Assessment 3 and Assessment 4

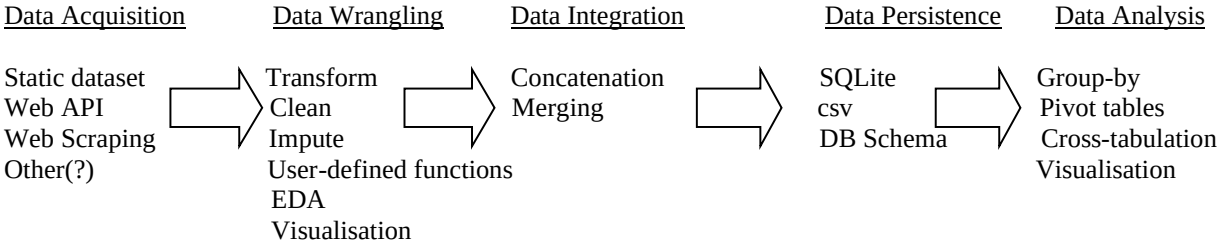
Deadline:	Hand in by midnight May 31 2021
Project 3 Evaluation	100 marks (15% of your final course grade).
Project 4 Evaluation	100 marks (50% of your final course grade).
Work	This assignment may be done in pairs. If you are doing this project with someone else, state this clearly in your submission, together with a document that clearly specifies which tasks each person completed in the project.
Purpose:	Re-enforce and build on data wrangling skills learned so far. Learn how to implement the full process of data acquisition, data wrangling, data integration, data persistence using SQLite, and data analysis using Python.

Assessment 3 and 4 overarching outline:

The goal of these projects is the implementation of a full data analysis workflow using python with the combination of SQLite database persistence.

You are asked to select a domain of interest to you. You may re-use some of the datasets from the previous assignment. Research what kinds of data sources are available for your selected domain. Subsequently, you are asked to (1) formulate questions that you would like answered, (2) acquire datasets from at least two different sources (at least one source must be dynamic, i.e. is web-scraped or is retrieved from a web API), (3) wrangle the data into an usable format and perform EDA, (4) integrate datasets into one, (5) persist the data into a SQLite relational database with a suitable schema, (6) perform group-by queries, pivot tables, cross-tabulation of the data to answer your research questions, together with a rich set of visualisations.

Links to various dataset and web API repositories are provided on Stream. The analysis workflow you are asked to perform is illustrated in the diagram
below:



Assessment 4 Requirements:

Your research report must be in a Jupyter Notebook format and thus executable and repeatable. Clearly introduce your problem domain, articulate your research questions and provide an executive summary at the beginning.

You must document and explain the reasoning behind the coding steps you are taking and provide explanations of all your graphs and tables as is appropriate. Make sure you label all aspects of your graphs.

The activities listed under the five stages in the workflow diagram above are a guide only. This means that operations like group-by statements as well as pivot tables could be a part of the 'Data Wrangling' phase as EDA, and not only a part of the data analysis phase. Finally, please run your report through an external spell checker.

Assessment 4 Marking criteria:

Marks will be awarded for different components of the project using the following rubric:

Component	Marks	Requirements and expectations
Data Acquisition	20	• Diversity of sources (at least one must be dynamic – full marks for using both APIs and web scraping – penalties will be applied for re-using examples from class) • Appropriate use of merging and concatenation.
Data Wrangling and EDA	30	• Quality of your EDA • Appropriate use of visualisations • Thoroughness in data cleaning • Use of user-defined functions
Data Analysis	35	• Quality of the research questions being asked • Diversity of techniques used to answer and present them • Clear and structured presentation of findings • Interpretation and communication of findings and visualisations
Originality and challenge	15	• Originality in problem definition and approach to the analysis • Creativity in problem solving • The degree of challenge undertaken
BONUS		
Big Data Processing Techniques	5	• Demonstration of out-of-core processing • Analysis of query performance issues and optimisations where necessary

Assessment 3 Specific Requirements:

Once you have completed the above components, your task now is to design a database (DB) schema that represents all the data that you have acquired from multiple sources in a normalised form, and to populate it using SQLite, thus achieving full data persistence.

The project requirements are as follows:

- create a separate Jupyter Notebook for these tasks
- create a simple DB schema document that shows the tables (aim for around half a dozen), their attributes and relationships that depict your design;
- create an image file from the schema DB design document and embed it into your notebook
- describe your DB schema at a high level
- write all the database schema code for creating the necessary tables for SQLite DBs
- read in all the data that you have prepared in the above project and which you have stored in various file formats (.csv and/or .xlsx) and populate your tables from the notebook
- perform some analysis that requires extracting data from your DB; write at least six queries that require various table joins on your DB; these queries can replicate or be based on some of the analysis that you performed in the above project. You may also include some visualisations in the notebook.
- create at least two DB Views which encapsulated queries from above and test them

Assessment 3 Marking criteria:

Marks will be awarded for different components of the project using the following rubric:

Component	Marks	Requirements and expectations
Schema Definition	35	• design of a DB schema document and its explanation • creating half a dozen normalised tables that capture all the data • use of correct data types for attributes • definition of primary and foreign keys where appropriate • definition of indexes where appropriate • definition, implementation and explanation of constraints where necessary
DB Population	20	• automation of reading files from flat-files and writing data into SQLite tables • performing checking that the data has been persisted in the SQLite DB
SQLite Queries	35	• complexity of queries (these should be much more than simple SELECT statements) • diversity of queries • readability and structure of the SQL code • explanation of the queries and results
DB Views	10	• creation of two DB Views • testing out the views

Hand-in: Submit your zipped notebook(s) file together with your final datasets and SQLite database, via the Stream assignment submission link**.**

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***** Plagiarism *****
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It is mandatory that any assessment items that you submit during your University study are your own work. Massey University takes a firm stance on academic misconduct, such as plagiarism and any form of cheating.

Plagiarism is the copying or paraphrasing of another person's work, whether published or unpublished, without clearly acknowledging it. It includes copying the work of other students and reusing work previously submitted by yourself for another course. It also includes the copying of code from unacknowledged sources.

Academic integrity breaches impact on students as it disadvantages honest students and undermines the credibility of your qualification. Plagiarism, and cheating in tests and exams will be penalised; it is likely to lead to loss of marks for that item of assessment and may lead to an automatic failing grade for the course and/or exclusion from reenrolment at the University.

Please see the Academic Integrity Guide for Students on the University website for more information. The Guide steps you through the University Academic Integrity Policy and Procedures. For example you will find definitions of academic integrity misconduct, such as plagiarism; how misconduct is determined and managed; and where to find resources and assistance to help develop the skills of academic writing, exam preparation and time management. These skills will help you approach university study with academic integrity.