# Unit 11 Notes

## Business Intelligence Applications

### Introduction

Business Intelligence (BI) applications are the primary DW/BI component accessed by the business users. For many of these users, this is also the only DW/BI component that they actually interact with. Therefore, BI applications are essential to a DW/BI system and face high expectations.

The main types of BI apps are depicted in Figure 1-1 (pp 475) and described on pp 479-480. **Direct access query** and **reporting** tools allow users to directly query the DW data. These tools range from ad-hoc tools that only deliver tabular reports, to more advanced tools that generate fully-featured reports. **Standard reports** are predefined both in terms of contents and format. They allow for some customization based on changing parameter values and the level of detail. **Data mining** tools search for useful patterns and relationships within the DW data. **Analytic applications** are managed sets of reports that often embed domain expertise and data mining models. **Dashboards** (Figure 11-3 on pp 491 shows an example) and **scorecards** offer a combination of reports and charts that highlight exceptions and offer drilldown capabilities to analyze data for multiple business processes. **Operational BI** apps analyze data for multiple business processes to guide operational decision making.

As a DW/BI system can have hundreds of BI apps of various types, they need to be organized into a higher level interface called a **BI Portal** (Figure 11-4 on pp 501 shows an example). The portal enables users to navigate the BI apps and standard reports. The best portal uses the organization's business processes as the main outline for BI apps. In addition, a typical portal offers a search tool that allows users to search for reports using keywords and metadata, a metadata browser, and a user forum. A portal also allows for home page personalization by users.

Designers and developers of the BI apps need an excellent understanding of the process followed by business users for making analytic decisions. This process is called the **analytic cycle**, and it offers many guidelines for BI app designers and developers. The analytic cycle has five stages as shown in Figure 11-2 (pp 477). In the first stage (Monitor Activity), business users check the standard reports and compare the results with the plan or the previous period. BI apps for this stage include portals, dashboards, and scorecards. Many DWs stop at this stage. The second stage (Indentify Exceptions) looks for exceptions from normal performance, as well as opportunities, using visualization tools such as trend lines and geographical maps. The third stage (Determine Causal Factors) looks for the causes of the exceptions. To this end, it uses statistical tools and data mining tools to identify association, classification and cause-and-effect relationships. The fourth stage (Model Alternatives) evaluates alternative decisions as what-if scenarios, looking for the best decision. It uses similar tools as stage four, plus simulation tools. The fifth stage (Take Action and Track Results) communicates the best decision and related actions back to the operational system and the other interested parties.

## BI Tools

Effective BI applications present the right information to the right people at the right time. Executives usually require summary reports, dashboards and scorecards. A summary report can be augmented with minimal textual information explaining the trends or deviations from target. Department managers, on the other hand, typically require **drill down** and **slice and dice** capabilities. To "drill down" means to select an information item out of a set, and to analyze it into further detail. For instance, drilling down into the annual regional sales report could involve analyzing the annual sales numbers at a monthly level to understand the trends across the period or drilling down further at a day level to assess the trends across certain days of the week. "Slice and dice" refers to the various dimensions or characteristics used to analyze the factual information. The annual sales information ($) might be presented with columns such as region. This information could also include states in the region, to analyze sales distribution by state. This information might help make strategic decisions such as store closings in states that are running at a loss or store openings in states that are profitable.

Recent BI tools provide increased functionality and efficiency. Many hours of work have been reduced to seconds. The tools offer pre-written functions and formatting features. They also enable multi-dimensional analysis, provide capabilities to execute reports across multiple data sources on the fly, provide an array of "drag and drop" functions to use in reports and also provide scheduling and delivery features for reports to be run and delivered to user's inbox in a preferred format. The goal should still be to perform as many calculations on the database layer as possible, and provide as much pre-calculated information to the BI application layer as possible, in order to save the end user's time. The tools also provide security features that enable LDAP authentication and options to control security at row and column level. Users can create and share reports, or save them in public folders provided by the tool.

Most reporting tools have an underlying semantic layer that hides the complexity of database details and relationships from the end user. The semantic layer provides business friendly terminology and definitions to entities and attributes (tables and columns). Report designers and developers go through a comprehensive requirements gathering and business analysis process to deploy the semantic layer, which can then be used to create canned and ad-hoc reports. Business Objects, a popular BI tool, calls this semantic layer 'Universe'. The semantic layer can provide an intuitive querying mechanism to users, and can control how users query the data. For instance, consider a data mart layer that contains information that was gathered over multiple years. The semantic layer can be set up so that users always get prompted to select a year to direct queries against data that belongs to a specific year.

Controlling the creation, sharing, and retirement of thousands of reports is a serious challenge for today's enterprise. The typical company spends quite a bit of time selecting a reporting tool, and then spends a lot of time and effort convincing and training users to adopt the new tool. A team of report designers and developers is dispatched to create the semantic layer and a set of canned reports. The users also create and save numerous ad-hoc reports. Their effort is duplicated and wasted with the creation of redundant reports because of minimal governance and controls. Effective management of all these reports over time requires improved governance, standards, processes, and controls.