



## Background Information

Since 1900, the percentage of people living in large cities has grown significantly. In 1900, only 14% of people lived in urban areas. Today, more than half do. This rapid growth has been driven by the industrialization of the planet, but important questions still remain about how extremely large cities can be sustained.



## Problem Statement

In this assignment, students will explore population statistics for the 65 largest cities in the world. By analyzing this data, demographic patterns and trends can be investigated.

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## Instructions

**IMPORTANT:** This is not the actual Exam for your section. You will not receive any credit for completing this project.

**IMPORTANT:** This assignment requires the Windows version of Microsoft Office.

**IMPORTANT:** Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.

1. Download and extract the provided Data Files ZIP file. It contains the following files for use in this assignment:
  - a. **cities.xml** – Data on population and area for various major cities [1].

<b>Table: <i>Cities</i></b>		
<b>Field Name</b>	<b>Type</b>	<b>Description</b>
<b>City</b>	Short Text	Primary key. Name of the city.
<b>CountryAbbrv</b>	Short Text	Abbreviation of the country.
<b>Population</b>	Number	Population of the city.
<b>Area</b>	Number	Area of the city in square miles.
<b>Capital</b>	True/False	Indicator if the city is its country's capital.

- b. **countries.xml** – Data on countries [2], [3].

<b>Table: <i>Countries</i></b>		
<b>Field Name</b>	<b>Type</b>	<b>Description</b>
<b>CountryName</b>	Short Text	Name of the country.
<b>CountryAbbrv</b>	Short Text	Primary key. Abbreviation of the country.
<b>ContinentAbbrv</b>	Short Text	Abbreviation of the country.
<b>Population</b>	Number	Population of the country.



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## Most Populous Cities Problem

2. Create a new Microsoft Access database named ***lastname\_firstname\_er2\_mpcp.accdb***.
3. Import the following items into the database:
  - a. **cities.xml** file – Import structure and data into a new table.
  - b. **countries.xml** file – Import structure and data into a new table.
4. We need to create a new table to store information about each continent.
  - a. Create a table named *Continents* with the fields below. Use appropriate field types and designate a good primary key.

<b>Table: <i>Continents</i></b>	
<b>Field Name</b>	<b>Description</b>
<b>ContinentAbbrev</b>	Abbreviation of the continent.
<b>ContinentName</b>	Full name of the continent.

- b. Enter records for all continents below.

**HINT:** The *Continents* table will contain 7 records.

<b>ContinentAbbrev</b>	<b>ContinentName</b>
AF	Africa
AS	Asia
EU	Europe
NA	North America
SA	South America
AU	Australia
AN	Antarctica

5. Create the appropriate relationships for the following tables. Enforce referential integrity, but do not enable cascade updates or cascade deletes.
  - a. *Cities* and *Countries*
  - b. *Countries* and *Continents*
6. Create separate queries to provide the information requested below. Name each query after the step in which it appears (e.g., name the query in Step 6a as *Query6A* ).

**HINT:** Run your queries to test them. Make sure that they display all and only the records that you would expect to appear.



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- a. Create a query displaying information on cities. List the continent name, country name, city, population, and area. Also, include a field to calculate the number of residents per square mile.

You can calculate the number of residents per square mile using the formula:

$$\frac{[Cities.Population]}{[Cities.Area]}$$

Format the calculated field as a standard-type number with no decimal places. Sort by country name and then by city, both in ascending order.

**HINT:** This query will show 65 records and 6 fields.

- b. We wish to calculate statistics on sprawling cities. Create a query listing the city, country name, city population, and country population. Also, include a field to calculate the percentage of the country's population in the city.

You can calculate the percentage of the country's population living within the city using the formula:

$$\frac{[Cities.Population]}{[Countries.Population]}$$

Only display records for cities with an area larger than 500 square miles. Do not show the area in the results.

Format the calculated field as a percentage with 1 decimal place. Sort by country name in ascending order.

**HINT:** This query will show 33 records and 5 fields.

- c. Create a query to summarize the countries with the largest cities. List, for each country name, the count of cities.

Format the count as a standard-type number with no decimal places. Sort by country name in ascending order.

**HINT:** This query will show 34 records and 2 fields.



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- d. We wish to calculate statistics on capitals. Create a query listing, for each continent name, if the cities are capitals, the average of city populations, and average of city areas.

Only display records for capitals.

Format the averages as standard-type numbers with no decimal places.

**HINT:** This query will show 5 records and 4 fields.

- e. We want to list the largest city in each country. Copy-and-paste this SQL code into a new query:

```
SELECT Continents.ContinentName, Countries.CountryName,
Cities.City, Cities.Population
FROM Continents INNER JOIN (Countries INNER JOIN ((SELECT
Countries.CountryAbbrv, Max(Cities.Population) AS
MaxOfPopulation FROM Countries INNER JOIN Cities ON
Countries.CountryAbbrv = Cities.CountryAbbrv GROUP BY
Countries.CountryAbbrv) AS MaxPopulation INNER JOIN Cities ON
(MaxPopulation.CountryAbbrv = Cities.CountryAbbrv) AND
(MaxPopulation.MaxOfPopulation = Cities.Population)) ON
(Countries.CountryAbbrv = Cities.CountryAbbrv) AND
(Countries.CountryAbbrv = MaxPopulation.CountryAbbrv)) ON
Continents.ContinentAbbrv = Countries.ContinentAbbrv
GROUP BY Continents.ContinentName, Countries.CountryName,
Cities.City, Cities.Population
ORDER BY Continents.ContinentName, Countries.CountryName;
```

**IMPORTANT:** Do not make any modifications to this query other than entering the above SQL code.

**HINT:** This query will show 34 records and 4 fields.

7. Using the Form Wizard, create a form with a subform. The main form should display the country name. The subform must display a datasheet with all *Cities* table fields.

Name the main form *CountryData* and the subform *CountryDataSubform*.

8. Using the Report Wizard, create a report to show the results of the *Query6E* query. Display all fields from the query.

View by cities, group by continent name, and sort by country name in ascending order. Use a stepped layout and landscape page orientation. Name the report *LargestCitySummary*.



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Ensure the full widths of all columns are visible on the report.

9. We need to create a new table to store analysis questions responses.
  - a. Create a table named *AnalysisQuestions* with the fields below. Use appropriate field types and designate a good primary key.

<b>Table: <i>AnalysisQuestions</i></b>	
<b>Field Name</b>	<b>Description</b>
<b>QuestionNumber</b>	Question being answered.
<b>Response</b>	Response to the analysis question prompt.

10. In the *AnalysisQuestions* table, answer four of the five analysis questions below. Respond to one question per record.
  - a. Are there any patterns with the country a city is located in and its population density (number of residents per square mile)?
  - b. Is the capital normally the largest city in a country? How might whether or not a city is a capital impact its population?
  - c. What sort of factors might drive the growth of large cities in developing (lower living standard, lesser industrialized) countries?
  - d. What are some potential risks of having many millions of people living in a city?
  - e. Egypt has two of the world's largest cities in its borders. Ethiopia, which is somewhat larger, has none on the list. Nigeria, which is twice as large, only has one. What might this suggest about these countries' population distributions?
11. Run the Compact and Repair Database utility on your database. Ignore any errors you receive when running the utility.

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## Grading Rubric

This is a practice assignment and is worth no points. A comparable Exam would be worth 100 points and graded using this rubric, with partial credit awarded as appropriate:

Step 3	7.5 points	Step 7	7.5 points
Steps 4a-b	10 points total	Step 8	7.5 points
Step 5	7.5 points	Step 9a	2.5 points
Steps 6a-e	7.5 points each	Steps 10a-e (pick 4 of 5)	5 points each



EXAM REVIEW PROJECT INSTRUCTIONS  
**Exam #2 Review**  
Most Populous Cities Problem

The analysis questions in Steps 10a-e can be evaluated using this rubric:

<b>Standard</b>	<b>Meets Requirements (2.5 points)</b>	<b>Does Not Meet Requirements (0 points)</b>
Answer is reasonable.	Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.	Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.
Answer is supported.	Logical rationale is provided to support the given answer.	Logical rationale is not provided to support the given answer.

## Acknowledgments

The image in the introduction appears courtesy of Jarred Trost [4].

## References

- [1] "List of cities proper by population," *Wikipedia*. Available:  
[https://en.wikipedia.org/wiki/List\\_of\\_cities\\_proper\\_by\\_population](https://en.wikipedia.org/wiki/List_of_cities_proper_by_population).
- [2] "List of sovereign states and dependent territories by continent," *Wikipedia*. Available:  
[https://en.wikipedia.org/wiki/List\\_of\\_sovereign\\_states\\_and\\_dependent\\_territories\\_by\\_continent](https://en.wikipedia.org/wiki/List_of_sovereign_states_and_dependent_territories_by_continent).
- [3] "Population, total," *World Bank*. Available:  
<http://data.worldbank.org/indicator/SP.POP.TOTL>.
- [4] J. Trost, *Chicago skyline*. 2006. Available:  
<https://commons.wikimedia.org/wiki/File:Chicago-Skyline.jpg>.