed risus sapien.

Language

1

SUBMITRESET

Copyright Notice

Contest page

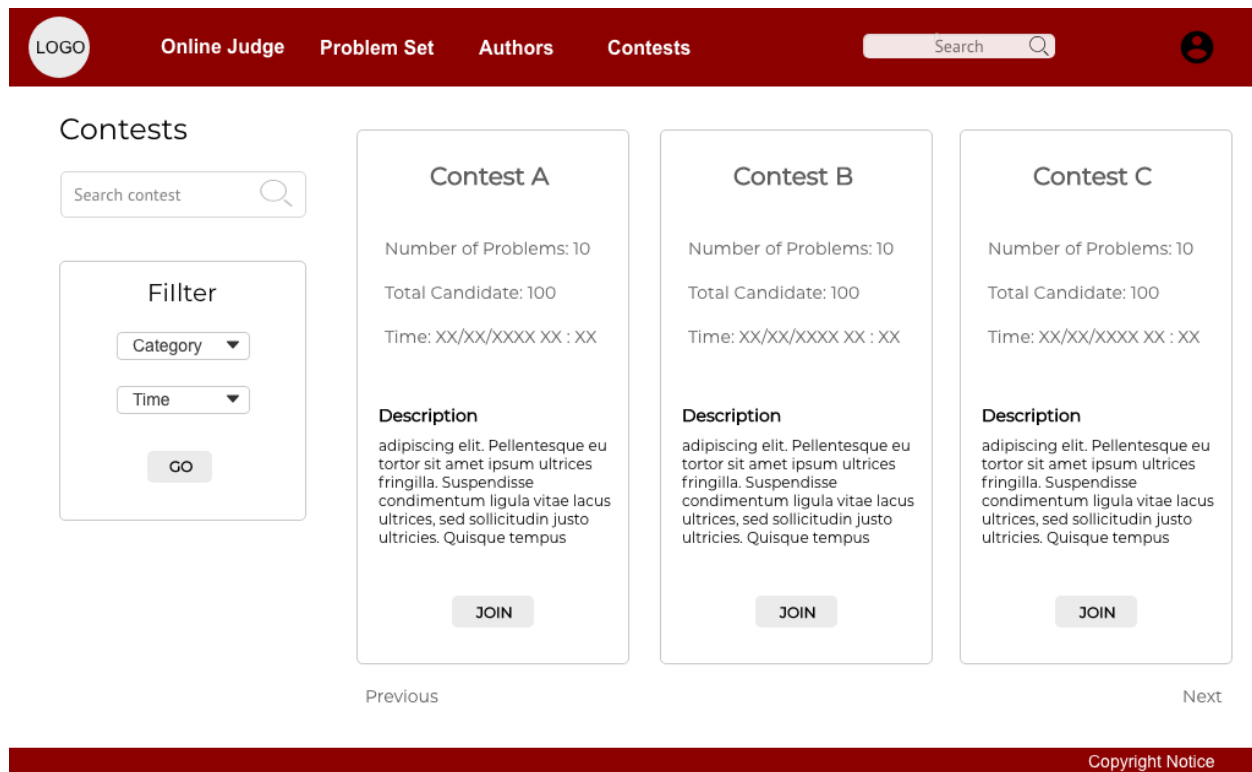
Original

Online Judge	Problem Set	Authors	Online Contests	User
Web Board Home Page F.A.Qs Statistical Charts	Problems Submit Problem Online Status Prob.ID: <input type="text"/> Go	Register Update your info Authors ranklist <input type="text"/> Search	Current Contest Past Contests Scheduled Contests Award Contest	oncelife Mail:0(0) Login Log Archive

ID	Title	Start Time	Status
1528	POJ Challenge Round 5(绍兴一中邀请赛)(This contest is hosting in http://poj.openjudge.cn/challenge5/)	2014-01-26 18:30:00.0	ended
1527	POJ Challenge Round 4(雅礼中学邀请赛)(This contest is hosting in http://poj.openjudge.cn/challenge4/)	2013-12-22 14:00:00.0	ended
1526	POJ Challenge Round 3(This contest is hosting in http://poj.openjudge.cn/challenge3/)	2013-11-10 19:00:00.0	ended
1525	测试1	2013-10-12 14:50:00.0	ended
1524	POJ Challenge Round 2(长郡中学邀请赛)http://poj.openjudge.cn/	2013-10-13 19:00:00.0	ended
1523	POJ Challenge Test Round 1(This contest is hosting in poj.openjudge.cn)	2013-06-02 14:00:00.0	ended
1522	ACM Training	2012-10-06 00:00:00.0	ended
1521	IOI Training	2012-09-20 13:00:00.0	ended
1520	ACM Training 2012.7.27	2012-07-27 10:00:00.0	ended
1519	ACM Training 2012.7.26	2012-07-26 10:00:00.0	ended
1518	ACM Training 2012.7.25	2012-07-25 10:00:00.0	ended
1517	ACM Training 2012.7.24	2012-07-24 10:00:00.0	ended
1516	ACM Training 2012.7.23	2012-07-23 10:00:00.0	ended
1515	ACM Training 2012.7.22	2012-07-22 10:00:00.0	ended
1514	ACM Training 2012.7.20	2012-07-20 10:00:00.0	ended
1513	ACM Training 2012.7.19	2012-07-19 10:00:00.0	ended
1512	ACM Training 2012.7.18	2012-07-18 10:00:00.0	ended
1511	ACM Training 2012.7.17	2012-07-17 10:00:00.0	ended
1510	ACM Training 2012.7.16	2012-07-16 10:00:00.0	ended
1509	ACM Training 2012.7.15	2012-07-15 10:00:00.0	ended

[Title] [Previous Panel] [Next Panel]

Redesigned



### Usability Improvements for the redesigned model

- **Intuitive Design**  
By hiding sub options into dropdowns and dividing each page into left, right parts, it will give out a more intuitive structure
- **Ease of Learning**  
To raise learnability, I change layout more similar to famous counterparts, and use different color to highlight important parts
- **Efficiency of Use**  
Every page is in a more clear and structured layout. For experienced users, it's easy to memorize the procedures
- **Memorability**  
Change list and table to graphical components, easier for memorizing
- **Error Frequency and Severity**  
Enough space between different items, also apply different colors to distinguish. Error rate is expected to be lower
- **Subjective Satisfaction**  
After the redesign, the website now has a clear structure with good learnability. Thus, most users will be satisfied using it

### Tradeoffs

There are certain tradeoffs I made in achieving those goals. A significant one is the adding of large amount of new information, like problem categories, contest candidate numbers, user's own statistics, which need to be calculated

when actually implementing the website. Another one is the reduce in maximum information shown in one page, as now the gap between different blocks largely increases.

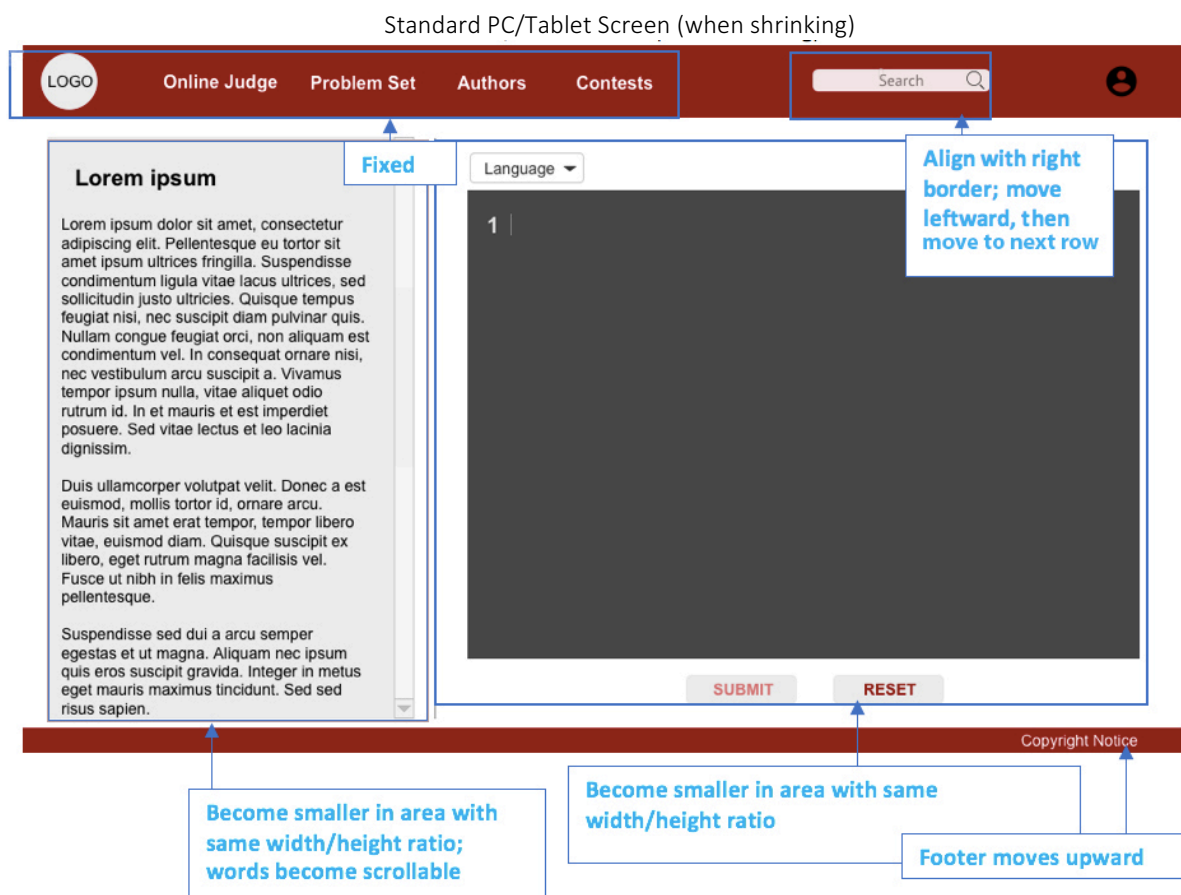
## VI. Addition Task: Programming one page

After finishing the visual redesign, I decide to technically implement one page to give a better idea on how it actually looks like. The page I chose to make is the coding page, as this is the page that serves core function of the whole website.

Writing responsive pages is a fundamental idea in modern web app development. First, I will show the responsiveness of this page on different screens. One way to easily tell the difference is by adding annotations to the hi-fi mockup.

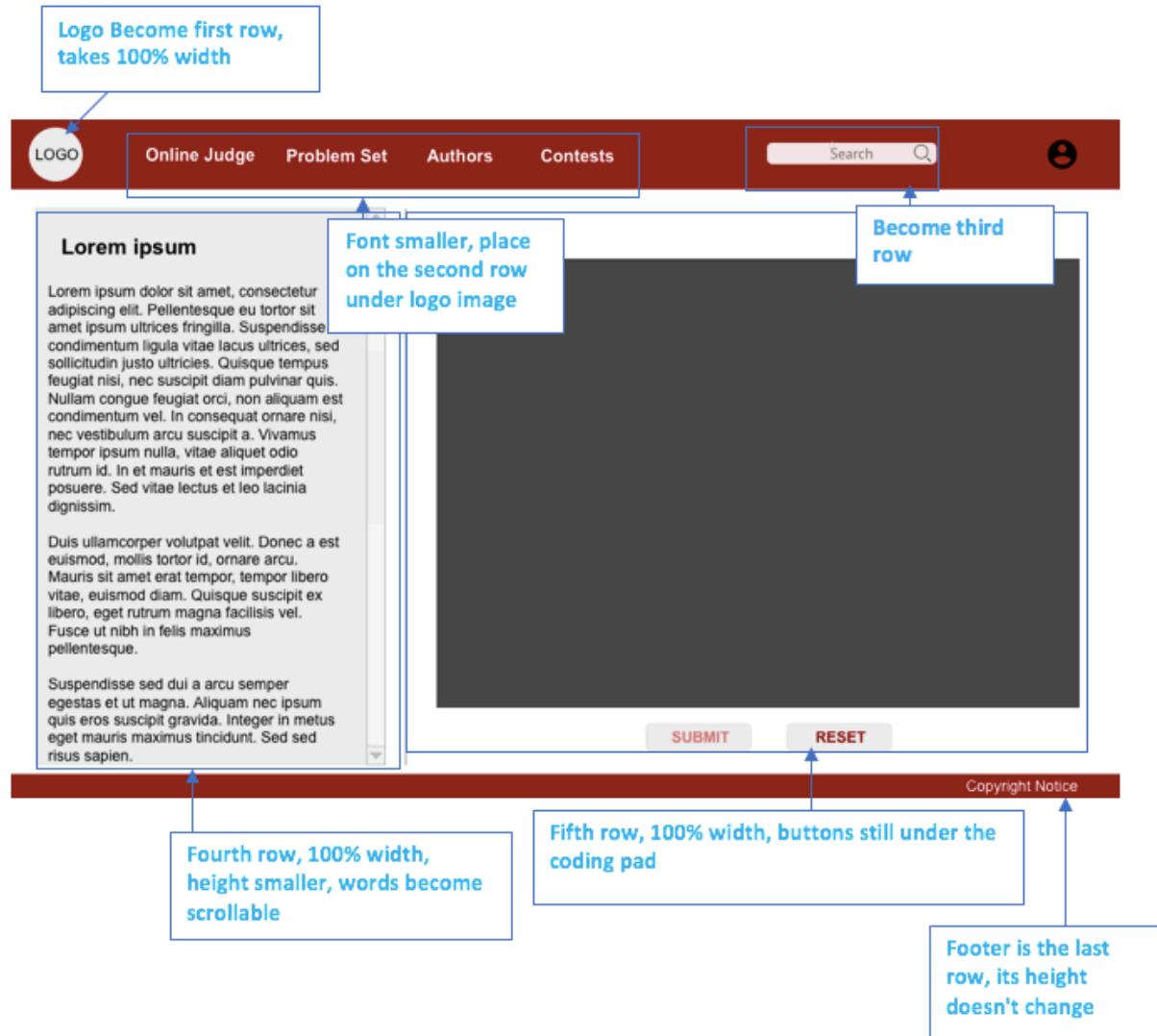
### Annotated mockup

Due to its programming website property, the primary use of this website would be on PC/Tablet with keyboard:



However, with the continuous growing usage of smart phone, a page that automatically fits into phone screens should also be considered. I add a media query on 600px width, to change the page to phone mode:

Change to phone mode (When width  $\leq$  600px)



### Coding the page

I write this in standard HTML/CSS format. For responsiveness handling, I choose CSS Grid, a method which divide page into grids and automatically handles relevant responsive changes. The final work includes one HTML file (index.html), one CSS file (style.css) and an image folder.

View the page at: <https://edwardcgeorge.github.io/poj-redesign/>