UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

COS 221 Practical Assignment 3

- Date Issued: **21st April 2021**
- Date Due: **5th May 2021** and **19th May 2021** before **11:00 (in the morning)**
- Submission Procedure: **Upload to ClickUP**
- This assignment consists of **7 tasks** for a total of **150 marks**.

1 Introduction

The **2021 South African municipal elections** will be held in May of 2021, to elect councils for all district, metropolitan and local municipalities in each of the country's nine provinces. It will be the sixth municipal election held in South Africa since the end of apartheid in 1994; municipal elections are held every five years. The previous municipal elections were held in 2016[1].

Local government in South Africa consists of municipalities of various types. The largest metropolitan areas are governed by metropolitan municipalities, while the rest of the country is divided into district municipalities, each of which consists of several local municipalities. After the 2016 elections, there were eight metropolitan municipalities, 44 district municipalities and 205 local municipalities.

The councils of metropolitan and local municipalities are elected through a system of mixed-member proportional representation, in which half of the seats in each municipality are elected on the first-past-the-post system in single-member wards and the other half of the seats are allocated according to the proportional representation (PR) system. The latter takes into account the number of ward seats won by a party and ensures that the final number of seats held by that party is proportional to their percentage of the total vote.

District municipality councils are partly elected by proportional representation and partly appointed by the councils of the constituent local municipalities. Voters in both metropolitan and local municipalities elect a single ward candidate as well as a proportional representative in their municipal council. Residents of municipalities that form part of district councils (that is, excluding metropolitan municipalities) also cast a third vote to elect a proportional representative for their district council in addition to the two votes they cast for their local council.

After successful completion of this assignment you should be able to:

- develop a simple web based online system using php for both front-end and back-end development,
- design a database for any system,
- specify and execute SQL in PHP and Java host languages,
- extract information from your database as an XML file using JDBC for reporting purposes.

2 Constraints

1. You are required to complete this assignment in groups of three (3) students per group.
2. There will be a demo session where each group will present their completed assignment on **19th May 2021** during the practical session on Blackboard Collaborate.
3. The system which includes all code developed, database schemas and queries designed and implemented will be marked.

[1]The introductory text has been adapted from: https://en.wikipedia.org/wiki/2021_South_African_municipal_elections

(a) Systems which run and perform what they are supposed to do get full marks.

(b) Systems which run but do not perform as required, will receive partial marks.

(c) Systems which do not run will be allocated partial marks based on the functionality they would have exhibited.

4. You may ask the Teaching Assistants for help but they will not be able to give you the solutions.
5. You may utilise any text editor or IDE, upon an OS of your choice. All files and scripts must be uploaded to ClickUP. You can choose to demo from your local connection or `wheatley.`
6. You are required to apply the knowledge acquired from the previous lectures by using java, php, xml and any tool for designing your database schema and ER diagram.

3 Submission Instructions

You are required to upload all your source files and mySQL dump (in an archive) to ClickUP. The functional and data requirements, (E)ER diagram, and the preliminary database dump (after creating the schema in SQL) should be submitted by **5th May 2021** and the rest of the files by **19th May 2021.** Only one submission per group is required on both submission dates. No late submissions will be accepted, so make sure you upload in good time.

4 Online resources

Design and Strategies for Online Voting System: `http://www.ijcaonline.org/archives/volume142/number7/mazumder-2016-ijca-909951.pdf`

Access a free SQL Tutorial at: `https://www.w3schools.com/sql/sql_create_table.asp`

PHP 5 Tutorial: `https://www.w3schools.com/php/default.asp`

PHP Connect to MySQL:`https://www.w3schools.com/php/php_mysql_connect.asp`

Example to connect to the mysql database in java: `https://www.javatpoint.com/example-to-connect-to-the-mysql-da`

XML Tutorial at: `https://www.w3schools.com/xml/default.asp`

There are many other resources online for example Stack overflow – `https://stackoverflow.com/` a platform for developers to learn, share knowledge and build a career.

IMPORTANT NOTE: Make use of your textbook[2] and/or the lecture notes for SQL programming and web programming using php.

[2]Some of the source code examples and database design techniques are in Edition 6 [1]

5 Rubric for marking

System functionality	
Registration of electoral staff members	5
Registration and management of voters	5
Updating information about voters	5
Registration and management of candidates and their posts	5
Voting: No voting more than once; secrecy of voters	5
Vote counting and reporting (overall winning party)	5
Requirements, database schema and (E)ER Diagram	45
Creating your database and tables	20
Using PHP/CSS/HTML/JAVASCRIPT	
Front-end development (both for IEC and Voters)	10
Back-end development	10
Ballot paper design	5
Casting of votes	5
Java	
Connecting java to your database	5
Reporting (extracting data from your database)	5
SQL	
Correct use of SQL scripts	10
SQL injection vulnerability(is your system secure?)	5
Total	**150**

6 Assignment Instructions

Task 1: Determine functional and data requirements ..... (15 marks)
You are required to elicit the functional and data requirements from the scenario as narrated in the Introduction section.

Task 2: Design and create the database ..... (50 marks)
Develop a design for your database by developing a conceptual model which you then map to a logical model, from which you create the database using SQL.

You must include appropriate attributes in your tables.

Task 3: Interface development ..... (20 marks)
Develop interfaces for the IEC staff and voters. The interfaces for the IEC staff must provide for registering voters, updating voting districts, capturing party information for the ballot papers and extracting reports after the elections. Voter interface must make provision for registering for online voting, updating the address information and casting a vote in a secure manner. All interfaces should be developed in PHP/JavaScript/CSS except for the IEC reporting, which needs to be developed in Java.

Task 4: Registration and updating information ..... (30 marks)
Only staff members should be able to register the voters. However, after registration, voters should be able to update their addresses.

Task 5: Ballot paper design ..... (5 marks)
Devise a way of designing and presenting a ballot paper to the voter.

Task 6: Casting of votes ..... (5 marks)
This entails logging in securely and casting a vote by the voter. The system should then store the vote anonymously, that is, by viewing the database, a vote should not be linked to a person.

Task 7: Reporting system ..... (25 marks)
You are required to use java for reporting the state of your database. The winning party should have the highest majority vote.

IMPORTANT NOTE: Please refer to the rubric for the detailed allocation of marks.

References

[1] R. Elmasri and S. Navathe, *Fundamentals of database systems*, 6th ed. Addison-Wesley Publishing Company, 2010.