



# Python Programming Projects

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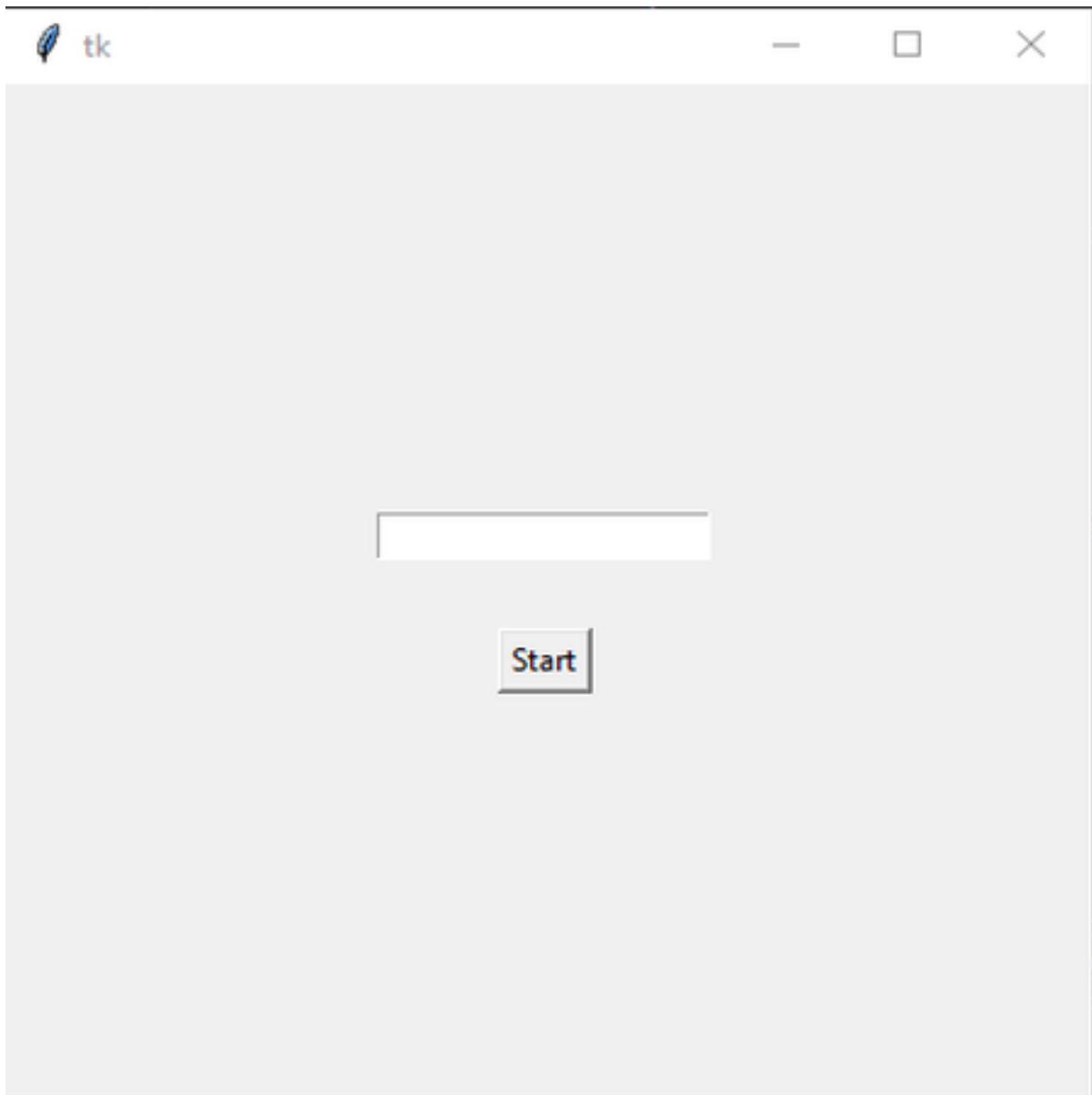
Files :*demo.py*

Files :*demo2.py*

### Chapter 1: AudiotoText

*This is the project description.*

*The basic idea of this project is to convert text into audio file*



*Image :D:\inlightn\AudiotoText\demo\_tkinter.PNG*

*The libraries used in this project are:*

1. gTTS
2. os
3. tkinter

*The gTTS library is used to convert text into audio file.*

*The os library is used to play the audio file.*

*The tkinter library is used to create the GUI for the project.*

*1)The code used in this project is:*

```
from gtts import gTTS  
import os
```

```
text="LOL this is really funny"
```

```
output = gTTS(text=text,lang="en",slow=False)  
output.save('output.mp3')
```

```
os.system("start output.mp3")
```

*This code is used to convert the text file into audio file.*

*The text is read and stored in the variable text.*

2) *The code used in this project is:*

```
from gtts import gTTS
```

```
import os
```

```
text = open("demo.txt", "r", encoding="utf-8").read()
```

```
language = "hi"
```

```
output = gTTS(text, lang=language, slow=False)
```

```
output.save('fileoutput.mp3')
```

```
os.system('start fileoutput.mp3')
```

*This code is used to convert the text file into audio file.*

*The text file is opened in read mode and the content is read and stored in the variable text.*

*3) The code used in this project is:*

```
from gtts import gTTS  
import os  
from tkinter import *
```

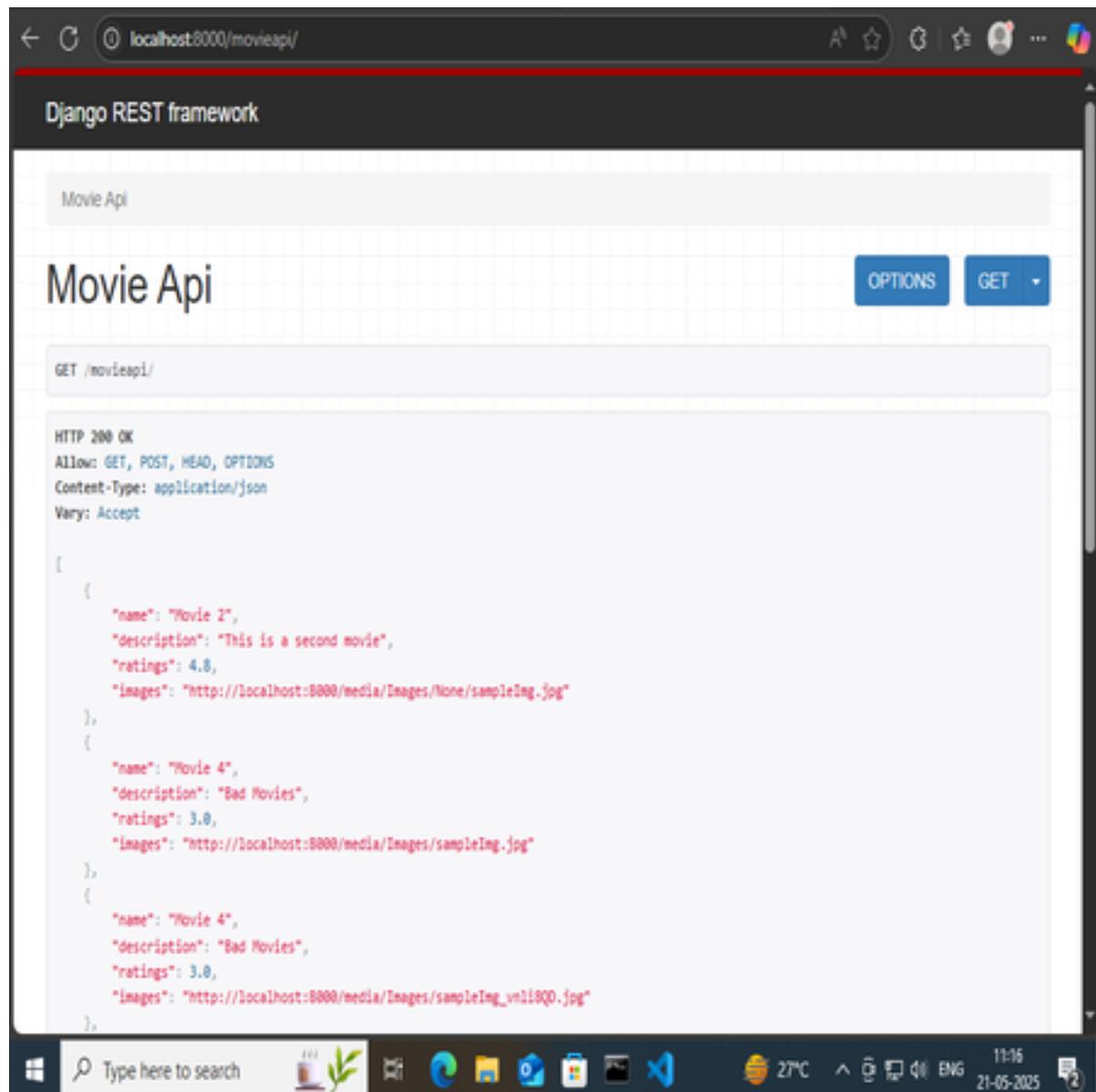
```
root = Tk()  
canvas = Canvas(root, width=400, height=400)  
canvas.pack()
```

```
def textToSpeech():  
    text = entry.get()  
    language="en"  
    output = gTTS(text=text, lang=language, slow=False)  
    output.save('output.mp3')
```

```
os.system("start output.mp3")  
  
entry = Entry(root)  
canvas.create_window(200,180,window=entry)  
button = Button(text="Start",command=textToSpeech )  
canvas.create_window(200,230,window=button)  
  
root.mainloop()
```

*This code is used to convert the text file into audio file.  
the text is read from the entry box and a text to speech function  
is used to convert the text into audio file.*

### Chapter 2:Building\_RestAPI\_Django\_python\_framework



The screenshot shows a browser window displaying a Django REST framework API response for a Movie API. The URL in the address bar is `localhost:8000/movieapi/`. The response is a JSON object representing a list of movies. The JSON data is as follows:

```
[{"name": "Movie 2", "description": "This is a second movie", "ratings": 4.8, "images": "http://localhost:8000/media/Images/None/sampleImg.jpg"}, {"name": "Movie 4", "description": "Bad Movies", "ratings": 3.0, "images": "http://localhost:8000/media/Images/sampleImg.jpg"}, {"name": "Movie 4", "description": "Bad Movies", "ratings": 3.0, "images": "http://localhost:8000/media/Images/sampleImg_val1800.jpg"}]
```

The browser interface includes a title bar "Django REST framework", a header bar with "Movie Api", and a toolbar with "OPTIONS" and "GET" buttons. The bottom of the screen shows a Windows taskbar with a search bar, pinned icons for File Explorer, Mail, and Task View, and system status icons.

Image :D:\inligntech\Building\_RestAPI\_Django\_python\_framework\movieapi.PNG

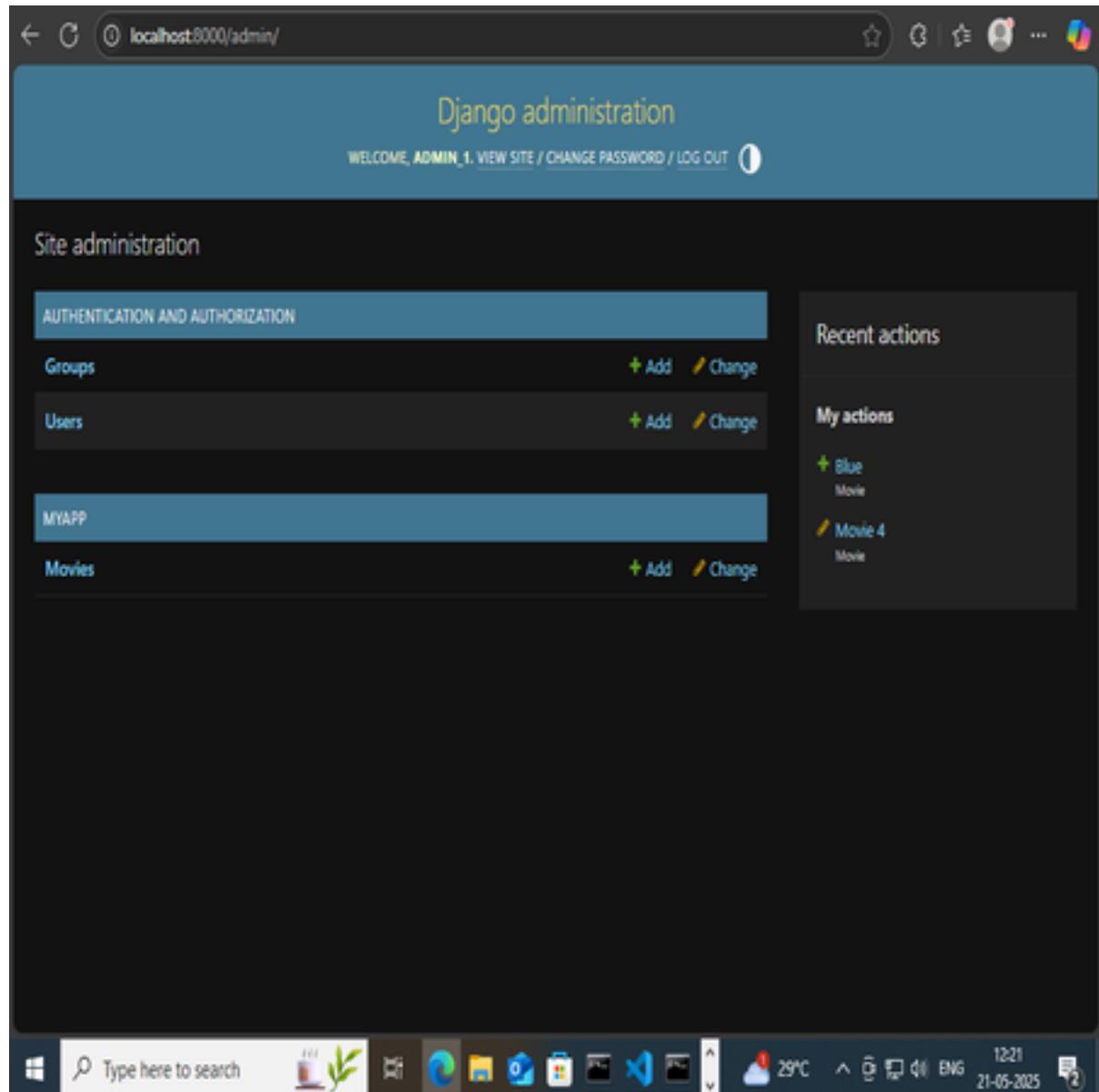
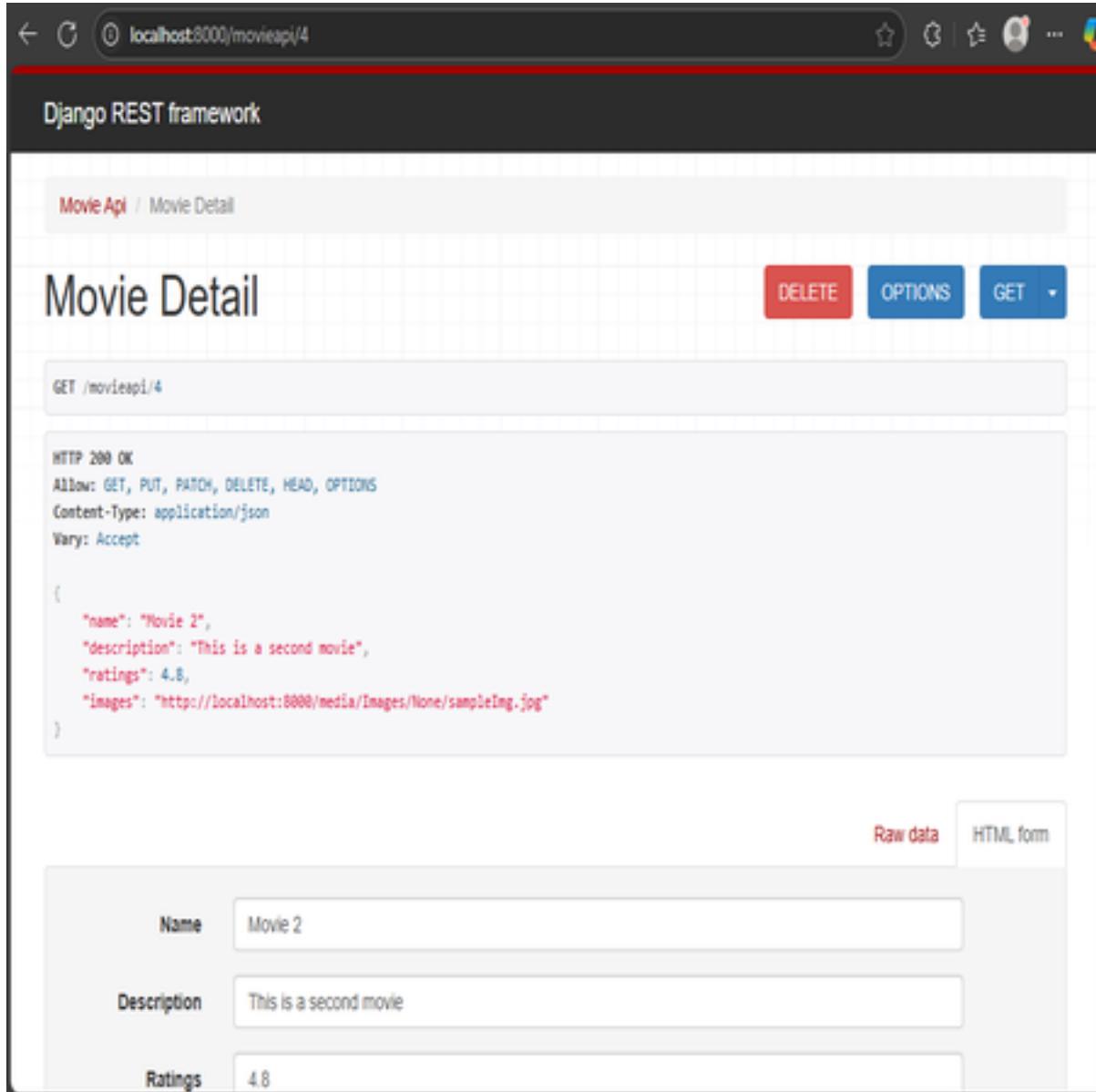


Image :D:\inligntech\Building\_RestAPI\_Django\_python\_framework\api\_admin.PNG



The screenshot shows a Django REST framework interface for a movie detail view. The URL in the browser is `localhost:8000/movieapi/4`. The page title is "Movie Detail". On the right, there are three buttons: "DELETE" (red), "OPTIONS" (blue), and "GET" (blue with a dropdown arrow). Below the title, a "Raw data" button is highlighted in red, and an "HTML, form" button is in blue. The "Raw data" section shows the following JSON response:

```
HTTP 200 OK
Allow: GET, PUT, PATCH, DELETE, HEAD, OPTIONS
Content-Type: application/json
Vary: Accept

{
    "name": "Movie 2",
    "description": "This is a second movie",
    "ratings": 4.8,
    "images": "http://localhost:8000/media/Images/None/sampleImg.jpg"
}
```

The "HTML, form" section contains form fields for editing the movie details:

Raw data	HTML, form
Name	<input type="text" value="Movie 2"/>
Description	<input type="text" value="This is a second movie"/>
Ratings	<input type="text" value="4.8"/>

*This is the project description.*

*Building\_RestAPI\_Django\_python\_framework .*

*This is the backend for the React Frontend.*

*The basic idea of this project is to create a REST API using Django Rest Framework.*

*The Django Rest Framework is a powerful toolkit for building Web APIs.*

*Please install the required libraries using the command:*

*pip install -r requirements.txt*

*1)create a Django project*

*django-admin startproject mysite*

*2)create a myapp*

*django-admin startapp myapp*

*3)Register the movie app in the settings.py file*

*4)create a movie model*

*from django.db import models*

*# Create your models here.*

*class Movie(models.Model):*

*def \_\_str\_\_(self):*

*return self.name*

*images = models.ImageField(upload\_to = 'Images',*

*default="Images/None/sampleImg.jpg")*

*name = models.CharField(max\_length=100)*

*description= models.CharField(max\_length=200)*

*ratings = models.FloatField()*

5) Register the movie model in the admin.py file

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

6) create a movieapi

7) Register the movieapi app in the settings.py file

```
8) create a movieapi serializer
from myapp.models import Movie
from rest_framework import serializers
```

```
class MovieSerializer(serializers.ModelSerializer):
```

```
    images = serializers.ImageField(max_length = None, use_url=True)
    class Meta:
        model = Movie
        fields =['name','description','ratings','images']
```

9) create the urls.py for the movieapi app

```
from django.contrib import admin
from django.urls import path, include
from .views import MovieAPIView, MovieDetail
urlpatterns = [
```

```
path(",MovieAPIView.as_view()),  
path('<int:pk>',MovieDetail.as_view()),  
]  
]
```

10) create the views.py for the movieapi app

```
from django.shortcuts import render  
from rest_framework import generics  
from myapp.models import Movie  
from .serializers import MovieSerializer  
# Create your views here.  
class MovieAPIView(generics.ListCreateAPIView):  
    queryset = Movie.objects.all()  
    serializer_class = MovieSerializer
```

```
class MovieDetail(generics.RetrieveUpdateDestroyAPIView):  
    queryset = Movie.objects.all()  
    serializer_class = MovieSerializer
```

11) your installed apps should look like this:

```
INSTALLED_APPS = [  
    'corsheaders',  
    'movieapi',  
    'rest_framework',  
    'myapp',
```

```
"django.contrib.admin",
"django.contrib.auth",
"django.contrib.contenttypes",
"django.contrib.sessions",
"django.contrib.messages",
"django.contrib.staticfiles",
]
```

12) your middleware should look like this:

```
MIDDLEWARE = [
    'corsheaders.middleware.CorsMiddleware',
    "django.middleware.security.SecurityMiddleware",
    "django.contrib.sessions.middleware.SessionMiddleware",
    "django.middleware.common.CommonMiddleware",
    "django.middleware.csrf.CsrfViewMiddleware",
    "django.contrib.auth.middleware.AuthenticationMiddleware",
    "django.contrib.messages.middleware.MessageMiddleware",
    "django.middleware.clickjacking.XFrameOptionsMiddleware",
]
```

13) your CORS\_ORIGIN\_WHITELIST = (

```
'http://localhost:3000',
'http://localhost:8000',
```

)

14) setup the media root in the `settings.py` file

```
MEDIA_URL = '/media/'
```

```
MEDIA_ROOT = os.path.join(BASE_DIR, 'media')
```

15) setup the static root in the `settings.py` file

```
STATIC_URL = '/static/'
```

15) your `urls.py` file should look like this:

```
from django.contrib import admin
```

```
from django.urls import path, include
```

```
from django.conf import settings
```

```
from django.conf.urls.static import static
```

```
urlpatterns = [
```

```
    path("admin/", admin.site.urls),
```

```
    path('movieapi/', include('movieapi.urls'))
```

```
] + static(settings.MEDIA_URL, document_root=settings.MEDIA_ROOT)
```

We can run the server using the command:

```
python manage.py runserver
```

16) The server will run on the port 8000

17) The API will be available at the following URL:

```
http://localhost:8000/movieapi/
```

Now we can create a react frontend for this API.

*it will consume the API and display the data in a user friendly way.*

*18) The react frontend will be available at the following URL:*

*<http://localhost:3000/>*

*The libraries used in this project are:*

*asgiref*

*Django*

*django-cors-headers*

*djangorestframework*

*pillow*

*sqlparse*

*tzdata*

*The asgiref library is used to run the Django server.*

*The Django library is used to create the Django project.*

*The django-cors-headers library is used to allow cross-origin requests.*

*The djangorestframework library is used to create the REST API.*

*The pillow library is used to create the images.*

*The sqlparse library is used to parse the SQL queries.*

*The tzdata library is used to set the timezone.*



## Python Programming Projects

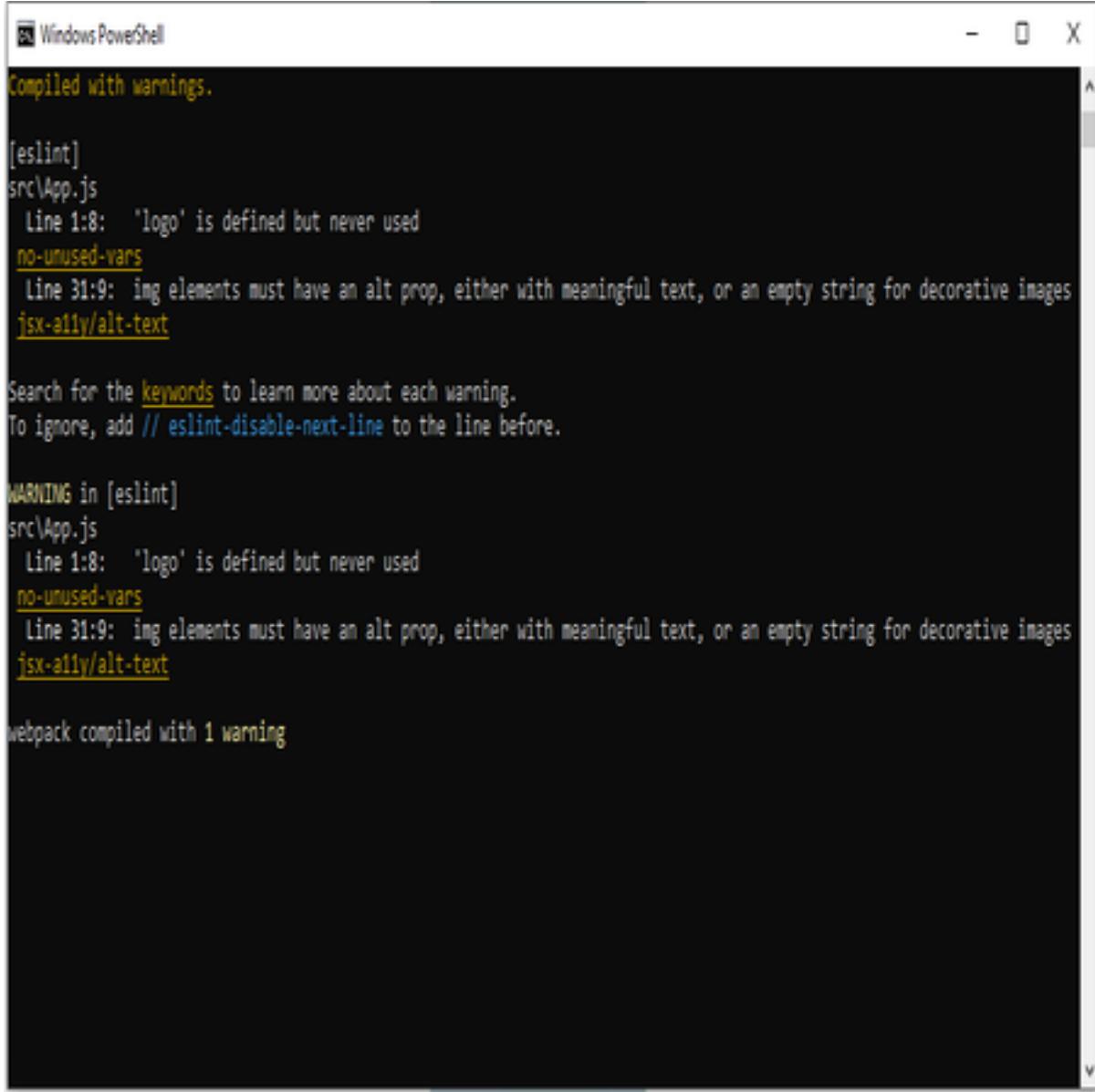
### Chapter 3:Building\_RestAPI\_React\_Frontend

```
D:\inlightn\Building_RestAPI_React_Frontend>cd myapp

D:\inlightn\Building_RestAPI_React_Frontend\myapp>npm start
\

> myapp@0.1.0 start
> react-scripts start
```

Image :D:\inlightn\Building\_RestAPI\_React\_Frontend\start\_node.PNG



```
Windows PowerShell

Compiled with warnings.

[eslint]
src\App.js
  Line 1:8:  'logo' is defined but never used
  no-unused-vars
  Line 31:9:  img elements must have an alt prop, either with meaningful text, or an empty string for decorative images
  jsx-a11y/alt-text

Search for the keywords to learn more about each warning.
To ignore, add // eslint-disable-next-line to the line before.

WARNING in [eslint]
src\App.js
  Line 1:8:  'logo' is defined but never used
  no-unused-vars
  Line 31:9:  img elements must have an alt prop, either with meaningful text, or an empty string for decorative images
  jsx-a11y/alt-text

webpack compiled with 1 warning
```

Image :D:\inlighttech\Building\_RestAPI\_React\_Frontend\start\_node1.PNG

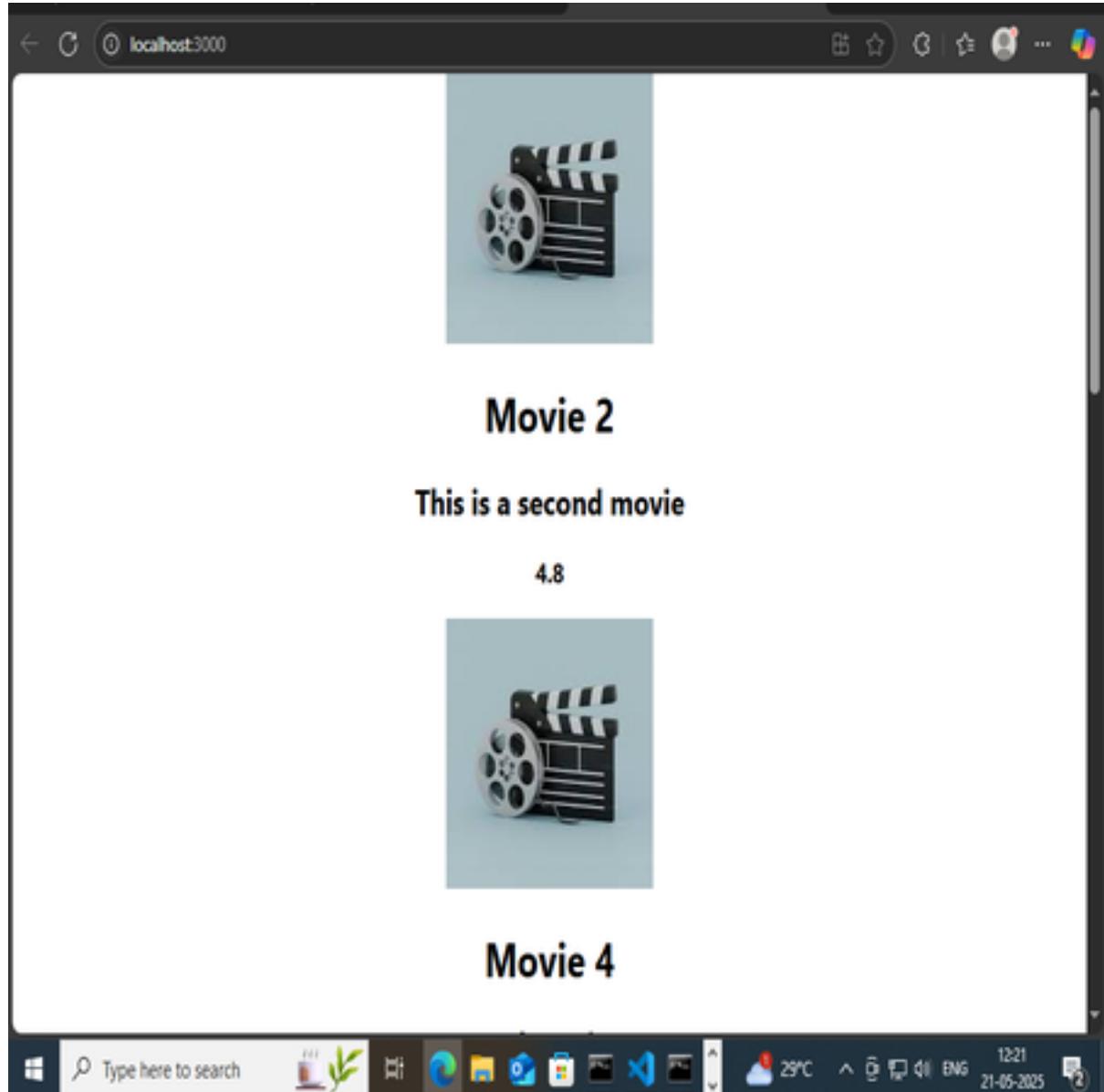


Image :D:\inlighttech\Building\_RestAPI\_React\_Frontend\react\_frontend.PNG

*this is the project description*

*we have created a react frontend for the Django Rest API.*

*The react frontend is created using the create-react-app command.*

*we did yarn install to install the required libraries.*

*we can start the app using the command:*

*yarn start*

*The app will run on the port 3000.*

*The API will be available at the following URL:*

*http://localhost:3000*

*In the src folder of the myapp react app*

*we have created a file called App.js*

*The code in the App.js file is as follows:*

```
import logo from './logo.svg';
```

```
import './App.css';
```

```
import React from 'react';
```

```
import axios from 'axios';
```

```
class App extends React.Component {
```

```
  state = {
```

```
    movies: [],
```

```
  };
```

```
  componentDidMount() {
```

```
this.getMovies()
}

getMovies()
{
  axios
    .get("http://localhost:8000/movieapi/")
    .then((res)=>{this.setState({movies: res.data})})
    .catch((error)=> {console.log(error);});
}

render(){
  return (
    <div className="App">
      {this.state.movies.map((movie)=>(
        <div key={movie.id}>
          <img src={movie.images}></img>
          <h1>{movie.name}</h1>
          <h2>{movie.description}</h2>
          <h3>{movie.ratings}</h3>
      ))
    )
  )
}
```

```
</div>

    )})
</div>
);
}

}

export default App;
```

*we importes the axios library to make the API calls.*

*we created a class called App and in the constructor*

*we created a state called movies.*

*we created a function called getMovies*

*which will make the API call to the Django Rest API.*

*the styling for the react app is done using the App.css file.*

*The code in the App.css file is as follows:*

```
.App {
  text-align: center;
}

.App-logo {
```

```
height: 40vmin;  
pointer-events: none;  
}  
  
@media (prefers-reduced-motion: no-preference) {  
  .App-logo {  
    animation: App-logo-spin infinite 20s linear;  
  }  
}  
  
.App-header {  
  background-color: #282c34;  
  min-height: 100vh;  
  display: flex;  
  flex-direction: column;  
  align-items: center;  
  justify-content: center;  
  font-size: calc(10px + 2vmin);  
  color: white;  
}  
  
.App-link {
```

```
color: #61dafb;  
}
```

```
@keyframes App-logo-spin {  
from {  
  transform: rotate(0deg);  
}  
to {  
  transform: rotate(360deg);  
}  
}
```

*The libraries used in this project are:*

- 1)react
- 2)axios

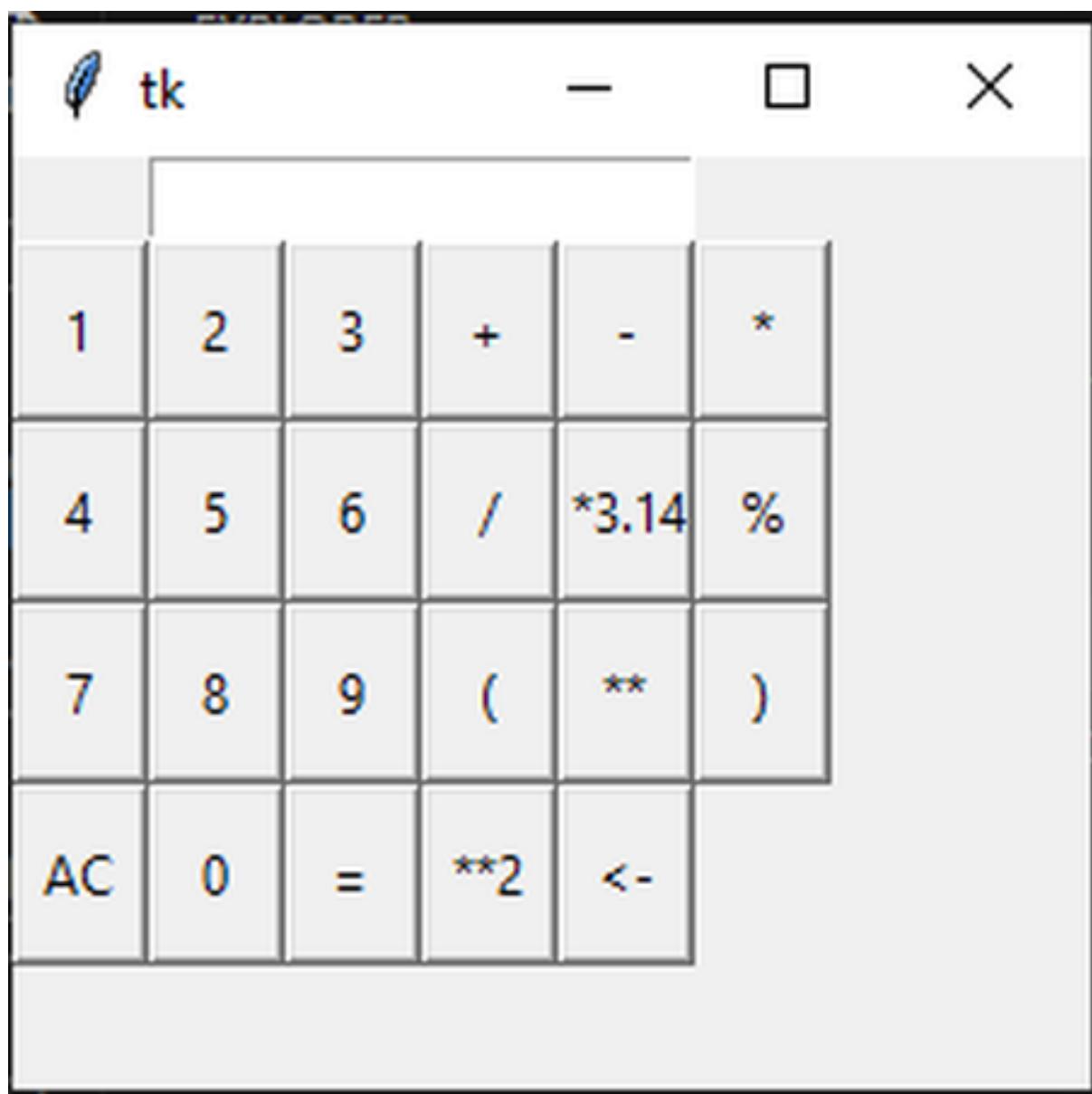
*react is used to create the react app.*

*axios is used to make the API calls.*

## Chapter 4:Calculator\_Tkinter

*This is the project description.*

*The basic idea of this project is to create a calculator using tkinter.*



*Image :D:\inlightn\Calculator\_Tkinter\calculator.PNG*

*The code used in this project is:*

```
from tkinter import *
import ast

root = Tk()
i=0

def get_number(num):
    global i
    display.insert(i, num)
    i+=1

def get_operation(operator):
    global i
    length = len(operator)
    display.insert(i, operator)
    i+=length

def clear_all():
    display.delete(0,END)
```

```
def calculate():
    entire_string = display.get()
    try:
        node = ast.parse(entire_string, mode='eval')
        result = eval(compile(node, "<string>", mode='eval'))
        clear_all()
        display.insert(0, result)
    except Exception:
        clear_all()
        display.insert(0, "Error")

def undo():
    entire_string = display.get()
    if len(entire_string)>0:
        entire_string = entire_string[:-1]
        clear_all()
        display.insert(0, entire_string)
    else:
        clear_all()
        display.insert(0, "Error")
```

```
display = Entry(root)
display.grid(row=1, columnspan=6)
numbers = [ 1,2,3,4,5,6,7,8,9]
counter = 0
for x in range(3):
    for y in range(3):
        button_text = numbers[counter]
        button = Button(root, text=button_text, width=3,
                        height=2, command = lambda text=button_text:
get_number(text))
        button.grid(row=x+2, column=y)
        counter +=1

button = Button(root, text=0, width=3, height=2, command=
lambda :
get_number(0))
button.grid(row=5, column=1)

count=0
operations = ['+', '-', '*', '/', '*3.14', "%", "(", "**", ")",
"**2"]
for x in range(4):
    for y in range(3):
```

```
if count < len(operations):  
    button = Button(root, text=operations[count],  
                    width=3, height=2,  
                    command= lambda text=operations[count]:  
                        get_operation(text))  
    count +=1  
    button.grid(row=x+2, column=y+3)  
  
button = Button(root, text="AC", width=3,  
                height=2, command=clear_all).grid(row=5, column=0)  
button = Button(root, text="=", width=3,  
                height=2, command=calculate).grid(row=5, column=2)  
button = Button(root, text=<-, width=3,  
                height=2, command=undo).grid(row=5, column=4)  
  
root.mainloop()
```

*This code is used to create a calculator using tkinter.*

*The tkinter library is used to create the GUI for the project.*

*The ast library is used to parse the expression and evaluate it.*

*The eval function is used to evaluate the expression.*

*The get\_number function is used to get the number  
from the button and insert it in the entry box.*

*The get\_operation function is used to get the  
operation from the button and insert it in the entry box.*

*The clear\_all function is used to clear the entry box.*

*The calculate function is used to evaluate the expression  
and display the result in the entry box.*

*The undo function is used to delete the last character from the entry box.*

*The libraries used in this project are:*

1)tkinter

2)ast

*The tkinter library is used to create the GUI for the project.*

*The ast library is used to parse the expression and evaluate it.*

### Chapter 5: Chat\_app\_Socket\_Networking\_programming

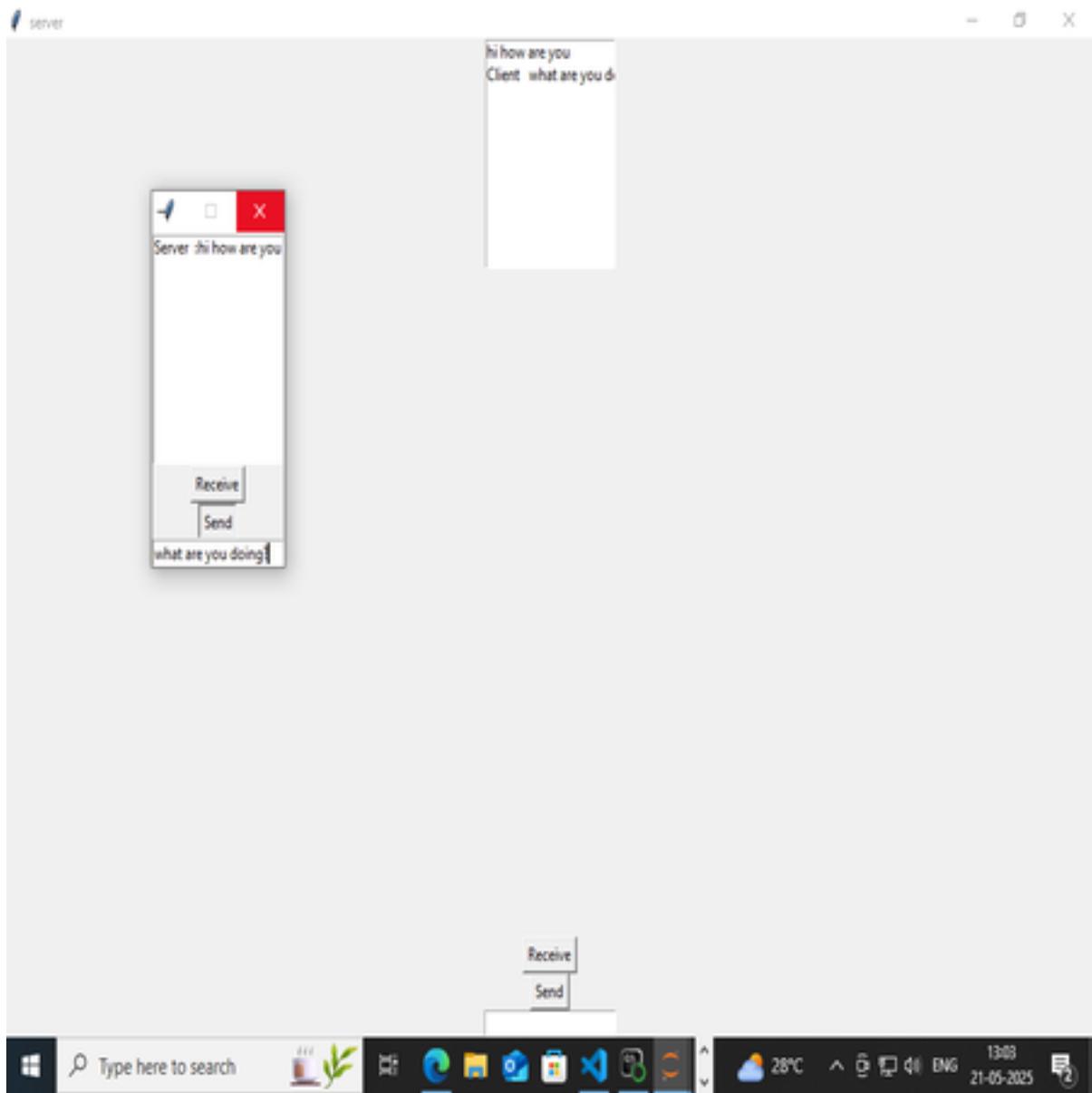


Image :D:\inligntech\Chat\_app\_Socket\_Networking\_programming\cs\_tool.PNG

*This is the project description.*

*We have created a simple chat application using socket programming.*

*The client will send the message to the server  
and the server will send the message to all the clients.  
we create the server using the socket library.  
we created a simple chat application using tkinter.*

*The code used in this project is:*

*server.py*

```
import socket
from tkinter import *

s= socket.socket(socket.AF_INET,socket.SOCK_STREAM)
HOST_NAME = socket.gethostname()
PORT = 12345
s.connect((HOST_NAME,PORT))
```

```
def send(listbox,entry):
    message = entry.get()
```

```
listbox.insert('end',message)
entry.delete(0,END)
s.send(bytes(message, "utf-8"))
receive(listbox)

def receive(listbox):
    message_from_server = s.recv(50)
    listbox.insert('end', "Server :" + message_from_server.decode('utf-8'))

root = Tk()
entry = Entry()
entry.pack(side=BOTTOM)

listbox = Listbox(root)
listbox.pack()

button = Button(root, text="Send", command=lambda :send(listbox,entry))
button.pack(side=BOTTOM)
```

```
rbutton = Button(root, text="Receive", command=lambda :receive(listbox))
rbutton.pack(side=BOTTOM)
root.title("client")

root.mainloop()
```

*This code is used to create a simple chat application using socket programming.*

*The code used in this project is:*

```
client.py
import socket
from tkinter import *
```

```
s= socket.socket(socket.AF_INET,socket.SOCK_STREAM)
```

```
HOST_NAME = socket.gethostname()
```

```
PORT = 12345
```

```
s.connect((HOST_NAME,PORT))
```

```
def send(listbox,entry):
```

```
    message = entry.get()
```

```
    listbox.insert('end',message)
```

```
    entry.delete(0,END)
```

```
    s.send(bytes(message, "utf-8"))
```

```
    receive(listbox)
```

```
def receive(listbox):
```

```
    message_from_server = s.recv(50)
```

```
    listbox.insert('end',"Server :" + message_from_server.decode('utf-8'))
```

```
root = Tk()
```

```
entry = Entry()
```

```
entry.pack(side=BOTTOM)
```

```
listbox = Listbox(root)
```

```
listbox.pack()
```

```
button = Button(root, text="Send", command=lambda :send(listbox, entry))
```

```
button.pack(side=BOTTOM)
```

```
rbutton = Button(root, text="Receive", command=lambda :receive(listbox))
```

```
rbutton.pack(side=BOTTOM)
```

```
root.title("client")
```

```
root.mainloop()
```

*This code is used to create a simple chat application using socket programming.*

*The client will send the message to the server and the server will send the message to all the clients.*

*The layout of the app is as follows:*

```
from tkinter import *
import socket

root = Tk()
entry = Entry()
entry.pack(side=BOTTOM)

listbox = Listbox(root)
listbox.pack()

button = Button(root, text="Send", command=lambda :send(listbox, entry))
button.pack(side=BOTTOM)

rbutton = Button(root, text="Receive", command=lambda :receive(listbox))
rbutton.pack(side=BOTTOM)

root.mainloop()
```

*This code is used to create a simple chat application using socket programming.*

*The client will send the message to the server and the server will send the message to all the clients.*

*The libraries used in this project are:*

- 1)socket
- 2)tkinter

*The socket library is used to create the server and client.*

*The tkinter library is used to create the GUI for the project.*

### Chapter 6:Compress

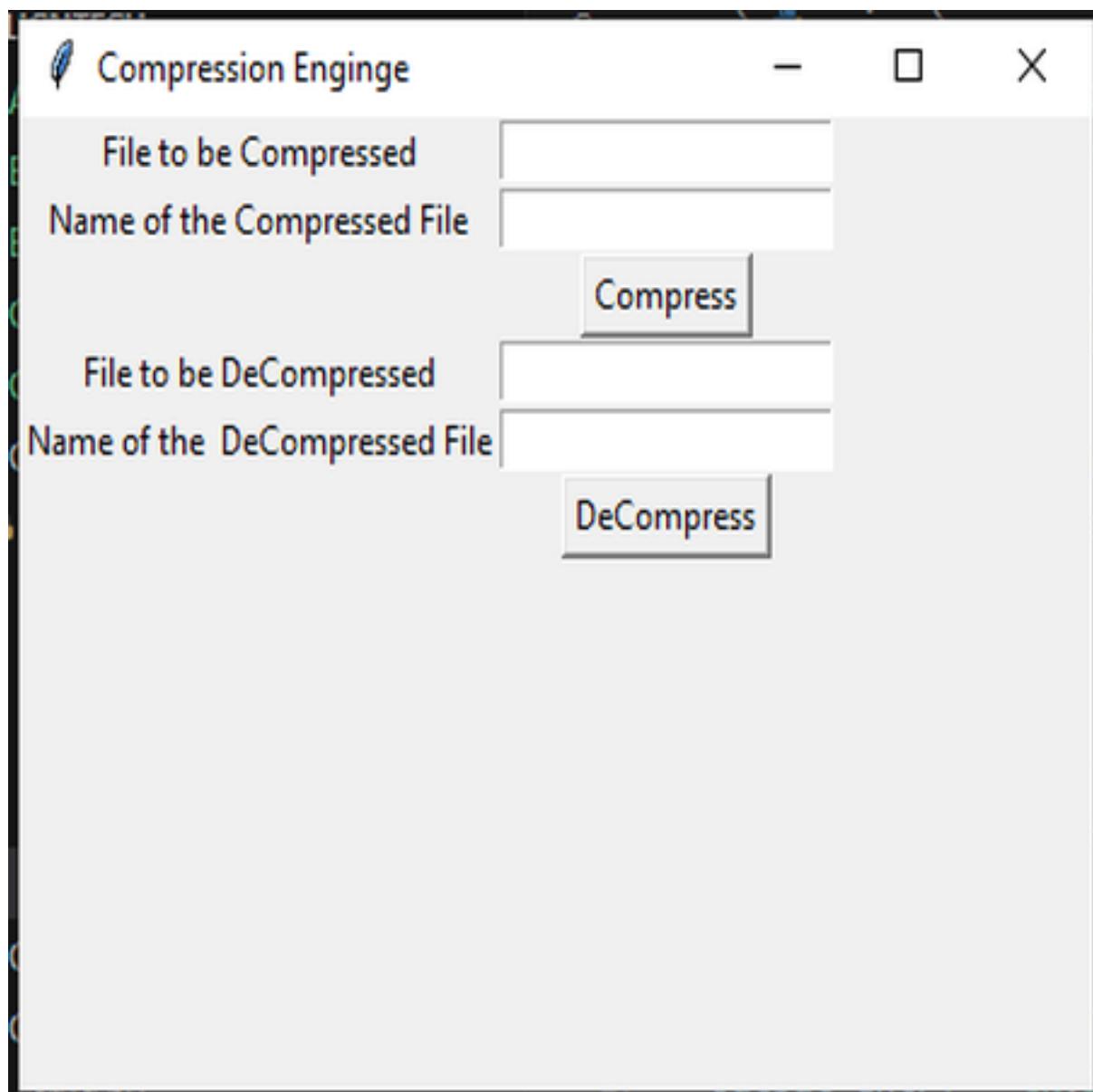


Image :D:\inlightn\Compress\compress.PNG

*This is the project description.*

*The basic idea of this project is to compress and decompress the files.*

*The compress\_file function is used to compress the file.*

*The decompress\_file function is used to decompress the file.*

*The code used in this project is:*

```
import zlib, base64
```

```
def compress_file(input_file, output_file):  
    data = open(input_file, "r").read()  
    data_bytes = bytes(data, 'utf-8')  
    compressed_data = base64.b64encode(zlib.compress(data_bytes, 9))  
    decoded_data = compressed_data.decode('utf-8')  
    compressed_file = open(output_file, "w")  
    compressed_file.write(decoded_data)  
    compressed_file.close()
```

```
def decompress_file(input_file, output_file):  
    compressed_data = open(input_file, "r").read()  
    data_bytes = compressed_data.encode('utf-8')  
    compressed_data = base64.b64decode(data_bytes)  
    decompressed_data = zlib.decompress(compressed_data)  
    decompressed_file = open(output_file, "w")
```

```
decompressed_file.write(decompressed_data.decode('utf-8'))  
decompressed_file.close()
```

*This code is used to compress and decompress the files.*

*The compress\_file function is used to compress the file.*

*The decompress\_file function is used to decompress the file.*

*create a gui for the project using tkinter.*

*The code used in this project is:*

```
import tkinter as tk
```

```
from compressmodule import compress_file, decompress_file
```

```
def compression(input_file, output_file):
```

```
    compress_file(input_file, output_file)
```

```
def decompression(input_file, output_file):
```

```
    decompress_file(input_file, output_file)
```

```
window = tk.Tk()
window.title("Compression Engine")
window.geometry("400x300")

input_entry = tk.Entry(window)
output_entry = tk.Entry(window)
input_label = tk.Label(window, text="File to be Compressed")
output_label = tk.Label(window, text="Name of the Compressed File")
compressed_button = tk.Button(window,
                               text="Compress",
                               command=lambda : compression(input_entry.get(),
output_entry.get()))
compressed_label = tk.Label(window, text="File to be DeCompressed")
compressed_entry = tk.Entry(window)
decompressed_label = tk.Label(window, text="Name of the
DeCompressed File")
decompressed_entry = tk.Entry(window)
decompressed_button = tk.Button(window, text="DeCompress",
                               command=lambda :
```

*decompression(compressed\_entry.get(), decompressed\_entry.get())*

```
input_label.grid(row=0, column=0)
input_entry.grid(row=0, column=1)
output_label.grid(row=1, column=0)
output_entry.grid(row=1, column=1)
compressed_button.grid(row=2, column=1)
compressed_label.grid(row=3, column=0)
compressed_entry.grid(row=3, column=1)
decompressed_label.grid(row=4, column=0)
decompressed_entry.grid(row=4, column=1)
decompressed_button.grid(row=5, column=1)
```

*window.mainloop()*

*gui with filedialog*

*The code used in this project is:*

```
import tkinter as tk
```

```
from compressmodule import compress_file, decompress_file
from tkinter import filedialog

def open_file():
    filename = filedialog.askopenfilename(initialdir="/", title="Select a File",
                                           filetypes=(("Text files", "*.txt"), ("all files", "*.*")))
    return filename

def compression(input_file, output_file):
    compress_file(input_file, output_file)

def decompression(input_file, output_file):
    decompress_file(input_file, output_file)

window = tk.Tk()
window.title("Compression Engine")
window.geometry("400x300")
```

```
compressed_button = tk.Button(window,
text="Compress",command=lambda : compression(open_file(),
"compress_ouput1.txt"))

decompressed_button = tk.Button(window,
text="DeCompress",command=lambda : decompression(open_file(),
"decompress_output1.txt"))

compressed_button.grid(row=2,column=1)
decompressed_button.grid(row=5,column=1)

window.mainloop()
```

*The libraries used in this project are:*

- 1) zlib
- 2) base64
- 3) tkinter
- 4) compressmodule

*The zlib library is used to compress and decompress the files.*

*The base64 library is used to encode and decode the data.*

*The tkinter library is used to create the GUI for the project.*

### Chapter 7: CreditCardValidator

*This is the project description.*

*The basic idea of this project is to create a credit card validator.*

*The code is used to validate the credit card number.*

*The code used in this project is:*

```
card_no ="5610591081018250"
number = list(card_no)
odd_sum=0
double_list=[]
for (idx, val) in enumerate(number):
    if idx % 2 != 0:
        odd_sum += int(val)
    else:
        double_list.append(int(val)*2)
double_string =""
for x in double_list:
    double_string += str(x)
#converting a string to a list
double_list = list(double_string)
```

```
even_sum=0
for x in double_list:
    even_sum += int(x)
net_sum = odd_sum + even_sum
if net_sum % 10 == 0:
    print("Valid card")
else:
    print("Invalid card")
```

## Chapter 8:CRUD\_Commandline

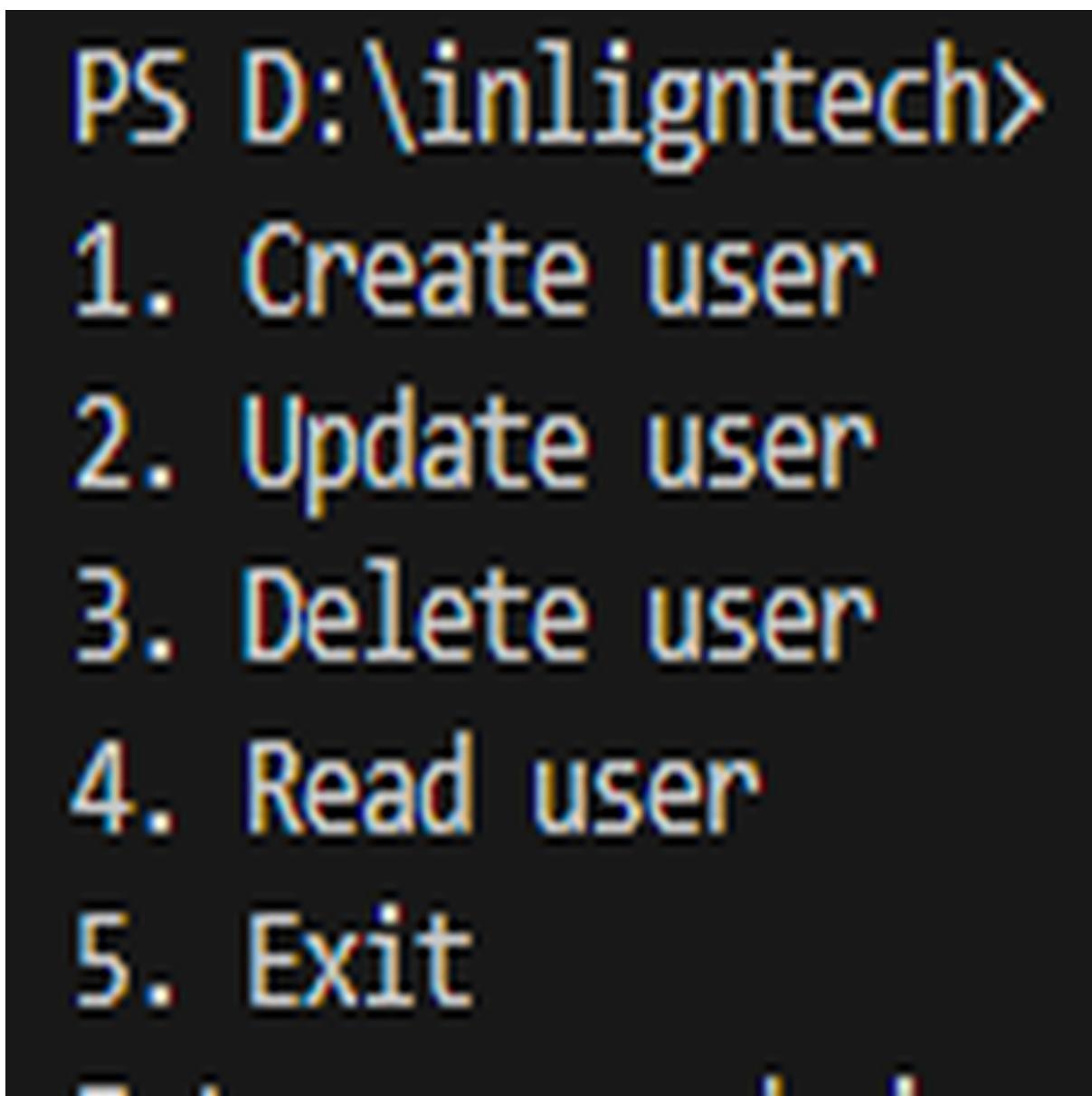


Image :D:\inlighttech\CRUD\_Commandline\crud.PNG

*This is the project description.*

*The basic idea of this project is to create a CRUD application using*

*command line.*

*The code is used to create a CRUD application using command line.*

*The code is used to create a database and perform the CRUD operations on the database.*

*The code used in this project is:*

*import json*

*import os*

*def create\_user():*

*while True:*

*if os.path.exists("data.json"):*

*add\_user = input("Do you want to add a user? (yes/no): ")*

*if add\_user.lower() == "yes":*

*name = input("Enter your name: ")*

*age = int(input("Enter your age: "))*

*city = input("Enter your city: ")*

*data = {"name": name,*

*"age": age,*

*"city": city}*

```
with open("data.json", 'r') as file:
    present_data = json.load(file)
    present_data.append(data)
    with open("data.json", "w") as file:
        json.dump(present_data, file)

    print("User created successfully")
    print("The updated data is: ")
    print(present_data)

else:
    print("User not created")
    with open("data.json", 'r') as file:
        present_data = json.load(file)
        print(present_data)
    break

else:
    print("File does not exist")

def update_user():
    while True:
        if os.path.exists("data.json"):
            with open("data.json", 'r') as file:
```

```
present_data = json.load(file)
print("The present data is: ")
print(present_data)
update_user = input("Do you want to update a user? (yes/no): ")
if update_user.lower() == "yes":
    name = input("Enter the name of the user you want to update: ")
    for i in present_data:
        if i["name"] == name:
            i["age"] = int(input("Enter the new age: "))
            i["city"] = input("Enter the new city: ")
            with open("data.json", "w") as file:
                json.dump(present_data, file)
            print("User updated successfully")
            print("The updated data is: ")
            print(present_data)
            break
    else:
        print("User not found")
        break
else:
    print("File does not exist")
```

*break*

```
def delete_user():
    while True:
        if os.path.exists("data.json"):
            with open("data.json", 'r') as file:
                present_data = json.load(file)
                print("The present data is: ")
                print(present_data)
                delete_user = input("Do you want to delete a user? (yes/no): ")
                if delete_user.lower() == "yes":
                    name = input("Enter the name of the user you want to delete: ")
                    for i in present_data:
                        if i["name"] == name:
                            present_data.remove(i)
                    with open("data.json", "w") as file:
                        json.dump(present_data, file)
                    print("User deleted successfully")
                    print("The updated data is: ")
                    print(present_data)
                    break
    else:
```

```
        print("User not found")
        break
    else:
        print("File does not exist")
        break

def read_user():
    while True:
        if os.path.exists("data.json"):
            with open("data.json", 'r') as file:
                present_data = json.load(file)
                print("The present data is: ")
                print(present_data)
                break
        else:
            print("File does not exist")
            break

def user_management():
    try:
        while True:
            print("1. Create user")
```

```
print("2. Update user")
print("3. Delete user")
print("4. Read user")
print("5. Exit")
choice = int(input("Enter your choice: "))
if choice == 1:
    create_user()
elif choice == 2:
    update_user()
elif choice == 3:
    delete_user()
elif choice == 4:
    read_user()
elif choice == 5:
    break
else:
    print("Invalid choice")
except ValueError:
    print("Invalid input")
```

*user\_management()*

*The libraries used in this project are:*

1)json

2)os

*The json library is used to create the json file.*

*The os library is used to create the file.*

*This is the project description.*

*we can create, update, delete and read the user data command line.*

*we saved the data in a json file.*

## Chapter 9:CRUD\_Databases\_Student\_management\_system

Welcome to the Student database management system

1. Create a Table
2. Insert the data
3. Read the data
4. Update the data
5. Delete the data
6. Exit the system

Enter your choice (1-6)

Page :D:\inlighttech\CRUD\_Databases\_Student\_management\_system\crud\_mysql.PM

Welcome to the Student database management system

1. Create a Table
2. Insert the data
3. Read the data
4. Update the data
5. Delete the data
6. Exit the system

Enter your choice (1-6)

Path :D:\inlighttech\CRUD\_Databases\_Student\_management\_system\crud\_mssql\server

Student Management system

Student Data

Name:	<input type="text"/>
Address:	<input type="text"/>
Age:	<input type="text"/>
Phone number:	<input type="text"/>

Create Table   Add data   Update data   Delete data

ID	Name	Address	Age	Phone number
2	shiva	LA	34	23423423
1005	avv	WY	23	232323
2007	Jack	WT	32	798798
2008	jonas	MT	23	9999999
2009	jimmy	SD	23	3534534
2010	jackie	SD	23	3534534
2011	Mc call	SD	23	3534534
2012		0	0	0
2013		0	0	0
2014		0	0	0

:\inlighttech\CRUD\_Databases\_Student\_management\_system\crud\_mssql\server\_tki

Student Management System

Students

Name :	<input type="text"/>
address :	<input type="text"/>
Age :	<input type="text"/>
Phone number :	<input type="text"/>

[Create Table](#) [Insert Table](#) [Update Table](#) [Delete Table](#)

ID	Name	Address	age	Phone number
1	jonnahh	NY	34	435345
2	ravui	vizag	34	1567890
3	shiva	NM	23	35434534
7	stuyevesant	CT	34	23423423
9	shane	NJ	23	23234234

Path :D:\inlighttech\CRUD\_Databases\_Student\_management\_system\crud\_mysql\_tkinter

*This is the project description.*

*The basic idea of this project is to create a CRUD application using mysql and mssqlserver.*

*The code used for connecting mysqlDb is*

```
import MySQLdb
```

```
def create_table():
```

```
    db = MySQLdb.connect(
```

```
        user="root",
```

```
        password="shiva",
```

```
        database="mysqlDb4")
```

```
    cursor = db.cursor()
```

```
        cursor.execute("create table students(id int primary key
```

```
AUTO_INCREMENT, name varchar(100), address varchar(500), age
```

```
int, number int);")
```

```
    print("Table created successfully")
```

```
    db.commit()
```

```
    db.close()
```

```
def insert_data():
```

```
    name = input("Enter name:")
```

```
    address = input("Enter address:")
```

```
    age = input("Enter age:")
```

```
    number = input("Enter number:")
```

```
db =MySQLdb.connect(  
    user="root",  
    password="shiva",  
    database="mysql4")  
cursor =db.cursor()  
    cursor.execute("Insert into    students(name ,address ,age ,number)  
values(%s,%s,%s,%s)",(name,address,age,number))  
print("data added successfully")  
db.commit()  
db.close()  
  
def update_data():  
    db =MySQLdb.connect(  
        user="root",  
        password="shiva",  
        database="mysql4")  
    cursor =db.cursor()  
    student_id =input("Please enter the student_id to be updated?")  
    fields = {  
        "1":("name","Please enter the new name?"),  
        "2":("address","Please enter the new address"),  
        "3":("age","Please enter the new age"),
```

```
"4":("number","Please enter the new number"),  
}  
for keys in fields:
```

```
    print(f"{keys} : {fields[keys][0]}")
```

```
selected_choice = input("Enter the selection to be updated")
```

```
if selected_choice in fields:
```

```
    field_choice, prompt =
```

```
    fields[selected_choice][0],fields[selected_choice][1]
```

```
    new_choice = input(prompt)
```

```
    sql =f"update students set {field_choice}=%s where id =%s"
```

```
    cursor.execute(sql,(new_choice,student_id))
```

```
    print(f"{field_choice} updated successfully")
```

```
else:
```

```
    print("invalid field choice ")
```

```
db.commit()
```

```
db.close()
```

```
def delete_data():
    db = MySQLdb.connect(
        user="root",
        password="shiva",
        database="mysqlDb4")
    cursor = db.cursor()
```

```
student_id = input("Enter id of the student to be deleted:")
cursor.execute("select * from students where id=%s ",(student_id,))
```

```
student = cursor.fetchone()
```

```
if student:
    print(f"Student to be deleted: ID {student[0]}, Name: {student[1]},\nAddress= {student[2]}, Number ={student[3]} ")
    choice = input("Do you want to delete the student (yes/no)?")
    if choice.lower() == "yes":
        cursor.execute("delete from students where id=%s ",(student_id,))
        print("Data updated successfully")
```



*for student in result:*

```
    print(f" ID {student[0]}, Name: {student[1]}, Address= {student[2]},  
Number ={student[3]} ")
```

```
print("data printed successfully")
```

```
db.commit()
```

```
db.close()
```

*while True:*

```
    print("welcome to the Student database management system")
```

```
    print("1. Create a Table")
```

```
    print("2. Insert the data")
```

```
    print("3. Read the data")
```

```
    print("4. Update the data")
```

```
    print("5. Delete the data")
```

```
    print("6. Exit the system")
```

```
choice = input("Enter your choice (1-6)")
```

```
if choice == "1":
```

```
    create_table()
```

```
elif choice == "2":
```

```
insert_data()  
elif choice == "3":  
    read_data()  
elif choice == "4":  
    update_data()  
elif choice == "5":  
    delete_data()  
elif choice == "6":  
    break  
else:  
    print("Enter a valid choice")
```

2) The code used for connecting mssqlserver is:

```
import pyodbc
```

```
def create_table():  
    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql  
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')  
    cursor = conn.cursor()  
    cursor.execute("create table students(id int identity(1,1) primary  
key,name varchar(100),address varchar(500),age int,number int);")  
    print("Table created successfully")
```

```
cursor.commit()  
conn.close()  
  
def insert_data():  
    name= input("Enter name:")  
    address=input("Enter address:")  
    age= input("Enter age:")  
    number= input("Enter number:")  
  
    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql  
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')  
    cursor = conn.cursor()  
    cursor.execute("Insert into students(name ,address ,age ,number)  
values(?, ?, ?, ?)",(name,address,age,number))  
    print("data added successfully")  
    cursor.commit()  
    conn.close()  
  
def read_data():  
    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql  
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')
```

```
cursor = conn.cursor()
cursor.execute("select * from students;")
result = cursor.fetchall()

for student in result:
    print(f" ID {student[0]}, Name: {student[1]}, Address= {student[2]}, 
Number ={student[3]} ")

print("data printed successfully")
cursor.commit()
conn.close()

def update_data():

    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')

    cursor = conn.cursor()

    student_id = input("Enter id of the student to be updated:")
    fields = {
```

```
"1":['name','Please enter the new name'],
"2":['address','Please enter the new address'],
"3":['age','Please enter the new age'],
"4":['number','Please enter the new number'],
}
```

```
print("Enter the field you want to update")
```

```
for key in fields:
```

```
    print(f" {key}:{fields[key][0]}")
```

```
field_choice = input("Enter the field you want to update:")
```

```
if field_choice in fields:
```

```
    field_name,prompt = fields[field_choice]
```

```
    new_value = input(prompt)
```

```
    sql = f"update students set {field_name}=? where id=? "
```

```
    cursor.execute(sql,(new_value,student_id))
```

```
    print(f"{field_name} update successfully")
```

```
else:
```

```
    print("Invalid field choice")
```

```
cursor.commit()
```

```
conn.close()
```

```
def delete_data():

    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')

    cursor = conn.cursor()
    student_id = input("Enter id of the student to be deleted:")
    cursor.execute("select * from students where id=? ",(student_id,))

    student =cursor.fetchone()

    if student:
        print(f"Student to be deleted: ID {student[0]},Name: {student[1]},

Address= {student[2]}, Number ={student[3]} ")
        choice = input("Do you want to delete the student (yes/no)")

        if choice.lower() == "yes":
            cursor.execute("delete from students where id=? ",(student_id,))

            print("Data updated successfully")
            cursor.commit()

        conn.close()
```

```
else:  
    print("Deletion cancelled")  
    conn.close()  
  
else:  
    print("data not updated")  
    conn.close()  
  
while True:  
    print("welcome to the Student database management system")  
    print("1. Create a Table")  
    print("2. Insert the data")  
    print("3. Read the data")  
    print("4. Update the data")  
    print("5. Delete the data")  
    print("6. Exit the system")  
  
    choice = input("Enter your choice (1-6)")  
    if choice == "1":  
        create_table()  
    elif choice == "2":
```

```
insert_data()  
elif choice == "3":  
    read_data()  
elif choice == "4":  
    update_data()  
elif choice == "5":  
    delete_data()  
elif choice == "6":  
    break  
else:  
    print("Enter a valid choice")
```

*The code used for connecting mysql db is*  
*import MySQLdb*

```
def create_table():  
    db = MySQLdb.connect(  
        user="root",  
        password="shiva",
```

```
database="mysqlDb4")

cursor = db.cursor()

    cursor.execute("create table students(id int primary key
AUTO_INCREMENT, name varchar(100), address varchar(500), age
int, number int);")

print("Table created successfully")

db.commit()

db.close()

def insert_data():

    name = input("Enter name:")

    address = input("Enter address:")

    age = input("Enter age:")

    number = input("Enter number:")

    db = MySQLdb.connect(

        user="root",

        password="shiva",

        database="mysqlDb4")

    cursor = db.cursor()

        cursor.execute("Insert into students(name ,address ,age ,number)
values(%s,%s,%s,%s)",(name,address,age,number))

    print("data added successfully")
```

```
db.commit()  
db.close()  
  
def update_data():  
    db = MySQLdb.connect(  
        user="root",  
        password="shiva",  
        database="mysqlDb4")  
    cursor = db.cursor()  
    student_id = input("Please enter the student_id to be updated?")  
    fields = {  
        "1": ("name", "Please enter the new name?"),  
        "2": ("address", "Please enter the new address"),  
        "3": ("age", "Please enter the new age"),  
        "4": ("number", "Please enter the new number"),  
    }  
  
    for keys in fields:  
        print(f'{keys} : {fields[keys][0]}')
```

```
selected_choice = input("Enter the selection to be updated")

if selected_choice in fields:
    field_choice, prompt = fields[selected_choice][0], fields[selected_choice][1]
    new_choice = input(prompt)

    sql = f"update students set {field_choice}=%s where id=%s"
    cursor.execute(sql, (new_choice, student_id))
    print(f"{field_choice} updated successfully")

else:
    print("invalid field choice ")

db.commit()
db.close()

def delete_data():
    db = MySQLdb.connect(
        user="root",
        password="shiva",
        database="mysql_db4")
    cursor = db.cursor()
```

```
student_id = input("Enter id of the student to be deleted:")
cursor.execute("select * from students where id=%s ",(student_id,))

student =cursor.fetchone()

if student:
    print(f"Student to be deleted: ID {student[0]},Name: {student[1]}, Address= {student[2]}, Number ={student[3]} ")
    choice = input("Do you want to delete the student (yes/no)")
    if choice.lower() == "yes":
        cursor.execute("delete from students where id=%s ",(student_id,))
        print("Data updated succesfully")

    else:
        print("Deletion cancelled")

else:
    print("data not updated")
```

```
db.commit()  
db.close()  
  
def read_data():  
  
    db = MySQLdb.connect(  
        user="root",  
        password="shiva",  
        database="mysql_db4")  
    cursor = db.cursor()  
    cursor.execute("select * from students;")  
    result = cursor.fetchall()  
  
    for student in result:  
        print(f" ID {student[0]}, Name: {student[1]}, Address= {student[2]},  
        Number ={student[3]} ")  
  
    print("data printed successfully")  
    db.commit()
```

```
db.close()

while True:
    print("welcome to the Student database management system")
    print("1. Create a Table")
    print("2. Insert the data")
    print("3. Read the data")
    print("4. Update the data")
    print("5. Delete the data")
    print("6. Exit the system")

choice = input("Enter your choice (1-6)")
if choice == "1":
    create_table()
elif choice == "2":
    insert_data()
elif choice == "3":
    read_data()
elif choice == "4":
    update_data()
elif choice == "5":
    delete_data()
elif choice == "6":
```

```
        break
else:
    print("Enter a valid choice")
```

2) The code used for connecting mssqlserver is:

```
import pyodbc
```

```
def create_table():
    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')
    cursor = conn.cursor()
    cursor.execute("create table students(id int identity(1,1) primary
key,name varchar(100),address varchar(500),age int,number int);")
    print("Table created successfully")
    cursor.commit()
    conn.close()
```

```
def insert_data():
    name= input("Enter name:")
    address=input("Enter address:")
    age= input("Enter age:")
    number= input("Enter number:")
```

```
conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')

cursor = conn.cursor()

cursor.execute("Insert into students(name ,address ,age ,number)
values(?, ?, ?, ?)",(name,address,age,number))

print("data added successfully")

cursor.commit()

conn.close()

def read_data():

    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')

    cursor = conn.cursor()

    cursor.execute("select * from students;")

    result = cursor.fetchall()

    for student in result:

        print(f" ID {student[0]},Name: {student[1]}, Address= {student[2]},

Number ={student[3]} ")
```

```
print("data printed successfully")
cursor.commit()
conn.close()

def update_data():

    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')
    cursor = conn.cursor()

student_id = input("Enter id of the student to be updated:")
fields = {

    "1":['name','Please enter the new name'],
    "2":['address','Please enter the new address'],
    "3":['age','Please enter the new age'],
    "4":['number','Please enter the new number'],
}

print("Enter the field you want to update")
```

```
for key in fields:
    print(f" {key}:{fields[key][0]}")

field_choice = input("Enter the field you want to update:")
if field_choice in fields:
    field_name,prompt = fields[field_choice]
    new_value = input(prompt)
    sql = f"update students set {field_name}=? where id=? "
    cursor.execute(sql,(new_value,student_id))
    print(f"{field_name} update successfully")
else:
    print("Invalid field choice")
cursor.commit()
conn.close()

def delete_data():
    conn= pyodbc.connect(Trusted_connection='yes',driver='{sql
server}',server='DESKTOP-3RB0IMS\SQLEXPRESS',database='master')
    cursor = conn.cursor()
    student_id = input("Enter id of the student to be deleted:")
```

```
cursor.execute("select * from students where id=? ",(student_id,))

student =cursor.fetchone()

if student:
    print(f"Student to be deleted: ID {student[0]},Name: {student[1]},Address= {student[2]}, Number ={student[3]} ")
    choice = input("Do you want to delete the student (yes/no)")

    if choice.lower() == "yes":
        cursor.execute("delete from students where id=? ",(student_id,))
        print("Data updated successfully")
        cursor.commit()
        conn.close()

    else:
        print("Deletion cancelled")
        conn.close()

else:
    print("data not updated")
    conn.close()
```

*while True:*

```
    print("welcome to the Student database management system")
    print("1. Create a Table")
    print("2. Insert the data")
    print("3. Read the data")
    print("4. Update the data")
    print("5. Delete the data")
    print("6. Exit the system")
```

*choice = input("Enter your choice (1-6)")*

*if choice == "1":*

*create\_table()*

*elif choice == "2":*

*insert\_data()*

*elif choice == "3":*

*read\_data()*

*elif choice == "4":*

*update\_data()*

*elif choice == "5":*

*delete\_data()*

*elif choice == "6":*

```
break
else:
    print("Enter a valid choice")
```

*The libraries used in this project are:*

- 1)pyodbc
- 2)tkinter
- 3)ttk
- 4)MySQLdb
- 5)os

*The pyodbc library is used to connect to the mssqlserver.*

*The tkinter library is used to create the GUI for the project.*

*The ttk library is used to create the treeview for the project.*

*The MySQLdb library is used to connect to the mysql database.*

*The os library is used to create the file.*

### Chapter 10:CRUD\_pyqt6

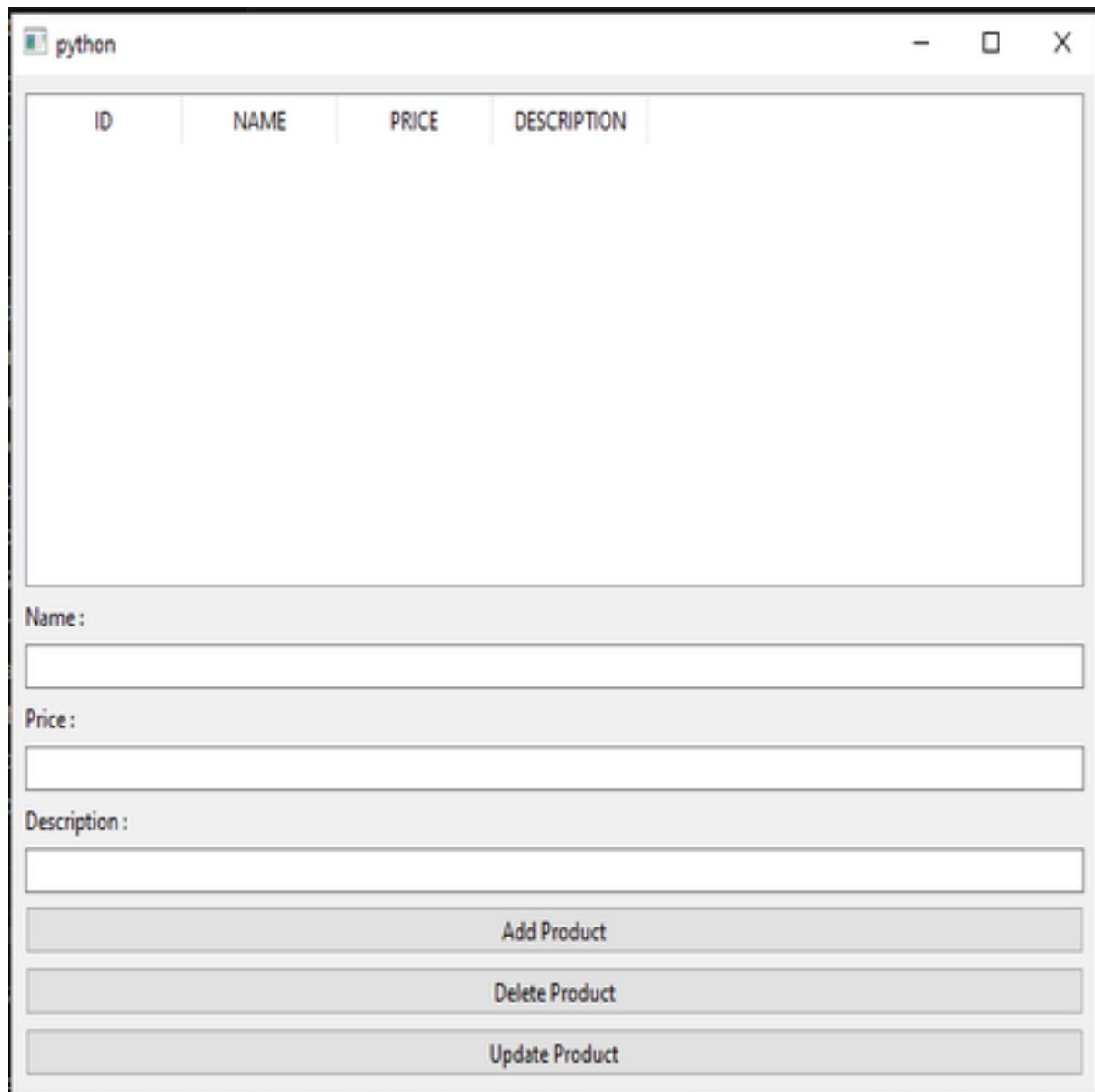


Image :D:\inlighttech\CRUD\_pyqt6\crud\_pyqt6.PNG

*This is the project description.*

*The basic idea of this project is to create a CRUD application using PyQt6.*

*The code used in this project is:*

```
from PyQt6.QtWidgets import
QVBoxLayout, QMenu, QMessageBox, QToolBar, QPushButton, QSpinBox, Q
LineEdit, QFormLayout, QMainWindow, QDockWidget, QWidget,
QApplication, QLabel, QTableWidget, QTableWidgetItem,
QListWidget, QHBoxLayout, QListWidgetItem
from PyQt6.QtGui import QPixmap, QAction, QIcon
from PyQt6.QtCore import Qt, QSize
import sys
import warnings
import sqlite3
warnings.filterwarnings("ignore", category=DeprecationWarning)
#CRUD, create, read , update , delete
class MainWindow(QMainWindow):

    def __init__(self):
        super().__init__()
        self.conn = sqlite3.connect("products.db")
        self.create_table()
        self.initUI()

    def load_data(self):
```

```
cursor = self.conn.cursor()
cursor.execute('SELECT * FROM products')
products = cursor.fetchall()
self.table_widget.setRowCount(len(products))
for row, product in enumerate(products):
    for column, value in enumerate(product):
        item = QTableWidgetItem(str(value))
        self.table_widget.setItem(row, column, item)

def create_table(self):
    cursor = self.conn.cursor()
    cursor.execute("""
        CREATE TABLE IF NOT EXISTS products (
            id INTEGER PRIMARY KEY AUTOINCREMENT,           name
            TEXT,           price INTEGER,           description TEXT)
            """)
    self.conn.commit()

def initUI(self):
    self.setGeometry(0, 0, 700, 500)
```

```
central_widget = QWidget(self)
```

```
self.setCentralWidget(central_widget)
```

```
layout = QVBoxLayout(central_widget)
```

```
self.table_widget = QTableWidget(self)
```

```
layout.addWidget(self.table_widget)
```

```
self.table_widget.setColumnCount(4)
```

```
self.table_widget.setHorizontalHeaderLabels(["ID", "NAME", "PRICE", "DESCRIPTION"])
```

```
#
```

```
self.load_data()
```

```
self.name_edit = QLineEdit(self)
```

```
self.price_edit = QLineEdit(self)
```

```
self.description_edit = QLineEdit(self)
```

```
layout.addWidget(QLabel("Name :"))
layout.addWidget(self.name_edit)
```

```
layout.addWidget(QLabel("Price :"))
layout.addWidget(self.price_edit)
```

```
layout.addWidget(QLabel("Description :"))
layout.addWidget(self.description_edit)
```

```
add_button = QPushButton("Add Product",self)
layout.addWidget(add_button)
add_button.clicked.connect(self.add_product)
```

```
delete_button = QPushButton("Delete Product",self)
layout.addWidget(delete_button)
delete_button.clicked.connect(self.delete_product)
```

```
update_button = QPushButton("Update Product",self)
layout.addWidget(update_button)
update_button.clicked.connect(self.update_product)
```

```
def add_product(self):  
    name = self.name_edit.text().strip()  
    price = self.price_edit.text().strip()  
    description = self.description_edit.text().strip()  
    #new_product = {  
    #    'name':name,'price':price,'description':description  
    #  
    #self.products.append(new_product)  
    ##creating the table  
    #row_position = len(self.products)-1  
    #self.table_widget.insertRow(row_position)  
    #for col,value in enumerate(new_product.values()):  
    #    item = QTableWidgetItem(str(value))  
    #    self.table_widget.setItem(row_position,col,item)  
    # Adding new product to the database  
    cursor = self.conn.cursor()  
    cursor.execute('INSERT INTO products(name , price , description)  
VALUES(?,?,?),(name,price,description))  
    self.conn.commit()
```

```
self.load_data()
```

```
self.name_edit.clear()  
self.price_edit.clear()  
self.description_edit.clear()
```

```
def delete_product(self):  
    current_row = self.table_widget.currentRow()  
    if current_row < 0 or current_row >= self.table_widget.rowCount():  
        return QMessageBox.warning("Warning", "No row Selected")  
    product_id = self.table_widget.item(current_row, 0).text()  
    response = QMessageBox.question(self, "Delete Product", "Do you  
want to delete the product", QMessageBox.StandardButton.Yes  
| QMessageBox.StandardButton.No)  
    if response == QMessageBox.StandardButton.Yes:  
        #self.table_widget.removeRow(current_row)  
        #del self.products[current_row]  
        cursor = self.conn.cursor()  
        cursor.execute('DELETE FROM products where id =  
?', (product_id))
```

```
self.conn.commit()  
self.load_data()  
  
def update_product(self):  
    current_row = self.table_widget.currentRow()  
    if current_row<0 or current_row>= self.table_widget.rowCount():  
        return QMessageBox.warning("Warning", "No row Selected")  
    name = self.name_edit.text().strip()  
    price = self.price_edit.text().strip()  
    description = self.description_edit.text().strip()  
    product_id = self.table_widget.item(current_row,0).text()  
    cursor = self.conn.cursor()  
    cursor.execute('UPDATE products SET name=?, price=?,  
description=? WHERE id=?',(name,price,description,product_id))  
    self.conn.commit()  
    self.load_data()  
  
# updated_product = {  
#     'name':name,'price':price,'description':description  
# }  
# self.products[current_row] = updated_product
```

```
# for col,value in enumerate(updated_product.values()):  
#     item = QTableWidgetItem(str(value))  
#     self.table_widget.setItem(current_row,col,item)  
  
app = QApplication(sys.argv)  
window = MainWindow()  
window.show()  
app.exec()
```

*The libraries used in this project are:*

- 1)PyQt6.QtWidgets
- 2)PyQt6.Qtcore
- 3)PyQt6.QtCore
- 4)sqlite3

*The PyQt6 library is used to create the GUI for the project.*

*The sqlite3 library is used to create the database for the project.*

*The PyQt6.QtWidgets library is used to create the widgets for the project.*

*The PyQt6.QtCore library is used to create the core functionality for the project.*

### Chapter 11:Custom\_Color\_Picker

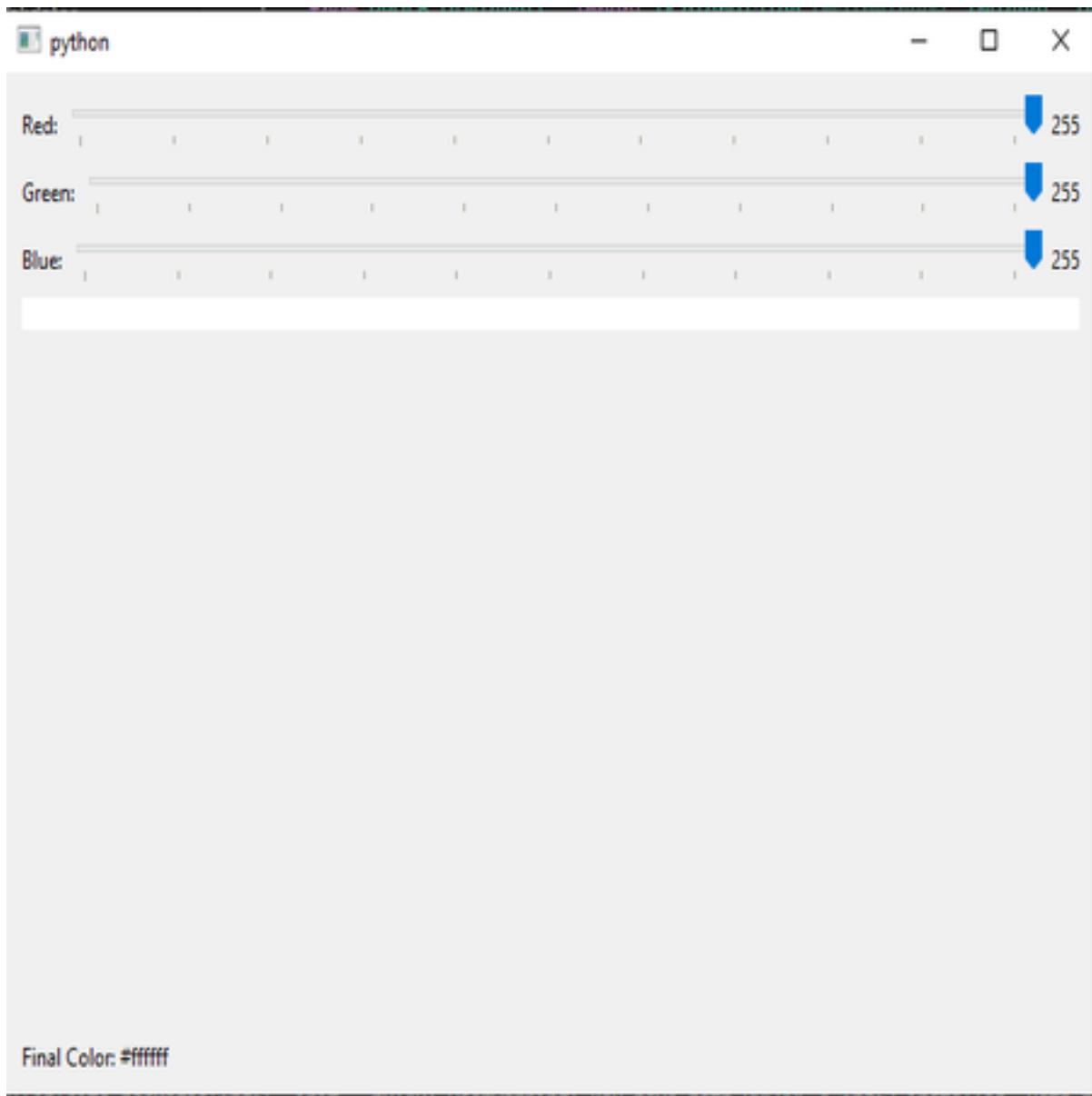


Image :D:\inligntech\Custom\_Color\_Picker\color\_picker.PNG

*The code used in this project is:*

```
from PyQt6.QtWidgets import QColorDialog, QMainWindow, QWidget,
```

*QApplication, QSlider, QLabel, QHBoxLayout, QVBoxLayout*

*from PyQt6.QtGui import QAction, QColor*

*from PyQt6.QtCore import Qt*

*import sys*

*class Window(QWidget):*

*def \_\_init\_\_(self):*

*super().\_\_init\_\_()*

*self.initUI()*

*def initUI(self):*

*self.setGeometry(0,0,700,500)*

*self.red\_slider = QSlider(Qt.Orientation.Horizontal)*

*self.green\_slider = QSlider(Qt.Orientation.Horizontal)*

*self.blue\_slider = QSlider(Qt.Orientation.Horizontal)*

*for slider in [self.red\_slider, self.green\_slider, self.blue\_slider]:*

```
slider.setRange(0,255)
slider.setValue(255)
slider.setTickPosition(QSlider.TickPosition.TicksBelow)
slider.setTickInterval(25)

self.red_label = QLabel("Red: ")

self.green_label = QLabel("Green: ")

self.blue_label = QLabel("Blue: ")

self.red_value_label = QLabel("255")

self.green_value_label = QLabel("255")

self.blue_value_label = QLabel("255")

#creating a layout for main window
```

```
layout = QVBoxLayout(self)

sliders_layout = QVBoxLayout()
    for label, slider, value_label in
zip([self.red_label, self.green_label, self.blue_label],
    [self.red_slider, self.green_slider, self.blue_slider],
    [self.red_value_label, self.green_value_label, self.blue_value_label])
    ):
    slider_layout = QHBoxLayout()
    slider_layout.addWidget(label)
    slider_layout.addWidget(slider)
    slider_layout.addWidget(value_label)
    sliders_layout.addLayout(slider_layout)

layout.addLayout(sliders_layout)
# creating a label to preview colors
self.color_preview = QLabel()
color_layout = QVBoxLayout()
color_layout.addWidget(self.color_preview)
color_layout.addStretch()
```

```
layout.addLayout(color_layout)

# connecting sliders to the methods
self.red_slider.valueChanged.connect(self.update_color)
self.green_slider.valueChanged.connect(self.update_color)
self.blue_slider.valueChanged.connect(self.update_color)

#Setting the initial value of Color
self.color="#ffffff"
self.color_preview.setStyleSheet(f"background-color:{self.color}")

self.final_color_label= QLabel("Final Color: #ffffff")
final_color_layout = QBoxLayout()
final_color_layout.addWidget(self.final_color_label)
layout.addLayout(final_color_layout)

def update_color(self):
    red = self.red_slider.value()
    self.red_value_label.setText(str(red))
    green = self.green_slider.value()
    blue = self.blue_slider.value()
```

```
self.green_value_label.setText(str(green))
blue = self.blue_slider.value()
self.blue_value_label.setText(str(blue))
self.color = QColor(red,green,blue)

self.color_preview.setStyleSheet(f"background-color:{self.color.name()}")
self.final_color_label.setText(str(self.color.name()))

def show_color_dialog(self,event):
    print("Method triggered")
    if event.button() == Qt.MouseButton.LeftButton:
        color_dialog = QColorDialog(self.color,self)
        color_dialog.colorSelected.connect(self.set_color)
        color_dialog.exec_()
def set_color(self,color):
    self.color = color
    self.red_slider.value(color.red)
    self.green_slider.value(color.green)
    self.blue_slider.value(color.blue)
    self.update_color()
```

```
app = QApplication(sys.argv)
```

```
window = Window()
```

```
window.show()
```

```
app.exec()
```

*The libraries used in this project are:*

1) *PyQt6.QtWidgets*

2) *PyQt6.QtCore*

3) *PyQt6.QtGui*

4) *sys*

5) *os*

*The PyQt6 library is used to create the GUI for the project.*

*The sys library is used to create the system for the project.*

*The os library is used to create the file.*

### Chapter 12:CvGenerator\_app

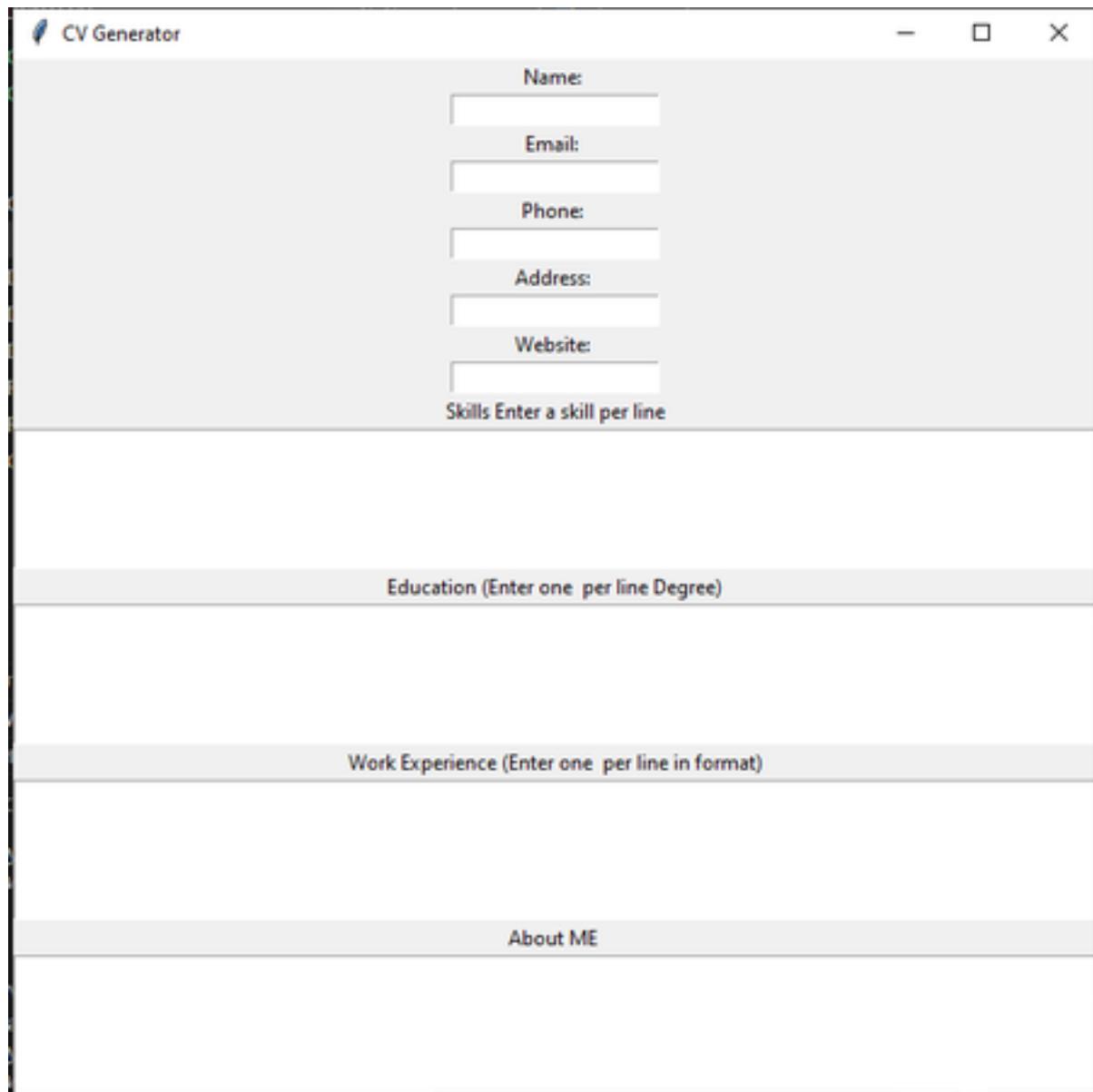


Image :D:\inlightn\CVGenerator\_app\cvgenerator.PNG

*This is the project description.*

*The basic idea of this project is to create a CV generator using python.*

*the project is used to create a CV using the information provided by the user.*

*We build a tkinter application*

*The code used in this project is:*

```
from tkinter import *
import pyqrcode
from fpdf import FPDF
from tkinter import messagebox
```

```
class PDFCV(FPDF):
```

```
    def header(self):
        self.image("mywebsite.png", 10, 8, 33, title="Portfolio Site")
```

```
    def footer(self):
```

```
        pass
```

```
    def
```

```
generate_cv(self, name, email, phone_number, address, skills, work_experience, education, about_me):
```

```
        self.add_page()
```

```
self.ln(20)
```

```
#display name
```

```
self.set_font("helvetica", "B", size=26)
```

```
self.cell(0, 10, name, new_x='LMARGIN', new_y="NEXT", align='C')
```

```
#Adding contact information
```

```
self.set_font("helvetica", "B", size=12)
```

```
    self.cell(0, 10, "Contact Information", new_x='LMARGIN',
```

```
new_y="NEXT", align='L')
```

```
self.set_font("helvetica", "B", size=10)
```

```
    self.cell(0, 10, "Email : {}".format(email), new_x='LMARGIN',  
new_y="NEXT", )
```

```
    self.cell(0, 10, "Phone : {}".format(phone_number), new_x='LMARGIN',  
new_y="NEXT", )
```

```
    self.cell(0, 10, "Address : {}".format(address), new_x='LMARGIN',  
new_y="NEXT", )
```

```
#display skills
```

```
self.ln(20)
```

```
self.set_font("helvetica", "B", size=12)
self.cell(0, 10, "Skills", new_x='LMARGIN', new_y="NEXT", align='L')

self.set_font("helvetica", "B", size=10)
for skill in skills:
    self.cell(0, 5, "- {}".format(skill), new_x='LMARGIN', new_y="NEXT" )
```

```
#display experience
self.ln(20)
self.set_font("helvetica", "B", size=12)
    self.cell(0, 10, "Experience", new_x='LMARGIN', new_y="NEXT",
align='L')
```

```
self.set_font("helvetica", "B", size=10)
```

```
for experience in work_experience:
```

```
    self.cell(0, 5, "{} : ".format(experience['title']), new_x='LMARGIN',
new_y="NEXT" )
```

```
#display education
```

```
self.ln(20)
```

```
self.set_font("helvetica", "B", size=12)
    self.cell(0, 10, "Education", new_x='LMARGIN', new_y="NEXT",
align='L')

self.set_font("helvetica", "B", size=10)

for education_item in education:
    self.cell(0, 5, "{} : "
    "{}".format(education_item['degree'], education_item['university']),
new_x='LMARGIN', new_y="NEXT" )

#display about me
self.ln(20)
self.set_font("helvetica", "B", size=12)
    self.cell(0, 10, "About Me", new_x='LMARGIN', new_y="NEXT",
align='L')

self.set_font("helvetica", "B", size=10)

self.multi_cell(0, 5, about_me)
```

```
self.output("cv.pdf")

def generate_cv_pdf():
    name = entry_name.get()
    email = entry_email.get()
    phone_number = entry_phone.get()
    address = entry_address.get()
    website = entry_website.get()
    skills = entry_skills.get("1.0",END).strip().split(
    ")
    work_experience = []
    education = []

    work_experience_lines = entry_experience.get("1.0",END).strip().split(
    ")
    for line in work_experience_lines:
        title, description = line.split(":")
        work_experience.append({"title": title.strip(), "description" :
description.strip()})

    self.output("cv.pdf")
```

```
print(work_experience)
education_lines = entry_education.get("1.0",END).strip().split("\n")
for line in education_lines:
    degree , university = line.split(":")
    education.append({"degree": degree.strip(), "university" : university.strip()})

about_me = entry_about_me.get("1.0",END)
# create QR code
qrcode = pyqrcode.create(website)
qrcode.png("mywebsite.png", scale=6)

if not name or not email or not phone_number or not address or
not website or not education or not work_experience or not skills:
    messagebox.showerror("Error", "Please fill all fields")
    return

cv = PDFCV()

cv.generate_cv(name,email,phone_number,address,skills,work_experience,education,about_me)
```

```
window = Tk()
```

```
window.title("CV Generator")
```

```
label_name = Label(window, text="Name: ")
```

```
label_name.pack()
```

```
entry_name = Entry(window)
```

```
entry_name.pack()
```

```
label_email = Label(window, text="Email: ")
```

```
label_email.pack()
```

```
entry_email = Entry(window)
```

```
entry_email.pack()
```

```
label_phone = Label(window, text="Phone: ")
```

```
label_phone.pack()
```

```
entry_phone = Entry(window)
```

```
entry_phone.pack()
```

```
label_address = Label(window, text="Address: ")  
label_address.pack()
```

```
entry_address = Entry(window)  
entry_address.pack()
```

```
label_website = Label(window, text="Website: ")  
label_website.pack()
```

```
entry_website = Entry(window)  
entry_website.pack()
```

```
label_skills = Label(window, text="Skills Enter a skill per line")  
label_skills.pack()  
entry_skills = Text(window, height=5)  
entry_skills.pack()
```

```
label_education = Label(window, text="Education (Enter one per line  
Degree)")  
label_education.pack()  
entry_education = Text(window, height=5)
```

```
entry_education.pack()
```

```
label_experience = Label(window, text="Work Experience (Enter one per line in format)")
```

```
label_experience.pack()
```

```
entry_experience = Text(window, height=5)
```

```
entry_experience.pack()
```

```
label_about_me = Label(window, text="About ME ")
```

```
label_about_me.pack()
```

```
entry_about_me = Text(window, height=5)
```

```
entry_about_me.pack()
```

```
button_generate = Button(window, text="Generate CV",
```

```
command=generate_cv_pdf)
```

```
button_generate.pack()
```

```
window.mainloop()
```

*The libraries used in this project are:*

- 1) *tkinter*
- 2) *pyqrcode*
- 3) *fpdf*
- 4) *os*
- 5) *sys*

*The tkinter library is used to create the GUI for the project.*

*The pyqrcode library is used to create the QR code for the project.*

*The fpdf library is used to create the PDF for the project.*

*The os library is used to create the file.*

*The sys library is used to create the system for the project.*

## Chapter 13: Data Analysis Project

stackoverflowdevelopersurvey

May 21, 2025

```
[1]: #import libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt

[2]: #read the data
data = pd.read_csv(r"C:\Users\DELL\Downloads\stack-overflow-developer-survey-2023\survey_results_public.csv")
data.shape

[3]: (89184, 84)

[4]: #read the info
data.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 89184 entries, 0 to 89183
Data columns (total 84 columns):
 #   Column           Non-Null Count  Dtype  
 --- 
 0   ResponseId      89184 non-null   int64  
 1   Q120             89184 non-null   object  
 2   MainBranch       89184 non-null   object  
 3   Age              89184 non-null   object  
 4   Employment       87898 non-null   object  
 5   RemoteWork       73810 non-null   object  
 6   CodingActivities 73764 non-null   object  
 7   EdLevel          87973 non-null   object  
 8   LearnsCode       87663 non-null   object  
 9   LearnsCodeOnline 70084 non-null   object  
 10  LearnsCodeCoursesCert 37076 non-null   object  
 11  YearsCode        87435 non-null   object  
 12  YearsCodePro     66136 non-null   object  
 13  DevType          76872 non-null   object  
 14  OrgSize          65043 non-null   object  
 15  PurchaseInfluence 64964 non-null   object  
 16  TechList         60851 non-null   object
```

1

Image :stackoverflowdevelopersurvey-images-0

17	BuyNewTool	83009	non-null	object
18	Country	87973	non-null	object
19	Currency	65334	non-null	object
20	CompTotal	48225	non-null	float64
21	LanguageHaveWorkedWith	87140	non-null	object
22	LanguageWantToWorkWith	80709	non-null	object
23	DatabaseHaveWorkedWith	73435	non-null	object
24	DatabaseWantToWorkWith	60911	non-null	object
25	PlatformHaveWorkedWith	63628	non-null	object
26	PlatformWantToWorkWith	51308	non-null	object
27	WebframeHaveWorkedWith	66938	non-null	object
28	WebframeWantToWorkWith	56741	non-null	object
29	MiscTechHaveWorkedWith	57019	non-null	object
30	MiscTechWantToWorkWith	46848	non-null	object
31	ToolsTechHaveWorkedWith	77884	non-null	object
32	ToolsTechWantToWorkWith	68315	non-null	object
33	NEWCollabToolsHaveWorkedWith	85864	non-null	object
34	NEWCollabToolsWantToWorkWith	76649	non-null	object
35	OpSysPersonal use	86557	non-null	object
36	OpSysProfessional use	78587	non-null	object
37	OfficeStackAsyncHaveWorkedWith	69090	non-null	object
38	OfficeStackAsyncWantToWorkWith	53743	non-null	object
39	OfficeStackSyncHaveWorkedWith	83439	non-null	object
40	OfficeStackSyncWantToWorkWith	69776	non-null	object
41	AISeachHaveWorkedWith	56328	non-null	object
42	AISeachWantToWorkWith	46150	non-null	object
43	AIDevHaveWorkedWith	25904	non-null	object
44	AIDevWantToWorkWith	19587	non-null	object
45	NEWSOSites	87973	non-null	object
46	SOVisitFreq	87140	non-null	object
47	SOAccount	87852	non-null	object
48	SOPartFreq	66061	non-null	object
49	SOComm	87692	non-null	object
50	SOAI	47858	non-null	object
51	AISelect	87973	non-null	object
52	AISent	61501	non-null	object
53	AIAcc	38594	non-null	object
54	AIRes	61396	non-null	object
55	AIToolInterested in Using	32783	non-null	object
56	AIToolCurrently Using	36137	non-null	object
57	AIToolNot interested in Using	21069	non-null	object
58	AINextVery different	12661	non-null	object
59	AINextNeither different nor similar	6599	non-null	object
60	AINextSomewhat similar	6238	non-null	object
61	AINextVery similar	2621	non-null	object
62	AINextSomewhat different	23303	non-null	object
63	TBranch	65768	non-null	object
64	ICorPM	43668	non-null	object

2

*Image :stackoverflowdevelopersurvey-images-1*

89178	Bachelor's degree (B.A., B.S., B.Eng., etc.)
89179	Associate degree (A.A., A.S., etc.)
89180	Bachelor's degree (B.A., B.S., B.Eng., etc.)
89181	Something else
89182	Secondary school (e.g. American high school, G...
89183	Bachelor's degree (B.A., B.S., B.Eng., etc.)
LearnCode \	
89164	Online Courses or Certification;Other online r...
89165	Online Courses or Certification;Other online r...
89166	Books / Physical media;Hackathons (virtual or ...
89167	Online Courses or Certification;Other online r...
89168	Other online resources (e.g., videos, blogs, f...
89169	Other online resources (e.g., videos, blogs, f...
89170	Colleague;Hackathons (virtual or in-person);On...
89171	Other online resources (e.g., videos, blogs, f...
89172	Books / Physical media;School (i.e., Universit...
89173	Other online resources (e.g., videos, blogs, f...
89174	School (i.e., University, College, etc)
89175	Hackathons (virtual or in-person);Online Cours...
89176	On the job training;Other online resources (e...
89177	Books / Physical media;Other online resources -
89178	Online Courses or Certification;On the job tra...
89179	Online Courses or Certification;Other online r...
89180	Colleague;Online Courses or Certification;Othe...
89181	Books / Physical media;Hackathons (virtual or ...
89182	Online Courses or Certification;Other online r...
89183	Colleague;Online Courses or Certification;Othe...
LearnCodeOnline \	
89164	Formal documentation provided by the owner of -
89165	Formal documentation provided by the owner of -
89166	Formal documentation provided by the owner of -
89167	Formal documentation provided by the owner of -
89168	Formal documentation provided by the owner of -
89169	Formal documentation provided by the owner of -
89170	Formal documentation provided by the owner of -
89171	Formal documentation provided by the owner of -
89172	NaN
89173	Formal documentation provided by the owner of -
89174	NaN
89175	Formal documentation provided by the owner of -
89176	How-to videos;Video-based Online Courses;Writt...
89177	Blogs with tips and tricks;How-to videos;Writt...
89178	Formal documentation provided by the owner of -
89179	Formal documentation provided by the owner of -
89180	Formal documentation provided by the owner of -

11

*Image :stackoverflowdevelopersurvey-images-10*

```

Bash/Shell (all
shells);Dart;HTML/CSS;Java;JavaScript;Kotlin;Objective-C;Python;SQL;TypeScript
1
Ada;Assembly;Bash/Shell (all shells);C;C++;Clojure;Cobol;Dart;Elixir;Erlang;F
#;Fortran;Go;Groovy;Haskell;HTML/CSS;Java;JavaScript;Julia;Kotlin;Lisp;Lua;Nim;O
bjective-C;OCaml;Perl;PHP;PowerShell;Prolog;Python;R;Raku;Ruby;Rust;Scala;SQL;Sw
ift;TypeScript;Visual Basic (.Net);Zig      1
Prolog;Python
1
JavaScript;TypeScript
1
Go;SQL
1
HTML/CSS;Java;JavaScript;Python;SQL;TypeScript
1
Bash/Shell (all
shells);Go;HTML/CSS;JavaScript;PHP;Python;Ruby;Solidity;SQL;TypeScript
1
C#;Go;Java;JavaScript;TypeScript
1
Flow;HTML/CSS;JavaScript;Kotlin;Objective-C;Swift
1
Bash/Shell (all shells);Java;JavaScript;Kotlin;Python;SQL;TypeScript
1
HTML/CSS;Java;JavaScript
1
C;OCaml
1
HTML/CSS;JavaScript;TypeScript
1
Name: count, dtype: int64

```

[ 1]: data

```

[ 1]:      ResponseId      Q120          MainBranch
0           1  I agree  None of these
1           2  I agree  I am a developer by profession
2           3  I agree  I am a developer by profession
3           4  I agree  I am a developer by profession
4           5  I agree  I am a developer by profession
      -  -  -
89179  89180  I agree  I am a developer by profession
89180  89181  I agree  I am a developer by profession
89181  89182  I agree  I code primarily as a hobby
89182  89183  I agree  I am a developer by profession
89183  89184  I agree  I am a developer by profession

```

101

*Image :stackoverflowdevelopersurvey-images-100*

```

          Age          Employment \
0      18-24 years old      NaN
1      25-34 years old  Employed, full-time
2      45-54 years old  Employed, full-time
3      25-34 years old  Employed, full-time
4      25-34 years old Employed, full-time;Independent contractor, fr...
-          -
89179  25-34 years old Employed, full-time;Independent contractor, fr...
89180  18-24 years old  Student, full-time;Employed, part-time
89181  Prefer not to say  I prefer not to say
89182  Under 18 years old Employed, part-time;Student, part-time
89183  35-44 years old  Employed, full-time

          RemoteWork \
0                  NaN
1                  Remote
2  Hybrid (some remote, some in-person)
3  Hybrid (some remote, some in-person)
4                  Remote
-          -
89179  Hybrid (some remote, some in-person)
89180  Hybrid (some remote, some in-person)
89181      NaN
89182  Hybrid (some remote, some in-person)
89183  Hybrid (some remote, some in-person)

          CodingActivities \
0                  NaN
1 Hobby;Contribute to open-source projects;Books...
2 Hobby;Professional development or self-paced l...
3                  Hobby
4 Hobby;Contribute to open-source projects;Profes...
-          -
89179 Hobby;Bootstrapping a business;Freelance/contr...
89180  School or academic work
89181      NaN
89182  Hobby;School or academic work
89183 Hobby;Professional development or self-paced l...

          EdLevel \
0                  NaN
1 Bachelor's degree (B.A., B.S., B.Eng., etc.)
2 Bachelor's degree (B.A., B.S., B.Eng., etc.)
3 Bachelor's degree (B.A., B.S., B.Eng., etc.)
4 Bachelor's degree (B.A., B.S., B.Eng., etc.)
-          -
89179  Associate degree (A.A., A.S., etc.)

```

```

89180 Bachelor's degree (B.A., B.S., B.Eng., etc.)          \
89181 Something else
89182 Secondary school (e.g. American high school, G_
89183 Bachelor's degree (B.A., B.S., B.Eng., etc.)          \
                                         LearnCode \
0                                         NaN
1 Books / Physical media;Colleague;Friend or fam_
2 Books / Physical media;Colleague;On the job tr_
3 Colleague;Friend or family member;Other online_
4 Books / Physical media;Online Courses or Certi_
-
89179 Online Courses or Certification;Other online r_
89180 Colleague;Online Courses or Certification;Othe_
89181 Books / Physical media;Hackathons (virtual or -
89182 Online Courses or Certification;Other online r_
89183 Colleague;Online Courses or Certification;Othe_
                                         LearnCodeOnline \
0                                         NaN
1 Formal documentation provided by the owner of -
2 Formal documentation provided by the owner of -
3 Formal documentation provided by the owner of -
4 Formal documentation provided by the owner of -
-
89179 Formal documentation provided by the owner of -
89180 Formal documentation provided by the owner of -
89181                                         NaN
89182 Formal documentation provided by the owner of -
89183 Formal documentation provided by the owner of -
                                         LearnCodeCoursesCert YearsCode YearsCodePro \
0                                         NaN      NaN      NaN
1                                         Other      18       9
2                                         NaN      27      23
3                                         NaN      12       7
4 Other;Codecademy;edX      6       4
-
89179                                         Udemy      20       5
89180                                         NaN      5      NaN
89181 Codecademy;Coursera      10      NaN
89182                                         Udemy      3      NaN
89183 Codecademy;Pluralsight;Coursera      17      12
                                         DevType          OrgSize \
0                                         NaN      NaN
1 Senior Executive (C-Suite, VP, etc.)      2 to 9 employees

```

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*Image :stackoverflowdevelopersurvey-images-102*

```

2             Developer, back-end 5,000 to 9,999 employees
3             Developer, front-end    100 to 499 employees
4             Developer, full-stack    20 to 99 employees
-
89179             Developer, front-end    100 to 499 employees
89180             Developer, back-end    NaN
89181             NaN                NaN
89182             System administrator    NaN
89183             Developer, full-stack    100 to 499 employees

        PurchaseInfluence      TechList \
0             NaN                NaN
1             I have a great deal of influence Investigate
2             I have some influence  Given a list
3             I have some influence Investigate
4             I have some influence Investigate
-
89179             I have some influence Investigate
89180             NaN                Investigate
89181             NaN                NaN
89182             NaN                Investigate
89183             I have some influence    NaN

        BuyNewTool \
0             NaN
1             Start a free trial;Ask developers I know/work -
2             Start a free trial;Ask developers I know/work -
3             Start a free trial;Ask developers I know/work -
4             Start a free trial;Ask developers I know/work -
-
89179             NaN
89180             Start a free trial;Ask developers I know/work -
89181             NaN
89182             Ask developers I know/work with;Visit developer
89183             Start a free trial;Ask developers I know/work -

        Country          Currency      CompTotal \
0             NaN                NaN                NaN
1             United States of America  USD\United States dollar 2.850000e+05
2             United States of America  USD\United States dollar 2.500000e+05
3             United States of America  USD\United States dollar 1.560000e+05
4             Philippines          PHP\Philippine peso 1.320000e+06
-
89179             Brazil          BRL\Brazilian real 2.000000e+05
89180             Romania         NaN                NaN
89181             Israel          NaN                NaN
89182             Switzerland       NaN                NaN

```

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*Image :stackoverflowdevelopersurvey-images-103*

```

89183 Iran, Islamic Republic of... IRR\万里an rial 3.300000e+09
          LanguageHaveWorkedWith \
0                      NaN
1          HTML/CSS;JavaScript;Python
2          Bash/Shell (all shells);Go
3          Bash/Shell (all shells);HTML/CSS;JavaScript;PH...
4          HTML/CSS;JavaScript;TypeScript
-
89179          HTML/CSS;Java;JavaScript;SQL;TypeScript
89180          Dart;Java;Python;SQL
89181 Assembly;Bash/Shell (all shells);C;C#;Python;R...
89182 Bash/Shell (all shells);C#;HTML/CSS;Java;JavaS...
89183          C#;Go;JavaScript;SQL;TypeScript

          LanguageWantToWorkWith \
0                      NaN
1          Bash/Shell (all shells);C#;Dart;Elixir;GDScript...
2          Haskell;OCaml;Rust
3          Bash/Shell (all shells);HTML/CSS;JavaScript;Ru...
4          HTML/CSS;JavaScript;Python;Rust;TypeScript
-
89179 Bash/Shell (all shells);C;Go;HTML/CSS;JavaScri...
89180          Java;JavaScript;Python;SQL;TypeScript
89181          Python;Rust
89182 Bash/Shell (all shells);HTML/CSS;JavaScript;Po...
89183          C#;Go;JavaScript;SQL;TypeScript

          DatabaseHaveWorkedWith \
0                      NaN
1          Supabase
2                      NaN
3          PostgreSQL;Redis
4          BigQuery;Elasticsearch;MongoDB;PostgreSQL
-
89179          MongoDB;MySQL;PostgreSQL;SQLite
89180          PostgreSQL
89181          SQLite
89182 MariaDB;Microsoft SQL Server;MongoDB;MySQL;Red...
89183          Microsoft SQL Server;Redis;SQLite

          DatabaseWantToWorkWith \
0                      NaN
1          Firebase Realtime Database;Supabase
2                      NaN
3          PostgreSQL;Redis
4          Elasticsearch;MongoDB;PostgreSQL;Redis;Supabase

```

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*Image :stackoverflowdevelopersurvey-images-104*

```

-
89179          PostgreSQL;SQLite
89180          PostgreSQL
89181          NaN
89182 Cassandra;Cosmos DB;Dynamodb;MariaDB;Microsoft...
89183          Microsoft SQL Server;Redis;SQLite

          PlatformHaveWorkedWith \
0          NaN
1          Amazon Web Services (AWS);Netlify;Vercel
2          Amazon Web Services (AWS);Google Cloud;OpenSta...
3          Cloudflare;Heroku
4          Amazon Web Services (AWS);Firebase;Heroku;Netl...

-
89179 Digital Ocean;Firebase;Google Cloud;Heroku;Vercel
89180          NaN
89181          Amazon Web Services (AWS)
89182 Amazon Web Services (AWS);Cloudflare;Google Cl...
89183          Hetzner

          PlatformWantToWorkWith \
0          NaN
1          Fly.io;Netlify;Render
2          NaN
3          Cloudflare;Heroku
4          Amazon Web Services (AWS);Cloudflare;Digital O...

-
89179 Amazon Web Services (AWS);Heroku;Netlify;Vercel
89180          NaN
89181          Amazon Web Services (AWS);Microsoft Azure
89182 Amazon Web Services (AWS);Cloudflare;Digital O...
89183          Hetzner;Microsoft Azure

          WebframeHaveWorkedWith \
0          NaN
1          Next.js;React;Remix;Vue.js
2          NaN
3          Node.js;React;Ruby on Rails;Vue.js;WordPress
4          Express;Gatsby;NextJS;Next.js;Node.js;React

-
89179 Angular;AngularJS;Express;jQuery;Node.js;Nuxt...
89180          Spring Boot
89181          NaN
89182          Express;Next.js;Node.js;React;WordPress
89183          Angular;ASP.NET;ASP.NET CORE;Blazor;Node.js

          WebframeWantToWorkWith \

```

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*Image :stackoverflowdevelopersurvey-images-105*

```

0                               NaN
1           Deno;Elm;Nuxt.js;React;Svelte;Vue.js
2                               NaN
3           Node.js;Ruby on Rails;Vue.js
4           Express;NextJS;Next.js;Node.js;React;Remix;Vue.js
-
89179           Express;Node.js;Nuxt.js;Svelte;Vue.js
89180                               Spring Boot
89181                               NaN
89182   Angular;AngularJS;Express;Next.js;Node.js;React...
89183   Angular;ASP.NET;ASP.NET CORE;Blazor;Demo;Node...

          MiscTechHaveWorkedWith \
0                               NaN
1           Electron;React Native;Tauri
2                               NaN
3                               NaN
4                               NaN
-
89179           Flutter
89180   Flutter;OpenCV;RabbitMQ;Spring Framework;Torch...
89181           NumPy;Pandas;TensorFlow
89182           CUDA;NumPy;Torch;PyTorch
89183   .NET (5+) ;.NET Framework (1.0 - 4.8)

          MiscTechWantToWorkWith \
0                               NaN
1   Capacitor;Electron;Tauri;Uno Platform;Xamarini
2                               NaN
3                               NaN
4                               NaN
-
89179           NaN
89180   RabbitMQ;Spring Framework;Torch/PyTorch
89181           NumPy;Pandas;Torch/PyTorch
89182   CUDA;Flutter;NumPy;TensorFlow;Torch/PyTorch
89183   .NET (5+) ;Apache Kafka;RabbitMQ;Tauri

          ToolsTechHaveWorkedWith \
0                               NaN
1   Docker;Kubernetes;npm;Pip;Vite;Webpack;Yarn
2   Cargo;Docker;Kubernetes;Make;Nix
3   Homebrew;npm;Vite;Webpack;Yarn
4   Docker;npm;Webpack;Yarn
-
89179   Chocolatey;CMake;Docker;Maven (build tool);npm...
89180   Maven (build tool);Pip

```

```

89181                               Cargo
89182             Docker;Kubernetes;npm;Podman;Vite
89183             Docker;npm;NuGet;pnpm;Vite;Webpack;Yarn

                           ToolsTechWantToWorkWith \
0                               NaN
1             Godot;npm;pnpm;Unity 3D;Unreal Engine;Vite;Web_
2                               Cargo;Kubernetes;Nix
3                               Homebrew;npm;Vite
4                               Docker;npm;Yarn
-
89179                               Docker;npm;Pip;Vite;Yarn
89180                               Maven (Build tool);Pip
89181             Cargo;Docker;Kubernetes;Terraform
89182   Ansible;APT;Docker;Kubernetes;npm;Pip;Podman;T-
89183             Bun;Docker;npm;NuGet;pnpm;Vite;Yarn

                           NEDCollabToolsHaveWorkedWith \
0                               NaN
1                               Vim;Visual Studio Code
2                               Emacs;Helix
3             IntelliJ IDEA;Vim;Visual Studio Code;WebStorm
4                               Vim;Visual Studio Code
-
89179   Android Studio;Atom;Eclipse;IntelliJ IDEA;Netb-
89180             Android Studio;IntelliJ IDEA;PyCharm
89181   Jupyter Notebook/JupyterLab;Neovim;Visual Stud-
89182   Eclipse;IntelliJ IDEA;Nano;Notepad++;PyCharm;V-
89183             Visual Studio;Visual Studio Code

                           NEDCollabToolsWantToWorkWith \
0                               NaN
1                               Vim;Visual Studio Code
2                               Emacs;Helix
3             IntelliJ IDEA;Vim;WebStorm
4                               Vim;Visual Studio Code
-
89179                               Visual Studio Code
89180             IntelliJ IDEA;PyCharm
89181   Jupyter Notebook/JupyterLab;Neovim;Visual Stud-
89182   Jupyter Notebook/JupyterLab;Notepad++;Visual S-
89183             Visual Studio;Visual Studio Code

                           OpSysPersonal use \
0                               NaN
1             iOS;iPadOS;MacOS;Windows;Windows Subsystem for-
2             MacOS;Other Linux-based

```

iOS

*Image :stackoverflowdevelopersurvey-images-107*

```

3           iOS;iPadOS;MacOS
4           Other (Please Specify):
5           =
89179           =
89180           Windows
89181           Windows
89182 Arch;Debian;iOS;iPadOS;MacOS;Ubuntu;Windows;Wi_
89183           Windows

           OpSysProfessional use \
0           NaN
1           MacOS;Windows;Windows Subsystem for Linux (WSL)
2           MacOS;Other Linux-based
3           iOS;iPadOS;MacOS
4           Other (Please Specify):
5           =
89179           =
89180           Windows
89181           NaN
89182           BSD;Red Hat;Solaris;Ubuntu;Windows
89183           Windows

           OfficeStackAsyncHaveWorkedWith \
0           NaN
1           Asana;Basecamp;GitHub Discussions;Jira;Linear;_
2           Markdown File;Stack Overflow for Teams
3           Jira
4           Confluence;Jira;Notion
5           =
89179 Asana;Confluence;Jira;Markdown File;Miro;Notio_
89180           Jira
89181           NaN
89182           Confluence;Jira;Trello
89183           NaN

           OfficeStackAsyncWantToWorkWith \
0           NaN
1           GitHub Discussions;Linear;Notion;Trello
2           Markdown File
3           Jira
4           Confluence;Jira;Notion
5           =
89179           Markdown File;Miro;Wikis
89180           Jira
89181           NaN
89182 Azure Devops;Confluence;Jira
89183           NaN

```

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*Image :stackoverflowdevelopersurvey-images-108*

```

          OfficeStackSyncHaveWorkedWith \
0                               NaN
1 Cisco Webex Teams;Discord;Google Chat;Google M...
2                               Microsoft Teams;Slack;Zoom
3 Discord;Google Meet;Microsoft Teams;Slack;Zoom
4                               Discord;Google Meet;Slack;Zoom
-
89179 Discord;Google Meet;Jitsi;Microsoft Teams;Slac...
89180                               Microsoft Teams
89181                               NaN
89182 Cisco Webex Teams;Discord;Microsoft Teams;Sign...
89183 Google Meet;Skype;Telegram;Whatsapp

          OfficeStackSyncWantToWorkWith \
0                               NaN
1 Discord;Signal;Slack;Zoom
2                               Slack;Zoom
3 Discord;Google Meet;Slack;Zoom
4 Discord;Google Meet;Slack;Zoom
-
89179 Discord;Google Meet;Jitsi;Microsoft Teams;Tele...
89180                               Microsoft Teams
89181                               NaN
89182 Discord;Microsoft Teams;Skype
89183 Google Meet;Skype;Telegram;Whatsapp

          AIStackHaveWorkedWith          AIStackWantToWorkWith \
0                               NaN          NaN
1 ChatGPT          ChatGPT;Neeva AI
2                               NaN          NaN
3                               NaN          NaN
4 ChatGPT          ChatGPT
-
89179 ChatGPT          ChatGPT
89180 ChatGPT          ChatGPT
89181 ChatGPT;Quora Poe          ChatGPT;Quora Poe
89182 Bing AI;ChatGPT;WolframAlpha  Bing AI;ChatGPT;Google Bard AI
89183 ChatGPT          ChatGPT

          AIDevHaveWorkedWith AIDevWantToWorkWith \
0                               NaN          NaN
1 GitHub Copilot GitHub Copilot
2                               NaN          NaN
3                               NaN          NaN
4                               NaN          NaN
-

```

110

*Image :stackoverflowdevelopersurvey-images-109*

89181						NaN
89182	Formal documentation provided by the owner of -					
89183	Formal documentation provided by the owner of -					
89164	LearnCode	Courses	Cert	YearsCode	YearsCodePro	\
89165	Other;Udemy			6	2	
89166	Udemy			6	3	
89167	Codecademy;Udemy			7	2	
89168	edX;Udemy;Coursera			6	2	
89169				NaN	10	NaN
89170				NaN	15	15
89171	Other			18	9	
89172				NaN	20	9
89173				NaN	38	22
89174				NaN	20	NaN
89175	Codecademy;Udemy;Pluralsight;Udacity			10	8	
89176				NaN	2	NaN
89177				NaN	17	11
89178	edX;Udemy;Pluralsight;Udacity			25	22	
89179				Udemy	20	5
89180					5	NaN
89181	Codecademy;Coursera			10	NaN	
89182				Udemy	3	NaN
89183	Codecademy;Pluralsight;Coursera			17	12	
89164	DevType			OrgSize		\
89165	Developer, back-end			20 to 99 employees		
89166	Developer, back-end			1,000 to 4,999 employees		
89167	Developer, full-stack			20 to 99 employees		
89168	Developer, mobile			20 to 99 employees		
89169				NaN		
89170	Engineer, data			2 to 9 employees		
89171	Other (please specify):			500 to 999 employees		
89172	Developer, full-stack			10 to 19 employees		
89173	Developer, full-stack			20 to 99 employees		
89174				NaN		
89175	Developer, mobile			10 to 19 employees		
89176				NaN		
89177	Developer, full-stack			100 to 499 employees		
89178	Developer, full-stack			10,000 or more employees		
89179	Developer, front-end			100 to 499 employees		
89180	Developer, back-end			NaN		
89181				NaN		
89182	System administrator			NaN		
89183	Developer, full-stack			100 to 499 employees		

```

89179      Whispr AI      Whispr AI
89180      NaN          NaN
89181      NaN          NaN
89182      NaN          NaN
89183      GitHub Copilot GitHub Copilot

                           NEWSOSites \
0                           NaN
1                           Stack Overflow;Stack Exchange
2   Stack Overflow;Stack Exchange;Stack Overflow f...
3                           Stack Overflow;Stack Exchange
4                           Stack Overflow;Stack Exchange
-
89179      Stack Overflow;Stack Exchange
89180      Stack Overflow;Stack Exchange
89181      Stack Overflow;Stack Exchange
89182   Stack Overflow;Stack Exchange;Stack Overflow f...
89183      Stack Overflow

                           SOVisitFreq SOAccount \
0                           NaN          NaN
1   Daily or almost daily      Yes
2   A few times per month or weekly  Yes
3   A few times per week      Yes
4   A few times per week      No
-
89179      Multiple times per day      Yes
89180      Multiple times per day      Yes
89181      NaN          NaN
89182   A few times per month or weekly  No
89183      A few times per week      Yes

                           SOPartFreq      SOComm \
0                           NaN          NaN
1   A few times per month or weekly  Yes, definitely
2   Less than once per month or monthly  Neutral
3   Less than once per month or monthly  No, not really
4                           NaN          Neutral
-
89179   I have never participated in Q&A on Stack Over...  Neutral
89180   I have never participated in Q&A on Stack Over...  No, not really
89181      NaN          NaN
89182      NaN          Yes, somewhat
89183   Less than once per month or monthly  Yes, somewhat

                           SOAI \
0                           NaN

```

111

*Image :stackoverflowdevelopersurvey-images-110*

```

1 I don't think it's super necessary, but I thin...      NaN
2 I'm wearing of Stack Overflow using AI.           NaN
3 Using AI to suggest better answer to my questi...      -
4
89179
89180
89181
89182 Define Parameters more detailed. I believe in -      NaN
89183

          AISelect      AISent \
0           NaN      NaN
1           Yes  Indifferent
2  No, and I don't plan to      NaN
3  No, and I don't plan to      NaN
4           Yes  Very favorable
-
89179           Yes  Very favorable
89180           Yes  Very favorable
89181  No, but I plan to soon  Very favorable
89182           Yes  Favorable
89183           Yes  Favorable

          AIAcc \
0           NaN
1           Other (please explain)
2           NaN
3           NaN
4 Increase productivity;Greater efficiency;Speed...
-
89179 Increase productivity;Greater efficiency;Speed...
89180
89181           Speed up learning      NaN
89182 Increase productivity;Greater efficiency;Speed...
89183 Increase productivity;Greater efficiency;Speed...

          AIBen \
0           NaN
1  Somewhat distrust
2           NaN
3           NaN
4  Somewhat trust
-
89179  Somewhat trust
89180  Somewhat trust
89181      Highly trust

```

112

*Image :stackoverflowdevelopersurvey-images-111*

```

89182      Somewhat distrust
89183 Neither trust nor distrust

          AIToolInterested in Using \
0                               NaN
1           Learning about a codebase;Writing code;Debuggi...
2                               NaN
3                               NaN
4           Project planning;Testing code;Committing and r...
-
89179  Learning about a codebase;Project planning;Wri...
89180      Writing code;Documenting code;Testing code
89181                               NaN
89182  Learning about a codebase;Project planning;Wri...
89183      Learning about a codebase;Writing code

          AIToolCurrently Using \
0                               NaN
1           Writing code;Committing and reviewing code
2                               NaN
3                               NaN
4           Learning about a codebase;Writing code;Documen...
-
89179  Writing code;Documenting code;Debugging and ge...
89180  Learning about a codebase;Debugging and gettin...
89181                               NaN
89182  Learning about a codebase;Writing code;Debuggi...
89183      Learning about a codebase;Writing code

          AIToolNot interested in Using \
0                               NaN
1                               NaN
2                               NaN
3                               NaN
4                               NaN
-
89179      Deployment and monitoring
89180  Project planning;Committing and reviewing code...
89181                               NaN
89182      Committing and reviewing code
89183                               NaN

          AINextVery different \
0                               NaN
1                               NaN
2                               NaN
3                               NaN

```

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*Image :stackoverflowdevelopersurvey-images-112*

```

4           NaN
-
89179      NaN
89180      NaN
89181      NaN
89182      NaN
89183 Learning about a codebase

    AINextNeither different nor similar \
0           NaN
1           NaN
2           NaN
3           NaN
4           NaN
-
89179      NaN
89180      NaN
89181      NaN
89182 Debugging and getting help;Deployment and moni...
89183      NaN

    AINextSomewhat similar AINextVery similar \
0           NaN           NaN
1           NaN           NaN
2           NaN           NaN
3           NaN           NaN
4           NaN           NaN
-
89179      NaN           NaN
89180      NaN           NaN
89181      NaN           NaN
89182      NaN           NaN
89183      NaN           NaN

    AINextSomewhat different TBranch \
0           NaN           NaN
1           NaN           Yes
2           NaN           Yes
3           NaN           Yes
4           NaN           Yes
-
89179 Writing code;Documenting code;Debugging and ge...
89180 Learning about a codebase;Debugging and gettin...
89181           NaN           NaN
89182 Learning about a codebase;Writing code           NaN
89183           NaN           Yes

```

```

          ICorPM  WorkExp      Knowledge_1  \
0           NaN      NaN        NaN
1      People manager    10.0  Strongly agree
2  Individual contributor   23.0  Strongly agree
3  Individual contributor    7.0  Strongly agree
4  Individual contributor    6.0       Agree
-          -      -        -
89179      NaN      NaN        NaN
89180      NaN      NaN        NaN
89181      NaN      NaN        NaN
89182      NaN      NaN        NaN
89183      People manager    14.0       Agree

          Knowledge_2      Knowledge_3      Knowledge_4  \
0           NaN        NaN        NaN
1           Agree  Strongly agree       Agree
2  Neither agree nor disagree  Agree  Agree
3  Strongly disagree  Strongly agree  Strongly agree
4  Strongly agree       Agree       Agree
-          -      -        -
89179      NaN        NaN        NaN
89180      NaN        NaN        NaN
89181      NaN        NaN        NaN
89182      NaN        NaN        NaN
89183  Neither agree nor disagree  Neither agree nor disagree  Strongly agree

          Knowledge_5      Knowledge_6  \
0           NaN        NaN
1           Agree       Agree
2           Agree       Agree
3           Agree  Neither agree nor disagree
4  Neither agree nor disagree       Agree
-          -      -        -
89179      NaN        NaN
89180      NaN        NaN
89181      NaN        NaN
89182      NaN        NaN
89183  Strongly agree       Agree

          Knowledge_7      Knowledge_8  \
0           NaN        NaN
1           Agree  Strongly agree
2           Agree       Agree
3           Agree       Agree
4  Strongly agree       Agree
-          -      -        -
89179      NaN        NaN

```

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*Image :stackoverflowdevelopersurvey-images-114*

```

89180           NaN           NaN
89181           NaN           NaN
89182           NaN           NaN
89183 Neither agree nor disagree Neither agree nor disagree

      Frequency_1      Frequency_2      Frequency_3 \
0           NaN           NaN           NaN
1  1-2 times a week  10+ times a week      Never
2  6-10 times a week  6-10 times a week  3-5 times a week
3  1-2 times a week  10+ times a week  1-2 times a week
4  1-2 times a week  1-2 times a week  3-5 times a week
-           -           -           -
89179           NaN           NaN           NaN
89180           NaN           NaN           NaN
89181           NaN           NaN           NaN
89182           NaN           NaN           NaN
89183      Never  1-2 times a week  1-2 times a week

      TimeSearching      TimeAnswering \
0           NaN           NaN
1  15-30 minutes a day  15-30 minutes a day
2  30-60 minutes a day  30-60 minutes a day
3  15-30 minutes a day  30-60 minutes a day
4  60-120 minutes a day  30-60 minutes a day
-           -           -
89179           NaN           NaN
89180           NaN           NaN
89181           NaN           NaN
89182           NaN           NaN
89183  60-120 minutes a day  30-60 minutes a day

      ProfessionalTech \
0           NaN
1  DevOps function;Microservices;Automated testing
2  DevOps function;Microservices;Automated testing
3  Automated testing;Continuous integration (CI) -
4  Microservices;Automated testing;Observability -
-           -
89179           NaN
89180           NaN
89181           NaN
89182           NaN
89183  DevOps function;Developer portal or other cent...

      Industry \
0           NaN
1  Information Services, IT, Software Development...

```

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*Image :stackoverflowdevelopersurvey-images-115*

```

2      Information Services, IT, Software Development...
3                      NaN
4                      Other
-
89179                      -
89180                      NaN
89181                      NaN
89182                      NaN
89183      Information Services, IT, Software Development...
             SurveyLength      SurveyEase  ConvertedCompYearly
0            NaN            NaN            NaN
1  Appropriate in length      Easy        285000.0
2  Appropriate in length      Easy        250000.0
3  Appropriate in length      Easy        156000.0
4  Appropriate in length  Neither easy nor difficult  23456.0
-
89179          Too long  Neither easy nor difficult      -
89180          Too long            Easy            NaN
89181          Too long  Neither easy nor difficult            NaN
89182  Appropriate in length  Neither easy nor difficult            NaN
89183  Appropriate in length            Easy            NaN
[89184 rows x 84 columns]

```

```

[1]: #set index to the ResponseId column
data = pd.read_csv(r"C:
..\Users\DELL\Downloads\stack-overflow-developer-survey-2023\survey_results_public.
.csv",index_col='ResponseId')

```

```
[1]: data
```

```

[1]:      Q120      MainBranch      Age  \
ResponseId
1      I agree      None of these  18-24 years old
2      I agree  I am a developer by profession  25-34 years old
3      I agree  I am a developer by profession  45-54 years old
4      I agree  I am a developer by profession  25-34 years old
5      I agree  I am a developer by profession  25-34 years old
-
89180      I agree  I am a developer by profession  25-34 years old
89181      I agree  I am a developer by profession  18-24 years old
89182      I agree  I code primarily as a hobby  Prefer not to say
89183      I agree  I am a developer by profession  Under 18 years old
89184      I agree  I am a developer by profession  35-44 years old

      Employment \

```

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*Image :stackoverflowdevelopersurvey-images-116*

```

    ResponsId
1                               NaN
2                               Employed, full-time
3                               Employed, full-time
4                               Employed, full-time
5                               Employed, full-time;Independent contractor, fr...
-                               -
89180                           Employed, full-time;Independent contractor, fr...
89181                           Student, full-time;Employed, part-time
89182                           I prefer not to say
89183                           Employed, part-time;Student, part-time
89184                           Employed, full-time

    RemoteWork \
ResponsId
1                               NaN
2                               Remote
3                               Hybrid (some remote, some in-person)
4                               Hybrid (some remote, some in-person)
5                               Remote
-                               -
89180                           Remote
89181                           Hybrid (some remote, some in-person)
89182                           NaN
89183                           Hybrid (some remote, some in-person)
89184                           Hybrid (some remote, some in-person)

    CodingActivities \
ResponsId
1                               NaN
2                               Hobby;Contribute to open-source projects;Boots...
3                               Hobby;Professional development or self-paced l...
4                               Hobby
5                               Hobby;Contribute to open-source projects;Profe...
-                               -
89180                           Hobby;Bootstrapping a business;Freelance/contr...
89181                           School or academic work
89182                           NaN
89183                           Hobby;School or academic work
89184                           Hobby;Professional development or self-paced l...

    EdLevel \
ResponsId
1                               NaN
2                               Bachelor's degree (B.A., B.S., B.Eng., etc.)
3                               Bachelor's degree (B.A., B.S., B.Eng., etc.)
4                               Bachelor's degree (B.A., B.S., B.Eng., etc.)

```

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*Image :stackoverflowdevelopersurvey-images-117*

RespondId	LearnCode
5	Bachelor's degree (B.A., B.S., B.Eng., etc.)
-	-
89180	Associate degree (A.A., A.S., etc.)
89181	Bachelor's degree (B.A., B.S., B.Eng., etc.)
89182	Something else
89183	Secondary school (e.g. American high school, G...
89184	Bachelor's degree (B.A., B.S., B.Eng., etc.)
	LearnCodeOnline
1	NaN
2	Books / Physical media;Colleague;Friend or fam...
3	Books / Physical media;Colleague;On the job tr...
4	Colleague;Friend or family member;Other online...
5	Books / Physical media;Online Courses or Certi...
-	-
89180	Online Courses or Certification;Other online r...
89181	Colleague;Online Courses or Certification;Other...
89182	Books / Physical media;Hackathons (virtual or ...
89183	Online Courses or Certification;Other online r...
89184	Colleague;Online Courses or Certification;Other...
	LearnCodeCoursesCert
1	NaN
2	Formal documentation provided by the owner of -
3	Formal documentation provided by the owner of -
4	Formal documentation provided by the owner of -
5	Formal documentation provided by the owner of -
-	-
89180	Formal documentation provided by the owner of -
89181	Formal documentation provided by the owner of -
89182	NaN
89183	Formal documentation provided by the owner of -
89184	Formal documentation provided by the owner of -
	YearsCode
1	NaN
2	Other 18 9
3	NaN 27 23
4	NaN 12 7
5	Other;Codecademy;edX 6 4
-	- - -
89180	Udemy 20 5
89181	NaN 5 NaN
89182	Codecademy;Coursera 10 NaN

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*Image :stackoverflowdevelopersurvey-images-118*

RespondentId	DevType	OrgSize
1	NaN	NaN
2	Senior Executive (C-Suite, VP, etc.)	2 to 9 employees
3	Developer, back-end	5,000 to 9,999 employees
4	Developer, front-end	100 to 499 employees
5	Developer, full-stack	20 to 99 employees
-	-	-
89180	Developer, front-end	100 to 499 employees
89181	Developer, back-end	NaN
89182	NaN	NaN
89183	System administrator	NaN
89184	Developer, full-stack	100 to 499 employees
RespondentId	PurchaseInfluence	TechList
1	NaN	NaN
2	I have a great deal of influence	Investigate
3	I have some influence	Given a list
4	I have some influence	Investigate
5	I have some influence	Investigate
-	-	-
89180	I have some influence	Investigate
89181	NaN	Investigate
89182	NaN	NaN
89183	NaN	Investigate
89184	I have some influence	NaN
RespondentId	BuyNewTool	
1	NaN	
2	Start a free trial;Ask developers I know/work	-
3	Start a free trial;Ask developers I know/work	-
4	Start a free trial;Ask developers I know/work	-
5	Start a free trial;Ask developers I know/work	-
-	-	NaN
89180	Start a free trial;Ask developers I know/work	-
89181	Start a free trial;Ask developers I know/work	-
89182	NaN	
89183	Ask developers I know/work with;Visit developer	-
89184	Start a free trial;Ask developers I know/work	-
RespondentId	Country	Currency

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Image :stackoverflowdevelopersurvey-images-119

```

PurchaseInfluence      TechList \
89164  I have little or no influence      NaN
89165  I have little or no influence      NaN
89166      I have some influence  Investigate
89167  I have little or no influence      NaN
89168      NaN  Investigate
89169  I have a great deal of influence  Investigate
89170  I have little or no influence      NaN
89171  I have little or no influence      NaN
89172  I have little or no influence      NaN
89173      NaN  Other
89174  I have little or no influence      NaN
89175      I have some influence  Investigate
89176      NaN  Investigate
89177  I have little or no influence      NaN
89178  I have little or no influence      NaN
89179      I have some influence  Investigate
89180      NaN  Investigate
89181      NaN  NaN
89182      NaN  Investigate
89183      I have some influence      NaN

BuyNewTool \
89164  Start a free trial;Ask developers I know/work -
89165  Start a free trial;Ask developers I know/work -
89166  Start a free trial;Ask developers I know/work -
89167  Start a free trial;Ask developers I know/work -
89168  Ask developers I know/work with;Visit developer communities
89169  Start a free trial;Visit developer communities
89170  Start a free trial;Ask developers I know/work -
89171  Start a free trial;Ask developers I know/work -
89172  Start a free trial;Ask developers I know/work -
89173      Start a free trial;Other (please specify):
89174  Start a free trial;Ask developers I know/work -
89175  Start a free trial;Ask developers I know/work -
89176  Start a free trial;Ask developers I know/work -
89177  Visit developer communities like Stack Overflow
89178  Start a free trial;Ask developers I know/work -
89179      NaN
89180  Start a free trial;Ask developers I know/work -
89181      NaN
89182  Ask developers I know/work with;Visit developer communities
89183  Start a free trial;Ask developers I know/work -

Country          Currency      CompTotal \
89164  India        INR\ntIndian rupee      NaN

```

```

1           NaN           NaN
2           United States of America  USD\tUnited States dollar
3           United States of America  USD\tUnited States dollar
4           United States of America  USD\tUnited States dollar
5           Philippines           PHP\tPhilippine peso
-
89180         Brazil           BRL\tBrazilian real
89181         Romania          NaN
89182         Israel            NaN
89183         Switzerland       NaN
89184         Iran, Islamic Republic of...  IRR\tIranian rial

    CompTotal           LanguageHaveWorkedWith \
RespondId
1           NaN           NaN
2           2.850000e+05  HTML/CSS;JavaScript;Python
3           2.500000e+05  Bash/Shell (all shells);Go
4           1.560000e+05  Bash/Shell (all shells);HTML/CSS;JavaScript;PH...
5           1.320000e+06  HTML/CSS;JavaScript;TypeScript
-
89180         2.000000e+05  HTML/CSS;Java;JavaScript;SQL;TypeScript
89181         NaN           Dart;Java;Python;SQL
89182         NaN           Assembly;Bash/Shell (all shells);C;C++;Python;R...
89183         NaN           Bash/Shell (all shells);C++;HTML/CSS;Java;JavaS...
89184         3.300000e+09  C++;Go;JavaScript;SQL;TypeScript

    LanguageWantToWorkWith \
RespondId
1           NaN
2           Bash/Shell (all shells);C++;Dart;Elixir;GDScript...
3           Haskell;OCaml;Rust
4           Bash/Shell (all shells);HTML/CSS;JavaScript;Ru...
5           HTML/CSS;JavaScript;Python;Rust;TypeScript
-
89180         Bash/Shell (all shells);C;Go;HTML/CSS;JavaScri...
89181         Java;JavaScript;Python;SQL;TypeScript
89182         Python;Rust
89183         Bash/Shell (all shells);HTML/CSS;JavaScript;Po...
89184         C++;Go;JavaScript;SQL;TypeScript

    DatabaseHaveWorkedWith \
RespondId
1           NaN
2           Supabase
3           NaN
4           PostgreSQL;Redis
5           BigQuery;Elasticsearch;MongoDB;PostgreSQL

```

```

-
89180      MongoDB;MySQL;PostgreSQL;SQLite
89181                  PostgreSQL
89182                  SQLite
89183      MariaDB;Microsoft SQL Server;MongoDB;MySQL;Redis
89184      Microsoft SQL Server;Redis;SQLite

                    DatabaseWantToWorkWith \
ResponsId
1                  NaN
2      Firebase Realtime Database;Supabase
3                  NaN
4                  PostgreSQL;Redis
5      Elasticsearch;MongoDB;PostgreSQL;Redis;Supabase
-
89180      PostgreSQL;SQLite
89181      PostgreSQL
89182                  NaN
89183      Cassandra;Cosmos DB;Dynamodb;MariaDB;Microsoft...
89184      Microsoft SQL Server;Redis;SQLite

                    PlatformHaveWorkedWith \
ResponsId
1                  NaN
2      Amazon Web Services (AWS);Netlify;Vercel
3      Amazon Web Services (AWS);Google Cloud;OpenSta...
4                  Cloudflare;Heroku
5      Amazon Web Services (AWS);Firebase;Heroku;Netl...
-
89180      Digital Ocean;Firebase;Google Cloud;Heroku;Vercel
89181                  NaN
89182      Amazon Web Services (AWS)
89183      Amazon Web Services (AWS);Cloudflare;Google Cl...
89184      Netzner

                    PlatformWantToWorkWith \
ResponsId
1                  NaN
2      Fly.io;Netlify;Render
3                  NaN
4      Cloudflare;Heroku
5      Amazon Web Services (AWS);Cloudflare;Digital O...
-
89180      Amazon Web Services (AWS);Heroku;Netlify;Vercel
89181                  NaN
89182      Amazon Web Services (AWS);Microsoft Azure
89183      Amazon Web Services (AWS);Cloudflare;Digital O...

```

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*Image :stackoverflowdevelopersurvey-images-121*

```

89184           Hetzner;Microsoft Azure
                    WebframeHaveWorkedWith \
                    Responselid
1                           NaN
2                   Next.js;React;Remix;Vue.js
3                           NaN
4           Node.js;React;Ruby on Rails;Vue.js;WordPress
5           Express;Gatsby;NextJS;Next.js;Node.js;React
-
89180           Angular;AngularJS;Express;jQuery;Node.js;Nuxt_
                    Spring Boot
89181                           NaN
89182
89183           Express;Next.js;Node.js;React;WordPress
89184           Angular;ASP.NET;ASP.NET CORE;Blazor;Node.js

                    WebframeWantToWorkWith \
                    Responselid
1                           NaN
2           Deno;Elm;Nuxt.js;React;Svelte;Vue.js
3                           NaN
4           Node.js;Ruby on Rails;Vue.js
5           Express;NextJS;Next.js;Node.js;React;Remix;Vue.js
-
89180           Express;Node.js;Nuxt.js;Svelte;Vue.js
89181                           Spring Boot
89182                           NaN
89183           Angular;AngularJS;Express;Next.js;Node.js;React
89184           Angular;ASP.NET;ASP.NET CORE;Blazor;Deno;Node.js

                    MiscTechHaveWorkedWith \
                    Responselid
1                           NaN
2           Electron;React Native;Tauri
3                           NaN
4                           NaN
5                           NaN
-
89180           -
89181           Flutter;OpenCV;RabbitMQ;Spring Framework;Torch_
                    NumPy;Pandas;TensorFlow
89182           CUDA;NumPy;Torch/FaTorch
89183           .NET (5+) ;.NET Framework (1.0 - 4.8)
89184

                    MiscTechWantToWorkWith \
                    Responselid
1                           NaN

```

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*Image :stackoverflowdevelopersurvey-images-122*

```

2      Capacitor;Electron;Tauri;Uno Platform;Xamarini
3
4
5
-
89180
89181      RabbitMQ;Spring Framework;Torch/PyTorch
89182      NumPy;Pandas;Torch/PyTorch
89183      CUDA;Flutter;NumPy;TensorFlow;Torch/PyTorch
89184      .NET (5+);Apache Kafka;RabbitMQ;Tauri

      ToolsTechHaveWorkedWith \
ResponsId
1
2      Docker;Kubernetes;npm;Pip;Vite;Webpack;Yarn
3      Cargo;Docker;Kubernetes;Make;Nix
4      Homebrew;npm;Vite;Webpack;Yarn
5      Docker;npm;Webpack;Yarn
-
89180      Chocolatey;CMake;Docker;Maven (build tool);npm...
89181      Maven (build tool);Pip
89182
89183      Docker;Kubernetes;npm;Podman;Vite
89184      Docker;npm;NuGet;pnpm;Vite;Webpack;Yarn

      ToolsTechWantToWorkWith \
ResponsId
1
2      Godot;npm;pnpm;Unity 3D;Unreal Engine;Vite;Web...
3      Cargo;Kubernetes;Nix
4      Homebrew;npm;Vite
5      Docker;npm;Yarn
-
89180
89181      Docker;npm;Pip;Vite;Yarn
89182      Maven (build tool);Pip
89183      Cargo;Docker;Kubernetes;Terraform
89184      Ansible;APT;Docker;Kubernetes;npm;Pip;Podman;T...
      -
      NEWCollabToolsHaveWorkedWith \
ResponsId
1
2      Vim;Visual Studio Code
3      Emacs;Helix
4      IntelliJ IDEA;Vim;Visual Studio Code;WebStorm
5      Vim;Visual Studio Code
-

```

```

89180      Android Studio;Atom;Eclipse;IntelliJ IDEA;Netb...
89181          Android Studio;IntelliJ IDEA;PyCharm
89182      Jupyter Notebook/JupyterLab;Neovim;Visual Stud...
89183      Eclipse;IntelliJ IDEA;Nano;Notepad++;PyCharm;V...
89184          Visual Studio;Visual Studio Code

                    NEWCollabToolsWantToWorkWith \
RespondId
1                      NaN
2          Vim;Visual Studio Code
3          Emacs;Helix
4          IntelliJ IDEA;Vim;WebStorm
5          Vim;Visual Studio Code
-
89180          Visual Studio Code
89181          IntelliJ IDEA;PyCharm
89182      Jupyter Notebook/JupyterLab;Neovim;Visual Stud...
89183      Jupyter Notebook/JupyterLab;Notepad++;Visual S...
89184          Visual Studio;Visual Studio Code

                    OpSysPersonal use \
RespondId
1                      NaN
2      iOS;iPadOS;MacOS;Windows;Windows Subsystem for...
3          MacOS;Other Linux-based
4          iOS;iPadOS;MacOS
5          Other (Please Specify):
-
89180          Android;Windows
89181          Windows
89182          Windows
89183      Arch;Debian;iOS;iPadOS;MacOS;Ubuntu;Windows;Wi...
89184          Windows

                    OpSysProfessional use \
RespondId
1                      NaN
2      MacOS;Windows;Windows Subsystem for Linux (WSL)
3          MacOS;Other Linux-based
4          iOS;iPadOS;MacOS
5          Other (Please Specify):
-
89180          Android;Ubuntu;Windows
89181          Windows
89182          NaN
89183      SSD;Red Hat;Solaris;Ubuntu;Windows
89184          Windows

```

```

    OfficeStackAsyncHaveWorkedWith \
RespondId
1
2
3
4
5
-
89180
89181
89182
89183
89184

    OfficeStackAsyncWantToWorkWith \
RespondId
1
2
3
4
5
-
89180
89181
89182
89183
89184

    OfficeStackSyncHaveWorkedWith \
RespondId
1
2
3
4
5
-
89180
89181
89182
89183
89184

    OfficeStackSyncWantToWorkWith \
RespondId
1
2

```

```

3                               Slack;Zoom
4                               Discord;Google Meet;Slack;Zoom
5                               Discord;Google Meet;Slack;Zoom
-
89180   Discord;Google Meet;Jitsi;Microsoft Teams;Tele...
89181                               Microsoft Teams
89182                               NaN
89183   Discord;Microsoft Teams;Skype
89184   Google Meet;Skype;Telegram;Whatsapp

      AISeachHaveWorkedWith      AISeachWantToWorkWith \
RespondId
1                               NaN      NaN
2                               ChatGPT  ChatGPT;Neeva AI
3                               NaN      NaN
4                               NaN      NaN
5                               ChatGPT  ChatGPT
-
89180   ChatGPT      -
89181   ChatGPT      ChatGPT
89182   ChatGPT;Quora Poe  ChatGPT;Quora Poe
89183   Bing AI;ChatGPT;WolframAlpha  Bing AI;ChatGPT;Google Bard AI
89184   ChatGPT      ChatGPT

      AIDevHaveWorkedWith AIDevWantToWorkWith \
RespondId
1                               NaN      NaN
2   GitHub Copilot  GitHub Copilot
3                               NaN      NaN
4                               NaN      NaN
5                               NaN      NaN
-
89180   Whispr AI      Whispr AI
89181   NaN      NaN
89182   NaN      NaN
89183   NaN      NaN
89184   GitHub Copilot  GitHub Copilot

      NEWSOSites \
RespondId
1                               NaN
2                               Stack Overflow;Stack Exchange
3   Stack Overflow;Stack Exchange;Stack Overflow f...
4                               Stack Overflow;Stack Exchange
5                               Stack Overflow;Stack Exchange
-
89180   Stack Overflow;Stack Exchange

```

```

89181             Stack Overflow;Stack Exchange
89182             Stack Overflow;Stack Exchange
89183             Stack Overflow;Stack Exchange;Stack Overflow f-
89184                         Stack Overflow

SOVisitFreq SOAccount \
ResponsId
1             NaN      NaN
2             Daily or almost daily      Yes
3             A few times per month or weekly      Yes
4             A few times per week      Yes
5             A few times per week      No
-
89180             =      =
89181             Multiple times per day      Yes
89182             Multiple times per day      Yes
89183             NaN      NaN
89184             A few times per month or weekly      No
89184             A few times per week      Yes

SOPartFreq \
ResponsId
1             NaN
2             A few times per month or weekly
3             Less than once per month or monthly
4             Less than once per month or monthly
5             NaN
-
89180             I have never participated in Q&A on Stack Over-
89181             I have never participated in Q&A on Stack Over-
89182                         NaN
89183                         NaN
89184             Less than once per month or monthly

SOComm \
ResponsId
1             NaN
2             Yes, definitely
3             Neutral
4             No, not really
5             Neutral
-
89180             Neutral
89181             No, not really
89182             NaN
89183             Yes, somewhat
89184             Yes, somewhat

```

```

          SOAI  \
ResponsId
1           NaN
2           I don't think it's super necessary, but I thin... NaN
3           NaN
4           I'm wearing of Stack Overflow using AI.
5           Using AI to suggest better answer to my questi... -
6           NaN
89180          NaN
89181          I'm not sure
89182          NaN
89183          Define Parameters more detailed. I believe in -
89184          NaN

          AISelect      AISent \
ResponsId
1           NaN      NaN
2           Yes     Indifferent
3           No, and I don't plan to      NaN
4           No, and I don't plan to      NaN
5           Yes     Very favorable
6           -      -
89180          Yes     Very favorable
89181          Yes     Very favorable
89182          No, but I plan to soon  Very favorable
89183          Yes     Favorable
89184          Yes     Favorable

          AIAcc  \
ResponsId
1           NaN
2           Other (please explain)
3           NaN
4           NaN
5           Increase productivity;Greater efficiency;Speed...
6           -
89180          Increase productivity;Greater efficiency;Speed...
89181          Speed up learning
89182          NaN
89183          Increase productivity;Greater efficiency;Speed...
89184          Increase productivity;Greater efficiency;Speed...

          AIBen \
ResponsId
1           NaN
2           Somewhat distrust
3           NaN

```

```

4                      NaN
5          Somewhat trust
-
89180          =
89181          Somewhat trust
89182          Somewhat trust
89183          Highly trust
89183          Somewhat distrust
89184          Neither trust nor distrust

          AIToolInterested in Using \
RespondId
1                      NaN
2          Learning about a codebase;Writing code;Debuggi-
3                      NaN
4                      NaN
5          Project planning;Testing code;Committing and r-
-
89180          =
89181          Learning about a codebase;Project planning;Wri-
89181          Writing code;Documenting code;Testing code
89182                      NaN
89183          Learning about a codebase;Project planning;Wri-
89184          Learning about a codebase;Writing code

          AIToolCurrently Using \
RespondId
1                      NaN
2          Writing code;Committing and reviewing code
3                      NaN
4                      NaN
5          Learning about a codebase;Writing code;Documen-
-
89180          =
89181          Writing code;Documenting code;Debugging and ge-
89181          Learning about a codebase;Debugging and gettin-
89182                      NaN
89183          Learning about a codebase;Writing code;Debuggi-
89184          Learning about a codebase;Writing code

          AIToolNot interested in Using \
RespondId
1                      NaN
2                      NaN
3                      NaN
4                      NaN
5                      NaN
-
89180          =
89181          Deployment and monitoring
89181          Project planning;Committing and reviewing code.

```

89165	India	INR\tIndian rupee	NaN
89166	Armenia	AMD\tArmenian dram	6.500000e+06
89167	India	INR\tIndian rupee	1.300000e+06
89168	France		NaN
89169	South Africa	ZAR\tSouth African rand	NaN
89170	France	EUR European Euro	6.000000e+04
89171	Greece	EUR European Euro	5.700000e+04
89172	Spain	EUR European Euro	3.554100e+04
89173	Trinidad and Tobago		NaN
89174	Pakistan	PKR\tPakistani rupee	1.200000e+06
89175	United States of America	USD\tUnited States dollar	1.350000e+05
89176	Greece		NaN
89177	Mexico	MXN\tMexican peso	1.000000e+06
89178	United States of America	USD\tUnited States dollar	2.120210e+05
89179	Brazil	BRL\tBrazilian real	2.000000e+05
89180	Romania		NaN
89181	Israel		NaN
89182	Switzerland		NaN
89183	Iran, Islamic Republic of...	IRR\tIranian rial	3.300000e+09
LanguageHaveWorkedWith \			
89164	Go;HTML/CSS;Java;JavaScript;Python		
89165	C;C++;C++;Java;JavaScript;TypeScript		
89166	Assembly;Bash/Shell (all shells);C;C++;Java...		
89167	Dart;HTML/CSS;JavaScript;TypeScript		
89168	Assembly;Bash/Shell (all shells);C;C++;HTML/CSS...		
89169	Groovy;HTML/CSS;Java;JavaScript;PHP;Python;R;S...		
89170	C++;F#;HTML/CSS;JavaScript;SQL;TypeScript		
89171	Java;JavaScript;TypeScript		
89172	Bash/Shell (all shells);HTML/CSS;JavaScript;Pe...		
89173	C++;HTML/CSS;JavaScript;R;SQL		
89174	Bash/Shell (all shells);C;C++;HTML/CSS;JavaScr...		
89175	Java;Kotlin		
89176	HTML/CSS;Java;JavaScript;PHP;Python;SQL;TypeSc...		
89177	Bash/Shell (all shells);C++;Cobol;Groovy;PH...		
89178	JavaScript;TypeScript		
89179	HTML/CSS;Java;JavaScript;SQL;TypeScript		
89180	Dart;Java;Python;SQL		
89181	Assembly;Bash/Shell (all shells);C;C++;Python;R...		
89182	Bash/Shell (all shells);C++;HTML/CSS;Java;JavaS...		
89183	C++;Go;JavaScript;SQL;TypeScript		
LanguageWantToWorkWith \			
89164	Go;Python;Rust		
89165	Dart;Elixir;Go;JavaScript;Python;Rust;Solidity...		
89166	C++;Python;TypeScript		
89167	Dart;Go;HTML/CSS;JavaScript;Swift;TypeScript		

```

89182                               NaN
89183           Committing and reviewing code
89184                               NaN

    AINextVery different  \
RespondId
1                               NaN
2                               NaN
3                               NaN
4                               NaN
5                               NaN
-
89180                               NaN
89181                               NaN
89182                               NaN
89183                               NaN
89184 Learning about a codebase

    AINextNeither different nor similar  \
RespondId
1                               NaN
2                               NaN
3                               NaN
4                               NaN
5                               NaN
-
89180                               NaN
89181                               NaN
89182                               NaN
89183 Debugging and getting help;Deployment and moni...
89184                               NaN

    AINextSomewhat similar AINextVery similar  \
RespondId
1                               NaN      NaN
2                               NaN      NaN
3                               NaN      NaN
4                               NaN      NaN
5                               NaN      NaN
-
89180                               NaN      NaN
89181                               NaN      NaN
89182                               NaN      NaN
89183                               NaN      NaN
89184                               NaN      NaN

    AINextSomewhat different TBranch  \

```

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*Image :stackoverflowdevelopersurvey-images-130*

RespondId				
1			NaN	NaN
2			NaN	Yes
3			NaN	Yes
4			NaN	Yes
5			NaN	Yes
89180	Writing code;Documenting code;Debugging and ge...		No	
89181	Learning about a codebase;Debugging and gettin...		NaN	
89182			NaN	NaN
89183	Learning about a codebase;Writing code		NaN	
89184		Writing code	Yes	
RespondId	ICorPM	WorkExp	Knowledge_1	
1	NaN	NaN	NaN	
2	People manager	10.0	Strongly agree	
3	Individual contributor	23.0	Strongly agree	
4	Individual contributor	7.0	Strongly agree	
5	Individual contributor	6.0	Agree	
89180		NaN	NaN	
89181		NaN	NaN	
89182		NaN	NaN	
89183		NaN	NaN	
89184	People manager	14.0	Agree	
RespondId		Knowledge_2	Knowledge_3	
1		NaN	NaN	
2		Agree	Strongly agree	
3	Neither agree nor disagree		Agree	
4	Strongly disagree		Strongly agree	
5	Strongly agree		Agree	
89180		NaN	NaN	
89181		NaN	NaN	
89182		NaN	NaN	
89183		NaN	NaN	
89184	Neither agree nor disagree	Neither agree nor disagree		
RespondId		Knowledge_4	Knowledge_5	
1		NaN	NaN	
2		Agree	Agree	
3		Agree	Agree	
4	Strongly agree		Agree	

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*Image :stackoverflowdevelopersurvey-images-131*

5	Agree	Neither agree nor disagree		
-	-	-		
89180	NaN	NaN		
89181	NaN	NaN		
89182	NaN	NaN		
89183	NaN	NaN		
89184	Strongly agree	Strongly agree		
			Knowledge_6	Knowledge_7 \
RespondId				
1		NaN		NaN
2		Agree		Agree
3		Agree		Agree
4	Neither agree nor disagree			Agree
5		Agree	Strongly agree	
-	-	-	-	
89180		NaN		NaN
89181		NaN		NaN
89182		NaN		NaN
89183		NaN		NaN
89184		Agree	Neither agree nor disagree	
			Knowledge_8	Frequency_1
RespondId				Frequency_2 \
1		NaN	NaN	NaN
2	Strongly agree	1-2 times a week	10+ times a week	
3	Agree	6-10 times a week	6-10 times a week	
4	Agree	1-2 times a week	10+ times a week	
5	Agree	1-2 times a week	1-2 times a week	
-	-	-	-	
89180		NaN	NaN	NaN
89181		NaN	NaN	NaN
89182		NaN	NaN	NaN
89183		NaN	NaN	NaN
89184	Neither agree nor disagree		Never	1-2 times a week
			Frequency_3	TimeSearching
RespondId				TimeAnswering \
1		NaN	NaN	NaN
2	Never	15-30 minutes a day	15-30 minutes a day	
3	3-5 times a week	30-60 minutes a day	30-60 minutes a day	
4	1-2 times a week	15-30 minutes a day	30-60 minutes a day	
5	3-5 times a week	60-120 minutes a day	30-60 minutes a day	
-	-	-	-	
89180		NaN	NaN	NaN
89181		NaN	NaN	NaN
89182		NaN	NaN	NaN

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Image :stackoverflowdevelopersurvey-images-132

89183	NaN	NaN	NaN
89184	1-2 times a week	60-120 minutes a day	30-60 minutes a day
			ProfessionalTech \
Respondent			NaN
1			NaN
2	DevOps function;Microservices;Automated testin...		
3	DevOps function;Microservices;Automated testin...		
4	Automated testing;Continuous integration (CI) -		
5	Microservices;Automated testing;Observability -		
-			-
89180			NaN
89181			NaN
89182			NaN
89183			NaN
89184	DevOps function;Developer portal or other cent...		
			Industry \
Respondent			NaN
1			NaN
2	Information Services, IT, Software Development...		
3	Information Services, IT, Software Development...		
4			NaN
5			Other
-			-
89180			NaN
89181			NaN
89182			NaN
89183			NaN
89184	Information Services, IT, Software Development...		
			SurveyLength \
Respondent			SurveyEase \
1	NaN		NaN
2	Appropriate in length		Easy
3	Appropriate in length		Easy
4	Appropriate in length		Easy
5	Appropriate in length	Neither easy nor difficult	
-	-	-	-
89180	Too long	Neither easy nor difficult	
89181	Too long		Easy
89182	Too long	Neither easy nor difficult	
89183	Appropriate in length	Neither easy nor difficult	
89184	Appropriate in length		Easy
			ConvertedCompYearly
Respondent			

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*Image :stackoverflowdevelopersurvey-images-133*

```

1           NaN
2           285000.0
3           250000.0
4           156000.0
5           23456.0
-
89180       -
89181       NaN
89182       NaN
89183       NaN
89184       NaN

[89184 rows x 83 columns]

[1]: # Read the schema
survey = pd.read_csv(r"C:\\\\Users\\\\Dell\\\\Downloads\\\\stack-overflow-developer-survey-2023\\\\survey_results_schema.csv",index_col='qname')
survey

[2]:      qid           question \
qname
S0      QID16  <div><span style="font-size:19px;"><strong>Me...
MetaInfo  QID12  Browser Meta Info
Q310    QID310  <div><span style="font-size:19px;"><strong>You...
Q120    QID312
S1      QID1  <span style="font-size:22px; font-family: aria...
-
Knowledge_7  QID289 Waiting on answers to questions often causes i...
Knowledge_8  QID289 I feel like I have the tools and/or resources ...
Frequency_1  QID290 Needing help from people outside of your immedi...
Frequency_2  QID290 Interacting with people outside of your immedi...
Frequency_3  QID290 Encountering knowledge silos (where one individu...

           force_resp  type  selector
qname
S0           False    DB      TB
MetaInfo      False  Meta  Browser
Q310          False    DB      TB
Q120          True     MC     SAVR
S1           False    DB      TB
-
Knowledge_7    NaN     MC     MAVR
Knowledge_8    NaN     MC     MAVR
Frequency_1    NaN     MC     MAVR
Frequency_2    NaN     MC     MAVR
Frequency_3    NaN     MC     MAVR

```

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*Image :stackoverflowdevelopersurvey-images-134*

```
[78 rows x 5 columns]

[ ]: #Find what 'Knowledge_1' signifies
survey.loc['Knowledge_1'].question

[ ]: 'I have interactions with people outside of my immediate team.'

[ ]: #Find what 'TBranch' signifies
survey.loc['TBranch'].question

[ ]: '<span style="font-size:16px;">Would you like to participate in the Professional
Developer Series? </span>'

[ ]: #Queries to find Conditional Data
data[data['Country']=='United States of America']

[ ]: Q120
      MainBranch \
ResponseId
2           I agree           I am a developer by profession
3           I agree           I am a developer by profession
4           I agree           I am a developer by profession
7           I agree           I am a developer by profession
8           I agree           I am a developer by profession
-
89151      I agree I used to be a developer by profession, but no...           I am a developer by profession
89155      I agree           I am a developer by profession
89157      I agree           I am a developer by profession
89176      I agree           I am a developer by profession
89179      I agree           I am a developer by profession

      Age      Employment \
ResponseId
2      25-34 years old  Employed, full-time
3      45-54 years old  Employed, full-time
4      25-34 years old  Employed, full-time
7      35-44 years old  Employed, full-time
8      25-34 years old  Employed, full-time
-
89151      55-64 years old  Employed, full-time
89155      35-44 years old  Employed, full-time
89157      25-34 years old  Employed, full-time
89176      25-34 years old  Employed, full-time
89179      45-54 years old  Employed, full-time

      RemoteWork \
ResponseId
```

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*Image :stackoverflowdevelopersurvey-images-135*

```

2           Remote
3       Hybrid (some remote, some in-person)
4       Hybrid (some remote, some in-person)
7           Remote
8           Remote
-
89151       -
89155       Remote
89156       Hybrid (some remote, some in-person)
89157       Remote
89176       Remote
89179       Remote

          CodingActivities \
ResponsId
2   Hobby;Contribute to open-source projects;Books...
3   Hobby;Professional development or self-paced l...
4           Hobby
7   Hobby;Contribute to open-source projects;Profes...
8           Hobby
-
89151   Hobby;Contribute to open-source projects
89155       I don't code outside of work
89157   Hobby;Contribute to open-source projects;Profes...
89176       I don't code outside of work
89179           Hobby

          EdLevel \
ResponsId
2   Bachelor's degree (B.A., B.S., B.Eng., etc.)
3   Bachelor's degree (B.A., B.S., B.Eng., etc.)
4   Bachelor's degree (B.A., B.S., B.Eng., etc.)
7   Some college/university study without earning a...
8   Bachelor's degree (B.A., B.S., B.Eng., etc.)
-
89151   Bachelor's degree (B.A., B.S., B.Eng., etc.)
89155   Bachelor's degree (B.A., B.S., B.Eng., etc.)
89157   Bachelor's degree (B.A., B.S., B.Eng., etc.)
89176   Bachelor's degree (B.A., B.S., B.Eng., etc.)
89179   Bachelor's degree (B.A., B.S., B.Eng., etc.)

          LearnCode \
ResponsId
2   Books / Physical media;Colleague;Friend or fam...
3   Books / Physical media;Colleague;On the job tr...
4   Colleague;Friend or family member;Other online...
7   Friend or family member;Online Courses or Cert...
8   Books / Physical media;Online Courses or Certi...

```

89151	Books / Physical media;Online Courses or Certification;On the job training	—
89155	Online Courses or Certification;On the job training	—
89157	Books / Physical media;Colleague;Online Course	—
89176	Hackathons (virtual or in-person);Online Courses	—
89179	Online Courses or Certification;On the job training	—
LearnCodeOnline		
89151	Formal documentation provided by the owner of —	—
89155	Formal documentation provided by the owner of —	—
89157	Formal documentation provided by the owner of —	—
89176	Formal documentation provided by the owner of —	—
89179	Formal documentation provided by the owner of —	—
LearnCodeCoursesCert		
89151	Other	18
89155	NaN	27
89157	NaN	12
89176	Udemy	4
89179	Codecademy;edX	5
YearsCode		
89151	—	—
89155	Codecademy	25
89157	Codecademy;edX;Pluralsight	20
89176	Coursera	12
89179	Codecademy;Udemy;Pluralsight;Udacity	10
YearsCodePro		
89151	—	—
89155	—	—
89157	—	—
89176	—	—
89179	edX;Udemy;Pluralsight;Udacity	25
DevType		
89151	Senior Executive (C-Suite, VP, etc.)	2 to 9 employees
89155	Developer, back-end	5,000 to 9,999 employees
89157	Developer, front-end	100 to 499 employees
89176	Developer, full-stack	1,000 to 4,999 employees
89179	Developer, full-stack	10 to 19 employees
OrgSize		
89151	—	—
89155	Developer Experience	NaN
89157	Developer, front-end	2 to 9 employees
89176	Engineering manager	100 to 499 employees
89179	Developer, mobile	10 to 19 employees

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*Image :stackoverflowdevelopersurvey-images-137*

```

89179             Developer, full-stack 10,000 or more employees
                    PurchaseInfluence      TechList  \
ResponselId
2           I have a great deal of influence  Investigate
3           I have some influence   Given a list
4           I have some influence  Investigate
7           I have little or no influence    NaN
8           I have some influence  Investigate
-           -           -           -
89151           -           NaN  Investigate
89155           I have some influence  Investigate
89157           I have little or no influence    NaN
89176           I have some influence  Investigate
89179           I have little or no influence    NaN

                    BuyNewTool  \
ResponselId
2  Start a free trial;Ask developers I know/work -
3  Start a free trial;Ask developers I know/work -
4  Start a free trial;Ask developers I know/work -
7  Ask developers I know/work with;Read ratings on -
8  Start a free trial;Ask developers I know/work -
-           -           -
89151  Start a free trial;Ask developers I know/work -
89155  Start a free trial;Ask developers I know/work -
89157           -           NaN
89176  Start a free trial;Ask developers I know/work -
89179  Start a free trial;Ask developers I know/work -

                    Country          Currency  CompTotal  \
ResponselId
2  United States of America  USD\nUnited States dollar  285000.0
3  United States of America  USD\nUnited States dollar  250000.0
4  United States of America  USD\nUnited States dollar  186000.0
7  United States of America  USD\nUnited States dollar  135000.0
8  United States of America  USD\nUnited States dollar   80000.0
-           -           -           -
89151  United States of America           NaN           NaN
89155  United States of America  USD\nUnited States dollar   75000.0
89157  United States of America  USD\nUnited States dollar  195000.0
89176  United States of America  USD\nUnited States dollar  135000.0
89179  United States of America  USD\nUnited States dollar  212021.0

                    LanguageHaveWorkedWith  \
ResponselId
2  HTML/CSS;JavaScript;Python

```

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*Image :stackoverflowdevelopersurvey-images-138*

```

3           Bash/Shell (all shells);Go
4           Bash/Shell (all shells);HTML/CSS;JavaScript;PH...
7           Ada;Clojure;Elixir;Go;HTML/CSS;Java;JavaScript...
8           Go;HTML/CSS;JavaScript;Python;Rust;SQL;TypeScript
-
89151           -
89155           SQL
89156           HTML/CSS;JavaScript;PHP;TypeScript;Visual Basic
89157           Bash/Shell (all shells);C;C++;JavaScript;Julia
89176           Java;Kotlin
89179           JavaScript;TypeScript

           LanguageWantToWorkWith \
ResponsId
2           Bash/Shell (all shells);C#;Dart;Elixir;GDScript...
3           Haskell;OCaml;Rust
4           Bash/Shell (all shells);HTML/CSS;JavaScript;Ru...
7           NaN
8           Elixir;Go;Julia;Python;R;Rust;Scala;SQL;TypeSc...
-
89151           -
89155           HTML/CSS;JavaScript;Ruby
89156           HTML/CSS;JavaScript;TypeScript
89157           Julia;Zig
89176           Dart;Java;JavaScript;Kotlin
89179           Go;JavaScript;Python;TypeScript

           DatabaseHaveWorkedWith \
ResponsId
2           Supabase
3           NaN
4           PostgreSQL;Redis
7           MariaDB;Microsoft SQL Server;MySQL;PostgreSQL;...
8           Dynamodb;MongoDB;MySQL;Redis;SQLite
-
89151           -
89155           PostgreSQL
89156           NaN
89157           Cosmos DB;PostgreSQL
89176           H2;MongoDB;MySQL;SQLite
89179           Dynamodb

           DatabaseWantToWorkWith \
ResponsId
2           Firebase Realtime Database;Supabase
3           NaN
4           PostgreSQL;Redis
7           Datomic
8           BigQuery;Cockroachdb;DuckDB;Elasticsearch;Mong...
-

```

```

89168 Bash/Shell (all shells);Go; Haskell;HTML/CSS;Ru...      NaN
89169                                         C#;HTML/CSS;JavaScript;SQL
89170                                         C;C++
89171 Bash/Shell (all shells);JavaScript;SAS;SQL
89172                                         C#;HTML/CSS;JavaScript;PHP;SQL
89173 Assembly;Bash/Shell (all shells);C;C++;HTML/CS...
89174                                         Dart;Java;JavaScript;Kotlin
89175                                         HTML/CSS;TypeScript
89176                                         HTML/CSS;Java;JavaScript;SQL;TypeScript
89177                                         Go;JavaScript;Python;TypeScript
89178 Bash/Shell (all shells);C;Go;HTML/CSS;JavaScri...
89179                                         Java;JavaScript;Python;SQL;TypeScript
89180                                         Python;Rust
89181 Bash/Shell (all shells);HTML/CSS;JavaScript;Po...
89182                                         C#;Go;JavaScript;SQL;TypeScript

                                         DatabaseHaveWorkedWith \
89164 Dynamodb;Elasticsearch;Firebase Realtime Datab...
89165                                         Cloud Firestore;MongoDB;PostgreSQL;Redis
89166 Elasticsearch;Firebase Realtime Database;Micro...
89167                                         MongoDB;MySQL;PostgreSQL;SQLite
89168 Firebird;MariaDB;MySQL;PostgreSQL;SQLite
89169 MariaDB;Microsoft SQL Server;MongoDB;MySQL;Pos...
89170                                         Microsoft SQL Server
89171                                         H2
89172                                         Oracle;PostgreSQL;SQLite
89173                                         Microsoft SQL Server;MySQL
89174                                         MySQL;Oracle;PostgreSQL;Redis;SQLite
89175                                         H2;MongoDB;MySQL;SQLite
89176                                         MySQL
89177 Firebird;IBM DB2;MariaDB;Microsoft Access;Micr...
89178                                         Dynamodb
89179                                         MongoDB;MySQL;PostgreSQL;SQLite
89180                                         PostgreSQL
89181                                         SQLite
89182 MariaDB;Microsoft SQL Server;MongoDB;MySQL;Red...
89183                                         Microsoft SQL Server;Redis;SQLite

                                         DatabaseWantToWorkWith \
89164                                         MongoDB;PostgreSQL
89165 Dynamodb;Elasticsearch;MongoDB;MySQL;PostgreSQL
89166 Elasticsearch;Microsoft SQL Server;MongoDB;Pos...
89167 Cockroachdb;MongoDB;MySQL;PostgreSQL;SQLite
89168                                         Firebird;PostgreSQL;SQLite
89169                                         NaN
89170                                         Microsoft SQL Server

```

```

89151          PostgreSQL
89155          NaN
89157          Cockroachdb;DuckDB;Snowflake
89176          MySQL;SQLite
89179          Dynamodb

          PlatformHaveWorkedWith \
RespondId
2          Amazon Web Services (AWS);Netlify;Vercel
3          Amazon Web Services (AWS);Google Cloud;OpenSta...
4          Cloudflare;Heroku
7          Amazon Web Services (AWS);Digital Ocean
8          Amazon Web Services (AWS);Fly.io;Netlify;Vercel
-
89151          -
89155          NaN
89157          Amazon Web Services (AWS);Hetzner;Microsoft Azure
89176          VMware
89179          Amazon Web Services (AWS)

          PlatformWantToWorkWith \
RespondId
2          Fly.io;Netlify;Render
3          NaN
4          Cloudflare;Heroku
7          Vercel
8          Amazon Web Services (AWS);Digital Ocean;Fly.io...
-
89151          -
89155          Netlify
89157          Amazon Web Services (AWS)
89176          NaN
89179          Amazon Web Services (AWS)

          WebframeHaveWorkedWith \
RespondId
2          Next.js;React;Remix;Vue.js
3          NaN
4          Node.js;React;Ruby on Rails;Vue.js;WordPress
7          AngularJS;jQuery;Node.js;Phoenix;Ruby on Rails...
8          Angular;Express;Next.js;Node.js;React
-
89151          -
89155          Next.js;React;WordPress
89157          jQuery;Node.js
89176          Spring Boot
89179          Express;Node.js;Spring Boot

```

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*Image :stackoverflowdevelopersurvey-images-140*

```

WebframeWantToWorkWith \
ResponseId
2          Deno;Elm;Nuxt.js;React;Svelte;Vue.js
3                               NaN
4                               Node.js;Ruby on Rails;Vue.js
7                               NaN
8          Deno;FastAPI;Fastify;Flask;NestJS;Next.js;Node...
=                               -
89151                               NaN
89155                               React
89157                               NaN
89176                               NaN
89179                               Node.js

MiscTechHaveWorkedWith \
ResponseId
2          Electron;React Native;Tauri
3                               NaN
4                               NaN
7          RabbitMQ;Spring Framework
8          NumPy;Pandas;Scikit-Learn;Tauri;TensorFlow
=                               -
89151                               Hadoop
89155                               NaN
89157                               NaN
89176          OpenCV;OpenGL;Spring Framework
89179                               Apache Kafka

MiscTechWantToWorkWith \
ResponseId
2          Capacitor;Electron;Tauri;Uno Platform;Xamarin
3                               NaN
4                               NaN
7                               NaN
8          .NET MAUI;Apache Kafka;Apache Spark;Hugging Pa...
=                               -
89151                               NaN
89155                               NaN
89157                               NaN
89176                               Xamarin
89179                               NaN

ToolsTechHaveWorkedWith \
ResponseId
2          Docker;Kubernetes;npm;Pip;Vite;Webpack;Yarn
3          Cargo;Docker;Kubernetes;Make;Nix

```

```

4           Homebrew;npm;Vite;Webpack;Yarn
7           Bun;Cargo;Chocolatey;Docker;Homebrew;Kubernetes...
8           Ansible;Cargo;Docker;Homebrew;Make;npm;Pip;pnpm...
-
89151           Chocolatey;Docker;Homebrew;npm
89155           Docker;npm;Webpack;Yarn
89157           NaN
89176           Docker;Gradle;Maven (build tool)
89179           Docker;Homebrew;Yarn

           ToolsTechWantToWorkWith \
RespondId
2           Godot;npm;pnpm;Unity 3D;Unreal Engine;Vite;Web...
3           Cargo;Kubernetes;Nix
4           Homebrew;npm;Vite
7           NaN
8           Cargo;Dagger;Docker;Homebrew;Kubernetes;Make;n...
-
89151           Docker;Homebrew;Kubernetes
89155           npm;Webpack;Yarn
89157           NaN
89176           Gradle
89179           Docker;Godot;Homebrew;Vite;Yarn

           NEWCollabToolsHaveWorkedWith \
RespondId
2           Vim;Visual Studio Code
3           Emacs;Helix
4           IntelliJ IDEA;Vim;Visual Studio Code;WebStorm
7           Emacs;IntelliJ IDEA;RubyMine;Visual Studio Code...
8           DataGrip;IPython;Neovim;Vim;Visual Studio Code...
-
89151           Emacs;Visual Studio Code
89155           Visual Studio;Visual Studio Code
89157           Vim;Visual Studio Code
89176           Android Studio;Atom;Eclipse;IntelliJ IDEA;Netb...
89179           IntelliJ IDEA;Nano;Visual Studio Code

           NEWCollabToolsWantToWorkWith \
RespondId
2           Vim;Visual Studio Code
3           Emacs;Helix
4           IntelliJ IDEA;Vim;WebStorm
7           NaN
8           IPython;Neovim;RStudio;Visual Studio Code
-
89151           Emacs;Visual Studio Code

```

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*Image :stackoverflowdevelopersurvey-images-142*

```

89155           Visual Studio Code
89157           Vim;Visual Studio Code
89176           Android Studio;IntelliJ IDEA;Notepad++
89179           Visual Studio Code

                           OpSysPersonal use \
ResponsId
2           iOS;iPadOS;MacOS;Windows;Windows Subsystem for_
                       MacOS;Other Linux-based
3           MacOS;Windows
4           iOS;iPadOS;MacOS
7           MacOS;Windows
8           MacOS;Ubuntu;Windows
-
89151           MacOS
89155           MacOS;Windows
89157           MacOS
89176           Android;ChromeOS;iOS;iPadOS;Other Linux-based;-
89179           MacOS

                           OpSysProfessional use \
ResponsId
2           MacOS;Windows;Windows Subsystem for Linux (WSL)
3           MacOS;Other Linux-based
4           iOS;iPadOS;MacOS
7           MacOS
8           MacOS;Ubuntu;Windows
-
89151           Cygwin;Windows;Windows Subsystem for Linux (WSL)
89155           Windows
89157           MacOS
89176           Android;Other Linux-based;Windows;Windows Subs...
89179           MacOS;Ubuntu

                           OfficeStackAsyncHaveWorkedWith \
ResponsId
2           Asana;Basecamp;GitHub Discussions;Jira;Linear;-
                       Markdown File;Stack Overflow for Teams
3           Jira
4           Jira
7           Jira
8           Markdown File;Notion
-
89151           Confluence;Doxygen;GitHub Discussions;Jira;Mir...
89155           Basecamp;GitHub Discussions
89157           Jira
89176           Jira
89179           Confluence;Jira;Markdown File;Stack Overflow f...

```

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*Image :stackoverflowdevelopersurvey-images-143*

```

        OfficeStackAsyncWantToWorkWith \
ResponsId
2 GitHub Discussions;Linear;Notion;Trello
3                               Markdown File
4                               Jira
7                               NaN
8                               Markdown File;Notion
-
89151 Confluence;Doxygen;GitHub Discussions;Jira;Wikis
89155                               GitHub Discussions
89157                               Airtable
89176                               Jira;Trello;YouTrack
89179 GitHub Discussions;Stack Overflow for Teams

        OfficeStackSyncHaveWorkedWith \
ResponsId
2 Cisco Webex Teams;Discord;Google Chat;Google M...
3                               Microsoft Teams;Slack;Zoom
4                               Discord;Google Meet;Microsoft Teams;Slack;Zoom
7                               Slack
8                               Microsoft Teams
-
89151                               Discord;Microsoft Teams;Zoom
89155                               Jitsi;Slack
89157                               Google Meet;Slack;Zoom
89176 Cisco Webex Teams;Discord;Microsoft Teams;Zoom
89179                               Microsoft Teams;Slack;Zoom

        OfficeStackSyncWantToWorkWith \
ResponsId
2 Discord;Signal;Slack;Zoom
3                               Slack;Zoom
4 Discord;Google Meet;Slack;Zoom
7                               NaN
8                               Discord
-
89151                               Discord;Microsoft Teams
89155                               Jitsi;Slack
89157                               Slack;Zoom
89176 Cisco Webex Teams;Discord;Microsoft Teams;Slack
89179                               Slack

        AISearchHaveWorkedWith          AISearchWantToWorkWith \
ResponsId
2 ChatGPT                         ChatGPT;Neeva AI
3 NaN                             NaN
4 NaN                             NaN

```

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*Image :stackoverflowdevelopersurvey-images-144*

```

7          ChatGPT          NaN
8  Bing AI;ChatGPT;Google Bard AI  ChatGPT;Neeva AI;Perplexity AI
=          =          =
89151      NaN          NaN
89155  ChatGPT;Google Bard AI      ChatGPT;Google Bard AI
89157      ChatGPT          ChatGPT
89176  ChatGPT;Google Bard AI      ChatGPT;Google Bard AI
89179          NaN          NaN

  AIDevHaveWorkedWith          AIDevWantToWorkWith \
RespondId
2          GitHub Copilot          GitHub Copilot
3          NaN          NaN
4          NaN          NaN
7          GitHub Copilot          GitHub Copilot
8          GitHub Copilot          GitHub Copilot
=          =          =
89151      NaN          NaN
89155  GitHub Copilot          NaN
89157  GitHub Copilot  GitHub Copilot;Replit Ghostwriter
89176      NaN          NaN
89179      NaN          NaN

  NEWSOSites \
RespondId
2          Stack Overflow;Stack Exchange
3  Stack Overflow;Stack Exchange;Stack Overflow f...
4          Stack Overflow;Stack Exchange
7          Stack Overflow
8  Stack Overflow;Stack Exchange;Collectives on S...
=          =
89151  Stack Overflow;Stack Exchange;Stack Overflow f...
89155      Stack Overflow;Stack Exchange
89157      Stack Overflow;Stack Exchange
89176      Stack Overflow;Stack Exchange
89179  Stack Overflow;Stack Exchange;Stack Overflow f...

  SOVisitFreq          SOAccount \
RespondId
2          Daily or almost daily          Yes
3  A few times per month or weekly          Yes
4          A few times per week          Yes
7  A few times per month or weekly          Yes
8          Daily or almost daily          Yes
=          =
89151  A few times per month or weekly          Yes
89155  A few times per month or weekly          Yes

```

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*Image :stackoverflowdevelopersurvey-images-145*

ResponseId	SOFreq	SOComm
89157	Less than once per month or monthly	Yes
89176	Multiple times per day	Not sure/can't remember
89179	Daily or almost daily	Yes
		\
ResponseId	SOPartFreq	SOComm
2	A few times per month or weekly	Yes, definitely
3	Less than once per month or monthly	Neutral
4	Less than once per month or monthly	No, not really
7	Less than once per month or monthly	Neutral
8	A few times per month or weekly	Yes, somewhat
		\
89151	Less than once per month or monthly	No, not at all
89155	Less than once per month or monthly	No, not at all
89157	Less than once per month or monthly	No, not really
89176		NaN
89179	A few times per month or weekly	No, not really
		\
ResponseId	SOAI	
2	I don't think it's super necessary, but I thin...	NaN
3		NaN
4	I'm wearing of Stack Overflow using AI.	Neutral
7		NaN
8		NaN
		\
89151	Generally negative. Doing a better job of find...	NaN
89155	I think AI could help improve the quality of p...	NaN
89157	Sounds generally helpful, yes. It could also d...	NaN
89176	I think there is value in incorporating AI to ...	NaN
89179	Improve question writing	NaN
		\
ResponseId	AISelect	AISent
2	Yes	Indifferent
3	No, and I don't plan to	NaN
4	No, and I don't plan to	NaN
7	Yes	Unfavorable
8	Yes	Favorable
		\
89151	No, and I don't plan to	NaN
89155	No, but I plan to soon	Favorable
89157		Favorable
89176	Yes	Favorable
89179	No, but I plan to soon	Favorable
		\

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*Image :stackoverflowdevelopersurvey-images-146*

```

    ResponsId
2           Other (please explain)
3
4
7           Improve accuracy in coding
8           Increase productivity;Speed up learning
-
89151
89155
89157           Increase productivity;Improve collaboration
89176           Increase productivity;Greater efficiency;Speed...
89179

    AIBen \
ResponsId
2           Somewhat distrust
3
4
7           Somewhat distrust
8           Somewhat distrust
-
89151
89155
89157
89176           Somewhat trust
89179           Somewhat distrust

    AIToolInterested in Using \
ResponsId
2           Learning about a codebase;Writing code;Debuggi...
3
4
7
8           Project planning;Writing code;Documenting code...
-
89151
89155
89157           Learning about a codebase;Debugging and gettin...
89176           Learning about a codebase;Documenting code;Deb...
89179

    AIToolCurrently Using \
ResponsId
2           Writing code;Committing and reviewing code
3
4
7           Writing code;Debugging and getting help

```

	Project planning;Writing code;Debugging and ge...	
-		
89151		NaN
89155		NaN
89157	Writing code;Documenting code	
89176	Writing code;Testing code	
89179		NaN
	AIToolNot interested in Using \	
RespondId		
2		NaN
3		NaN
4		NaN
7	Learning about a codebase;Project planning;Wri...	
8		NaN
-		
89151		NaN
89155		NaN
89157	Project planning;Committing and reviewing code...	
89176	Project planning;Committing and reviewing code...	
89179		NaN
	AINextVery different AINextNeither different nor similar \	
RespondId		
2		NaN
3		NaN
4		NaN
7		NaN
8		NaN
-	-	-
89151		NaN
89155		NaN
89157		NaN
89176	Writing code;Testing code	
89179		NaN
	AINextSomewhat similar AINextVery similar \	
RespondId		
2		NaN
3		NaN
4		NaN
7		NaN
8		NaN
-	-	-
89151		NaN
89155		NaN
89157		NaN

89176		NaN	NaN	
89179		NaN	NaN	
AINextSomewhat different TBranch				
RespondId				ICorPM \
2		NaN	Yes	People manager
3		NaN	Yes	Individual contributor
4		NaN	Yes	Individual contributor
7		NaN	Yes	Individual contributor
8		NaN	Yes	NaN
- - -				
89151		NaN	Yes	Individual contributor
89155		NaN	Yes	Individual contributor
89157	Writing code; Documenting code	Yes		People manager
89176		NaN	Yes	Individual contributor
89179		NaN	Yes	Individual contributor
WorkExp      Knowledge_1				
RespondId				Knowledge_2 \
2	10.0	Strongly agree		Agree
3	23.0	Strongly agree	Neither agree nor disagree	
4	7.0	Strongly agree		Strongly disagree
7	4.0	Strongly agree		Agree
8	5.0	NaN		NaN
- - -				
89151	30.0	Strongly agree		Agree
89155	8.0	Agree		Strongly disagree
89157	8.0	Strongly agree		Agree
89176	8.0	Agree	Neither agree nor disagree	
89179	22.0	Strongly agree	Neither agree nor disagree	
Knowledge_3      Knowledge_4 \				
RespondId				
2	Strongly agree		Agree	
3	Agree		Agree	
4	Strongly agree		Strongly agree	
7	Neither agree nor disagree	Neither agree nor disagree		
8	NaN		NaN	
- - -				
89151	Neither agree nor disagree		Agree	
89155	Agree		Disagree	
89157	Agree		Agree	
89176	Neither agree nor disagree		Strongly agree	
89179	Disagree	Neither agree nor disagree		
Knowledge_5      Knowledge_6 \				
RespondId				

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*Image :stackoverflowdevelopersurvey-images-149*

```

89171                     Supabase
89172                     PostgreSQL
89173 MySQL;Oracle;SQLite
89174                     PostgreSQL
89175 MySQL;SQLite
89176 Firebase Realtime Database;MongoDB;PostgreSQL
89177 H2;Oracle
89178                     Dynamodb
89179 PostgreSQL;SQLite
89180                     PostgreSQL
89181 NaN
89182 Cassandra;Cosmos DB;Dynamodb;MariaDB;Microsoft...
89183 Microsoft SQL Server;Redis;SQLite

                     PlatformHaveWorkedWith \
89164 Amazon Web Services (AWS);Google Cloud;Netzner
89165 Amazon Web Services (AWS);Firebase;Heroku
89166                     Firebase;Heroku
89167 NaN
89168 Amazon Web Services (AWS);Firebase;Netlify
89169 Amazon Web Services (AWS);Cloudflare;Netzner
89170                     Microsoft Azure
89171 NaN
89172 VMware
89173 NaN
89174 Heroku
89175 VMware
89176 NaN
89177 Digital Ocean;Microsoft Azure;OpenShift;VMware
89178 Amazon Web Services (AWS)
89179 Digital Ocean;Firebase;Google Cloud;Heroku;Vercel
89180 NaN
89181 Amazon Web Services (AWS)
89182 Amazon Web Services (AWS);Cloudflare;Google Cl...
89183 Netzner

                     PlatformWantToWorkWith \
89164 Amazon Web Services (AWS)
89165 Amazon Web Services (AWS);Firebase
89166 Amazon Web Services (AWS);Cloudflare;VMware
89167 NaN
89168 Firebase
89169 NaN
89170 Microsoft Azure
89171 NaN
89172 NaN
89173 NaN

```

```

2           Agree           Agree
3           Agree           Agree
4           Agree  Neither agree nor disagree
7           Agree           Agree
8           NaN            NaN
-
89151      Agree           Disagree
89155      Agree           Agree
89157      Agree           Strongly agree
89176  Strongly agree  Neither agree nor disagree
89179      Agree           Agree

           Knowledge_7           Knowledge_8 \
RespondId
2           Agree           Strongly agree
3           Agree           Agree
4           Agree           Agree
7           Agree  Neither agree nor disagree
8           NaN            NaN
-
89151      Disagree  Neither agree nor disagree
89155  Strongly agree           Disagree
89157  Neither agree nor disagree  Neither agree nor disagree
89176      Agree           Agree
89179  Strongly agree  Neither agree nor disagree

           Frequency_1           Frequency_2           Frequency_3 \
RespondId
2      1-2 times a week  10+ times a week           Never
3      6-10 times a week  6-10 times a week  3-5 times a week
4      1-2 times a week  10+ times a week  1-2 times a week
7      1-2 times a week  3-5 times a week  1-2 times a week
8           NaN            NaN            NaN
-
89151      1-2 times a week  6-10 times a week  1-2 times a week
89155      Never           1-2 times a week  1-2 times a week
89157      1-2 times a week  10+ times a week  3-5 times a week
89176      1-2 times a week  3-5 times a week           Never
89179      1-2 times a week  1-2 times a week  1-2 times a week

           TimeSearching           TimeAnswering \
RespondId
2      15-30 minutes a day  15-30 minutes a day
3      30-60 minutes a day  30-60 minutes a day
4      15-30 minutes a day  30-60 minutes a day
7  Less than 15 minutes a day  15-30 minutes a day
8      60-120 minutes a day  30-60 minutes a day

```

```

 89151    Less than 15 minutes a day    Less than 15 minutes a day
 89155    30-60 minutes a day        30-60 minutes a day
 89157    30-60 minutes a day        Over 120 minutes a day
 89176    60-120 minutes a day       30-60 minutes a day
 89179    15-30 minutes a day        60-120 minutes a day

                                         ProfessionalTech \
ResponsId
2          DevOps function;Microservices;Automated testin...
3          DevOps function;Microservices;Automated testin...
4          Automated testing;Continuous integration (CI) ...
7          Microservices;Automated testing;Continuous int...
8          None of these

 89151    DevOps function;Automated testing;Developer po...
 89155    Developer portal or other central places to fi...
 89157    Automated testing;Observability tools;Continuo...
 89176    DevOps function;Continuous integration (CI) an...
 89179    DevOps function;Microservices;Automated testin...

                                         Industry \
ResponsId
2          Information Services, IT, Software Development...
3          Information Services, IT, Software Development...
4          NaN
7          Information Services, IT, Software Development...
8          Financial Services

 89151    Information Services, IT, Software Development...
 89155    Information Services, IT, Software Development...
 89157    Information Services, IT, Software Development...
 89176    Information Services, IT, Software Development...
 89179    Insurance

                                         SurveyLength        SurveyEase \
ResponsId
2          Appropriate in length        Easy
3          Appropriate in length        Easy
4          Appropriate in length        Easy
7          Appropriate in length        Easy
8          NaN                         NaN

 89151    Too short                   Easy
 89155    Appropriate in length        Easy
 89157    Appropriate in length        Neither easy nor difficult
 89176    Appropriate in length        Neither easy nor difficult

```

```

89179      Appropriate in length           Easy
            ConvertedCompYearly
Respondent
2          285000.0
3          260000.0
4          156000.0
7          135000.0
8          80000.0
-
89151      -
89155      75000.0
89157      195000.0
89176      -
89179      -
[18647 rows x 83 columns]

[1]: #data[data['Country']=='United States of America']
data.query('Country == "United States of America"')

[1]:          Q120                         MainBranch \
Respondent
2    I agree           I am a developer by profession
3    I agree           I am a developer by profession
4    I agree           I am a developer by profession
7    I agree           I am a developer by profession
8    I agree           I am a developer by profession
-
89151   I agree   I used to be a developer by profession, but no...
89155   I agree           I am a developer by profession
89157   I agree           I am a developer by profession
89176   I agree           I am a developer by profession
89179   I agree           I am a developer by profession

          Age            Employment \
Respondent
2    25-34 years old  Employed, full-time
3    45-54 years old  Employed, full-time
4    25-34 years old  Employed, full-time
7    35-44 years old  Employed, full-time
8    25-34 years old  Employed, full-time
-
89151   55-64 years old  -
89155   35-44 years old  Employed, full-time
89157   25-34 years old  Employed, full-time
89176   25-34 years old  Employed, full-time

```

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*Image :stackoverflowdevelopersurvey-images-152*

```

89179      45-54 years old Employed, full-time

                    RemoteWork \
ResponselId
2                  Remote
3      Hybrid (some remote, some in-person)
4      Hybrid (some remote, some in-person)
7                  Remote
8                  Remote
-                  -
89151      Remote
89155      Hybrid (some remote, some in-person)
89157      Remote
89176      Remote
89179      Remote

                    CodingActivities \
ResponselId
2      Hobby;Contribute to open-source projects;Books...
3      Hobby;Professional development or self-paced l...
4                  Hobby
7      Hobby;Contribute to open-source projects;Profes...
8                  Hobby
-                  -
89151      Hobby;Contribute to open-source projects
89155      I don't code outside of work
89157      Hobby;Contribute to open-source projects;Profes...
89176      I don't code outside of work
89179      Hobby

                    EdLevel \
ResponselId
2      Bachelor's degree (B.A., B.S., B.Eng., etc.)
3      Bachelor's degree (B.A., B.S., B.Eng., etc.)
4      Bachelor's degree (B.A., B.S., B.Eng., etc.)
7      Some college/university study without earning a
8      Bachelor's degree (B.A., B.S., B.Eng., etc.)
-                  -
89151      Bachelor's degree (B.A., B.S., B.Eng., etc.)
89155      Bachelor's degree (B.A., B.S., B.Eng., etc.)
89157      Bachelor's degree (B.A., B.S., B.Eng., etc.)
89176      Bachelor's degree (B.A., B.S., B.Eng., etc.)
89179      Bachelor's degree (B.A., B.S., B.Eng., etc.)

                    LearnCode \
ResponselId
2      Books / Physical media;Colleague;Friend or fam...

```

```

3      Books / Physical media;Colleague;On the job tra...
4      Colleague;Friend or family member;Other online...
7      Friend or family member;Online Courses or Cert...
8      Books / Physical media;Online Courses or Certi...
-
89151     Books / Physical media;Online Courses or Certi...
89155     Online Courses or Certification;On the job tra...
89157     Books / Physical media;Colleague;Online Course...
89176     Hackathons (virtual or in-person);Online Cours...
89179     Online Courses or Certification;On the job tra...
                                         LearnCodeOnline \_
ResponsId
2      Formal documentation provided by the owner of ...
3      Formal documentation provided by the owner of ...
4      Formal documentation provided by the owner of ...
7      Formal documentation provided by the owner of ...
8      Formal documentation provided by the owner of ...
-
89151     Formal documentation provided by the owner of ...
89155     Formal documentation provided by the owner of ...
89157     Formal documentation provided by the owner of ...
89176     Formal documentation provided by the owner of ...
89179     Formal documentation provided by the owner of ...
                                         LearnCodeCoursesCert YearsCode YearsCodePro \_
ResponsId
2      Other      18      9
3      NaN        27      23
4      NaN        12      7
7      Udemy      4       3
8      Codecademy;edX 5       3
-
89151     Codecademy      25      8
89155     Codecademy;Pluralsight 20      8
89157     Coursera      12      8
89176     Codecademy;Udemy;Pluralsight;Udacity 10      8
89179     edX;Udemy;Pluralsight;Udacity 25      22
                                         DevType          OrgSize \_
ResponsId
2      Senior Executive (C-Suite, VP, etc.) 2 to 9 employees
3      Developer, back-end 5,000 to 9,999 employees
4      Developer, front-end 100 to 499 employees
7      Developer, full-stack 1,000 to 4,999 employees
8      Developer, full-stack 10 to 19 employees
-

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89151	Developer Experience		NaN
89155	Developer, front-end	2 to 9 employees	
89157	Engineering manager	100 to 499 employees	
89176	Developer, mobile	10 to 19 employees	
89179	Developer, full-stack	10,000 or more employees	
PurchaseInfluence \			
Responseld	PurchaseInfluence	TechList	\
2	I have a great deal of influence	Investigate	
3	I have some influence	Given a list	
4	I have some influence	Investigate	
7	I have little or no influence	NaN	
8	I have some influence	Investigate	
-	-	-	
89151		Investigate	
89155	I have some influence	Investigate	
89157	I have little or no influence	NaN	
89176	I have some influence	Investigate	
89179	I have little or no influence	NaN	
BuyNewTool \			
Responseld			
2	Start a free trial;Ask developers I know/work -		
3	Start a free trial;Ask developers I know/work -		
4	Start a free trial;Ask developers I know/work -		
7	Ask developers I know/work with;Read ratings on -		
8	Start a free trial;Ask developers I know/work -		
-	-	-	
89151	Start a free trial;Ask developers I know/work -		
89155	Start a free trial;Ask developers I know/work -		
89157		NaN	
89176	Start a free trial;Ask developers I know/work -		
89179	Start a free trial;Ask developers I know/work -		
Country \			
Responseld	Country	Currency	CompTotal
2	United States of America	USD\United States dollar	285000.0
3	United States of America	USD\United States dollar	250000.0
4	United States of America	USD\United States dollar	156000.0
7	United States of America	USD\United States dollar	135000.0
8	United States of America	USD\United States dollar	80000.0
-	-	-	-
89151	United States of America	NaN	NaN
89155	United States of America	USD\United States dollar	75000.0
89157	United States of America	USD\United States dollar	195000.0
89176	United States of America	USD\United States dollar	135000.0
89179	United States of America	USD\United States dollar	212021.0

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Image :stackoverflowdevelopersurvey-images-155

```

        LanguageHaveWorkedWith \
ResponseId
2           HTML/CSS;JavaScript;Python
3           Bash/Shell (all shells);Go
4           Bash/Shell (all shells);HTML/CSS;JavaScript;PH...
7           Ada;Clojure;Elixir;Go;HTML/CSS;Java;JavaScript...
8           Go;HTML/CSS;JavaScript;Python;Rust;SQL;TypeScript
-
89151
89155           HTML/CSS;JavaScript;PHP;TypeScript;Visual Basic
89157           Bash/Shell (all shells);C;C++;JavaScript;Julia
89176           Java;Kotlin
89179           JavaScript;TypeScript

        LanguageWantToWorkWith \
ResponseId
2           Bash/Shell (all shells);C#;Dart;Elixir;GDScript...
3           Haskell;OCaml;Rust
4           Bash/Shell (all shells);HTML/CSS;JavaScript;Ru...
7           NaN
8           Elixir;Go;Julia;Python;R;Rust;Scala;SQL;TypeSc...
-
89151           HTML/CSS;JavaScript;Ruby
89155           HTML/CSS;JavaScript;TypeScript
89157           Julia;Zig
89176           Dart;Java;JavaScript;Kotlin
89179           Go;JavaScript;Python;TypeScript

        DatabaseHaveWorkedWith \
ResponseId
2           Supabase
3           NaN
4           PostgreSQL;Redis
7           MariaDB;Microsoft SQL Server;MySQL;PostgreSQL;...
8           Dynamodb;MongoDB;MySQL;Redis;SQLite
-
89151           PostgreSQL
89155           NaN
89157           Cosmos DB;PostgreSQL
89176           H2;MongoDB;MySQL;SQLite
89179           Dynamodb

        DatabaseWantToWorkWith \
ResponseId
2           Firebase Realtime Database;Supabase
3           NaN

```

```

4                               PostgreSQL;Redis
7                               Datomic
8 BigQuery;Cockroachdb;DuckDB;Elasticsearch;MongoDB
-
89151                               PostgreSQL
89155                               NaN
89157 Cockroachdb;DuckDB;Snowflake
89176                               MySQL;SQLite
89179                               Dynamodb

PlatformHaveWorkedWith \
ResponseId
2 Amazon Web Services (AWS);Netlify;Vercel
3 Amazon Web Services (AWS);Google Cloud;OpenShift
4 Cloudflare;Heroku
7 Amazon Web Services (AWS);Digital Ocean
8 Amazon Web Services (AWS);Fly.io;Netlify;Vercel
-
89151                               NaN
89155                               Netlify
89157 Amazon Web Services (AWS);Netzner;Microsoft Azure
89176                               VMware
89179 Amazon Web Services (AWS)

PlatformWantToWorkWith \
ResponseId
2 Fly.io;Netlify;Render
3 NaN
4 Cloudflare;Heroku
7 Vercel
8 Amazon Web Services (AWS);Digital Ocean;Fly.io
-
89151                               NaN
89155                               Netlify
89157 Amazon Web Services (AWS)
89176                               NaN
89179 Amazon Web Services (AWS)

WebframeHaveWorkedWith \
ResponseId
2 Next.js;React;Remix;Vue.js
3 NaN
4 Node.js;React;Ruby on Rails;Vue.js;WordPress
7 AngularJS;jQuery;Node.js;Phoenix;Ruby on Rails
8 Angular;Express;Next.js;Node.js;React
-
89151                               NaN

```

```

89155           Next.js;React;WordPress
89157           jQuery;Node.js
89176           Spring Boot
89179           Express;Node.js;Spring Boot

                    WebframeWantToWorkWith \
ResponsId
2           Deno;Elm;Nuxt.js;React;Svelte;Vue.js
3           NaN
4           Node.js;Ruby on Rails;Vue.js
7           NaN
8           Deno;FastAPI;Fastify;Flask;NestJS;Next.js;Node...
-
89151           -
89155           React
89157           NaN
89176           NaN
89179           Node.js

                    MiscTechHaveWorkedWith \
ResponsId
2           Electron;React Native;Tauri
3           NaN
4           NaN
7           RabbitMQ;Spring Framework
8           NumPy;Pandas;Scikit-Learn;Tauri;TensorFlow
-
89151           Hadoop
89155           NaN
89157           NaN
89176           OpenCV;OpenGL;Spring Framework
89179           Apache Kafka

                    MiscTechWantToWorkWith \
ResponsId
2           Capacitor;Electron;Tauri;Uno Platform;Xamarin
3           NaN
4           NaN
7           NaN
8           .NET MAUI;Apache Kafka;Apache Spark;Hugging Fa...
-
89151           -
89155           NaN
89157           NaN
89176           Xamarin
89179           NaN

```

```

ToolsTechHaveWorkedWith \
ResponselD
2 Docker;Kubernetes;npm;Pip;Vite;Webpack;Yarn
3 Cargo;Docker;Kubernetes;Make;Nix
4 Homebrew;npm;Vite;Webpack;Yarn
7 Bun;Cargo;Chocolatey;Docker;Homebrew;Kubernetes
8 Ansible;Cargo;Docker;Homebrew;Make;npm;Pip;pnpm
-
89151 Chocolatey;Docker;Homebrew;npm
89155 Docker;npm;Webpack;Yarn
89157 NaN
89176 Docker;Gradle;Maven (build tool)
89179 Docker;Homebrew;Yarn

ToolsTechWantToWorkWith \
ResponselD
2 Godot;npm;pnpm;Unity 3D;Unreal Engine;Vite;Web...
3 Cargo;Kubernetes;Nix
4 Homebrew;npm;Vite
7 NaN
8 Cargo;Dagger;Docker;Homebrew;Kubernetes;Make;n...
-
89151 Docker;Homebrew;Kubernetes
89155 npm;Webpack;Yarn
89157 NaN
89176 Gradle
89179 Docker;Godot;Homebrew;Vite;Yarn

NEWCollabToolsHaveWorkedWith \
ResponselD
2 Vim;Visual Studio Code
3 Emacs;Helix
4 IntelliJ IDEA;Vim;Visual Studio Code;WebStorm
7 Emacs;IntelliJ IDEA;RubyMine;Visual Studio Code
8 DataGrip;IPython;Neovim;Vim;Visual Studio Code
-
89151 Emacs;Visual Studio Code
89155 Visual Studio;Visual Studio Code
89157 Vim;Visual Studio Code
89176 Android Studio;Atom;Eclipse;IntelliJ IDEA;NetBeans
89179 IntelliJ IDEA;Nano;Visual Studio Code

NEWCollabToolsWantToWorkWith \
ResponselD
2 Vim;Visual Studio Code
3 Emacs;Helix
4 IntelliJ IDEA;Vim;WebStorm

```

```

89174 Amazon Web Services (AWS);Google Cloud;Heroku;-
89175 NaN
89176 NaN
89177 NaN
89178 Amazon Web Services (AWS)
89179 Amazon Web Services (AWS);Heroku;Netlify;Vercel
89180 NaN
89181 Amazon Web Services (AWS);Microsoft Azure
89182 Amazon Web Services (AWS);Cloudflare;Digital O-
89183 Hetzner;Microsoft Azure

WebframeHaveWorkedWith \
89164 Django;Express;FastAPI;Flask;Node.js;React
89165 Angular;Django;Express;NextJS;Node.js;React
89166 ASP.NET;ASP.NET CORE;jQuery
89167 Express;Node.js;React;Svelte
89168 Angular;AngularJS;Deno;Django;Express;Flask;jQ-
89169 uery;Node.js;WordPress
89170 ASP.NET;ASP.NET CORE;Blazor;React
89171 NaN
89172 Express;jQuery;Node.js
89173 ASP.NET CORE;WordPress
89174 ASP.NET;ASP.NET CORE;Blazor;jQuery;React;Ruby -
89175 Spring Boot
89176 Angular;Express;jQuery;Node.js;React
89177 AngularJS;ASP.NET;CodeIgniter;Drupal;jQuery;La-
89178 Express;Node.js;Spring Boot
89179 Angular;AngularJS;Express;jQuery;Node.js;Nuxt-
89180 Spring Boot
89181 NaN
89182 Express;Next.js;Node.js;React;WordPress
89183 Angular;ASP.NET;ASP.NET CORE;Blazor;Node.js

WebframeWantToWorkWith \
89164 Django;FastAPI;Flask
89165 Deno;Express;Fastify;NextJS;Next.js;Node.js;Re-
89166 ASP.NET CORE;Blazor;jQuery
89167 Deno;Express;FastAPI;Next.js;Node.js;Svelte
89168 Solid.js
89169 NaN
89170 ASP.NET CORE;Blazor;jQuery
89171 NaN
89172 Express;Node.js
89173 ASP.NET CORE;Node.js;WordPress
89174 jQuery;React;Ruby on Rails
89175 NaN
89176 Express;Node.js;React

```

```

7                               NaN
8           IPython;Neovim;RStudio;Visual Studio Code
-
89151                  -
89155          Emacs;Visual Studio Code
89156          Visual Studio Code
89157          Vim;Visual Studio Code
89176          Android Studio;IntelliJ IDEA;Notepad++
89179          Visual Studio Code

                    OpSysPersonal use \
ResponsId
2           iOS;iPadOS;MacOS;Windows;Windows Subsystem for_
3                           MacOS;Other Linux-based
4                           iOS;iPadOS;MacOS
7                           MacOS;Windows
8                           MacOS;Ubuntu;Windows
-
89151                  -
89155          MacOS;Windows
89156          MacOS
89176          Android;ChromeOS;iOS;iPadOS;Other Linux-based;_
89179          MacOS

                    OpSysProfessional use \
ResponsId
2           MacOS;Windows;Windows Subsystem for Linux (WSL)
3                           MacOS;Other Linux-based
4                           iOS;iPadOS;MacOS
7                           MacOS
8                           MacOS;Ubuntu;Windows
-
89151          Cygwin;Windows;Windows Subsystem for Linux (WSL)
89155          Windows
89156          MacOS
89176          Android;Other Linux-based;Windows;Windows Subs_
89179          MacOS;Ubuntu

                    OfficeStackAsyncHaveWorkedWith \
ResponsId
2           Asana;Basecamp;GitHub Discussions;Jira;Linear;_
3                           Markdown File;Stack Overflow for Teams
4                           Jira
7                           Jira
8                           Markdown File;Notion
-
89151          Confluence;Doxygen;GitHub Discussions;Jira;Mir_
89155          Basecamp;GitHub Discussions

```

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89157                               Jira
89176                               Jira
89179   Confluence;Jira;Markdown File;Stack Overflow f...
                               OfficeStackAsyncWantToWorkWith \
ResponsId
2   GitHub Discussions;Linear;Notion;Trello
3   Markdown File
4   Jira
7   NaN
8   Markdown File;Notion
-
89151   Confluence;Doxygen;GitHub Discussions;Jira;Wikis
89155   GitHub Discussions
89157   Airtable
89176   Jira;Trello;YouTrack
89179   GitHub Discussions;Stack Overflow for Teams
                               OfficeStackSyncHaveWorkedWith \
ResponsId
2   Cisco Webex Teams;Discord;Google Chat;Google M...
3   Microsoft Teams;Slack;Zoom
4   Discord;Google Meet;Microsoft Teams;Slack;Zoom
7   Slack
8   Microsoft Teams
-
89151   Discord;Microsoft Teams;Zoom
89155   Jitsi;Slack
89157   Google Meet;Slack;Zoom
89176   Cisco Webex Teams;Discord;Microsoft Teams;Zoom
89179   Microsoft Teams;Slack;Zoom
                               OfficeStackSyncWantToWorkWith \
ResponsId
2   Discord;Signal;Slack;Zoom
3   Slack;Zoom
4   Discord;Google Meet;Slack;Zoom
7   NaN
8   Discord
-
89151   Discord;Microsoft Teams
89155   Jitsi;Slack
89157   Slack;Zoom
89176   Cisco Webex Teams;Discord;Microsoft Teams;Slack
89179   Slack
                               AISearchHaveWorkedWith      AISearchWantToWorkWith \

```

RespondId	AIDevHaveWorkedWith	AIDevWantToWorkWith
2	ChatGPT	ChatGPT;Neeva AI
3	NaN	NaN
4	NaN	NaN
7	ChatGPT	NaN
8	Bing AI;ChatGPT;Google Bard AI	ChatGPT;Neeva AI;Perplexity AI
-	-	-
89151	NaN	NaN
89155	ChatGPT;Google Bard AI	ChatGPT;Google Bard AI
89157	ChatGPT	ChatGPT
89176	ChatGPT;Google Bard AI	ChatGPT;Google Bard AI
89179	NaN	NaN
NEWSOSites		
RespondId	NEWSOSites	
2	Stack Overflow;Stack Exchange	
3	Stack Overflow;Stack Exchange;Stack Overflow f...	
4	Stack Overflow;Stack Exchange	
7	Stack Overflow	
8	Stack Overflow;Stack Exchange;Collectives on S...	
-	-	
89151	Stack Overflow;Stack Exchange;Stack Overflow f...	
89155	Stack Overflow;Stack Exchange	
89157	Stack Overflow;Stack Exchange	
89176	Stack Overflow;Stack Exchange	
89179	Stack Overflow;Stack Exchange;Stack Overflow f...	
RespondId	SOVisitFreq	SOAccount
2	Daily or almost daily	Yes
3	A few times per month or weekly	Yes
4	A few times per week	Yes
7	A few times per month or weekly	Yes

8	Daily or almost daily	Yes
-	-	-
89151	A few times per month or weekly	Yes
89155	A few times per month or weekly	Yes
89157	Less than once per month or monthly	Yes
89176	Multiple times per day	Not sure/can't remember
89179	Daily or almost daily	Yes
SOPartFreq		SOComm \
RespondId		
2	A few times per month or weekly	Yes, definitely
3	Less than once per month or monthly	Neutral
4	Less than once per month or monthly	No, not really
7	Less than once per month or monthly	Neutral
8	A few times per month or weekly	Yes, somewhat
-	-	-
89151	Less than once per month or monthly	No, not at all
89155	Less than once per month or monthly	No, not at all
89157	Less than once per month or monthly	No, not really
89176	NaN	No, not really
89179	A few times per month or weekly	No, not really
SOAI \		
RespondId		
2	I don't think it's super necessary, but I thin...	NaN
3		NaN
4	I'm wearing of Stack Overflow using AI.	Neutral
7		NaN
8		NaN
-	-	-
89151	Generally negative. Doing a better job of find...	
89155	I think AI could help improve the quality of p...	
89157	Sounds generally helpful, yes. It could also d...	
89176	I think there is value in incorporating AI to ...	
89179	Improve question writing	
AISelect		AISent \
RespondId		
2	Yes	Indifferent
3	No, and I don't plan to	NaN
4	No, and I don't plan to	NaN
7	Yes	Unfavorable
8	Yes	Favorable
-	-	-
89151	No, and I don't plan to	NaN
89155	No, but I plan to soon	Favorable
89157	Yes	Favorable

```

89176      Yes      Favorable
89179      No, but I plan to soon  Favorable

AIAcc  \
RespondId
2          Other (please explain)
3          NaN
4          NaN
7          Improve accuracy in coding
8          Increase productivity;Speed up learning
-
89151      -
89155      NaN
89157      Increase productivity;Improve collaboration
89176      Increase productivity;Greater efficiency;Speed...
89179      NaN

AIBen  \
RespondId
2      Somewhat distrust
3      NaN
4      NaN
7      Somewhat distrust
8      Somewhat distrust
-
89151      NaN
89155      Somewhat distrust
89157      Somewhat distrust
89176      Somewhat trust
89179      Somewhat distrust

AIToolInterested in Using  \
RespondId
2      Learning about a codebase;Writing code;Debuggi...
3          NaN
4          NaN
7          NaN
8      Project planning;Writing code;Documenting code...
-
89151      -
89155      NaN
89157      Learning about a codebase;Debugging and gettin...
89176      Learning about a codebase;Documenting code;Deb...
89179      NaN

AIToolCurrently Using  \
RespondId

```

```

2           Writing code;Committing and reviewing code
3                               NaN
4                               NaN
7           Writing code;Debugging and getting help
8           Project planning;Writing code;Debugging and ge...
-
89151                               NaN
89155                               NaN
89157           Writing code;Documenting code
89176           Writing code;Testing code
89179                               NaN

          AIToolNot interested in Using \
RespondId
2                               NaN
3                               NaN
4                               NaN
7           Learning about a codebase;Project planning;Wri...
8                               NaN
-
89151                               NaN
89155                               NaN
89157           Project planning;Committing and reviewing code...
89176           Project planning;Committing and reviewing code...
89179                               NaN

          AINextVery different AINextNeither different nor similar \
RespondId
2                               NaN
3                               NaN
4                               NaN
7                               NaN
8                               NaN
-
89151                               NaN
89155                               NaN
89157                               NaN
89176           Writing code;Testing code
89179                               NaN

          AINextSomewhat similar AINextVery similar \
RespondId
2                               NaN      NaN
3                               NaN      NaN
4                               NaN      NaN
7                               NaN      NaN
8                               NaN      NaN

```

89151	NaN	NaN	
89155	NaN	NaN	
89157	NaN	NaN	
89176	NaN	NaN	
89179	NaN	NaN	
- AINextSomewhat different TBranch		ICorPM \	
RespondId			
2	NaN	Yes	People manager
3	NaN	Yes	Individual contributor
4	NaN	Yes	Individual contributor
7	NaN	Yes	Individual contributor
8	NaN	Yes	NaN
- 89151		NaN	Individual contributor
89155	NaN	Yes	Individual contributor
89157	Writing code; Documenting code	Yes	People manager
89176		Yes	Individual contributor
89179	NaN	Yes	Individual contributor
WorkExp Knowledge_1		Knowledge_2 \	
RespondId			
2	10.0	Strongly agree	Agree
3	23.0	Strongly agree	Neither agree nor disagree
4	7.0	Strongly agree	Strongly disagree
7	4.0	Strongly agree	Agree
8	5.0	NaN	NaN
- 89151		="	="
89155	30.0	Strongly agree	Agree
89157	8.0	Agree	Strongly disagree
89176	8.0	Strongly agree	Agree
89179	22.0	Agree	Neither agree nor disagree
Knowledge_3		Knowledge_4 \	
RespondId			
2	Strongly agree	Agree	Agree
3	Agree	Agree	Agree
4	Strongly agree	Strongly agree	Strongly agree
7	Neither agree nor disagree	Neither agree nor disagree	Neither agree nor disagree
8	NaN	NaN	NaN
- 89151		="	="
89155	Neither agree nor disagree	Agree	Agree
89157	Agree	Disagree	Agree
89176	Neither agree nor disagree	Strongly agree	Strongly agree

		Disagree	Neither agree nor disagree	Agree
		Knowledge_5	Knowledge_6	Knowledge_7
RespondId				
2	Agree			Agree
3	Agree			Agree
4	Agree	Neither agree nor disagree		
7	Agree			Agree
8	NaN			NaN
-	-			-
89151	Agree			Disagree
89155	Agree			Agree
89157	Agree		Strongly agree	
89176	Strongly agree	Neither agree nor disagree		
89179	Agree			Agree
		Knowledge_7	Knowledge_8	Knowledge_9
RespondId				
2		Agree	Strongly agree	
3		Agree	Agree	
4		Agree	Agree	
7		Agree	Neither agree nor disagree	
8		NaN	NaN	
-	-	Disagree	Neither agree nor disagree	-
89151		Strongly agree		Disagree
89155		Neither agree nor disagree	Neither agree nor disagree	
89157			Neither agree nor disagree	
89176		Agree		Agree
89179		Strongly agree	Neither agree nor disagree	
		Frequency_1	Frequency_2	Frequency_3
RespondId				
2	1-2 times a week	10+ times a week		Never
3	6-10 times a week	6-10 times a week	3-5 times a week	
4	1-2 times a week	10+ times a week	1-2 times a week	
7	1-2 times a week	3-5 times a week	1-2 times a week	
8	NaN	NaN	NaN	
-	-	-	-	-
89151	1-2 times a week	6-10 times a week	1-2 times a week	
89155	Never	1-2 times a week	1-2 times a week	
89157	1-2 times a week	10+ times a week	3-5 times a week	
89176	1-2 times a week	3-5 times a week		Never
89179	1-2 times a week	1-2 times a week	1-2 times a week	
		TimeSearching	TimeAnswering	Time
RespondId				
2	15-30 minutes a day		15-30 minutes a day	

SurveyLength	SurveyEase
3	30-60 minutes a day
4	15-30 minutes a day
7	Less than 15 minutes a day
8	60-120 minutes a day
-	-
89151	Less than 15 minutes a day
89155	30-60 minutes a day
89157	30-60 minutes a day
89176	60-120 minutes a day
89179	15-30 minutes a day
ProfessionalTech \	
RespondId	
2	DevOps function;Microservices;Automated testin...
3	DevOps function;Microservices;Automated testin...
4	Automated testing;Continuous integration (CI) -
7	Microservices;Automated testing;Continuous int...
8	None of these
-	-
89151	DevOps function;Automated testing;Developer po...
89155	Developer portal or other central places to fi...
89157	Automated testing;Observability tools;Continuo...
89176	DevOps function;Continuous integration (CI) an...
89179	DevOps function;Microservices;Automated testin...
Industry \	
RespondId	
2	Information Services, IT, Software Development...
3	Information Services, IT, Software Development...
4	NaN
7	Information Services, IT, Software Development...
8	Financial Services
-	-
89151	Information Services, IT, Software Development...
89155	Information Services, IT, Software Development...
89157	Information Services, IT, Software Development...
89176	Information Services, IT, Software Development...
89179	Insurance
SurveyLength	SurveyEase \
RespondId	
2	Appropriate in length
3	Appropriate in length
4	Appropriate in length
7	Appropriate in length
8	NaN
-	-

```

89151           Too short           Easy
89155 Appropriate in length   Easy
89157 Appropriate in length Neither easy nor difficult
89176 Appropriate in length Neither easy nor difficult
89179 Appropriate in length   Easy

ConvertedCompYearly
ResponselId
2           285000.0
3           250000.0
4           156000.0
7           135000.0
8           80000.0
-
89151           NaN
89155           75000.0
89157           195000.0
89176           NaN
89179           NaN

[18647 rows x 83 columns]

[1]: data.query('ConvertedCompYearly>=100000 & Country=="India" & RemoteWork == "Remote" & YearsCodePro=="12"')

[1]: Q120
ResponselId      MainBranch      Age \
52814 I agree I am a developer by profession 35-44 years old
58985 I agree I am a developer by profession 35-44 years old

                                         Employment RemoteWork \
ResponselId
52814 Independent contractor, freelancer, or self-em.      Remote
58985 Employed, full-time      Remote

CodingActivities \
ResponselId
52814 I don't code outside of work
58985 I don't code outside of work

EdLevel \
ResponselId
52814 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
58985 Bachelor's degree (B.A., B.S., B.Eng., etc.)

LearnCode \
ResponselId

```

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*Image :stackoverflowdevelopersurvey-images-169*

```

89177          Angular;Spring Boot
89178          Node.js
89179          Express;Node.js;Nuxt.js;Svelte;Vue.js
89180          Spring Boot
89181          NaN
89182  Angular;AngularJS;Express;Next.js;Node.js;React
89183  Angular;ASP.NET;ASP.NET CORE;Blazor;Django;Node.js

          MiscTechHaveWorkedWith \
89164  Flutter;NumPy;OpenCV;OpenGL;Pandas;RabbitMQ
89165          NaN
89166  .NET (5+);Apache Kafka;OpenGL;Qt
89167  Flutter;NumPy;Pandas;Scikit-Learn
89168          Qt
89169          Hadoop
89170  .NET (5+);.NET Framework (1.0 - 4.8)
89171          OpenCV
89172          NaN
89173          Cordova
89174          NaN
89175  OpenCV;OpenGL;Spring Framework
89176          TensorFlow
89177  Apache Kafka;Cordova;Ionic;OpenGL
89178          Apache Kafka
89179          Flutter
89180  Flutter;OpenCV;RabbitMQ;Spring Framework;Torch
89181          NumPy;Pandas;TensorFlow
89182          CUDA;NumPy;Torch/PyTorch
89183  .NET (5+);.NET Framework (1.0 - 4.8)

          MiscTechWantToWorkWith \
89164  NumPy;OpenCV;Pandas
89165          NaN
89166  .NET (5+);.NET MAUI;Apache Kafka;OpenGL;RabbitMQ
89167  Capacitor;Flutter;JAX;NumPy;Pandas;React Native
89168          Tauri
89169          NaN
89170          .NET (5+)
89171          CUDA
89172          NaN
89173  Cordova;Electron;TensorFlow
89174          NaN
89175          Xamarin
89176          NaN
89177          Spring Framework
89178          NaN
89179          NaN

```

```

52814    Books / Physical media;Hackathons (virtual or ...
58985    On the job training;Other online resources (e...
                           LearnCodeOnline LearnCodeCoursesCert  \
ResponsId
52814                               NaN           Coursera
58985    Blogs with tips and tricks;Stack Overflow      NaN

                           YearsCode YearsCodePro          DevType  \
ResponsId
52814        24            12  Developer, full-stack
58985        14            12  Developer, mobile

                           OrgSize          PurchaseInfluence  \
ResponsId
52814    10 to 19 employees  I have a great deal of influence
58985    500 to 999 employees  I have little or no influence

                           TechList          BuyNewTool  \
ResponsId
52814  Investigate  Start a free trial;Ask developers I know/work ...
58985          NaN  Start a free trial;Ask developers I know/work ...

                           Country      Currency  CompTotal  \
ResponsId
52814    India  INR\;Indian rupee  22200000.0
58985    India  INR\;Indian rupee  8800000.0

                           LanguageHaveWorkedWith  \
ResponsId
52814  Bash/Shell (all shells);Go;HTML/CSS;JavaScript...
58985  Flow;HTML/CSS;JavaScript;Kotlin;Objective-C;Swift

                           LanguageWantToWorkWith  \
ResponsId
52814  C++;Elixir;Go;HTML/CSS;JavaScript;Lua;Python;R...
58985          NaN

                           DatabaseHaveWorkedWith  \
ResponsId
52814  BigQuery;Cloud Firestore;Dynamodb;Elasticsearc...
58985  Firebase Realtime Database;SQLite

                           DatabaseWantToWorkWith  \
ResponsId
52814  BigQuery;DuckDB;Dynamodb;Firebase Realtime Dat...
58985          NaN

```

```

PlatformHaveWorkedWith \
ResponseId
52814    Amazon Web Services (AWS);Google Cloud;Vercel
58985      NaN

PlatformWantToWorkWith \
ResponseId
52814    Amazon Web Services (AWS);Cloudflare;Fly.io;Go...
58985      NaN

WebframeHaveWorkedWith \
ResponseId
52814    Express;Flask;Next.js;Node.js;React;WordPress
58985      NaN

WebframeWantToWorkWith \
ResponseId
52814    Django;Express;FastAPI;Flask;Next.js;Node.js;P...
58985      NaN

MiscTechHaveWorkedWith \
ResponseId
52814    NumPy;Pandas
58985    React Native;Xamarin

MiscTechWantToWorkWith \
ResponseId
52814    Apache Kafka;Apache Spark;Electron;NumPy;OpenG...
58985      NaN

ToolsTechHaveWorkedWith \
ResponseId
52814    Docker;Homebrew;Kubernetes;Make;mpm;Pip;Terraf...
58985    Homebrew;LLVM's Clang;Make;ngm;Yarn

ToolsTechWantToWorkWith \
ResponseId
52814    Chef;CMake;Docker;Homebrew;Kubernetes;Make;npm...
58985      NaN

NEWCollabToolsHaveWorkedWith \
ResponseId
52814    Visual Studio Code
58985    Android Studio;Atom;IntelliJ IDEA;Vim;Visual S...

NEWCollabToolsWantToWorkWith \

```

ResponseId			
52814	Jupyter Notebook/JupyterLab;Visual Studio Code		
58985		NaN	
	OpSysPersonal use	OpSysProfessional use	\
ResponseId			
52814	Android;iOS;MacOS;Windows	Debian;Other Linux-based;Ubuntu	
58985	Android;iOS;iPadOS;MacOS	Android;iOS;iPadOS;MacOS	
	OfficeStackAsyncHaveWorkedWith		\
ResponseId			
52814	Confluence;Jira;Markdown File;Miro;Notion;Trello		
58985		Confluence;Jira;Wikis	
	OfficeStackAsyncWantToWorkWith		\
ResponseId			
52814	Markdown File;Miro;Notion;Stack Overflow for T...		
58985	Document360;Doxygen;GitHub Discussions		
	OfficeStackSyncHaveWorkedWith		\
ResponseId			
52814	Discord;Google Meet;Slack;Zoom		
58985		Slack;Zoom	
	OfficeStackSyncWantToWorkWith	AISearchHaveWorkedWith	\
ResponseId			
52814	Google Meet;Signal;Slack;WhatsApp;Zoom		ChatGPT
58985		NaN	ChatGPT
	AISearchWantToWorkWith	AIDevHaveWorkedWith	\
ResponseId			
52814	ChatGPT;Google Bard AI	AWS CodeWhisperer	
58985		NaN	NaN
	AIDevWantToWorkWith		\
ResponseId			
52814	AWS CodeWhisperer;GitHub Copilot;Rubber Duck AI		
58985		NaN	
	NEWSOSites		\
ResponseId			
52814	Stack Overflow;Stack Exchange;Stack Overflow f...		
58985	Stack Overflow;Collectives on Stack Overflow		
	SOVisitFreq	SOAccount	\
ResponseId			
52814	Multiple times per day	Yes	

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*Image :stackoverflowdevelopersurvey-images-172*

```

58985      A few times per month or weekly      Yes
                         S0PartFreq      S0Comm  \
RespondId
52814      Less than once per month or monthly  Yes, somewhat
58985      A few times per month or weekly  Yes, somewhat
                                         SOAI  \
RespondId
52814                           NaN
58985      Its a great idea to integrate the AI to stack -
                         AISelect      AISent  \
RespondId
52814      Yes  Favorable
58985      No, but I plan to soon  Favorable
                                         AIAcc  \
RespondId
52814      Increase productivity;Greater efficiency;Impro...
58985                           NaN
                                         AIBen  \
RespondId
52814      Highly distrust
58985      Highly trust
                         AIToolInterested in Using  \
RespondId
52814      Learning about a codebase;Project planning;Deb...
58985                           NaN
                                         AIToolCurrently Using AIToolNot interested in Using  \
RespondId
52814      Writing code;Documenting code
58985                           NaN                           NaN
                                         AINextVery different AINextNeither different nor similar  \
RespondId
52814      Documenting code
58985                           NaN                           NaN
                                         AINextSomewhat similar AINextVery similar AINextSomewhat different  \
RespondId
52814                           NaN                           NaN      Writing code
58985                           NaN                           NaN

```

```

TBranch           ICorPM  WorkExp   Knowledge_1  \
RespondId
52814      Yes      People manager    12.0  Strongly agree
58985      Yes  Individual contributor    12.0      Agree

Knowledge_2 Knowledge_3           Knowledge_4 Knowledge_5  \
RespondId
52814      Agree  Disagree Neither agree nor disagree      Agree
58985  Disagree  Disagree                  Agree      Agree

Knowledge_6           Knowledge_7  \
RespondId
52814  Neither agree nor disagree  Neither agree nor disagree
58985  Neither agree nor disagree  Neither agree nor disagree

Knowledge_8           Frequency_1  Frequency_2  \
RespondId
52814  Strongly agree  1-2 times a week  3-5 times a week
58985      Agree  1-2 times a week  1-2 times a week

Frequency_3           TimeSearching  TimeAnswering  \
RespondId
52814  1-2 times a week  Over 120 minutes a day  30-60 minutes a day
58985      Never  Less than 15 minutes a day  15-30 minutes a day

ProfessionalTech  \
RespondId
52814      None of these
58985  DevOps function;Microservices;Automated testin...

Industry  \
RespondId
52814      NaN
58985  Information Services, IT, Software Development

SurveyLength           SurveyEase  \
RespondId
52814  Appropriate in length  Neither easy nor difficult
58985  Appropriate in length  Neither easy nor difficult

ConvertedCompYearly
RespondId
52814      268995.0
58985      106629.0

[ ]: data.query('ConvertedCompYearly>=100000 & Country=="India" & RemoteWork == "Remote" & YearsCodePro=="5"')

```

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*Image :stackoverflowdevelopersurvey-images-174*

```

[ ]: Q120 MainBranch Age \
  ResponseId 48195 I agree I am a developer by profession 25-34 years old
          Employment RemoteWork \
  ResponseId 48195 Employed, full-time Remote
          CodingActivities \
  ResponseId 48195 Hobby;Contribute to open-source projects;Books...
          EdLevel \
  ResponseId 48195 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
          LearnCode \
  ResponseId 48195 Books / Physical media;Online Courses or Certi...
          LearnCodeOnline \
  ResponseId 48195 Formal documentation provided by the owner of ...
  ResponseId 48195 LearnCodeCoursesCert YearsCode YearsCodePro DevType \
  ResponseId 48195 Udemy;Pluralsight 17 8 Educator
          OrgSize PurchaseInfluence TechList \
  ResponseId 48195 1,000 to 4,999 employees I have some influence Investigate
          BuyNewTool Country \
  ResponseId 48195 Start a free trial;Ask developers I know/work ... India
          Currency CompTotal \
  ResponseId 48195 INR\Indian rupee 12000000.0
          LanguageHaveWorkedWith \
  ResponseId 48195 HTML/CSS;Java;JavaScript;Python;SQL;TypeScript
          LanguageWantToWorkWith \
  ResponseId 48195 Haskell;HTML/CSS;Nim;Python;Rust;TypeScript

```

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*Image :stackoverflowdevelopersurvey-images-175*

```

    DatabaseHaveWorkedWith DatabaseWantToWorkWith \
RespondId
48195      PostgreSQL;Supabase PostgreSQL;Redis;SQLite

    PlatformHaveWorkedWith PlatformWantToWorkWith \
RespondId
48195      NaN      NaN

    WebframeHaveWorkedWith WebframeWantToWorkWith \
RespondId
48195      Django;Next.js;React;Svelte Deno;Django;FastAPI;Svelte

    MiscTechHaveWorkedWith MiscTechWantToWorkWith \
RespondId
48195      NaN      NaN

    ToolsTechHaveWorkedWith ToolsTechWantToWorkWith \
RespondId
48195      Vite;Webpack;Yarn Kubernetes;Terraform;Vite;Yarn

    NEWCollabToolsHaveWorkedWith \
RespondId
48195      CLion;IntelliJ IDEA;PyCharm;Sublime Text;WebStorm

    NEWCollabToolsWantToWorkWith OpSysPersonal use \
RespondId
48195      IntelliJ IDEA;PyCharm;Visual Studio Code      MacOS

    OpSysProfessional use OfficeStackAsyncHaveWorkedWith \
RespondId
48195      MacOS      NaN

    OfficeStackAsyncWantToWorkWith OfficeStackSyncHaveWorkedWith \
RespondId
48195      NaN      Google Meet;Slack;Whatsapp;Zoom

    OfficeStackSyncWantToWorkWith AISearchHaveWorkedWith \
RespondId
48195      Google Meet;Slack;Whatsapp      ChatGPT

    AISearchWantToWorkWith AIDevHaveWorkedWith AIDevWantToWorkWith \
RespondId
48195      ChatGPT      GitHub Copilot      GitHub Copilot

    NEWSOSites      SOVisitFreq SOAccount \
RespondId

```

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*Image :stackoverflowdevelopersurvey-images-176*

```

48195      Stack Overflow;Stack Exchange  Multiple times per day      Yes
                    S0PartFreq      S0Comm  \
RespondId
48195      Less than once per month or monthly  No, not really
                    SOAI AISelect  \
RespondId
48195      AI can be used to answer simpler/repetitive qu...      Yes
                    AISent      AIAcc  \
RespondId
48195      Very favorable  Increase productivity;Greater efficiency;Speed...
                    AIBen      AIToolInterested in Using  \
RespondId
48195      Somewhat trust  Learning about a codebase;Project planning;Wri...
                    AIToolCurrently Using AIToolNot interested in Using  \
RespondId
48195      Writing code;Documenting code      NaN
                    AINextVery different AINextNeither different nor similar  \
RespondId
48195      Writing code;Documenting code      NaN
                    AINextSomewhat similar AINextVery similar AINextSomewhat different  \
RespondId
48195      NaN      NaN      NaN
                    TBranch      ICorPM  WorkExp Knowledge_1  \
RespondId
48195      Yes  Individual contributor      8.0      Agree
                    Knowledge_2 Knowledge_3      Knowledge_4 Knowledge_5  \
RespondId
48195      Strongly agree  Disagree  Strongly disagree  Disagree
                    Knowledge_6      Knowledge_7      Knowledge_8  \
RespondId
48195      Strongly agree  Strongly agree  Strongly disagree
                    Frequency_1      Frequency_2      Frequency_3  \
RespondId
48195      10+ times a week  10+ times a week  10+ times a week
                    TimeSearching      TimeAnswering  \

```

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*Image :stackoverflowdevelopersurvey-images-177*

```

    ResponselD          Q120
    ResponselD          48195      30-60 minutes a day 30-60 minutes a day
                                         ProfessionalTech \
    ResponselD          48195      DevOps function;Microservices;Observability to..
                                         Industry SurveyLength SurveyEase  ConvertedCompYearly
    ResponselD          48195      Higher Education      Too short      Easy           145403.0
    [ ]: data['YearsCodePro'] = pd.to_numeric(data['YearsCodePro'],errors='coerce')
    [ ]: #making 100k with less than 12 years of experience.
    data.query('ConvertedCompYearly>=100000 & Country=="India" & RemoteWork == "Remote" & YearsCodePro<12')
    [ ]: Q120
    ResponselD          MainBranch \
    ResponselD          5411      I agree           I am a developer by profession
    36752              I agree           I am not primarily a developer, but I write co...
    44276              I agree           I am a developer by profession
    48195              I agree           I am a developer by profession
    76024              I agree           I am a developer by profession
    86253              I agree           I am a developer by profession
    ResponselD          Age          Employment RemoteWork \
    ResponselD          5411      25-34 years old Employed, full-time      Remote
    36752              25-34 years old Employed, full-time      Remote
    44276              25-34 years old Employed, full-time      Remote
    48195              25-34 years old Employed, full-time      Remote
    76024              25-34 years old Employed, full-time      Remote
    86253              25-34 years old Employed, full-time      Remote
    ResponselD          CodingActivities \
    ResponselD          5411      Contribute to open-source projects
                                         Hobby
    36752              Hobby;Professional development or self-paced l...
    44276              Hobby;Contribute to open-source projects;Boots...
    48195              Hobby;Professional development or self-paced l...
    76024              Hobby;Contribute to open-source projects;Bootstrappi...
    86253              Hobby;Professional development or self-paced l...
    ResponselD          EdLevel \
    ResponselD          5411      Bachelor's degree (B.A., B.S., B.Eng., etc.)

```

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*Image :stackoverflowdevelopersurvey-images-178*

36752	Master's degree (M.A., M.S., M.Eng., MBA, etc.)	LearnCode	\
44276	Master's degree (M.A., M.S., M.Eng., MBA, etc.)		
48195	Master's degree (M.A., M.S., M.Eng., MBA, etc.)		
76024	Bachelor's degree (B.A., B.S., B.Eng., etc.)		
86253	Bachelor's degree (B.A., B.S., B.Eng., etc.)		
LearnCode			
ResponsId			
5411	Books / Physical media;Colleague;Hackathons (v...		
36752	Books / Physical media;Other online resources -		
44276	Online Courses or Certification;Other online r...		
48195	Books / Physical media;Online Courses or Certi...		
76024	Online Courses or Certification;Other online r...		
86253	Hackathons (virtual or in-person);Online Cours...		
LearnCodeOnline			
ResponsId			
5411	Formal documentation provided by the owner of -		
36752	Formal documentation provided by the owner of -		
44276	Formal documentation provided by the owner of -		
48195	Formal documentation provided by the owner of -		
76024	Formal documentation provided by the owner of -		
86253	Formal documentation provided by the owner of -		
LearnCodeCoursesCert YearsCode YearsCodePro			
ResponsId			
5411	Udemy 15 10.0		
36752	NaN 20 11.0		
44276	Other;Codecademy;Coursera 15 11.0		
48195	Udemy;Pluralsight 17 8.0		
76024	Codecademy;Udemy;Coursera 14 10.0		
86253	NaN 11 5.0		
DevType OrgSize			
ResponsId			
5411	Developer, back-end 10,000 or more employees		
36752	Engineering manager 5,000 to 9,999 employees		
44276	Developer, front-end 100 to 499 employees		
48195	Educator 1,000 to 4,999 employees		
76024	Developer, full-stack 10,000 or more employees		
86253	Senior Executive (C-Suite, VP, etc.) 10 to 19 employees		
PurchaseInfluence TechList			
ResponsId			
5411	I have some influence Given a list		
36752	I have little or no influence NaN		
44276	I have little or no influence NaN		

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Image :stackoverflowdevelopersurvey-images-179

```

89180      RabbitMQ;Spring Framework;Torch/PyTorch
89181      NumPy;Pandas;Torch/PyTorch
89182      CUDA;Flutter;NumPy;TensorFlow;Torch/PyTorch
89183      .NET (5+);Apache Kafka;RabbitMQ;Tauri

          ToolsTechHaveWorkedWith \
89164      Docker;Kubernetes;npm;Pip;Yarn
89165      Docker;Homebrew;npm;Pip;Unity 3D;Webpack;Yarn
89166      Chocolatey;GNU GCC;Homebrew;LLVM's Clang;npm;N-
89167          Homebrew;Vite
89168      APT;Bun;Cargo;Chocolatey;Docker;GNU GCC;Gradle-
89169          Docker;Homebrew;npm;Pip
89170      MSBuild;Visual Studio Solution
89171      Gradle
89172      APT;GNU GCC;Make;npm;Pip;Webpack
89173          npm
89174      Docker;Homebrew;npm;Visual Studio Solution;Web-
89175          Docker;Gradle;Maven (build tool)
89176          npm;Yarn
89177      Ant;Composer;Docker;NuGet;Visual Studio Soluti-
89178          Docker;Homebrew;Yarn
89179      Chocolatey;CMake;Docker;Maven (build tool);npm-
89180          Maven (build tool);Pip
89181          Cargo
89182      Docker;Kubernetes;npm;Podman;Vite
89183      Docker;npm;NuGet;ppm;Vite;Webpack;Yarn

          ToolsTechWantToWorkWith \
89164      Ansible;Docker;Kubernetes;Pip;Terraform
89165      Bun;Docker;Homebrew;npm;Yarn
89166      Chocolatey;Docker;npm;NuGet;Terraform;Unity 3D-
89167          Docker;Homebrew;Podman;Vite
89168          Docker;Make;Podman
89169          NaN
89170      MSBuild;Visual Studio Solution
89171      Gradle
89172      APT;Docker;npm;Webpack
89173      Docker;Godot;npm;Unreal Engine
89174      Docker;Homebrew;Kubernetes;LLVM's Clang;Unreal-
89175          Gradle
89176          npm
89177      Maven (build tool);npm
89178      Docker;Godot;Homebrew;Vite;Yarn
89179      Docker;npm;Pip;Vite;Yarn
89180      Maven (build tool);Pip
89181      Cargo;Docker;Kubernetes;Terraform
89182      Ansible;APT;Docker;Kubernetes;npm;Pip;Podman;T-

```

```

48195           I have some influence   Investigate
76024           I have little or no influence   NaN
86253           I have a great deal of influence   Investigate

                                         BuyNewTool Country \
RespondId
5411           Ask developers I know/work with;Visit developer_   India
36752           Start a free trial;Ask developers I know/work _   India
44276           Start a free trial;Visit developer communities_   India
48195           Start a free trial;Ask developers I know/work _   India
76024           Start a free trial;Ask developers I know/work _   India
86253           Start a free trial;Ask developers I know/work _   India

                                         Currency   CompTotal \
RespondId
5411           INR\tIndian rupee 10000000.0
36752           INR\tIndian rupee 10000000.0
44276           CAD\tCanadian dollar 150000.0
48195           INR\tIndian rupee 12000000.0
76024           INR\tIndian rupee 9000000.0
86253           INR\tIndian rupee 11200000.0

                                         LanguageHaveWorkedWith \
RespondId
5411           C++;HTML/CSS;JavaScript;Python
36752           C++;Go;Java;JavaScript;Python
44276           JavaScript;TypeScript
48195           HTML/CSS;Java;JavaScript;Python;SQL;TypeScript
76024           HTML/CSS;Java;JavaScript
86253           HTML/CSS;JavaScript;TypeScript

                                         LanguageWantToWorkWith \
RespondId
5411           C++;HTML/CSS;JavaScript;Python
36752           Go;Java;Kotlin;Rust;Swift;TypeScript
44276           Go;Ruby;Rust
48195           Haskell;HTML/CSS;Nim;Python;Rust;TypeScript
76024           Go;HTML/CSS;Java;JavaScript;Python
86253           HTML/CSS;JavaScript;TypeScript

                                         DatabaseHaveWorkedWith \
RespondId
5411           MongoDB
36752           BigQuery;Cassandra;Couch DB;Elasticsearch;Mari_   NaN
44276           PostgreSQL;Supabase
48195           MariaDB;MongoDB;MySQL
76024

```

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*Image :stackoverflowdevelopersurvey-images-180*

```

86253      Cloud Firestore;Elasticsearch;Firebase Realtime
                        DatabaseWantToWorkWith \
ResponsId
5411          MongoDB
36752      Cassandra;Cloud Firestore;Dynamodb;Elasticsearch
                        NaN
44276          PostgreSQL;Redis;SQLite
48195          NaN
76024      Dynamodb;MariaDB;MongoDB;MySQL;PostgreSQL
86253      Cloud Firestore;Elasticsearch;Firebase Realtime

                        PlatformHaveWorkedWith \
ResponsId
5411      Amazon Web Services (AWS);Cloudflare;Digital Ocean
                        Amazon Web Services (AWS);Google Cloud
36752          Amazon Web Services (AWS);Google Cloud
44276          Microsoft Azure
48195          NaN
76024      Amazon Web Services (AWS);Microsoft Azure
86253          Google Cloud;Netlify

                        PlatformWantToWorkWith \
ResponsId
5411      Amazon Web Services (AWS);Cloudflare;Digital Ocean
                        Amazon Web Services (AWS)
44276          Microsoft Azure
48195          NaN
76024      Amazon Web Services (AWS);Google Cloud;Microsoft Azure
86253          Google Cloud;Netlify

                        WebframeHaveWorkedWith \
ResponsId
5411          Node.js;React
36752      Django;Express;FastAPI;Flask;Next.js;Node.js;React
                        React
44276          Django;Next.js;React;Svelte
48195          jQuery;Node.js
76024          NestJS;Node.js;Nuxt.js;Vue.js
86253          NestJS;Node.js;Nuxt.js;Vue.js

                        WebframeWantToWorkWith \
ResponsId
5411          Node.js;React
36752      FastAPI;React;Spring Boot
                        Vue.js
44276          Deno;Django;FastAPI;Svelte
48195          jQuery;Node.js
76024          NestJS;Node.js;Nuxt.js;Vue.js
86253          NestJS;Node.js;Nuxt.js;Vue.js

```

```

      MiscTechHaveWorkedWith \
  ResponseId
  5411      CUDA;GTK;OpenGL;Qt;TensorFlow;Torch/PyTorch
  36752     Apache Kafka;Hugging Face Transformers;NumPy;P-
  44276
  48195
  76024
  86253     Tauri

      MiscTechWantToWorkWith \
  ResponseId
  5411      CUDA;GTK;OpenGL;Qt;TensorFlow;Torch/PyTorch
  36752     Apache Kafka;Hugging Face Transformers;NumPy;P-
  44276
  48195
  76024
  86253     Tauri

      ToolsTechHaveWorkedWith \
  ResponseId
  5411      GNU GCC;LLVM's Clang;Unreal Engine
  36752     Docker;GNU GCC;Gradle;Kubernetes;Make;Maven (b-
  44276
  48195
  76024
  86253     Docker;Webpack;Yarn
                  Vite;Webpack;Yarn
                  Homebrew;npm;Webpack
                  Docker;Homebrew;ngm;pngm;Vite

      ToolsTechWantToWorkWith \
  ResponseId
  5411      GNU GCC;LLVM's Clang;Unreal Engine
  36752     Docker;GNU GCC;Gradle;Kubernetes;Make;Maven (b-
  44276
  48195
  76024
  86253     Docker;Kubernetes;Terraform;Vite;Yarn
                  Homebrew;Kubernetes;npm;Webpack
                  Docker;Homebrew;ngm;pngm;Vite

      NEwCollabToolsHaveWorkedWith \
  ResponseId
  5411      CLion;Kate;Nano;Notepad++;Qt Creator;Rad Studio-
  36752     Goland;IntelliJ IDEA;IPython;Jupyter Notebook/-
  44276
  48195
  76024
  86253     RubyMine
                  CLion;IntelliJ IDEA;PyCharm;Sublime Text;WebStorm
                  IntelliJ IDEA;Visual Studio Code
                  Visual Studio Code

      NEwCollabToolsWantToWorkWith \
  ResponseId

```

```

5411      CLion;Kate;Nano;Notepad++;Qt Creator;Rsd Studio...
36752      Goland;IntelliJ IDEA;IPython;Jupyter Notebook/...
44276          NaN
48195      IntelliJ IDEA;PyCharm;Visual Studio Code
76024      IntelliJ IDEA;Visual Studio Code
86253          Visual Studio Code

                    OpSysPersonal use \_
ResponsId
5411      Arch;Debian;Other Linux-based;Red Hat;Ubuntu;W...
36752          MacOS;Ubuntu
44276          MacOS
48195          MacOS
76024          MacOS
86253          MacOS

                    OpSysProfessional use \_
ResponsId
5411      Arch;Debian;Other Linux-based;Red Hat;Ubuntu;W...
36752          MacOS;Ubuntu
44276          NaN
48195          MacOS
76024          MacOS
86253          MacOS

                    OfficeStackAsyncHaveWorkedWith \_
ResponsId
5411          NaN
36752      Confluence;GitHub Discussions;Notion
44276          Jira
48195          NaN
76024      Markdown File;Microsoft Planner;Miro
86253      GitHub Discussions;Linear

                    OfficeStackAsyncWantToWorkWith \_
ResponsId
5411          NaN
36752      Confluence;GitHub Discussions;Notion
44276          NaN
48195          NaN
76024      Markdown File;Microsoft Planner;Miro
86253      GitHub Discussions;Linear

                    OfficeStackSyncHaveWorkedWith \_
ResponsId
5411      Discord;Google Meet;Microsoft Teams;Telegram;W...
36752      Google Meet;Microsoft Teams;Slack;Zoom

```

```

44276           Microsoft Teams;Slack;Zoom
48195           Google Meet;Slack;Whatsapp;Zoom
76024           Mattermost;Microsoft Teams
86253           Discord;Google Meet;Signal;Telegram;Whatsapp;Zoom

                    OfficeStackSyncWantToWorkWith \
ResponsId
5411           Discord;Google Meet;Microsoft Teams;Telegram;W...
36752           Google Meet;Microsoft Teams;Slack;Zoom
44276           NaN
48195           Google Meet;Slack;Whatsapp
76024           Mattermost;Microsoft Teams
86253           Discord;Google Meet;Signal;Telegram;Whatsapp;Zoom

                    AIStackWantToWorkWith \
ResponsId
5411           ChatGPT
36752           ChatGPT
44276           NaN
48195           ChatGPT
76024           ChatGPT;Google Bard AI
86253           ChatGPT;Google Bard AI;WolframAlpha
                           ChatGPT

                    AIDevWantToWorkWith \
ResponsId
5411           NaN
36752           NaN
44276           GitHub Copilot
48195           GitHub Copilot
76024           NaN
86253           GitHub Copilot

                    NEWSOSites \
ResponsId
5411           Stack Overflow;Stack Exchange
36752           Stack Overflow;Stack Exchange;Collectives on S...
44276           Stack Overflow
48195           Stack Overflow;Stack Exchange
76024           Stack Overflow;Stack Exchange;Collectives on S...
86253           Stack Overflow

                    SOVisitFreq           SOAccount \
ResponsId
5411           Less than once per month or monthly           Yes
36752           A few times per month or weekly  Not sure/can't remember
44276           Daily or almost daily           Yes
48195           Multiple times per day           Yes

```

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Image :stackoverflowdevelopersurvey-images-185

```

    AIToolInterested in Using \
    RespondId
    5411
    36752
    44276
    48195
    76024
    86253

    Committing and reviewing code
    Learning about a codebase;Project planning;Wri...
    NaN
    NaN
    NaN
    NaN
    NaN
    NaN

    AIToolCurrently Using \
    RespondId
    5411
    36752
    44276
    48195
    76024
    86253

    Writing code;Documenting code;Testing code
    Writing code;Documenting code
    NaN
    NaN
    NaN
    NaN

    AIToolNot interested in Using \
    RespondId
    5411
    36752
    44276
    48195
    76024
    86253

    NaN
    NaN
    NaN
    NaN
    NaN
    NaN

    AINextVery different \
    RespondId
    5411
    36752
    44276
    48195
    76024
    86253

    NaN
    NaN
    Documenting code
    Writing code;Documenting code
    NaN
    Project planning;Documenting code;Debugging an...
    NaN

    AINextNeither different nor similar AINextSomewhat similar \
    RespondId
    5411
    36752
    44276
    48195
    76024
    86253

    NaN
    NaN
    NaN
    NaN
    NaN
    Writing code

    AINextVery similar \

```

RespondId	AINextSomewhat different TBranch \		
5411	NaN	NaN	Yes
36752	NaN	NaN	Yes
44276	NaN	NaN	Yes
48195	NaN	NaN	Yes
76024	NaN	NaN	Yes
86253	NaN	NaN	Yes

RespondId	Writing code;Testing code \		
5411	NaN	NaN	Yes
36752	NaN	NaN	Yes
44276	NaN	NaN	Yes
48195	NaN	NaN	Yes
76024	NaN	NaN	Yes
86253	Learning about a codebase;Collaborating with t...	NaN	Yes

RespondId	ICorPM	WorkExp	Knowledge_1 \
5411	Individual contributor	10.0	Agree
36752	People manager	10.0	Strongly agree
44276	Individual contributor	11.0	Neither agree nor disagree
48195	Individual contributor	8.0	Agree
76024	Individual contributor	10.0	Strongly agree
86253	People manager	9.0	Agree

RespondId	Knowledge_2	Knowledge_3 \
5411	Strongly disagree	Strongly agree
36752	Strongly disagree	Strongly agree
44276	Agree	Neither agree nor disagree
48195	Strongly agree	Disagree
76024	Agree	Disagree
86253	Agree	Agree

RespondId	Knowledge_4	Knowledge_5 \
5411	Strongly agree	Strongly agree
36752	Strongly agree	Strongly agree
44276	Neither agree nor disagree	Agree
48195	Strongly disagree	Disagree
76024	Agree	Agree
86253	Agree	Agree

RespondId	Knowledge_6	Knowledge_7 \
5411	Strongly disagree	Strongly disagree

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*Image :stackoverflowdevelopersurvey-images-187*

36752	Neither agree nor disagree	Strongly disagree	
44276	Neither agree nor disagree	Neither agree nor disagree	
48195	Strongly agree	Strongly agree	
76024	Agree	Agree	
86253	Agree	Agree	
Knowledge_S			
Frequency_1			
Frequency_2 \			
5411	Strongly agree	1-2 times a week	6-10 times a week
36752	Strongly agree	1-2 times a week	1-2 times a week
44276	Neither agree nor disagree	1-2 times a week	1-2 times a week
48195	Strongly disagree	10+ times a week	10+ times a week
76024	Agree	1-2 times a week	1-2 times a week
86253	Agree	1-2 times a week	Never
Frequency_3			
TimeSearching \			
5411	Never	15-30 minutes a day	
36752	Never	Less than 15 minutes a day	
44276	3-5 times a week	30-60 minutes a day	
48195	10+ times a week	30-60 minutes a day	
76024	1-2 times a week	Less than 15 minutes a day	
86253	1-2 times a week	Less than 15 minutes a day	
TimeAnswering \			
5411	15-30 minutes a day		
36752	Less than 15 minutes a day		
44276	Less than 15 minutes a day		
48195	30-60 minutes a day		
76024	30-60 minutes a day		
86253	15-30 minutes a day		
ProfessionalTech \			
5411	DevOps function;Microservices;Automated testing		
36752	DevOps function;Microservices;Automated testing		
44276	DevOps function;Automated testing;Developer po		
48195	DevOps function;Microservices;Observability to		
76024	DevOps function;Microservices;Automated testing		
86253	Microservices;Developer portal or other centra		
Industry \			
5411	Information Services, IT, Software Development		
36752		Other	
44276		Financial Services	

```

48195                               Higher Education
76024  Information Services, IT, Software Development...
86253  Information Services, IT, Software Development...

SurveyLength          SurveyEase \
Respondent
5411    Appropriate in length           Easy
36752   Appropriate in length           Easy
44276   Appropriate in length  Neither easy nor difficult
48195   Too short                      Easy
76024   NaN                           Easy
86253   Appropriate in length  Neither easy nor difficult

ConvertedCompYearly
Respondent
5411    121169.0
36752   121169.0
44276   111527.0
48195   148403.0
76024   109052.0
86253   135709.0

[1]: sample_devs=data.query('ConvertedCompYearly>=100000 & Country=="India" & \
    ~RemoteWork == "Remote" & YearsCodePro<12')

[2]: sample_devs['LanguageHaveWorkedWith'].value_counts()

[3]: LanguageHaveWorkedWith
C++;HTML;CSS;JavaScript;Python           1
C++;Go;Java;JavaScript;Python           1
JavaScript;TypeScript                   1
HTML/CSS;Java;JavaScript;Python;SQL;TypeScript  1
HTML/CSS;Java;JavaScript                 1
HTML/CSS;JavaScript;TypeScript          1
Name: count, dtype: int64

[4]: sample_devs['WebframeHaveWorkedWith'].value_counts()

[5]: WebframeHaveWorkedWith
Node.js;React                           1
Django;Express;FastAPI;Flask;Next.js;Node.js;React;Spring Boot  1
React                                  1
Django;Next.js;React;Svelte             1
jQuery;Node.js                         1
NestJS;Node.js;Nuxt.js;Vue.js           1
Name: count, dtype: int64

```

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*Image :stackoverflowdevelopersurvey-images-189*

```

89183   Bun;Docker;npm;NuGet;pnpm;Vite;Yarn
          NEWCollabToolsHaveWorkedWith \
89164  Android Studio;Atom;Fleet;Goland;IntelliJ IDEA; \
89165  Android Studio;Atom;Code::Blocks;Eclipse;Intel; \
89166  Android Studio;Atom;CLion;DataGrip;Nano;Neovim; \
89167  Android Studio;Jupyter Notebook/JupyterLab;Sub; \
89168  Eclipse;IntelliJ IDEA;Qt Creator;Vim;Visual St; \
89169          NaN
89170          Notepad++;Vim;Visual Studio
89171          IntelliJ IDEA;Vim
89172          Vim
89173  RStudio;Visual Studio;Visual Studio Code
89174  Android Studio;Atom;Notepad++;Sublime Text;Vim; \
89175  Android Studio;Atom;Eclipse;IntelliJ IDEA;Netb; \
89176  Android Studio;Code::Blocks;Eclipse;IntelliJ I; \
89177  Atom;Eclipse;PhpStorm;Sublime Text;Vim;Visual - \
89178          IntelliJ IDEA;Nano;Visual Studio Code
89179  Android Studio;Atom;Eclipse;IntelliJ IDEA;Netb; \
89180          Android Studio;IntelliJ IDEA;PyCharm
89181  Jupyter Notebook/JupyterLab;Neovim;Visual Stud; \
89182  Eclipse;IntelliJ IDEA;Nano;Notepad++;PyCharm;V- \
89183          Visual Studio;Visual Studio Code

          NEWCollabToolsWantToWorkWith \
89164          PyCharm;Visual Studio Code
89165          Nano;Vim;Visual Studio Code
89166          DataGrip;Notepad++;Rider
89167  Jupyter Notebook/JupyterLab;Sublime Text;Visua- \
89168          Vim
89169          NaN
89170          Notepad++;Visual Studio
89171          Fleet;IntelliJ IDEA;Vim
89172          Neovim;Vim
89173  Netbeans;Visual Studio;Visual Studio Code
89174          Vim;Visual Studio Code
89175  Android Studio;IntelliJ IDEA;Notepad++
89176          PyCharm;Visual Studio Code
89177  IntelliJ IDEA;Notepad++;Visual Studio Code
89178          Visual Studio Code
89179          Visual Studio Code
89180          IntelliJ IDEA;PyCharm
89181  Jupyter Notebook/JupyterLab;Neovim;Visual Stud; \
89182  Jupyter Notebook/JupyterLab;Notepad++;Visual S- \
89183          Visual Studio;Visual Studio Code

          OpSysPersonal use \

```

```
[1]: sample_devs['OpSysProfessional use'].value_counts()

[1]: OpSysProfessional use
MacOS                               3
Arch;Debian;Other Linux-based;Red Hat;Ubuntu;Windows    1
MacOS;Ubuntu                         1
Name: count, dtype: int64

[1]: sample_devs['PlatformHaveWorkedWith'].value_counts()

[1]: PlatformHaveWorkedWith
Amazon Web Services (AWS);Google Cloud                  2
Amazon Web Services (AWS);Cloudflare;Digital Ocean;Google Cloud;OVH  1
Amazon Web Services (AWS);Microsoft Azure                1
Google Cloud;Netlify                               1
Name: count, dtype: int64

[1]: #Remove Outliers
max_value = data['ConvertedCompYearly'].max()
second_highest = data[data['ConvertedCompYearly'] <= max_value]['ConvertedCompYearly']

[1]: second_highest.sort_values(ascending=False)

[1]: Respondent
77849      73607918.0
66224      72714292.0
28122      57513831.0
19680      36573181.0
55103      17612921.0
-
87481      1.0
37161      1.0
8863       1.0
37315      1.0
85526      1.0
Name: ConvertedCompYearly, Length: 48018, dtype: float64

[1]: #Find the 95 percentile
data['ConvertedCompYearly'].quantile(0.95)

[1]: 230000.0

[1]: #Find the 99 percentile
max_salary = data['ConvertedCompYearly'].quantile(0.999)

[1]: data = data[data['ConvertedCompYearly'] < max_salary]
```

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*Image :stackoverflowdevelopersurvey-images-190*

```
[1]: data['ConvertedCompYearly'].max()
[1]: 1063111.0
[1]: data[data['ConvertedCompYearly'] == data['ConvertedCompYearly'].max()]
[1]:          Q120          MainBranch          Age \
[1]: 18472    I agree  I am a developer by profession  25-34 years old
[1]:                                     Employment \
[1]: 18472  Employed, full-time;Independent contractor, fr...
[1]:                                     RemoteWork \
[1]: 18472  Hybrid (some remote, some in-person)
[1]:          CodingActivities          EdLevel \
[1]: 18472  Hobby;Contribute to open-source projects;Books..  Something else
[1]:          LearnCode LearnCodeOnline \
[1]: 18472  Books / Physical media;Colleague;Friend or fam...      NaN
[1]:          LearnCodeCoursesCert YearsCode  YearsCodePro          DevType \
[1]: 18472  Codecademy;Skillsoft       10       11.0  Project manager
[1]:          OrgSize \
[1]: 18472  Just me - I am a freelancer, sole proprietor, ...
[1]:          PurchaseInfluence      TechList \
[1]: 18472  I have some influence  Given a list
[1]:          BuyNewTool  Country \
[1]: 18472  Start a free trial;Research companies that hav...  Nigeria
[1]:          Currency  CompTotal          LanguageHaveWorkedWith \
[1]: 18472  NGN\n\tNigerian naira  500000000.0  Bash/Shell (all shells);Swift
[1]:          LanguageWantToWorkWith DatabaseHaveWorkedWith \
[1]: 192
```

*Image :stackoverflowdevelopersurvey-images-191*

```

RespondId
18472 Ada;Assembly;Bash/Shell (all shells);Swift Clickhouse
DatabaseWantToWorkWith \
RespondId
18472 BigQuery;Clickhouse;Firebase Realtime Database.. PlatformHaveWorkedWith \
RespondId
18472 Amazon Web Services (AWS);Google Cloud PlatformWantToWorkWith \
RespondId
18472 Amazon Web Services (AWS);Google Cloud;Netlify.. WebframeHaveWorkedWith WebframeWantToWorkWith \
RespondId
18472 WordPress Express;WordPress MiscTechHaveWorkedWith MiscTechWantToWorkWith \
RespondId
18472 NaN NaN ToolsTechHaveWorkedWith ToolsTechWantToWorkWith \
RespondId
18472 NaN NaN NEWCollabToolsHaveWorkedWith \
RespondId
18472 Android Studio;DataGrip NEWCollabToolsWantToWorkWith \
RespondId
18472 Android Studio;DataGrip;RStudio;Visual Studio .. OpSysPersonal use OpSysProfessional use \
RespondId
18472 Android Android OfficeStackAsyncHaveWorkedWith \
RespondId
18472 Adobe Workfront OfficeStackAsyncWantToWorkWith \
RespondId
18472 Adobe Workfront;Microsoft Planner;Swit;YouTrack

```

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*Image :stackoverflowdevelopersurvey-images-192*

```

OfficeStackSyncHaveWorkedWith OfficeStackSyncWantToWorkWith \
RespondId              Telegram;Whatsapp           Telegram;Whatsapp
AIStackSyncHaveWorkedWith AIStackSyncWantToWorkWith AIStackSyncWantToWorkWith \
RespondId              Andi                  Andi           NaN
AIStackSyncWantToWorkWith \
RespondId              NaN
NEWSOSsites \
RespondId              Stack Overflow;Stack Exchange;Stack Overflow f...
SOVisitFreq SOAccount \
RespondId              A few times per month or weekly      Yes
SOPartFreq SOComm \
RespondId              A few times per month or weekly  Yes, definitely
SOAI \
RespondId              This will make my job more easier for me to ha...
AISelect AISent AIAcc      AIBen \
RespondId              No, but I plan to soon  Favorable  NaN  Somewhat trust
AIToolInterested in Using AIToolCurrently Using \
RespondId              NaN                  NaN
AIToolNot interested in Using AINextVery different \
RespondId              NaN                  NaN
AINextNeither different nor similar AINextSomewhat similar \
RespondId              NaN                  NaN
AINextVery similar AINextSomewhat different TBranch \
RespondId              NaN                  NaN      Yes

```

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*Image :stackoverflowdevelopersurvey-images-193*

```

ICorPM  WorkExp Knowledge_1 Knowledge_2 \
ResponseId
18472  People manager    11.0      Agree      Agree
                           Knowledge_3                  Knowledge_4 \
ResponseId
18472  Neither agree nor disagree  Neither agree nor disagree
                           Knowledge_5 Knowledge_6 Knowledge_7 \
ResponseId
18472  Neither agree nor disagree      Agree      Agree
                           Knowledge_8      Frequency_1      Frequency_2 \
ResponseId
18472  Strongly agree  1-2 times a week  1-2 times a week
                           Frequency_3      TimeSearching      TimeAnswering \
ResponseId
18472  1-2 times a week  15-30 minutes a day  30-60 minutes a day
                           ProfessionalTech \
ResponseId
18472  DevOps function;Microservices;Automated testin...
                           Industry      SurveyLength \
ResponseId
18472  Advertising Services  Appropriate in length
                           SurveyEase  ConvertedCompYearly
ResponseId
18472  Neither easy nor difficult      1083111.0
[ ]: data['ConvertedCompYearly'].min()
[ ]: 1.0
[ ]: emp_data = data[(data['Employment']=='Employed') & data['ConvertedCompYearly']!=
...np.nan]
emp_data['ConvertedCompYearly'].min()
[ ]: 1.0
[ ]: min_salary = emp_data['ConvertedCompYearly'].quantile(0.2)
min_salary
[ ]: 37241.0

```

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*Image :stackoverflowdevelopersurvey-images-194*

```
[1]: data = data[emp_data['ConvertedCompYearly'] > min_salary]
[2]: data['ConvertedCompYearly'].sort_values().head(40)
[3]: ResponseId
71974    37267.0
2572     37267.0
1560     37275.0
28880    37286.0
28192    37325.0
70590    37325.0
4256     37325.0
53050    37325.0
57498    37325.0
39466    37325.0
75427    37325.0
73143    37325.0
37024    37325.0
60359    37325.0
82807    37325.0
52110    37325.0
53345    37329.0
68717    37348.0
83083    37348.0
64100    37348.0
73112    37348.0
58999    37348.0
32227    37350.0
22639    37359.0
78161    37432.0
32966    37455.0
14206    37481.0
13696    37481.0
65645    37481.0
83385    37481.0
39624    37481.0
47900    37481.0
16116    37481.0
38210    37481.0
76888    37481.0
65290    37481.0
39473    37481.0
61449    37481.0
17336    37481.0
66664    37481.0
Name: ConvertedCompYearly, dtype: float64
```

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*Image :stackoverflowdevelopersurvey-images-195*

```
[1]: #mean salaries
indian_devs = data[data['Country']=="India"]
max_indian_salary = indian_devs['ConvertedCompYearly'].max()
indian_devs[indian_devs['ConvertedCompYearly']==max_indian_salary]

[1]:          Q120          MainBranch          Age \
ResponseId 72666  I agree I am a developer by profession 25-34 years old
                           Employment RemoteWork CodingActivities \
ResponseId 72666  Employed, full-time In-person          Hobby
                           EdLevel \
ResponseId 72666  Bachelor's degree (B.A., B.S., B.Eng., etc.)
                           LearnCode LearnCodeOnline \
ResponseId 72666  On the job training;School (i.e., University, -          NaN
                           LearnCodeCoursesCert YearsCode  YearsCodePro          DevType \
ResponseId 72666          NaN          8          7.0  Developer, mobile
                           OrgSize          PurchaseInfluence          TechList \
ResponseId 72666  20 to 99 employees I have some influence Investigate
                           BuyNewTool Country \
ResponseId 72666  Start a free trial;Ask developers I know/work in India
                           Currency          CompTotal          LanguageHaveWorkedWith \
ResponseId 72666  INR\₹Indian rupee  35000000.0  Dart;Objective-C;Solidity;Swift
                           LanguageWantToWorkWith DatabaseHaveWorkedWith \
ResponseId 72666          NaN          SQLite
                           DatabaseWantToWorkWith          PlatformHaveWorkedWith \
ResponseId 72666          NaN  Google Cloud;Microsoft Azure
                           PlatformWantToWorkWith WebframeHaveWorkedWith \
ResponseId
```

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*Image :stackoverflowdevelopersurvey-images-196*

```

72666           NaN           WordPress
                    WebframeWantToWorkWith MiscTechHaveWorkedWith \
                    RespondId 72666           WordPress           SwiftUI
                    MiscTechWantToWorkWith \
                    RespondId 72666           SwiftUI
                    ToolsTechHaveWorkedWith \
                    RespondId 72666           APT;Gradle;Homebrew;Kubernetes;npm;Pip;Unity 3D
                    ToolsTechWantToWorkWith \
                    RespondId 72666           APT;Gradle;Homebrew;Kubernetes;npm;Pip;Unity 3D
                    NEWCollabToolsHaveWorkedWith \
                    RespondId 72666           Android Studio;IntelliJ IDEA;Vim;Visual Studio...
                    NEWCollabToolsWantToWorkWith \
                    RespondId 72666           Android Studio;IntelliJ IDEA;Vim;Visual Studio...
                    OpSysPersonal use \
                    RespondId 72666           MacOS;Windows;Windows Subsystem for Linux (WSL)
                    OpSysProfessional use OfficeStackAsyncHaveWorkedWith \
                    RespondId 72666           MacOS;Windows           Confluence;Jira
                    OfficeStackAsyncWantToWorkWith \
                    RespondId 72666           Jira
                    OfficeStackSyncHaveWorkedWith \
                    RespondId 72666           Google Meet;Microsoft Teams;Whatsapp;Zoom
                    OfficeStackSyncWantToWorkWith \
                    RespondId 72666           Google Meet;Microsoft Teams
                    AISSearchHaveWorkedWith \

```

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*Image :stackoverflowdevelopersurvey-images-197*

```

    ResponselD
72666      Bing AI;ChatGPT;Google Bard AI;Neeva AI

                           AISeachWantToWorkWith AIDevHaveWorkedWith \
    ResponselD
72666      Bing AI;ChatGPT;Google Bard AI;Neeva AI      GitHub Copilot

                           AIDevWantToWorkWith          NEWBOSites \
    ResponselD
72666      GitHub Copilot  Stack Overflow;Stack Exchange

                           SOVisitFreq SOAccount \
    ResponselD
72666      Multiple times per day      Yes

                           SOPartFreq          SOComm \
    ResponselD
72666      Less than once per month or monthly  Yes, somewhat

                           SOAI AISelect \
    ResponselD
72666      Currently SO is a wiki, providing AI generated...      Yes

                           AISent          AIAcc          AIBes \
    ResponselD
72666      Favorable  Greater efficiency  Somewhat distrust

                           AIToolInterested in Using \
    ResponselD
72666      Learning about a codebase;Project planning;Deb...

                           AIToolCurrently Using AIToolNot interested in Using \
    ResponselD
72666      Writing code;Documenting code          NaN

                           AINextVery different AINextNeither different nor similar \
    ResponselD
72666          NaN                      NaN

                           AINextSomewhat similar AINextVery similar \
    ResponselD
72666          NaN                      NaN

                           AINextSomewhat different TBranch          ICorPM \
    ResponselD
72666      Writing code;Documenting code      Yes  Individual contributor

```

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*Image :stackoverflowdevelopersurvey-images-198*

```

WorkExp Knowledge_1 Knowledge_2 Knowledge_3 \
RespondId 72666 8.0 Agree Disagree Neither agree nor disagree

Knowledge_4 Knowledge_5 Knowledge_6 Knowledge_7 \
RespondId 72666 Neither agree nor disagree Agree Agree Agree

Knowledge_8 Frequency_1 Frequency_2 \
RespondId 72666 Neither agree nor disagree 1-2 times a week 1-2 times a week

Frequency_3 TimeSearching TimeAnswering \
RespondId 72666 1-2 times a week 30-60 minutes a day 15-30 minutes a day

ProfessionalTech \
RespondId 72666 Microservices;Continuous integration (CI) and ...

Industry SurveyLength \
RespondId 72666 Information Services, IT, Software Development.. Too long

SurveyEase ConvertedCompYearly
RespondId 72666 Easy 424091.0

[1]: min_indian_salary = indian_devs['ConvertedCompYearly'].min()
indian_devs[indian_devs['ConvertedCompYearly']==min_indian_salary]

[2]: Q120 MainBranch Age \
RespondId 39838 I agree I am a developer by profession 18-24 years old
61296 I agree I am a developer by profession 25-34 years old
63235 I agree I am a developer by profession 25-34 years old
72060 I agree I am a developer by profession 25-34 years old
73116 I agree I am a developer by profession 25-34 years old
89009 I agree I am a developer by profession 25-34 years old

Employment RemoteWork \
RespondId 39838 Employed, full-time Hybrid (some remote, some in-person)
61296 Employed, full-time Remote
63235 Employed, full-time Remote
72060 Employed, full-time Hybrid (some remote, some in-person)
73116 Employed, full-time Hybrid (some remote, some in-person)

```

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*Image :stackoverflowdevelopersurvey-images-199*

```

65  WorkExp          43579 non-null  float64
66  Knowledge_1      42535 non-null  object
67  Knowledge_2      41670 non-null  object
68  Knowledge_3      41798 non-null  object
69  Knowledge_4      41684 non-null  object
70  Knowledge_5      41527 non-null  object
71  Knowledge_6      41520 non-null  object
72  Knowledge_7      41467 non-null  object
73  Knowledge_8      41404 non-null  object
74  Frequency_1      41916 non-null  object
75  Frequency_2      41925 non-null  object
76  Frequency_3      41054 non-null  object
77  TimeSearching    42778 non-null  object
78  TimeAnswering   42629 non-null  object
79  ProfessionalTech 41783 non-null  object
80  Industry          36774 non-null  object
81  SurveyLength     86485 non-null  object
82  SurveyEase        86554 non-null  object
83  ConvertedCompYearly 48019 non-null  float64
dtypes: float64(3), int64(1), object(80)
memory usage: 57.2+ MB

```

```
[1]: #read the first 20 rows
data.head(20)
```

```

[1]:   ResponseId  Q120          MainBranch \
0           1 I agree  None of these
1           2 I agree  I am a developer by profession
2           3 I agree  I am a developer by profession
3           4 I agree  I am a developer by profession
4           5 I agree  I am a developer by profession
5           6 I agree  I am a developer by profession
6           7 I agree  I am a developer by profession
7           8 I agree  I am a developer by profession
8           9 I agree  I am not primarily a developer, but I write co...
9          10 I agree  I am a developer by profession
10          11 I agree  I am a developer by profession
11          12 I agree  I am a developer by profession
12          13 I agree  I am a developer by profession
13          14 I agree  I am not primarily a developer, but I write co...
14          15 I agree  I am a developer by profession
15          16 I agree  I am a developer by profession
16          17 I agree  I am a developer by profession
17          18 I agree  I am a developer by profession
18          19 I agree  I am a developer by profession
19          20 I agree  I am a developer by profession

```

```
89164 Ubuntu;Windows;Windows Subsystem for Linux (WSL)
89165     Android;Debian;MacOS;Ubuntu;Windows
89166 Debian;Ubuntu;Windows;Windows Subsystem for Li...
89167             Android;MacOS
89168             Arch;Other Linux-based
89169             MacOS
89170             Windows
89171             Windows
89172             Ubuntu
89173             Android;Windows
89174             MacOS
89175 Android;ChromeOS;iOS;iPadOS;Other Linux-based;...
89176             Ubuntu;Windows
89177             Debian;Ubuntu
89178             MacOS
89179             Android;Windows
89180             Windows
89181             Windows
89182 Arch;Debian;iOS;iPadOS;MacOS;Ubuntu;Windows;Wi...
89183             Windows

OpSysProfessional use \
89164             MacOS;Ubuntu
89165 Android;Arch;ChromeOS;Fedora;MacOS;Other Linux...
89166             Red Hat;Windows
89167             Android;MacOS
89168 Fedora;Other Linux-based;Ubuntu
89169             NaN
89170             Windows
89171             Windows
89172             Debian;Ubuntu
89173             Windows
89174             MacOS;Other Linux-based
89175 Android;Other Linux-based;Windows;Windows Sub...
89176             Windows
89177             MacOS;Windows
89178             MacOS;Ubuntu
89179             Android;Ubuntu;Windows
89180             Windows
89181             NaN
89182 BSD;Red Hat;Solaris;Ubuntu;Windows
89183             Windows

OfficeStackAsyncHaveWorkedWith \
89164             Jira
89165             Monday.com;Trello
89166 Confluence;Jira;Miro;Trello
```

```

89009      Employed, full-time  Hybrid (some remote, some in-person)

                    CodingActivities  \
ResponsId
39838      Professional development or self-paced learnin...
61296      Hobby;Professional development or self-paced l...
63235          Hobby
72060      I don't code outside of work
73116      Hobby;Freelance/contract work
89009      Bootstrapping a business

                    EdLevel  \
ResponsId
39838      Bachelor's degree (B.A., B.S., B.Eng., etc.)
61296      Bachelor's degree (B.A., B.S., B.Eng., etc.)
63235      Bachelor's degree (B.A., B.S., B.Eng., etc.)
72060      Bachelor's degree (B.A., B.S., B.Eng., etc.)
73116      Bachelor's degree (B.A., B.S., B.Eng., etc.)
89009      Bachelor's degree (B.A., B.S., B.Eng., etc.)

                    LearnCode  \
ResponsId
39838      Books / Physical media;Online Courses or Certi...
61296      Books / Physical media;Online Courses or Certi...
63235          School (i.e., University, College, etc)
72060      Online Courses or Certification;Other online r...
73116      Books / Physical media;Hackathons (virtual or ...
89009      Online Courses or Certification;Other online r...

                    LearnCodeOnline  \
ResponsId
39838      Formal documentation provided by the owner of ...
61296      Formal documentation provided by the owner of ...
63235          NaN
72060      Recorded coding sessions;How-to videos;Video-b...
73116          NaN
89009      Formal documentation provided by the owner of ...

                    LearnCodeCoursesCert  YearsCode  \
ResponsId
39838          Udemy      5
61296      Udemy;Coursera 10
63235          NaN      5
72060  Codecademy;edX;Udemy;Pluralsight;Coursera;Udacity 9
73116          NaN      8
89009          Udemy      8

```

```

YearsCodePro          DevType  \
RespondId
39838      2.0          Other (please specify): 
61296      8.0  Data scientist or machine learning specialist
63235      4.0          Developer, back-end
72060      9.0          Developer, front-end
73116      4.0          Developer, back-end
89009      6.0          Developer, full-stack

OrgSize          PurchaseInfluence  \
RespondId
39838  10,000 or more employees  I have little or no influence
61296  10,000 or more employees  I have little or no influence
63235      20 to 99 employees  I have some influence
72060  5,000 to 9,999 employees  I have some influence
73116      500 to 999 employees  I have little or no influence
89009  1,000 to 4,999 employees  I have little or no influence

TechList          BuyNewTool  \
RespondId
39838      NaN  Start a free trial;Ask developers I know/work at
61296      NaN  Start a free trial;Ask developers I know/work at
63235      Given a list  Start a free trial;Ask developers I know/work at
72060      Given a list  Start a free trial;Read ratings or reviews on
73116      NaN  Start a free trial;Ask developers I know/work at
89009      NaN  Start a free trial;Ask developers I know/work at

Country          Currency  CompTotal  \
RespondId
39838      India  INR\tIndian rupee  3100000.0
61296      India  INR\tIndian rupee  3100000.0
63235      India  INR\tIndian rupee  3100000.0
72060      India  INR\tIndian rupee  3100000.0
73116      India  INR\tIndian rupee  3100000.0
89009      India  INR\tIndian rupee  3100000.0

LanguageHaveWorkedWith  \
RespondId
39838  Bash/Shell (all shells);Java;JavaScript;Python; 
61296  Bash/Shell (all shells);C;C++;HTML/CSS;Java;Ja_
63235                                JavaScript;Python
72060                                JavaScript
73116                                Go;Java;PHP
89009  HTML/CSS;Python;SQL;TypeScript

LanguageWantToWorkWith  \
RespondId

```

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*Image :stackoverflowdevelopersurvey-images-201*

```

39838      Bash/Shell (all shells);Java;JavaScript;Python...
61296          Rust
63235          NaN
72060      HTML/CSS;JavaScript;Python
73116          Java;PHP
89009      C#;HTML/CSS;Python;Rust;SQL;TypeScript

                    DatabaseHaveWorkedWith \
RespondId
39838          PostgreSQL
61296      BigQuery;MongoDB;MySQL;Oracle;Snowflake;SQLite
63235          PostgreSQL;Redis
72060      Cloud Firestore;H2;MySQL
73116      Dynamodb;Elasticsearch;MongoDB
89009          PostgreSQL;SQLite

                    DatabaseWantToWorkWith \
RespondId
39838          PostgreSQL;Redis
61296          Elasticsearch
63235      Elasticsearch;Snowflake
72060      Cloud Firestore;MongoDB;MySQL
73116          NaN
89009          PostgreSQL

                    PlatformHaveWorkedWith PlatformWantToWorkWith \
RespondId
39838          NaN          NaN
61296      Amazon Web Services (AWS);Google Cloud          Vercel
63235          NaN          NaN
72060          Vultr          Vultr
73116      Amazon Web Services (AWS)          NaN
89009      Google Cloud          Google Cloud

                    WebframeHaveWorkedWith \
RespondId
39838          Spring Boot
61296      Angular;AngularJS;Django;Express;FastAPI;Flask...
63235          Django;React
72060          jQuery;Next.js;React
73116          Spring Boot
89009      Node.js;React

                    WebframeWantToWorkWith \
RespondId
39838          Spring Boot
61296          NaN

```

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*Image :stackoverflowdevelopersurvey-images-202*

```

63235          Spring Boot
72060          Django;Next.js;React
73116          NaN
89009          FastAPI;Next.js;Node.js;React

                    MiscTechHaveWorkedWith \
ResponsId
39838          Apache Spark
61296          Apache Spark;Hadoop;Hugging Face Transformers;-
63235          NaN
72060          NaN
73116          NaN
89009          Apache Spark

                    MiscTechWantToWorkWith \
ResponsId
39838          Apache Kafka;Apache Spark;Pandas
61296          NaN
63235          NaN
72060          NaN
73116          NaN
89009          .NET (5+);Apache Kafka;Apache Spark;TensorFlow

                    ToolsTechHaveWorkedWith \
ResponsId
39838          Ansible;Docker;Maven (build tool);Pip
61296          Cargo;Docker;Kubernetes;npm;Pip;Unity 3D;Unreal
63235          Docker;Pip
72060          Webpack
73116          Amt;Dagger;Gradle
89009          npm;Vite

                    ToolsTechWantToWorkWith \
ResponsId
39838          Ansible;Docker;Kubernetes;Maven (build tool);Pip
61296          NaN
63235          Kubernetes
72060          Webpack
73116          Amt;Dagger;Gradle
89009          Docker;npm;Vite

                    NEWCollabToolsHaveWorkedWith \
ResponsId
39838          IntelliJ IDEA;PyCharm;Sublime Text;Visual Studio
61296          Eclipse;IntelliJ IDEA;IPython;Jupyter Notebook
63235          IPython;Visual Studio Code
72060          Eclipse;Visual Studio Code

```

```

73116                               NaN
89009      Visual Studio Code

    NEWCollabToolsWantToWorkWith \
RespondId
39838  IntelliJ IDEA;Jupyter Notebook;JupyterLab;PyCh...
61296                               NaN
63235                               NaN
72060      Eclipse;Visual Studio Code
73116                               NaN
89009      Visual Studio Code

    OpSysPersonal use OpSysProfessional use \
RespondId
39838      NaN          MacOS
61296  iOS;Ubuntu          Windows
63235      MacOS          MacOS
72060  MacOS;Ubuntu;Windows  MacOS;Ubuntu;Windows
73116      MacOS          MacOS
89009      MacOS          Red Hat;Windows

    OfficeStackAsyncHaveWorkedWith \
RespondId
39838                               NaN
61296  Asana;Confluence;Jira;Markdown File;Notion
63235                               Clickup
72060                               NaN
73116                               NaN
89009                               NaN

    OfficeStackAsyncWantToWorkWith \
RespondId
39838                               NaN
61296                               NaN
63235      Confluence
72060                               NaN
73116                               NaN
89009                               NaN

    OfficeStackSyncHaveWorkedWith \
RespondId
39838  Mattermost;Microsoft Teams;Zoom
61296  Discord;Google Meet;Microsoft Teams;Slack;Tele...
63235      Google Meet;Slack;Zoom
72060      Slack;Zoom
73116      Slack
89009  Google Meet;Microsoft Teams;Whatsapp;Zoom

```

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*Image :stackoverflowdevelopersurvey-images-204*

```

        OfficeStackSyncWantToWorkWith \
    Responselid
39838                         Mattermost;Zoom
61296                           NaN
63235                           NaN
72060           Google Chat;Microsoft Teams;Zoom
73116                           Slack
89009           Google Meet;Microsoft Teams;Whatsapp;Zoom

        AISeachHaveWorkedWith \
    Responselid
39838                           NaN
61296       Bing AI;ChatGPT;Perplexity AI
63235   ChatGPT;Google Bard AI;Quora Poe
72060                           NaN
73116                           NaN
89009                           ChatGPT

        AISeachWantToWorkWith     AIDevHaveWorkedWith \
    Responselid
39838                           NaN      GitHub Copilot
61296                           NaN  GitHub Copilot;Tabnine
63235                           NaN      GitHub Copilot
72060                           NaN      NaN
73116                           NaN      NaN
89009       Bing AI;ChatGPT;WolframAlpha;You.com      NaN

        AIDevWantToWorkWith \
    Responselid
39838      GitHub Copilot
61296                           NaN
63235                           NaN
72060                           NaN
73116                           NaN
89009                           NaN

        NEWSOSites \
    Responselid
39838 Stack Overflow;Stack Exchange;Collectives on S...
61296           Stack Overflow;Stack Exchange
63235           Stack Overflow
72060           Stack Overflow;Stack Exchange
73116   Stack Overflow;Collectives on Stack Overflow
89009           Stack Overflow;Stack Exchange

        SOVisitFreq SOAccount \
    Responselid
39838
61296
63235
72060
73116
89009

```

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*Image :stackoverflowdevelopersurvey-images-205*

Respondent	SOPartFreq	SOComm
39838	A few times per week	Yes
61296	Multiple times per day	Yes
63235	A few times per month or weekly	Yes
72060	A few times per week	Yes
73116	Multiple times per day	Yes
89009	Less than once per month or monthly	Yes

Respondent	SOAI
39838	A few times per week
61296	Less than once per month or monthly
63235	I have never participated in Q&A on Stack Overflow
72060	Less than once per month or monthly
73116	A few times per month or weekly
89009	Less than once per month or monthly

Respondent	SOAI
39838	Suggestion of answers already posted when writing
61296	NaN
63235	Probably have a chatbot experience and make it...
72060	AI could actually help up with updating the old...
73116	Flagging incorrect answers or removing spam
89009	Could use AI to run auto-generated tests for a...

Respondent	AISelect	AISent
39838	No, but I plan to soon	Favorable
61296	Yes	Favorable
63235	Yes	Very favorable
72060	No, but I plan to soon	Unfavorable
73116	No, and I don't plan to	NaN
89009	Yes	Very favorable

Respondent	AIAcc
39838	NaN
61296	Increase productivity;Greater efficiency;Improve...
63235	Increase productivity;Greater efficiency
72060	NaN
73116	NaN
89009	Greater efficiency;Improve accuracy in coding

Respondent	AIBen
39838	Neither trust nor distrust

```

61296      Somewhat trust
63235      Somewhat trust
72060      Somewhat trust
73116      NaN
89009      Neither trust nor distrust

                    AIToolInterested in Using \
RespondId
39838          NaN
61296  Learning about a codebase;Project planning;Deb...
63235  Learning about a codebase;Project planning;Com...
72060          NaN
73116          NaN
89009  Learning about a codebase;Documenting code;Tes...

                    AIToolCurrently Using \
RespondId
39838          NaN
61296      Writing code;Documenting code
63235  Writing code;Documenting code;Debugging and ge...
72060          NaN
73116          NaN
89009  Writing code;Debugging and getting help

                    AIToolNot interested in Using      AINextVery different \
RespondId
39838          NaN          NaN
61296          NaN      Documenting code
63235          NaN      Writing code
72060          NaN          NaN
73116          NaN          NaN
89009  Committing and reviewing code  Debugging and getting help

                    AINextNeither different nor similar AINextSomewhat similar \
RespondId
39838          NaN          NaN
61296          NaN      Writing code
63235  Debugging and getting help;Testing code
72060          NaN          NaN
73116          NaN          NaN
89009          NaN          NaN

                    AINextVery similar AINextSomewhat different TBranch \
RespondId
39838          NaN          NaN      Yes
61296          NaN          NaN      Yes
63235          NaN  Documenting code      Yes

```

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*Image :stackoverflowdevelopersurvey-images-207*

72060	NaN	NaN	Yes
73116	NaN	NaN	Yes
89009	NaN	Writing code	Yes
ICorPM WorkExp Knowledge_1 \			
RespondId			
39838	Individual contributor	2.0	Agree
61296	Individual contributor	7.0	Agree
63235	Individual contributor	5.0	Strongly agree
72060	Individual contributor	9.0	Disagree
73116	Individual contributor	3.0	Strongly agree
89009	Individual contributor	9.0	Agree
Knowledge_2 Knowledge_3 Knowledge_4 \			
RespondId			
39838	Agree	Disagree	Agree
61296	Strongly disagree	Agree	Strongly agree
63235	Disagree	Strongly agree	Strongly agree
72060	Agree	Agree	Agree
73116	Strongly agree	NaN	Strongly agree
89009	Neither agree nor disagree	Agree	Agree
Knowledge_5 Knowledge_6 Knowledge_7 \			
RespondId			
39838	Disagree	Agree	Strongly agree
61296	Strongly agree	Neither agree nor disagree	Agree
63235	Strongly agree	Strongly agree	Agree
72060	Disagree	Disagree	Agree
73116	Strongly agree	Strongly agree	Strongly agree
89009	Agree	Neither agree nor disagree	Agree
Knowledge_8 Frequency_1 Frequency_2 \			
RespondId			
39838	Disagree	1-2 times a week	1-2 times a week
61296	Strongly agree	Never	6-10 times a week
63235	Disagree	1-2 times a week	1-2 times a week
72060	Disagree	Never	1-2 times a week
73116	NaN	1-2 times a week	6-10 times a week
89009	Agree	1-2 times a week	1-2 times a week
Frequency_3 TimeSearching TimeAnswering \			
RespondId			
39838	3-5 times a week	60-120 minutes a day	15-30 minutes a day
61296	1-2 times a week	Less than 15 minutes a day	30-60 minutes a day
63235	1-2 times a week	15-30 minutes a day	15-30 minutes a day
72060	1-2 times a week	30-60 minutes a day	15-30 minutes a day
73116	1-2 times a week	30-60 minutes a day	30-60 minutes a day

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Image :stackoverflowdevelopersurvey-images-208

```

89009      1-2 times a week      60-120 minutes a day  15-30 minutes a day
                                         ProfessionalTech  \
ResponseId
39838      DevOps function;Developer portal or other cent...
61296      DevOps function;Microservices;Automated testin...
63235      DevOps function;Developer portal or other cent...
72060      DevOps function;Microservices;Automated testin...
73116      NaN
89009      DevOps function;Automated testing;Continuous i...

                                         Industry  \
ResponseId
39838      Information Services, IT, Software Development...
61296      NaN
63235      Information Services, IT, Software Development...
72060      Information Services, IT, Software Development...
73116      Other
89009      Advertising Services

                                         SurveyLength      SurveyEase  \
ResponseId
39838      Appropriate in length      Easy
61296      Appropriate in length      Easy
63235      Appropriate in length      Easy
72060      Too long      Easy
73116      Too long  Neither easy nor difficult      Easy
89009      Appropriate in length      Easy

                                         ConvertedCompYearly
ResponseId
39838      37562.0
61296      37562.0
63235      37562.0
72060      37562.0
73116      37562.0
89009      37562.0

```

```
[ 1]: indian_devs[indian_devs['YearsCodePro']==?]['ConvertedCompYearly'].max()
```

```
[ 1]: 424091.0
```

```
[ 1]: usa_devs = data[data['Country']=="United States of America"]
usa_devs['ConvertedCompYearly'].min()
```

```
[ 1]: 38000.0
```

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*Image :stackoverflowdevelopersurvey-images-209*

```

89167           NaN
89168 Doxygen;Markdown File;Wikis;YouTrack
89169           Trello
89170           Confluence;Jira
89171           Confluence;Jira;Markdown File
89172           Markdown File
89173           Basecamp;Trello
89174           Asana;Jira
89175           Jira
89176           Trello
89177           Confluence;Jira
89178 Confluence;Jira;Markdown File;Stack Overflow f_
89179 Asana;Confluence;Jira;Markdown File;Miro;Notio_
89180           Jira
89181           NaN
89182           Confluence;Jira;Trello
89183           NaN

           OfficeStackAsyncWantToWorkWith \
89164           Jira
89165 GitHub Discussions;Monday.com;Stack Overflow f_
89166           NaN
89167           NaN
89168           Markdown File
89169           NaN
89170           Azure Devops;Notion
89171           Confluence;Markdown File
89172           Markdown File
89173           NaN
89174 Asana;GitHub Discussions;Jira;Trello
89175           Jira;Trello;YouTrack
89176           Jira
89177           NaN
89178 GitHub Discussions;Stack Overflow for Teams
89179           Markdown File;Miro;Wikis
89180           Jira
89181           NaN
89182           Azure Devops;Confluence;Jira
89183           NaN

           OfficeStackSyncHaveWorkedWith \
89164           Google Meet;Slack;Zoom
89165 Discord;Google Meet;Microsoft Teams;Skype;Slac_
89166           Discord;Google Meet;Mattermost;Telegram
89167           Google Meet;Slack
89168           Discord;Slack
89169           Whatsapp

```

```
[1]: data[data["LanguageHaveWorkedWith"]=="Python"]["ConvertedCompYearly"].mean()
[1]: 106632.63660477454

[1]: #using pandas Groupby to find salaries across countries
[1]: data["ConvertedCompYearly"].sum()

[1]: 4292045894.0

[1]: data.groupby('Country').sum()['ConvertedCompYearly']

[1]: Country
[1]: Afghanistan 68000.0
[1]: Albania 500594.0
[1]: Algeria 37776.0
[1]: Andorra 546157.0
[1]: Argentina 8613974.0
[1]: 
[1]: Venezuela, Bolivarian Republic of... 650600.0
[1]: Viet Nam 1217971.0
[1]: Yemen 59917.0
[1]: Zambia 41122.0
[1]: Zimbabwe 174000.0
[1]: Name: ConvertedCompYearly, Length: 143, dtype: float64

[1]: data.groupby('Country').sum()['ConvertedCompYearly'].
[1]: ...sort_values(ascending=False)

[1]: Country
[1]: United States of America 1.969483e+09
[1]: United Kingdom of Great Britain and Northern Ireland 3.293658e+08
[1]: Germany 3.226609e+08
[1]: Canada 2.142454e+08
[1]: Australia 1.257912e+08
[1]: 
[1]: Rwanda 4.416200e+04
[1]: Brunei Darussalam 4.259600e+04
[1]: Zambia 4.112200e+04
[1]: Saint Vincent and the Grenadines 4.000000e+04
[1]: Algeria 3.777600e+04
[1]: Name: ConvertedCompYearly, Length: 143, dtype: float64

[1]: data.groupby('RemoteWork').sum()['ConvertedCompYearly'].
[1]: ...sort_values(ascending=False)

[1]: RemoteWork
[1]: Remote 2.134146e+09
```

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*Image :stackoverflowdevelopersurvey-images-210*

```

Hybrid (some remote, some in-person) 1.752482e+09
In-person 3.993938e+08
Name: ConvertedCompYearly, dtype: float64

[1]: data["RemoteWork"].value_counts()

[2]: RemoteWork
Remote 17368
Hybrid (some remote, some in-person) 16788
In-person 4120
Name: count, dtype: int64

[3]: #Visualizations
learn_methods = data['LearnCode'].str.split(';').explode()
method_counts = learn_methods.value_counts()
method_percentages = (method_counts / 89184) * 100
method_percentages

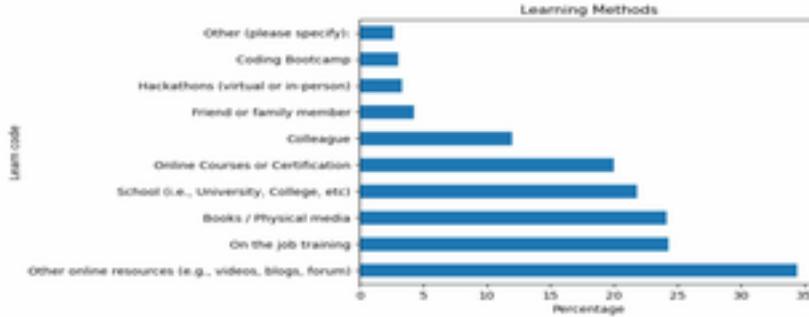
[4]: LearnCode
Other online resources (e.g., videos, blogs, forum) 34.389577
On the job training 24.323870
Books / Physical media 24.127646
School (i.e., University, College, etc) 21.846968
Online Courses or Certification 20.009194
Colleagues 11.994304
Friend or family member 4.258611
Hackathons (virtual or in-person) 3.315617
Coding Bootcamp 3.042025
Other (please specify): 2.688823
Name: count, dtype: float64

[5]: method_percentages.plot(kind='barh')
plt.title("Learning Methods")
plt.xlabel("Percentage")
plt.ylabel("Learn code")
plt.show()

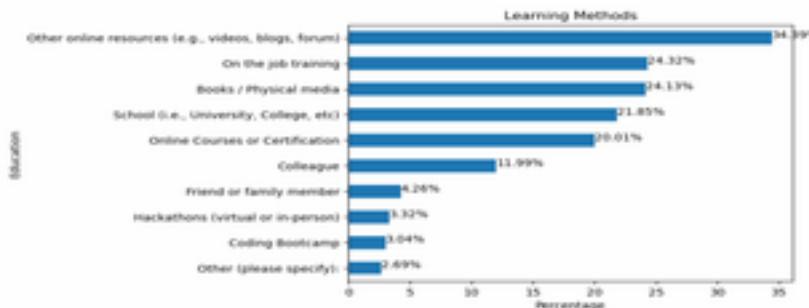
```

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*Image :stackoverflowdevelopersurvey-images-211*



```
[ ]: method_percentages = method_percentages.sort_values()
method_percentages.plot(kind='barh')
plt.title("Learning Methods")
plt.xlabel("Percentage")
plt.ylabel("Education")
for index, value in enumerate(method_percentages):
    plt.text(value,index,f'{value:.2f}%')
plt.show()
```



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*Image :stackoverflowdevelopersurvey-images-212*

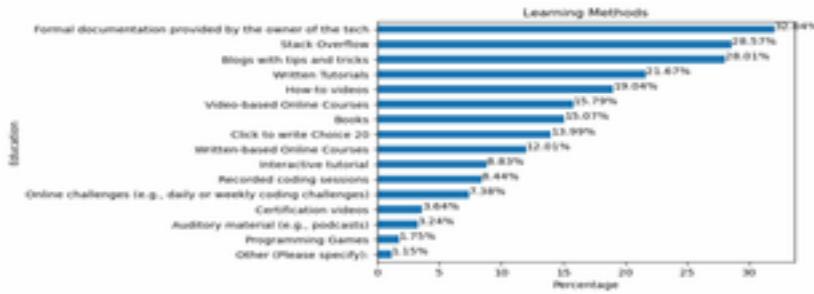
```
[1]: online_methods = data['LearnCodeOnline'].str.split(';').explode()
online_method_counts = online_methods.value_counts()
online_method_percentages = (online_method_counts / 89184) * 100
online_method_percentages

[2]: LearnCodeOnline
Formal documentation provided by the owner of the tech      32.039379
Stack Overflow                                              28.574432
Blogs with tips and tricks                                28.010630
Written Tutorials                                           21.670928
How-to videos                                              19.035926
Video-based Online Courses                                15.787585
Books                                                       15.071089
Click to write Choice 20                                    13.986814
Written-based Online Courses                            12.008881
Interactive tutorial                                       8.825574
Recorded coding sessions                                 8.444340
Online challenges (e.g., daily or weekly coding challenges) 7.380248
Certification videos                                       3.643030
Auditory material (e.g., podcasts)                         3.239370
Programming Games                                         1.749193
Other (Please specify):                                  1.149309
Name: count, dtype: float64

[3]: online_method_percentages = online_method_percentages.
     .sort_values(ascending=True)
online_method_percentages.plot(kind='barh')
plt.title("Learning Methods")
plt.xlabel("Percentage")
plt.ylabel("Education")
for index, value in enumerate(online_method_percentages):
    plt.text(value, index, f'{value:.2f}%')
plt.show()
```

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*Image :stackoverflowdevelopersurvey-images-213*



```
[1]: #online learning platform percentages
online_platform_responses = data[data['LearnCodeCoursesCert'] != np.nan]
response_count = online_platform_responses['LearnCodeCoursesCert'].count()

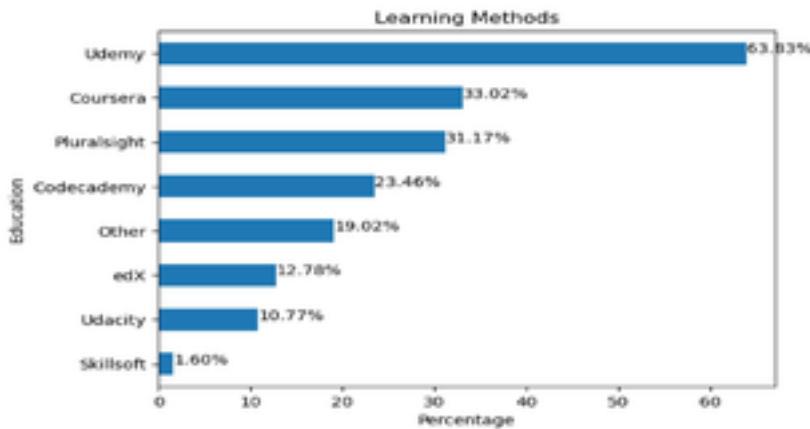
online_platform = data['LearnCodeCoursesCert'].str.split(';').explode()
online_platform_counts = online_platform.value_counts()
online_platform_percentages = (online_platform_counts / response_count) * 100
online_platform_percentages
```

```
[2]: LearnCodeCoursesCert
Udemy      63.829370
Coursera   33.021949
Pluralsight 31.173243
Codecademy  23.464855
Other       19.022733
edX        12.777633
Udacity     10.765613
Skillsoft    1.600470
Name: count, dtype: float64
```

```
[3]: online_platform_percentages = online_platform_percentages.
    .sort_values(ascending=True)
online_platform_percentages.plot(kind="barh")
plt.title("Learning Methods")
plt.xlabel("Percentage")
plt.ylabel("Education")
for index, value in enumerate(online_platform_percentages):
    plt.text(value, index, f'{value:.2f}%')
plt.show()
```

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*Image :stackoverflowdevelopersurvey-images-214*



1:

216

*Image :stackoverflowdevelopersurvey-images-215*

```

89170           Google Chat
89171           Discord;Microsoft Teams;Zoom
89172 Cisco Webex Teams;Jitsi;Microsoft Teams;Skype;-
89173           Google Chat;Google Meet;Whatsapp;Zoom
89174           Google Meet;Microsoft Teams;Slack
89175 Cisco Webex Teams;Discord;Microsoft Teams;Zoom
89176           Discord;Google Meet;Microsoft Teams;Slack
89177           Microsoft Teams;Zoom
89178           Microsoft Teams;Slack;Zoom
89179 Discord;Google Meet;Jitsi;Microsoft Teams;Slac-
89180           Microsoft Teams
89181           NaN
89182 Cisco Webex Teams;Discord;Microsoft Teams;Sign-
89183           Google Meet;Skype;Telegram;Whatsapp

           OfficeStackSyncWantToWorkWith \
89164           Google Meet;Slack;Zoom
89165 Discord;Google Meet;Microsoft Teams;Skype;Slac-
89166           Discord;Telegram
89167           Google Meet;Slack
89168           Discord;Slack
89169           NaN
89170           Microsoft Teams;Slack
89171           Discord;Microsoft Teams
89172           Jitsi;Telegram
89173           Whatsapp;Zoom
89174           Google Meet;Microsoft Teams;Slack
89175 Cisco Webex Teams;Discord;Microsoft Teams;Slack
89176           Discord;Microsoft Teams;Slack
89177           NaN
89178           Slack
89179 Discord;Google Meet;Jitsi;Microsoft Teams;Tele-
89180           Microsoft Teams
89181           NaN
89182           Discord;Microsoft Teams;Skype
89183           Google Meet;Skype;Telegram;Whatsapp

           AISearchHaveWorkedWith      AISearchWantToWorkWith \
89164           ChatGPT           ChatGPT
89165 Bing AI;ChatGPT        ChatGPT;Google Bard AI
89166           ChatGPT           ChatGPT
89167           ChatGPT           Bing AI;ChatGPT
89168           ChatGPT           NaN
89169           ChatGPT           NaN
89170           ChatGPT           ChatGPT
89171           NaN              NaN
89172           ChatGPT           ChatGPT;Google Bard AI

```

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*Image :stackoverflowdevelopersurvey-images-22*

```

89173           ChatGPT           ChatGPT;Google Bard AI
89174           ChatGPT;Phind      ChatGPT;Phind
89175           ChatGPT;Google Bard AI ChatGPT;Google Bard AI
89176           ChatGPT           ChatGPT
89177           NaN              NaN
89178           NaN              NaN
89179           ChatGPT           ChatGPT
89180           ChatGPT           ChatGPT
89181           ChatGPT;Quora Poe  ChatGPT;Quora Poe
89182 Bing AI;ChatGPT;WolframAlpha  Bing AI;ChatGPT;Google Bard AI
89183           ChatGPT           ChatGPT

    AIDevHaveWorkedWith AIDevWantToWorkWith \
89164     GitHub Copilot      NaN
89165     NaN              NaN
89166     NaN              NaN
89167     NaN              NaN
89168     NaN              NaN
89169     NaN              NaN
89170     NaN              NaN
89171     NaN              NaN
89172     NaN              NaN
89173     NaN              NaN
89174     Tabnine          Tabnine
89175     NaN              NaN
89176     NaN              NaN
89177     NaN              NaN
89178     NaN              NaN
89179     Whispr AI        Whispr AI
89180     NaN              NaN
89181     NaN              NaN
89182     NaN              NaN
89183     GitHub Copilot    GitHub Copilot

    NEWBOSites \
89164           Stack Overflow;Stack Exchange
89165 Stack Overflow;Stack Exchange;Stack Overflow f_
89166 Stack Overflow;Stack Exchange;Stack Overflow f_
89167           Stack Overflow;Stack Exchange
89168           Stack Overflow;Stack Exchange
89169           Stack Overflow;Stack Exchange
89170           Stack Overflow;Stack Exchange
89171           Stack Overflow;Stack Exchange
89172           Stack Overflow;Stack Exchange
89173           Stack Overflow;Stack Exchange
89174 Stack Overflow;Stack Exchange;Collectives on S-
89175           Stack Overflow;Stack Exchange

```

```

89176           Stack Overflow
89177           Stack Overflow
89178 Stack Overflow;Stack Exchange;Stack Overflow f-
89179           Stack Overflow;Stack Exchange
89180           Stack Overflow;Stack Exchange
89181           Stack Overflow;Stack Exchange
89182 Stack Overflow;Stack Exchange;Stack Overflow f-
89183           Stack Overflow

          SOVisitFreq           SOAccount \
89164     A few times per week           Yes
89165     Multiple times per day          Yes
89166     A few times per week           Yes
89167     Daily or almost daily          Not sure/can't remember
89168     A few times per week           No
89169     Daily or almost daily          Yes
89170     A few times per week           Yes
89171     Daily or almost daily          Yes
89172     A few times per week           Yes
89173     A few times per week           Yes
89174     Multiple times per day          Yes
89175     Multiple times per day          Not sure/can't remember
89176     Less than once per month or monthly Yes
89177     A few times per week           No
89178     Daily or almost daily          Yes
89179     Multiple times per day          Yes
89180     Multiple times per day          Yes
89181           NaN                  NaN
89182     A few times per month or weekly No
89183     A few times per week           Yes

          S0PartFreq           SOComm \
89164 I have never participated in Q&A on Stack Over... Yes, somewhat
89165           A few times per month or weekly Yes, definitely
89166           A few times per month or weekly Yes, definitely
89167           NaN                  No, not really
89168           NaN                  No, not at all
89169           A few times per month or weekly Yes, somewhat
89170           A few times per month or weekly Yes, somewhat
89171     Less than once per month or monthly Neutral
89172     Less than once per month or monthly Yes, somewhat
89173     Less than once per month or monthly Yes, somewhat
89174           A few times per month or weekly Yes, definitely
89175           NaN                  No, not really
89176 I have never participated in Q&A on Stack Over... No, not at all
89177           NaN                  No, not really
89178           A few times per month or weekly No, not really

```

```

89179 I have never participated in Q&A on Stack Over... Neutral
89180 I have never participated in Q&A on Stack Over... No, not really
89181 NaN NaN
89182 NaN Yes, somewhat
89183 Less than once per month or monthly Yes, somewhat

SOAI \
89164 NaN
89165 I think StackOverflow should also use AI to ge...
89166 Formating questions and answers properly (e.g...
89167 It's should, it will make stackoverflow better ...
89168 NaN
89169 I think it is great.
89170 Better titles would be good, but one great imp...
89171 It should definitely be explored
89172 To find right answers to questions and picking...
89173 AI can be used to help fix the grammar in user...
89174 no thoughts right now
89175 I think there is value in incorporating AI to ...
89176 Find appropriate response based on likes and c...
89177 To group the same questions/answers to differe...
89178 Improve question writing
89179 NaN
89180 I'm not sure
89181 NaN
89182 Define Parameters more detailed. I believe in ...
89183 NaN

AISelect AISent \
89164 Yes Favorable
89165 Yes Favorable
89166 No, but I plan to soon Unsure
89167 Yes Very favorable
89168 Yes Indifferent
89169 Yes Very favorable
89170 Yes Unsure
89171 No, and I don't plan to NaN
89172 Yes Favorable
89173 Yes Very favorable
89174 Yes Indifferent
89175 Yes Favorable
89176 Yes Very favorable
89177 No, but I plan to soon Indifferent
89178 No, but I plan to soon Favorable
89179 Yes Very favorable
89180 Yes Very favorable
89181 No, but I plan to soon Very favorable

```

```

89182           Yes      Favorable
89183           Yes      Favorable

          AIAcc \
89164 Increase productivity;Greater efficiency;Improv-
89165 Increase productivity;Greater efficiency;Speed...
89166                               NaN
89167 Increase productivity;Greater efficiency;Speed...
89168 Other (please explain);Increase productivity;S-
89169           Other (please explain)
89170           Increase productivity;Speed up learning
89171                               NaN
89172 Increase productivity;Speed up learning;Improv-
89173 Other (please explain);Increase productivity;G-
89174 Increase productivity;Speed up learning;Improv-
89175 Increase productivity;Greater efficiency;Speed...
89176 Increase productivity;Greater efficiency;Speed...
89177                               NaN
89178                               NaN
89179 Increase productivity;Greater efficiency;Speed...
89180           Speed up learning
89181                               NaN
89182 Increase productivity;Greater efficiency;Speed...
89183 Increase productivity;Greater efficiency;Speed...

          AIBen \
89164           Somewhat trust
89165           Somewhat trust
89166 Neither trust nor distrust
89167           Somewhat trust
89168 Neither trust nor distrust
89169           Somewhat trust
89170           Somewhat distrust
89171                               NaN
89172           Highly distrust
89173           Somewhat trust
89174 Neither trust nor distrust
89175           Somewhat trust
89176 Neither trust nor distrust
89177 Neither trust nor distrust
89178           Somewhat distrust
89179           Somewhat trust
89180           Somewhat trust
89181           Highly trust
89182           Somewhat distrust
89183 Neither trust nor distrust

```

```

          AIToolInterested in Using \
89164      Committing and reviewing code
89165  Learning about a codebase;Project planning;Wri...
89166                               NaN
89167  Writing code;Debugging and getting help;Commit...
89168  Learning about a codebase;Documenting code;Com...
89169  Project planning;Documenting code;Deployment a...
89170  Writing code;Debugging and getting help;Testin...
89171                               NaN
89172  Learning about a codebase;Documenting code;Deb...
89173  Documenting code;Debugging and getting help;Te...
89174  Learning about a codebase;Project planning;Wri...
89175  Learning about a codebase;Documenting code;Deb...
89176                               NaN
89177                               NaN
89178                               NaN
89179  Learning about a codebase;Project planning;Wri...
89180      Writing code;Documenting code;Testing code
89181                               NaN
89182  Learning about a codebase;Project planning;Wri...
89183      Learning about a codebase;Writing code

          AIToolCurrently Using \
89164                               NaN
89165  Learning about a codebase;Project planning;Wri...
89166                               NaN
89167  Project planning;Writing code;Debugging and ge...
89168      Debugging and getting help
89169  Learning about a codebase;Writing code;Debuggi...
89170      Other (please describe)
89171                               NaN
89172  Learning about a codebase;Documenting code;Deb...
89173                               Writing code
89174                               Writing code
89175      Writing code;Testing code
89176  Learning about a codebase;Project planning;Wri...
89177                               NaN
89178                               NaN
89179  Writing code;Documenting code;Debugging and ge...
89180  Learning about a codebase;Debugging and gettin...
89181                               NaN
89182  Learning about a codebase;Writing code;Debuggi...
89183      Learning about a codebase;Writing code

          AIToolNot interested in Using \
89164                               NaN
89165                               NaN

```

```

89166                               NaN
89167                               NaN
89168 Project planning;Writing code;Testing code
89169 Committing and reviewing code
89170 Learning about a codebase;Project planning;Doc...
89171                               NaN
89172                               NaN
89173 Collaborating with teammates
89174                               NaN
89175 Project planning;Committing and reviewing code...
89176                               NaN
89177                               NaN
89178                               NaN
89179 Deployment and monitoring
89180 Project planning;Committing and reviewing code...
89181                               NaN
89182 Committing and reviewing code
89183                               NaN

          AINextVery different \
89164                               NaN
89165 Writing code;Debugging and getting help
89166                               NaN
89167                               NaN
89168                               NaN
89169 Learning about a codebase;Writing code;Debuggi...
89170                               NaN
89171                               NaN
89172                               NaN
89173 Writing code
89174                               NaN
89175 Writing code;Testing code
89176 Learning about a codebase;Documenting code
89177                               NaN
89178                               NaN
89179                               NaN
89180                               NaN
89181                               NaN
89182                               NaN
89183 Learning about a codebase

          AINextNeither different nor similar \
89164                               NaN
89165                               NaN
89166                               NaN
89167                               NaN
89168                               NaN

```

```

89169                               NaN
89170          Other (please describe)  NaN
89171                               NaN
89172                               NaN
89173                               NaN
89174                               NaN
89175                               NaN
89176          Project planning      NaN
89177                               NaN
89178                               NaN
89179                               NaN
89180                               NaN
89181                               NaN
89182 Debugging and getting help;Deployment and moni_  NaN
89183                               NaN

          AINextSomewhat similar AINextVery similar \
89164                               NaN      NaN
89165                               NaN      NaN
89166                               NaN      NaN
89167                               NaN      NaN
89168 Debugging and getting help      NaN
89169                               NaN      Testing code
89170                               NaN      NaN
89171                               NaN      NaN
89172                               NaN      NaN
89173                               NaN      NaN
89174                               NaN      NaN
89175                               NaN      NaN
89176                               NaN      NaN
89177                               NaN      NaN
89178                               NaN      NaN
89179                               NaN      NaN
89180                               NaN      NaN
89181                               NaN      NaN
89182                               NaN      NaN
89183                               NaN      NaN

          AINextSomewhat different TBranch \
89164                               NaN      Yes
89165 Learning about a codebase;Project planning;Wri_  Yes
89166                               NaN      Yes
89167 Project planning;Writing code;Debugging and ge_  Yes
89168                               NaN      NaN
89169                               NaN      Yes
89170                               NaN      Yes
89171                               NaN      Yes

```

```

          Age          Employment \
0    18-24 years old           NaN
1    25-34 years old      Employed, full-time
2    45-54 years old      Employed, full-time
3    25-34 years old      Employed, full-time
4    25-34 years old  Employed, full-time;Independent contractor, fr...
5    35-44 years old      Employed, full-time
6    35-44 years old      Employed, full-time
7    25-34 years old      Employed, full-time
8    45-54 years old      Employed, full-time
9    25-34 years old  Not employed, but looking for work
10   25-34 years old      Employed, full-time
11   25-34 years old      Employed, full-time
12   25-34 years old      Employed, full-time
13   35-44 years old      Employed, full-time
14   25-34 years old      Employed, full-time
15   35-44 years old      Employed, full-time
16   35-44 years old      Employed, full-time
17   25-34 years old      Employed, full-time
18  Under 18 years old      Employed, full-time
19   35-44 years old      Employed, full-time

          RemoteWork \
0                  NaN
1                  Remote
2  Hybrid (some remote, some in-person)
3  Hybrid (some remote, some in-person)
4                  Remote
5                  Remote
6                  Remote
7                  Remote
8  Hybrid (some remote, some in-person)
9                  NaN
10                 Remote
11                 Remote
12                 Remote
13  Hybrid (some remote, some in-person)
14  Hybrid (some remote, some in-person)
15  Hybrid (some remote, some in-person)
16  Hybrid (some remote, some in-person)
17  Hybrid (some remote, some in-person)
18                 Remote
19  Hybrid (some remote, some in-person)

          CodingActivities \
0                  NaN
1  Hobby;Contribute to open-source projects;Books...

```

4

*Image :stackoverflowdevelopersurvey-images-3*

	Learning about a codebase;Documenting code;Deb...	Writing code	Yes
89173		Writing code	Yes
89174		Writing code	Yes
89175		NaN	Yes
89176		Writing code	NaN
89177		NaN	Yes
89178		NaN	Yes
89179	Writing code;Documenting code;Debugging and ge...	No	
89180	Learning about a codebase;Debugging and gettin...	NaN	
89181		NaN	NaN
89182	Learning about a codebase;Writing code	NaN	
89183	Writing code	Yes	
	ICorPM	WorkExp	Knowledge_1
89164	Individual contributor	2.0	Agree
89165	Individual contributor	3.0	Agree
89166	Individual contributor	3.0	Agree
89167	Individual contributor	2.0	Agree
89168	NaN	NaN	NaN
89169	Individual contributor	30.0	NaN
89170	Individual contributor	9.0	Strongly agree
89171	Individual contributor	9.0	Strongly agree
89172	Individual contributor	24.0	Neither agree nor disagree
89173	Individual contributor	15.0	Agree
89174	Individual contributor	2.0	Agree
89175	Individual contributor	8.0	Agree
89176	NaN	NaN	NaN
89177	Individual contributor	12.0	Agree
89178	Individual contributor	22.0	Strongly agree
89179	NaN	NaN	NaN
89180	NaN	NaN	NaN
89181	NaN	NaN	NaN
89182	NaN	NaN	NaN
89183	People manager	14.0	Agree
	Knowledge_2	Knowledge_3	
89164	Agree	Agree	
89165	Neither agree nor disagree	Strongly disagree	
89166	Agree	Neither agree nor disagree	
89167	Neither agree nor disagree	Neither agree nor disagree	
89168	NaN	NaN	
89169	NaN	NaN	
89170	Neither agree nor disagree	Disagree	
89171	Strongly disagree	Strongly disagree	
89172	Agree	Disagree	
89173	Strongly agree	Disagree	
89174	NaN	Neither agree nor disagree	

89175	Neither agree nor disagree	Neither agree nor disagree
89176	NaN	NaN
89177	Strongly agree	Agree
89178	Neither agree nor disagree	Disagree
89179	NaN	NaN
89180	NaN	NaN
89181	NaN	NaN
89182	NaN	NaN
89183	Neither agree nor disagree	Neither agree nor disagree
	Knowledge_4	
89164	Agree	Agree
89165	Agree	Strongly agree
89166	Agree	Agree
89167	Agree	Agree
89168	NaN	NaN
89169	NaN	NaN
89170	Strongly disagree	Strongly agree
89171	Strongly agree	Strongly agree
89172	Strongly agree	Strongly agree
89173	Neither agree nor disagree	Neither agree nor disagree
89174	Neither agree nor disagree	Agree
89175	Strongly agree	Strongly agree
89176	NaN	NaN
89177	Agree	Neither agree nor disagree
89178	Neither agree nor disagree	Agree
89179	NaN	NaN
89180	NaN	NaN
89181	NaN	NaN
89182	NaN	NaN
89183	Strongly agree	Strongly agree
	Knowledge_5	
89164	Agree	Agree
89165	Agree	Strongly agree
89166	Agree	Agree
89167	Agree	Agree
89168	NaN	NaN
89169	NaN	NaN
89170	Strongly disagree	Strongly agree
89171	Strongly agree	Strongly agree
89172	Strongly agree	Strongly agree
89173	Neither agree nor disagree	Neither agree nor disagree
89174	Neither agree nor disagree	Agree
89175	Strongly agree	Strongly agree
89176	NaN	NaN
89177	Agree	Neither agree nor disagree
89178	Neither agree nor disagree	Agree
89179	NaN	NaN
89180	NaN	NaN
89181	NaN	NaN
89182	NaN	NaN
89183	Strongly agree	Strongly agree
	Knowledge_6	
89164	Agree	Agree
89165	Neither agree nor disagree	Strongly agree
89166	Neither agree nor disagree	Neither agree nor disagree
89167	Agree	Strongly agree
89168	NaN	NaN
89169	NaN	NaN
89170	Strongly agree	Strongly agree
89171	Agree	Strongly agree
89172	Neither agree nor disagree	Neither agree nor disagree
89173	Neither agree nor disagree	Disagree
89174	Neither agree nor disagree	Agree
89175	Neither agree nor disagree	Agree
89176	NaN	NaN
89177	Agree	Agree

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*Image :stackoverflowdevelopersurvey-images-31*

89178	Agree	Strongly agree			
89179	NaN	NaN			
89180	NaN	NaN			
89181	NaN	NaN			
89182	NaN	NaN			
89183	Agree	Neither agree nor disagree			
			Knowledge_8		
			Frequency_1	Frequency_2	\
89164	Agree	Never	1-2 times a week		
89165	Strongly agree	1-2 times a week	3-5 times a week		
89166	Neither agree nor disagree	1-2 times a week	1-2 times a week		
89167	Agree	1-2 times a week	1-2 times a week		
89168	NaN	NaN	NaN		
89169	NaN	1-2 times a week	1-2 times a week		
89170	Strongly disagree	3-5 times a week	10+ times a week		
89171	Strongly agree	1-2 times a week	10+ times a week		
89172	Agree	Never	10+ times a week		
89173	Agree	Never	1-2 times a week		
89174	Agree	Never	Never		
89175	Agree	1-2 times a week	3-5 times a week		
89176	NaN	NaN	NaN		
89177	Agree	1-2 times a week	1-2 times a week		
89178	Neither agree nor disagree	1-2 times a week	1-2 times a week		
89179	NaN	NaN	NaN		
89180	NaN	NaN	NaN		
89181	NaN	NaN	NaN		
89182	NaN	NaN	NaN		
89183	Neither agree nor disagree	Never	1-2 times a week		
			Frequency_3	TimeSearching	\
89164	Never	Less than 15 minutes a day			
89165	1-2 times a week	30-60 minutes a day			
89166	1-2 times a week	15-30 minutes a day			
89167	NaN	Over 120 minutes a day			
89168	NaN	NaN			
89169	Never	30-60 minutes a day			
89170	1-2 times a week	15-30 minutes a day			
89171	Never	15-30 minutes a day			
89172	1-2 times a week	30-60 minutes a day			
89173	Never	30-60 minutes a day			
89174	3-5 times a week	30-60 minutes a day			
89175	Never	60-120 minutes a day			
89176	NaN	NaN			
89177	Never	15-30 minutes a day			
89178	1-2 times a week	15-30 minutes a day			
89179	NaN	NaN			
89180	NaN	NaN			

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Image :stackoverflowdevelopersurvey-images-32

```

89181           NaN           NaN
89182           NaN           NaN
89183 1-2 times a week  60-120 minutes a day

    TimeAnswering \
89164  Less than 15 minutes a day
89165  30-60 minutes a day
89166  15-30 minutes a day
89167  30-60 minutes a day
89168           NaN
89169  30-60 minutes a day
89170  30-60 minutes a day
89171  30-60 minutes a day
89172  30-60 minutes a day
89173  Less than 15 minutes a day
89174  30-60 minutes a day
89175  30-60 minutes a day
89176           NaN
89177  30-60 minutes a day
89178  60-120 minutes a day
89179           NaN
89180           NaN
89181           NaN
89182           NaN
89183  30-60 minutes a day

    ProfessionalTech \
89164  DevOps function;Microservices;Automated testin...
89165  Observability tools;Innersource initiative;Dev...
89166  DevOps function;Microservices;Continuous integ...
89167           Automated testing
89168           NaN
89169           AI-assisted technology tool(s)
89170  Automated testing;Observability tools;Innersou...
89171           None of these
89172           Innersource initiative
89173           Microservices
89174  Continuous integration (CI) and (more often) c...
89175  DevOps function;Continuous integration (CI) an...
89176           NaN
89177  Microservices;Developer portal or other centra...
89178  DevOps function;Microservices;Automated testin...
89179           NaN
89180           NaN
89181           NaN
89182           NaN
89183  DevOps function;Developer portal or other cent...

```

```

          Industry \
89164          Financial Services
89165  Information Services, IT, Software Development...
89166          Financial Services
89167          Retail and Consumer Services
89168          NaN
89169          Advertising Services
89170          Other
89171  Information Services, IT, Software Development...
89172  Information Services, IT, Software Development...
89173          NaN
89174  Manufacturing, Transportation, or Supply Chain
89175  Information Services, IT, Software Development...
89176          NaN
89177          Financial Services
89178          Insurance
89179          NaN
89180          NaN
89181          NaN
89182          NaN
89183  Information Services, IT, Software Development...

          SurveyLength      SurveyEase  ConvertedCompYearly
89164  Appropriate in length  Neither easy nor difficult      NaN
89165  Appropriate in length  Neither easy nor difficult      NaN
89166  Appropriate in length  Neither easy nor difficult  16917.0
89167  Appropriate in length  Neither easy nor difficult  15752.0
89168  Appropriate in length          Difficult          NaN
89169          Too long          Easy          NaN
89170  Appropriate in length  Neither easy nor difficult  64254.0
89171  Appropriate in length          Easy          NaN
89172  Appropriate in length  Neither easy nor difficult          NaN
89173          Too long          Easy          NaN
89174          Too long          Easy          NaN
89175  Appropriate in length  Neither easy nor difficult          NaN
89176          Too long          Easy          NaN
89177          Too long  Neither easy nor difficult          NaN
89178  Appropriate in length          Easy          NaN
89179          Too long  Neither easy nor difficult          NaN
89180          Too long          Easy          NaN
89181          Too long  Neither easy nor difficult          NaN
89182  Appropriate in length  Neither easy nor difficult          NaN
89183  Appropriate in length          Easy          NaN

```

```
[ ]: #check the employment column
data['Employment']
```

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*Image :stackoverflowdevelopersurvey-images-34*

```
[1]: 0                               NaN
      1                           Employed, full-time
      2                           Employed, full-time
      3                           Employed, full-time
      4 Employed, full-time;Independent contractor, fr...
      ...
89179   Employed, full-time;Independent contractor, fr...
89180       Student, full-time;Employed, part-time
89181           I prefer not to say
89182       Employed, part-time;Student, part-time
89183           Employed, full-time
Name: Employment, Length: 89184, dtype: object

[2]: #check the value_counts
data.Employment.value_counts()

[3]: Employment
      Employed, full-time
      53748
      Student, full-time
      7430
      Independent contractor, freelancer, or self-employed
      7076
      Employed, full-time;Independent contractor, freelancer, or self-employed
      4354
      Not employed, but looking for work
      2553
      ...
      Employed, full-time;Independent contractor, freelancer, or self-employed;Not
      employed, but looking for work;Student, full-time;Employed, part-time;Student,
      part-time;Not employed, and not looking for work
      1
      Employed, full-time;Independent contractor, freelancer, or self-
      employed;Student, full-time;Student, part-time
      1
      Employed, full-time;Independent contractor, freelancer, or self-
      employed;Student, full-time;Retired
      1
      Employed, full-time;Independent contractor, freelancer, or self-employed;Not
      employed, but looking for work;Not employed, and not looking for work
      1
      Employed, full-time;Not employed, but looking for work;Employed, part-
      time;Student, part-time
      1
Name: count, Length: 106, dtype: int64

[4]: #find which operating system is most popular among developers
data['OpSysProfessional use'].value_counts()
```

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*Image :stackoverflowdevelopersurvey-images-35*

```
[1]: OpSysProfessional use
Windows
15943
MacOS
12928
Ubuntu
5201
Windows;Windows Subsystem for Linux (WSL)
3934
Ubuntu;Windows
2795
-
Debian;iOS;iPadOS;MacOS;Red Hat;Windows
1
BSD;Other Linux-based;Red Hat
1
Arch;BSD;ChromeOS;Debian;iOS;iPadOS;MacOS;Red Hat;Ubuntu;Windows;Windows
Subsystem for Linux (WSL)
Android;Arch;BSD;Cygwin;Debian;Fedora;Other Linux-based;Ubuntu;Windows;Windows
Subsystem for Linux (WSL)
BSD;Red Hat;Solaris;Ubuntu;Windows
1
Name: count, Length: 2470, dtype: int64

[2]: data.Employment[89182]

[3]: 'Employed, part-time;Student, part-time'

[4]: #find the value_counts in Devtype column
data['DevType'].value_counts()

[5]: DevType
Developer, full-stack
Developer, back-end
Developer, front-end
Developer, desktop or enterprise applications
Other (please specify):
Developer, mobile
Engineering manager
Student
Developer, embedded applications or devices
Data scientist or machine learning specialist
DevOps specialist
Academic researcher
Research & Development role
Senior Executive (C-Suite, VP, etc.)
Engineer, data
25735
13745
5071
3904
3080
2597
2033
1996
1845
1688
1387
1354
1353
1332
1248
```

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*Image :stackoverflowdevelopersurvey-images-36*

```

Cloud infrastructure engineer          1036
Developer, game or graphics          866
Data or business analyst             837
System administrator                 743
Project manager                     589
Developer, QA or test                586
Security professional                474
Product manager                     446
Engineer, site reliability          427
Educator                            415
Scientist                            351
Developer Experience                 326
Blockchain                           323
Hardware Engineer                   286
Designer                            281
Database administrator               257
Developer Advocate                  212
Marketing or sales professional     149
Name: count, dtype: int64

```

```
[ ]: #find the developers who only use Mac os
macos_users = data[data['OpSysProfessional use']=='MacOS']
```

```
[ ]: macos_users
```

```

[ ]:      ResponseId      Q120      MainBranch \
5          6  I agree  I am a developer by profession
6          7  I agree  I am a developer by profession
16         17  I agree  I am a developer by profession
17         18  I agree  I am a developer by profession
20         21  I agree  I am a developer by profession
-
89134     89135  I agree  I code primarily as a hobby
89141     89142  I agree  I am a developer by profession
89153     89154  I agree  I am a developer by profession
89155     89156  I agree  I am a developer by profession
89156     89157  I agree  I am a developer by profession

      Age      Employment \
5  35-44 years old  Employed, full-time
6  35-44 years old  Employed, full-time
16 35-44 years old  Employed, full-time
17 25-34 years old  Employed, full-time
20 25-34 years old  Employed, full-time
-
89134  Under 18 years old  Student, full-time
89141  25-34 years old  Employed, full-time

```

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*Image :stackoverflowdevelopersurvey-images-37*

```

89153 25-34 years old Employed, full-time
89155 25-34 years old Employed, full-time
89156 25-34 years old Employed, full-time

                    RemoteWork \
5                  Remote
6                  Remote
16 Hybrid (some remote, some in-person)
17 Hybrid (some remote, some in-person)
20                  Remote
-
89134           NaN
89141           Remote
89153           Remote
89155           Remote
89156           Remote

                    CodingActivities \
5 Hobby;Professional development or self-paced l...
6 Hobby;Contribute to open-source projects;Profe...
16                         Hobby
17                         Hobby
20 Hobby;Professional development or self-paced l...
-
89134           NaN
89141 Hobby;Professional development or self-paced l...
89153           I don't code outside of work
89155 Hobby;Professional development or self-paced l...
89156 Hobby;Contribute to open-source projects;Profe...

                    EdLevel \
5 Some college/university study without earning -
6 Some college/university study without earning -
16 Bachelor's degree (B.A., B.S., B.Eng., etc.)
17 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
20 Bachelor's degree (B.A., B.S., B.Eng., etc.)
-
89134           Primary/elementary school
89141 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89153 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
89155 Some college/university study without earning -
89156 Bachelor's degree (B.A., B.S., B.Eng., etc.)

                    LearnCode \
5 Books / Physical media;Colleague;Online Course...
6 Friend or family member;Online Courses or Cert...
16 Online Courses or Certification;Coding Bootcamp

```

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*Image :stackoverflowdevelopersurvey-images-38*

```

17 Books / Physical media;Colleague;Other online -
20 Other online resources (e.g., videos, blogs, f-
-
89134 = NaN
89141 Books / Physical media;On the job training;Oth-
89153 Books / Physical media;Colleague;Friend or fam-
89155 Online Courses or Certification;Other online r-
89156 Books / Physical media;Colleague;Online Course-
-
5 Formal documentation provided by the owner of -
6 NaN
16 NaN
17 Formal documentation provided by the owner of -
20 Formal documentation provided by the owner of -
-
89134 = NaN
89141 Formal documentation provided by the owner of -
89153 Formal documentation provided by the owner of -
89155 Formal documentation provided by the owner of -
89156 Formal documentation provided by the owner of -
-
LearnCodeOnline \
5 Other 21 21
6 Udemy 4 3
16 NaN 4 2
17 NaN 11 6
20 NaN 6 6
-
89134 = = = NaN
89141 NaN 14 11
89153 Other;Coursera 10 6
89155 Codecademy;Udemy;Coursera;Udacity 1 Less than 1 year
89156 Coursera 12 8
-
DevType \
5 Developer, back-end
6 Developer, full-stack
16 Developer, front-end
17 Developer, front-end
20 Developer, front-end
-
89134 = NaN
89141 Developer, back-end
89153 Data scientist or machine learning specialist
89155 Developer, full-stack
89156 Engineering manager

```

```

2 Hobby;Professional development or self-paced l...
3                                         Hobby
4 Hobby;Contribute to open-source projects;Profes...
5 Hobby;Professional development or self-paced l...
6 Hobby;Contribute to open-source projects;Profes...
7                                         Hobby
8     Hobby;Contribute to open-source projects
9                                         NaN
10                                         Hobby
11                                         Hobby
12 Hobby;Professional development or self-paced l...
13 Hobby;Professional development or self-paced l...
14                                         Hobby
15 Hobby;Contribute to open-source projects;Profes...
16                                         Hobby
17                                         Hobby
18     Contribute to open-source projects
19 Hobby;Professional development or self-paced l...

                                         EdLevel \
0                                         NaN
1 Bachelor's degree (B.A., B.S., B.Eng., etc.)
2 Bachelor's degree (B.A., B.S., B.Eng., etc.)
3 Bachelor's degree (B.A., B.S., B.Eng., etc.)
4 Bachelor's degree (B.A., B.S., B.Eng., etc.)
5 Some college/university study without earning -
6 Some college/university study without earning -
7 Bachelor's degree (B.A., B.S., B.Eng., etc.)
8 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
9 Bachelor's degree (B.A., B.S., B.Eng., etc.)
10 Bachelor's degree (B.A., B.S., B.Eng., etc.)
11 Bachelor's degree (B.A., B.S., B.Eng., etc.)
12 Bachelor's degree (B.A., B.S., B.Eng., etc.)
13 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
14 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
15 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
16 Bachelor's degree (B.A., B.S., B.Eng., etc.)
17 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
18     Primary/elementary school
19 Some college/university study without earning -

                                         LearnCode \
0                                         NaN
1 Books / Physical media;Colleague;Friend or fam...
2 Books / Physical media;Colleague;On the job tr...
3 Colleague;Friend or family member;Other online...
4 Books / Physical media;Online Courses or Certi...

```

	OrgSize	PurchaseInfluence	TechList
5	100 to 499 employees	I have little or no influence	NaN
6	1,000 to 4,999 employees	I have little or no influence	NaN
16	1,000 to 4,999 employees	I have some influence	Given a list
17	500 to 999 employees	I have little or no influence	NaN
20	20 to 99 employees	I have some influence	Investigate
-	-	-	-
89134	NaN	NaN	NaN
89141	5,000 to 9,999 employees	I have little or no influence	NaN
89153	100 to 499 employees	I have little or no influence	NaN
89155	20 to 99 employees	I have little or no influence	NaN
89156	100 to 499 employees	I have little or no influence	NaN
	BuyNewTool		
5	Start a free trial;Ask developers I know/work with	NaN	NaN
6	Ask developers I know/work with;Read ratings on	NaN	NaN
16	Start a free trial;Ask developers I know/work with	NaN	NaN
17	Start a free trial;Ask developers I know/work with	NaN	NaN
20	Start a free trial;Ask developers I know/work with	NaN	NaN
-	-	-	-
89134	NaN	NaN	NaN
89141	Start a free trial;Ask developers I know/work with	NaN	NaN
89153	NaN	NaN	NaN
89155	Ask developers I know/work with;Visit developer	NaN	NaN
89156	NaN	NaN	NaN
	Country		
5	United Kingdom of Great Britain and Northern Ireland	United States of America	Sweden
6	United States of America	United States of America	France
16	United States of America	United States of America	United Kingdom of Great Britain and Northern Ireland
17	United States of America	United States of America	United States of America
20	United States of America	United States of America	United States of America
-	-	-	-
89134	United States of America	United States of America	United States of America
89141	United States of America	United States of America	Poland
89153	United States of America	United States of America	Canada
89155	United States of America	United States of America	United States of America
89156	United States of America	United States of America	United States of America
	Currency	CompTotal	
5	GBP\pound sterling	78000.0	
6	USD\United States dollar	135000.0	
16	SEK\Swedish krona	490000.0	
17	EUR European Euro	55000.0	
20	GBP\pound sterling	49000.0	
-	-	-	

*Image :stackoverflowdevelopersurvey-images-40*

```

89134           NaN      NaN
89141  USD\United States dollar  250000.0
89153          PLN\Polish zloty  NaN
89155  CAD\Canadian dollar  85000.0
89156  USD\United States dollar  195000.0

          LanguageHaveWorkedWith \
5  Bash/Shell (all shells);HTML/CSS;JavaScript;Ru...
6  Ada;Clojure;Elixir;Go;HTML/CSS;Java;JavaScript...
16          JavaScript;TypeScript
17          HTML/CSS;JavaScript;SQL;TypeScript
20          JavaScript;PHP;Ruby;TypeScript
-
89134  Bash/Shell (all shells);C;C++;Elixir;Go;Haskell...
89141          C#;C++;Java;Ruby;Scala;SQL;TypeScript
89153          Bash/Shell (all shells);Python;SQL
89155  Bash/Shell (all shells);HTML/CSS;JavaScript;Ru...
89156  Bash/Shell (all shells);C;C++;JavaScript;Julia

          LanguageWantToWorkWith \
5          Go;Rust
6          NaN
16          TypeScript
17  Go;HTML/CSS;JavaScript;Rust;SQL;TypeScript
20          TypeScript
-
89134  Assembly;Bash/Shell (all shells);C;Clojure;Eli...
89141          C#;Dart;Rust
89153          Python;Rust;SQL
89155  Bash/Shell (all shells);C#;Go;HTML/CSS;JavaScr...
89156          Julia;Zig

          DatabaseHaveWorkedWith \
5  BigQuery;Cloud Firestore;PostgreSQL;Redis
6  MariaDB;Microsoft SQL Server;MySQL;PostgreSQL;...
16          Elasticsearch
17          MongoDB;MySQL;Oracle;PostgreSQL
20          MySQL
-
89134  Cloud Firestore;Dynamodb;Firebase Realtime Dat...
89141          Elasticsearch;InfluxDB;MongoDB;MySQL;Snowflake
89153          BigQuery
89155  Clickhouse;Cloud Firestore;MongoDB;MySQL;Postg...
89156          Cosmos DB;PostgreSQL

          DatabaseWantToWorkWith \
5          NaN

```

```

6                               Datomic
16                           Elasticsearch
17                               NaN
20                               NaN
-
89134 Cassandra;Cockroachdb;Elasticsearch;MongoDB;Ne...
89141           InfluxDB;Microsoft SQL Server;MySQL
89153           BigQuery;MongoDB;Neo4J
89155 Cloud Firestore;MongoDB;MySQL;PostgreSQL;SQLite_
89156           Cockroachdb;DuckDB;Snowflake

                               PlatformHaveWorkedWith \
5      Amazon Web Services (AWS);Cloudflare;Google Cloud
6          Amazon Web Services (AWS);Digital Ocean
16          Firebase;Microsoft Azure
17          Netlify;Vercel
20          Amazon Web Services (AWS);Cloudflare;Netlify
-
89134 Amazon Web Services (AWS);Cloudflare;Digital O...
89141           Amazon Web Services (AWS)
89153           Google Cloud
89155           Firebase;Google Cloud;Heroku;Vercel
89156 Amazon Web Services (AWS);Netzner;Microsoft Azure

                               PlatformWantToWorkWith \
5          NaN
6          Vercel
16          Vercel
17          Netlify;Vercel
20          Amazon Web Services (AWS)
-
89134 Amazon Web Services (AWS);Cloudflare;Google Cl...
89141 Amazon Web Services (AWS);Google Cloud;Microso...
89153           Google Cloud
89155           Firebase;Google Cloud;Vercel
89156           Amazon Web Services (AWS)

                               WebframeHaveWorkedWith \
5          Angular;Express;NextJS;Node.js
6  AngularJS;jQuery;Node.js;Phoenix;Ruby on Rails...
16          Express;Gatsby;Next.js;Node.js;React
17          Express;Next.js;React
20          Laravel;Next.js;React;Ruby on Rails
-
89134 Angular;Deno;Django;Express;Flask;Next.js;Node...
89141           ASP.NET;ASP.NET CORE;Ruby on Rails
89153           NaN

```

```

89155 Express;jQuery;Next.js;Node.js;React;Ruby on R...
89156           jQuery;Node.js

                               WebframeWantToWorkWith \
5                               NaN
6                               NaN
16           Next.js;Node.js;React;Remix;Ruby on Rails
17           Express;Next.js;React
20           Next.js;React
-
89134 Angular;FastAPI;Fastify;Next.js;Node.js;Nuxt.js
89141           ASP.NET CORE;React;Ruby on Rails
89153           NaN
89155 Angular;AngularJS;Django;Express;jQuery;Next.js
89156           NaN

                               MiscTechHaveWorkedWith \
5                               NaN
6                               RabbitMQ;Spring Framework
16           React Native
17           NaN
20           React Native
-
89134 Electron;Keras;NumPy;OpenCV;Pandas;Qt;SwiftUI;-
89141 .NET (5+);.NET Framework (1.0 - 4.8);Apache K...
89153           NumPy;Pandas
89155           NaN
89156           NaN

                               MiscTechWantToWorkWith \
5                               NaN
6                               NaN
16           React Native
17           NaN
20           React Native
-
89134 Hadoop;Ionic;Keras;NumPy;OpenCV;Pandas;SwiftUI;-
89141 .NET (5+);.NET Framework (1.0 - 4.8);.NET MAU;-
89153           NumPy;Pandas;Torch/PyTorch
89155           NaN
89156           NaN

                               ToolsTechHaveWorkedWith \
5           Docker;Homebrew;Kubernetes;npm;pnpm;Terraform
6           Bun;Cargo;Chocolatey;Docker;Homebrew;Kubernetes
16           npm;Yarn
17           npm;pnpm;Webpack;Yarn

```

```

20                               NaN
-
89134 Ansible;APT;Cargo;Docker;GNU GCC;Make;npm;Terr_-
89141 Dagger;Docker;Kubernetes;MSBuild;MSVC;Terrafor_-
89153                               Docker
89155 Docker;Homebrew;Kubernetes;Make;npm;Webpack;Yarn
89156                               NaN

          ToolsTechWantToWorkWith \
5                               Cargo
6                               NaN
16                               Vite;Yarn
17                               npm;pnpm;Webpack;Yarn
20                               NaN

-
89134 Ansible;APT;Cargo;Docker;GNU GCC;Kubernetes;Ma_-
89141 Docker;Kubernetes;MSBuild;Visual Studio Solution
89153                               Ansible;Docker;Terraform
89155 Docker;Homebrew;Kubernetes;Make;npm;Unity 3D;W_-
89156                               NaN

          NEWCollabToolsHaveWorkedWith \
5                               Helix;Neovim
6 Emacs;IntelliJ IDEA;RubyMine;Visual Studio Cod_-
16                               Visual Studio Code
17                               Visual Studio Code
20                               Visual Studio Code

-
89134                               Neovim;Vim;Xcode
89141 IntelliJ IDEA;Notepad++;RubyMine;Sublime Text;-
89153 Jupyter Notebook;JupyterLab;PyCharm;Visual Stu_-
89155 Nano;PyCharm;Vim;Visual Studio Code
89156                               Vim;Visual Studio Code

          NEWCollabToolsWantToWorkWith \
5                               NaN
6                               NaN
16                               Visual Studio Code
17                               Visual Studio Code
20                               Visual Studio Code

-
89134                               Neovim;Vim;Xcode
89141 Notepad++;Sublime Text;Visual Studio;Visual St_-
89153 Jupyter Notebook;JupyterLab;PyCharm
89155 Nano;Visual Studio Code
89156                               Vim;Visual Studio Code

```

```

OpSysPersonal use OpSysProfessional use \
5      Other (Please Specify):           MacOS
6          MacOS;Windows               MacOS
16         MacOS
17         MacOS
20         MacOS;iPadOS;MacOS        MacOS
-
89134         MacOS
89141         Windows
89153         MacOS
89155 Windows Subsystem for Linux (WSL) MacOS
89156         MacOS
-
OfficeStackAsyncHaveWorkedWith \
5      Jira;Markdown File;Notion;Stack Overflow for T...
6          Jira
16         GitHub Discussions;Jira;Notion
17         GitHub Discussions;Jira;Miro;Notion
20         Jira;Miro;Notion;Trello
-
89134         Airtable;Markdown File;Notion
89141         Basecamp;Confluence;Jira;Miro
89153         Confluence
89155         Jira;Notion
89156         Jira
-
OfficeStackAsyncWantToWorkWith \
5          NaN
6          NaN
16         GitHub Discussions
17         GitHub Discussions;Jira;Miro;Notion
20         Jira;Miro
-
89134         Markdown File;Notion
89141 Confluence;Jira;Miro;Stack Overflow for Teams
89153         Confluence
89155         Notion
89156         Airtable
-
OfficeStackSyncHaveWorkedWith \
5      Google Meet;Microsoft Teams;Slack;Zoom
6          Slack
16         Microsoft Teams;Slack
17         Slack;Whatsapp;Zoom
20         Microsoft Teams;Slack
-
89134 Discord;Google Chat;Google Meet;Zoom

```

```

89141           Slack;Zoom
89153           Google Meet;Slack
89155           Discord;Slack;Zoom
89156           Google Meet;Slack;Zoom

OfficeStackSyncWantToWorkWith \
5                   NaN
6                   NaN
16                  Slack
17                  Slack;Whatsapp;Zoom
20                  NaN
-
89134           Discord
89141   Discord;Google Meet;Microsoft Teams;Slack
89153           Google Meet;Slack
89155           Discord;Slack;Zoom
89156           Slack;Zoom

AISeachHaveWorkedWith AISeachWantToWorkWith \
5   ChatGPT;Google Bard AI;Bing AI;Neeva AI      NaN
6           ChatGPT           NaN
16           Bing AI;ChatGPT      ChatGPT
17           ChatGPT           ChatGPT
20           ChatGPT           ChatGPT
-
89134           ChatGPT;Google Bard AI      ChatGPT
89141           Bing AI;ChatGPT      Bing AI;ChatGPT
89153           NaN           NaN
89155           ChatGPT           ChatGPT
89156           ChatGPT           ChatGPT

AIDevHaveWorkedWith           AIDevWantToWorkWith \
5   GitHub Copilot;Tabnine      NaN
6           GitHub Copilot      NaN
16           NaN           NaN
17           GitHub Copilot      GitHub Copilot
20           NaN           NaN
-
89134   GitHub Copilot;Tabnine      GitHub Copilot
89141           NaN           NaN
89153           NaN           NaN
89155           GitHub Copilot      GitHub Copilot
89156   GitHub Copilot  GitHub Copilot;Replit Ghostwriter

NEWSOSites           SOVisitFreq \
5   Stack Overflow      Daily or almost daily
6   Stack Overflow      A few times per month or weekly

```

```

16           Stack Overflow           Daily or almost daily
17           Stack Overflow           Multiple times per day
20           Stack Overflow           A few times per week
-
89134   Stack Overflow;Stack Exchange   A few times per month or weekly
89141   Stack Overflow;Stack Exchange   A few times per week
89153   Stack Overflow;Stack Exchange   A few times per week
89155       Stack Overflow           Multiple times per day
89156   Stack Overflow;Stack Exchange   Less than once per month or monthly

           SOAccount \
5             Yes
6             Yes
16  Not sure/can't remember
17             No
20             No
-
89134  Not sure/can't remember
89141             Yes
89153             No
89155             No
89156             Yes

           SOPartFreq           SOComm \
5   I have never participated in Q&A on Stack Over... No, not at all
6   Less than once per month or monthly   Neutral
16
17
20
-
89134
89141   A few times per month or weekly   Yes, somewhat
89153
89155
89156   Less than once per month or monthly   No, not really

           SOAI \
5             NaN
6             Neutral
16
17  I use both SO and ChatGPT. When I really want -
20
-
89134
89141   I bet StackOverflow could benefit from leverag-
89153   It's a good direction. AI can help with text e-
89155             Go for it

```

```

89156 Sounds generally helpful, yes. It could also do
      AISelect      AISent \
5          Yes      Favorable
6          Yes      Unfavorable
16         Yes  Very favorable
17         Yes  Very favorable
20         Yes      Favorable
-
89134         Yes  Indifferent
89141         Yes      Favorable
89153  No, but I plan to soon      Favorable
89155         Yes  Very favorable
89156         Yes      Favorable

      AIAcc \
5          Greater efficiency
6          Improve accuracy in coding
16  Increase productivity;Greater efficiency;Speed...
17          Greater efficiency;Speed up learning
20  Increase productivity;Greater efficiency;Speed...
-
89134         Greater efficiency
89141  Speed up learning;Improve accuracy in coding
89153          NaN
89155  Increase productivity;Greater efficiency;Speed...
89156  Increase productivity;Improve collaboration

      AIBen \
5          Somewhat trust
6          Somewhat distrust
16          Somewhat trust
17  Neither trust nor distrust
20          Somewhat trust
-
89134          Somewhat distrust
89141  Neither trust nor distrust
89153          Somewhat trust
89155          Somewhat trust
89156          Somewhat distrust

      AIToolInterested in Using \
5  Learning about a codebase;Documenting code;Test...
6          NaN
16          Debugging and getting help
17  Learning about a codebase;Project planning;Dep...
20          NaN

```

```

-
89134           NaN
89141 Learning about a codebase;Documenting code;Deb... NaN
89153           NaN
89155           NaN
89156 Learning about a codebase;Debugging and gettin... NaN

          AIToolCurrently Using \
5           Writing code;Debugging and getting help
6           Writing code;Debugging and getting help
16           Writing code
17 Writing code;Documenting code;Debugging and ge... NaN
20           Debugging and getting help

-
89134           NaN
89141           Writing code;Testing code
89153           NaN
89155 Learning about a codebase;Project planning;Wri... NaN
89156           Writing code;Documenting code

          AIToolNot interested in Using \
5           Project planning
6 Learning about a codebase;Project planning;Wri... NaN
16           NaN
17           NaN
20           NaN

-
89134           NaN
89141 Project planning;Committing and reviewing code... NaN
89153           NaN
89155           NaN
89156 Project planning;Committing and reviewing code... NaN

          AINextVery different \
5           NaN
6           NaN
16           NaN
17           NaN
20           NaN

-
89134           NaN
89141           NaN
89153           NaN
89155 Learning about a codebase;Writing code;Debuggi... NaN
89156           NaN

          AINextNeither different nor similar      AINextSomewhat similar \

```

```

5 Books / Physical media;Colleague;Online Course...
6 Friend or family member;Online Courses or Cert...
7 Books / Physical media;Online Courses or Certi...
8 Online Courses or Certification;On the job tra...
9 Books / Physical media;Online Courses or Certi...
10 Books / Physical media;Friend or family member...
11 Online Courses or Certification;Other online r...
12 Online Courses or Certification;Other online r...
13 Books / Physical media;Online Courses or Certi...
14 On the job training;Other online resources (e...
15 Books / Physical media;Other online resources -
16 Online Courses or Certification;Coding Bootcamp
17 Books / Physical media;Colleague;Other online -
18 Books / Physical media
19 Online Courses or Certification;On the job tra...

          LearnCodeOnline -      Frequency_1 \
0           NaN -           NaN
1 Formal documentation provided by the owner of - - 1-2 times a week
2 Formal documentation provided by the owner of - - 6-10 times a week
3 Formal documentation provided by the owner of - - 1-2 times a week
4 Formal documentation provided by the owner of - - 1-2 times a week
5 Formal documentation provided by the owner of - - 1-2 times a week
6           NaN -           NaN
7 Formal documentation provided by the owner of - - NaN
8 Formal documentation provided by the owner of - - NaN
9 Formal documentation provided by the owner of - - NaN
10 Formal documentation provided by the owner of - - 1-2 times a week
11 Formal documentation provided by the owner of - - NaN
12 Blogs with tips and tricks;Books;How-to videos... - Never
13 Blogs with tips and tricks;Books;Video-based D... 1-2 times a week
14 Formal documentation provided by the owner of - - Never
15 Formal documentation provided by the owner of - - 1-2 times a week
16           NaN -           NaN
17 Formal documentation provided by the owner of - - 1-2 times a week
18           NaN -           NaN
19 Formal documentation provided by the owner of - - 1-2 times a week

      Frequency_2      Frequency_3      TimeSearching \
0           NaN           NaN           NaN
1 10+ times a week           NaN           NaN
2 6-10 times a week  3-5 times a week  15-30 minutes a day
3 10+ times a week  1-2 times a week  15-30 minutes a day
4 1-2 times a week  3-5 times a week  60-120 minutes a day
5 1-2 times a week  3-5 times a week  30-60 minutes a day
6 3-5 times a week  1-2 times a week  Less than 15 minutes a day
7           NaN           NaN           NaN

```

```

5           NaN           NaN
6           NaN           NaN
16          NaN           NaN
17          NaN           NaN
20          NaN           NaN
-
89134          -           NaN
89141          -           NaN Writing code;Testing code
89153          -           NaN           NaN
89155          -           NaN           NaN
89156          -           NaN           NaN

    AINextVery similar    AINextSomewhat different    TBranch \
5           NaN           NaN           Yes
6           NaN           NaN           Yes
16          NaN           NaN           No
17          NaN           NaN           Yes
20          NaN           NaN           Yes
-
89134          -           -           -           NaN
89141          -           -           -           NaN Yes
89153          -           -           -           NaN Yes
89155          -           -           -           No
89156          -           -           -           Yes Writing code;Documenting code

    ICorPM    WorkExp    Knowledge_1 \
5 Individual contributor    22.0           Agree
6 Individual contributor    4.0    Strongly agree
16          NaN           NaN
17 Individual contributor    6.0    Strongly agree
20 Individual contributor    6.0           Agree
-
89134          -           -           -           NaN
89141          -           -           -           Agree
89153          -           -           -           Agree
89155          -           -           -           NaN
89156          -           -           -           Strongly agree

    Knowledge_2           Knowledge_3 \
5    Strongly agree           Disagree
6    Agree           Neither agree nor disagree
16          NaN           NaN
17 Neither agree nor disagree           Agree
20          Agree           Agree
-
89134          -           -           -           NaN
89141          -           -           -           Neither agree nor disagree

```

51

*Image :stackoverflowdevelopersurvey-images-50*

	Neither agree nor disagree			
89153	NaN	NaN	NaN	NaN
89155	Agree	Agree	Agree	Agree
89156				
	Knowledge_4	Knowledge_5	Knowledge_6	Knowledge_7
5	Neither agree nor disagree	Strongly disagree	Disagree	Disagree
6	Neither agree nor disagree	Agree	Agree	Agree
16	NaN	NaN	NaN	NaN
17	Agree	Agree	Agree	Agree
20	Agree	Agree	Agree	Agree
-	-	-	-	-
89134	NaN	NaN	NaN	NaN
89141	Neither agree nor disagree			
89153	Agree	Strongly agree	Strongly agree	Strongly agree
89155	NaN	NaN	NaN	NaN
89156	Agree	Agree	Agree	Agree
	Knowledge_6	Knowledge_7	Knowledge_8	Frequency_1
5	Neither agree nor disagree	Disagree	Disagree	1-2 times a week
6	Agree	Agree	Agree	1-2 times a week
16	NaN	NaN	NaN	3-5 times a week
17	Disagree	Neither agree nor disagree	Neither agree nor disagree	1-2 times a week
20	Agree	Agree	Agree	1-2 times a week
-	-	-	-	-
89134	NaN	NaN	NaN	NaN
89141	Agree	Agree	Agree	Agree
89153	Strongly disagree	Disagree	Disagree	Disagree
89155	NaN	NaN	NaN	NaN
89156	Strongly agree	Neither agree nor disagree	Neither agree nor disagree	Neither agree nor disagree
	Knowledge_8	Frequency_2	Frequency_1	TimeSearching
5	Disagree	1-2 times a week	1-2 times a week	30-60 minutes a day
6	Neither agree nor disagree	1-2 times a week	3-5 times a week	Less than 15 minutes a day
16	NaN	NaN	NaN	NaN
89134	NaN	NaN	NaN	NaN
89141	Disagree	1-2 times a week	3-5 times a week	15-30 minutes a day
89153	Agree	1-2 times a week	1-2 times a week	15-30 minutes a day
89155	NaN	NaN	NaN	NaN
89156	Neither agree nor disagree	1-2 times a week	10+ times a week	NaN
	Frequency_3	TimeSearching	TimeAnswering	TimeAnswering
5	3-5 times a week	30-60 minutes a day	15-30 minutes a day	15-30 minutes a day
6	1-2 times a week	Less than 15 minutes a day	15-30 minutes a day	NaN
16	NaN	NaN	NaN	NaN

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*Image :stackoverflowdevelopersurvey-images-51*

```

17  1-2 times a week      60-120 minutes a day      30-60 minutes a day
20  1-2 times a week      Over 120 minutes a day      30-60 minutes a day
=
89134      =      =      =
89141  1-2 times a week      60-120 minutes a day      15-30 minutes a day
89153  1-2 times a week      60-120 minutes a day      Over 120 minutes a day
89155      =      =      =
89156  3-5 times a week      30-60 minutes a day      Over 120 minutes a day

                           ProfessionalTech \
5  DevOps function;Microservices;Observability to...
6  Microservices;Automated testing;Continuous int...
16
17  DevOps function;Microservices;Automated testin...
20  DevOps function;Microservices;Automated testin...
=
89134      =      =      =
89141  DevOps function;Automated testing;Observabilit...
89153  DevOps function;Microservices;Automated testin...
89155      =      =      =
89156  Automated testing;Observability tools;Continuo...

                           Industry \
5
6  Information Services, IT, Software Development...
16
17  Retail and Consumer Services
20  Higher Education
=
89134      =      =      =
89141      =      =      =
89153      =      =      =
89155      =      =      =
89156  Information Services, IT, Software Development...

                           SurveyLength      SurveyEase      ConvertedCompYearly
5  Appropriate in length  Neither easy nor difficult      96828.0
6  Appropriate in length      Easy      135000.0
16  Appropriate in length      Easy      45149.0
17  Appropriate in length      Easy      58899.0
20  Appropriate in length      Easy      60828.0
=
89134  Appropriate in length      =      =      =
89141  Appropriate in length      =      =      =
89153  Appropriate in length      =      =      =
89155  Appropriate in length      =      =      =
89156  Appropriate in length  Neither easy nor difficult      195000.0

```

53

*Image :stackoverflowdevelopersurvey-images-52*

```
[12928 rows x 84 columns]

[1]: # Find developer count for each country
data['Country'].value_counts()

[1]: Country
United States of America          18647
Germany                           7328
India                             5625
United Kingdom of Great Britain and Northern Ireland 5552
Canada                            3507
-
Saint Kitts and Nevis              1
Marshall Islands                  1
Saoa                             1
Central African Republic          1
San Marino                        1
Name: count, Length: 185, dtype: int64

[1]: #find developers in USA
usa_developers = data[data['Country']=='United States of America']
usa_developers

[1]: ResponseID      Q120          MainBranch \
1            2 I agree      I am a developer by profession
2            3 I agree      I am a developer by profession
3            4 I agree      I am a developer by profession
6            7 I agree      I am a developer by profession
7            8 I agree      I am a developer by profession
-
89150      89151 I agree I used to be a developer by profession, but no...
89154      89155 I agree      I am a developer by profession
89156      89157 I agree      I am a developer by profession
89175      89176 I agree      I am a developer by profession
89178      89179 I agree      I am a developer by profession

          Age      Employment \
1  25-34 years old  Employed, full-time
2  45-54 years old  Employed, full-time
3  25-34 years old  Employed, full-time
6  35-44 years old  Employed, full-time
7  25-34 years old  Employed, full-time
-
89150  55-64 years old  Employed, full-time
89154  35-44 years old  Employed, full-time
89156  25-34 years old  Employed, full-time
```

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Image :stackoverflowdevelopersurvey-images-53

```

89175 25-34 years old Employed, full-time
89178 45-54 years old Employed, full-time

                    RemoteWork \
1                         Remote
2     Hybrid (some remote, some in-person)
3     Hybrid (some remote, some in-person)
6                         Remote
7                         Remote
-
89150                     -
89154     Hybrid (some remote, some in-person)
89156                     Remote
89175                     Remote
89178                     Remote

                    CodingActivities \
1     Hobby;Contribute to open-source projects;Books...
2     Hobby;Professional development or self-paced l...
3                         Hobby
6     Hobby;Contribute to open-source projects;Profe...
7                         Hobby
-
89150                     -
89154     I don't code outside of work
89156 Hobby;Contribute to open-source projects;Profe...
89175     I don't code outside of work
89178                     Hobby

                    EdLevel \
1     Bachelor's degree (B.A., B.S., B.Eng., etc.)
2     Bachelor's degree (B.A., B.S., B.Eng., etc.)
3     Bachelor's degree (B.A., B.S., B.Eng., etc.)
6     Some college/university study without earning -
7     Bachelor's degree (B.A., B.S., B.Eng., etc.)
-
89150                     -
89154     Bachelor's degree (B.A., B.S., B.Eng., etc.)
89156     Bachelor's degree (B.A., B.S., B.Eng., etc.)
89175     Bachelor's degree (B.A., B.S., B.Eng., etc.)
89178     Bachelor's degree (B.A., B.S., B.Eng., etc.)

                    LearnCode \
1     Books / Physical media;Colleague;Friend or fam...
2     Books / Physical media;Colleague;On the job tr...
3     Colleague;Friend or family member;Other online...
6     Friend or family member;Online Courses or Cert...

```

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*Image :stackoverflowdevelopersurvey-images-54*

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7      Books / Physical media;Online Courses or Certi...
-
89150  Books / Physical media;Online Courses or Certi...
89154  Online Courses or Certification;On the job tra...
89156  Books / Physical media;Colleague;Online Course...
89175  Hackathons (virtual or in-person);Online Cours...
89178  Online Courses or Certification;On the job tra...

                           LearnCodeOnline  \
1      Formal documentation provided by the owner of ...
2      Formal documentation provided by the owner of ...
3      Formal documentation provided by the owner of ...
6                           NaN
7      Formal documentation provided by the owner of ...

                           -
89150  Formal documentation provided by the owner of ...
89154  Formal documentation provided by the owner of ...
89156  Formal documentation provided by the owner of ...
89175  Formal documentation provided by the owner of ...
89178  Formal documentation provided by the owner of ...

                           LearnCodeCoursesCert  YearsCode  YearsCodePro  \
1      Other          18          9
2      NaN           27         23
3      NaN           12          7
6      Udemy          4          3
7      Codecademy;edX  5          3

                           -
89150  Codecademy          25          8
89154  Codecademy;edX;Pluralsight  20          8
89156  Coursera           12          8
89175  Codecademy;Udemy;Pluralsight;Udacity  10          8
89178  edX;Udemy;Pluralsight;Udacity          25         22

                           DevType          OrgSize  \
1  Senior Executive (C-Suite, VP, etc.)  2 to 9 employees
2  Developer, back-end  5,000 to 9,999 employees
3  Developer, front-end  100 to 499 employees
6  Developer, full-stack  1,000 to 4,999 employees
7  Developer, full-stack  10 to 19 employees

                           -
89150  Developer Experience          NaN
89154  Developer, front-end          2 to 9 employees
89156  Engineering manager          100 to 499 employees
89175  Developer, mobile           10 to 19 employees
89178  Developer, full-stack  10,000 or more employees

```

```

PurchaseInfluence      TechList \
1   I have a great deal of influence   Investigate
2   I have some influence   Given a list
3   I have some influence   Investigate
6   I have little or no influence   NaN
7   I have some influence   Investigate
-   -   -
89150   NaN   Investigate
89154   I have some influence   Investigate
89156   I have little or no influence   NaN
89175   I have some influence   Investigate
89178   I have little or no influence   NaN

BuyNewTool \
1   Start a free trial;Ask developers I know/work -
2   Start a free trial;Ask developers I know/work -
3   Start a free trial;Ask developers I know/work -
6   Ask developers I know/work with;Read ratings o-
7   Start a free trial;Ask developers I know/work -
-   -   -
89150   Start a free trial;Ask developers I know/work -
89154   Start a free trial;Ask developers I know/work -
89156   NaN
89175   Start a free trial;Ask developers I know/work -
89178   Start a free trial;Ask developers I know/work -

Country          Currency      CompTotal \
1   United States of America  USD\tUnited States dollar  285000.0
2   United States of America  USD\tUnited States dollar  250000.0
3   United States of America  USD\tUnited States dollar  156000.0
6   United States of America  USD\tUnited States dollar  135000.0
7   United States of America  USD\tUnited States dollar  80000.0
-   -   -   -
89150   United States of America  NaN  NaN
89154   United States of America  USD\tUnited States dollar  75000.0
89156   United States of America  USD\tUnited States dollar  195000.0
89175   United States of America  USD\tUnited States dollar  135000.0
89178   United States of America  USD\tUnited States dollar  212021.0

LanguageHaveWorkedWith \
1   HTML/CSS;JavaScript;Python
2   Bash/Shell (all shells);Go
3   Bash/Shell (all shells);HTML/CSS;JavaScript;PH-
6   Ada;Clojure;Elixir;Go;HTML/CSS;Java;JavaScript-
7   Go;HTML/CSS;JavaScript;Python;Rust;SQL;TypeScript
-   -   SQL
89150

```

```

89154  HTML/CSS;JavaScript;PHP;TypeScript;Visual Basic_
89156      Bash/Shell (all shells);C;C++;JavaScript;Julia
89175          Java;Kotlin
89178          JavaScript;TypeScript

          LanguageWantToWorkWith \
1      Bash/Shell (all shells);C#;Dart;Elixir;GDScript_
2          Haskell;OCaml;Rust
3      Bash/Shell (all shells);HTML/CSS;JavaScript;Ru_
6          NaN
7      Elixir;Go;Julia;Python;R;Rust;Scala;SQL;TypeSc_
-
89150          HTML/CSS;JavaScript;Ruby
89154          HTML/CSS;JavaScript;TypeScript
89156          Julia;Zig
89175          Dart;Java;JavaScript;Kotlin
89178          Go;JavaScript;Python;TypeScript

          DatabaseHaveWorkedWith \
1          Supabase
2          NaN
3          PostgreSQL;Redis
6      MariaDB;Microsoft SQL Server;MySQL;PostgreSQL;_
7          Dynamodb;MongoDB;MySQL;Redis;SQLite

          -
89150          PostgreSQL
89154          NaN
89156          Cosmos DB;PostgreSQL
89175          H2;MongoDB;MySQL;SQLite
89178          Dynamodb

          DatabaseWantToWorkWith \
1          Firebase Realtime Database;Supabase
2          NaN
3          PostgreSQL;Redis
6          Datomic
7      BigQuery;Cockroachdb;DuckDB;Elasticsearch;Mong_
-
89150          PostgreSQL
89154          NaN
89156          Cockroachdb;DuckDB;Snowflake
89175          MySQL;SQLite
89178          Dynamodb

          PlatformHaveWorkedWith \
1          Amazon Web Services (AWS);Netlify;Vercel
2          Amazon Web Services (AWS);Google Cloud;OpenSta_

```

```

3           Cloudflare;Heroku
6           Amazon Web Services (AWS);Digital Ocean
7           Amazon Web Services (AWS);Fly.io;Netlify;Vercel
-
89150           -
89154           NaN
89156           Netlify
89156 Amazon Web Services (AWS);Netzner;Microsoft Azure
89175           VMware
89178           Amazon Web Services (AWS)

           PlatformWantToWorkWith \
1           Fly.io;Netlify;Render
2           NaN
3           Cloudflare;Heroku
6           Vercel
7           Amazon Web Services (AWS);Digital Ocean;Fly.io...
-
89150           -
89154           Netlify
89156           Amazon Web Services (AWS)
89175           NaN
89178           Amazon Web Services (AWS)

           WebframeHaveWorkedWith \
1           Next.js;React;Remix;Vue.js
2           NaN
3           Node.js;React;Ruby on Rails;Vue.js;WordPress
6           AngularJS;jQuery;Node.js;Phoenix;Ruby on Rails...
7           Angular;Express;Next.js;Node.js;React
-
89150           -
89154           Next.js;React;WordPress
89156           jQuery;Node.js
89175           Spring Boot
89178           Express;Node.js;Spring Boot

           WebframeWantToWorkWith \
1           Deno;Elm;Nuxt.js;React;Svelte;Vue.js
2           NaN
3           Node.js;Ruby on Rails;Vue.js
6           NaN
7           Deno;FastAPI;Fastify;Flask;NextJS;Next.js;Node...
-
89150           -
89154           React
89156           NaN
89175           NaN

```

```

89178           Node.js
                MiscTechHaveWorkedWith \
1                 Electron;React Native;Tauri
2                               NaN
3                               NaN
6                 RabbitMQ;Spring Framework
7                 NumPy;Pandas;Scikit-Learn;Tauri;TensorFlow
-
89150                   Hadoop
89154                   NaN
89156                   NaN
89175           OpenCV;OpenGL;Spring Framework
89178           Apache Kafka

                MiscTechWantToWorkWith \
1                 Capacitor;Electron;Tauri;Uno Platform;Xamarin
2                               NaN
3                               NaN
6                               NaN
7                 .NET MAUI;Apache Kafka;Apache Spark;Hugging Pa...
-
89150                   NaN
89154                   NaN
89156                   NaN
89175           Xamarin
89178           NaN

                ToolsTechHaveWorkedWith \
1                 Docker;Kubernetes;npm;Pip;Vite;Webpack;Yarn
2                 Cargo;Docker;Kubernetes;Make;Nix
3                 Homebrew;npm;Vite;Webpack;Yarn
6                 Bun;Cargo;Chocolatey;Docker;Homebrew;Kubernetes...
7                 Ansible;Cargo;Docker;Homebrew;Make;npm;Pip;pnp...
-
89150           Chocolatey;Docker;Homebrew;npm
89154           Docker;npm;Webpack;Yarn
89156           NaN
89175           Docker;Gradle;Maven (build tool)
89178           Docker;Homebrew;Yarn

                ToolsTechWantToWorkWith \
1                 Godot;npm;pnpm;Unity 3D;Unreal Engine;Vite;Web...
2                 Cargo;Kubernetes;Nix
3                 Homebrew;npm;Vite
6                               NaN
7                 Cargo;Dagger;Docker;Homebrew;Kubernetes;Make;n...

```

	TimeAnswering	ProfessionalTech
0	NaN	NaN
1	15-30 minutes a day	DevOps function;Microservices;Automated testing
2	30-60 minutes a day	DevOps function;Microservices;Automated testing
3	30-60 minutes a day	Automated testing;Continuous integration (CI) -
4	30-60 minutes a day	Microservices;Automated testing;Observability -
5	15-30 minutes a day	DevOps function;Microservices;Observability to...
6	15-30 minutes a day	Microservices;Automated testing;Continuous int...
7	30-60 minutes a day	None of these
8	NaN	NaN
9	NaN	NaN
10	60-120 minutes a day	Automated testing;Continuous integration (CI) -
11	NaN	NaN
12	15-30 minutes a day	Automated testing;Observability tools;Continuo...
13	30-60 minutes a day	Automated testing;Observability tools;Continuo...
14	Over 120 minutes a day	Microservices;Observability tools;Developer po...
15	15-30 minutes a day	Microservices;Automated testing;Observability -
16	NaN	NaN
17	30-60 minutes a day	DevOps function;Microservices;Automated testin...
18	NaN	NaN
19	15-30 minutes a day	Observability tools;Continuous integration (CI)
	Industry	SurveyLength
0	NaN	NaN
1	Information Services, IT, Software Development	Appropriate in length
2	Information Services, IT, Software Development	Appropriate in length
3		NaN Appropriate in length
4		Other Appropriate in length
5		Other Appropriate in length
6	Information Services, IT, Software Development	Appropriate in length
7	Financial Services	NaN
8		NaN Appropriate in length
9		NaN Appropriate in length
10		Other Appropriate in length

```

-
89150           Docker;Homebrew;Kubernetes
89154           npm;Webpack;Yarn
89156           NaN
89175           Gradle
89178           Docker;Godot;Homebrew;Vite;Yarn

           NEWCollabToolsHaveWorkedWith \
1           Vim;Visual Studio Code
2           Emacs;Helix
3           IntelliJ IDEA;Vim;Visual Studio Code;WebStorm
6           Emacs;IntelliJ IDEA;RubyMine;Visual Studio Code
7           DataGrip;IPython;Neovim;Vim;Visual Studio Code

-
89150           Emacs;Visual Studio Code
89154           Visual Studio;Visual Studio Code
89156           Vim;Visual Studio Code
89175   Android Studio;Atom;Eclipse;IntelliJ IDEA;Netbeans
89178           IntelliJ IDEA;Nano;Visual Studio Code

           NEWCollabToolsWantToWorkWith \
1           Vim;Visual Studio Code
2           Emacs;Helix
3           IntelliJ IDEA;Vim;WebStorm
6           NaN
7           IPython;Neovim;RStudio;Visual Studio Code

-
89150           Emacs;Visual Studio Code
89154           Visual Studio Code
89156           Vim;Visual Studio Code
89175   Android Studio;IntelliJ IDEA;Notepad++
89178           Visual Studio Code

           OpSysPersonal use \
1           iOS;iPadOS;MacOS;Windows;Windows Subsystem for_
2           MacOS;Other Linux-based
3           iOS;iPadOS;MacOS
6           MacOS;Windows
7           MacOS;Ubuntu;Windows

-
89150           MacOS
89154           MacOS;Windows
89156           MacOS
89175   Android;ChromeOS;iOS;iPadOS;Other Linux-based;_
89178           MacOS

           OpSysProfessional use \

```

1 MacOS;Windows;Windows Subsystem for Linux (WSL)  
2 Mac OS;Other Linux-based  
3 iOS;iPadOS;Mac OS  
4 Mac OS  
5 Mac OS;Ubuntu;Windows  
6  
7  
89150 Cygwin;Windows;Windows Subsystem for Linux (WSL)  
89154 Windows  
89156 Mac OS  
89175 Android;Other Linux-based;Windows;Windows Sub...  
89178 Mac OS;Ubuntu  
9  
10  
11 OfficeStackAsyncHaveWorkedWith  
12 Anana;Basecamp;GitHub Discussions;Jira;Linear;--  
13 Markdown File;Stack Overflow for Teams  
14 Jira  
15 Jira  
16 Jira  
17 Markdown File;Notion  
18  
19 89150 Confluence;Doxygen;GitHub Discussions;Jira;Mir...  
20 Basecamp;GitHub Discussions  
21 Jira  
22 Jira  
23 Jira  
24 89178 Confluence;Jira;Markdown File;Stack Overflow f...  
25  
26  
27 OfficeStackAsyncWantToWorkWith  
28 GitHub Discussions;Linear;Notion;Trello  
29 Markdown File  
30 Jira  
31 NaN  
32 Markdown File;Notion  
33  
34 89150 Confluence;Doxygen;GitHub Discussions;Jira;Wikis  
35 GitHub Discussions  
36 Airtable  
37 Jira;Trello;YouTrack  
38 GitHub Discussions;Stack Overflow for Teams  
39  
40  
41 OfficeStackSyncHaveWorkedWith  
42 Cisco Webex Teams;Discord;Google Chat;Google M...  
43 Microsoft Teams;Slack;Zoom  
44 Discord;Google Meet;Microsoft Teams;Slack;Zoom  
45 Slack  
46 Microsoft Teams  
47  
48  
49 89150 Discord;Microsoft Teams;Zoom  
50 Jitsi;Slack

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Image :stackoverflowdevelopersurvey-images-61

```

89156           Google Meet;Slack;Zoom
89175 Cisco Webex Teams;Discord;Microsoft Teams;Zoom
89178           Microsoft Teams;Slack;Zoom

OfficeStackSyncWantToWorkWith \
1           Discord;Signal;Slack;Zoom
2           Slack;Zoom
3           Discord;Google Meet;Slack;Zoom
6           NaN
7           Discord
-
89150           -
89154           Jitsi;Slack
89156           Slack;Zoom
89175 Cisco Webex Teams;Discord;Microsoft Teams;Slack
89178           Slack

AISearchHaveWorkedWith           AISearchWantToWorkWith \
1           ChatGPT           ChatGPT;Neeva AI
2           NaN               NaN
3           NaN               NaN
6           ChatGPT           NaN
7           Bing AI;ChatGPT;Google Bard AI ChatGPT;Neeva AI;Perplexity AI
-
89150           NaN           NaN
89154 ChatGPT;Google Bard AI ChatGPT;Google Bard AI
89156           ChatGPT           ChatGPT
89175 ChatGPT;Google Bard AI ChatGPT;Google Bard AI
89178           NaN           NaN

AIDevHaveWorkedWith           AIDevWantToWorkWith \
1           GitHub Copilot GitHub Copilot
2           NaN               NaN
3           NaN               NaN
6           GitHub Copilot GitHub Copilot
7           GitHub Copilot GitHub Copilot
-
89150           NaN           NaN
89154 GitHub Copilot GitHub Copilot
89156 GitHub Copilot GitHub Copilot;Replit Ghostwriter
89175           NaN           NaN
89178           NaN           NaN

NEWSOSites \
1           Stack Overflow;Stack Exchange
2           Stack Overflow;Stack Exchange;Stack Overflow f-
3           Stack Overflow;Stack Exchange

```

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*Image :stackoverflowdevelopersurvey-images-62*

```

6           Stack Overflow
7           Stack Overflow;Stack Exchange;Collectives on S...
-
89150  Stack Overflow;Stack Exchange;Stack Overflow f...
89154           Stack Overflow;Stack Exchange
89156           Stack Overflow;Stack Exchange
89175           Stack Overflow;Stack Exchange
89178  Stack Overflow;Stack Exchange;Stack Overflow f...

           SOVisitFreq           SOAccount \
1           Daily or almost daily           Yes
2           A few times per month or weekly           Yes
3           A few times per week           Yes
6           A few times per month or weekly           Yes
7           Daily or almost daily           Yes
-
89150  A few times per month or weekly           Yes
89154  A few times per month or weekly           Yes
89156  Less than once per month or monthly           Yes
89175  Multiple times per day Not sure/can't remember
89178  Daily or almost daily           Yes

           SOPartFreq           SOComm \
1           A few times per month or weekly           Yes, definitely
2           Less than once per month or monthly           Neutral
3           Less than once per month or monthly           No, not really
6           Less than once per month or monthly           Neutral
7           A few times per month or weekly           Yes, somewhat
-
89150  Less than once per month or monthly           No, not at all
89154  Less than once per month or monthly           No, not at all
89156  Less than once per month or monthly           No, not really
89175           NaN           No, not really
89178  A few times per month or weekly           No, not really

           SOAI \
1           I don't think it's super necessary, but I thin...
2           NaN
3           I'm wearing of Stack Overflow using AI.
6           Neutral
7           NaN
-
89150  Generally negative. Doing a better job of find...
89154  I think AI could help improve the quality of p...
89156  Sounds generally helpful, yes. It could also d...
89175  I think there is value in incorporating AI to ...
89178           Improve question writing

```

```

          AISelect      AISent  \
1           Yes  Indifferent
2  No, and I don't plan to      NaN
3  No, and I don't plan to      NaN
6           Yes  Unfavorable
7           Yes  Favorable

-
89150  No, and I don't plan to      NaN
89154  No, but I plan to soon  Favorable
89156           Yes  Favorable
89175           Yes  Favorable
89178  No, but I plan to soon  Favorable

          AIAcc      AIBen  \
1           Other (please explain)  Somewhat distrust
2           NaN  NaN
3           NaN  NaN
6  Improve accuracy in coding  Somewhat distrust
7  Increase productivity;Speed up learning  Somewhat distrust

-
89150           NaN  NaN
89154           NaN  Somewhat distrust
89156  Increase productivity;Improve collaboration  Somewhat distrust
89175  Increase productivity;Greater efficiency;Speed  Somewhat trust
89178           NaN  Somewhat distrust

          AIToolInterested in Using  \
1  Learning about a codebase;Writing code;Debuggi...  NaN
2           NaN  NaN
3           NaN  NaN
6           NaN  NaN
7  Project planning;Writing code;Documenting code...  NaN

-
89150           NaN  NaN
89154           NaN  NaN
89156  Learning about a codebase;Debugging and getti...  NaN
89175  Learning about a codebase;Documenting code;Deb...  NaN
89178           NaN  NaN

          AIToolCurrently Using  \
1  Writing code;Committing and reviewing code  NaN
2           NaN  NaN
3           NaN  NaN
6  Writing code;Debugging and getting help  -
7  Project planning;Writing code;Debugging and ge...  -

```

```

89150                               NaN
89154                               NaN
89156           Writing code;Documenting code
89175           Writing code;Testing code
89178                               NaN

          AIToolNot interested in Using \
1                               NaN
2                               NaN
3                               NaN
6 Learning about a codebase;Project planning;Wri...
7                               NaN
-
89150                               NaN
89154                               NaN
89156 Project planning;Committing and reviewing code...
89175 Project planning;Committing and reviewing code...
89178                               NaN

          AINextVery different AINextNeither different nor similar \
1                               NaN                               NaN
2                               NaN                               NaN
3                               NaN                               NaN
6                               NaN                               NaN
7                               NaN                               NaN
-
89150                               NaN                               NaN
89154                               NaN                               NaN
89156                               NaN                               NaN
89175 Writing code;Testing code
89178                               NaN                               NaN

          AINextSomewhat similar AINextVery similar \
1                               NaN                               NaN
2                               NaN                               NaN
3                               NaN                               NaN
6                               NaN                               NaN
7                               NaN                               NaN
-
89150                               NaN                               NaN
89154                               NaN                               NaN
89156                               NaN                               NaN
89175                               NaN                               NaN
89178                               NaN                               NaN

          AINextSomewhat different TBranch
1                               NaN      Yes      ICorPM  WorkExp \
People manager      10.0

```

66

*Image :stackoverflowdevelopersurvey-images-65*

2	NaN	Yes	Individual contributor	23.0
3	NaN	Yes	Individual contributor	7.0
6	NaN	Yes	Individual contributor	4.0
7	NaN	Yes		5.0
-	-	-	-	-
89150	NaN	Yes	Individual contributor	30.0
89154	NaN	Yes	Individual contributor	8.0
89156	Writing code; Documenting code	Yes	People manager	8.0
89175	NaN	Yes	Individual contributor	8.0
89178	NaN	Yes	Individual contributor	22.0
	Knowledge_1	Knowledge_2	Knowledge_3	\
1	Strongly agree	Agree	Strongly agree	
2	Strongly agree	Neither agree nor disagree	Agree	
3	Strongly agree	Strongly disagree	Strongly agree	
6	Strongly agree	Agree	Neither agree nor disagree	
7	NaN	NaN	NaN	
-	-	-	-	-
89150	Strongly agree	Agree	Neither agree nor disagree	
89154	Agree	Strongly disagree	Agree	
89156	Strongly agree	Agree	Agree	
89175	Agree	Neither agree nor disagree	Neither agree nor disagree	
89178	Strongly agree	Neither agree nor disagree	Disagree	
	Knowledge_4	Knowledge_5	Knowledge_6	\
1	Agree	Agree	Agree	
2	Agree	Agree	Agree	
3	Strongly agree	Agree	Neither agree nor disagree	
6	Neither agree nor disagree	Agree	Agree	
7	NaN	NaN	NaN	
-	-	-	-	-
89150	Agree	Agree	Disagree	
89154	Disagree	Agree	Agree	
89156	Agree	Agree	Strongly agree	
89175	Strongly agree	Strongly agree	Neither agree nor disagree	
89178	Neither agree nor disagree	Agree	Agree	
	Knowledge_7	Knowledge_8	\	
1	Agree	Strongly agree		
2	Agree	Agree		
3	Agree	Agree		
6	Agree	Neither agree nor disagree		
7	NaN	NaN		
-	-	-	-	
89150	Disagree	Neither agree nor disagree		
89154	Strongly agree	Disagree		
89156	Neither agree nor disagree	Neither agree nor disagree		

	Agree	Agree	
	Strongly agree	Neither agree nor disagree	
89175			
89178			
1	Frequency_1	Frequency_2	Frequency_3 \
2	1-2 times a week	10+ times a week	Never
3	6-10 times a week	6-10 times a week	3-5 times a week
6	1-2 times a week	10+ times a week	1-2 times a week
7	1-2 times a week	3-5 times a week	1-2 times a week
	NaN	NaN	NaN
-	-	-	-
89150	1-2 times a week	6-10 times a week	1-2 times a week
89154	Never	1-2 times a week	1-2 times a week
89156	1-2 times a week	10+ times a week	3-5 times a week
89175	1-2 times a week	3-5 times a week	Never
89178	1-2 times a week	1-2 times a week	1-2 times a week
1	TimeSearching	TimeAnswering \	
2	15-30 minutes a day	15-30 minutes a day	
3	30-60 minutes a day	30-60 minutes a day	
6	15-30 minutes a day	30-60 minutes a day	
7	Less than 15 minutes a day	15-30 minutes a day	
	60-120 minutes a day	30-60 minutes a day	
-	-	-	
89150	Less than 15 minutes a day	Less than 15 minutes a day	
89154	30-60 minutes a day	30-60 minutes a day	
89156	30-60 minutes a day	Over 120 minutes a day	
89175	60-120 minutes a day	30-60 minutes a day	
89178	15-30 minutes a day	60-120 minutes a day	
1	ProfessionalTech \		
2	DevOps function;Microservices;Automated testin...		
3	DevOps function;Microservices;Automated testin...		
6	Automated testing;Continuous integration (CI) -		
7	Microservices;Automated testing;Continuous int...		
	None of these		
-	-	-	
89150	DevOps function;Automated testing;Developer po...		
89154	Developer portal or other central places to fi...		
89156	Automated testing;Observability tools;Continuo...		
89175	DevOps function;Continuous integration (CI) an...		
89178	DevOps function;Microservices;Automated testin...		
1	Industry \		
2	Information Services, IT, Software Development...		
3	Information Services, IT, Software Development...		
6	Information Services, IT, Software Development...		

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*Image :stackoverflowdevelopersurvey-images-67*

```

7                               Financial Services
-
89150  Information Services, IT, Software Development
89154  Information Services, IT, Software Development
89156  Information Services, IT, Software Development
89175  Information Services, IT, Software Development
89178                               Insurance

          SurveyLength          SurveyEase  ConvertedCompYearly
1  Appropriate in length          Easy        285000.0
2  Appropriate in length          Easy        250000.0
3  Appropriate in length          Easy        156000.0
6  Appropriate in length          Easy        135000.0
7          NaN                   NaN        80000.0
-
89150          Too short          Easy        NaN
89154  Appropriate in length          Easy        75000.0
89156  Appropriate in length  Neither easy nor difficult  195000.0
89175  Appropriate in length  Neither easy nor difficult        NaN
89178  Appropriate in length          Easy        NaN

[18647 rows x 84 columns]

```

```

[1]: #find developers in India
india_developers = data[data['Country']=='India']
india_developers

```

```

[1]:      RespondId  Q120          MainBranch \
9          10  I agree  I am a developer by profession
66         67  I agree  I am a developer by profession
78         79  I agree  I am a developer by profession
82         83  I agree  I am a developer by profession
85         86  I agree  I am a developer by profession
-
89119     89120  I agree  I am a developer by profession
89121     89122  I agree  I am not primarily a developer, but I write co...
89164     89165  I agree  I am a developer by profession
89165     89166  I agree  I am a developer by profession
89167     89168  I agree  I am a developer by profession

          Age          Employment \
9  25-34 years old  Not employed, but looking for work
66  25-34 years old  Employed, full-time
78  18-24 years old  Employed, full-time
82  25-34 years old  Employed, full-time
85  25-34 years old  Employed, full-time
-
```

69

*Image :stackoverflowdevelopersurvey-images-68*

```

89119 18-24 years old Student, full-time;Employed, part-time
89121 18-24 years old Employed, full-time;Student, part-time
89164 18-24 years old Employed, full-time
89165 25-34 years old Employed, full-time
89167 18-24 years old Employed, full-time

        RemoteWork \
9           NaN
66      Hybrid (some remote, some in-person)
78           Remote
82      Hybrid (some remote, some in-person)
85           In-person
=
89119           =
89121      Hybrid (some remote, some in-person)
89164           Remote
89165           In-person
89167           Remote

        CodingActivities \
9           NaN
66      Hobby;Contribute to open-source projects
78           Hobby
82           Hobby
85      Other (please specify):
=
89119 Hobby;Professional development or self-paced l-
89121 Contribute to open-source projects;Professiona-
89164 Professional development or self-paced learnin-
89165 Hobby;Contribute to open-source projects;Profe-
89167 Hobby;Bootstrapping a business;Professional de-

        EdLevel \
9      Bachelor's degree (B.A., B.S., B.Eng., etc.)
66      Bachelor's degree (B.A., B.S., B.Eng., etc.)
78      Bachelor's degree (B.A., B.S., B.Eng., etc.)
82      Bachelor's degree (B.A., B.S., B.Eng., etc.)
85      Bachelor's degree (B.A., B.S., B.Eng., etc.)
=
89119 Secondary school (e.g. American high school, G-
89121 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89164 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89165 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
89167 Bachelor's degree (B.A., B.S., B.Eng., etc.)

        LearnCode \
9      Books / Physical media;Online Courses or Certi-

```

```

11                               NaN  Appropriate in length
12                               Other  Appropriate in length
13  Information Services, IT, Software Development  Appropriate in length
14                               Other  Appropriate in length
15  Manufacturing, Transportation, or Supply Chain  Too long
16                               NaN  Appropriate in length
17  Retail and Consumer Services  Appropriate in length
18                               NaN  NaN
19  Information Services, IT, Software Development  Appropriate in length

      SurveyEase ConvertedCompYearly
0          NaN          NaN
1          Easy  285000.0
2          Easy  250000.0
3          Easy  156000.0
4  Neither easy nor difficult  23456.0
5  Neither easy nor difficult  96828.0
6          Easy  135000.0
7          NaN  80000.0
8  Neither easy nor difficult  64254.0
9  Neither easy nor difficult  NaN
10 Neither easy nor difficult  NaN
11          Easy  78003.0
12          Easy  75000.0
13          Easy  150000.0
14          Easy  187407.0
15  Neither easy nor difficult  107090.0
16          Easy  45149.0
17          Easy  58899.0
18          NaN  14.0
19          Easy  75010.0

[20 rows x 84 columns]

```

```
[1]: pd.set_option('display.max_columns',85)
```

```
[1]: data.tail(20)
```

```

[1]:   ResponseId      Q120          MainBranch \
89164      89165  I agree  I am a developer by profession
89165      89166  I agree  I am a developer by profession
89166      89167  I agree  I am a developer by profession
89167      89168  I agree  I am a developer by profession
89168      89169  I agree  I am a developer by profession
89169      89170  I agree  I am a developer by profession
89170      89171  I agree  I am a developer by profession
89171      89172  I agree  I am a developer by profession

```

```

66  Online Courses or Certification;School (i.e., -
78  Online Courses or Certification;School (i.e., -
82  Books / Physical media;Colleague;Friend or fam-
85  Books / Physical media;Online Courses or Certi-
-
89119 Online Courses or Certification;Other online r-
89121 Hackathons (virtual or in-person);Online Cours-
89164 Online Courses or Certification;Other online r-
89165 Online Courses or Certification;Other online r-
89167 Online Courses or Certification;Other online r-
                                         LearnCodeOnline \
9    Formal documentation provided by the owner of -
66                               NaN
78                               NaN
82  Formal documentation provided by the owner of -
85  Formal documentation provided by the owner of -
-
89119 Formal documentation provided by the owner of -
89121 Formal documentation provided by the owner of -
89164 Formal documentation provided by the owner of -
89165 Formal documentation provided by the owner of -
89167 Formal documentation provided by the owner of -
                                         LearnCodeCoursesCert YearsCode YearsCodePro \
9    edX;Udemy;Pluralsight;Coursera;Udacity       6      NaN
66      Codecademy;Udemy;Coursera                 10      6
78      Udemy                                     5      3
82      Codecademy;Udemy;Coursera                 10      5
85      edX;Coursera                            7      5
-
89119      -          -          -          -      NaN
89121      -          -          -          -      NaN
89164      -          -          -          -      2
89165      -          -          -          -      3
89167      -          -          -          -      2
                                         DevType \
9      Developer, full-stack
66      Engineer, data
78      Developer, full-stack
82      Developer, game or graphics
85      Developer, back-end
-
89119      -          -          -          -      NaN
89121 Data scientist or machine learning specialist
89164      -          -          -          -      2

```

```

89165             Developer, back-end
89167             Developer, mobile

OrgSize          PurchaseInfluence \
9               NaN
66              100 to 499 employees   I have little or no influence
78              20 to 99 employees    I have little or no influence
82              10,000 or more employees I have some influence
85              20 to 99 employees    I have a great deal of influence
-
89119             NaN
89121             NaN
89164              20 to 99 employees   I have little or no influence
89165  1,000 to 4,999 employees  I have little or no influence
89167              20 to 99 employees   I have little or no influence

TechList          BuyNewTool Country \
9   Investigate  Start a free trial;Research companies that hav... India
66   NaN          Start a free trial;Ask developers I know/work ... India
78   NaN          Visit developer communities like Stack Overflow India
82   Investigate  Start a free trial;Ask developers I know/work ... India
85   Investigate  Visit developer communities like Stack Overflow India
-
89119   NaN
89121  Investigate  Ask developers I know/work with;Visit developer... India
89164   NaN          Start a free trial;Ask developers I know/work ... India
89165   NaN          Start a free trial;Ask developers I know/work ... India
89167   NaN          Start a free trial;Ask developers I know/work ... India

Currency  CompTotal \
9          NaN      NaN
66        INR\tIndian rupee  3400000.0
78        INR\tIndian rupee  NaN
82        INR\tIndian rupee  NaN
85        INR\tIndian rupee  NaN
-
89119   NaN      NaN
89121   NaN      NaN
89164  INR\tIndian rupee  NaN
89165  INR\tIndian rupee  NaN
89167  INR\tIndian rupee  1300000.0

LanguageHaveWorkedWith \
9      HTML/CSS;Java;JavaScript;Python;SQL;TypeScript
66
78
82      Java;Scala;SQL
                    JavaScript;TypeScript
                    C++

```

```

85           Assembly;C;C++;Java;JavaScript;SQL
-
89119           -
89121           Dart;HTML/CSS;JavaScript;Python
89121           Python;SQL
89164           Go;HTML/CSS;Java;JavaScript;Python
89165           C;C#;C++;Java;JavaScript;TypeScript
89167           Dart;HTML/CSS;JavaScript;TypeScript

           LanguageWantToWorkWith \
9           HTML/CSS;JavaScript;TypeScript
66           Go;Java;Scala;SQL
78           JavaScript;TypeScript
82           C++
85           Assembly;C;C++;Java;JavaScript;SQL

-
89119   Dart;HTML/CSS;JavaScript;Python;Rust;Solidity;-
89121   Bash/Shell (all shells);Java;Python;SQL
89164           Go;Python;Rust
89165   Dart;Elixir;Go;JavaScript;Python;Rust;Solidity;-
89167   Dart;Go;HTML/CSS;JavaScript;Swift;TypeScript

           DatabaseHaveWorkedWith \
9           Cloud Firestore;MongoDB;MySQL;PostgreSQL;SQLite
66           BigQuery;MariaDB;MongoDB;MySQL;PostgreSQL
78           MySQL
82           NaN
85           Elasticsearch;H2;MySQL;Oracle;PostgreSQL;Redis;-
-
89119           -
89121           Cloud Firestore;MongoDB
89121           MariaDB;MySQL;PostgreSQL;Snowflake
89164   Dynamodb;Elasticsearch;Firebase Realtime Databa-
89165   Cloud Firestore;MongoDB;PostgreSQL;Redis
89167           MongoDB;MySQL;PostgreSQL;SQLite

           DatabaseWantToWorkWith \
9           Cloud Firestore;Firebase Realtime Database;Mon-
66           BigQuery;Cassandra;Clickhouse;Dynamodb;MariaDB;-
78           MongoDB
82           NaN
85           Elasticsearch;H2;MySQL;Oracle;PostgreSQL;Redis;-
-
89119   Cloud Firestore;Firebase Realtime Database;Sup-
89121   BigQuery;Dynamodb;MongoDB;MySQL;PostgreSQL;Sno-
89164   MongoDB;PostgreSQL
89165   Dynamodb;Elasticsearch;MongoDB;MySQL;PostgresQ-
89167   Cockroachdb;MongoDB;MySQL;PostgreSQL;SQLite

```

```

          PlatformHaveWorkedWith \
9      Amazon Web Services (AWS);Firebase;Google Clou...
66      Amazon Web Services (AWS);Google Cloud
78      Amazon Web Services (AWS)
82      VMware
85      Amazon Web Services (AWS);Firebase
-
89119      Amazon Web Services (AWS);Firebase;Vercel
89121      Amazon Web Services (AWS)
89164      Amazon Web Services (AWS);Google Cloud;Netzner
89165      Amazon Web Services (AWS);Firebase;Heroku
89167      NaN

          PlatformWantToWorkWith \
9      Cloudflare;Firebase;Google Cloud;IBM Cloud Or ...
66      Amazon Web Services (AWS);Google Cloud
78      Amazon Web Services (AWS)
82      VMware
85      Amazon Web Services (AWS);Firebase
-
89119      Amazon Web Services (AWS);Firebase;Google Clou...
89121      Amazon Web Services (AWS);Google Cloud;Microso...
89164      Amazon Web Services (AWS)
89165      Amazon Web Services (AWS);Firebase
89167      NaN

          WebframeHaveWorkedWith \
9      Angular;Express;NestJS;React
66      NaN
78      Angular;Next.js;Node.js
82      NaN
85      Angular;Spring Boot
-
89119      Flask;Next.js;React
89121      Flask
89164      Django;Express;FastAPI;Flask;Node.js;React
89165      Angular;Django;Express;NestJS;Node.js;React
89167      Express;Node.js;React;Svelte

          WebframeWantToWorkWith \
9      Deno;Express;FastAPI;Fastify;NestJS;Quik;React...
66      NaN
78      Next.js;Node.js;React
82      NaN
85      Angular;Spring Boot
-
89119      Next.js;Remix;Svelte;Vue.js

```

```

89121           FastAPI;Flask
89164           Django;FastAPI;Flask
89165 Deno;Express;Fastify;Next.js;Node.js;Re...
89167           Deno;Express;FastAPI;Next.js;Node.js;Svelte

           MiscTechHaveWorkedWith \
9                   NaN
66           Apache Kafka;Apache Spark;Hadoop
78           React Native
82   OpenCV;OpenGL;Pandas;Scikit-Learn;TensorFlow
85           Spring Framework
-
89119           -
89121   NumPy;Pandas;Scikit-Learn;TensorFlow
89164   Flutter;NumPy;OpenCV;OpenGL;Pandas;RabbitMQ
89165           NaN
89167   Flutter;NumPy;Pandas;Scikit-Learn

           MiscTechWantToWorkWith \
9                   NaN
66           Apache Kafka;Apache Spark;Hadoop
78           React Native
82   NumPy;OpenCV;OpenGL;Pandas;Qt;Scikit-Learn;Ten...
85           Spring Framework
-
89119   Flutter;NumPy;OpenCV;OpenGL;Pandas;Scikit-Learn
89121   OpenCV;Pandas;Scikit-Learn;TensorFlow;Torch/Py...
89164           NumPy;OpenCV;Pandas
89165           NaN
89167   Capacitor;Flutter;JAX;NumPy;Pandas;React Nativ...

           ToolsTechHaveWorkedWith \
9           Docker;npm;Vite;Webpack;Yarn
66           Docker;Gradle;Homebrew;Kubernetes;Maven (build...
78           NaN
82           GNU GCC;Make;Pip
85           Ant
-
89119           -
89121           NaN
89164           Docker;Kubernetes;npm;Pip;Yarn
89165   Docker;Homebrew;npm;Pip;Unity 3D;Webpack;Yarn
89167           Homebrew;Vite

           ToolsTechWantToWorkWith \
9           Docker;npm;Podman;Vite;Webpack;Yarn
66   Ansible;Chef;Composer;Docker;Gradle;Homebrew;K...

```

NaN  
82  
85  
-  
89119 Docker;Kubernetes;npm;Pacman;Pip;Unreal Engine...  
89121  
89164 Ansible;Docker;Kubernetes;Pip;Terraform  
89165 Bun;Docker;Homebrew;npm;Yarn  
89167 Docker;Homebrew;Podman;Vite  
-  
9  
66 NEWCollabToolsHaveWorkedWith  
78 Visual Studio Code  
82 Atom;IntelliJ IDEA;Jupyter Notebook/JupyterLab...  
85 Visual Studio Code  
-  
89119 Eclipse;IntelliJ IDEA;Notepad++;PyCharm;Sublim...  
89121 IntelliJ IDEA  
89164 Android Studio;Atom;Fleet;Goland;IntelliJ IDEA  
89165 Android Studio;Atom;Code::Blocks;Eclipse;Intel...  
89167 Android Studio;Jupyter Notebook/JupyterLab;Sub...  
-  
9 NEWCollabToolsWantToWorkWith  
66 Visual Studio Code  
78 Atom;IntelliJ IDEA;Jupyter Notebook/JupyterLab...  
82 Visual Studio Code  
85 Eclipse;IntelliJ IDEA;Notepad++;PyCharm;Sublim...  
IntelliJ IDEA  
-  
89119 Android Studio;IPython;Jupyter Notebook/Jupyter...  
89121 Jupyter Notebook/JupyterLab;Visual Studio Code  
89164 PyCharm;Visual Studio Code  
89165 Nano;Vim;Visual Studio Code  
89167 Jupyter Notebook/JupyterLab;Sublime Text;Visua...  
-  
9 OpSysPersonal use  
66 Fedora;Other Linux-based;Ubuntu;Windows;Window...  
78 Android;Debian;iOS;iPadOS;MacOS;Ubuntu;Windows  
82 Mac OS  
85 Red Hat  
-  
89119 ChromeOS;Fedora;Other Linux-based;Ubuntu  
89121 Android;Ubuntu  
89164 Arch;Debian;Other Linux-based;Windows  
Ubuntu;Windows;Windows Subsystem for Linux (WSL)  
89165 Android;Debian;MacOS;Ubuntu;Windows

```

89167           Android;MacOS
OpSysProfessional use \
9   Fedora;Other Linux-based;Red Hat;Windows;Windows_
66                           MacOS
78                           MacOS
82                           Red Hat
85       ChromeOS;Fedora;Other Linux-based;Ubuntu
-
89119           Android;Ubuntu
89121           Arch;Debian;Other Linux-based;Ubuntu
89164           MacOS;Ubuntu
89165   Android;Arch;ChromeOS;Fedora;MacOS;Other Linux-
89167           Android;MacOS

OfficeStackAsyncHaveWorkedWith \
9   Asana;Markdown File;Miro;Notion;Redmine;Trello
66           Jira;Markdown File
78           Jira
82       Confluence;Doxygen;Jira;Microsoft Planner
85           Asana;Jira
-
89119           GitHub Discussions;Notion
89121           NaN
89164           Jira
89165   Monday.com;Trello
89167           NaN

OfficeStackAsyncWantToWorkWith \
9   Asana;Markdown File;Miro;Notion;Redmine;Trello
66           Jira;Markdown File
78           Jira
82       Confluence;Doxygen;Jira;Microsoft Planner
85           Asana;Jira
-
89119           GitHub Discussions;Jira;Notion
89121           NaN
89164           Jira
89165   GitHub Discussions;Monday.com;Stack Overflow f-
89167           NaN

OfficeStackSyncHaveWorkedWith \
9   Discord;Google Chat;Google Meet;Slack;Telegram
66   Cisco Webex Teams;Discord;Google Chat;Google M_
78           Slack
82   Cisco Webex Teams;Google Meet;Microsoft Teams;-
85   Skype;Slack;Telegram;WhatsApp

```

```

89119 Discord;Google Meet;Microsoft Teams;Telegram;W...
89121 Discord;Google Meet;Microsoft Teams;Skype;Slack
89164 Google Meet;Slack;Zoom
89165 Discord;Google Meet;Microsoft Teams;Skype;Slac...
89167 Google Meet;Slack

OfficeStackSyncWantToWorkWith \
9 Discord;Google Chat;Google Meet;Telegram
66 Cisco Webex Teams;Discord;Google Chat;Google M...
78 Slack
82 Cisco Webex Teams;Google Meet;Microsoft Teams;...
85 Skype;Telegram;Whatsapp

89119 Discord;Google Meet;Slack;Telegram;Whatsapp;Zoom
89121 Discord;Slack;Telegram
89164 Google Meet;Slack;Zoom
89165 Discord;Google Meet;Microsoft Teams;Skype;Slac...
89167 Google Meet;Slack

AISeachHaveWorkedWith \
9 Bing AI;ChatGPT
66 NaN
78 ChatGPT
82 ChatGPT
85 NaN

89119 ChatGPT;Google Bard AI;Perplexity AI;WolframAI...
89121 You.com
89164 ChatGPT
89165 Bing AI;ChatGPT
89167 ChatGPT

AISeachWantToWorkWith \
9 Bing AI;ChatGPT;Google Bard AI
66 NaN
78 ChatGPT
82 ChatGPT
85 NaN

89119 ChatGPT;Google Bard AI;Perplexity AI;You.com
89121 ChatGPT;Google Bard AI;You.com
89164 ChatGPT
89165 ChatGPT;Google Bard AI
89167 Bing AI;ChatGPT

AIDevHaveWorkedWith \

```

```

9      AWS CodeWhisperer;GitHub Copilot;Tabname
66
78
82
85
-
89119  AWS CodeWhisperer;GitHub Copilot
89121
89164  GitHub Copilot
89165
89167
-
9      AIDevWantToWorkWith \
66
78
82
85
-
89119 AWS CodeWhisperer;GitHub Copilot
89121
89164
89165
89167
-
9      NEWSOsites \
66
78
82
85
-
89119 Stack Overflow;Stack Exchange
89121
89164
89165 Stack Overflow;Stack Exchange;Stack Overflow f...
89167
-
9      SOVisitFreq          SOAccount \
66
78
82
85
-
89119
89121
-

```

89164	A few times per week	Yes
89165	Multiple times per day	Yes
89167	Daily or almost daily	Not sure/can't remember
9	SOPartFreq	SOComm \
66	Less than once per month or monthly	Neutral
78	Daily or almost daily	Yes, definitely
82	Less than once per month or monthly	Yes, definitely
85	A few times per month or weekly	Neutral
89119	Less than once per month or monthly	Yes, definitely
89121	I have never participated in Q&A on Stack Over...	Yes, somewhat
89164	I have never participated in Q&A on Stack Over...	Yes, somewhat
89165	A few times per month or weekly	Yes, definitely
89167		NaN
9	SOAI	\
66	AI could assist solving communication issues p...	NaN
78		NaN
82	providing exact copy paste code	NaN
85		NaN
89119		NaN
89121		NaN
89164		NaN
89165	I think StackOverflow should also use AI to ge...	
89167	It's should,it will make stackoverflow better -	
9	AISelect	AISent \
66	No, and I don't plan to	Indifferent
78	Yes	NaN
82	No, but I plan to soon	Very favorable
85	No, but I plan to soon	Very favorable
89119	Yes	Unsure
89121	No, but I plan to soon	Favorable
89164	Yes	Indifferent
89165	Yes	Favorable
89167	Yes	Favorable
9	AIAcc	\
66	Other (please explain);Increase productivity;G...	NaN
78	Increase productivity;Greater efficiency;Speed...	

80

*Image :stackoverflowdevelopersurvey-images-79*

89172	89173	I agree	I am a developer by profession	
89173	89174	I agree	I am a developer by profession	
89174	89175	I agree	I am a developer by profession	
89175	89176	I agree	I am a developer by profession	
89176	89177	I agree	I am a developer by profession	
89177	89178	I agree	I am a developer by profession	
89178	89179	I agree	I am a developer by profession	
89179	89180	I agree	I am a developer by profession	
89180	89181	I agree	I am a developer by profession	
89181	89182	I agree	I code primarily as a hobby	
89182	89183	I agree	I am a developer by profession	
89183	89184	I agree	I am a developer by profession	
Age				Employment \
89164	18-24 years old			Employed, full-time
89165	25-34 years old			Employed, full-time
89166	18-24 years old		Employed, full-time;Independent contractor, fr-	
89167	18-24 years old			Employed, full-time
89168	18-24 years old			Student, full-time
89169	45-54 years old			Employed, full-time
89170	25-34 years old			Employed, full-time
89171	25-34 years old			Employed, full-time
89172	45-54 years old			Employed, full-time
89173	35-44 years old		Employed, full-time;Independent contractor, fr-	
89174	18-24 years old			Employed, full-time
89175	25-34 years old			Employed, full-time
89176	18-24 years old			Student, full-time
89177	35-44 years old			Employed, full-time
89178	45-54 years old			Employed, full-time
89179	25-34 years old		Employed, full-time;Independent contractor, fr-	
89180	18-24 years old		Student, full-time;Employed, part-time	
89181	Prefer not to say			I prefer not to say
89182	Under 18 years old			Employed, part-time;Student, part-time
89183	35-44 years old			Employed, full-time
RemoteWork \				
89164			Remote	
89165			In-person	
89166			In-person	
89167			Remote	
89168			NaN	
89169			Remote	
89170	Hybrid (some remote, some in-person)			
89171			In-person	
89172			In-person	
89173	Hybrid (some remote, some in-person)			
89174			In-person	

```

82                               NaN
85                               NaN
-
89119      Increase productivity;Greater efficiency      -
89121                               NaN
89164      Increase productivity;Greater efficiency;Impro-
89165      Increase productivity;Greater efficiency;Speed-
89167      Increase productivity;Greater efficiency;Speed-

          AIBen \
9      Neither trust nor distrust
66                               NaN
78      Somewhat trust
82      Somewhat trust
85      Somewhat trust
-
89119      Somewhat trust
89121  Neither trust nor distrust
89164      Somewhat trust
89165      Somewhat trust
89167      Somewhat trust

          AIToolInterested in Using \
9      Learning about a codebase;Documenting code;Com-
66                               NaN
78      Testing code;Committing and reviewing code;Dep-
82                               NaN
85                               NaN
-
89119      Learning about a codebase;Project planning;Tes-
89121                               NaN
89164      Committing and reviewing code
89165      Learning about a codebase;Project planning;Wri-
89167      Writing code;Debugging and getting help;Commit

          AIToolCurrently Using \
9      Writing code;Debugging and getting help
66                               NaN
78      Writing code
82                               NaN
85                               NaN
-
89119      Writing code;Debugging and getting help
89121                               NaN
89164                               NaN
89165      Learning about a codebase;Project planning;Wri-
89167      Project planning;Writing code;Debugging and ge-

```

81

*Image :stackoverflowdevelopersurvey-images-80*

```

9 Project planning;Testing code;Deployment and m_ \
66 NaN
78 NaN
82 NaN
85 NaN
-
89119 NaN
89121 NaN
89164 NaN
89165 NaN
89167 NaN

         AIMextVery different \
9 NaN
66 NaN
78 NaN
82 NaN
85 NaN
-
89119 NaN
89121 NaN
89164 NaN
89165 Writing code;Debugging and getting help
89167 NaN

         AIMextNeither different nor similar AIMextSomewhat similar \
9 NaN NaN
66 NaN NaN
78 NaN NaN
82 NaN NaN
85 NaN NaN
-
89119 Debugging and getting help NaN
89121 NaN
89164 NaN
89165 NaN
89167 NaN

         AIMextVery similar AIMextSomewhat different \
9 NaN NaN
66 NaN NaN
78 NaN NaN
82 NaN NaN
85 NaN NaN
-

```

89119	NaN	Writing code;Debugging and getting help
89121	NaN	NaN
89164	NaN	NaN
89165	NaN	Learning about a codebase;Project planning;Writing code;Debugging and ge...
89167	NaN	Project planning;Writing code;Debugging and ge...
TBranch	ICorPM	WorkExp Knowledge_1 \
9	NaN	NaN NaN NaN
66	No	NaN NaN NaN
78	No	NaN NaN NaN
82	Yes	Individual contributor 5.0 Agree
85	Yes	Individual contributor 6.0 Agree
89119	NaN	NaN NaN NaN
89121	No	NaN NaN NaN
89164	Yes	Individual contributor 2.0 Agree
89165	Yes	Individual contributor 3.0 Agree
89167	Yes	Individual contributor 2.0 Agree
	Knowledge_2	Knowledge_3 Knowledge_4 \
9	NaN	NaN NaN
66	NaN	NaN NaN
78	NaN	NaN NaN
82	Agree	Neither agree nor disagree Disagree
85	Strongly agree	Strongly agree Strongly agree
89119	NaN	NaN NaN
89121	NaN	NaN NaN
89164	Agree	Agree Agree
89165	Neither agree nor disagree	Strongly disagree Agree
89167	Neither agree nor disagree	Neither agree nor disagree Agree
	Knowledge_5	Knowledge_6 Knowledge_7 \
9	NaN	NaN NaN
66	NaN	NaN NaN
78	NaN	NaN NaN
82	Agree	Agree Strongly agree
85	Strongly agree	Disagree Agree
89119	NaN	NaN NaN
89121	NaN	NaN NaN
89164	Agree	Agree Agree
89165	Strongly agree	Neither agree nor disagree Strongly agree
89167	Agree	Agree Strongly agree
	Knowledge_8	Frequency_1 Frequency_2 \
9	NaN	NaN NaN

```

66           NaN           NaN           NaN
78           NaN           NaN           NaN
82 Neither agree nor disagree 1-2 times a week 1-2 times a week
85           Disagree 10+ times a week 10+ times a week
-
89119           -           -           -
89121           NaN           NaN           NaN
89164           Agree      Never      1-2 times a week
89165 Strongly agree 1-2 times a week 3-5 times a week
89167           Agree 1-2 times a week 1-2 times a week

Frequency_3           TimeSearching \
9           NaN           NaN
66          NaN           NaN
78          NaN           NaN
82 1-2 times a week 60-120 minutes a day
85 10+ times a week 30-60 minutes a day
-
89119           -           -           -
89121           NaN           NaN           NaN
89164           Never  Less than 15 minutes a day
89165 1-2 times a week 30-60 minutes a day
89167           NaN  Over 120 minutes a day

TimeAnswering \
9           NaN
66          NaN
78          NaN
82 30-60 minutes a day
85 60-120 minutes a day
-
89119           -           -           -
89121           NaN           NaN           NaN
89164 Less than 15 minutes a day
89165 30-60 minutes a day
89167 30-60 minutes a day

ProfessionalTech \
9           NaN
66          NaN
78          NaN
82 DevOps function;Developer portal or other cent...
85 Automated testing;Continuous integration (CI) -
-
89119           -           -           -
89121           NaN           NaN           NaN
89164 DevOps function;Microservices;Automated testin...

```

```

89165 Observability tools;Innersource initiative;Dev...
89167           Automated testing

                           Industry \
9                               NaN
66                               NaN
78                               NaN
82  Information Services, IT, Software Development...
85           Financial Services
-
89119                               NaN
89121                               NaN
89164           Financial Services
89165  Information Services, IT, Software Development...
89167           Retail and Consumer Services

                           SurveyLength           SurveyEase  ConvertedCompYearly
9      Appropriate in length  Neither easy nor difficult      NaN
66      Too long                Easy             41197.0
78      Appropriate in length                Easy      NaN
82      Appropriate in length  Neither easy nor difficult      NaN
85      Too long                Neither easy nor difficult      NaN
-
89119      Too long                Neither easy nor difficult      NaN
89121  Appropriate in length                Easy      NaN
89164  Appropriate in length  Neither easy nor difficult      NaN
89165  Appropriate in length  Neither easy nor difficult      NaN
89167  Appropriate in length  Neither easy nor difficult      15752.0

[5625 rows x 84 columns]

```

```
[1]: #Age Breakdown for USA developers
usa_developers['Age'].value_counts()
```

```
[2]: Age
25-34 years old      6283
35-44 years old      4855
18-24 years old      2468
45-54 years old      2277
55-64 years old      1238
Under 18 years old     867
65 years or older      529
Prefer not to say      130
Name: count, dtype: int64
```

```
[3]: #Age Breakdown
india_developers['Age'].value_counts()
```

85

*Image :stackoverflowdevelopersurvey-images-84*

```
[1]: Age
18-24 years old      2296
25-34 years old      2289
35-44 years old      612
Under 18 years old    378
45-54 years old      107
55-64 years old      20
Prefer not to say    19
65 years or older     4
Name: count, dtype: int64

[2]: #People interested in coding as Hobby
data[(data['Country']=='India') & (data['CodingActivities']=='Hobby') &
      (data['Employment']=='Employed, full-time')]

[3]:
```

RespondId	Q120	MainBranch	Age
78	79	I agree I am a developer by profession	18-24 years old
82	83	I agree I am a developer by profession	25-34 years old
172	173	I agree I am a developer by profession	18-24 years old
397	398	I agree I am a developer by profession	18-24 years old
404	405	I agree I am a developer by profession	25-34 years old
—	—	—	—
87460	87461	I agree I am a developer by profession	25-34 years old
87486	87487	I agree I am a developer by profession	18-24 years old
87526	87527	I agree I am a developer by profession	35-44 years old
87724	87725	I agree I am a developer by profession	18-24 years old
88037	88038	I agree I am a developer by profession	18-24 years old

Employment	RemoteWork
Employed, full-time	Remote
Employed, full-time	Hybrid (some remote, some in-person)
Employed, full-time	In-person
397	Hybrid (some remote, some in-person)
404	In-person
—	—
87460	Hybrid (some remote, some in-person)
87486	In-person
87526	Hybrid (some remote, some in-person)
87724	In-person
88037	Hybrid (some remote, some in-person)

CodingActivities	EdLevel
Hobby	Bachelor's degree (B.A., B.S., B.Eng., etc.)
Hobby	Bachelor's degree (B.A., B.S., B.Eng., etc.)
Hobby	Bachelor's degree (B.A., B.S., B.Eng., etc.)
Hobby	Bachelor's degree (B.A., B.S., B.Eng., etc.)
Hobby	Bachelor's degree (B.A., B.S., B.Eng., etc.)

86

Image :stackoverflowdevelopersurvey-images-85

```

-
87460      Hobby Bachelor's degree (B.A., B.S., B.Eng., etc.) -
87486      Hobby Bachelor's degree (B.A., B.S., B.Eng., etc.) -
87526      Hobby Bachelor's degree (B.A., B.S., B.Eng., etc.) -
87724      Hobby Bachelor's degree (B.A., B.S., B.Eng., etc.) -
88037      Hobby Bachelor's degree (B.A., B.S., B.Eng., etc.) -



LearnCode  \
78  Online Courses or Certification;School (i.e., - -
82  Books / Physical media;Colleague;Friend or fam...
172  Books / Physical media;Online Courses or Certi...
397  Other online resources (e.g., videos, blogs, f...
404  Online Courses or Certification;School (i.e., - -



87460  Colleague;Hackathons (virtual or in-person);On...
87486  Books / Physical media;Other (please specify);...
87526  On the job training;Other online resources (e...
87724  On the job training;Other online resources (e...
88037  Books / Physical media;Colleague;Friend or fam...



LearnCodeOnline  \
78
82  Formal documentation provided by the owner of - -
172  Formal documentation provided by the owner of - -
397  Formal documentation provided by the owner of - -
404
NaN

-
87460  Formal documentation provided by the owner of - -
87486
NaN
87526  Formal documentation provided by the owner of - -
87724  Recorded coding sessions;How-to videos;Video-b...
88037  Formal documentation provided by the owner of -



LearnCodeCoursesCert  YearsCode  YearsCodePro  \
78
82  Udemy      5          3
172  Codecademy;Udemy;Coursera  10          5
397
NaN
404  Udemy;Coursera      5          2
NaN

-
87460  edX;Udemy;Coursera      2  Less than 1 year
87486
NaN
87526
NaN
87724
NaN
88037  Udemy;Coursera;Udacity  7          1
NaN



DevType
OrgSize  \

```

```

78             Developer, full-stack      20 to 99 employees
82             Developer, game or graphics 10,000 or more employees
172             Developer, back-end      10 to 19 employees
397             Developer, embedded applications or devices 10,000 or more employees
404             Blockchain            500 to 999 employees
-
87460             Developer, full-stack      1,000 to 4,999 employees
87486             Developer, full-stack      10,000 or more employees
87526             Developer, full-stack      10,000 or more employees
87724             Developer, full-stack      1,000 to 4,999 employees
88037             Developer, full-stack      500 to 999 employees

        PurchaseInfluence      TechList \
78     I have little or no influence      NaN
82     I have some influence      Investigate
172     I have some influence      Investigate
397     I have little or no influence      NaN
404     I have some influence      Investigate
-
87460 I have little or no influence      NaN
87486 I have little or no influence      NaN
87526 I have little or no influence      NaN
87724 I have some influence      Investigate
88037 I have little or no influence      NaN

        BuyNewTool Country \
78     Visit developer communities like Stack Overflow      India
82     Start a free trial;Ask developers I know/work with      India
172     Visit developer communities like Stack Overflow      India
397     Start a free trial;Visit developer communities      India
404     Ask developers I know/work with      India
-
87460 Start a free trial;Ask developers I know/work with      India
87486 Visit developer communities like Stack Overflow      India
87526 Start a free trial;Ask developers I know/work with      India
87724 Start a free trial;Ask developers I know/work with      India
88037 Ask developers I know/work with;Visit developer      India

        Currency  CompTotal \
78     INR\tnIndian rupee      NaN
82     INR\tnIndian rupee      NaN
172     INR\tnIndian rupee      NaN
397     INR\tnIndian rupee      1050000.0
404     INR\tnIndian rupee      400000.0
-
87460 INR\tnIndian rupee      638000.0
87486 INR\tnIndian rupee      NaN

```

```

87526 INR\₹ Indian rupee      NaN
87724 INR\₹ Indian rupee      NaN
88037 INR\₹ Indian rupee  1700000.0

          LanguageHaveWorkedWith \
78                  JavaScript;TypeScript
82                  C++
172      Bash/Shell (all shells);Java;SQL
397      C;C++;Go;HTML/CSS;Python;Rust;SQL;TypeScript
404                  C#;C++

          -
87460      Java;JavaScript;SQL;TypeScript
87486 Bash/Shell (all shells);C;C++;HTML/CSS;Java;Ja-
87526 C#;Dart;HTML/CSS;JavaScript;PowerShell;Python;-
87724      Java;JavaScript;Python
88037 C#;HTML/CSS;JavaScript;PowerShell;SQL;TypeScript

          LanguageWantToWorkWith \
78                  JavaScript;TypeScript
82                  C++
172      Bash/Shell (all shells);Java;JavaScript;Python;-
397                  Go;Rust;SQL;TypeScript
404                  Rust

          -
87460      Java;JavaScript;Python;SQL;TypeScript
87486 Bash/Shell (all shells);C;C++;Erlang;Go;Groovy;-
87526 C#;Dart;HTML/CSS;JavaScript;Python;SQL;TypeScript
87724      JavaScript;Python
88037 C#;Dart;Go;Kotlin;PowerShell;SQL

          DatabaseHaveWorkedWith \
78                  MySQL
82                  NaN
172      MySQL;PostgreSQL
397      Cockroachdb;PostgreSQL;Redis;SQLite
404      MongoDB;MySQL;PostgreSQL;SQLite

          -
87460      N2;MariaDB;MySQL
87486      MariaDB;MongoDB;MySQL
87526      Cosmos DB;Microsoft SQL Server
87724 Cloud Firestore;Firebase Realtime Database;Mar-
88037      Microsoft SQL Server

          DatabaseWantToWorkWith \
78                  MongoDB
82                  NaN
172      MongoDB;PostgreSQL

```

```

397          Cockroachdb;MongoDB;PostgreSQL;Redis
404                               NaN
-
87460          MongoDB;MySQL;PostgreSQL
87486  Cassandra;MariaDB;MongoDB;MySQL;PostgreSQL;Redis
87526          Microsoft SQL Server
87724          Microsoft SQL Server;MongoDB;MySQL
88037  Dynamodb;Elasticsearch;Microsoft SQL Server;Mo...
-
78          PlatformHaveWorkedWith \
82          Amazon Web Services (AWS)
82          VMware
172          NaN
397  Amazon Web Services (AWS);Cloudflare;Google Cl...
404          Amazon Web Services (AWS);Cloudflare
-
87460          Microsoft Azure
87486  Amazon Web Services (AWS);Cloudflare;Firebase;-
87526          Microsoft Azure
87724          Amazon Web Services (AWS);Firebase
88037          NaN
-
78          PlatformWantToWorkWith \
82          Amazon Web Services (AWS)
82          VMware
172          NaN
397  Amazon Web Services (AWS);Cloudflare;Vercel
404          NaN
-
87460          Amazon Web Services (AWS);Microsoft Azure
87486  Amazon Web Services (AWS);Cloudflare;Digital O...
87526          Microsoft Azure
87724          Amazon Web Services (AWS);Firebase
88037          NaN
-
78          WebframeHaveWorkedWith \
82          Angular;Next.js;Node.js
82          NaN
172          Spring Boot
397          Express;Svelte
404          Django;Flask
-
87460          AngularJS;Django
87486  Express;jQuery;Next.js;Node.js;React;Spring Bo...
87526          ASP.NET CORE;Node.js;React
87724  AngularJS;Django;Express;Flask;Next.js;Node.js...
88037  Angular;AngularJS;ASP.NET;ASP.NET CORE;jQuery;-

```

```

89175           Remote
89176           NaN
89177           Remote
89178           Remote
89179           Remote
89180 Hybrid (some remote, some in-person)
89181           NaN
89182 Hybrid (some remote, some in-person)
89183 Hybrid (some remote, some in-person)

          CodingActivities \
89164 Professional development or self-paced learnin...
89165 Hobby;Contribute to open-source projects;Profes...
89166 Contribute to open-source projects;Professiona...
89167 Hobby;Bootstrapping a business;Professional de...
89168           NaN
89169           I don't code outside of work
89170 Bootstrapping a business;Freelance/contract work
89171           Hobby
89172 Hobby;Contribute to open-source projects;Profes...
89173 Hobby;Freelance/contract work;School or academ...
89174 Hobby;Contribute to open-source projects;Freel...
89175           I don't code outside of work
89176           NaN
89177 Bootstrapping a business;Freelance/contract work
89178           Hobby
89179 Hobby;Bootstrapping a business;Freelance/contr...
89180           School or academic work
89181           NaN
89182           Hobby;School or academic work
89183 Hobby;Professional development or self-paced l...

          EdLevel \
89164 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89165 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
89166 Some college/university study without earning -
89167 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89168 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89169 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89170 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
89171 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
89172 Some college/university study without earning -
89173 Master's degree (M.A., M.S., M.Eng., MBA, etc.)
89174 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89175 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89176 Bachelor's degree (B.A., B.S., B.Eng., etc.)
89177 Master's degree (M.A., M.S., M.Eng., MBA, etc.)

```

```

WebframeWantToWorkWith \
78           Next.js;Node.js;React
82                           NaN
172           Express;Next.js;Node.js;React;Spring Boot
397                           Svelte
404                           NaN
-
87460           AngularJS;Node.js;React
87486   Angular;AngularJS;Django;Express;jQuery;Next.js
87526           ASP.NET CORE;Node.js;React
87724   AngularJS;Express;Next.js;Node.js;React;Spring-
88037           Express;Next.js;React;Svelte;Vue.js

MiscTechHaveWorkedWith \
78           React Native
82   OpenCV;OpenGL;Pandas;Scikit-Learn;TensorFlow
172           Apache Kafka;Spring Framework
397                           Tauri
404           .NET Framework (1.0 - 4.8)
-
87460           .NET (5+) ;Spring Framework
87486   GTK;OpenCV;OpenGL;Spring Framework
87526           .NET (5+) ;Flutter
87724                           NaN
88037           .NET Framework (1.0 - 4.8)

MiscTechWantToWorkWith \
78           React Native
82   NumPy;OpenCV;OpenGL;Pandas;Qt;Scikit-Learn;Ten-
172           Apache Kafka;RabbitMQ;Spring Framework
397                           Tauri
404                           NaN
-
87460           Spring Framework
87486   GTK;OpenCV;OpenGL;Spring Framework
87526           .NET (5+) ;Flutter
87724                           NaN
88037           .NET (5+) ;Flutter;React Native;TensorFlow

ToolsTechHaveWorkedWith \
78                           NaN
82           GNU GCC;Make;Pip
172           Docker;Maven (build tool)
397           Cargo;CMake;Kubernetes;Make;Vite
404                           Ant
-

```

```

87460          Docker;Maven (build tool)
87486  CMake;GNU GCC;LLVM's Clang;Make;Maven (build t...
87526          MSBuild;npm;NuGet;Pip;Visual Studio Solution
87724          Maven (build tool);npm;Webpack
88037          Ant;MSBuild;npm;NuGet;Visual Studio Solution

                           ToolsTechWantToWorkWith \
78                           NaN
82                           GNU GCC;Make;npm;Pip
172  Ansible;Docker;Kubernetes;Maven (build tool);n...
397          Cargo;Kubernetes;Terraform;Vite
404                           NaN
-
87460          Docker;Kubernetes;Maven (build tool)
87486  CMake;Docker;GNU GCC;Godot;Google Test;Gradle;-
87526          MSBuild;Visual Studio Solution
87724          Maven (build tool);npm;Webpack
88037          MSBuild;Visual Studio Solution

                           NEWCollabToolsHaveWorkedWith \
78          Visual Studio Code
82  Eclipse;IntelliJ IDEA;Notepad++;PyCharm;Sublime...
172          IntelliJ IDEA;Vim
397          Visual Studio Code
404          Emacs;Notepad++
-
87460          IntelliJ IDEA;Visual Studio;Visual Studio Code
87486  Android Studio;Atom;Code::Blocks;Eclipse;Intelli...
87526  Android Studio;Notepad++;Visual Studio;Visual ...
87724  Android Studio;IntelliJ IDEA;IPython;Notepad++-
88037  Fleet;IntelliJ IDEA;Notepad++;PyCharm;Visual S...

                           NEWCollabToolsWantToWorkWith \
78          Visual Studio Code
82  Eclipse;IntelliJ IDEA;Notepad++;PyCharm;Sublime...
172          IntelliJ IDEA;Vim
397          Visual Studio Code
404                           NaN
-
87460          IntelliJ IDEA;Visual Studio Code
87486  Android Studio;Code::Blocks;Eclipse;Emacs;Intelli...
87526          Visual Studio;Visual Studio Code
87724  Android Studio;IntelliJ IDEA;IPython;Notepad++-
88037  Emacs;Neovim;Notepad++;Visual Studio;Visual St...

                           OpSysPersonal use \
78          MacOS

```

92

*Image :stackoverflowdevelopersurvey-images-91*

```

82                               Red Hat
172                               Ubuntu
397 Debian;Ubuntu;Windows;Windows Subsystem for Li...
404                               ChromeOS
-
87460                               Ubuntu
87486 Android;Arch;Other Linux-based;Windows;Other (...
87526                               Android;Debian;Windows
87724                               Android;ChromeOS;Ubuntu;Windows
88037                               Windows

OpSysProfessional use \
78                               MacOS
82                               Red Hat
172                               Ubuntu
397 Debian;Ubuntu;Windows;Windows Subsystem for Li...
404                               NaN
-
87460                               Windows
87486 Arch;Other Linux-based;Windows;Other (Please S...
87526                               Windows
87724                               Android;Ubuntu;Windows
88037 Fedora;MacOS;Windows;Windows Subsystem for Lin...

OfficeStackAsyncHaveWorkedWith \
78                               Jira
82 Confluence;Doxygen;Jira;Microsoft Planner
172                               NaN
397 Azure Devops;Markdown File
404                               Notion
-
87460                               Azure Devops
87486 Azure Devops;Confluence;Doxygen;GitHub Discuss...
87526                               Azure Devops
87724                               Confluence;Jira
88037                               Confluence;Jira

OfficeStackAsyncWantToWorkWith \
78                               Jira
82 Confluence;Doxygen;Jira;Microsoft Planner
172                               NaN
397                               Markdown File
404                               NaN
-
87460                               Azure Devops;GitHub Discussions
87486 Confluence;Doxygen;GitHub Discussions;Jira;Mir...
87526                               NaN

```

93

*Image :stackoverflowdevelopersurvey-images-92*

```

87724           Jira
88037           Jira;Notion

          OfficeStackSyncHaveWorkedWith \
78           Slack
82 Cisco Webex Teams;Google Meet;Microsoft Teams;-
172           Discord;Slack;Telegram;Whatsapp
397           Discord;Microsoft Teams;Whatsapp
404           Cisco Webex Teams
-
87460           -
87486 Cisco Webex Teams;Discord;Google Chat;Microsof-
87526 Cisco Webex Teams;Google Meet;Microsoft Teams;-
87724           Microsoft Teams
88037           Microsoft Teams

          OfficeStackSyncWantToWorkWith \
78           Slack
82 Cisco Webex Teams;Google Meet;Microsoft Teams;-
172           Discord;Slack;Telegram;Whatsapp
397           Discord;Signal;Whatsapp
404           NaN
-
87460           -
87486 Matrix;Microsoft Teams;Skype;Telegram;Whatsapp-
87526 Google Meet;Microsoft Teams;Whatsapp
87724           Microsoft Teams
88037           Microsoft Teams

          AISearchHaveWorkedWith AISearchWantToWorkWith AIDevHaveWorkedWith \
78           ChatGPT           ChatGPT           NaN
82           ChatGPT           ChatGPT           GitHub Copilot
172           ChatGPT           ChatGPT           NaN
397           ChatGPT           ChatGPT           GitHub Copilot
404           Andi             NaN             Replit Ghostwriter
-
87460           ChatGPT           ChatGPT           NaN
87486           NaN             NaN             NaN
87526 ChatGPT;Google Bard AI ChatGPT;Google Bard AI NaN
87724           NaN             NaN             NaN
88037           NaN             NaN             NaN

          AIDevWantToWorkWith
78           NaN           NEWSOSites \
82           GitHub Copilot           Stack Overflow;Stack Exchange
172           NaN           Stack Overflow;Stack Exchange;Stack Overflow f-
397           NaN           Stack Overflow;Stack Exchange

```

```

404           NaN           Stack Overflow;Stack Exchange
-
87460          NaN           Stack Overflow
87486          NaN           Stack Overflow;Stack Exchange
87526          NaN           Stack Overflow
87724          NaN           Stack Overflow
88037          NaN           Stack Overflow;Stack Exchange

           SOVisitFreq SOAccount \
78    A few times per month or weekly    Yes
82    Multiple times per day           Yes
172   Multiple times per day           Yes
397   Multiple times per day           Yes
404   A few times per month or weekly    Yes
-
87460          Multiple times per day    Yes
87486          A few times per month or weekly Yes
87526          Daily or almost daily      Yes
87724          A few times per month or weekly Yes
88037          Daily or almost daily      Yes

           SOPartFreq      SOComm \
78    Less than once per month or monthly Yes, definitely
82    A few times per month or weekly      Neutral
172   Daily or almost daily              Yes, somewhat
397   Less than once per month or monthly Yes, somewhat
404   I have never participated in Q&A on Stack Over.. Yes, somewhat
-
87460          A few times per month or weekly Yes, definitely
87486          Less than once per month or monthly Yes, somewhat
87526   I have never participated in Q&A on Stack Over.. Yes, somewhat
87724          Less than once per month or monthly Neutral
88037          Less than once per month or monthly Neutral

           SOAI \
78           NaN
82           providing exact copy paste code
172           It would be good.
397   It would help produce higher quality questions...
404           yes
-
87460   Stack overflow should definitely use AI to imp...
87486           Kills creativity and thinking ability.
87526           NaN
87724           NaN
88037   do an initial check on question to be posted t...

```

```

          AISelect      AISent  \
78          Yes  Very favorable
82  No, but I plan to soon  Very favorable
172          Yes  Favorable
397  No, and I don't plan to      NaN
404          Yes  Favorable
-          -
87460  No, but I plan to soon      -
87486  No, and I don't plan to      -
87526          Yes  Very favorable
87724  No, but I plan to soon  Favorable
88037  No, but I plan to soon  Very favorable

          AIAcc  \
78  Increase productivity;Greater efficiency;Speed...  NaN
82  Increase productivity;Greater efficiency;Speed...  NaN
172  Increase productivity;Greater efficiency;Speed...  NaN
397          Speed up learning
404          -
-          -
87460          -
87486          -
87526  Increase productivity;Greater efficiency;Impro...  NaN
87724          -
88037          -
          AIBen  \
78          Somewhat trust
82          Somewhat trust
172          Somewhat trust
397          NaN
404          Somewhat trust
-          -
87460  Neither trust nor distrust  NaN
87486          -
87526          Somewhat trust
87724          Somewhat trust
88037          Somewhat distrust

          AIToolInterested in Using  \
78  Testing code;Committing and reviewing code;Dep...  NaN
82  Learning about a codebase;Project planning;Wri...  NaN
172          Writing code
397          -
404          -
-          -
87460          -

```

```

87486                               NaN
87526 Writing code;Documenting code;Testing code;Com... NaN
87724                               NaN
88037                               NaN

          AIToolCurrently Using \
78          Writing code
82          NaN
172 Learning about a codebase;Writing code;Documen... NaN
397                               NaN
404 Learning about a codebase;Project planning;Wri... -
-
87460                               NaN
87486                               NaN
87526 Debugging and getting help NaN
87724                               NaN
88037                               NaN

          AIToolNot interested in Using AINextVery different \
78          NaN          NaN
82          NaN          NaN
172 Committing and reviewing code          NaN
397          NaN          NaN
404          NaN          NaN
-
87460          -          -
87486          NaN          NaN
87526          NaN          NaN
87724          NaN          NaN
88037          NaN          NaN

          AINextNeither different nor similar AINextSomewhat similar \
78          NaN          NaN
82          NaN          NaN
172          NaN          NaN
397          NaN          NaN
404 Project planning          Writing code
-
87460          -          -
87486          NaN          NaN
87526          NaN          NaN
87724          NaN          NaN
88037          NaN          NaN

          AINextVery similar    AINextSomewhat different TBranch \
78          NaN          NaN      No
82          NaN          NaN      Yes

```

172	NaN	NaN	NaN	Yes	
397	NaN	NaN	NaN	Yes	
404	NaN	Learning about a codebase	NaN	Yes	
—	—	—	—	—	
87460	NaN	NaN	NaN	Yes	
87486	NaN	NaN	NaN	Yes	
87526	NaN	Debugging and getting help	NaN	Yes	
87724	NaN	NaN	NaN	Yes	
88037	NaN	NaN	NaN	Yes	
	ICorPM	WorkExp	Knowledge_1	\\	
78	NaN	NaN	NaN		
82	Individual contributor	5.0	Agree		
172	Individual contributor	3.0	Neither agree nor disagree		
397	Individual contributor	1.0	Agree		
404	Individual contributor	1.0	Agree		
—	—	—	—	—	
87460	Individual contributor	0.0	Neither agree nor disagree		
87486	Individual contributor	0.0	Agree		
87526	Individual contributor	16.0	Agree		
87724	Individual contributor	1.0	Agree		
88037	Individual contributor	1.0	Strongly agree		
	Knowledge_2	Knowledge_3	\\		
78	NaN	NaN			
82	Agree	Neither agree nor disagree			
172	Disagree	Agree			
397	Strongly agree	Strongly disagree			
404	Agree	Agree			
—	—	—	—	—	
87460	Agree	Neither agree nor disagree			
87486	Agree	Neither agree nor disagree			
87526	Disagree	Agree			
87724	Neither agree nor disagree	Neither agree nor disagree			
88037	Agree	Disagree			
	Knowledge_4	Knowledge_5	\\		
78	NaN	NaN			
82	Disagree	Agree			
172	Disagree	Neither agree nor disagree			
397	Strongly disagree	Strongly disagree			
404	Agree	Agree			
—	—	—	—	—	
87460	Agree	Agree			
87486	Agree	Agree			
87526	Agree	Disagree			
87724	Agree	Agree			

98

*Image :stackoverflowdevelopersurvey-images-97*

	Disagree	Strongly agree	
	Knowledge_6	Knowledge_7	\
78	NaN	NaN	
82	Agree	Strongly agree	
172	Neither agree nor disagree	Disagree	
397	Agree	Agree	
404	Neither agree nor disagree	Neither agree nor disagree	
—	—	—	
87460	Neither agree nor disagree	Strongly agree	
87486	Disagree	Neither agree nor disagree	
87526	Agree	Disagree	
87724	Neither agree nor disagree	Agree	
88037	Disagree	Disagree	
	Knowledge_8	Frequency_1	Frequency_2
78	NaN	NaN	NaN
82	Neither agree nor disagree	1-2 times a week	1-2 times a week
172	Disagree	1-2 times a week	1-2 times a week
397	Disagree	1-2 times a week	1-2 times a week
404	Neither agree nor disagree	1-2 times a week	1-2 times a week
—	—	—	—
87460	Disagree	1-2 times a week	1-2 times a week
87486	Neither agree nor disagree	3-5 times a week	6-10 times a week
87526	Agree	3-5 times a week	Never
87724	Agree	3-5 times a week	1-2 times a week
88037	Neither agree nor disagree	1-2 times a week	3-5 times a week
	Frequency_3	TimeSearching	TimeAnswering
78	NaN	NaN	NaN
82	1-2 times a week	60-120 minutes a day	30-60 minutes a day
172	1-2 times a week	30-60 minutes a day	15-30 minutes a day
397	1-2 times a week	15-30 minutes a day	30-60 minutes a day
404	1-2 times a week	30-60 minutes a day	15-30 minutes a day
—	—	—	—
87460	Never	15-30 minutes a day	15-30 minutes a day
87486	10+ times a week	30-60 minutes a day	30-60 minutes a day
87526	Never	15-30 minutes a day	Less than 15 minutes a day
87724	1-2 times a week	60-120 minutes a day	60-120 minutes a day
88037	1-2 times a week	60-120 minutes a day	15-30 minutes a day
	ProfessionalTech		\
78	NaN		
82	DevOps function;Developer portal or other cent...		
172	Automated testing;Observability tools;Develop...		
397	Innersource initiative;Developer portal or oth...		
404	None of these		

99

*Image :stackoverflowdevelopersurvey-images-98*

```

87460 DevOps function;Microservices;Innersource init_
87486 DevOps function;Microservices;Developer portal_
87526 DevOps function;Microservices;Automated testin_
87724 DevOps function;Microservices;Automated testin_
88037 Automated testing;Continuous integration (CI) _
```

	Industry
78	NaN
82	Information Services, IT, Software Development
172	Healthcare
397	Manufacturing, Transportation, or Supply Chain
404	Information Services, IT, Software Development
87460	Healthcare
87486	Information Services, IT, Software Development
87526	Financial Services
87724	Other
88037	Information Services, IT, Software Development

	SurveyLength	SurveyEase	ConvertedCompYearly
78	Appropriate in length	Easy	NaN
82	Appropriate in length	Neither easy nor difficult	NaN
172	Appropriate in length	Easy	NaN
397	Appropriate in length	Easy	12723.0
404	Too long	Neither easy nor difficult	4847.0
87460	Appropriate in length	Easy	7731.0
87486	Appropriate in length	Easy	NaN
87526	Too long	Easy	NaN
87724	Appropriate in length	Neither easy nor difficult	NaN
88037	Appropriate in length	Easy	20599.0

[403 rows x 84 columns]

```
[ ]: #Multiple Queries
filter = (data['Country']=='India') & (data['RemoteWork']=='Remote') &
        ~(data['ConvertedCompYearly'] > 100000)
data[filter].LanguageHaveWorkedWith.value_counts()
```

```
[ ]: LanguageHaveWorkedWith
C++;HTML/CSS;JavaScript;Python
1
HTML/CSS;Java;JavaScript;Kotlin;PHP;Python;Rust;SQL
1
C++;Go;Java;JavaScript;Python
1
```

100

*Image :stackoverflowdevelopersurvey-images-99*

### Chapter 14:Django\_Books

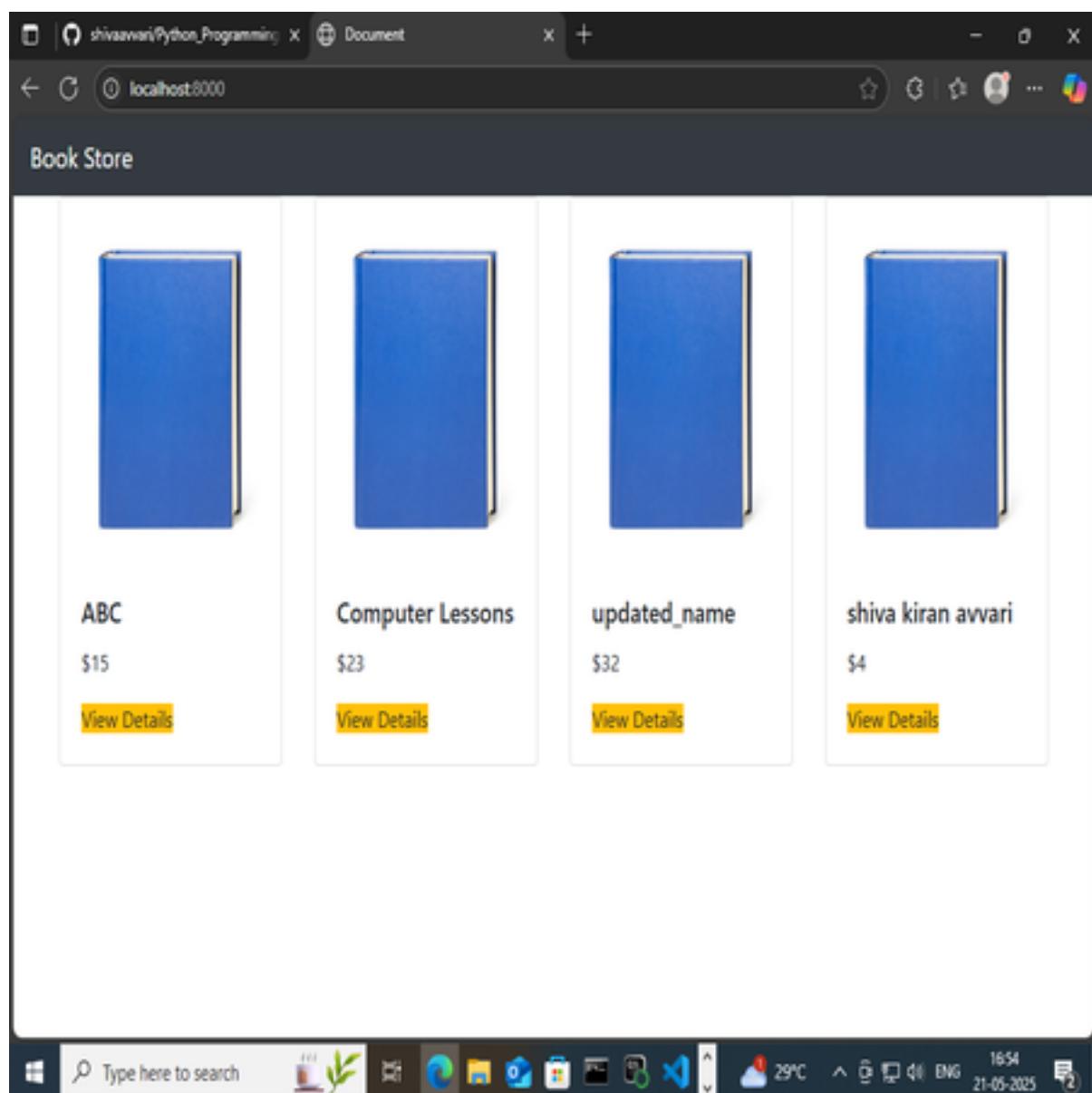
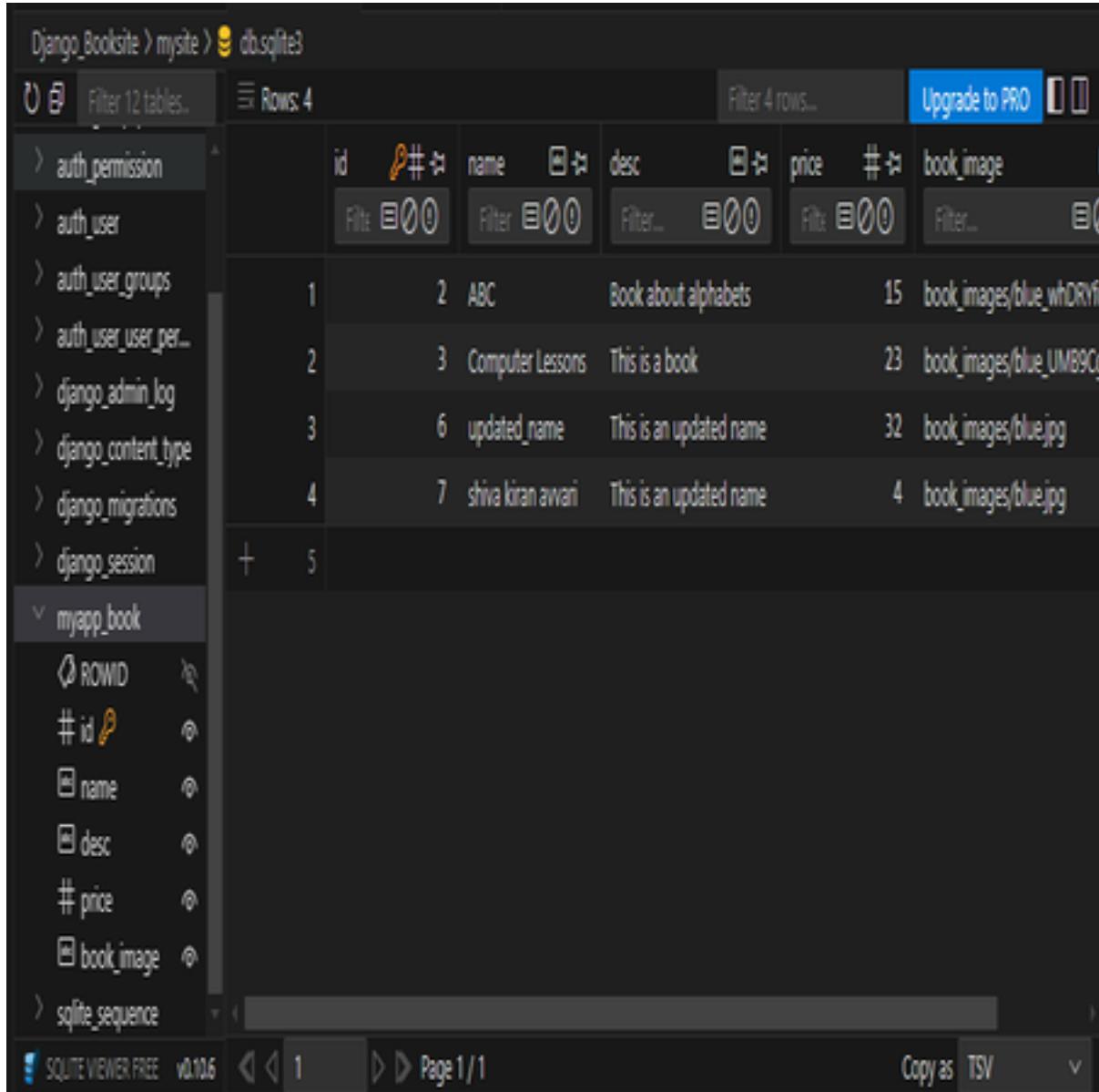


Image :D:\inlighttech\ Django\_Books\booksite.PNG



The screenshot shows the SQLite Viewer Free application interface. The left sidebar lists the database schema with tables like auth\_permission, auth\_user, auth\_user\_groups, auth\_user\_user\_permissions, django\_admin\_log, django\_content\_type, django\_migrations, django\_session, and myapp\_book. The myapp\_book table is currently selected, showing the following data:

	id	name	desc	price	book_image
	1	ABC	Book about alphabets	15	book_images/blue_whDRYf
	2	Computer Lessons	This is a book	23	book_images/blue_UMB90c
	3	updated_name	This is an updated name	32	book_images/blue.jpg
	4	7	shiva kiran awari	This is an updated name	4
	5				book_images/blue.jpg

Image :D:\inligntech\ Django\_Booksite\sqlite.PNG

*This is the project description.*

*The basic idea of this project is to create a book site using django.*

*The project is used to create a book site using the information provided by*

*the user.*

*We build a django application  
we can add delete and update the book information.*

*The libraries used in this project are:*

- 1)asgiref
- 2)Django
- 3)pillow
- 4)sqlparse
- 5)tzdata

*Asigref is used to create the asgi application for the project.*

*Django is used to create the web application for the project.*

*Pillow is used to create the image for the project.*

*Sqlparse is used to create the sql for the project.*

*Tzdata is used to create the timezone for the project.*

*The code used in this project is:*

*1) create a django project mysite*

*django-admin startproject mysite*

*2) create a django app myapp*

*python manage.py startapp myapp*

*3) create the media folder in the project directory to store the images*

*your settings.py file should look like this:*

*MEDIA\_ROOT = os.path.join(BASE\_DIR,'media')*

*MEDIA\_URL ='/media/'*

*4) create the static and templates folder in the app directory to*

*store the static files and templates*

*5) create the models.py file in the myapp directory*

*from django.db import models*

*# Create your models here.*

*class Book(models.Model):*

*def \_\_str\_\_(self):*

*return self.name*

*name = models.CharField(max\_length=100)*

```
desc = models.CharField(max_length=300)
price = models.IntegerField()
book_image = models.ImageField(default='default.jpg',upload_to='book_images/')
```

5) Register the model in the admin.py file

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

6) create the forms.py file in the myapp directory

```
from django import forms
from .models import Book
```

```
class BookForm(forms.ModelForm):
```

```
    class Meta:
```

```
        model = Book
        fields =['name','desc','book_image','price']
```

7) create urls.py file in the myapp directory

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

```
from . import views

app_name = 'myapp'
urlpatterns = [
    path("", views.index, name="index"),
    #path('products/', views.products, name="Products"),
    #book1/2
    path('book/<int:book_id>/', views.detail, name='detail'),
    path('add/', views.add_book, name='add_book'),
    path('update/<int:id>/', views.update, name='update'),
    path('delete/<int:id>/', views.delete, name='delete')
]
```

8) create the `views.py` file in the `myapp` directory

```
from django.http import HttpResponseRedirect
from django.shortcuts import render, redirect
from .models import Book
from .forms import BookForm
# Create your views here.

def index(request):
    book_list = Book.objects.all()
    context={
```

```
'book_list':book_list,
}

#return HttpResponse(book_list)
return render(request,'myapp/index.html',context=context)

def detail(request,book_id):
    book = Book.objects.get(id= book_id)
    #return HttpResponse("This is the requested book %s"%book_id)
    context={

        'book':book,
    }
    return render(request,'myapp/detail.html',context=context)

def add_book(request):
    if request.method == 'POST':
        name = request.POST.get('name',)

        desc = request.POST.get('desc',)

        price = request.POST.get('price',)
```

```
book_image = request.FILES['book_image']
```

```
book = Book(name=name, desc=desc, price=price, book_image=book_image)
book.save()
```

```
return render(request, 'myapp/add_book.html')
```

```
def update(request, id):
    book = Book.objects.get(id=id)
    form = BookForm(request.POST or None, request.FILES,
    instance=book)
    if form.is_valid():
        form.save()
    return redirect('/')
return render(request, 'myapp/edit.html', context={'form':form, 'book':book})
```

```
def delete(request, id):
    if request.method == 'POST':
        book = Book.objects.get(id=id)
        book.delete()
    return redirect('/')
```

```
return render(request,'myapp/delete.html')
```

10) create the urls.py file in the mysite directory

```
from django.contrib import admin
from django.urls import path , include
from . import settings
from django.conf.urls.static import static
urlpatterns = [
    path('admin/', admin.site.urls),
    path("",include('myapp.urls')),
```

```
]+ static(settings.MEDIA_URL,document_root=settings.MEDIA_ROOT)
```

11) create the base.html file in the templates directory

```
{% load static %}
<!DOCTYPE html>
<html lang="en">
<head>
    <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/css/bootstrap.min.css"
integrity="sha384-xOoHFLEh07PJGoPkLv1IbcEPTNtaed2xpHsD9ESMhqI
```

Yd0nLMwNLD69Npy4HI+N"

```
crossorigin="anonymous">
<link rel="stylesheet" href="{% static 'myapp/style.css' %}">
<title>Document</title>
</head>
<body>
  {% block body %}
  {% endblock %}
</body>
</html>
```

12) run the server

```
python manage.py runserver
```

### Chapter 15:Django\_todo\_app

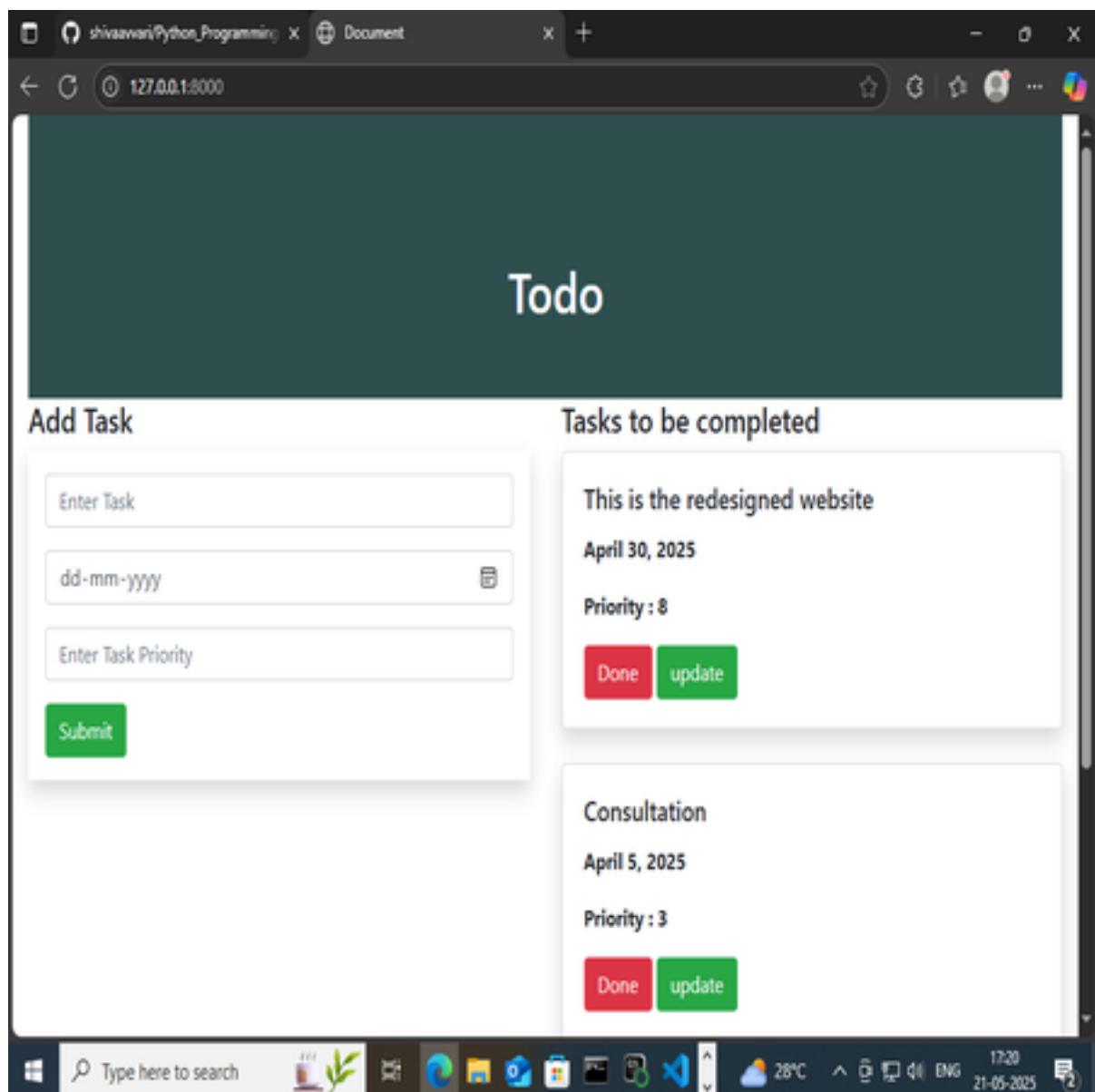


Image :D:\inlighttech\ Django\_todo\_app\ todo.PNG

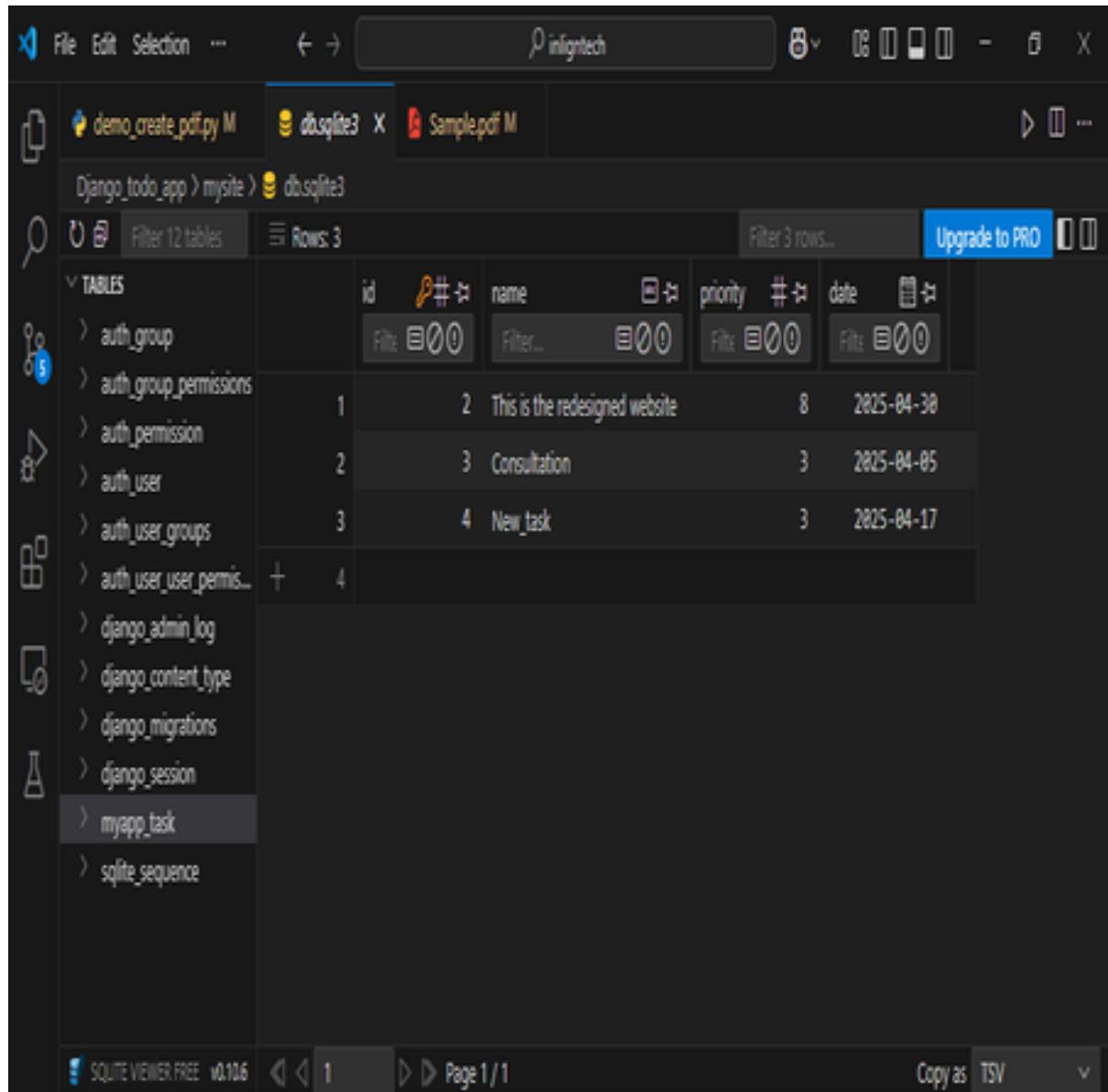


Image :D:\inlighttech\ Django\_todo\_app\sqlite.PNG

*This is the project description.*

*The basic idea of this project is to create a todo app using django.*

*The project is used to create a todo app using the information provided by*

*the user.*

*We build a django application  
we can add delete and update the todo information.*

*The libraries used in this project are:*

*The libraries used in this project are:*

- 1)asgiref
- 2)Django
- 3)sqlparse
- 4)tzdata

*Asigref is used to create the asgi application for the project.*

*Django is used to create the web application for the project.*

*Sqlparse is used to create the sql for the project.*

*Tzdata is used to create the timezone for the project.*

*The code used in this project is:*

1) *Install the requirements*

*pip install -r requirements.txt*

2) *create a django project mysite*

*django-admin startproject mysite*

3) *create a django app myapp*

*python manage.py startapp myapp*

4) *create the static and templates folder in the app directory to store the static files and templates*

*static folder should contain the css and js files*

5) *create the models.py file in the myapp directory*

*from django.db import models*

*import datetime*

*# Create your models here.*

*class Task(models.Model):*

*def \_\_str\_\_(self):*

*return self.name*

*name = models.CharField(max\_length=100)*

*priority = models.IntegerField()*

*date = models.DateField(default=datetime.date.today())*

6) Register the model in the admin.py file

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

7) create the forms.py file in the myapp directory

```
from .models import Task
from django import forms
```

```
class TodoForm(forms.ModelForm):
```

```
    class Meta:
        model = Task
        fields =['name','priority','date']
```

8) create the views.py file in the myapp directory

```
from django.shortcuts import render ,redirect
from .models import Task
from .forms import TodoForm
from django.views.generic import ListView
from django.views.generic.detail import DetailView
from django.views.generic.edit import UpdateView
```

```
from django.views.generic.edit import DeleteView
from django.urls import reverse_lazy

# Create your views here.

class TaskListView(ListView):
    model = Task
    template_name = 'myapp/index.html'
    context_object_name = "task_list"

class TaskDetailView(DetailView):
    model = Task
    template_name = 'myapp/detail.html'
    context_object_name = "task"

class TaskUpdateView(UpdateView):
    model = Task
    template_name = 'myapp/update.html'
    context_object_name = "task"
    fields =('name','priority','date')

    def get_success_url(self):
        return reverse_lazy('cbvdetail',kwargs={'pk':self.object.id})
```

```
class TaskDeleteview(DeleteView):  
    model = Task  
    template_name = 'myapp/delete.html'  
    success_url = reverse_lazy('cbvindex')  
  
def index(request):  
    task_list = Task.objects.all()  
    if request.method == "POST":  
        name = request.POST.get('name', '')  
        priority = request.POST.get('priority', '')  
        date = request.POST.get('date', '')  
        task = Task(name=name, priority=priority, date=date)  
        task.save()  
        return redirect('/')  
    return render(request, 'myapp/index.html', {'task_list': task_list})  
  
def delete(request, taskid):  
    task = Task.objects.get(id=taskid)
```



9) create the `urls.py` file in the project directory

```
from django.contrib import admin
from django.urls import path
from myapp import views

urlpatterns = [
    path('admin/', admin.site.urls),
    path("views index name="index")
```

```
path('delete/<int:taskid>/',views.delete,name="delete"),
path('update/<int:id>/',views.update,name="update"),
path('cbvindex/',views.TaskListView.as_view(),name='cbvindex'),

path('cbvdetail/<int:pk>/',views.TaskDetailView.as_view(),name='cbvdetail')
,
path('cbvupdate/<int:pk>/',views.TaskUpdateView.as_view(),name="cbvupdate"),
path('cbvdelete/<int:pk>/',views.TaskDeleteview.as_view(),name='cbvdelete')
,]
```

10) After models have been create run the following command

```
python manage.py makemigrations
python manage.py migrate
```

11) create the base.html file in the templates directory

```
{% load static %}
<!DOCTYPE html>
```

```
<html lang="en">
  <head>
    <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/css/bootstrap.min.css" integrity="sha384-xOoHFLEh07PJGoPkLv1IbcEPTNtaed2xpHsD9ESMhqYd0nLMwNLD69Npy4HI+N" crossorigin="anonymous">
    <link rel="stylesheet" href="{% static 'myapp/style.css' %}">
    <title>Document</title>
  </head>
  <body>
    {% block body %}
    {% endblock %}
  </body>
</html>
```

12) create superuser

*python manage.py createsuperuser*

13) run the server

### Chapter 16:Flask-Site

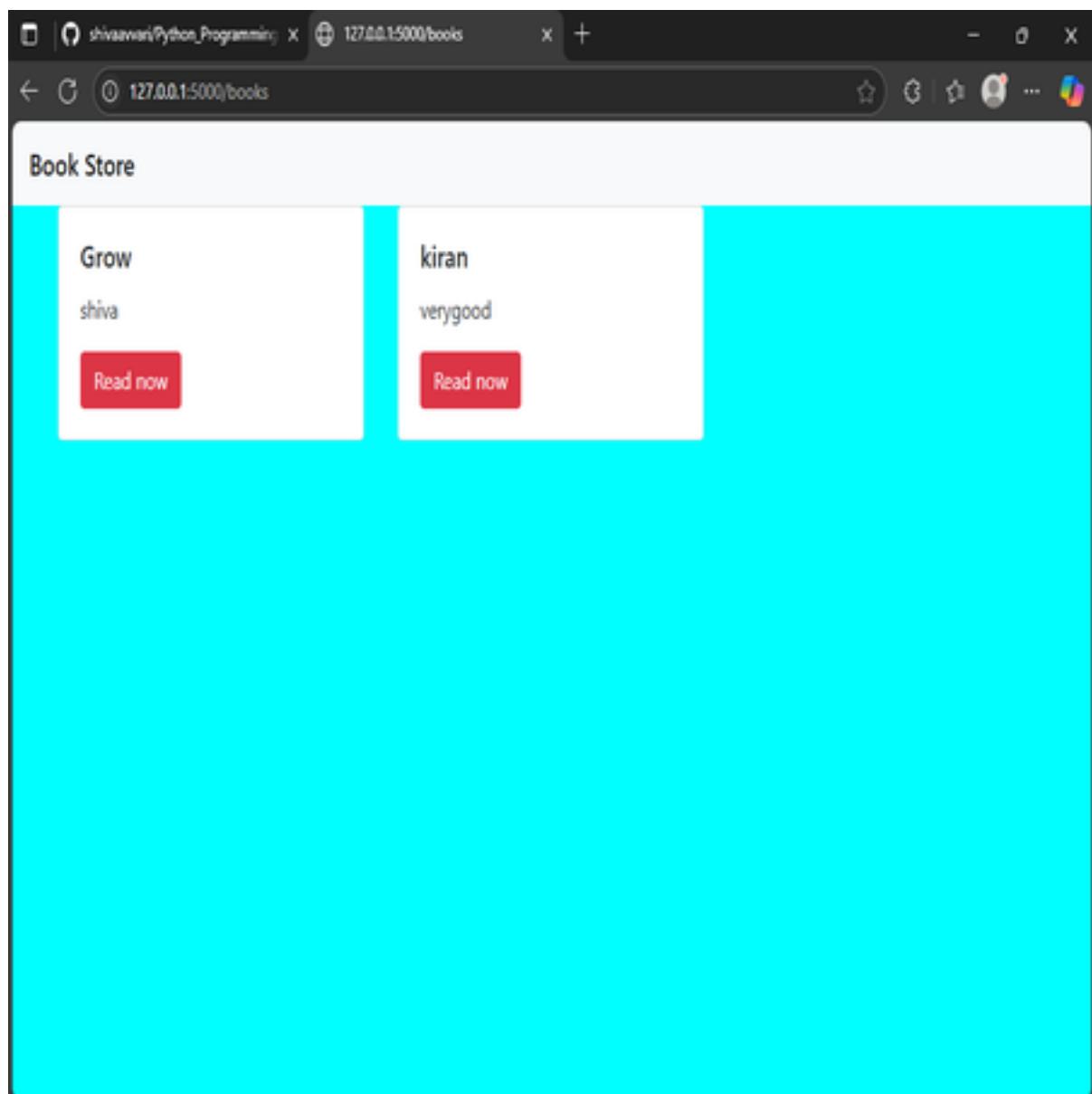


Image :D:\inlighttech\Flask-Site\books.PNG

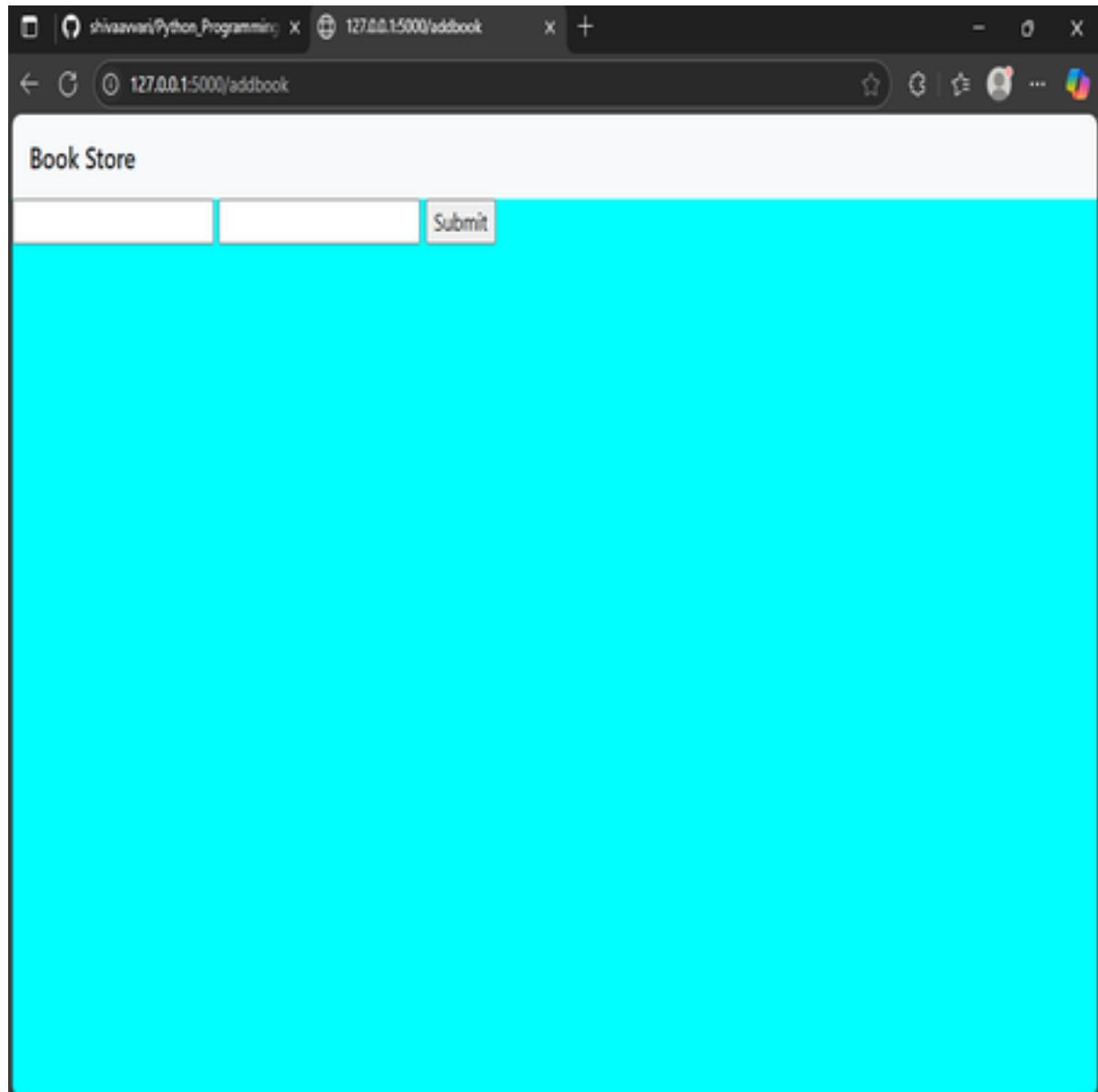


Image :D:\inligntech\Flask-Site\addbook.PNG

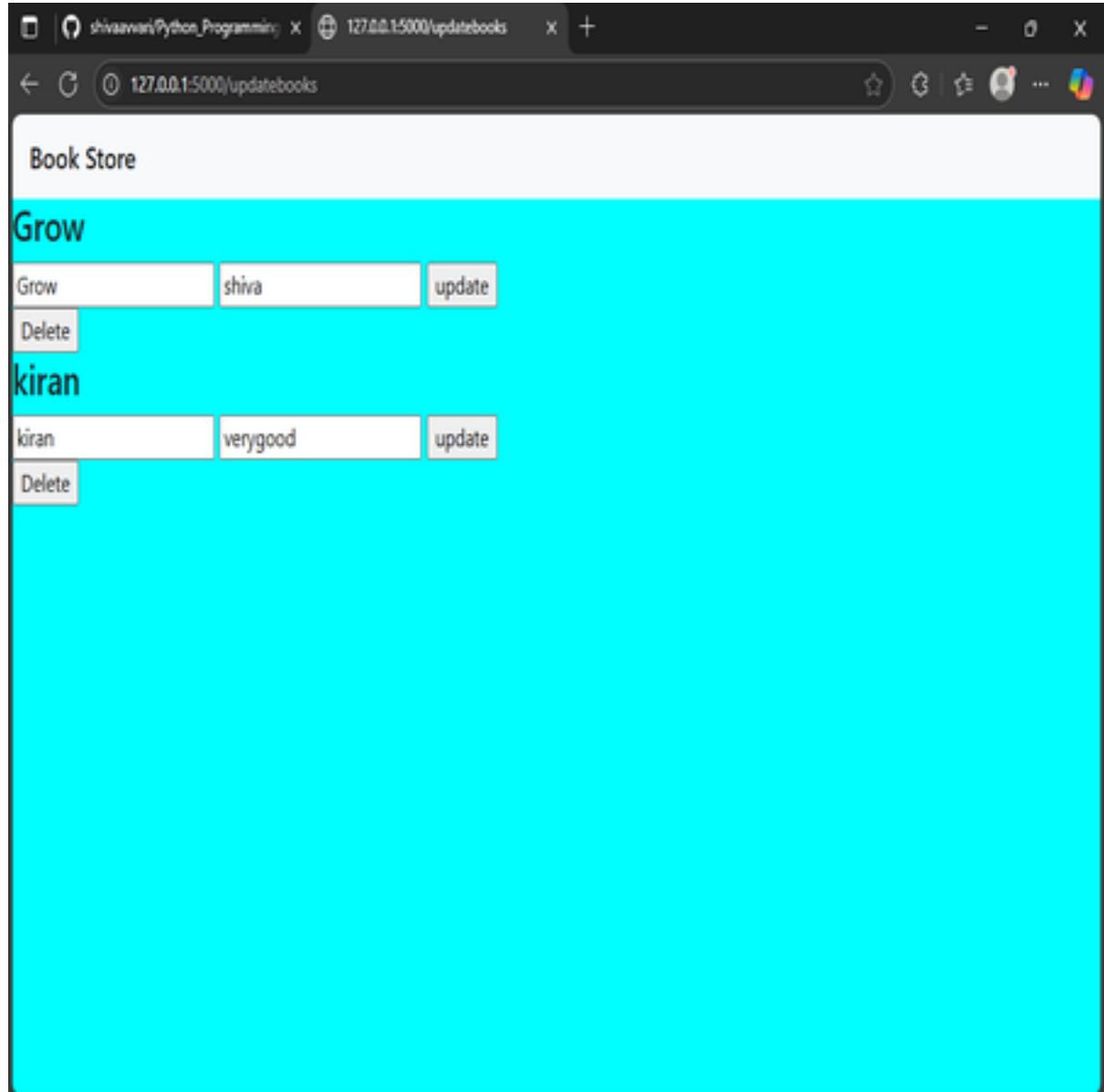


Image :D:\inligntech\Flask-Site\updatebook.PNG

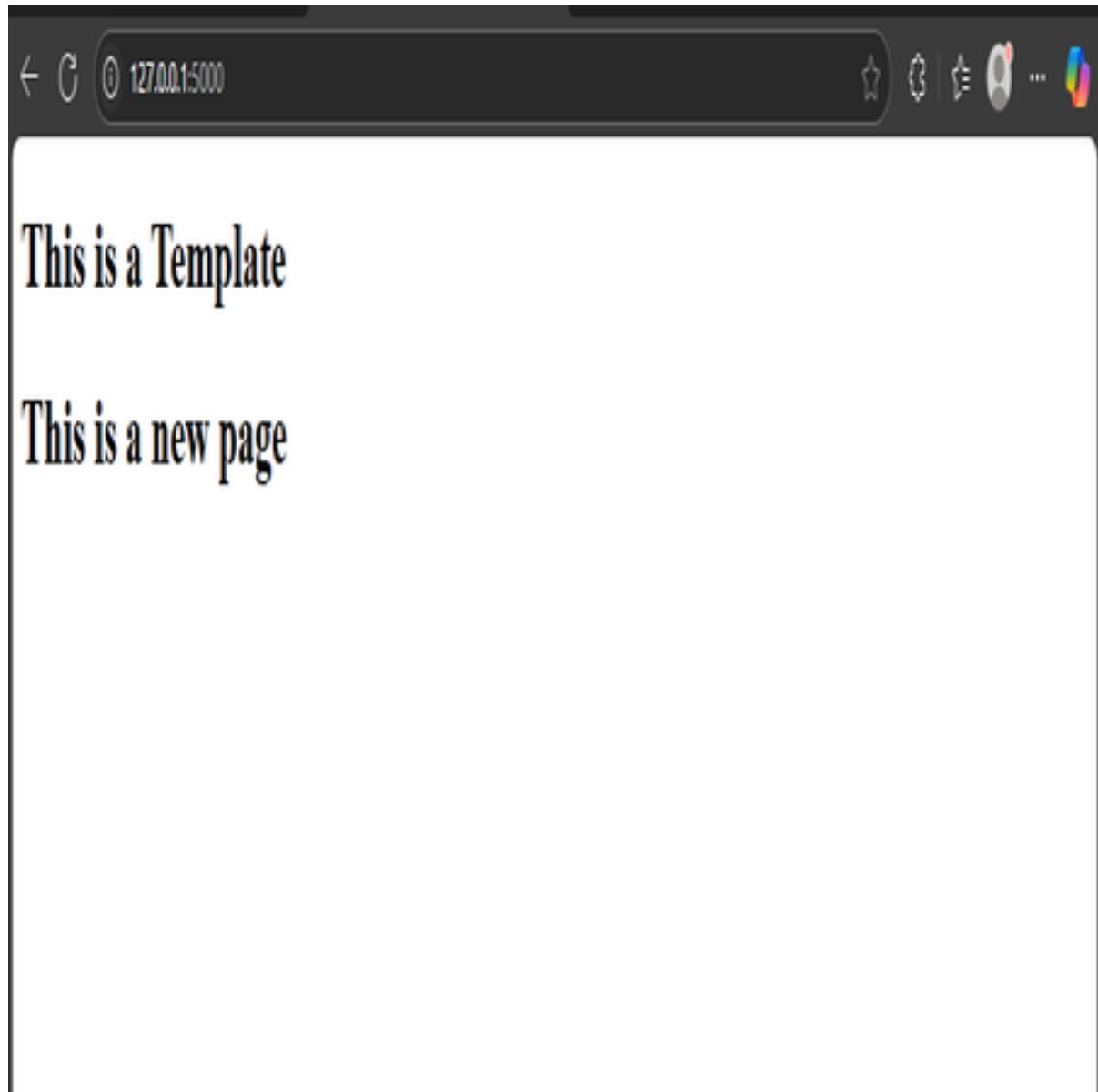


Image :D:\inlighttech\Flask-Site\flasksite.PNG

```
(env) D:\inlighttech\Flask-Site>python app.py
 * Serving Flask app 'app'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on http://127.0.0.1:5000
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 236-883-216
127.0.0.1 - - [21/May/2025 17:35:06] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [21/May/2025 17:35:06] "GET /favicon.ico HTTP/1.1" 404 -
```

Image :D:\inlighttech\Flask-Site\start.PNG

*create a flask site using python.*

*The project is used to create a book site using the information provided by the user.*

*We build a flask application  
we can add delete and update the book information.*

*1) install the requirements*

*2) we can start the flask site using the command*

*python app.py*

*3)We can add the book using the form provided in the site*

*4)We can update the book using the form provided in the site*

*5)We can delete the book using the form provided in the site*

*6)The data is stored in the sqlite database*

*7)The code used in this project is:*

```
from flask import Flask ,request, render_template , redirect
```

```
from flask_sqlalchemy import SQLAlchemy
```

```
import os
```

```
projet_dir = os.path.dirname(os.path.abspath(__file__))
```

```
database_file
```

```
"sqlite:///{}".format(os.path.join(projet_dir,"mydatabase.db"))
```

=

```
app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = database_file
db = SQLAlchemy(app)

class Book(db.Model):
    book = db.Column(db.String(100), unique=True,
                     nullable=True, primary_key=True)
    author = db.Column(db.String(100),
                      nullable=False)

@app.route('/updatebooks')
def updatebooks():
    books = Book.query.all()
    return render_template('updatebooks.html', books=books)

@app.route('/update', methods=['POST'])
def update():
    newname = request.form['newbook']
    oldname = request.form['oldbook']
    newauthor = request.form['newauthor']
```

```
book = Book.query.filter_by(book=oldname).first()  
book.book = newname  
book.author = newauthor
```

```
db.session.commit()
```

```
return redirect('/books')
```

```
@app.route('/submitbook',methods=['POST'])  
def submitbook():  
    name = request.form['book']  
    author = request.form['author']
```

```
book = Book(book=name,author=author)  
db.session.add(book)  
db.session.commit()
```

```
return redirect('/books')
```

```
@app.route('/addbook')  
def addbook():
```

```
return render_template('add_book.html')

@app.route('/delete',methods=['POST'])

def delete():

    book = request.form['oldb']

    book_1 = Book.query.filter_by(book=book).first()

    db.session.delete(book_1)

    db.session.commit()

    return redirect('/books')

@app.route('/')

def index():

    #return 'this is the request made by the client %s' % request.headers

    return render_template('index.html')

@app.route('/profile/<username>')

def profile(username):

    return render_template('profile.html',username=username, isActive=False)

@app.route('/books')
```

```
def books():
    books = Book.query.all()
    return render_template('books.html', books=books)

if __name__ == '__main__':
    with app.app_context():
        db.create_all()
    app.run(debug=True)
```

*create a base.html file in the templates directory*

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

{% block body %}

<form action="/submitbook" method="post">
    <input type="text" name="book">
    <input type="text" name="author">

    <input type="submit">
```

</form>

{% endblock %}

*The libraries used in this project are:*

- 1)Flask
- 2)Flask-SQLAlchemy
- 3)os
- 4)sqlite3

*The Flask library is used to create the web application for the project.*

*The Flask-SQLAlchemy library is used to create the database for the project.*

*The os library is used to create the file.*

*The sqlite3 library is used to create the database for the project.*

### Chapter 17: FlaskProject\_ExpenseManager

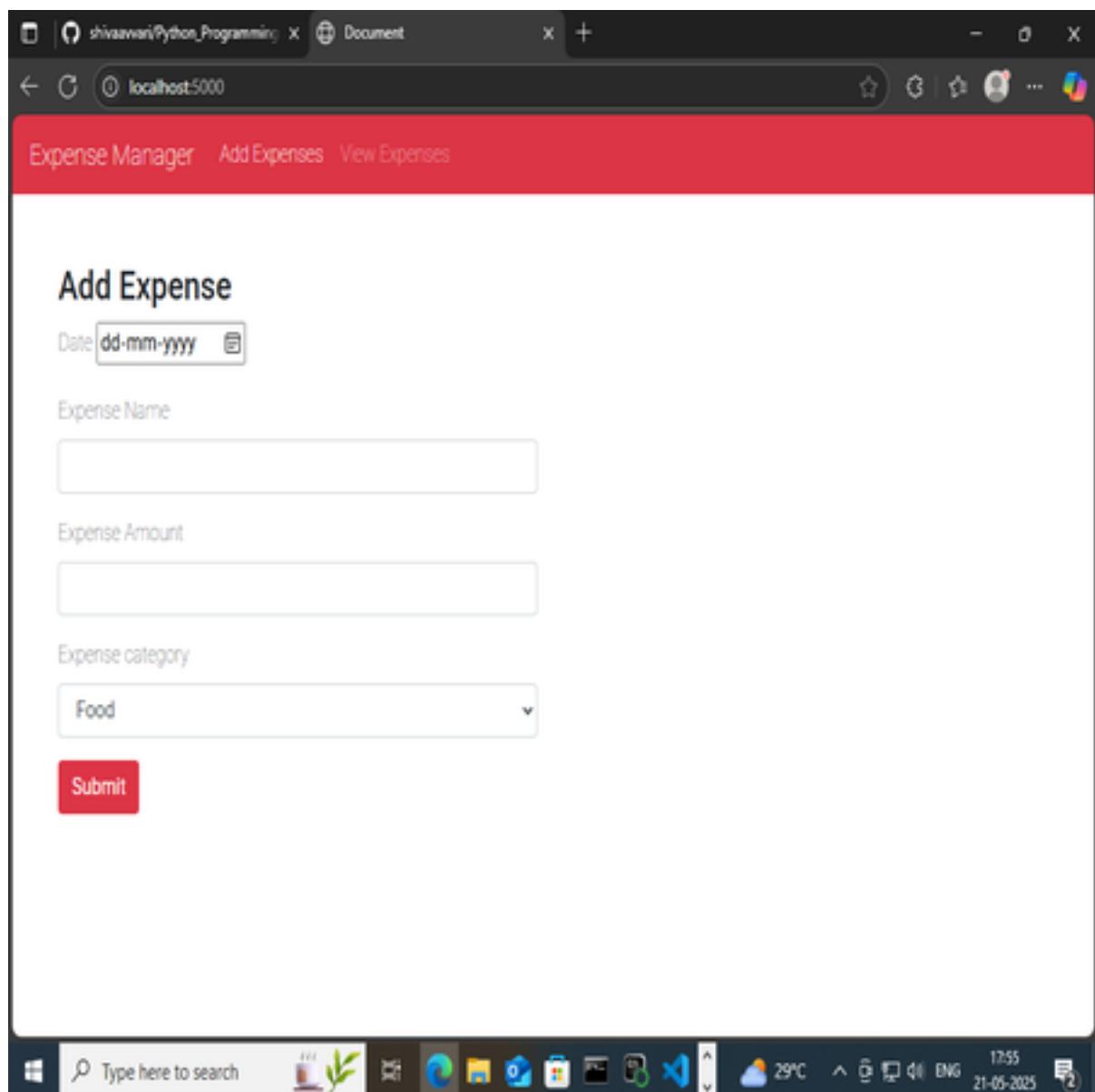


Image :D:\inlighttech\FlaskProject\_ExpenseManager\expensemanger.PNG

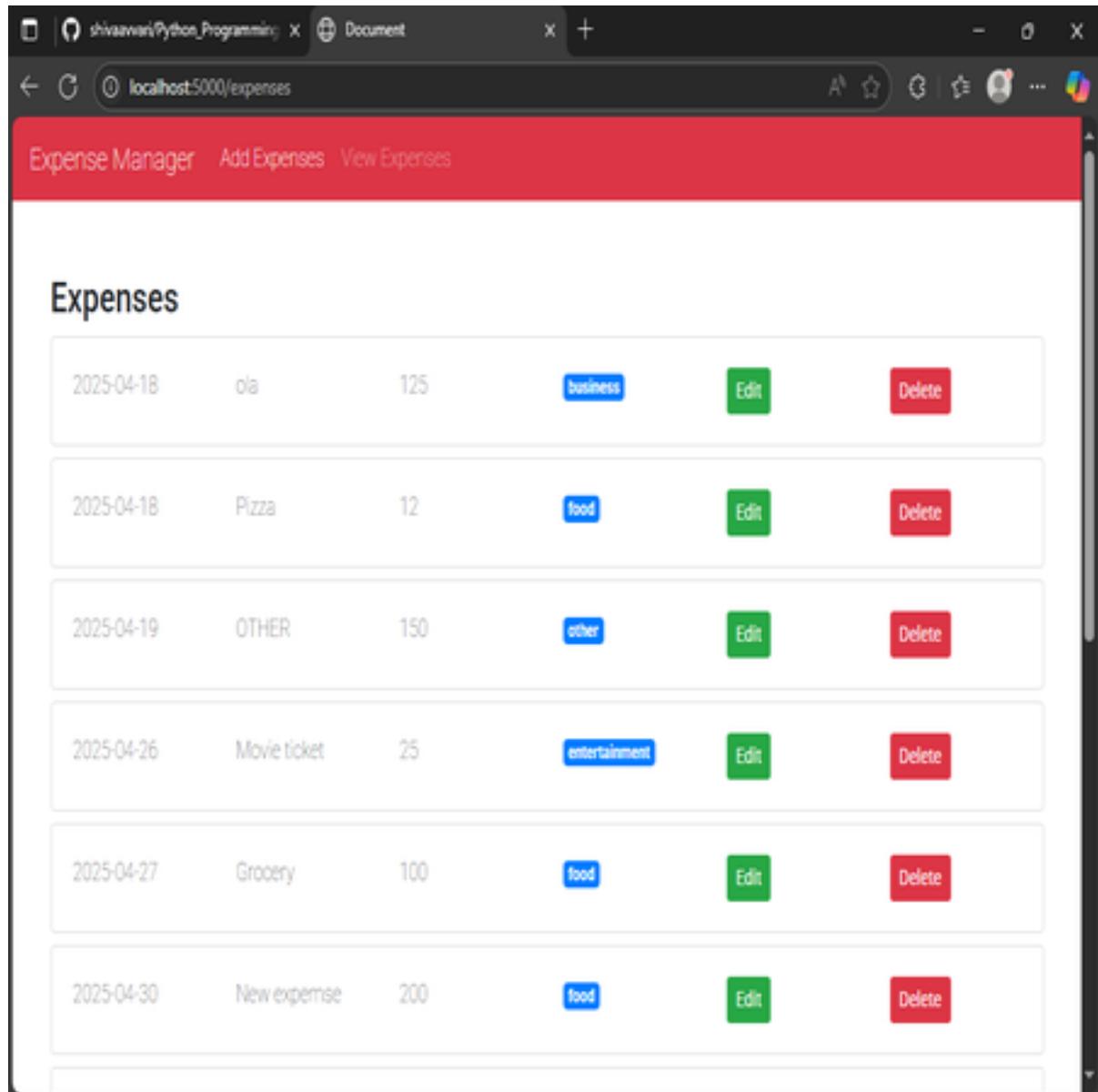


Image :D:\inlighttech\FlaskProject\_ExpenseManager\viewexpense.PNG

*create a Expense manager using python.*

*The project is used to create a Expense manager using the information provided by the user.*

*The user can make a list of expenses and can add the expenses to the list. We build a flask application and the store the data in a sqlite database. The website is created using bootstrap.*

*The libraries used in this project are:*

*blinker*

*click*

*colorama*

*Flask*

*Flask-SQLAlchemy*

*greenlet*

*itsdangerous*

*Jinja2*

*MarkupSafe*

*SQLAlchemy*

*typing\_extensions*

*Werkzeug*

*The Flask library is used to create the web application for the project.*

*The Flask-SQLAlchemy library is used to create the database for the project.*

*The os library is used to create the file.*

*The sqlite3 library is used to create the database for the project.*

*The code used in this project is:*

```
from flask import Flask, render_template, request, redirect ,url_for
from flask_sqlalchemy import SQLAlchemy
import os
```

```
project_dir = os.path.dirname(os.path.abspath(__file__))
database_file = "sqlite:///{}".format(
    os.path.join(project_dir,'mydatabase.db'))
)
```

```
app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI']= database_file
db = SQLAlchemy(app)
```

```
class Expense(db.Model):
```

```
id = db.Column(db.Integer,primary_key=True)
date = db.Column(db.String(50),nullable=False)
expensename = db.Column(db.String(50),nullable=False)
amount = db.Column(db.Integer,nullable=False)
category = db.Column(db.String(50),nullable=False)

@app.route('/expenses')
def expenses():
    expenses = Expense.query.all()
    total = 0
    t_business = 0
    t_other = 0
    t_food = 0
    t_entertainment = 0
    for expense in expenses:
        total+= expense.amount
        if expense.category == "business":
            t_business += expense.amount
        elif expense.category == "other":
            t_other += expense.amount
        elif expense.category == "food":
            t_food += expense.amount
```

```
elif expense.category == "entertainment":  
    t_entertainment += expense.amount
```

```
return render_template('expenses.html',expenses=expenses,  
                      total = total,  
                      t_business= t_business,  
                      t_other = t_other,  
                      t_food = t_food,  
                      t_entertainment = t_entertainment)
```

```
@app.route('/')  
def add():  
    return render_template('add.html')  
@app.route('/addexpense',methods=['POST'])  
def addexpense():  
    date = request.form["date"]  
    expensename =request.form["expensename"]  
    amount = request.form['amount']  
    category = request.form['category']  
    expense  
    =Expense(date=date,expensename=expensename,amount=amount,categ
```

```
ory=category)
```

```
    db.session.add(expense)
```

```
    db.session.commit()
```

```
    return redirect('/expenses')
```

```
@app.route('/delete/<int:id>')
```

```
def delete(id):
```

```
    expense = Expense.query.filter_by(id=id).first()
```

```
    db.session.delete(expense)
```

```
    db.session.commit()
```

```
    return redirect("/expenses")
```

```
@app.route('/updateexpense/<int:id>')
```

```
def updateexpense(id):
```

```
    expense = Expense.query.filter_by(id=id).first()
```

```
    return render_template('updateexpense.html', expense=expense)
```

```
@app.route('/edit', methods=['POST'])
```

```
def edit():
```

```
    date = request.form["date"]
```

```
    expensename = request.form["expensename"]
```

```
    amount = request.form['amount']
```

```
category = request.form['category']
id = request.form['id']
expense = Expense.query.filter_by(id=id).first()
expense.date = date
expense.category = category
expense.expensename = expensename
expense.amount = amount

db.session.commit()
return redirect("/expenses")
```

```
@app.route('/addview',methods=["GET","POST"])
def addview():
    if request.method=="GET":
        expenses = Expense.query.all()
        total = 0
        t_business = 0
        t_other = 0
        t_food = 0
        t_entertainment = 0
        for expense in expenses:
```

```
total+= expense.amount
if expense.category == "business":
    t_business += expense.amount
elif expense.category == "other":
    t_other += expense.amount
elif expense.category == "food":
    t_food += expense.amount
elif expense.category == "entertainment":
    t_entertainment += expense.amount
elif request.method=="POST":
    date = request.form["date"]
    expensename =request.form["expensename"]
    amount = request.form['amount']
    category = request.form['category']
    expense
=Expense(date=date,expensename=expensename,amount=amount,categ
ory=category)
    db.session.add(expense)
    db.session.commit()
    return redirect('/addview')

return render_template('addview.html',expenses=expenses,
```

*total = total,*  
*t\_business = t\_business,*  
*t\_other = t\_other,*  
*t\_food = t\_food,*  
*t\_entertainment = t\_entertainment)*

*pass*

```
if __name__ == '__main__':  
    app.run(debug=True)
```

- 1) Please install the requirements
  - 2) run the app.py file at the terminal
  - 3) The app will run on the localhost
  - 4) The app will run on the port 5000
  - 5) The base.html file is used to create the base template for the project

```
<head>
```

```
    <link rel="stylesheet"
```

```
        href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css"
        integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm" crossorigin="anonymous">
```

```
    <script
```

```
        src="https://cdnjs.cloudflare.com/ajax/libs/Chart.js/3.0.1/chart.min.js"
        integrity="sha512-2uu1jrAmW1A+SMwi5DAPqzFS2PI+OPw79OVLS4NJ6jGHQ/GmIVDDIWwz4KLO8DnoUmYdU8hTtFcp8je6zxbCg=="
        crossorigin="anonymous" referrerPolicy="no-referrer"></script>
```

```
    <link rel="preconnect" href="https://fonts.googleapis.com">
```

```
    <link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
    <link
```

```
        href="https://fonts.googleapis.com/css2?family=Roboto:ital,wght@0,100..900;1,100..900&display=swap" rel="stylesheet">
    <link rel="stylesheet" href="{{ url_for('static', filename='style.css') }}>
```

```
<title>Document</title>
```

```
</head>
```

```
<body>
```

```
<nav class="navbar navbar-expand-lg navbar-dark bg-danger">
  <a class="navbar-brand" href="#">Expense Manager </a>
  <button class="navbar-toggler" type="button" data-toggle="collapse"
  data-target="#navbarNav" aria-controls="navbarNav"
  aria-expanded="false" aria-label="Toggle navigation">
    <span class="navbar-toggler-icon"></span>
  </button>
  <div class="collapse navbar-collapse" id="navbarNav">
    <ul class="navbar-nav">
      <li class="nav-item active">
        <a class="nav-link" href="/">Add Expenses <span
        class="sr-only">(current)</span></a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="/expenses">View Expenses</a>
      </li>
    </ul>
  </div>
</nav>
{% block body %}
```

```
{% endblock %}
```

```
</body>
```

```
</html>
```

5) We can add the expenses using the form provided in the site  
we can view the expenses using the view expenses link  
and we can delete the expenses using the delete link

6) The add.html file is used to create the add expenses form

### Chapter 18:Generate\_PDF\_with\_Python

*this is the project description. we aim to create a pdf using the fpdf library. The project is used to create a pdf using the information provided by the user.*

*we can create pdf with csv files, text files and create links as well*

1)

```
from fpdf import FPDF
```

```
class PDF(FPDF):
```

```
    def header(self):  
        self.image(r'D:\inlightn\Generate_PDF_with_Python\logo.png', 10,  
8, 33)  
        self.set_font("helvetica", 'B', 16)  
        self.cell(80)  
        self.cell(40, 10, "Hello world", border=1, align="C")  
        self.ln(40) # line break
```

```
def footer(self):  
    self.set_y(-15)  
    self.set_font("helvetica", 'I', 16)  
    self.cell(0, 10, f"Page {self.page_no()} / {470}  
  
pdf = PDF()  
pdf.add_page()  
pdf.set_font("helvetica", 'B', 16)  
for i in range(1, 41):  
    pdf.cell(60, 10, f"Printing Line number.{i}",  
             new_x="LMARGIN", new_y="NEXT", align='C')  
    # pdf.cell(0,10,f"Printing line number {i}",new_x="LMARGIN",  
    new_y="TOP", align="L")  
  
pdf.output("Sample.pdf")  
  
2)  
from fpdf import FPDF
```

```
class PDF(FPDF):  
  
    def header(self):  
  
        self.set_font("helvetica", "B", size=12)  
        width = self.get_string_width(self.title) + 6  
        self.set_x((210-width)/2)  
        self.set_draw_color(0, 80, 180)  
        self.set_fill_color(200, 220, 255)  
        self.set_text_color(220, 50, 50)  
        self.set_line_width(1)  
        self.cell(width, 9, self.title, new_x="LMARGIN",  
                 new_y="NEXT", align="C", fill=True)  
        self.ln(10) # line break  
  
    def footer(self):  
  
        self.set_y(-15)  
        self.set_font("helvetica", "i", size=12)  
        self.set_text_color(128)  
        self.cell(0, 10, f"Page {self.page_no()}", align="C")  
  
    def chapter_title(self, num, label):  
        self.set_font("helvetica", "I", size=12)
```

```
self.set_fill_color(200, 220, 255)
self.cell(0, 6, f"chapter {num} : {label}",
          new_x="LMARGIN", new_y="NEXT", align="L", fill=True)

def chapter_body(self, file_path):
    with open(file_path, "rb") as f:
        txt = f.read().decode("latin-1")
    self.set_font("Times", size=12)
    self.ln(10)
    self.multi_cell(0, 5, txt)
    self.ln() # line break
    self.set_font(style="I")
    self.cell(0, 5, "(End of excerpt)")

def print_chapter(self, num, title, file_path):
    self.add_page() # add a new page
    self.chapter_title(num, title)
    self.chapter_body(file_path)

pdf = PDF()
pdf.set_title("100 ways to learning programming")
```

```
pdf.set_author("Inlightn Technologies")
```

```
pdf.print_chapter(1, "GETTING STARTED WITH PROGRAMMING",
```

```
    "D:\\inlightn\\PDF\\para.txt")
```

```
pdf.print_chapter(2, "WHICH PROGRAMMING LANGUAGE",
```

```
    "D:\\inlightn\\PDF\\para.txt")
```

```
pdf.output("Sample2.pdf")
```

3)

```
from fpdf import FPDF
```

```
from fpdf.fonts import FontFace
```

```
import csv
```

```
with open('D:\\inlightn\\Generate_PDF_with_Python\\credit.csv',  
encoding='utf-8') as csvfile:
```

```
    data = list(csv.reader(csvfile, delimiter=','))
```

```
    data = [dat[2:8] for dat in data]
```

```
pdf = FPDF()
```

```
pdf.set_font("helvetica", size=14)
```

```
pdf.add_page()
```

```
pdf.set_draw_color(255, 0, 0)
pdf.set_line_width(0.3)
heading_style = FontFace(emphasis="BOLD", color=255, fill_color=(255,
100, 0))
with pdf.table(
    borders_layout="NO_HORIZONTAL_LINES",
    cell_fill_color=(224, 235, 255),
    line_height=6,
    width=160,
    headings_style=heading_style
) as table:
    for data_row in data:
        row = table.row()
        for datum in data_row:
            row.cell(datum)
pdf.output('table.pdf')

4)
from fpdf import FPDF
```

```
pdf = FPDF()
```

```
pdf.add_page()  
pdf.set_font("helvetica", size=20)  
pdf.write(5, "To find out what new in the tutorial ")  
pdf.set_font(style="U")  
link = pdf.add_link(page=2)  
pdf.write(5, "here", link=link)
```

```
# second page  
pdf.add_page()  
pdf.image("D:\\inligntech\\PDF\\Logo.png", 10, 10,  
50, 0, "", "https://www.google.com")  
pdf.set_left_margin(60)  
pdf.set_font_size(18)
```

```
pdf.write_html("""You can add any html text here<b>This is some bold  
text</b>  
<h1>This is a heading</h1>  
<a href="https://www.google.com">Click here to go to Google  
</a>""")
```

```
""")  
pdf.output("Link.pdf")
```

*The libraries used in this project are:*

- 1)fpdf
- 2)fpdf.fonts
- 3)csv
- 4)os
- 5)pyqrccode

*The fpdf library is used to create the pdf for the project.*

*The fpdf.fonts library is used to create the fonts for the project.*

*The csv library is used to create the csv file for the project.*

*The os library is used to create the file.*

*The pyqrccode library is used to create the QR code for the project.*

### Chapter 19:InvoiceGenerator\_PDF

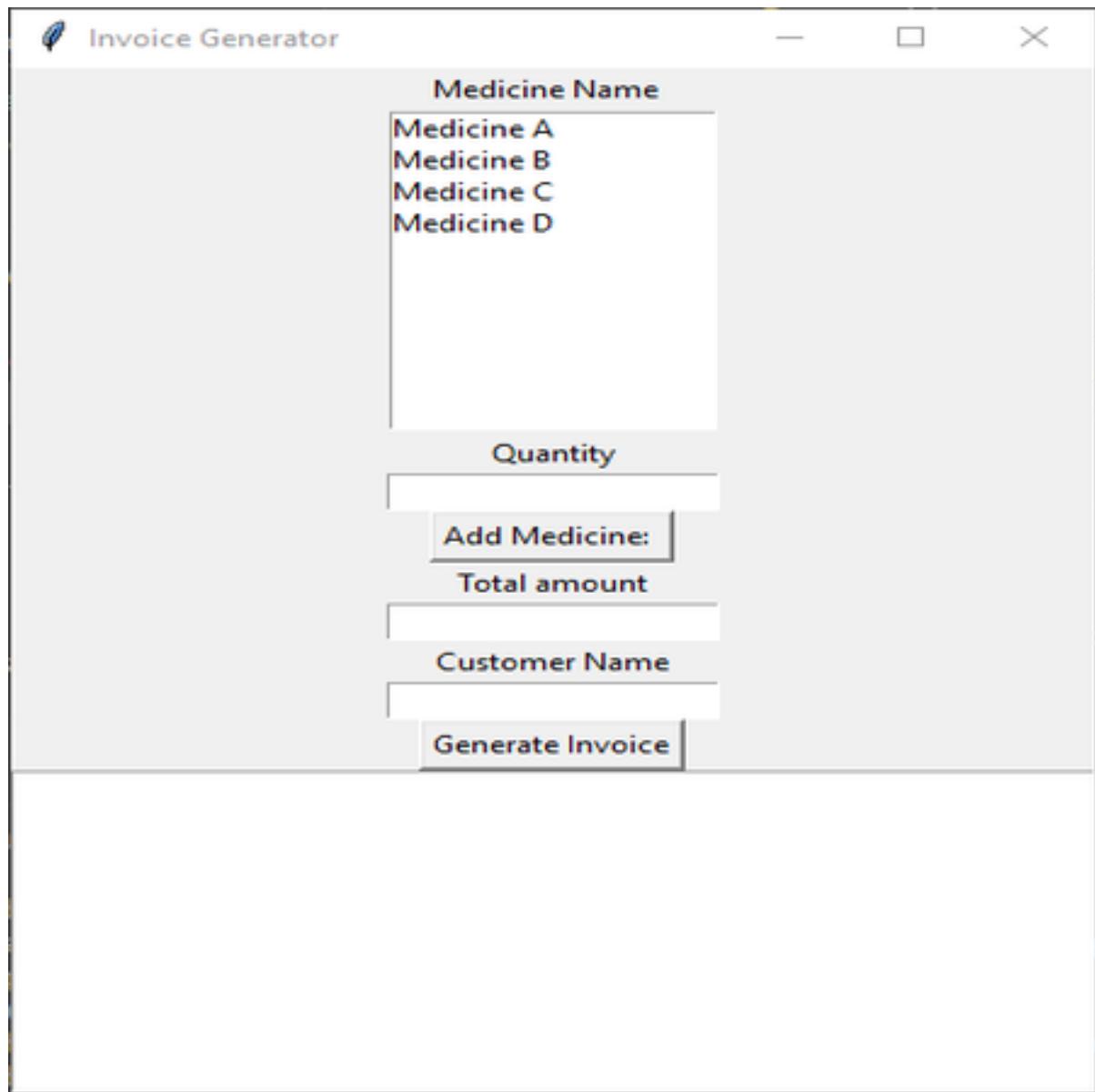


Image :D:\inlighttech\InvoiceGenerator\_PDF\invoicegen.PNG

*This is the project description.*

*We want to create a invoice generator using python for billing purpose. The project is used to create a invoice using the information provided by the user.*

*We build a python application we can add delete and update the invoice information.*

```
from tkinter import *
from fpdf import FPDF
invoice_item = []

def add_medicine():
    selected_medicine = medicine_listbox.get(ANCHOR)
    quantity = int(quantity_entry.get())
    price = medicines[selected_medicine]
    total_amount = price * quantity
    invoice_item.append((selected_medicine, quantity, price, total_amount))
    update_invoice_text()
```

```
def calculate_total():
    total = 0.0
    for item in invoice_item:
        total += item[3]
    return total

def update_invoice_text():
    invoice_text.delete(1.0, END) # line 1, column 0
    for item in invoice_item:
        invoice_text.insert(
            END, f"Medicine{item[0]},Quanity{item[1]},Price{item[2]},Total
{item[3]}
        ")
    total_amount_entry.delete(0, END)
    total_amount_entry.insert(END, str(calculate_total()))

def generate_invoice():
    customer_name = customer_entry.get()
    pdf = FPDF()
    pdf.add_page()
```

```
pdf.set_font("helvetica", size=12)

pdf.cell(0, 10, text="Invoice", new_x='LMARGIN', new_y="NEXT",
align='C')

pdf.cell(0, 10, text=f"Customer {customer_name}",
new_x='LMARGIN', new_y="NEXT", align='L')

pdf.cell(0, 10, text="", new_x='LMARGIN', new_y="NEXT")

for item in invoice_item:
    medicine_name, quantity, price, total = item

    pdf.cell(0, 10, text=f"Medicine : {medicine_name} , Quantity :
{quantity}, Amount : {total}",
new_x='LMARGIN', new_y="NEXT", align='L')

pdf.cell(0, 10, text="Total Amount :"+str(calculate_total()),
new_x='LMARGIN', new_y="NEXT", align='L')

pdf.cell(0, 10, text="", new_x='LMARGIN', new_y="NEXT")

pdf.output("invoice.pdf")

window = Tk()
```

```
window.title("Invoice Generator")
```

```
medicines = {  
    "Medicine A": 10.0,  
    "Medicine B": 20.0,  
    "Medicine C": 30.0,  
    "Medicine D": 40.0,  
}
```

```
medicine_label = Label(window, text="Medicine Name ")  
medicine_label.pack()  
medicine_listbox = Listbox(window, selectmode=SINGLE)  
for medicine in medicines:  
    medicine_listbox.insert(END, medicine)  
medicine_listbox.pack()
```

```
quantity_label = Label(window, text="Quantity")  
quantity_entry = Entry(window)  
quantity_label.pack()  
quantity_entry.pack()
```

```
add_button = Button(window, text="Add Medicine:",  
command=add_medicine)  
add_button.pack()
```

```
total_amount_label = Label(window, text="Total amount")  
total_amount_label.pack()
```

```
total_amount_entry = Entry(window)  
total_amount_entry.pack()
```

```
customer_label = Label(window, text="Customer Name")  
customer_label.pack()  
customer_entry = Entry(window)  
customer_entry.pack()
```

```
generate_button = Button(  
    window, text="Generate Invoice", command=generate_invoice)  
generate_button.pack()
```

```
invoice_text = Text(window, height=10, width=50)
```

*invoice\_text.pack()*

*window.mainloop()*

*The libraries used in this project are:*

- 1) *tkinter*
- 2) *fpdf*
- 3) *os*

*The tkinter library is used to create the GUI for the project.*

*The fpdf library is used to create the pdf for the project.*

*The os library is used to create the file.*

## Chapter 20:opencv

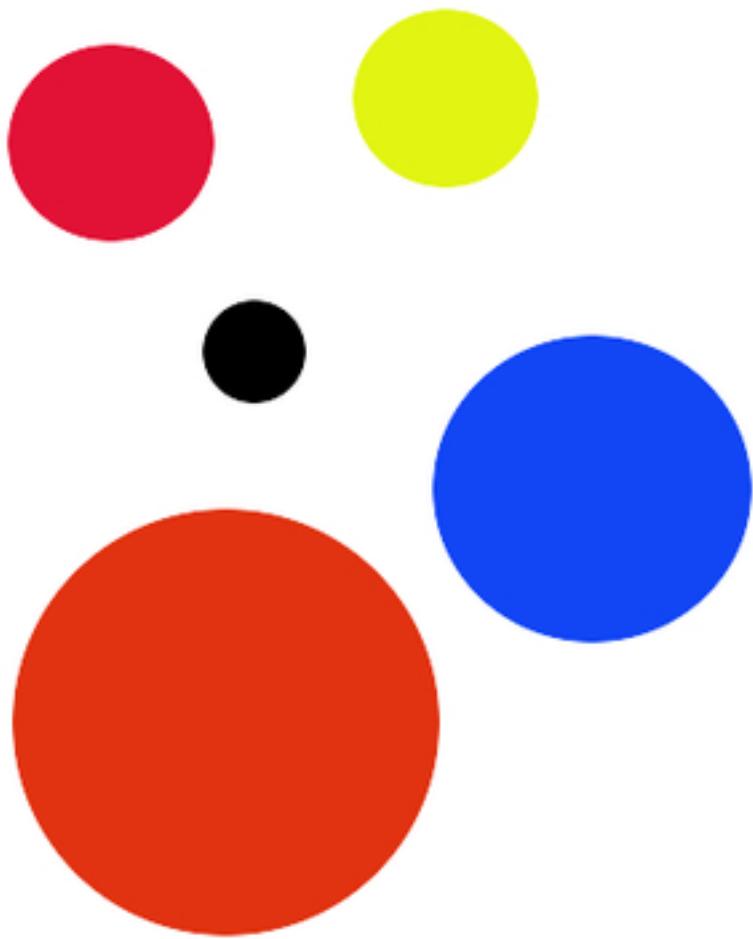


Image :D:\inlighttech\opencv\blue.jpg

*This is an opencv project.*

*This project helps us understand the opencv library.*

*we perform the image processing using the opencv library.*

*image thresholding is used to create a binary image from a grayscale image.*

*geometric transformation is used to create a new image from the original image.*

*image blurring is performed.*

*gaussian blurring is performed using the gaussian filter.*

*The libraries used in this project are:*

*1)cv2*

*opencv library is used to create the image processing for the project.*

## Chapter 21: Password Validator

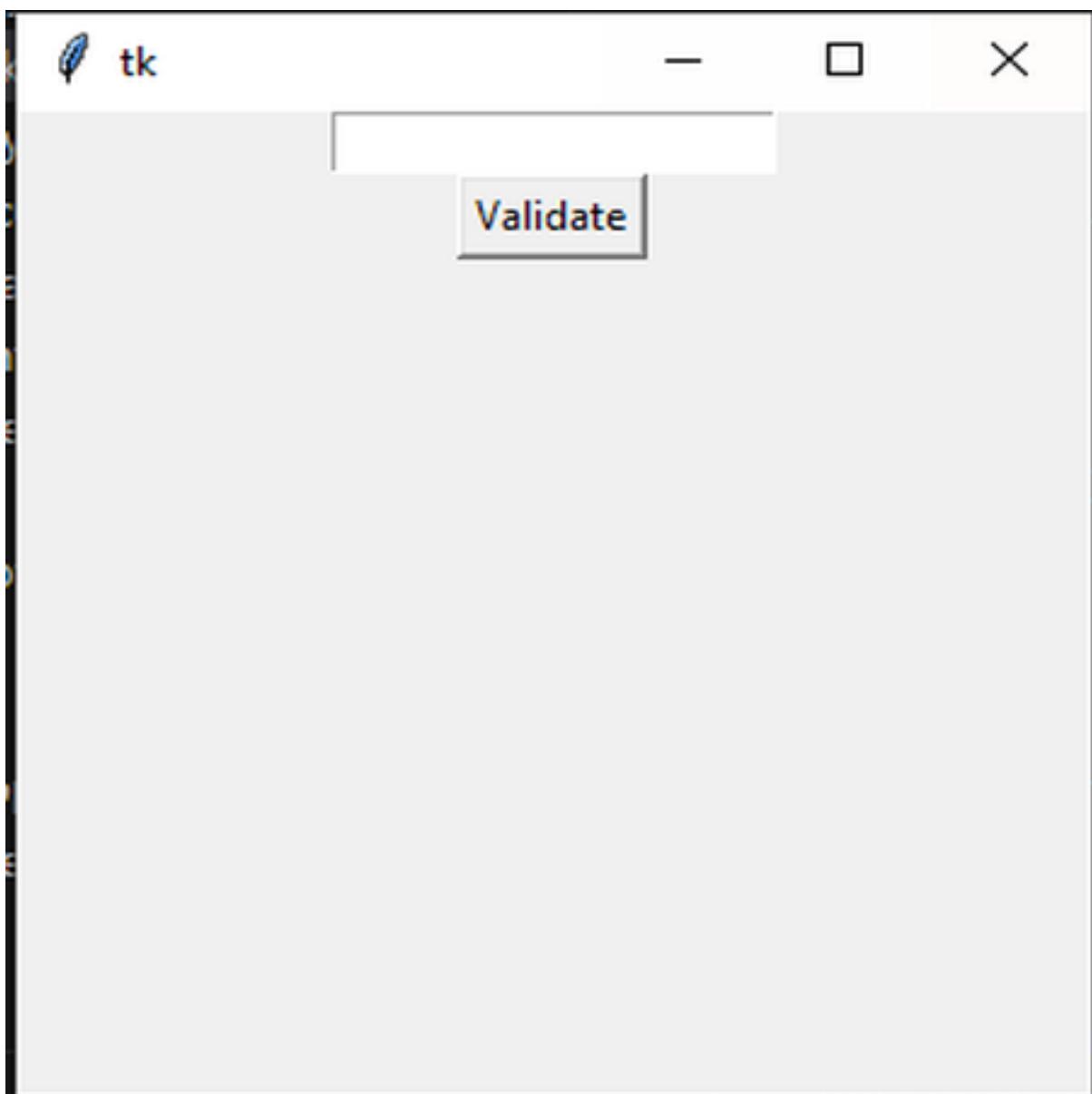


Image :D:\inligntech\Password\_Validator\password\_val.png

*This is a password validator project.*

*The project is used to create a password validator using the information provided by the user.*

*We build a python application*

```
from tkinter import *
import bcrypt

def validate(password):
    hash = b'$2b$12$XvLQGsorO07xxiOk54dpbeApVZ9Om/uJTu/qXwgcNhu8uamES
alli'
    password = bytes(password,encoding='utf-8')

    if bcrypt.checkpw(password,hash):
        print("Login successful")
    else:
        print("invalid password")

root = Tk()
```

```
root.geometry("300x300")
```

```
password_entry = Entry(root)
```

```
password_entry.pack()
```

```
button = Button(root, text="Validate", command=lambda:  
    validate(password_entry.get()))  
button.pack()  
root.mainloop()
```

```
2)import bcrypt
```

```
password = b>thisismy password"  
hashed = bcrypt.hashpw(password, bcrypt.gensalt())  
print(hashed)
```

```
entered_password = input("enter password to login")  
entered_password = bytes(entered_password, encoding='utf-8')
```

```
if bcrypt.checkpw(entered_password,hashed):  
    print("Login successful")  
else:  
    print("invalid password")
```

*The libraries used in this project are:*

- 1)tkinter
- 2)bcrypt

*tkinter library is used to create the GUI for the project.*

*bcrypt library is used to create the password hashing for the project.*

### Chapter 22:Pyqt6

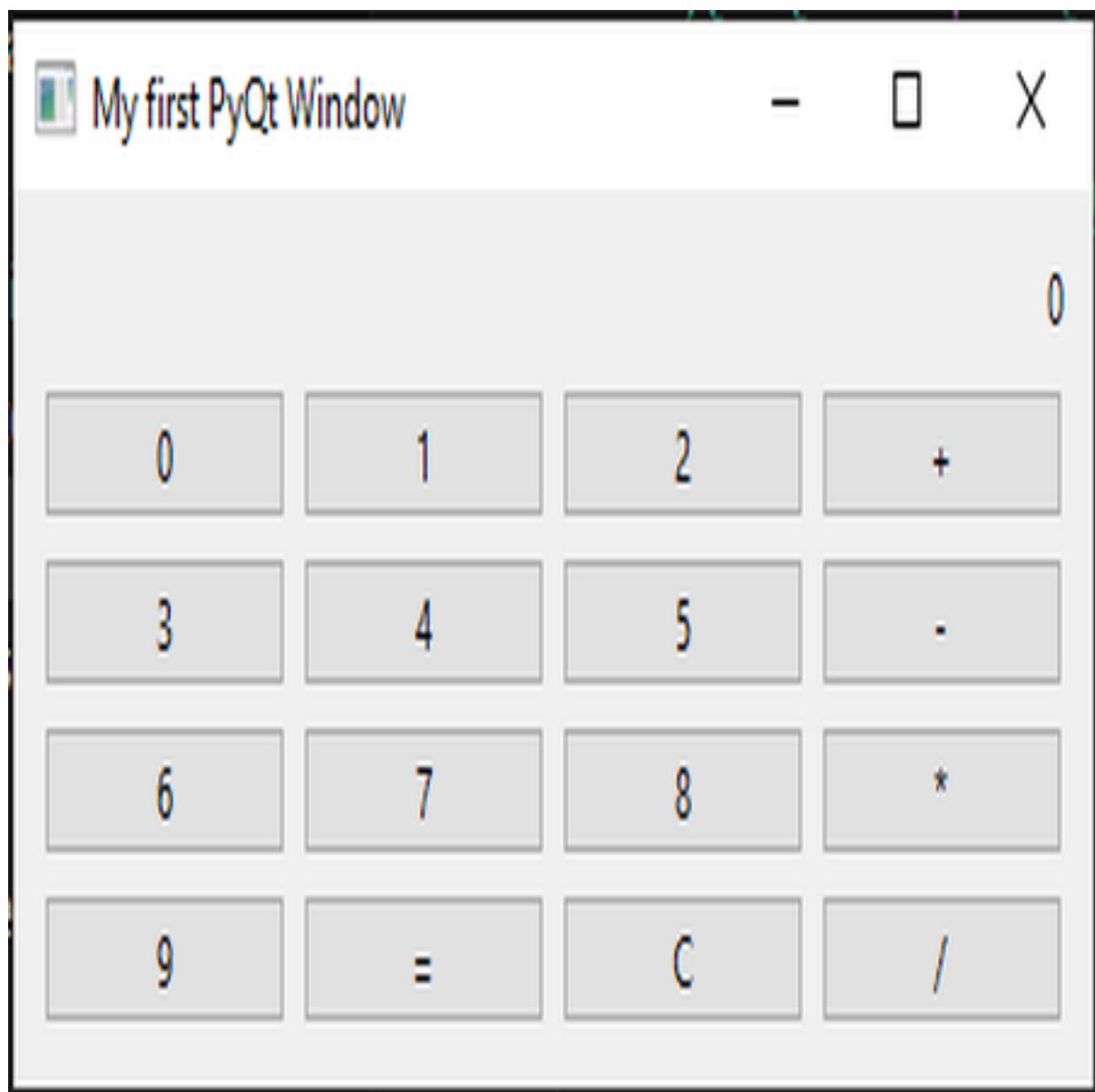


Image :D:\inlighttech\Pyqt\_Calculator\pyqt\_calc.png

*This is a calculator project using pyqt6 library.*

```
from PyQt6.QtWidgets import QGridLayout, QHBoxLayout, QVBoxLayout, QWidget, QPushbutton, QLineEdit, QCheckBox
from PyQt6.QtGui import QPixmap
import sys
from PyQt6.QtCore import Qt

class Window(QWidget):

    def __init__(self):
        super().__init__()
        self.initUI()

    def initUI(self):
        self.current_input = "0"
        self.previous_input = ""
        self.current_operator = ""
        self.setWindowTitle("My first PyQt Window")
        self.setGeometry(0, 0, 400, 160)
```

```
# adding label
layout = QGridLayout()
self.setLayout(layout)

self.display = QLabel("0")
self.display.setAlignment(Qt.AlignmentFlag.AlignRight)

layout.addWidget(self.display, 0, 0, 1, 4)

buttons = [QPushButton(str(i)) for i in range(10)]
for i, button in enumerate(buttons):

    row, col = divmod(i, 3)
    layout.addWidget(button, row+1, col)

# Adding event handlers to buttons
for button in buttons:
    button.clicked.connect(self.number_button_click)

operators = ['+', '-', '*', '/']
operator_buttons = [QPushButton(op) for op in operators]
```

```
for i,operator_button in enumerate(operator_buttons):
    layout.addWidget(operator_button, i+1, 3)
for button in operator_buttons:
    button.clicked.connect(self.operator_button_click)

self.equals_button = QPushButton("=")
self.equals_button.clicked.connect(self.calculate)

self.clear_button = QPushButton("C")
self.clear_button.clicked.connect(self.clear)

layout.addWidget(self.equals_button, 4, 1)
layout.addWidget(self.clear_button, 4, 2)

def number_button_click(self):
    digit = self.sender().text()
    if self.current_input=="0":
        self.current_input = digit
    else:
        # not adding but appending as a string
```

```
self.current_input = self.current_input + digit
self.display.setText(self.current_input)

def operator_button_click(self):
    operator = self.sender().text()
    if self.current_operator == "":
        self.current_operator = operator
        self.previous_input = self.current_input
        self.current_input = "0"
    else:
        #calculate the result
        self.calculate()
        self.current_operator = operator
        self.previous_input = self.current_input
        self.current_input = "0"
def calculate(self):
    if self.current_operator == "+":
        result = str(float(self.previous_input) + float(self.current_input))
    elif self.current_operator == "-":
        result = str(float(self.previous_input) - float(self.current_input))
    elif self.current_operator == "*":
        result = str(float(self.previous_input) * float(self.current_input))
```

```
elif self.current_operator == "/":
    if self.current_input == "0":
        result="Error4"
    else:
        result = str(float(self.previous_input) / float(self.current_input))

    else:
        result = str(self.current_input)
        self.display.setText(str(result))
        self.current_input = result
        self.current_operator = ""

def clear(self):
    self.current_operator = ""
    self.previous_input = ""
    self.current_input = "0"
    self.display.setText(self.current_input)

app = QApplication(sys.argv)
window = Window()

window.show()
```

```
sys.exit(app.exec())
```

*The libraries used in this project are:*

- 1)PyQt6
- 2)sys
- 3)os
- 4)PyQt6.QtWidgets
- 5)PyQt6.QtGui
- 6)PyQt6.QtCore

*The PyQt6 library is used to create the GUI for the project.*

### Chapter 23:Pyqt6\_NotePad

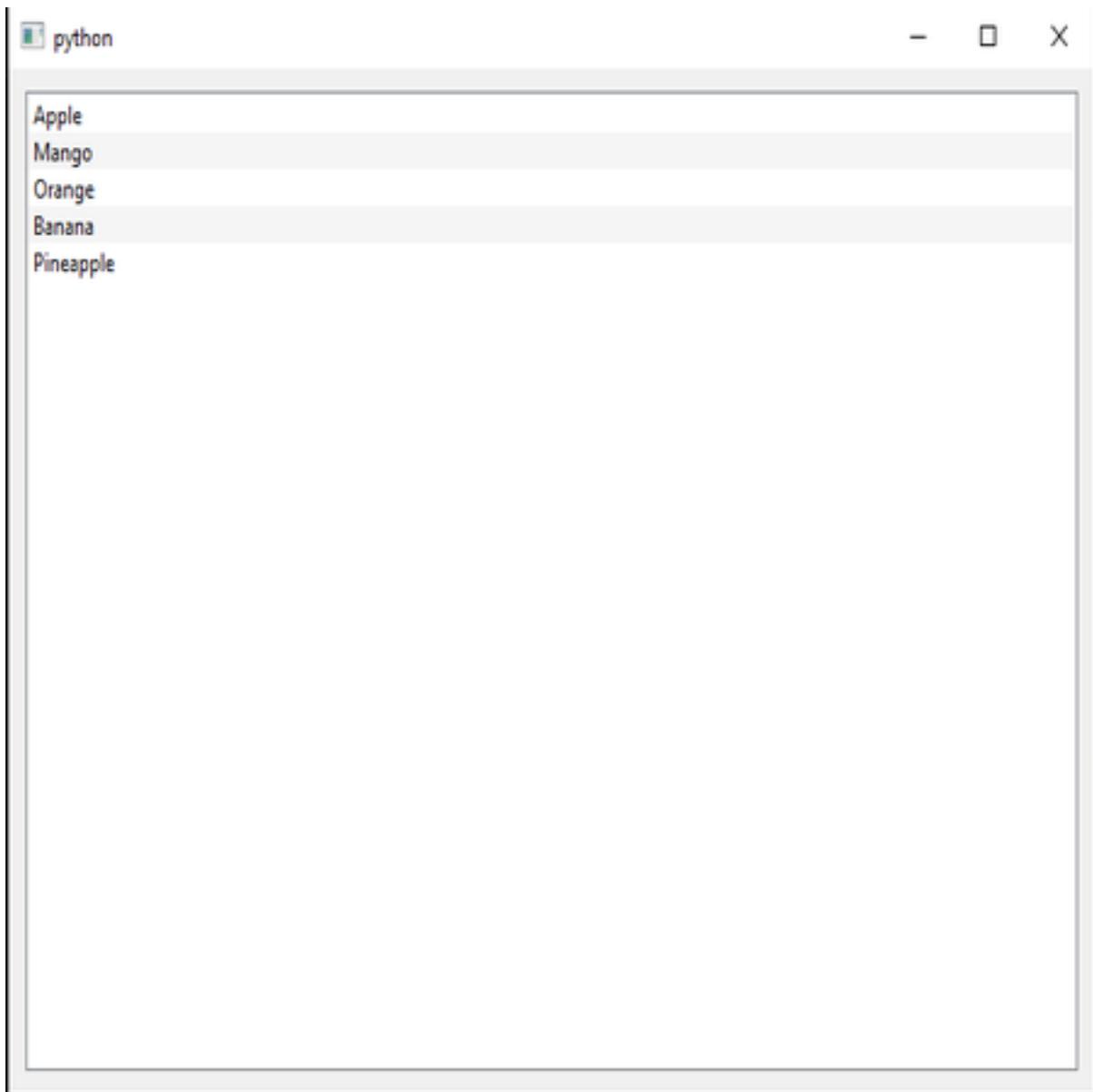


Image :D:\inlighttech\Pyqt\_Database\pyqt\_database.png

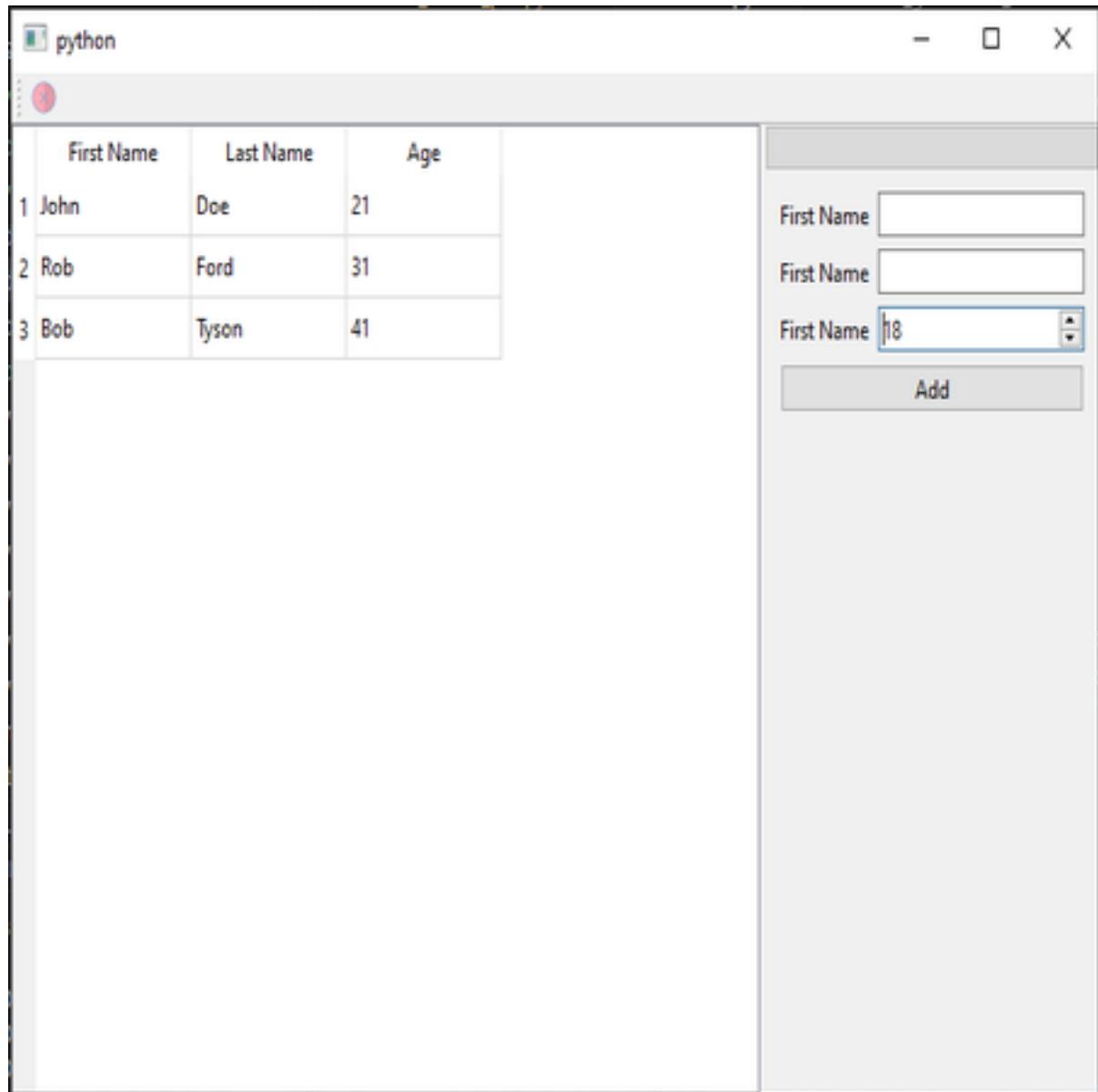


Image :D:\inligntech\Pyqt\_Database\pyqt\_database2.png

*This is a database project using PyQt6 library.*

1)

```
from PyQt6.QtWidgets import QWidget, QApplication, QLabel, QListWidget, QHBoxLayout, QListWidgetItem
from PyQt6.QtGui import QPixmap
import sys

class MainWindow(QWidget):

    def __init__(self):
        super().__init__()
        self.initUI()

    def initUI(self):
        self.setGeometry(0,0,700,500)
        fruits =['Apple','Mango','Orange','Banana','Pineapple']
        self.listwidget = QListWidget()
        self.listwidget.setAlternatingRowColors(True)

        for fruit in fruits:
            listitem = QListWidgetItem()
            listitem.setText(fruit)
            self.listwidget.addItem(listitem)

    def onListWidgetClicked(self, item):
        print(item.text())

    def onListWidgetDoubleClicked(self, item):
        print(item.text())
        print("Double Clicked")

    def onListWidgetItemChanged(self, item):
        print(item.text())
        print("Item changed")

    def onListWidgetItemEntered(self, item):
        print(item.text())
        print("Item entered")

    def onListWidgetItemPressed(self, item):
        print(item.text())
        print("Item pressed")

    def onListWidgetItemSelected(self, item):
        print(item.text())
        print("Item selected")

    def onListWidgetItemToggled(self, item):
        print(item.text())
        print("Item toggled")

    def onListWidgetItemChanged(self, item):
        print(item.text())
        print("Item changed")

    def onListWidgetItemEntered(self, item):
        print(item.text())
        print("Item entered")

    def onListWidgetItemPressed(self, item):
        print(item.text())
        print("Item pressed")

    def onListWidgetItemSelected(self, item):
        print(item.text())
        print("Item selected")

    def onListWidgetItemToggled(self, item):
        print(item.text())
        print("Item toggled")
```

```
listitem.setText(fruit)  
self.listwidget.addItem(listitem)
```

```
self.layout = QHBoxLayout()  
self.layout.addWidget(self.listwidget)  
self.setLayout(self.layout)
```

```
app = QApplication(sys.argv)  
window = MainWindow()  
window.show()  
app.exec()
```

2)

```
from PyQt6.QtWidgets import  
QMenu, QMessageBox, QToolBar, QPushButton, QSpinBox, QLineEdit, QFor  
mLayout, QMainWindow, QDockWidget, QWidget,  
QApplication, QLabel, QTableWidget, QTableWidgetItem,  
QListWidget, QHBoxLayout, QListWidgetItem  
from PyQt6.QtGui import QPixmap, QAction, QIcon  
from PyQt6.QtCore import Qt, QSize
```

```
import sys

class MainWindow(QMainWindow):

    def __init__(self):
        super().__init__()
        self.initUI()

    def initUI(self):
        self.setGeometry(0,0,700,500)
        people = [
            {"First Name": "John", "Last Name": "Doe", "Age": 21},
            {"First Name": "Rob", "Last Name": "Ford", "Age": 31},
            {"First Name": "Bob", "Last Name": "Tyson", "Age": 41},
        ]
        self.table_widget = QTableWidget()
        self.table_widget.setRowCount(len(people))
        self.table_widget.setColumnCount(3)

        self.table_widget.setHorizontalHeaderLabels(people[0].keys())
```

*row = 0*

*for person in people:*

*self.table\_widget.setItem(row, 0, QTableWidgetItem(person['First Name']))*

*self.table\_widget.setItem(row, 1, QTableWidgetItem(person['Last Name']))*

*self.table\_widget.setItem(row, 2, QTableWidgetItem(str(person['Age']))))*

*row +=1*

*dock = QDockWidget()*

*dock.setFeatures(QDockWidget.DockWidgetFeature.NoDockWidgetFeatures)*

*self.addDockWidget(Qt.DockWidgetArea.RightDockWidgetArea, dock)*

*form = QWidget()*

*layout = QFormLayout(form)*

*form.setLayout(layout)*

```
self.first_name = QLineEdit()  
self.last_name = QLineEdit()  
self.age = QSpinBox(form, minimum=18, maximum=60)
```

```
layout.addRow("First Name", self.first_name)  
layout.addRow("First Name", self.last_name)  
layout.addRow("First Name", self.age)
```

```
add_button = QPushButton("Add")  
add_button.clicked.connect(self.add_people)  
layout.addRow(add_button)
```

```
dock.setWidget(form)
```

```
toolbar = QToolBar()  
toolbar.setIconSize(QSize(16, 16))  
self.addToolBar(toolbar)
```

```
self.delete_action =  
QAction(QIcon("D:\inligntech\icons\delete.png"), "Delete ", self)
```

```
self.delete_action.triggered.connect(self.delete)
toolbar.addAction(self.delete_action)
```

```
self.add_row_above = QAction("Add row above ",self)
self.add_row_above.triggered.connect(self.addRowAbove)
```

```
self.add_row_below = QAction("Add row below ",self)
self.add_row_below.triggered.connect(self.addRowBelow)
```

```
self.copy_action = QAction("Copy ",self)
self.copy_action.triggered.connect(self.copy)
```

```
self.paste_action = QAction("Paste ",self)
self.paste_action.triggered.connect(self.paste)
```

```
self.setCentralWidget(self.table_widget)
```

```
def delete(self):
```

```
current_row = self.table_widget.currentRow()
if current_row < 0 :
    QMessageBox.warning(self, "No row Selected")

button = QMessageBox.question(self, "Delete Row", "Are you Sure,
you want to Delete Row?", QMessageBox.StandardButton.Yes | 
QMessageBox.StandardButton.No)

if button == QMessageBox.StandardButton.Yes:
    self.table_widget.removeRow(current_row)

def add_people(self):
    row = self.table_widget.rowCount()
    self.table_widget.insertRow(row)

    self.table_widget.setItem(row, 0, QTableWidgetItem(self.first_name.text().str
ip()))
    self.table_widget.setItem(row, 1, QTableWidgetItem(self.last_name.text().str
ip()))
```

```
self.table_widget.setItem(row,2,QTableWidgetItem(self.age.text().strip()))
```

```
def contextMenuEvent(self, event):
```

```
    context_menu = QMenu()
```

```
    context_menu.addAction(self.delete_action)
```

```
    context_menu.addAction(self.add_row_below)
```

```
    context_menu.addAction(self.add_row_above)
```

```
    context_menu.addAction(self.copy_action)
```

```
    context_menu.addAction(self.paste_action)
```

```
    context_menu.exec(event.globalPos())
```

```
def addRowAbove(self):
```

```
    current_row = self.table_widget.currentRow()
```

```
    self.table_widget.insertRow(current_row)
```

```
def addRowBelow(self):
```

```
current_row = self.table_widget.currentRow()
self.table_widget.insertRow(current_row+1)

def copy(self):
    text    = self.table_widget.currentItem().text()
    self.item_text = text

def paste(self):
    if self.item_text != None:
        row = self.table_widget.currentRow()
        column = self.table_widget.currentColumn()

        self.table_widget.setItem(row, column, QTableWidgetItem(self.item_text))

app = QApplication(sys.argv)
window = MainWindow()
window.show()
app.exec()
```

*The libraries used in this project are:*

- 1) *PyQt6*
- 2) *PyQt6.QtWidgets*
- 3) *PyQt6.QtGui*
- 4) *PyQt6.QtCore*

*The PyQt6 library is used to create the GUI for the project.*

*The PyQt6.QtWidgets library is used to create the widgets for the project.*

*The PyQt6.QtGui library is used to create the GUI for the project.*

*The PyQt6.QtCore library is used to create the core for the project.*

## Chapter 24:Pyqtform

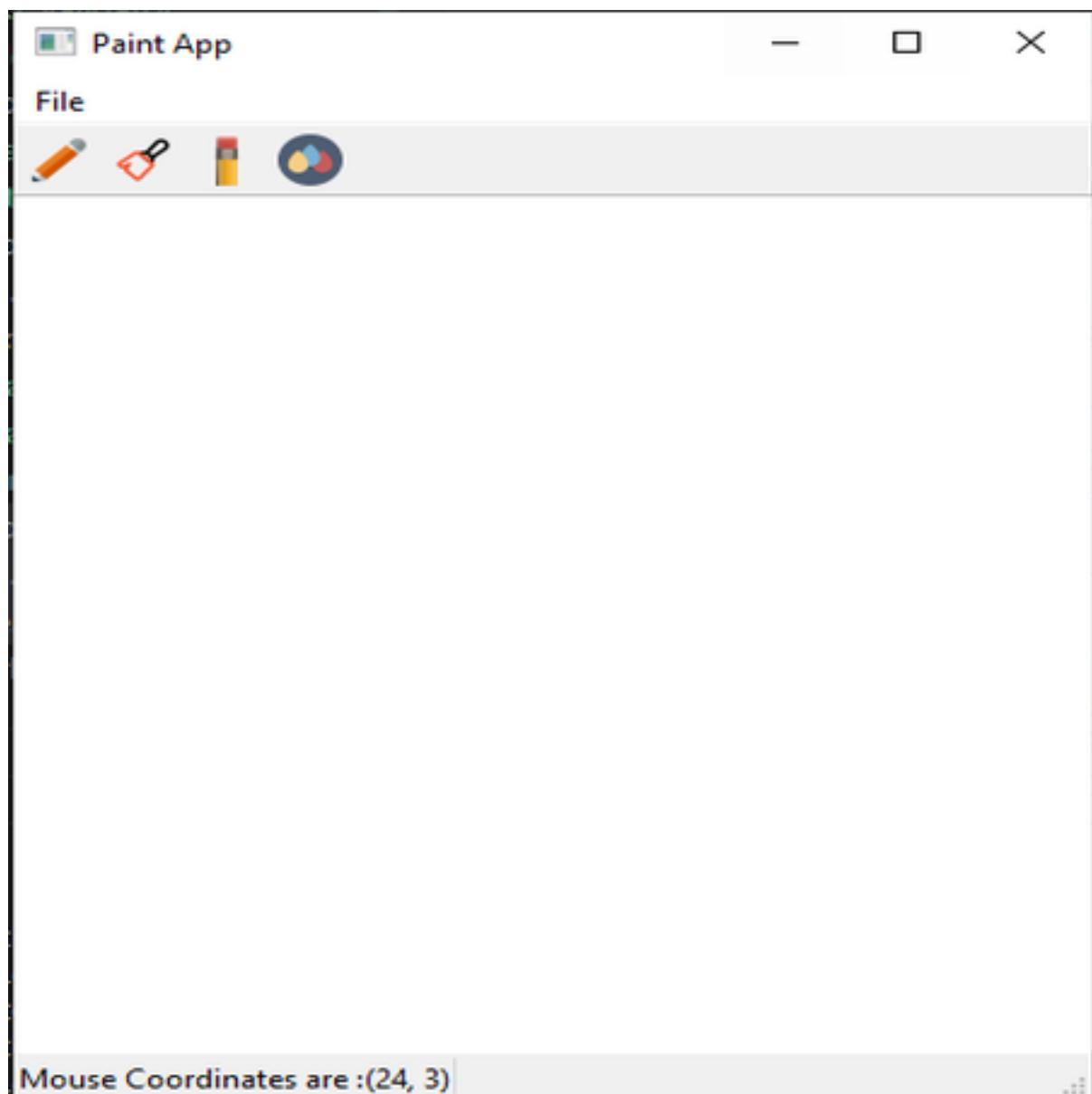


Image :D:\inlighttech\Pyqt\_Paint\paint.png



Image :D:\inlighttech\Pyqt\_Paint\paint2.png

*This is a paint project using PyQt6 library.*

1)

```
from PyQt6.QtWidgets import QMainWindow, QApplication, QLabel
,QStatusBar,QToolBar ,QColorDialog,QFileDialog
from PyQt6.QtGui import QPixmap, QMouseEvent , QPainter ,QPen
,QColor , QAction ,QIcon
from PyQt6.QtCore import Qt ,QPoint, QRect, QSize
#pyuic6 demo.ui -o form.py
import sys
import os

class Canvas(QLabel):
    def __init__(self,parent):
        super().__init__(parent)
        self.parent= parent
        self.initUI()

    def initUI(self):
        self.pixmap = QPixmap(400,400)
        self.pixmap.fill(Qt.GlobalColor.white)
        self.setPixmap(self.pixmap)
```

```
self.setMouseTracking(True)
self.drawing = False
self.last_mouse_position = QPoint()
self.status_label = QLabel()
self.eraser = False
self.pen_color = Qt.GlobalColor.black
self.pen_width = 1

def mouseMoveEvent(self, event):
    mouse_position = event.pos()
    status_text= f"Mouse    Coordinates    are
:{mouse_position.x()}, {mouse_position.y()}"
    self.status_label.setText(status_text)

    self.parent.statusBar.addWidget(self.status_label)
    if(event.buttons() & Qt.MouseButton.LeftButton) and self.drawing:
        self.draw(mouse_position)

def mousePressEvent(self, event):
    if event.button() == Qt.MouseButton.LeftButton:
```

```
print(event.button())
self.drawing = True
self.last_mouse_position = event.pos()
print("Left Click Position: "+ str(event.pos()))

def mouseReleaseEvent(self, event):
    if event.button() == Qt.MouseButton.LeftButton:

        self.drawing = False
        print("Mouse released at Position: "+ str(event.pos()))

def draw(self,points):
    painter = QPainter(self.pixmap)
    pen = QPen(self.pen_color, self.pen_width)

    if self.eraser==False:

        painter.setPen(pen)
        painter.drawLine(self.last_mouse_position,points)
        self.last_mouse_position = points

    elif self.eraser==True:
        eraser = QRect(points.x(),points.y(),12,12)
```

```
painter.eraseRect(eraser)

self.update()

def paintEvent(self,event):
    painter = QPainter(self)

    target_rect = event.rect()
    painter.drawPixmap(target_rect,self.pixmap,target_rect)
    painter.end()

def selectTool(self,tool):
    if tool == "pencil":
        self.pen_width =2
        self.eraser= False
    elif tool == "marker":
        self.pen_width=4
        self.eraser= False
    elif tool == "color":
        self.eraser= False
        color=QColorDialog.getColor()
        self.pen_color = color
```



```
self.setGeometry(0,0,400,400)
self.setWindowTitle("Paint App")

# creating Canvas
canvas =Canvas(self)
self.setCentralWidget(canvas)
self.statusBar = QStatusBar()
self.setStatusBar(self.statusBar)

#Adding Toolbar
tool_bar = QToolBar("Toolbar")
tool_bar.setIconSize(QSize(24,24))
self.addToolBar(QtToolBarArea.TopToolBarArea,tool_bar)
tool_bar.setMovable(False)

pencil_act = QAction(QIcon("icons/pencil.png"),"Pencil",tool_bar)
pencil_act.triggered.connect(lambda: canvas.selectTool("pencil"))

marker_act = QAction(QIcon("icons/marker.png"),"Marker",tool_bar)
marker_act.triggered.connect(lambda: canvas.selectTool("marker"))
```

```
eraser_act = QAction(QIcon("icons/eraser.png"), "Eraser", tool_bar)
eraser_act.triggered.connect(lambda: canvas.selectTool("eraser"))
```

```
color_act = QAction(QIcon("icons/color.png"), "Color", tool_bar)
color_act.triggered.connect(lambda: canvas.selectTool("color"))
```

```
tool_bar.addAction(pencil_act)
tool_bar.addAction(marker_act)
tool_bar.addAction(eraser_act)
tool_bar.addAction(color_act)
```

```
self.new_action = QAction("New")
self.new_action.triggered.connect(canvas.new)
self.save_file_action = QAction("Save")
self.save_file_action.triggered.connect(canvas.save)
self.quit_action = QAction("Exit")
self.quit_action.triggered.connect(self.close)
```

```
self.menuBar().setNativeMenuBar(False)
file_menu = self.menuBar().addMenu("File")
file_menu.addAction(self.new_action)
file_menu.addAction(self.save_file_action)
```

```
file_menu.addAction(self.quit_action)
```

```
app = QApplication(sys.argv)
window = MainWindow()
```

```
window.show()
app.exec()
```

2)

```
from PyQt6.QtWidgets import QMainWindow, QApplication, QLabel
from PyQt6.QtGui import QPixmap, QMouseEvent, QPainter, QPen
from PyQt6.QtCore import Qt, QPoint, QRect
import sys
```

```
class Canvas(QLabel):
    def __init__(self):
        super().__init__()
        self.initUI()
```

```
def initUI(self):
```

```
self.pixmap = QPixmap(400, 400) # Set the size of the canvas
self.pixmap.fill(Qt.GlobalColor.white) # Fill the canvas with white color
self.setPixmap(self.pixmap) # Properly set the pixmap
self.setMouseTracking(True)
self.drawing = False
self.last_mouse_position = QPoint()

def mouseMoveEvent(self, event):
    mouse_position = event.pos()
    if (event.buttons() & Qt.MouseButton.LeftButton) and self.drawing:
        self.draw(mouse_position)
    print(mouse_position)

def mousePressEvent(self, event):
    if event.button() == Qt.MouseButton.LeftButton:
        self.drawing = True
        self.last_mouse_position = event.pos() # Initialize the last mouse
position
    print("Left Click Position: " + str(event.pos()))

def mouseReleaseEvent(self, event):
    if event.button() == Qt.MouseButton.LeftButton:
```

```
self.drawing = False
print("Mouse released at Position: " + str(event.pos()))

def draw(self, points):
    painter = QPainter(self.pixmap)
    pen = QPen(Qt.GlobalColor.black, 5) # Set pen color and width
    painter.setPen(pen)
    painter.drawLine(self.last_mouse_position, points) # Draw a line from
the last position to the current position
    self.last_mouse_position = points # Update the last mouse position
    self.update() # Trigger a repaint

def paintEvent(self, event):
    painter = QPainter(self)
    target_rect = event.rect()
    painter.drawPixmap(target_rect, self.pixmap, target_rect) # Draw the
pixmap on the canvas
    painter.end()

class MainWindow(QMainWindow):
    def __init__(self):
```

```
super().__init__()
```

```
self.initUI()
```

```
def initUI(self):
```

```
    self.setGeometry(0, 0, 400, 400)
```

```
    self.setWindowTitle("Paint App")
```

```
    canvas = Canvas()
```

```
    self.setCentralWidget(canvas)
```

```
app = QApplication(sys.argv)
```

```
window = MainWindow()
```

```
window.show()
```

```
app.exec()
```

*The libraries used in this project are:*

1) PyQt6

2) PyQt6.QtWidgets

3) PyQt6.QtGui

### 4) PyQt6.QtCore

*The PyQt6 library is used to create the GUI for the project.*

*The PyQt6.QtWidgets library is used to create the widgets for the project.*

*The PyQt6.QtGui library is used to create the GUI for the project.*

*The PyQt6.QtCore library is used to create the core for the project.*

### Chapter 25:Pyqt\_Calculator

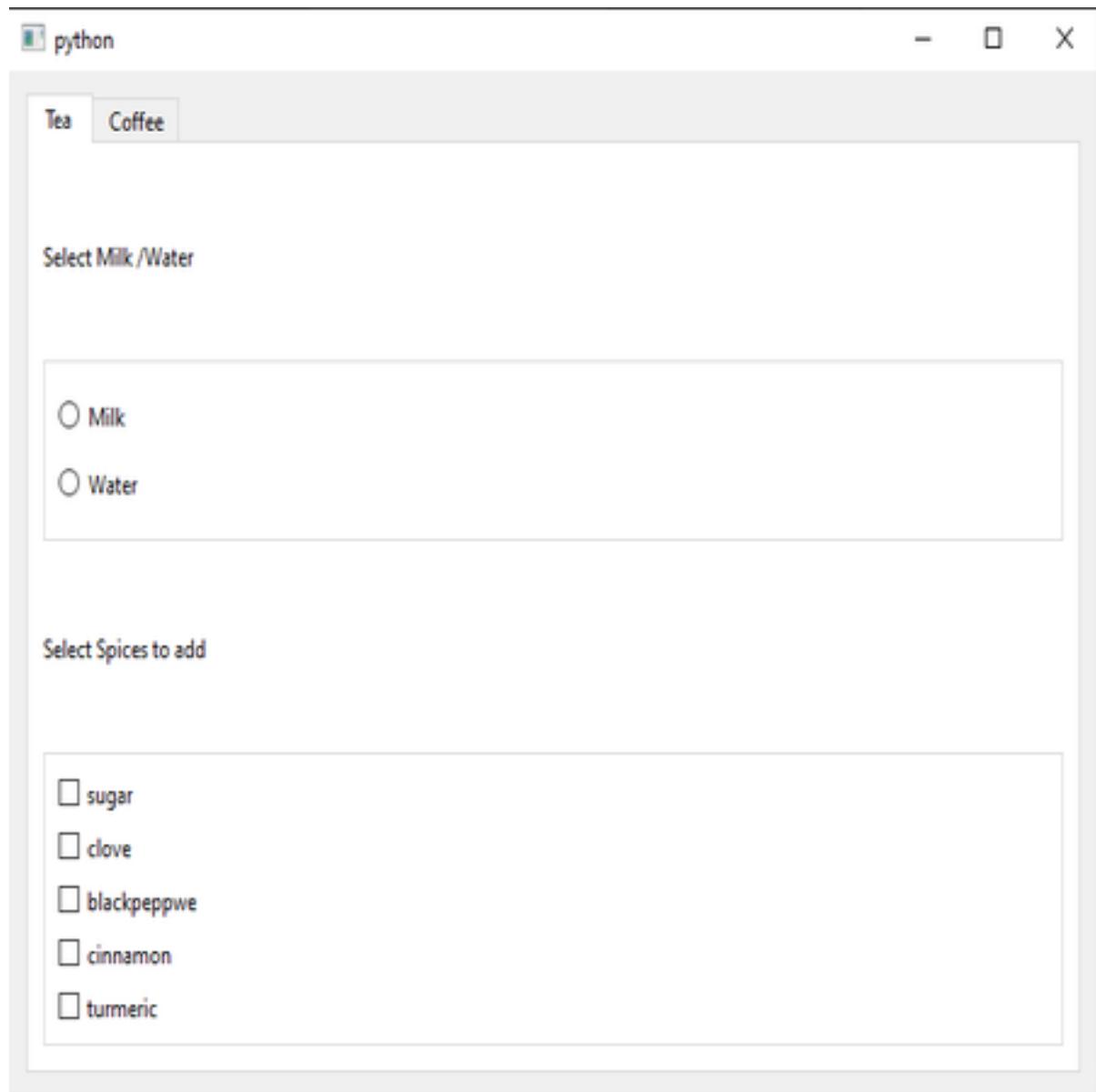


Image :D:\inlighttech\Pyqt\_Stylesheets\_QtDesigner\bm.png

*This project is to create a beverage maker using the PyQt6 application*

```
from PyQt6.QtWidgets import
QCheckBox, QRadioButton, QTabWidget, QHBoxLayout, QGroupBox,
QPushButton, QWidget, QMainWindow, QApplication, QStyleFactory,
QLabel, QVBoxLayout
import sys

class Window(QWidget):
    def __init__(self):
        super().__init__()
        self.initUI()

    def initUI(self):
        self.setGeometry(100, 100, 700, 500)
        # creating the tab widget
```

```
tab_widget = QTabWidget()
```

```
tea_tab = QWidget()
```

```
coffee_tab = QWidget()
```

```
tab_widget.addTab(tea_tab, "Tea")
```

```
tab_widget.addTab(coffee_tab, "Coffee")
```

```
# create the layout Tea
```

```
tea_layout = QVBoxLayout()
```

```
# create a label
```

```
liquid_label = QLabel("Select Milk /Water")
```

```
spice_label = QLabel("Select Spices to add ")
```

```
milk_button = QRadioButton("Milk ")
```

```
water_button = QRadioButton("Water ")
```

```
#sugar_button = QCheckBox("Sugar")
```

```
#clove_button = QCheckBox("Clove ")
```

```
#bpepper_button = QCheckBox("Black Pepper")
#cinammon_button = QCheckBox("Cinnamon ")
#turmeric_button = QCheckBox("Turmeric ")

# create a container for milk/water
liquid_group = QGroupBox()
spice_group = QGroupBox()
# create a layout for liquid

liquid_group_layout = QVBoxLayout()
spice_group_layout = QVBoxLayout()
liquid_group_layout.addWidget(milk_button)
liquid_group_layout.addWidget(water_button)

spices = ['sugar','clove','blackpeppwe','cinnamon','turmeric']

for spice in spices:
    spice_check_box = QCheckBox(spice)
    spice_group_layout.addWidget(spice_check_box)
#spice_group_layout.addWidget(sugar_button)
#spice_group_layout.addWidget(clove_button)
```

```
#spice_group_layout.addWidget(bpepper_button)
#spice_group_layout.addWidget(cinammon_button)
#spice_group_layout.addWidget(turmeric_button)
```

```
liquid_group.setLayout(liquid_group_layout)
spice_group.setLayout(spice_group_layout)
```

```
tea_layout.addWidget(liquid_label)
tea_layout.addWidget(liquid_group)
tea_layout.addWidget(spice_label)
tea_layout.addWidget(spice_group)
tea_tab.setLayout(tea_layout)
```

```
mainlayout = QVBoxLayout(self)
mainlayout.addWidget(tab_widget)
```

```
app = QApplication(sys.argv)
window = Window()
window.show()

sys.exit(app.exec())
```

*The libraries used in this project are:*

- 1)PyQt6
- 2)PyQt6.QtWidgets
- 3)PyQt6.QtGui
- 4)PyQt6.QtCore

*The PyQt6 library is used to create the GUI for the project.*

*The PyQt6.QtWidgets library is used to create the widgets for the project.*

*The PyQt6.QtGui library is used to create the GUI for the project.*

*The PyQt6.QtCore library is used to create the core for the project.*

### Chapter 26:Pyqt\_Database

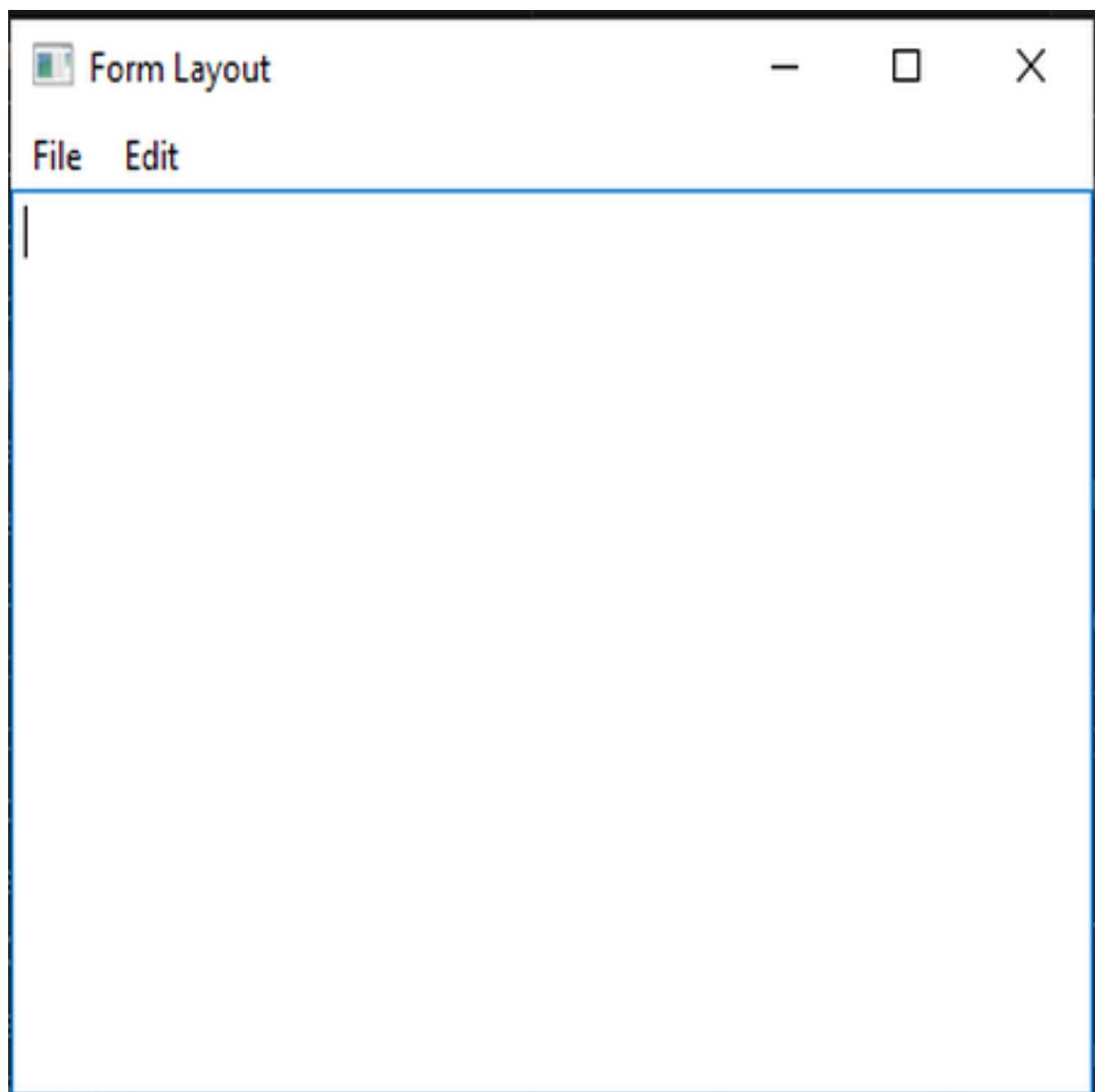


Image :D:\inlighttech\Pyqt6\_NotePad\NotePad.png

*This project is used to create a Notepad application using PyQt6 Library*

```
from PyQt6.QtWidgets import
QInputDialog, QFileDialog, QMenu, QMenuBar, QMainWindow, QTextEdit,
QFormLayout, QWidget, QApplication, QLabel, QPushButton, QLineEdit,
QCheckBox
from PyQt6.QtGui import QAction, QIcon, QTextCursor, QColor
from PyQt6.QtCore import Qt

import sys

class Window(QMainWindow):

    def __init__(self):
        super().__init__()
        self.initUI()

    def initUI(self):
```

```
self.setWindowTitle("Form Layout")
self.setGeometry(100,100,400,300)

self.edit_field = QTextEdit(self)
self.setCentralWidget(self.edit_field)

self.current_file = None
# creating a menu bar
menubar = QMenuBar(self)
self.setMenuBar(menubar)
#create a Menu
fileMenu = QMenu("File",self)
menubar.addMenu(fileMenu)
editmenu = QMenu("Edit",self)
menubar.addMenu(editmenu)

#creating an action
new_action = QAction("New",self)
fileMenu.addAction(new_action)
new_action.triggered.connect(self.new_file)
```

```
open_action = QAction("Open",self)
fileMenu.addAction(open_action)
open_action.triggered.connect(self.open_file)
```

```
save_action = QAction("Save",self)
fileMenu.addAction(save_action)
save_action.triggered.connect(self.save_file)
```

```
save_as_action = QAction("Save as",self)
fileMenu.addAction(save_as_action)
save_as_action.triggered.connect(self.save_file_as)
```

*#creating an edit menu*

```
#creating an action
undo_action = QAction("Undo ",self)
editmenu.addAction(undo_action)
undo_action.triggered.connect(self.edit_field.undo)
```

```
redo_action = QAction("Redo ",self)
editmenu.addAction(redo_action)
```

```
redo_action.triggered.connect(self.edit_field.redo)
```

```
cut_action = QAction("Cut ",self)
editmenu.addAction(cut_action)
cut_action.triggered.connect(self.edit_field.cut)
```

```
copy_action = QAction("Copy ",self)
editmenu.addAction(copy_action)
copy_action.triggered.connect(self.edit_field.copy)
```

```
paste_action = QAction("Paste ",self)
editmenu.addAction(paste_action)
paste_action.triggered.connect(self.edit_field.paste)
```

```
find_action = QAction("Find ",self)
editmenu.addAction(find_action)
find_action.triggered.connect(self.find_text)
```

```
def new_file(self):
```

```
print("Creating New File ")
self.edit_field.clear()
self.current_file = None

def open_file(self):
    print("opening New File ")
    filepath,_ = QFileDialog.getOpenFileName(self,"Open file","","All Files
(*);; Python Files (*.py)")
    with open(filepath,"r") as f:
        data = f.read()
        self.edit_field.setText(data)

def save_file_as(self):
    print("saving New File ")
    filepath,_ = QFileDialog.getSaveFileName(self,"Save file","","All Files
(*);; Python Files (*.py)")
    print(filepath)
    if filepath:
        with open(filepath,'w') as f:
            f.write(self.edit_field.toPlainText())
```

```
self.current_file = filepath

def save_file(self):
    print("saving as New File ")
    if self.current_file:
        with open(self.current_file,'w') as f:
            f.write(self.edit_field.toPlainText())

    else:
        self.save_file_as()

def find_text(self):
    print("Finding Text")
    text,ok = QInputDialog.getText(self,"Find Text","Search for text:")
    if ok:
        all_words = []
        self.edit_field.moveCursor(QTextCursor.MoveOperation.Start)
        highlight_color = Qt.GlobalColor.yellow

        while (self.edit_field.find(text)):
            selection = QTextEdit.ExtraSelection()
            selection.format.setBackground(highlight_color)
```

```
selection.cursor = self.edit_field.textCursor()
all_words.append(selection)

self.edit_field.setExtraSelections(all_words)

app = QApplication(sys.argv)
#app.setStyle('Fusion')

window = Window()

window.show()

sys.exit(app.exec())
```

*The libraries used in this project are:*

1) PyQt6

2) `PyQt6.QtWidgets`

3) `PyQt6.QtGui`

4) `PyQt6.QtCore`

*The PyQt6 library is used to create the GUI for the project.*

*The PyQt6.QtWidgets library is used to create the widgets for the project.*

*The PyQt6.QtGui library is used to create the GUI for the project.*

*The PyQt6.QtCore library is used to create the core for the project.*

### Chapter 30:Pytest\_app

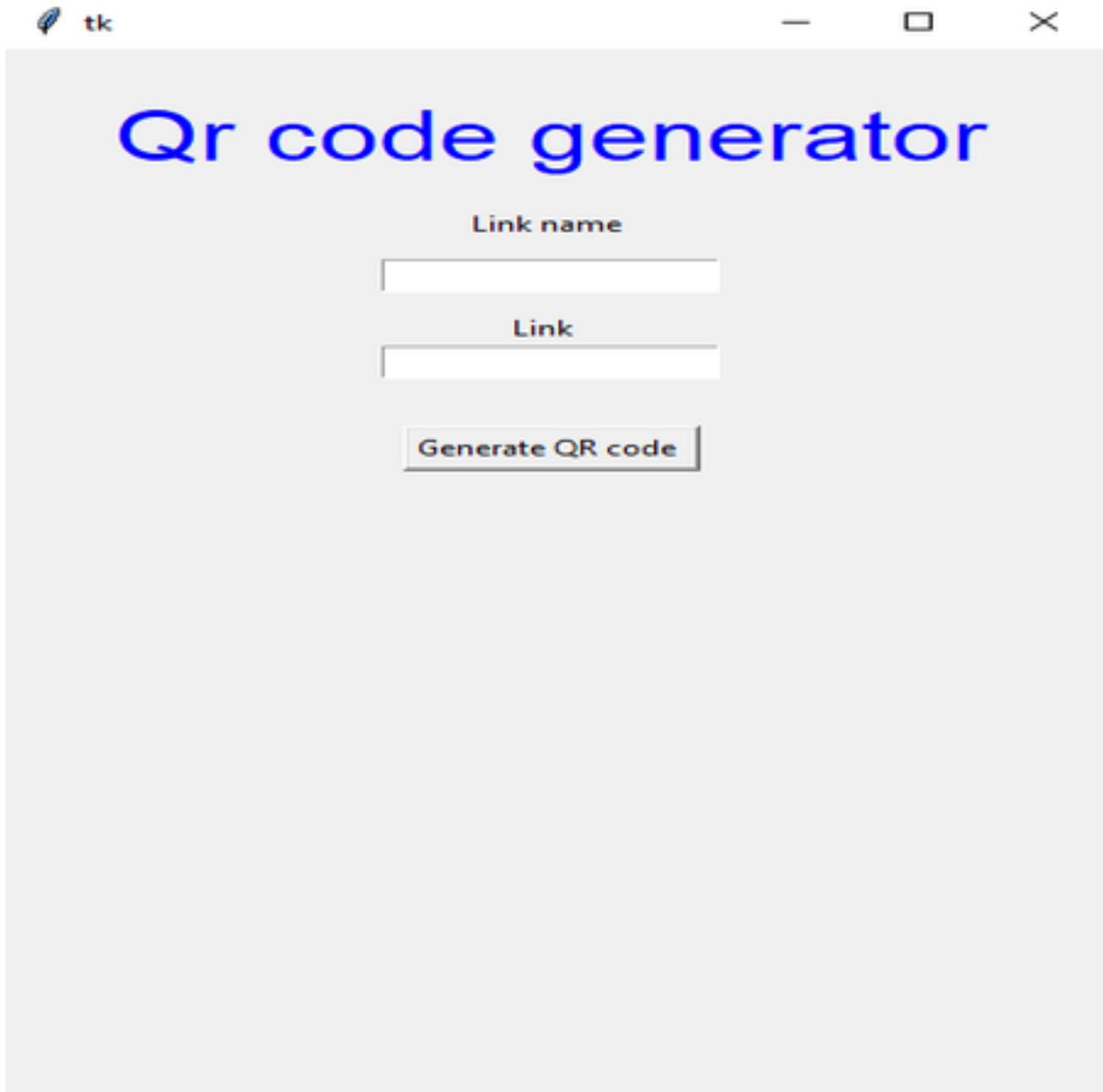


Image :D:\inlighttech\QrcodeGenerator\qrcode.png

*This project is to create a Qrcode with the specified website link and name*

1) *tkinter*

2) *pyqrcode*

3) *PIL*

*tkinter* is used to create the gui application

*pyqrcode* is used to create the Qr code

*PIL* is used to create the images

### Chapter 30:Pytest\_app

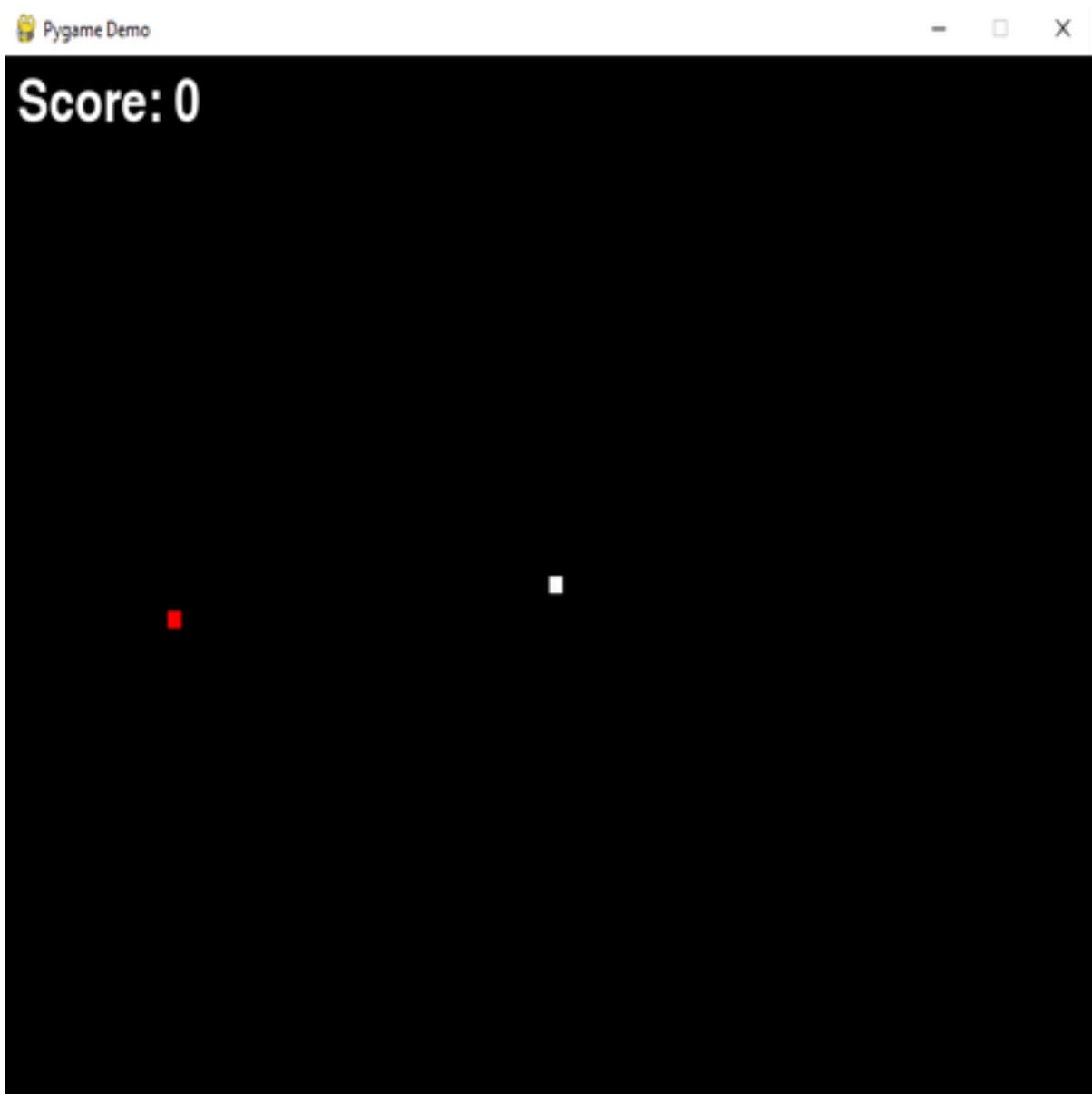


Image :D:\inligntech\Snake\_Pygame\snake.png

*This project is used to create the Snake game using the pygame library*

"

```
import pygame
import random

pygame.init()

# setting the game window
window_width = 800
window_height = 600

# set the display mode
window = pygame.display.set_mode((window_width, window_height))
# set the caption
pygame.display.set_caption("Pygame Demo")

# set the colors
white =(255,255,255)
black =(0,0,0)
red = (255,0,0)

# gameover bool
```

```
game_over = False
```

```
# adjusted snake head positions
```

```
x1= window_width/2
```

```
y1= window_height/2
```

```
# change in x1, y1
```

```
x1_change =0
```

```
y1_change =0
```

```
# length of snake , score , snakebody
```

```
length_of_snake =1
```

```
score = 0
```

```
snake_body=[]
```

```
# snake touch window game stops
```

```
if x1 >= window_width or x1 < 0 or y1>=window_height or y1 <0 :
```

```
    game_over =True
```

```
# check frame rate
```

```
clock = pygame.time.Clock()
```

```
# Randomized food positions
food_x = round(random.randrange(0,window_width-10)/10) *10
food_y = round(random.randrange(0,window_height-10)/10) *10

#running event loop
while not game_over:
    for event in pygame.event.get():
        if event.type == pygame.QUIT:
            game_over =True
        #check for arrow keys press
        if event.type == pygame.KEYDOWN:
            if event.key == pygame.K_LEFT:
                x1_change = -10
                y1_change = 0
            elif event.key == pygame.K_RIGHT:
                x1_change = 10
                y1_change = 0
            elif event.key == pygame.K_UP:
                x1_change = 0
                y1_change = -10
            elif event.key == pygame.K_DOWN:
                x1_change = 0
                y1_change = 10
```

```
x1_change = 0  
y1_change = 10
```

```
#adjust x1 changes  
x1 += x1_change  
y1 += y1_change  
#fill window black  
window.fill(black)
```

```
# contain the length of the snake while traversing to just length of the  
snake.
```

```
snake_head = []  
# append every single x1, y1  
snake_head.append(x1)  
snake_head.append(y1)  
# add it to snake head  
snake_body.append(snake_head)
```

```
# for every x1,y1 added to snake head and then added to snakebody  
tuple.
```

```
# start deleting the entries from the beginning if the snakebody exceeds
snake_length

if len(snake_body) > length_of_snake:
    del snake_body[0]

# if snake touches itself, then it is gameover
for segment in snake_body[:-1]:
    if segment == snake_head:
        game_over=True

# display score on the screen using blit
font_style = pygame.font.SysFont(None,50)
score_text = font_style.render("Score: "+str(score),True,white)
window.blit(score_text,(10,10))

# snake eats food then add new randomized food locations and update
length and score

if x1 == food_x and y1==food_y:
    food_x = round(random.randrange(0>window_width-10)/10) *10
    food_y = round(random.randrange(0>window_height-10)/10) *10
    length_of_snake += 1
    score +=1
```

```
#Draw food and snake location on screen
pygame.draw.rect(window,red,[food_x,food_y,10,10])
#pygame.draw.rect(window,white,[x1,y1,10,10])
for segment in snake_body:
    pygame.draw.rect(window,white,[segment[0],segment[1],10,10])
    if x1 >= window_width or x1 < 0 or y1>=window_height or y1 <0:
        game_over =True

# update display
pygame.display.update()

clock.tick(15)
```

*The libraries used to create the above code are*

- 1)pygame
- 2)Random

*pygame is a library used to create gui games with Python*

*Random is a random number generator*

### Chapter 32:Qtapp

"

*This project is used to download videos using python*

```
from tkinter import *
from tkinter import filedialog
from pytube import YouTube
from moviepy.editor import *
import shutil

def download():
    try:
        video_path = url_entry.get()
        file_path = path_label.cget("text")
        if not video_path.startswith("https://www.youtube.com/"):
            print("Invalid YouTube URL")
        return
    except:
        pass

    video = YouTube(video_path)
    video.streams.get_highest_resolution().download(file_path)
    print("Download completed!")

    video_file = file_path + ".mp4"
    mp4_file = file_path + ".mp3"
    video_file = video_file.replace(".mp4", ".mp3")
    os.rename(video_file, mp4_file)
    print("File converted to MP3 format!")
```

mp4 =

```
YouTube(video_path).streams.get_highest_resolution().download(output_p
ath=file_path)

videoclip = VideoFileClip(mp4)
# code for MP3
audio_file = videoclip.audio
audio_file.write_audiofile('audio.mp3')
shutil.move(audio.mp3,file_path)
audio_file.close()
videoclip.close()
shutil.move(mp4,file_path)
print("Download Complete")

except Exception as e:
    print(f"An error occurred:{e}")

def get_path():
    path = filedialog.askdirectory()
    path_label.config(text=path)

root= Tk()
```

```
root.title('Video Downloader')
canvas = Canvas(root, width=400, height=300)

canvas.pack()

app_label = Label(root, text="Video Downloader", fg="blue", font=("Arial", 30))
canvas.create_window(200, 20, window=app_label)

#entry to accept video url

url_entry = Entry(root)
url_label = Label(root, text="Enter video url:")
canvas.create_window(200, 80, window=url_label)
canvas.create_window(200, 100, window=url_entry)

#path to download videos
path_label = Label(root, text="Select path to download")
path_button = Button(root, text="Select", command=get_path)
canvas.create_window(200, 150, window=path_label)
canvas.create_window(200, 170, window=path_button)

#downloadbutton
download_button = Button(root, text="Download", command=download)
```

```
canvas.create_window(200,250,window=download_button)
```

```
root.mainloop()
```

*This project has the following requirements*

- 1)tkinter
- 2)pytubefix
- 3)moviepy.editor

*tkinter is used to create gui based application*

*pytubefix is a library to download youtube videos*