Design and Development of an OLAP Based Analysis of Multidimensional Urban Welfare Data

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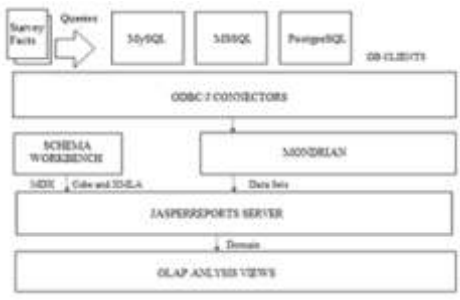
Abstract:

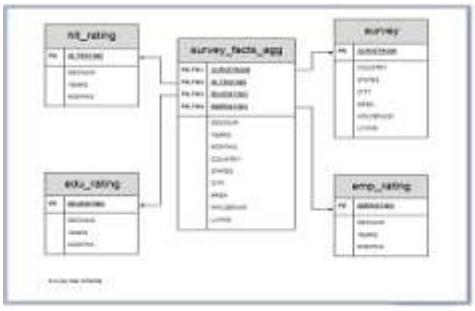
Urbanisation is a global phenomenon with more than half the world population now living in urban areas. Citizen welfare data, such as health, employment and education, is surveyed periodically and analysed by researchers from the government and non government organisations. Currently these researchers employ traditional database management and analysis tools such as spread sheets and tables. OLAP is one of the technologies widely used to analyse and view multidimensional data sets specifically designed for the analysis of large data volumes and for flexible aggregations along multiple dimensions. Multidimensional modeling of such data combined with On-Line Analytics Processing (OLAP) will enable a better representation and help the researchers to carry out detailed analysis in an efficient manner.

In this project, a multidimensional modeling, querying, analysis and graphical visualisation of urban welfare statistical data is carried out. Appropriate dimensions, levels and measures are identified to represent the various facts of survey to include welfare factors such as health, education and employment across time and place. The multidimensional design is represented as an OLAP cube using Jaspersoft R-OLAP framework. The corresponding relational database is designed and implemented using MySQL RDBMS. The relational database is populated with the factual welfare data. A basic set of MDX based multidimensional queries were developed to test and validate the developed multidimensional database design.

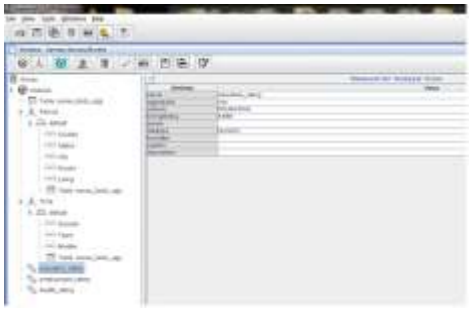
Multidimensional exploration and analysis techniques of drill-down/up and aggregation are employed to analyse the data with the help of the Business Intelligence (BI) software. The results are represented in terms of reports and graphical visualisation. Plots, charts and graphs were employed to provide visualisation of the analysis results. The results have demonstrated the efficacy of multidimensional modeling and analysis of urban welfare data.



Architectural design



Star schema



Cube design

Performance analysis graphs