K.J. Somaiya College of Science & Commerce Vidyavihar (E),

Mumbai – 400077.

Autonomous

Affiliated to University of Mumbai

PROJECT REPORT

ON

Question Generation System using NLP and Django

Questioniz

SUBMITTED BY

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T.Y.BSC (COMPUTER SCIENCE)

UNIVERSITY OF MUMBAI

2021 – 2022

PROJECT GUIDE

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CERTIFICATE

This is to certify that ***Jagrut Gemendra Gala*** *of* ***T.Y.B.Sc. [Computer Science]*** ***Semester - V****, Seat no.* ***2109805*** *has successfully completed the project entitled as* ***Question Generation System using NLP and Django - Questioniz*** *during the academic year* ***2021-2022****.*

Internal Guide

Date:

Course Coordinator of CS Department ***College seal*** ***Sign of Examiner***

Date: ***Date***

Acknowledgement

First and foremost, I would like to thank our project guide Mr. Mohammed Bilal Shaikh who guided us in doing these projects. He provided us with invaluable advice and helped us in difficult periods. His motivation and help contributed tremendously to the successful completion of the project.

Besides, we would like to thank all the teachers who helped us by giving us advice and providing the equipment which we needed.

Finally, we would like to thank my friends and classmates who helped and motivated us to work on this project.

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Overview

In recent times as the number of students appearing for competitive exams are increasing yet the number of admissions available in institutions remain the same. This is resulting in exams getting more intense and competitive.

So students need to practice more to master the subject, but teachers can give them a certain number of questions to students to practice. Even if students uses reference books questions to practice the book provides only a limited number of questions.

Question Generation systems are very useful in these types of situations especially trying times when education is online.

Description of Existing System

Existing Systems of Question Generation systems involve Questgen, Quillionz, QuizEasy by KG-1510 and Question-Generation by KristiyanVachev which are used by Teachers and Schools to generate practice worksheets or quiz's for their students. Questgen is AI-based question generation web-application made using questgen api.

Some systems specialize in generating a specific type of questions like multiple-choice-question(MCQ), open questions, True/ False questions, etc. Many systems also provide functionality to export the generated quiz in a PDF format and download it.

Questioniz is a web-application that uses Natural language Processing(NLP) to generate questions.

Limitations of Existing Systems

Existing systems like Questgen and Quillionz are good and generate high quality questions but are locked behind a monthly subscription fees. They are also proprietary and the user has no way to control over what new feature will be added.

Other question generation systems which are free are self hosted and user needs technical skills to install and run the application. eg. QuizEasy by KG-1510 and Question-Generation by KristiyanVachev.

Proposed System and Its Advantages

This proposed work is made using Django Framework with sqlite3 database. For Natural Laguage Processing the system uses NLTK library.

The objective of this question generation system is to generate fill in the blank questions from the text provided by the user. It aims to generate the questions by following the given procedure:

1. Cleaning the given text
2. Finding keywords using TF-IDF algorithm
3. Swapping keywords with blanks
4. Presenting the list of questions

Some advantages of the system are:

- Highlights derived sentence
- New questions every time
- Easy to use
- Open Source
- Clean and modern user interface

Stakeholders

Individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion.

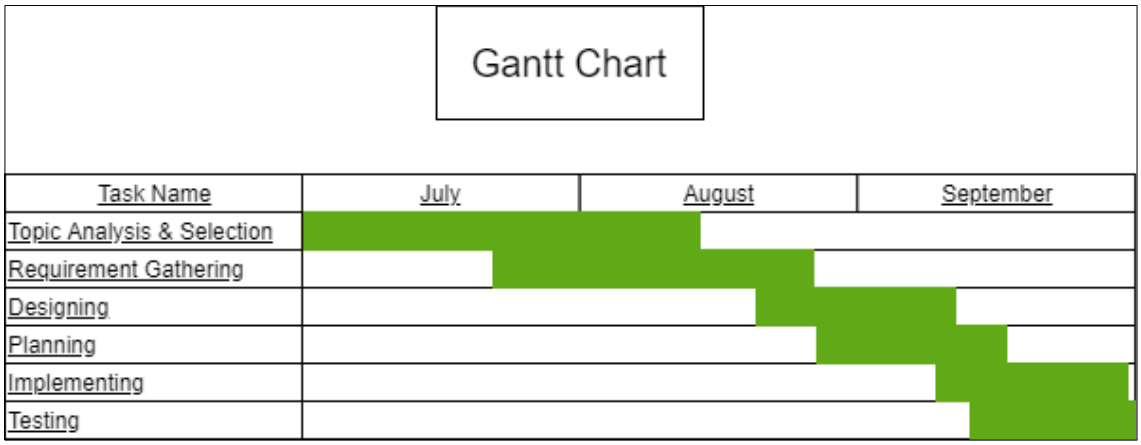
The project's stakeholders are as follows:

- Developer: The developer is the main person in charge of the making the system. All features of the system are well-understood by the developer. The developer is in responsible of keeping track of the information provided by the users.

- End User: The end user is the person who will use this application to benefit from themselves.

Gantt Chart

Gantt charts are a type of bar chart that depicts a project's progress. The tasks to be accomplished are shown on the vertical axis, while the time intervals are listed on the horizontal axis. The width of the horizontal bars in the graph show the time of each action.



Technologies Used

- Programming Environment-
  - **Operating System**: Windows
  - **Language**: Python
  - **Code Editor**: Visual Studio Code
  - **Browser**: Chrome

- Libraries and Frameworks used-
  - **Django**: Django is a high-level Python web framework that enables rapid development of secure and maintainable websites.

  - **SQLite3**: SQLite is a self-contained, file-based SQL database. SQLite comes bundled with Python and can be used in any of your Python applications without having to install any additional software.

  - **NLTK**: The Natural Language Toolkit (NLTK) is a platform used for building Python programs that work with human language data for applying in statistical natural language processing (NLP).

Event Table

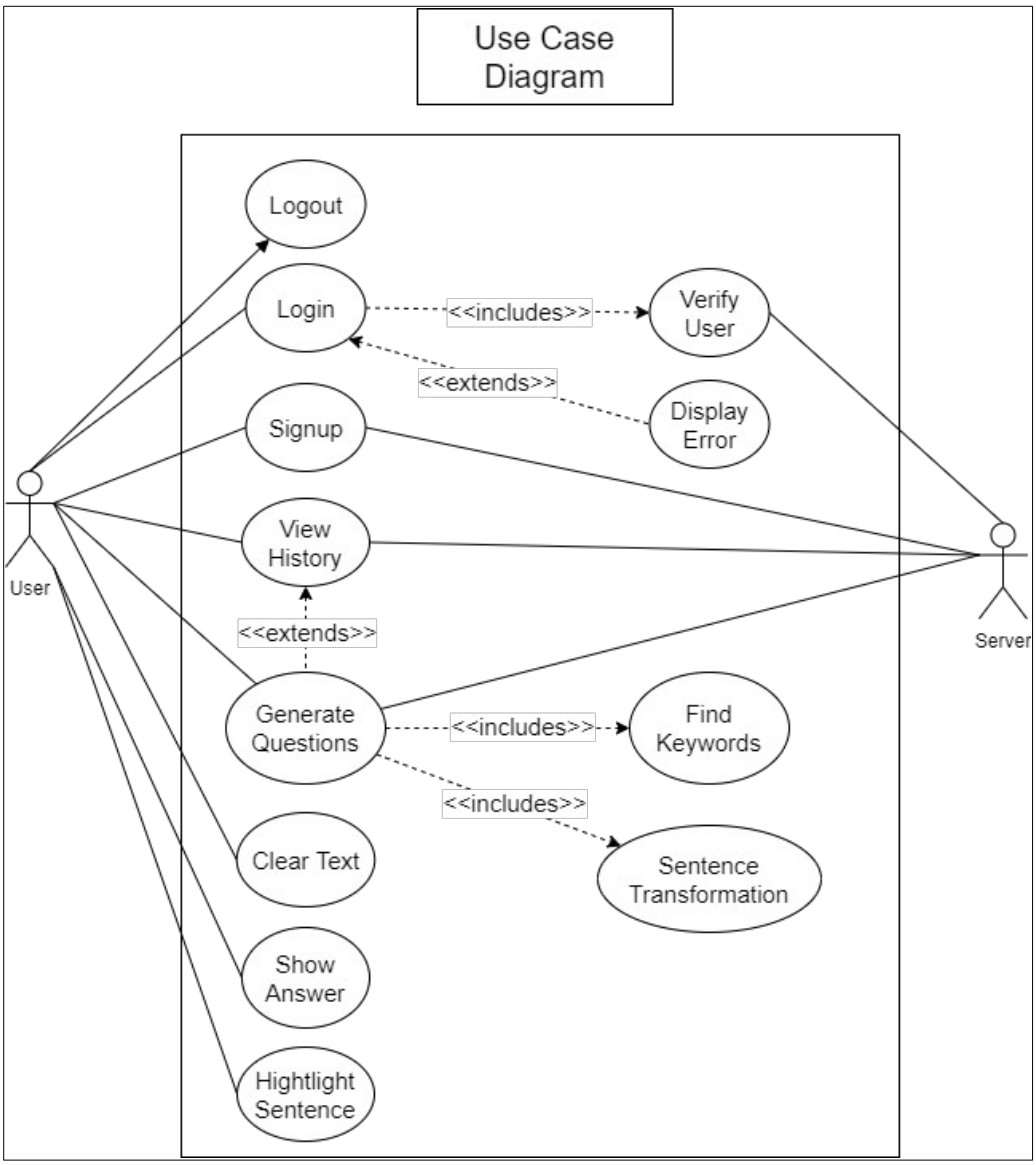
Event Table is a catalogue of use cases listed by event. Contains detailed information

- Trigger: Signal that indicates an event has occurred.
- Source: External agent that initiates event and supplies data for the event.
- Response: Output produced by the system.
- Destination: External agent that receives the response.

Event	Trigger	Source	Use Case	Response	Destination
user wants to log in	username and password	user	Login	session	End User
user wants to signup	username and password	user	Signup	session	End User Database
user wants to see answer	answer visibility	user	Show Answer	answer	End User
user wants to highlight orginal sentence	sentence index	user	Hightlight Sentence	original sentence	End User
user wants to see history	username	user	View History	previous 10 submissions	End User
user wants to clear text	-	user	Clear Text	empty text box	End User
user wants to generate questions	text	user	Generate Questions	questions	End User Database
user want to see a reult	text	user	Generate Questions	questions	End User Database
user want to logout	session	user	Logout	-	End User

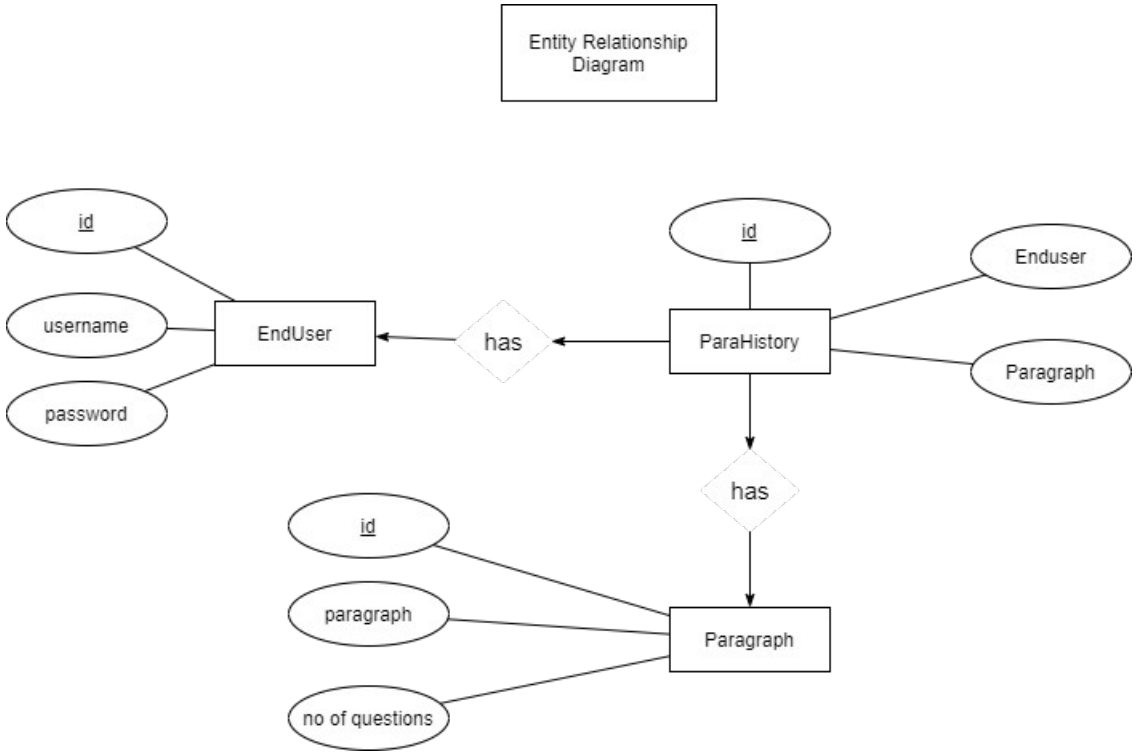
Use Case Diagram

Use Case Diagrams are used to summarize the details of any system's users (also known as actors) and their interactions with the system.



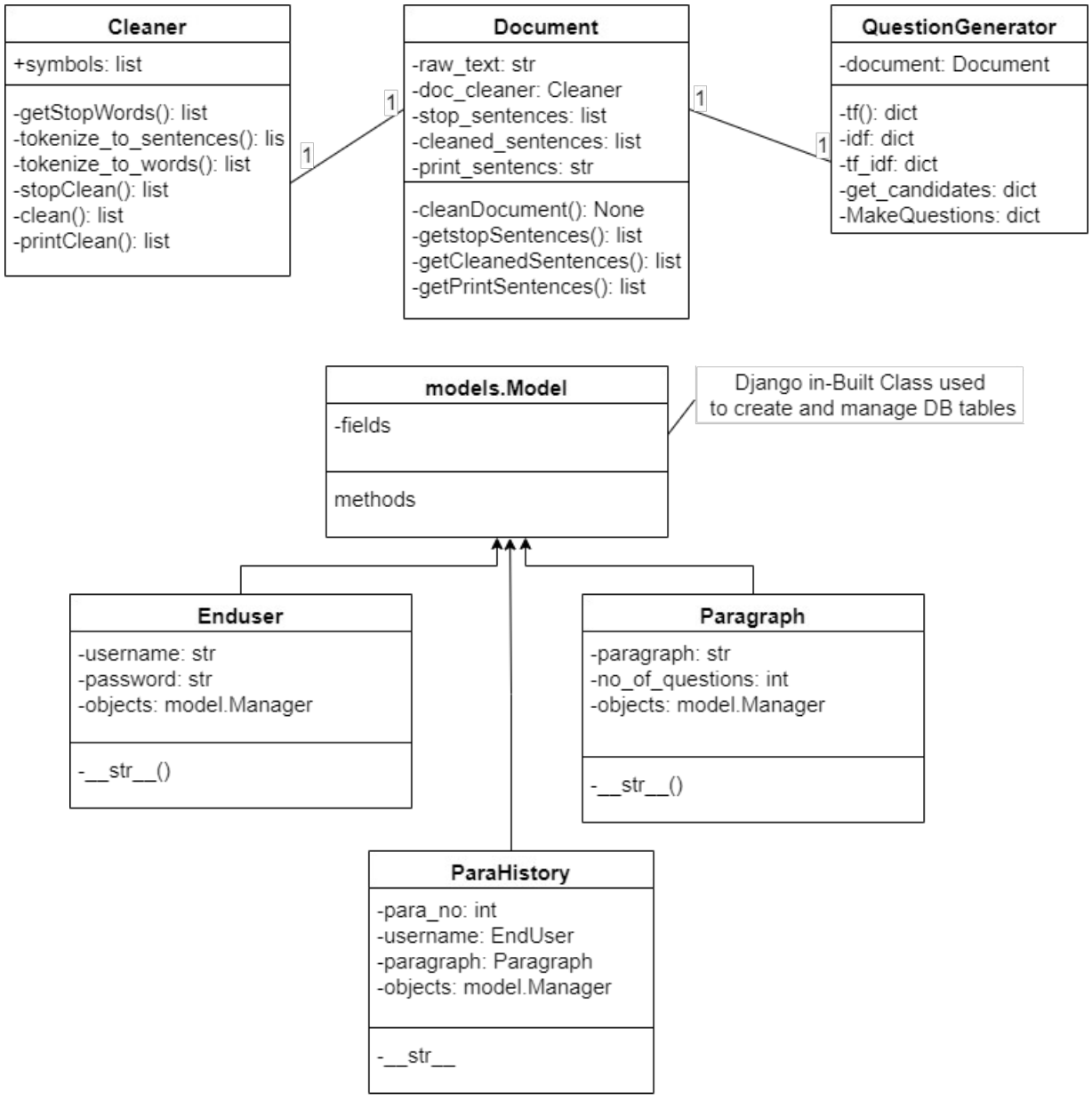
Entity-Relationship Diagram

Entity Relationship Diagram(ERD) shows the relationships of entity sets stored in a database. An entity in this context is an object, a component of data. An entity set is a collection of similar entities. These entities can have attributes that define its properties.



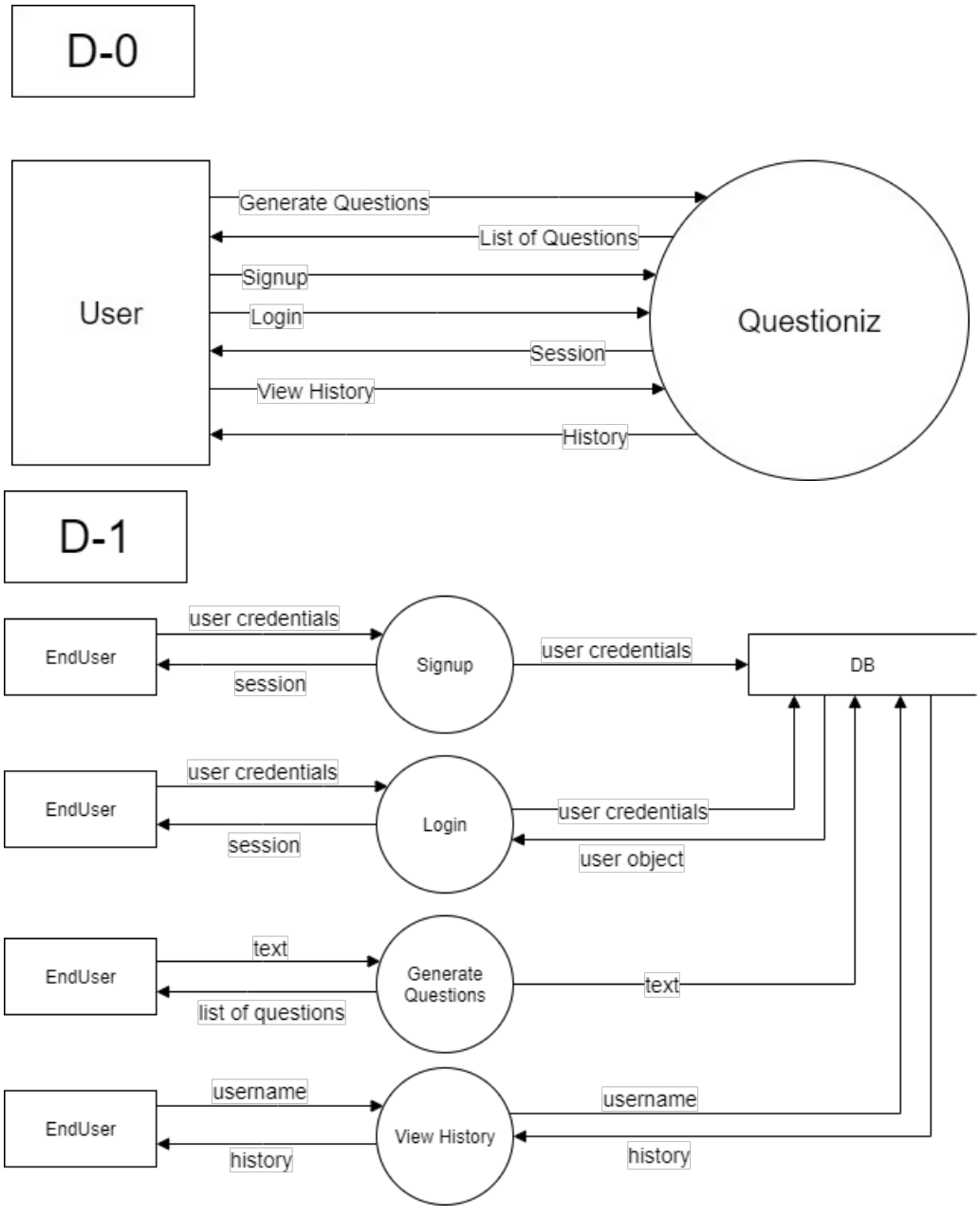
Class Diagram

Class diagram is a static diagram. It represents the static view of an application. Class diagram is not only used for understanding and documenting different aspects of a system but also for constructing executable code of the software application. Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. Class diagram shows a collection of classes, interfaces, associations, collaborations, and constraints. It is also known as a structural diagram.



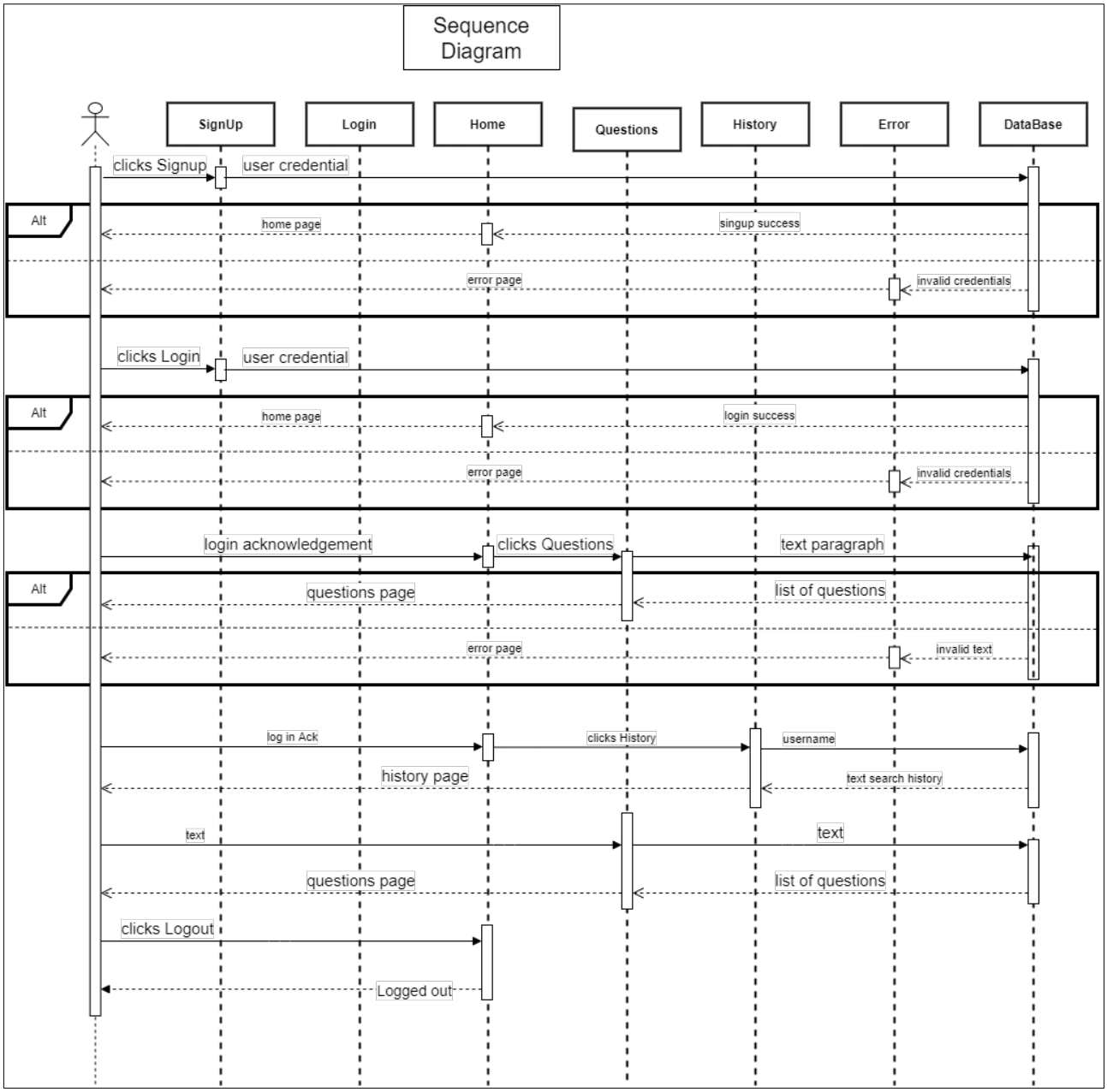
Data Flow Diagram

Data Flow Diagram (DFD) describes the in and out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.



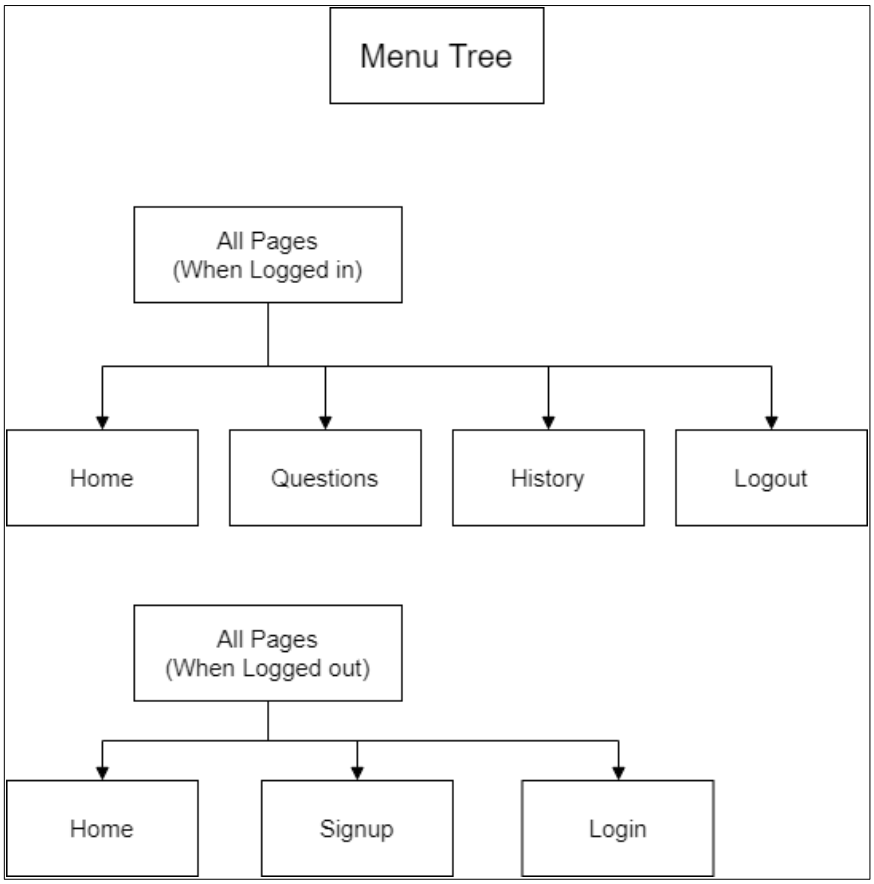
Sequence Diagram

Sequence Diagram is a diagram that explains the order of interactions that the any actor is going to have with the system. The diagram shows how—and in what order—a group of objects works together.



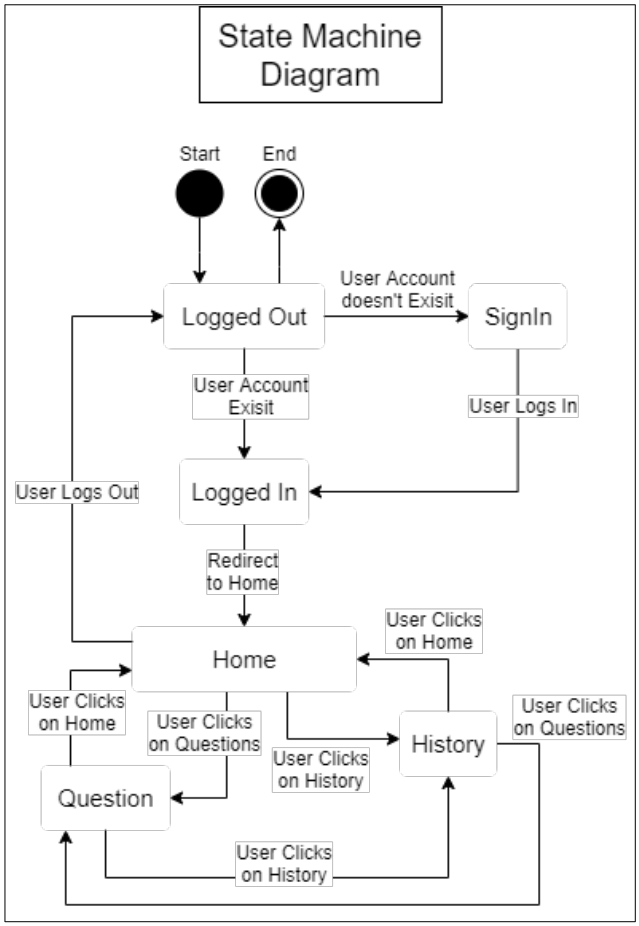
Menu Tree

Menu Tree shows all the pages and activities that are present in a system.



State Machine Diagram

A state machine is any device that stores the status of an object at a given time and can change status or cause other actions based on the input it receives. States refer to the different combinations of information that an object can hold, not how the object behaves.



System Coding

base.html

```
{% load static %}
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>{% block title%}Questioniz{% endblock %}</title>
  <link rel="stylesheet" href="{% static 'css/global.css' %}">
  {% block style %}{% endblock %}
  {% block script %}{% endblock %}
</head>
<body>
  <div class="root">
    <header>
      <section class="navigation">
        <a class="app" href="/">
          <svg class="svg-logo svg" viewBox="0 0 16 16"><use xlink:href="#svg-
logo" href="#svg-logo"></use></svg>
          <h1>Questioniz</h1>
        </a>
        <ul class="navigation-list">
          <li><a class="link" href="/">Home</a></li>
          {% if username %}
          <li><a class="link" href="/questions/">Questions</a></li>
          <li><a class="link" href="/history/">History</a></li>
          <form action="/logout/">
            <button class="link logout-btn" type="submit" valu
e="logout">Logout</button>
          </form>
          {% else %}
            <li><a class="link" href="/signup/">Signup</a></li>
            <li><a class="link" href="/login/">Login</a></li>
          {% endif %}
        </ul>
      </section>
      {% block header %}{% endblock %}
    </header>
```

```
    <div class="content">{% block content %}{% endblock %}</div>
    <footer>{% block footer %}{% endblock %}</footer>
  </div>
  <svg style="display: none;">
    <symbol id="svg-logo" class="svg-symbol" width="16" height="16" xmln
s="http://www.w3.org/2000/svg">
      <g id="Layer_1">
        <rect stroke="#000" rx="2" fill-opacity="1" id="svg_1" heigh
t="13.44136" width="13.87499" y="1.27932" x="1.0625" fill="#fff"/>
        <text transform="matrix(1 0 0 1 0 0)" xml:space="preserve" text-
anchor="start" font-family="sans-serif" font-size="12" stroke-width="0" i
d="svg_2" y="12.15313" x="4.65626" stroke="#000" fill="#000000">?</text>
      </g>
    </symbol>
    <symbol id="svg-highlight" class="svg-symbol" width="16" height="16" viewBo
x="0 0 16 16" fill="none" xmlns="http://www.w3.org/2000/svg">
      <path d="M2.5 1C2.77614 1 3 1.22386 3 1.5V4.5C3 4.77614 3.22386 5 3.5 5H1
2.502C12.7782 5 13.002 4.77614 13.002 4.5V1.5C13.002 1.22386 13.2259 1 13.502 1
C13.7782 1 14.002 1.22386 14.002 1.5V4.5C14.002 5.1535 13.5841 5.70939 13.001 5
.91502V7C13.001 8.10457 12.1055 9 11.001 9H10.9997L11.0029 10.7399C11.0038 11.2
515 10.7439 11.7283 10.3134 12.0048L5.77287 14.9207C5.619 15.0196 5.42347 15.02
65 5.26299 14.9388C5.10251 14.8512 5.00269 14.6829 5.00269 14.5V9H5.00098C3.896
41 9 3.00098 8.10457 3.00098 7V5.91499C2.41787 5.70935 2 5.15347 2 4.5V1.5C2 1.
22386 2.223861 2.5 1ZM6.00269 9V13.5847L9.77306 11.1634C9.91656 11.0712 10.0032
10.9123 10.0029 10.7417L9.99968 9H6.00269ZM4.00098 7C4.00098 7.55228 4.44869 8
5.00098 8H11.001C11.5533 8 12.001 7.55228 12.001 7V6H4.00098V7Z" fill="#212121"
/>
    </symbol>
    <symbol id="svg-copy" class="svg-symbol" width="16" height="16" viewBox="0
016 16" fill="none" xmlns="http://www.w3.org/2000/svg">
      <path d="M4.00029 4.08525L4 10.5C4 11.8255 5.03154 12.91 6.33562 12.9947L
6.5 13L10.9144 13.0007C10.7083 13.5829 10.1528 14 9.5 14H6C4.34315 14 3 12.6569
3 11V5.5C3 4.84678 3.41754 4.29109 4.00029 4.08525ZM11.5 2C12.3284 2 13 2.67157
13 3.5V10.5C13 11.3284 12.3284 12 11.5 12H6.5C5.67157 12 5 11.3284 5 10.5V3.5C5
2.67157 5.67157 2 6.5 2H11.5ZM11.5 3H6.5C6.22386 3 6 3.22386 6 3.5V10.5C6 10.77
61 6.22386 11 6.5 11H11.5C11.7761 11 12 10.7761 12 10.5V3.5C12 3.22386 11.7761
3 11.5 3Z" fill="#212121"/>
    </symbol>
  </svg>
</body>
</html>
```

index.html

```
{% extends 'base.html' %}
{% load static %}

{% block title %}Home Page{% endblock %}
{% block style %}
  <link rel="stylesheet" href="{% static 'css/home.css' %}">
{% endblock %}

{% block script %}
  <script src="{% static 'js/loader.js' %}" defer></script>
  <script src="{% static 'js/home.js' %}" defer></script>
{% endblock %}

{% block content %}
  <section class="">
    Index Page
    about and how it works
    product description
  </section>
{% endblock %}

{% block footer %}
  <div class="no-display overlay" id="loading">
    <div class="loader"></div>
  </div>
  {% if c %}
    {{c}}
  {% endif %}
{% endblock %}
```

signup.html

```
{% extends 'base.html' %}
{% load static %}

{% block title %}Home Page{% endblock %}
{% block style %}
  <link rel="stylesheet" href="{% static 'css/home.css' %}">
{% endblock %}

{% block content %}
  <section class="form-container">
    <h1 class="pg-title">Sign up</h1>
    <form class="singup-form form" method="POST" action="/home/">
      {% csrf_token %}
        <input class="form-input text" type="text" name="username" i
d="username" placeholder="Username">
        <input class="form-input password" type="password" name="password" i
d="password" placeholder="Confirm">
        <input class="form-input password" type="password" name="cpassword" i
d="cpassword" placeholder="Confirm Confirm">
      <button class="signup-btn btn round-border" type="submit" name="signup-
btn" value="sign-up">Signup</button>
      <button class="reset-btn btn round-border" type="reset" name="reset-btn"
value="reset">Reset</button>
    </form>
  </section>
{% endblock %}
```

login.html

```
{% extends 'base.html' %}
{% load static %}

{% block title %}Home Page{% endblock %}
{% block style %}
  <link rel="stylesheet" href="{% static 'css/home.css' %}">
{% endblock %}

{% block content %}
  <section class="form-container">
    <h1 class="pg-title">Log in</h1>
    <form class="login-form form" method="POST" action="/home/">
      {% csrf_token %}
        <input class="form-input text" type="text" name="username" i
d="username" placeholder="Username">
        <input class="form-input password" type="password" name="password" i
d="password" placeholder="Confirm">
      <button class="login-btn btn round-border" type="submit" name="login-btn"
value="let-me-in">Login</button>
      <button class="reset-btn btn round-border" type="reset" name="reset-btn"
value="reset">Reset</button>
    </form>
  </section>
{% endblock %}
```

no_questions.html

```
{% extends 'base.html' %}
{% load static %}

{% block style %}
  <link rel="stylesheet" href="{% static 'css/questions.css' %}">
  <link rel="stylesheet" href="{% static 'css/loader.css' %}">
{% endblock %}

{% block script %}
  <script>
    var textarea_text= "{{text}}";
  </script>
  <script src="{% static 'js/home.js' %}" defer></script>
  <script src="{% static 'js/questions.js' %}"></script>
{% endblock %}

{% block content %}
  <section class="text-area--section" id="span-text">
    <form class="text-area--form" name="text-area-form" id="text-area-form" met
hod="POST" action="/questions/">
      {% csrf_token %}
      <label class="text-area--label" for="text">Text Here <span>↓</span></
label>
      <div class="text-area--container" words="0">
        {% if text %}
          <textarea class="text-area--text" name="text-area" id="text-area" pla
ceholder="Text here..." words="0">{{text}}</textarea>
        {% else %}
          <textarea class="text-area--text" name="text-area" id="text-area" pla
ceholder="Text here..." words="0"></textarea>
        {% endif %}
        <button type="reset" class="reset-btn btn " id="text-area-btn-reset" na
me="text-area-btn-reset" value="reset">X</button>
      </div>
        <button type="submit" class="submit-btn btn round-border-thick" i
d="text-area-btn-submit" name="text-area-btn-submit" value="generate-
questions">Generate</button>
    </form>
  </section>
{% endblock %}
```

```
{% block footer %}
  <div class="no-display overlay" id="loading">
    <div class="loader"></div>
  </div>
{% endblock %}
```

questions.html

```
{% extends 'base.html' %}
{% load static %}

{% block style %}
  <link rel="stylesheet" href="{% static 'css/questions.css' %}">
{% endblock %}

{% block script %}
  <script>
    var textarea_text= "{{text}}";
  </script>
  <script src="{% static 'js/questions.js' %}"></script>
{% endblock %}

{% block content %}
  <section class="text-area--section">
    <form class="text-area--form" name="text-area-form" id="text-area-form" met
hod="POST" action="/questions/">
      {% csrf_token %}
      <textarea class="text-area--text no-display" name="text-area" id="text-
area" name="text-area" id="text-area">{{text}}</textarea>
      <button class="go-back btn round-border-thin" type="submit" name="goback-
btn" value="go-back">← Go Back</button>
    </form>
  </section>

  <section class="display-text round-border" id="span-sentences">
    {% for s in sentences %}
      <span indx="{{forloop.counter0}}">
        {{s}}
      </span>
    {% endfor %}
  </section>

  <section class="questions--section">
    <button class="clear-selection-btn btn round-border-thin no-display" i
d="clear-selection-btn" name="clear-selection-btn" onclic
k="clearSelection()">X</button>
    <ul class="questions--ul custom-marker" name="questions--ul" i
d="questions--ul">
```

```
      {% for i, s in questions_with_ans %}
        <li class="question--item">
          <div class="question-contanier">
            <span class="question" onclick="toggleAnswer('{{forloop.counter0}}'
)">{{s}}?</span>
            <p class="answer no-display">Answer: {{i.1}}</p>
          </div>
          <div class="action-container">
            <button class="highlight btn round-border-thin" hover="Highlight" o
nclick="highlightPrase('{{i.0}}')">
              <svg class="svg-highlight svg" viewBox="0 0 16 16"><use xlink:hre
f="#svg-highlight" href="#svg-highlight"></use></svg>
            </button>
            <button class="copy btn round-border-thin" hover="Copy" onclic
k="copyPhrase('{{forloop.counter0}}')">
              <svg class="svg-copy svg" viewBox="0 0 16 16"><use xlink:hre
f="#svg-copy" href="#svg-copy"></use></svg>
            </button>
          </div>

        </li>
      {% endfor %}
    </ul>
  </section>
{% endblock %}
```

history.html

```
{% extends 'base.html' %}
{% load static %}

{% block title %}Home Page{% endblock %}
{% block style %}
  <link rel="stylesheet" href="{% static 'css/history.css' %}">
{% endblock %}

{% block script %}
  <script src="{% static 'js/loader.js' %}" defer></script>
{% endblock %}

{% block content %}
  <section>
    <ul class="history--ul custom-marker">
      {% for i in paragraphs %}
      <li class="question--item">
        <form class="text-area--form" name="text-area-form" id="text-area-form"
method="POST" action="/questions/">
          {% csrf_token %}
          <textarea class="text-area--text no-display" name="text-area" i
d="text-area" placeholder="Text here..." words="0" type="hidden">{{i}}</
textarea>
          <p class="question--text">{{i}}</p>
          <button type="submit" class="submit-btn btn round-border-thin" i
d="text-area-btn-submit" name="text-area-btn-submit" value="generate-
questions">See Questions</button>
        </form>
      </li>
      {% endfor %}
    </ul>
  </section>
{% endblock %}
```

error.html

```
{% extends 'base.html' %}
{% load static %}

{% block title %}Home Page{% endblock %}
{% block style %}
  <link rel="stylesheet" href="{% static 'css/error.css' %}">
{% endblock %}

{% block script %}{% endblock %}

{% block header %}
  <p class="error big">Error</p>
{% endblock %}

{% block content %}
  <div>"{{error_msg}}"</div>
{% endblock %}

{% block footer %}{% endblock %}
```

home.js

```
var edit_area= document.querySelector("#text-area");
edit_area.addEventListener("input", function (event) {
  let words= edit_area.value.replace(/\n/g, " ").split(" ").filter((entry)=> {
    return entry.trim()!= '';
  });
  let no_of_words= words.length;
  edit_area.parentElement.setAttribute("words", no_of_words);
});
```

loader.js

```
var q_btn= document.querySelector("#send_text-btn");
q_btn.addEventListener("click", function() {
  console.log("show_loading");
  document.querySelector("#loading").classList.remove("no-display");
});
```

questions.js

```
function highlightPrase(index) {
  // console.log(index);
  let sentences= document.querySelector("#span-sentences").children;
  let clear_btn= document.querySelector("#clear-selection-btn");
  // console.log(clear_btn);
  for(let i=0; i<sentences.length; i++) {
    sentences[i].classList.remove("selected");
    if(index == i) {
      sentences[i].classList.add("selected");
    }
  }
  document.querySelector("#span-sentences").scrollIntoView({ block: "center", b
ehavior: "smooth"});
  clear_btn.classList.remove("no-display");
}

function copyPhrase(index) {
  /* Get the text field */
  let question_li= document.querySelector("#questions--ul").children[index];
  // console.log(question_li);
  let copyText= question_li.querySelector(".question").innerHTML;
  console.log(copyText);
```

```
  navigator.clipboard.writeText(copyText);
}

function clearSelection() {
  let sentences= document.querySelector("#span-sentences").children;
  let clear_btn= document.querySelector("#clear-selection-btn");
  // console.log(sentences);
  for(let i=0; i<sentences.length; i++) {
    sentences[i].classList.remove("selected");
  }
  clear_btn.classList.add("no-display");
}

function toggleAnswer(indx) {
  console.log(indx);
  let clicked_li= document.querySelector("#questions--ul").children[indx];
  let ans_p= clicked_li.querySelector(".answer");
  console.log(clicked_li);
  if(ans_p.classList.contains("no-display")) {
    ans_p.classList.remove("no-display");
  } else {
    ans_p.classList.add("no-display");
  }
}
```

Questioniz_Web/urls.py

```
"""Questioniz_web URL Configuration

The `urlpatterns` list routes URLs to views. For more information please see:
  https://docs.djangoproject.com/en/3.2/topics/http/urls/
Examples:
Function views
  1. Add an import:  from my_app import views
  2. Add a URL to urlpatterns:  path('', views.home, name='home')
Class-based views
  1. Add an import:  from other_app.views import Home
  2. Add a URL to urlpatterns:  path('', Home.as_view(), name='home')
Including another URLconf
  1. Import the include() function: from django.urls import include, path
  2. Add a URL to urlpatterns:  path('blog/', include('blog.urls'))
"""
from django.contrib import admin
from django.urls import path, include

urlpatterns = [
  path('admin/', admin.site.urls),
  path('', include("qGen.urls")),

]
```

qGen/urls.py

```
from django.urls import path
from . import views

urlpatterns= [
  path("", views.index, name="index"),
  path("login/", views.login, name="login"),
  path("signup/", views.signup, name="signup"),
  path("logout/", views.logout, name="logout"),
  path("home/", views.home, name="home"),
  path("questions/", views.questions, name="questions"),
  path("history/", views.history, name="history"),
  path("error/<str:err>", views.error, name="error"),
]
```

qGen/views.py

```
from django.shortcuts import render, redirect
from django.http import HttpResponse
import nltk # test: test123
from .models import EndUser, Paragraph, ParaHistory
from .qg import Document, QuestionGenerator
from django.contrib.auth.models import User
# Create your views here.

def cleanText(string, v_type):
  if(v_type== "username"):
    v= True
    if(string.isalnum()):
      v= True
  elif(v_type== "password"):
    v= True
  if(not v): return None
  return string

def validate(username, password): # validation of user
  cd= EndUser.objects.filter(username= username)
  if(cd.count()< 1 or cd.count()> 1): return None
  c= EndUser.objects.get(username= username)
  if(c.password== password): return c
  return None

def index(request):
  options= {
    "username": None,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    pass
  return render(request, "index.html", options)

def home(request):
  # print(request)
  options= {
    "username": None,
```

```
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    pass
  if request.method== "POST":
    if(request.POST.get("signup-btn", False)== "sign-up"): #code to register si
gnup
      username= cleanText(request.POST.get("username"), "username")
      password= cleanText(request.POST.get("password"), "password")
      cpassword= cleanText(request.POST.get("cpassword"), "password")
      if(not username or not password): return redirect("/error/
invalid_username_or_password")
      if(password!= cpassword): return redirect("/error/passwords_dont_match")
      if(EndUser.objects.filter(username= username)): return redirect("/error/
user_already_exists")
      user= EndUser(username=username, password=password)
      user.save()
      request.session["username"]= user.username
    elif(request.POST.get("login-btn", False)== "let-me-in"): #code to authenti
cate login
      username= cleanText(request.POST.get("username"), "username")
      password= cleanText(request.POST.get("password"), "password")
      user= validate(username, password)
      if not user: return redirect("/error/invalid_username_or_password")
      request.session["username"]= user.username
    try:
      options["username"]= request.session["username"]
    except Exception:
      pass
  return render(request, "index.html", options)

def signup(request):
  options= {
    "username": None,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    pass
```

```
  if request.method == "POST":
    pass
  return render(request, "signup.html", options)

def login(request):
  options= {
    "username": None,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    pass
  return render(request, "login.html", options)

def logout(request):
  options= {
    "username": None,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    pass
  request.session.flush()
  return redirect("/")

def error(request, err):
  options= {
    "username": None,
    "error_msg": err,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    pass
  print(err)
  return render(request, "error.html", options)

  # b = Blog(name='Beatles Blog', tagline='All the latest Beatles news.')
  # b.save()
```

```
def questions(request):
  options= {
    "username": None,
    "text": None,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    return redirect("/error/not_logged_in")

  text:str= None
  sentences= None
  questions_with_ans= None
  # print(request.POST)
  if(request.POST.get("text-area-btn-submit")== "generate-questions"):
    text= request.POST.get("text-area", None)
    # change to redirect
    if(not text): return redirect("/error/Empty Textarea")
    # All Validations Complete now processing Data
    doc= Document(text)
    sentences= doc.getPrintSentences()
    qg_maker= QuestionGenerator(doc)
    questions:dict= qg_maker.MakeQuestions()
    questions_with_ans= questions.items()
    options["text"]= text
    options["sentences"]= sentences
    options["questions_with_ans"]= questions_with_ans
    options["no_of_questions"]= len(questions_with_ans)
    if(options["username"]): # save paragraph if logged in
      user= EndUser.objects.get(username= options["username"])
      para= Paragraph(paragraph= text, no_of_questions= options["no_of_question
s"])
      para.save()
      ph_query= ParaHistory.objects.filter(username= user)
      if(ph_query.count()> 0):
        ph= ParaHistory(para_no= ph_query.count()% 10, username= user, paragrap
h= para)
        ph.save()
```

```
      else:
        ph= ParaHistory(para_no= 0, username= user, paragraph= para)
        ph.save()
    return render(request, "questions.html", options)
  elif(request.POST.get("goback-btn")== "go-back"):
    text= request.POST.get("text-area", None)
    options["text"]= text
    return render(request, "no_questions.html", options)
  return render(request, "no_questions.html", options)


def history(request):
  options= {
    "username": None,
    "text": None,
    "paragraph": None,
  }
  try:
    options["username"]= request.session["username"]
  except Exception:
    return redirect("/error/not_logged_in")
  if(options["username"]): # get paragraph if logged in
    user= EndUser.objects.get(username= options["username"])
    ph_query= ParaHistory.objects.filter(username= user).order_by("-para_no")
    ph_set= []
    for p in ph_query:
      if(p.paragraph.paragraph in ph_set): continue
      ph_set.append(p.paragraph.paragraph)

    options["paragraphs"]= ph_set[:10]
  return render(request, "history.html", options)
```

qGen/models.py

```
from django.db import models

# Create your models here.
class EndUser(models.Model):
  username = models.CharField(max_length=50,default='')
  password = models.CharField(max_length=50,default='')
  # is_active = models.BooleanField(null=True)

  def __str__(self):
    return self.username

class Paragraph(models.Model):
  paragraph= models.CharField(max_length=2500)
  no_of_questions= models.IntegerField()

  def __str__(self):
    return self.paragraph

class ParaHistory(models.Model):
  para_no= models.IntegerField()
  username= models.ForeignKey("Enduser", on_delete= models.CASCADE)
  paragraph= models.ForeignKey("Paragraph", on_delete= models.CASCADE)

  def __str__(self):
    return f"{self.para_no} - {self.paragraph}"
```

qGen/admin.py

```
from django.contrib import admin
from . import models
# Register your models here.
admin.site.register(models.EndUser)
admin.site.register(models.Paragraph)
```

qGen/qg.py

```
import nltk, math, string, random
from nltk.corpus import stopwords as StopWords

class Cleaner:
  symbols= ['\n', '~', ':', "'", "''", '+', '[', '\\', '@', '^', '{', '%', '(', '-', '"', '*', '|', '&', '<', '`', '```', '}', '_', '=', ']', '!', '>', ';', '?', '#', '$', ')', '/']
  def __init__(self):
    self.better_stop_words= self.getStopWords()

  def getStopWords(self, lang= None, symbols=True)->list:
    if(lang== None): lang= "english"
    sw= StopWords.words(lang)
    sw+= [w.capitalize() for w in sw]
    if(symbols):
      sw+= ['\n', '~', ':', "'", "''", '+', '[', '\\', '@', '^', '{', '%', '(', '-', '"', '*', '|', ',', '&', '<', '`', '```', '}', '.', '_', '=', ']', '!', '>', ';', '?', '#', '$', ')', '/']
    return sw

  def tokenize_to_sentences(self, data)->list:
    """tokenizes given data in sentences"""
    return nltk.sent_tokenize(data)

  def tokenize_to_words(self, data:str)->list:
    """tokenizes given data in words"""
    return nltk.word_tokenize(data)

  def stopClean(self, data):
    """sentences:list= list of sentences, sentence:list= list of words i.e. it is an element of sentences"""
    data= "".join([x.lower() for x in data if x not in Cleaner.symbols])
    data= "".join([x for x in data if not x.isdigit()])
    sentences= self.tokenize_to_sentences(data)
    for i, s in enumerate(sentences):
      word_s= self.tokenize_to_words(s)
      word_s= [w.lower() for w in word_s if w not in self.better_stop_words]
      sentences[i]= word_s
```

```
    for i, s in enumerate(sentences):
      tag_word_s= nltk.pos_tag(s)
      sentences[i]= [tw[0] for tw in tag_word_s if tw[1] in ["NN", "NNS", "NNP"
, "NNPS"]]
    return sentences

  def clean(self, data):
    data= "".join([x for x in data if x not in Cleaner.symbols])
    sentences= self.tokenize_to_sentences(data)
    for i, s in enumerate(sentences):
      word_s= self.tokenize_to_words(s)
      word_s= [w for w in word_s if w not in [".", ","]]
      sentences[i]= word_s
    return sentences

  def printClean(self, data):
    cleaned_data= self.clean(data)
    for i, s in enumerate(cleaned_data):
      cleaned_data[i]= " ".join(s)
      cleaned_data[i]+= "."
    return cleaned_data

class Document:
  def __init__(self, text):
    self.raw_text= text
    self.doc_cleaner= Cleaner()
    self.cleanDocument()

  def cleanDocument(self):
    self.stop_sentences= self.doc_cleaner.stopClean(self.raw_text)
    self.cleaned_sentences = self.doc_cleaner.clean(self.raw_text)
    self.print_sentences = self.doc_cleaner.printClean(self.raw_text)

  def getstopSentences(self):
    return self.stop_sentences

  def getCleanedSentences(self):
    return self.cleaned_sentences
```

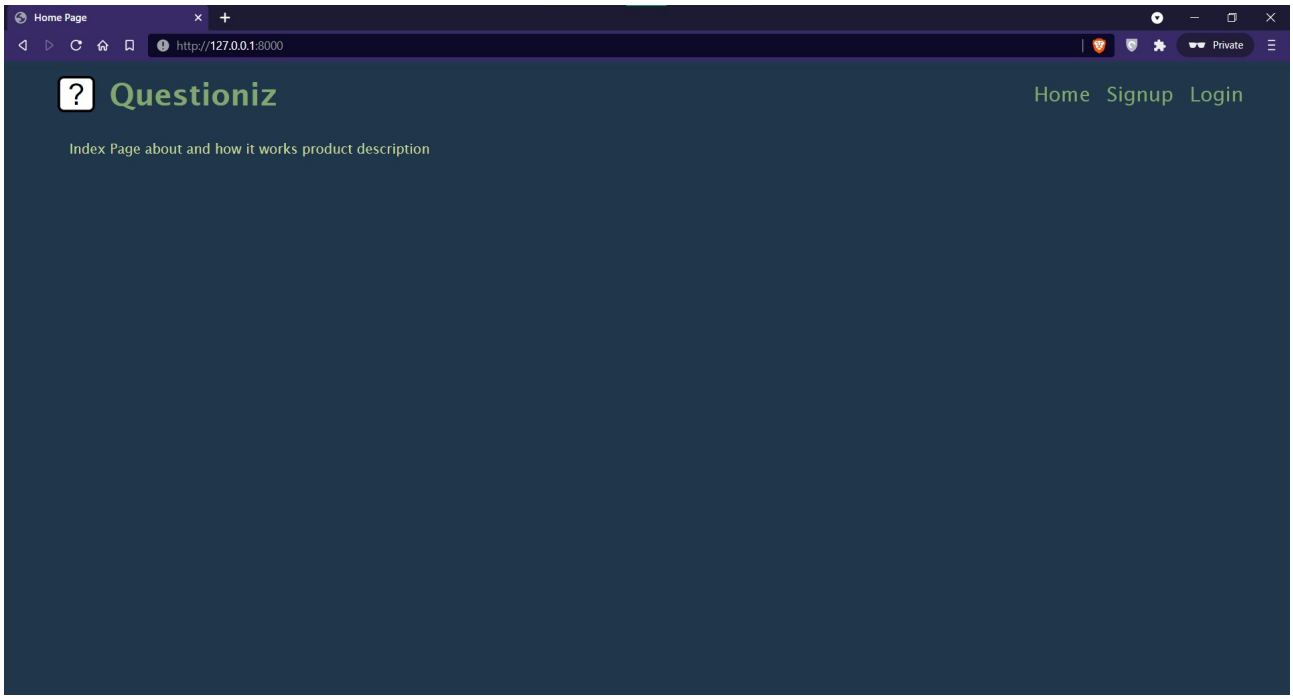
```
  def getPrintSentences(self):
    return self.print_sentences

class QuestionGenerator:
  def __init__(self, doc):
    self.document= doc

# TF-IDF
  def tf(self, words, len_words)->dict:
    tf_score= {}
    for each_word in words:
      tf_score[each_word]= tf_score.get(each_word, 0)+ 1
    # Dividing each element of dict by total_no_of_words
    tf_score.update((x, y/len_words) for x, y in tf_score.items())
    return tf_score

  def idf(self, words, sentences, len_sentences)->dict:
    idf_score = {}

    def check_in_sentence(word, sentences): # check occurence of a word in all
sentences
      final= [word in s for s in sentences]
      return final.count(True)

    for each_word in words:
      if each_word in idf_score:
        idf_score[each_word] += check_in_sentence(each_word, sentences)
      else:
        idf_score[each_word] = 1
    # Performing a log and divide
    idf_score.update((x, math.log(len_sentences)/y) for x, y in idf_score.items
())
    return idf_score

  def tf_idf(self, stop_sentences)->dict:
    # Gather list of all sentences and all words
    no_of_sentences= len(stop_sentences)
    words= [] # list of all words
    for s in stop_sentences:
```

```
      words.extend(s)
    no_of_words= len(words)
    # Calculate TF
    tf_score= self.tf(words, no_of_words) # Term Frequency
    # Calculate IDF
    idf_score= self.idf(words, stop_sentences, no_of_sentences) # Inverse Docum
ent Frequency
    # Calculate TF-IDF
    tf_idf_score = {key: tf_score[key] * idf_score.get(key, 0) for key in tf_sc
ore.keys()}
    # Sort tf_idf_scores
    tf_idf_score= dict(sorted(tf_idf_score.items(), key=lambda elem: elem[1], r
everse = True))
    return tf_idf_score

  def get_candidates(self, sentences, extracted_words)->dict:
    q_can= {}
    for s_id, s in enumerate(sentences):
      ans_words= [w for w in s if w.lower() in extracted_words] # list of words
from the sentence that can be answer
      for aw in ans_words:
        for indx in [i for i,v in enumerate(s) if v==aw]: # find and replace an
s_word with '_____'
          sent_copy= [w.lower() for w in s]
          sent_copy[indx]= "_____"
          q_can[(s_id, aw)]= " ". join(sent_copy)
    return q_can

  def MakeQuestions(self)->dict:
    stop_sentences= self.document.getstopSentences()
    cleaned_sentences= self.document.getCleanedSentences()
    tf_idf_score= self.tf_idf(stop_sentences)
    question_candidates= self.get_candidates(cleaned_sentences, tf_idf_score)
    questions_marked= {}
    random_sent_order= [n for n in range(len(cleaned_sentences))]
    random.shuffle(random_sent_order)
    for i in random_sent_order:
      selected= False
      ith_questions= []
      for k in question_candidates:
```

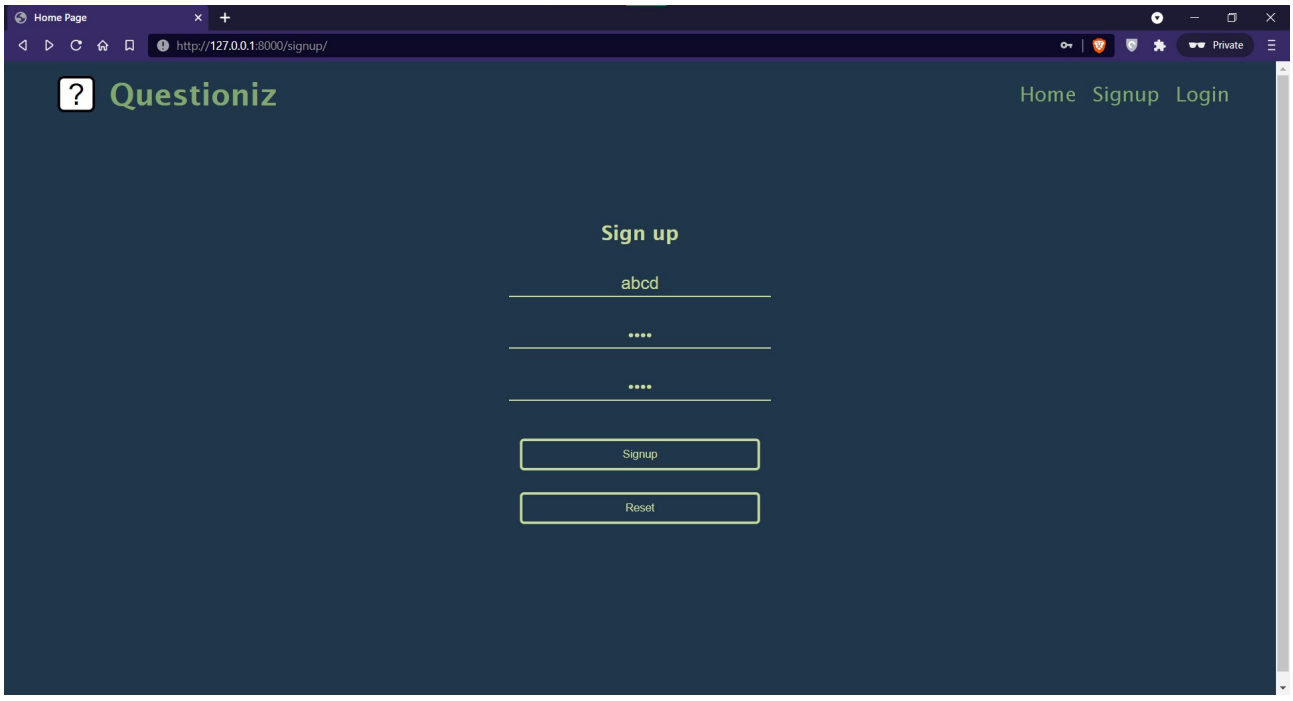
```
        if(selected): break
        if(k[0]== i):
          ith_questions.append(k)
      rand_indx= random.choice(ith_questions)
      questions_marked[rand_indx]= question_candidates[rand_indx]

    # question_candidates= {tuple(sentence_id, answer): dash_question}
    return questions_marked
```

Screen Layout

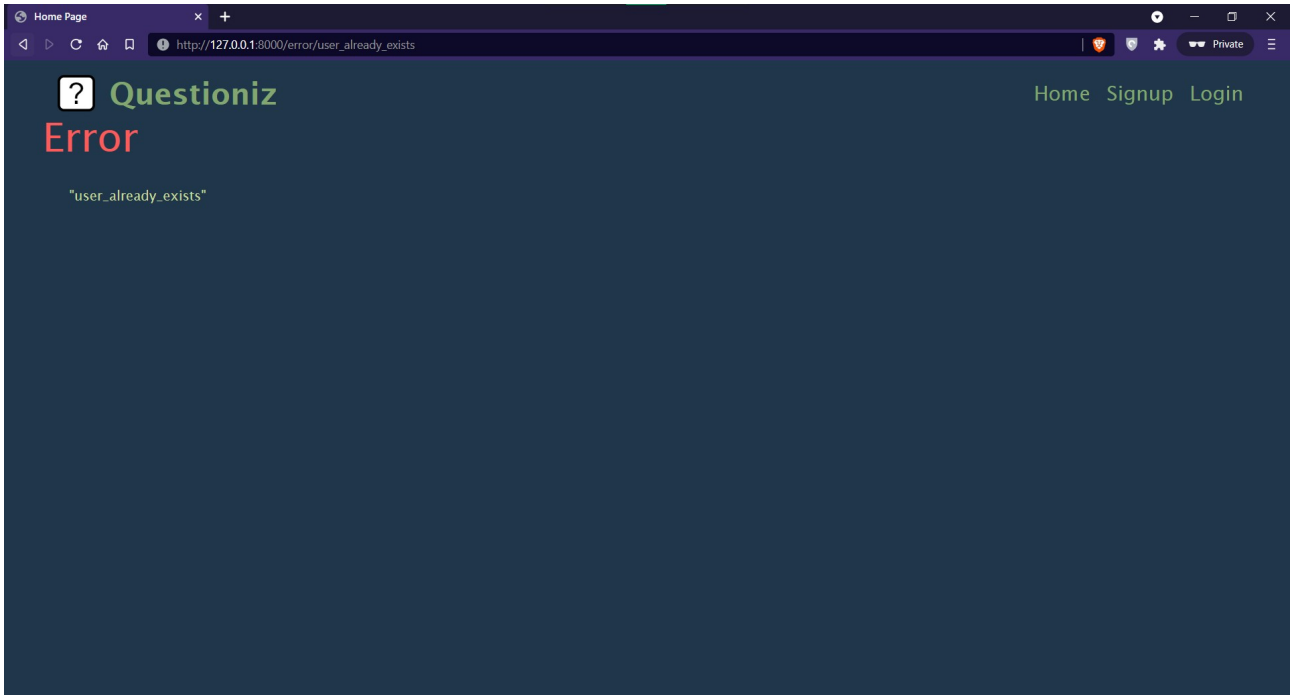
index page without login



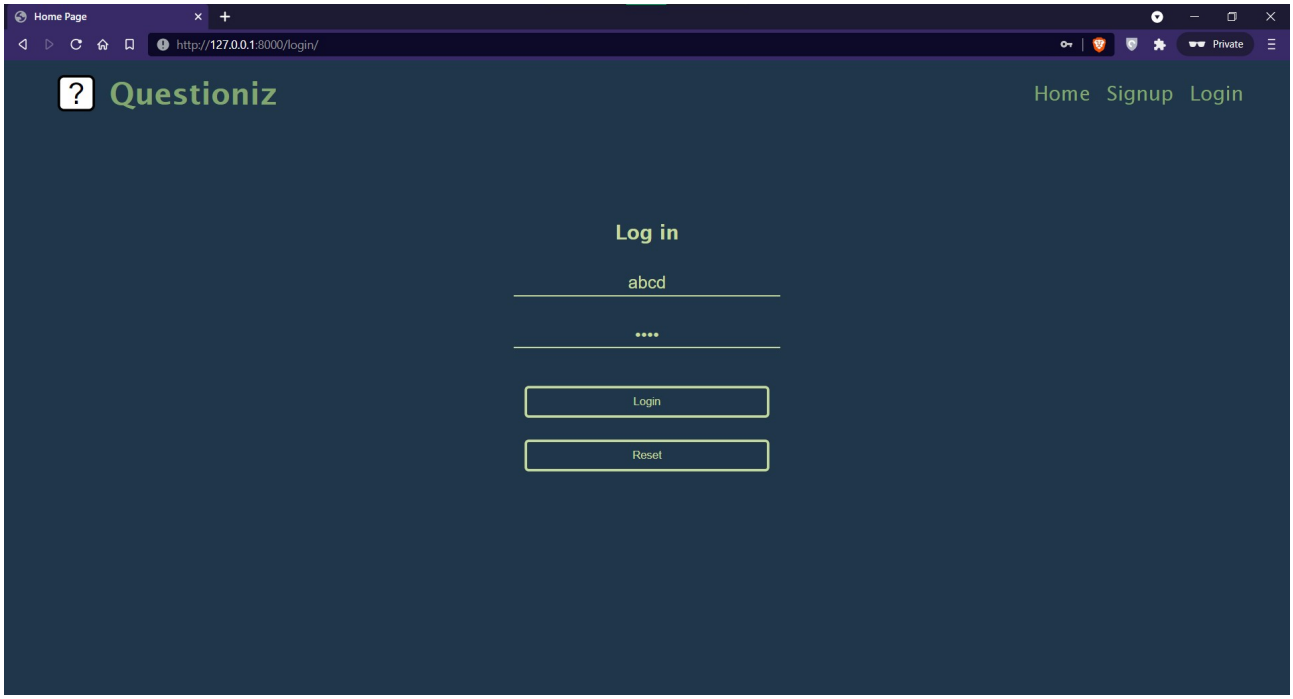
signup page



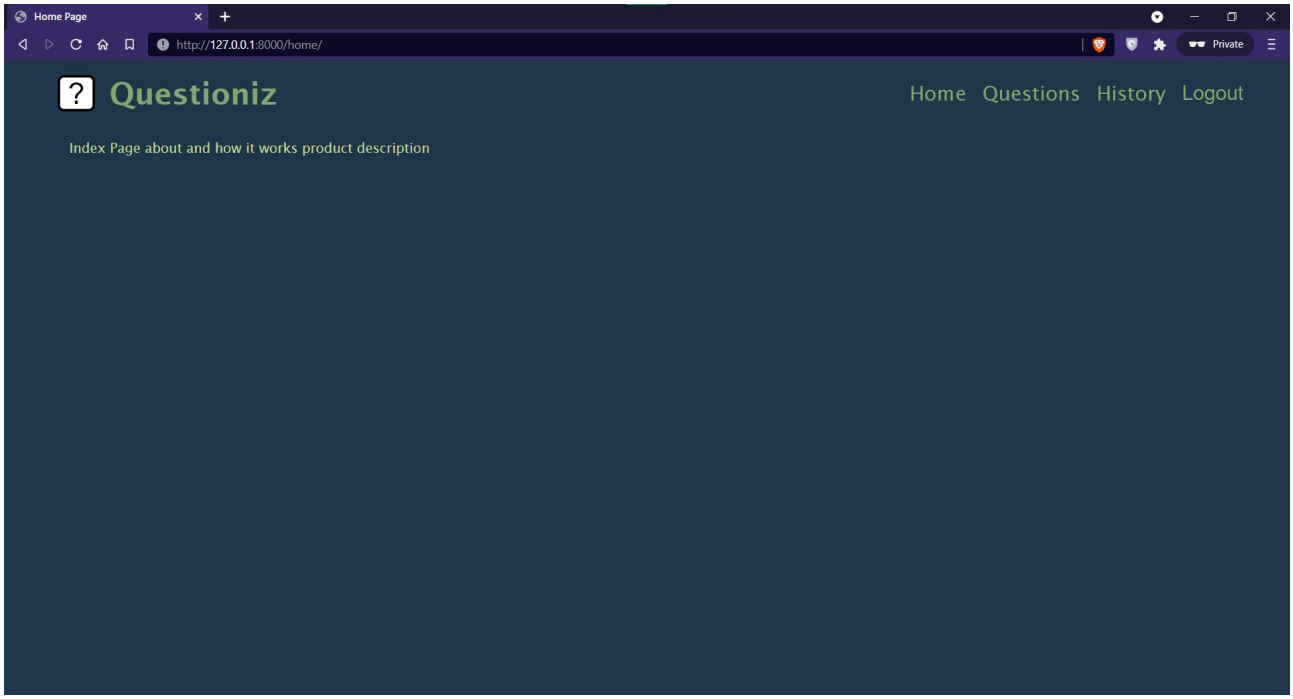
signup error page



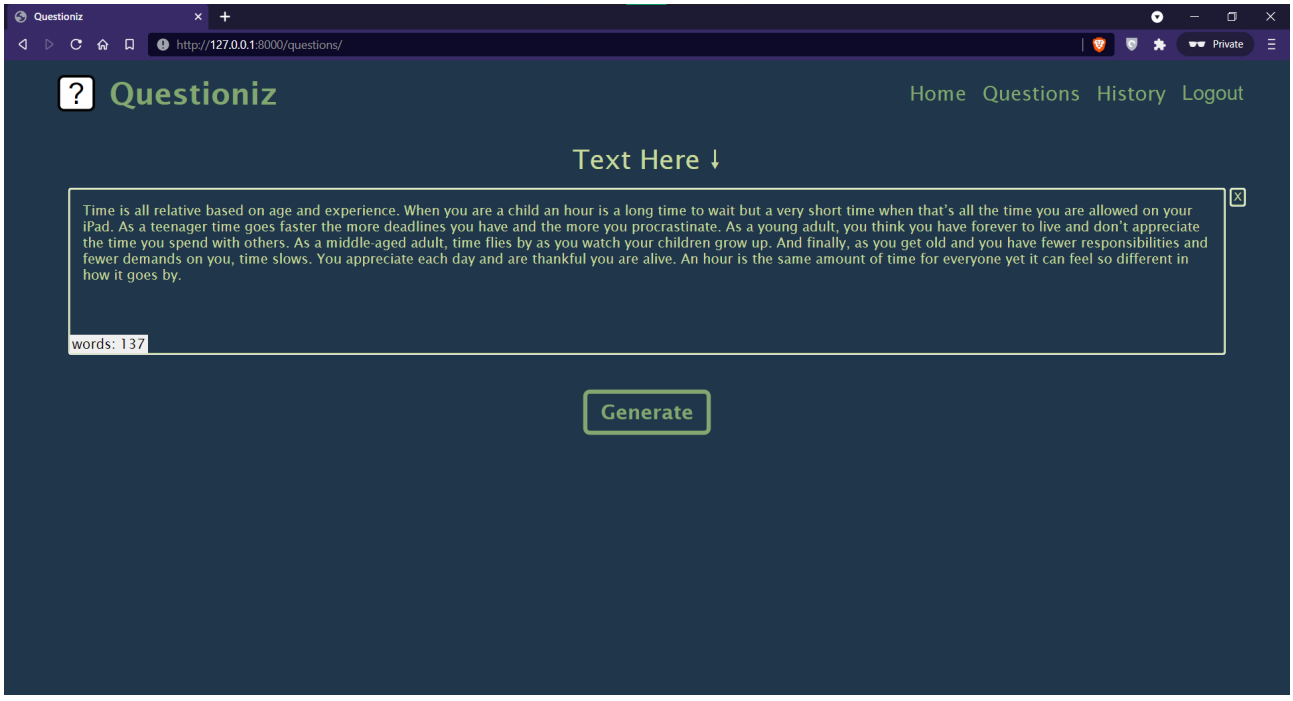
log in page



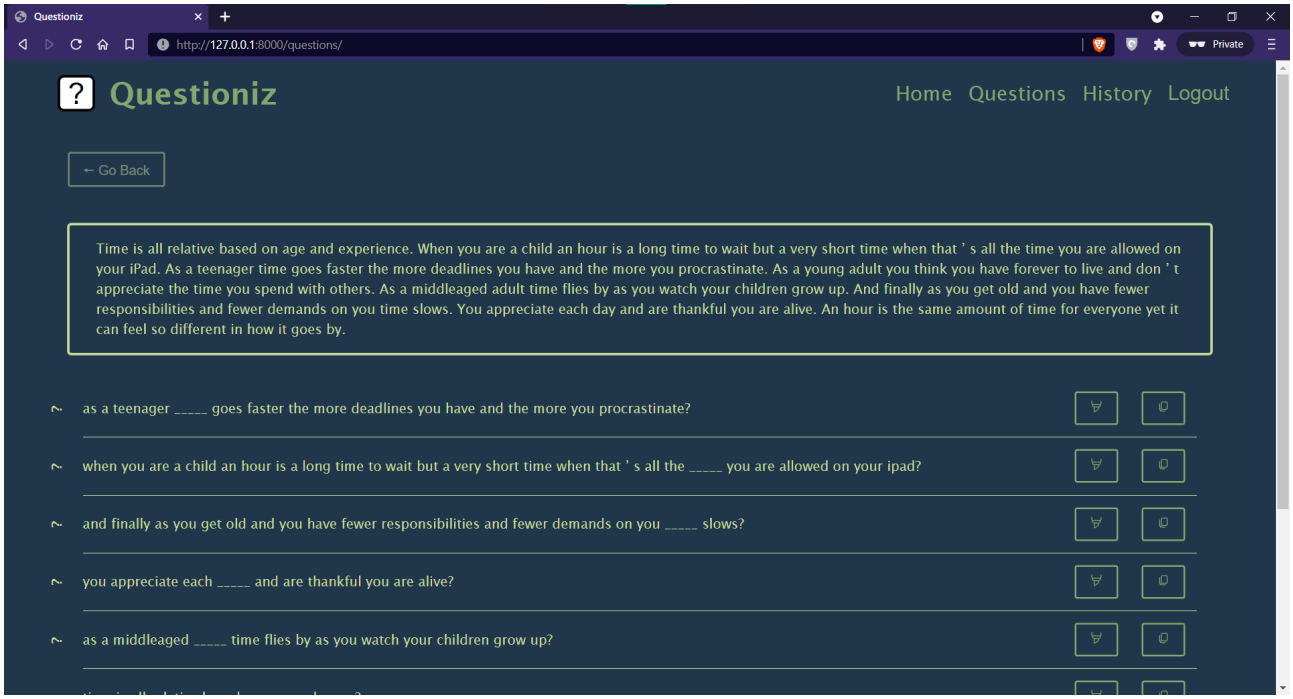
index page when logged in



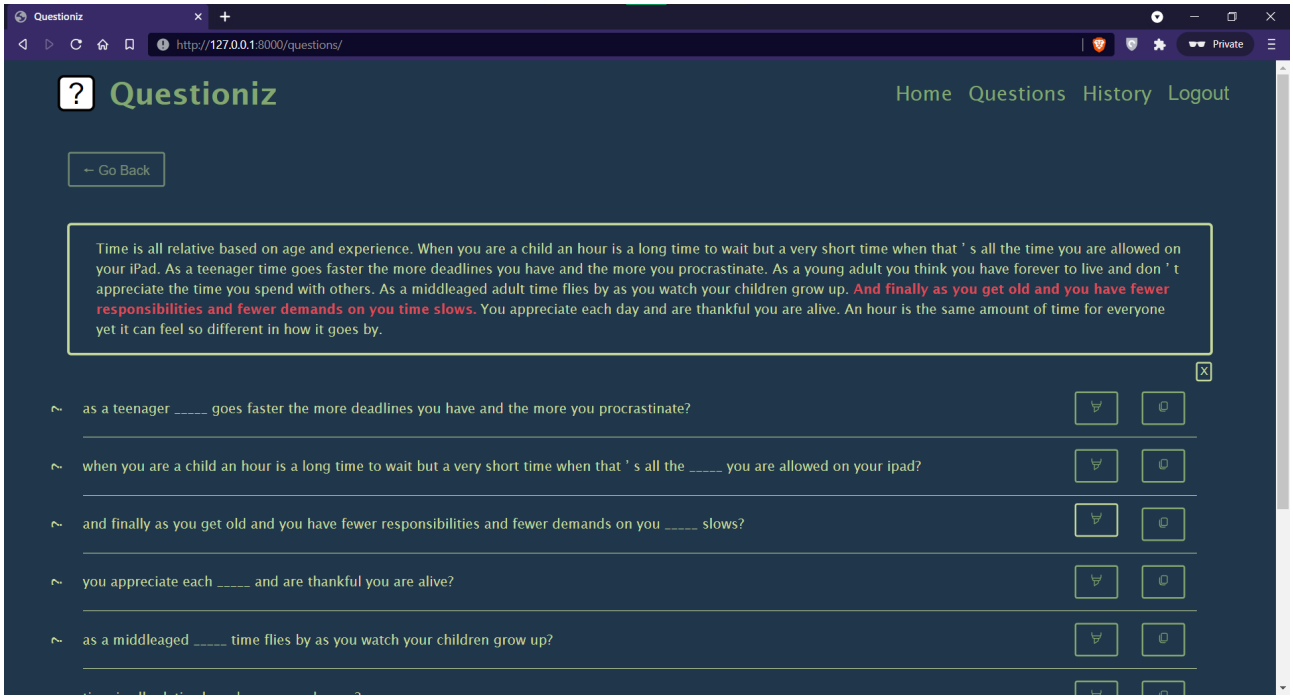
questions page



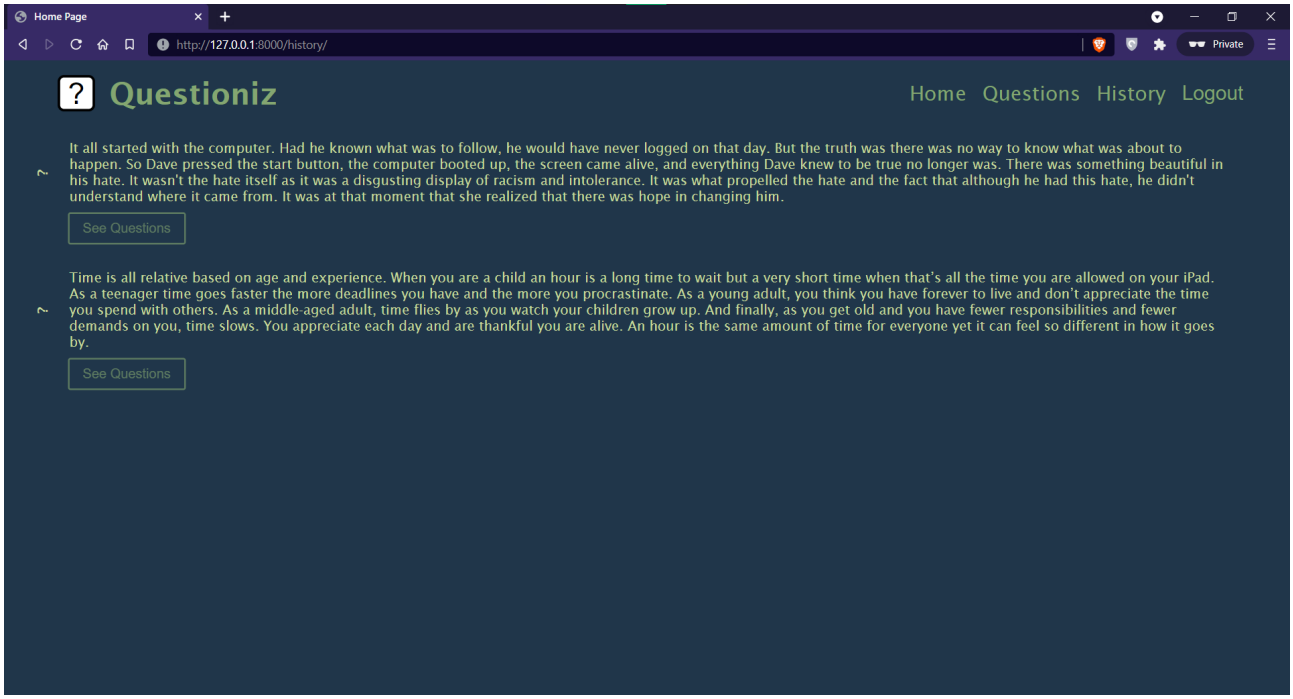
questions page with answer



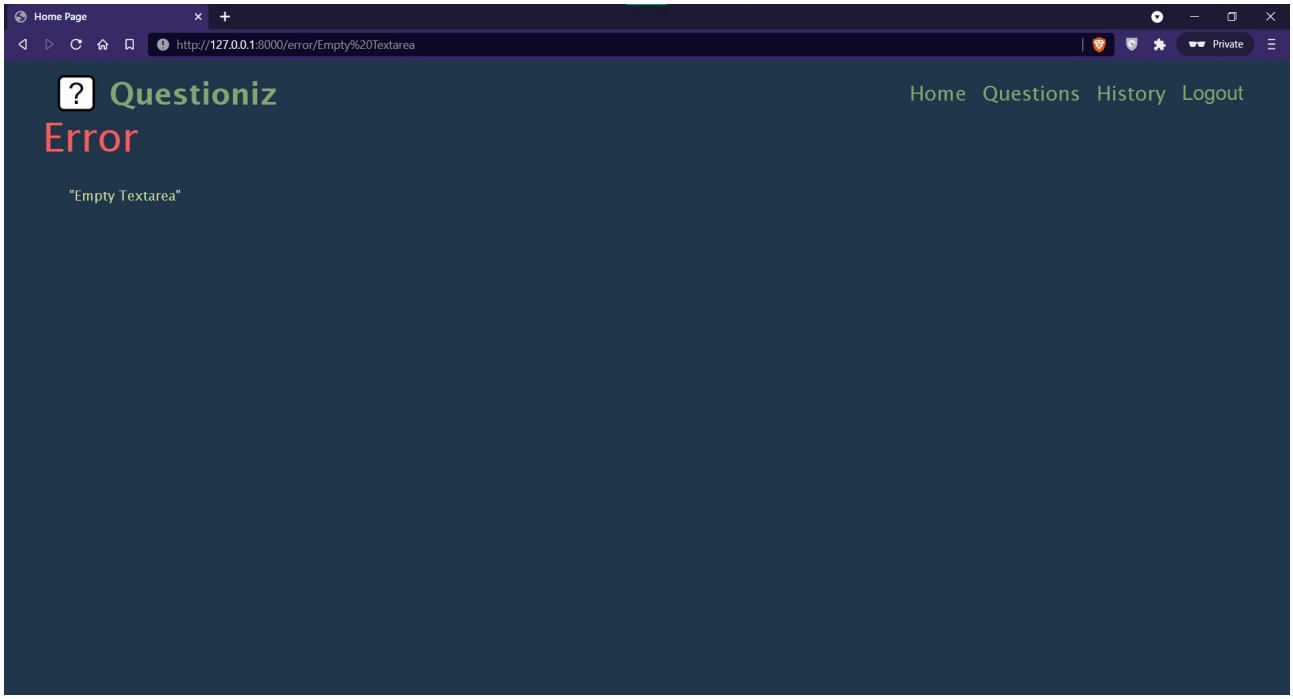
questions page highlight



history page



error page empty field



Future Enhancements

- Generate Wh- questions
- Generate MCQ Question
- Generate Mathematical Question
- Generate Short Answer Question
- Export and Download Generated Questions in PDF format
- Save specific question

Bibliography

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Questgen - https://questgen.ai/

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QuizEasy by KG-1510 - https://github.com/KG-1510/QuizEasy

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NLTK - https://www.nltk.org/

Django - https://docs.djangoproject.com/en/3.2/