



Case Study

Implementing a Statistical Database Using Business Intelligence Tools and Data Warehouse Concepts

BUSINESS SITUATION

DFAT has been using their custom built Statistical Analysis and Reporting System (STARS) with data going back 25 years but it is expensive to support and maintain and its inflexibility and unfriendly user interface have hampered productivity & usage

REQUIREMENT

The development & implementation of a new data warehouse that replaces DFAT's traditional statistical database

SOLUTION

The STARS application was completely redeveloped using the latest Microsoft technologies and state of the art Business Intelligence tools and OLAP cubes

SOFTWARES

Microsoft's SQL Server
ComOps BI Tool

"This new system represents a quantum leap in technology and capability for the Market Information and Analysis group in DFAT."

The Department of Foreign Affairs and Trade (DFAT) provides foreign and trade policy advice to the government and is the lead agency managing Australia's international presence. DFAT manages a network of 89 overseas posts in five continents and has over 3400 staff - including locally engaged staff - located in Canberra, state and territory offices and overseas posts. DFAT has an information, communications and technology (ICT) platform that allows them to transmit classified and unclassified messages quickly across their overseas network. The department's role is to advance Australia's national interest.

Working closely with DFAT, CDC Praxa implemented a data warehouse that replaced their traditional statistical database using third generation languages and tools. The replacement system is a data warehouse with an analysis and reporting system using state of the art Business Intelligence tools and OLAP cubes based on a MS platform.

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BACKGROUND

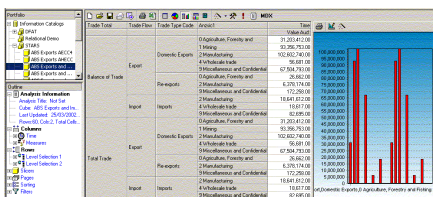
DFAT has been using a custom built Statistical Analysis and Reporting System called STARS on their mainframe, containing international trade data going back over the past 25 years. STARS provides the department and external users with the capability to analyse and report on foreign trade data, both imports and exports. Data is sourced from the Australian Bureau of Statistics and the UN World Trade Organisation and provides details of commodity trade volumes and trade values between reporting and partner countries.

A large number of standard reports are provided to allow reporting of trade by any combination of reporter country, partner country, and commodity.

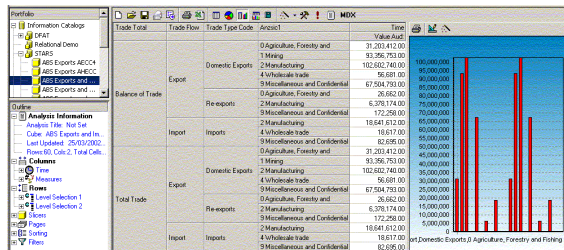
The mainframe system used for STARS was shared with Passports and other systems which imposed limits on the available processing power and the time windows when data loading could be done. The original STARS was written in PL1 and DB2 making it expensive to support and maintain. The user interface is difficult to use, and the systems inflexibility prevented users from creating new reports, adding additional analysis columns or formatting reports as required for publication. For these reasons a decision was made to replace STARS with a new system employing the latest in hardware and software technology.

Technology Application:

The technical architecture proposed by CDC Praxa utilises the data warehousing capabilities of SQL Server 2000 to build star schemas in the data warehouse, and uses Data Transformation Services (DTS) to extract, transform and load the data warehouse. SQL Server Analysis Services were used to build OLAP cubes for analysis and reporting. The user interface is



provided by the ComOps BI tool which is used to provide analysis and reporting capabilities, with some reference tables maintained in a Visual Basic application. Standard Reports were developed using ComOps BI, and for the more complex reports using Active Reports 2 which is part of ComOps BI. The application runs on two Windows 2000 servers at DFAT; one for the data staging environment, and the other for the production database, OLAP cubes and ComOps BI Server.



Solution:

The STARS application was completely redeveloped, using the Microsoft technologies and was approached as a full data warehouse lifecycle development. Analysis revealed the need for some new data items to be captured, and for the Extract, Transform and Load (ETL) processes to be more automated. The data warehouse approach using business intelligence tools was endorsed by DFAT, and the ComOps BI tool was chosen because of its versatility, and good fit to the requirements. Being an Australian company, there was an added advantage that ComOps could customise the tool to meet DFAT requirements. This was especially important, as the existing STARS application is a very mature system with some unique requirements that would provide a challenge to any BI tools vendor. The final design created 11 OLAP cubes with 21 shared dimensions to accommodate all the required query parameters. Additional dimensions which were not in the original system provided the ability to analyse trade data by state of origin, or destination (Australian data only), mode of transport and values in any of 5 currencies.

Ad hoc reporting and analysis is provided with trade values and/or trade volumes being available by reporter and partner country, state of origin/destination, mode of transport, trade type (imports and/or exports), over selected time periods, and for a number of different commodity classifications. Additional dimensions are provided to allow analysis of import tariff details for Australian imports. Data is available back to 1988 in most cases.

Benefits:

A Data Warehouse and OLAP cubes overcomes the limitations of OLTP systems to provide a better solution for applications which emphasize analysis and reporting rather than the traditional transaction processing. The decision to adopt a data warehouse and business intelligence approach for the project was based on the following key benefits which would derive from such an approach—see right table:

Aggregations and Summaries	Easy data aggregation, with the OLAP cubes calculating aggregations automatically. Other calculations such as matrix operations, statistics, forecasting, financial and time formulas are all available in the tool.
Query Response	Faster response through automatic pre-aggregation of totals in the OLAP cubes. Together with smart caching this provides consistently superior query responses.
All in one tool	Using the ComOps BI tool more of the complex reporting and formatting has been achieved using the ComOps BI and Active Reports tools. This reduced the need to 'massage' reports in Excel prior to publishing.
Analysis Capability	Business Analysis is performed using a tool designed for analysis, with many built-in 'time' functions and other calculations reducing the possibility of errors.
Speed of business analysis	The OLAP Cubes and BI tools are designed to assist users to perform analysis with minimum effort. Functions such as drill down, slice and dice, and layout changes can all be done quickly and efficiently, allowing true investigative analysis to be performed with far less effort than older style tools.
Standard Reports	All reports have been developed in ComOps and/or Active Reports. Reports can be viewed using the ComOps viewer, with the ability to open the underlying query in ComOps BI tool for further investigation or refinement.
Advanced Reports	Advanced Reports can be developed by 'power users' in ComOps BI and made accessible to users through the standard viewer. These reports are managed in a Portfolio as part of the ComOps tool.
Ad-hoc queries	The ComOps BI supports a very flexible and versatile ad-hoc query capability with extensive charting functionality available to both the 'power user' and the novice using an intuitive user interface.
Exporting and publishing of data	Data can be published in a variety of formats including PDL, HT, or Excel. A user can simply click on an XL icon to export to Excel; Or publish data as a ComOps Report, with or without Analysis capability; Or save the data extract as an online Query. Reports can even be easily be e-mail in a variety of formats.
Analytical functions	This approach includes many standard, built-in analysis functions, including '% change', 'This period vs Previous Period', 'Total YTD compared with Last Year YTD for same period', 'Pareto Analysis' (80/20 Rule), 'Ranking', 'Top n', 'Bottom n', and many more
Metadata	OLAP cubes have in-built metadata that describes the structure and hierarchy of the data in the cube. This allows the user to drill down through the cube, and select the required level of information or data within a level, without the user having to know and understand the data structure.
System Architecture	This architecture embodies the current best practices and provides a platform that will provide extensibility and flexibility for the future, extending the lifetime of the STARS system.

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