Data and Analytics Group Questions

Please answer the following questions in your preferred format. Unless otherwise specified, feel free to use any language or pseudocode. Some of these prompts are deliberately open-ended. You can absolutely include any design assumptions in comments where applicable.

1. Design an Employee database for an organization. Constraints are:
   a. An Employee can be part of only one Department at a point in time
   b. An Employee can have only one Manager at a point in time
   c. He/she can receive Reviews from multiple peers for performance reviews but only one downward review

   Please draw the ER diagram and come prepared to write some queries on your designed system.

2. Write an example implemenation for the following design patterns:
   a. Memento
   b. Façade
   c. Template

3. Given a sorted (increasing order) array with unique integer elements, design an algorithm to create a binary search tree with minimal height.

4. Using the attached HTML template in abc.zip, create a function renderResults that takes in a tree node object of the format in data.json and renders a table in the div with id "result". Each leaf node in the tree should result in a table row. There should be a column for:
   a. The name of each non-root parent node
   b. The name of the node
   c. The population and population_prior_year properties
   d. A "change in population" column, which shows the difference of the prior two properties. Cells with a negative change in population should appear red.

   Consider how this function would behave with a tree of a different depth, or a null or empty set.