Technische Hochschule Deggendorf, Fakultät für Elektrotechnik und Medientechnik

Master Elektro- und Informationstechnik

Advanced Programming Techniques

Final Report

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Lab report for exercise 01

Basics of using Git

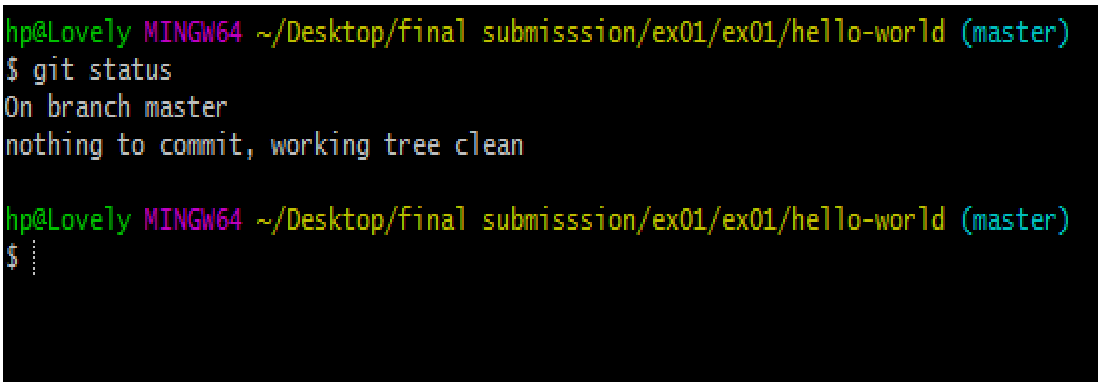
Install the Git Version Control System(VCS) on the computer and create a Git repository and commit a text file which contains name and matriculation number.Add a .gitignore file to ignore HTML file for the repository.Copy the output of git status to the file git-status.txt

Purpose

Gitignore mechanisms can ignore intenstionally untracked file by its name in a Git repository.If you dont want to commit files in local copy of a project ,you can ignore file by specifying in .gitignore.The files which the user want to eliminate before checking into master branch can be done using gitignore mechanisms.

Result

Initialised git repository using “git init“ command.Added a text file with name and matriculation number.The changes to text file was saved .The file was aded and committed to git repository using meaningful message.
Added a textfile “.gitignore “ file and commit it to the repository.We intensionally ignored HTML *files(.htm and .html)* from the directory using .gitignore file.If we do not want git to track files in a repository.Copy the output of git status to a text file git-status.txt.Commit the text file.
We learned about Git Version Control System in this exrexise.We got to know different git commands and their applications.The git status showed no files to commit and the working tree is clean .



```
hp@Lovely MINGW64 ~/Desktop/final submisssion/ex01/ex01/hello-world (master)
$ git status
On branch master
nothing to commit, working tree clean

hp@Lovely MINGW64 ~/Desktop/final submisssion/ex01/ex01/hello-world (master)
$
```

Lab report for exercise 02

Conflicts and branching in Git

Bring back the repository “conflicts_in_repository“ into a clean state by resolving the conflicts.Create and checkout a new feature branch “error-message“ ,commit the changes in python file to it and checkout master branch again.Create a project in in the server “ https://mygit.th-deg.de/“ and push git repository to server.

Purpose

“git checkout –b error-message “ command simultaneosly creates and check out to new branches.It helps to checkout previous commits and files in which the current working directory is updated .Every Git has a master branch.Developers could create any number of branches.We should resolve conflicts occured due to changes made to same line by two people.

Result

Make the repository “conflicts_in_repository“ into a clean state by manually resolving the conflicts in yeats.txt.The headers deleted and then merged the file.The files were added and commit the changes to the repository using git add <file_name> and git commit –m “ <changes>“ .

Create and checkout a new feature branch “error-message“.Line 49 in automaton.py file was modified.The file was added and changes were committed to feature branch “error-message“.Checkout to master branch.It shows that “Your branch is ahead of ‘origin/master‘ by 2 commits.

git remote –v command gives information about remote repository.To push the existing git repository and local commits to the server https://mygit.th-deg.de/ we use the following commands:

```
cd existing_repo
git remote rename origin old-origin
git remote add origin https://mygit.th-deg.de/lv06581/exercise2_repository
git push –u origin –all
git push –u origin --tags
```

Lab report for exercise 03

HTML and CSS

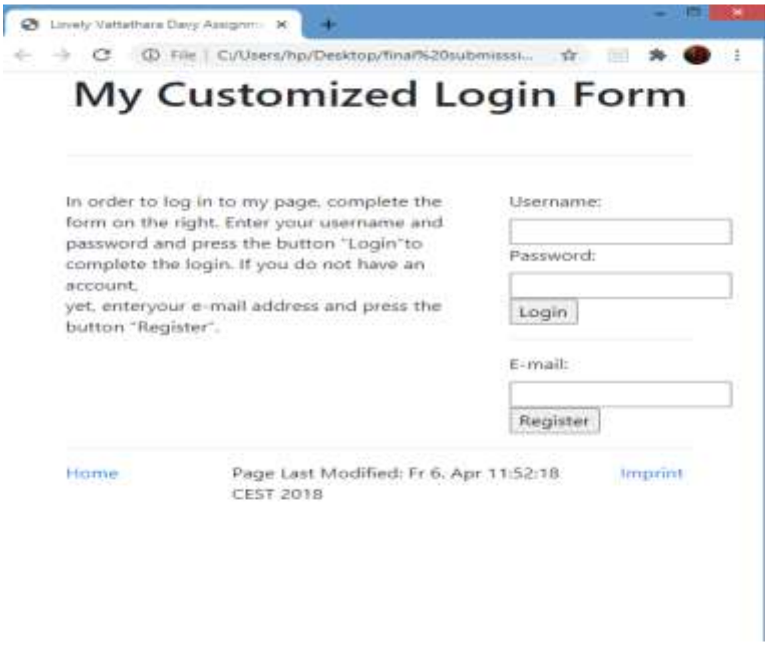
Create a webpage using HTML and CSS script with the help of bootsrap toolkit.Included all style commands in <style></style> section in the header of the document.

Purpose

Bootstrap is a free and open-source front-end web framework to design websites and web applications .Bootstrap framework has predesigned CSS templates for buttons,tables,fonts which use HTML script short and makes the designing process easier.CSS framework are used to design responsive websites. HTML and CSS Scripts create a website.Bootstrap framework automatically adjust position when window size is reduced to be used in different devices.

Result

The layout of login page created using HTML and CSS is designed such that it is compatible in different devices even when window size is reduced.Bootstrap framework help to organise elements on webpage by dividing it into colums using grid system.We use input type as a password to enable users to input password securely . The class <div class="col-sm-1"> assign a column on the webpage into section one.We used input type username,password , email using <input type="text" id="username"/><br />.
A webpage with few lines of code was implemented using bootstrap framework.


Lively Vattathara Davy Assignm...
File | C:/Users/hp/Desktop/final%20submissi...

My Customized Login Form

In order to log in to my page, complete the form on the right. Enter your username and password and press the button "Login"to complete the login. If you do not have an account,
yet, enteryour e-mail address and press the button "Register".

Username:
Password:
Login
E-mail:
Register
Home
Imprint

Page Last Modified: Fr 6. Apr 11:52:18 CEST 2018

Lab report for exercise 04

<u>Programming Languages</u>

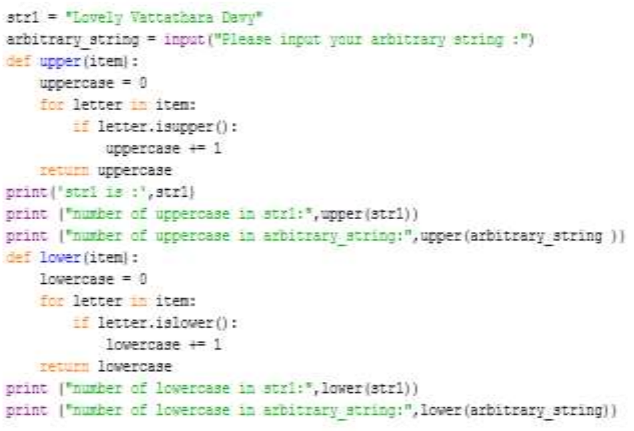
Add and commit the python program that counts the number of uppercase and lowercase characters of my name and an arbitrary string.Compute the difference in number of uppercase and lowercase in both strings.Commit the changes.Repeat the same objective using C.

Purpose

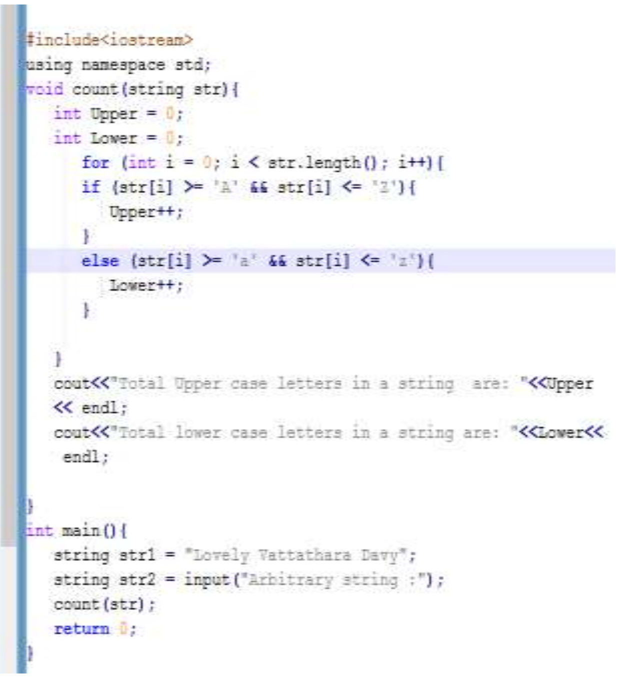
The program counts the number of uppercase and lowercase characters of strings.The magnitude of difference in uppercases and lowercases of input string and arbitrarystring is calculated.

Result

We generated a python code to compute number of uppercase and lowercase characters of my name and an arbitrary string.The difference of strings were computed.Repetitions of code were prevented using functions.Total number of lines to run the C program is more than Python code.The figure below shows the python and c code to count the uppercase and lowercase characters of the strings.



```python
str1 = "Lovely Vattathara Davy"
arbitrary_string = input("Please input your arbitrary string :")
def upper(item):
    uppercase = 0
    for letter in item:
        if letter.isupper():
          uppercase += 1
    return uppercase
print('str1 is :',str1)
print ("number of uppercase in str1:",upper(str1))
print ("number of uppercase in arbitrary_string:",upper(arbitrary_string ))
def lower(item):
    lowercase = 0
    for letter in item:
        if letter.islower():
          lowercase += 1
    return lowercase
print ("number of lowercase in str1:",lower(str1))
print ("number of lowercase in arbitrary_string:",lower(arbitrary_string))
```



```cpp
#include<iostream>
using namespace std;
void count(string str){
   int Upper = 0;
   int Lower = 0;
      for (int i = 0; i < str.length(); i++){
      if (str[i] >= 'A' && str[i] <= 'Z'){
         Upper++;
      }
      else (str[i] >= 'a' && str[i] <= 'z'){
         Lower++;
      }

   }
   cout<<"Total Upper case letters in a string  are: "<<Upper
   << endl;
   cout<<"Total lower case letters in a string are: "<<Lower<<
    endl;

}
int main(){
   string str1 = "Lovely Vattathara Davy";
   string str2 = input("Arbitrary string :");
   count(str);
   return 0;
}
```

Lab report for exercise 05

Programming in Python

Commit the changes after editting the python file html_writer.py to produce an html file with contents of CSV file presented as tabular data with the help of python string format functionality.

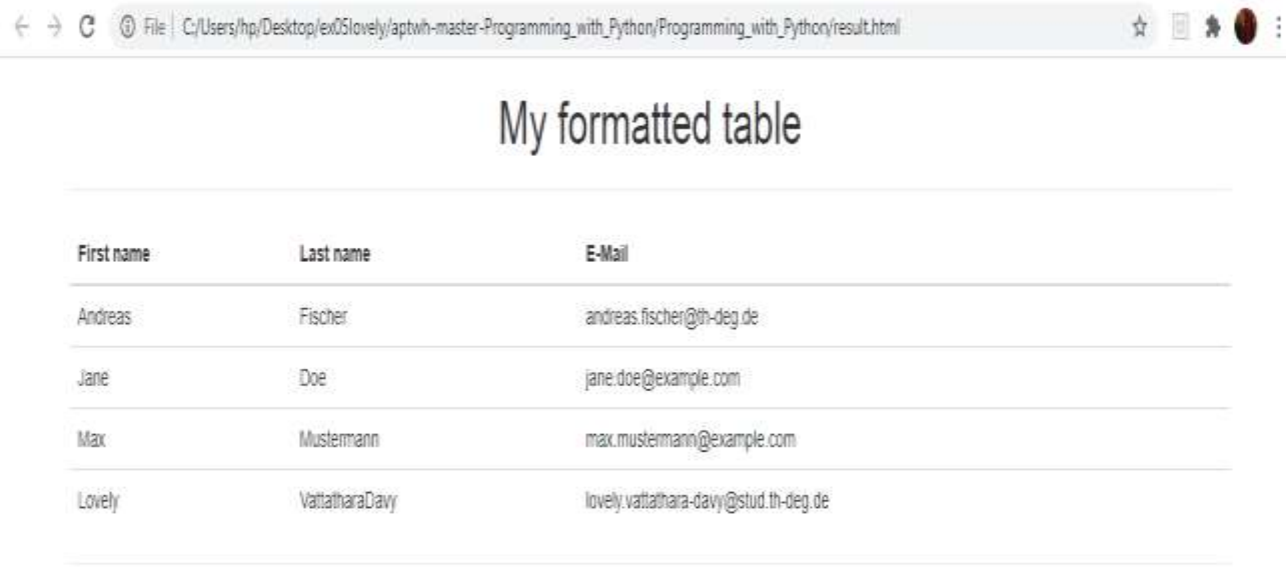
Purpose

Python code can be used to update the website content in HTML file.This process has got many practical applications like updating e-ticket booking website easily .

Result

To copy the content of CSV file to the variable reader we use reader = csv.reader(CSV file,delimiter=“;“).The delimiter as a semicolon was used to seperate data .The placeholder was used to identify the position of contents in HTML file .

Python code that extracts CSV file content into HTML file to update website was done in this exercise. Append name and email address to CSV file and run the program such that the data appears in result.html.Commit the changes to test.csv to the repository.The figure below shows that the data appears in result.html after running the python code .



File
C:/Users/hp/Desktop/ex05lovely/aptwh-master-Programming_with_Python/Programming_with_Python/result.html

My formatted table

First name	Last name	E-Mail
Andreas	Fischer	andreas.fischer@th-deg.de
Jane	Doe	jane.doe@example.com
Max	Mustermann	max.mustermann@example.com
Lovely	VattatharaDavy	lovely.vattathara-davy@stud.th-deg.de

Lab report for exercise 06

Programming Paradigms

Implement insert function of a binary sorted tree which inserts a value into empty BinTree and create newroot BinTreeNode with the inserted value.Discard the value ifit already exists in the tree.Search functionality to return an existing value is also implemented.

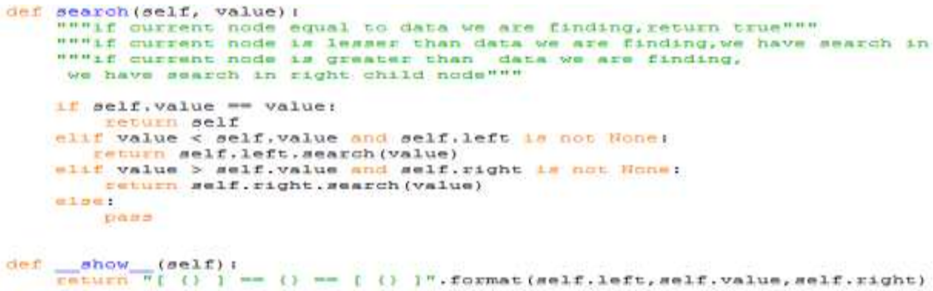
Purpose

A binary sorted tree is a data structure in which every node in the tree stores a value.Every node has exactly two children ,“left“ and “right“. Both children represent again a tree.For every node ite left subtree has nodes with smaller value,whereas its right subtree has only nodes with larger values.

Result

Every node,except root node, has a parent node in a binary tree .Insert calss in BinTreeNode () compares and decide to add the elemet to the left or right of parent node. Clone the repository https://mygit.th-deg.de/afischer/aptwh to the computer.Created two classes named BinTree and BinTreeNode. It also has two instance variables left and right which may be None initially and can point to other BinTreeNodes later. A BinTree has an instance variable called root which is None initially and will point to the first BinTreeNode later. Used the __init__() method to set up objects.

The insert functionality: Inserting a value into an empty BinTree will create a new root BinTreeNode with the inserted value. Inserting into a tree which already has values will delegate the insert functionality to the root BinTreeNode . A BinTreeNode will insert to the left if the value is smaller than its own value, and to the right if the value is larger than its own value. If the value to be inserted is equal to the value of a BinTreeNode , it is silently discarded. The search functionality: It works similar to the insert functionality, but will not create new nodes. Instead, it will return the BinTreeNode if the value is present in the tree and None otherwise as shown in the figure.The bintree_test.py ran successfully.



```
def search(self, value):
    """if current node equal to data we are finding,return true"""
    """if current node is lesser than data we are finding,we have search in
    """if current node is greater than  data we are finding,
     we have search in right child node"""

    if self.value == value:
        return self
    elif value < self.value and self.left is not None:
       return self.left.search(value)
    elif value > self.value and self.right is not None:
        return self.right.search(value)
    else:
        pass

def __show__(self):
    return "[ {} ] == {} == [ {} ]".format(self.left,self.value,self.right)
```

Lab report for exercise 07

The Unified Modeling Language

Create a UML diagram fot the python file.Use inheritence ,aggregation and composition where appliacble.Use multiplicities on relationships to specify one-to-many and many-to-many relationships.

Purpose

UML diagrams can communicate different aspects and characteristics of a system by modelling a system independent of a platform language.UML can execute a code graphically.Relationship between different class and its method is conveyed through an UML.

Result

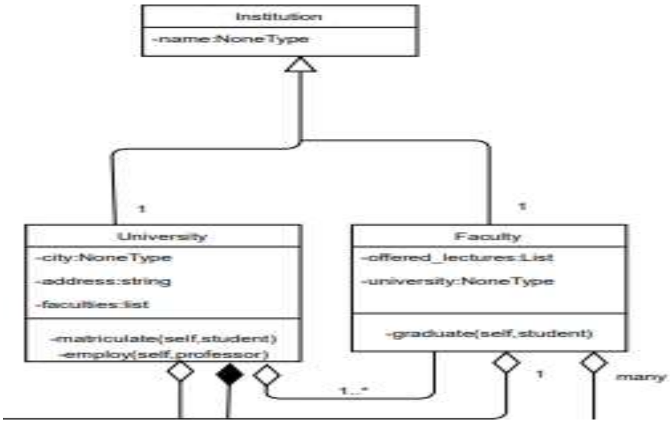
Execution of python code was studied to know the dependencoed of classes with each other.Created UML diagram through online editor https://draw.io/ .Classes and relationships have properties called attributes.A class has elements like name of the class,attributes and operations.

Association is a reference relationship between two objects or classes.It could be unidirectional or bidirectional.

Aggregation is a parent-child relationship however it is not inheritence.

Composition is a type of association where the child cannot exist independent of the other.

An example of inheritence is shown in the figure below. UML ease the understanding of the flow and operation of a program.



Lab report for exercise 08

Software Design Pattern

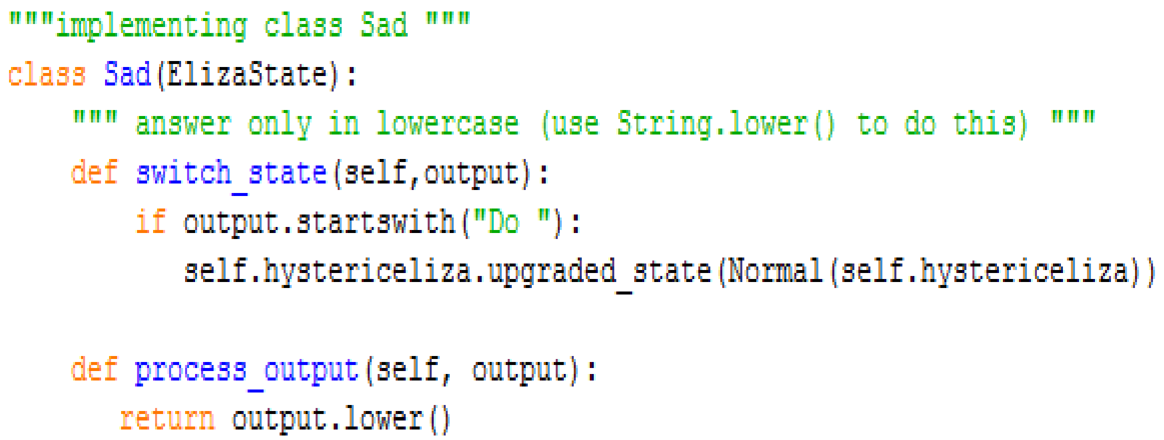
Change the class process –output of python file hystericeliza.py in the repository , https://mygit.th-deg.de/afischer/aptwh, to a more object-oriented variant clean code implementing the state pattern and not relying on hardcoded strings.Functionality should remain the same .

Purpose

Identify the pattern in the code and relate it to different categories in the repository Software_Design_patterns.Identify the pattern to make the code into cleaner structure.

Result

Python code for eliza chatbot was given to repond to a user depending on its mood and tone.The class process_output was hardcoded using if and else statements.It compares and switch states base on Normal,Angry,Sad moods.The class was made more object oriented without changing the variables and logic.output.lower() converts the output into lowercase characters as shown in the given figure.The resulting code is cleaner and easy to interpret.The unit–test code in the repository was used to check the correctness. The repository was zipped to upload .



```
"""implementing class Sad """
class Sad(ElizaState):
    """ answer only in lowercase (use String.lower() to do this) """
    def switch_state(self,output):
        if output.startswith("Do "):
            self.hystericeliza.upgraded_state(Normal(self.hystericeliza))

    def process_output(self, output):
       return output.lower()
```

Lab report for exercise 09

Object-Relational Mappers

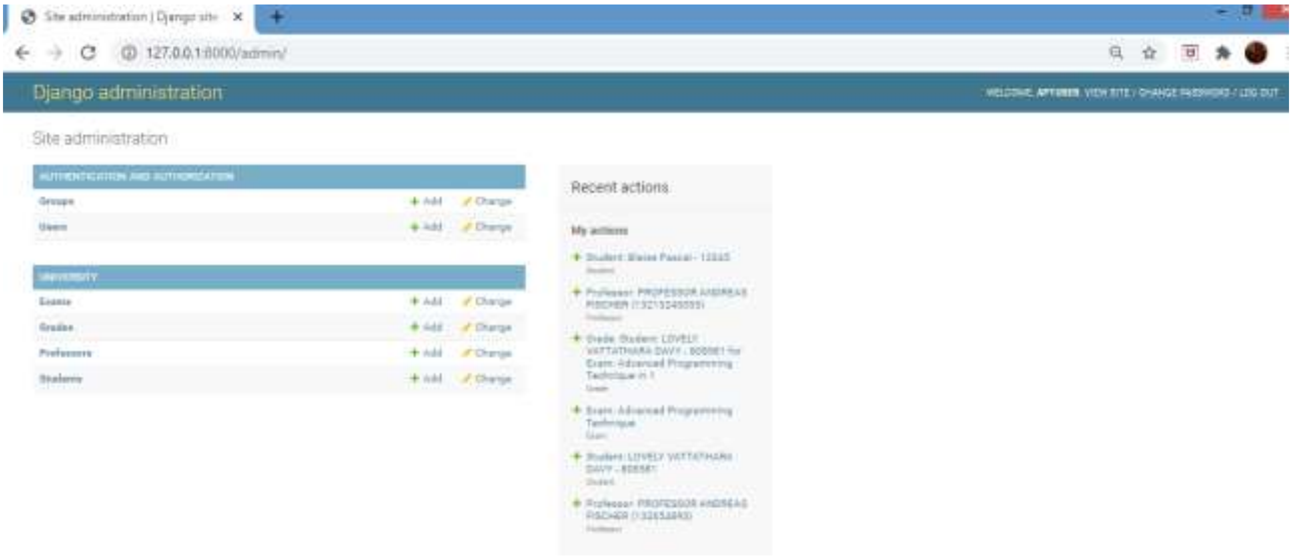
Install Django to model a reduced university context dealing with the four objects : Students,Professors,Exams,and Grades in the python file models.py.Use ForeignKeys to refer other classes and ManyToManyField to model an n:m relationship in the Django framework.Run the webserver after executing ‘makemigrations‘ and migrate to record the changes to the database model.

Purpose

Get introduced to Django framework.Django is a python-based free and open source web framework that follows the model-template-views pattern.Django commands were used to create a model of a university’s database webportal on a server.

Result

We modelled a reduced university context ,dealing with the four objects : Students,Professors,Exams,and Grades in the python file models.py.Django framework generated webportal on a webserver depending on the relations between objects in the code.Make the migrations to record the changes to the database after adding a default values to non-nullable fields.“python manage.py runserver“ command run the testserver at http://127.0.0.1:8000/ address.The credential were added to login page and add values to all fields to check functionality.SQL lite database in Object_Relational_Mappers repository were automatically updated as we enter values to each elements as shown in the figure.



Site administration | Django site

127.0.0.1:8000/admin/

Django administration

WELCOME, [illegible]. VIEW SITE / CHANGE PASSWORD / LOG OUT

Site administration

AUTHENTICATION AND AUTHORIZATION		
Groups	+ Add	Change
Users	+ Add	Change

UNIVERSITY		
Exams	+ Add	Change
Grades	+ Add	Change
Professors	+ Add	Change
Students	+ Add	Change

Recent actions

My actions

- Student: Blaise Pascal - 12345
  Student
- Professor: PROFESSOR ANDREAS FISCHER ([illegible])
  Professor
- Grade: Student: LOVELY VATTATHARA DAVY : [illegible] for Exam: Advanced Programming Technique in 1
  Grade
- Exam: Advanced Programming Technique
  Exam
- Student: LOVELY VATTATHARA DAVY - [illegible]
  Student
- Professor: PROFESSOR ANDREAS FISCHER ([illegible])
  Professor

Lab report for exercise 10

Template Engines

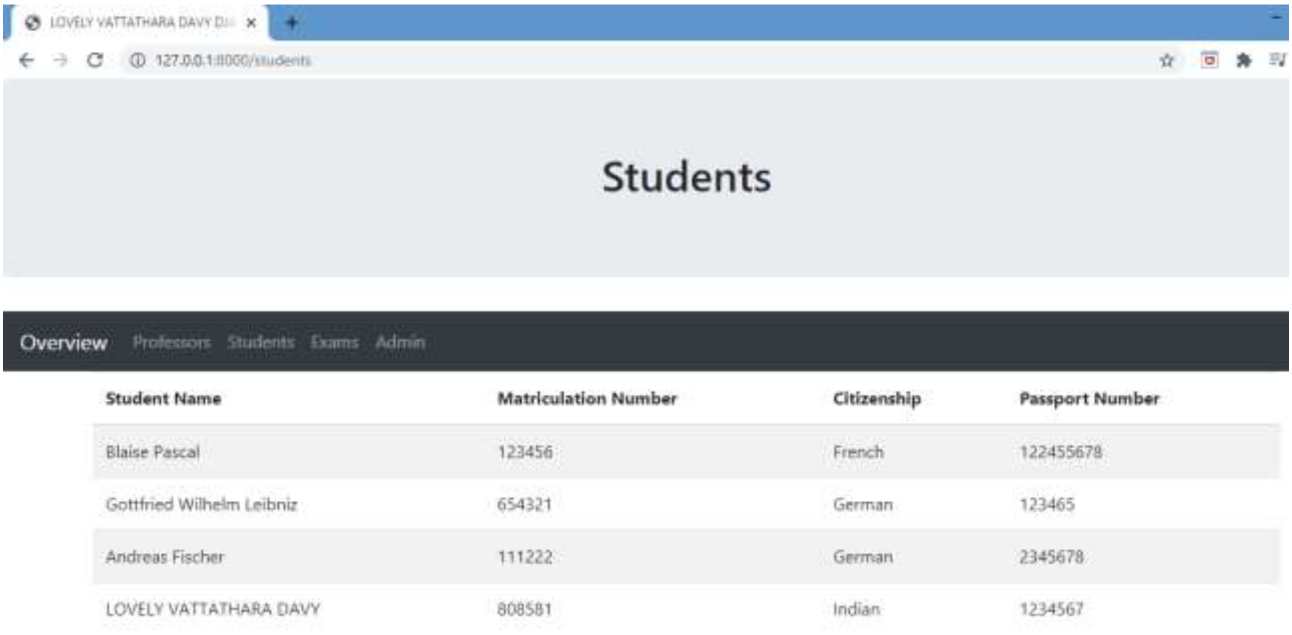
Create a web interface to list all registered professors, students, and exams. Complete the functions in university/views.py alongwith HTML template to get an overview of all registered professors, students, and exams using Django frameworks.

Purpose

Structure an application to be represented into a web server using Django template engines.Template inheritence is a major property of Django template engine.Django provides a template engine used to render pages in the browser with ease by reusing components.Django hold the templates to create static entities.

Result

Upgraded repository of assignment 09 Object_Relational_Mappers repository and pull the changes using git.Templates,urls.py and views.py were added.Represent the data in SQLlite database into webserver as shown in the figure given below. Modify the template files and views.py .Run the server to obtain a result as expected.



Students

Student Name	Matriculation Number	Citizenship	Passport Number
Blaise Pascal	123456	French	122455678
Gottfried Wilhelm Leibniz	654321	German	123465
Andreas Fischer	111222	German	2345678
LOVELY VATTATHARA DAVY	808581	Indian	1234567

Lab report for exercise 11

Clean Code

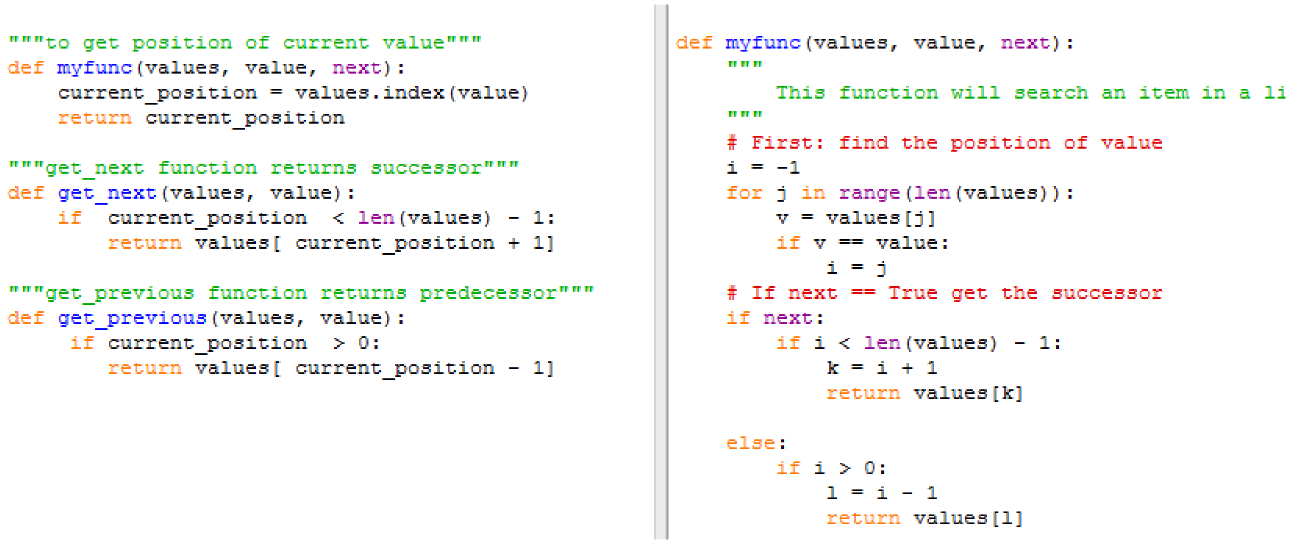
Considering Clean Code guidelines, identified four substantially different improvements to that function and implement them in the code example.py and digitsum.py without changing the actual functionality. Document changes using comments.

Purpose

Clean code is easy to change and understand.Clean codes help programmers to easily remember changes in the code.Clean and structured data help to understand how different object collaborate with each other.There will be no doubt in flow of a clean code ,variable names and purpose of each class and methods.

Result

A function was restricted to do single task.Paramter numbers of a function was reduced to two.Variable names were changed to reflect its contents .Comments were written to define the functionality of a function.Duplications were removed in the code.String comprehension was implemented in digitsum.py to make an expression into singleline.The clean code and original code of example.py is shown below in the figure.



```
"""to get position of current value"""
def myfunc(values, value, next):
    current_position = values.index(value)
    return current_position

"""get_next function returns successor"""
def get_next(values, value):
    if  current_position  < len(values) - 1:
        return values[ current_position + 1]

"""get_previous function returns predecessor"""
def get_previous(values, value):
     if current_position  > 0:
        return values[ current_position - 1]
```

```
def myfunc(values, value, next):
    """
        This function will search an item in a li
    """
    # First: find the position of value
    i = -1
    for j in range(len(values)):
        v = values[j]
        if v == value:
            i = j
    # If next == True get the successor
    if next:
        if i < len(values) - 1:
            k = i + 1
            return values[k]

    else:
        if i > 0:
            l = i - 1
            return values[l]
```

Grading table

Lab exercise no.	Points for report (max. 2P each)	Points for solution (max. 3P each)	Grade from iLearn	Grade from submitted ZIP file
1			[_]	[_*]
2			[_]	[_*]
3			[_]	[_*]
4			[_]	[_*]
5			[_]	[_*]
6			[_]	[_*]
7			[_]	[_*]
8			[_]	[_*]
9			[_]	[_*]
10			[_]	[_*]
11			[_]	[_*]
12			[_]	[_*]
Total (max. 60 points)				