CHAPTER 1

Enterprise Resource Planning, Business Intelligence, Data Warehouses, and SAP BW

In This Chapter:

Enterprise resource planning (ERP)
SAP R/3
Business intelligence
Data warehousing
OLAP
ERP data warehousing
SAP Business Information Warehouse (SAP BW)

This chapter provides a general overview and background to enterprise resource planning (ERP), SAP R/3, business intelligence, data warehousing, OLAP, and the SAP Business Information Warehouse (SAP BW), the main themes of this book.

The contents in this chapter are not explicitly tested on the exam, but provide important background information. This section will assist you in answering general-purpose questions on the exam related to these topics.

Enterprise Resource Planning

Enterprise Resource Planning Systems (ERP) are commercial software packages that facilitate the seamless integration of all the information flowing through a company—financial, accounting, human resources, supply chain, and customer information. ERP systems fundamentally integrate the different processes necessary in a business into a centralized pool that facilitates data sharing and eliminates redundancy. ERP provides information management and analysis to organizations.

The major benefits of ERP systems include:

- On-line/real-time information made available throughout all the functional areas of an organization
- Improved data standardization and accuracy across the enterprise
- "Best practices" included in the applications
- The efficiency gained throughout an organization
- The analysis and reporting made available for long-term planning

The major players in the ERP software industry are Baan, J. D. Edwards, Lawson, PeopleSoft, Oracle, and SAP. Examples of ERP modules are human resource management systems (HRMS), financials, manufacturing, distribution, and sales. Each ERP module offers different functionality for different industries.

SAP R/3

The German software company SAP AG is the market leader in the ERP arena. Systems, Application and Products in Data Processing (SAP) consists of highly integrated software modules that perform common business functions based on multinational leading practices.

SAP R/3 is the third generation of SAP software. SAP R/3 is based on a client/server architecture and uses a relational database to track all information related to a corporation. SAP R/3 runs on several operating systems, including UNIX, Windows NT, and AS/400, and can use different database management systems, including Oracle, DB2, Informix, and Microsoft SQL Server.

The SAP R/3 client/server system architecture is built around several modules or applications. A module is a set of transactions that deal with the same area of business functionality. The current modules of SAP R/3 include:

- FI—Finance
- CO—Controlling
- MM—Materials Management
- HR—Human Resources
- PM—Plant Management
- PP—Production Planning
- LO—Logistics
- SD—Sales and Distribution

One of the reasons for the success of SAP R/3 is the tight integration of the business applications. One event in one module, such as materials, automatically triggers response in the others, such as sales, finance, and plant maintenance. For instance, when a customer places an

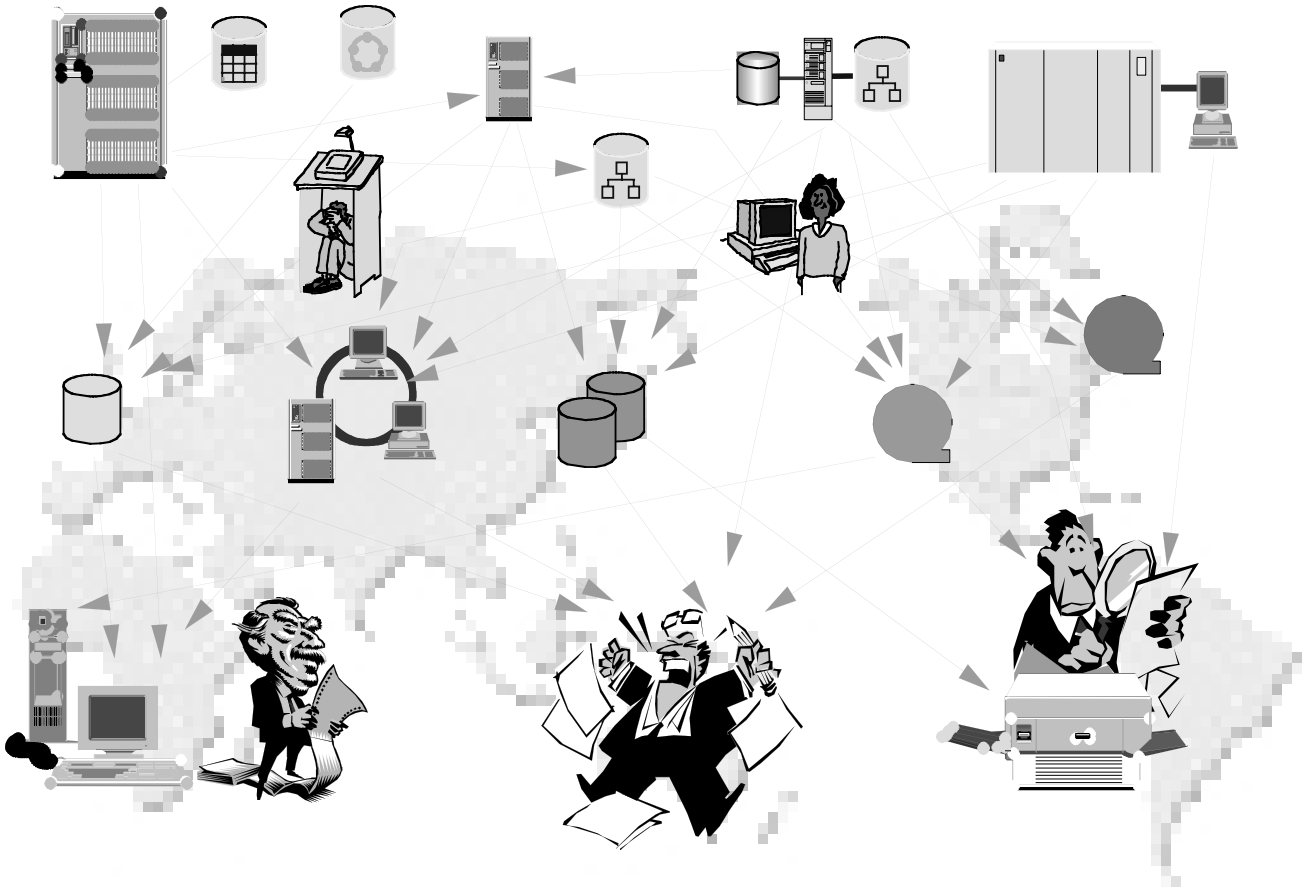
order, a purchase order is created, an inventory is created, appropriate documents are created, and so on. This functionality is a major advantage compared to that offered by other vendors who simply package the business functionality in one box with limited integration.

Business Intelligence, Data Warehousing, and On-line Analytical Processing

Data Warehousing and Business Intelligence

The twenty-first century belongs to those who exploit information as a strategic enterprise resource. Today's decision makers urgently need accurate information on production, sales and markets, finance, and personnel to obtain a complete and up-to-date picture of their business and environment. As illustrated in Exhibit 1.1, that information is usually spread throughout the corporate IT structure, on a wide variety of platforms and in a wide range of applications. In other words, getting hold of vital facts and figures can be a complex and time-consuming task.

Exhibit 1.1 **Business Intelligence Reality: Islands of Information**



The technical concept for meeting this data challenge is known as *data warehousing*. A *data warehouse* is a separate application environment with a dedicated database drawing on diverse data sources and designed to support query and analysis.

"Business Intelligence is the process of transforming data into information and transforming that information into knowledge through discovery."[1] Data warehousing and other business intelligence tools give meaning to all of that "useless" data. Using data warehousing and business intelligence functions, strategic decision makers can analyze, slice and dice, query, and generate reports. Closer integration of corporatewide data warehousing data with ERP data potentially enhances companies' return on their ERP and data warehouse investments.

On-line Analytical Processing

One significant functional component of business intelligence is *on-line analytical processing (OLAP)*. The OLAP Council defines OLAP as a category of software technology that enables analysts, managers, and executives to gain insight into data through fast, consistent, interactive access to a wide variety of possible views of information that has been transformed from raw data to reflect the dimensionality of the enterprise as understood by the user.[2]

OLAP functionality is characterized by dynamic multidimensional analysis of consolidated enterprise data supporting end-user analytical and navigational activities, including:

- Calculations and modeling applied across dimensions, through hierarchies, and/or across members
- Trend analysis over sequential time periods
- Slicing subsets for on-screen viewing
- Drill-down to deeper levels of consolidation
- Reach-through to underlying detail data
- Rotation to new dimensional comparisons in the viewing area

While OLAP systems can answer "who and what" questions, it is their ability to answer "what, if, and why" questions that differentiates them from data warehouses. OLAP enables decision making about future actions. A typical OLAP calculation is more complex than simply summing data, for example, "What would be the effect on soft drink costs to distributors if syrup prices went up by $.10/gallon and transportation costs went down by $.05/mile?"

OLAP and data warehouses are complementary: A data warehouse stores and manages data. OLAP transforms data warehouse data into strategic information. OLAP ranges from basic navigation and browsing (often known as "slice-and-dice"), to calculations, to more serious analyses such as time series and complex modeling. As decision makers exercise more advanced OLAP capabilities, they move from data access to information to knowledge.

ERP Data Warehouses

The demand for data warehousing functionality for ERP systems has been growing exponentially as companies strive to gain and maintain a competitive advantage and executives are realizing that an ERP implementation alone does not provide the business intelligence edge that they need to take full advantage of emerging front-office applications such as supply chain management, sales force automation, and customer relationship management.

To improve the quality and accuracy of decision making in these areas, decision makers and business analysts need full integration and access to ERP and other source system data. However, some major hurdles prevent the flow of ERP data to business intelligence systems such as data warehouses. In response to these challenges, ERP vendors, data warehousers, and third-party tool vendors developed numerous products and solutions to meet this demand.

Aside from building a data warehouse from scratch, the three basic categories of vendor-based data warehousing solutions include:

1. Solutions from third-party vendors that analyze data within ERP systems
2. ERP-based solutions that analyze data within ERP systems
3. ERP-based solutions that build data warehouses outside their ERP systems

An ERP-based data warehouse is a classical, external data warehouse or data mart built with tools offered by an ERP vendor. Oracle and SAP are currently the only major ERP vendors with such offerings. Sooner or later other ERP vendors such as PeopleSoft and Baan will enter the market.

Limitations of ERP Data Warehouses

There has been a lot of skepticism about ERP vendor offerings of data warehouses. Wayne Eckersen, vice president of the Data Warehouse Institute,[3] stated that:

> The promise of closed-loop decision support gives the ERP vendors an advantage in building next-generation data warehouses. But making the leap from transaction systems to analytic applications involves a radical shift in the way systems are designed, developed, and used. It's not self-evident that ERP vendors will master the art of building decision support tools or analytic applications, let alone linking the two together to create a closed-loop environment. This gives data warehousing vendors an opportunity to compete as the markets for ERP systems and data warehouses converge.

Data warehouse professionals are not the only skeptics of ERP-based data warehousing solutions. In an article entitled "ERP Users Face Data Warehouse Dilemma,"[4] Frank Gillette, a Forrester, Inc. analyst, expressed doubt that ERP vendors are qualified to build data warehouses, saying, "You do not want to have data extraction and transformation going on in the same database that you run your transactions in."

The prime reason for this skepticism by the analysts in accepting ERP data warehouse initiatives can be traced back to the "cultural issues" as Naeem Hashmi, CTO of Information Frameworks, documented in his article "Mix It Up."[5] This article explains what ERP data warehousing really means and identifies the traditional and ERP-centric data warehouse evolution and the cultural issues.

Three major limitations of ERP applications prevent the productive flow of data for business intelligence:

1. ERP applications are designed to support high-volume transaction-level activity using highly normalized data structures; they are not designed to support business intelligence functions such as ad-hoc querying, reporting, and analysis.

2. ERP applications do not store historical data that are needed for trend analysis.
3. Finally it is notoriously difficult to access and analyze data in ERP applications, especially in SAP. Therefore ERP's limitations cause considerable difficulty when linking business intelligence and ERP technologies.

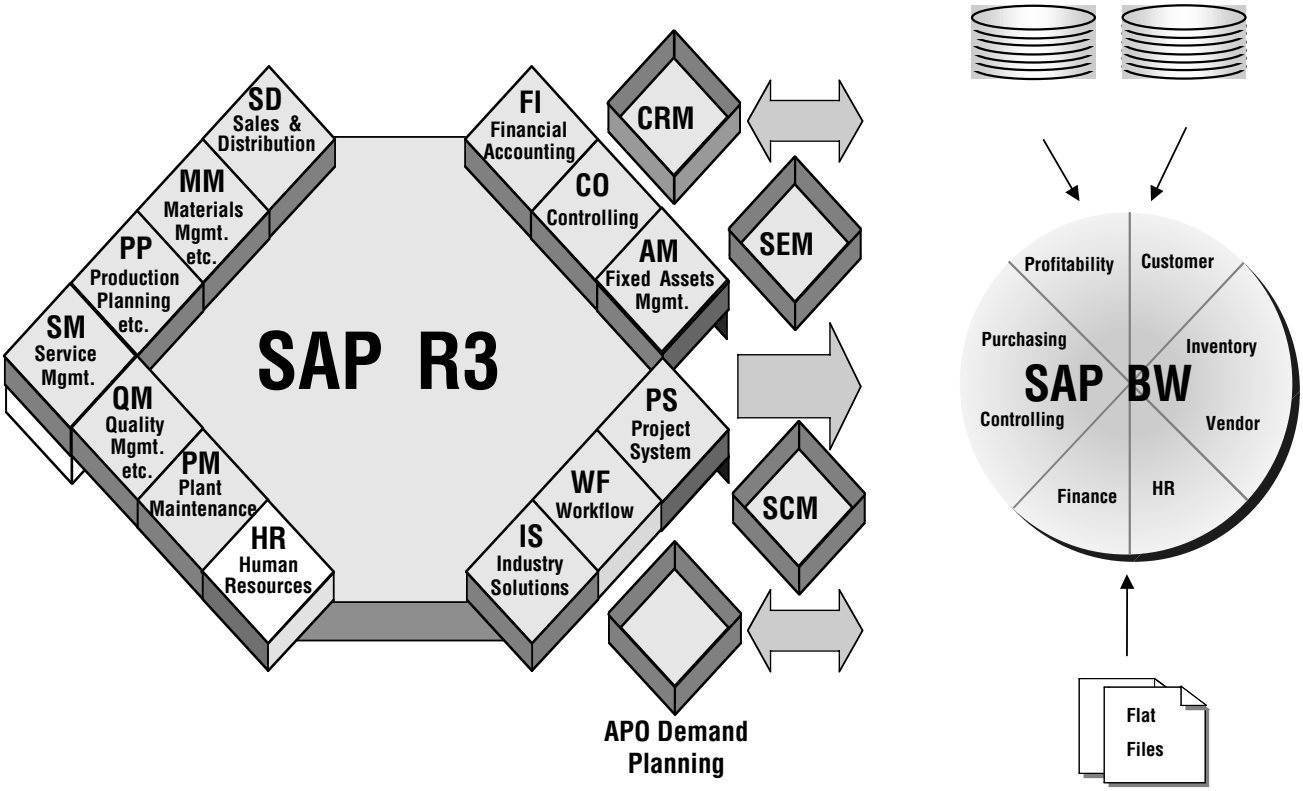
SAP Business Information Warehouse (SAP BW)

The SAP Business Information Warehouse (SAP BW) is a state-of-the-art, end-to-end data warehouse solution developed by SAP. As pictured in Exhibit 1.2, SAP BW provides knowledge workers and decision makers with rapid access to data from SAP R/3 systems, other enterprise applications, and external sources, such as Nielsen.

Based on proven SAP R/3 client/server technology and exploiting SAP's acknowledged business expertise, SAP BW combines state-of-the-art data warehousing technologies with SAP AG's expertise to create an end-to-end solution. It includes all the components required for installation, use, ongoing changes, and maintenance of a data warehouse.

The content-rich SAP BW sets a precedent for speed and ease of implementation and maintenance because it is preconfigured with intelligence about a company's business

Exhibit 1.2 **SAP BW Integrates Data from SAP R/3 and Other Enterprise Applications**



processes, providing a faster return on information. This new-generation solution provides users with a comprehensive view of data across an organization, including SAP R/3-based data as well as data from other systems.

SAP BW Drivers

When the ERP environment is SAP, the majority of the users face multiple problems in accessing, analyzing, and reporting of data. These problems prevent end users from easily accessing both current and historical data for better decision making.

It is difficult to extract customized reports from SAP R/3 and access enterprisewide analytical data while users are provided with a limited set of options:

- Build custom programs for each new reporting requirement.
- Use SAP's predefined reports—if you know where to find them.
- Do without the data.

Custom SAP reports can be written using Advance Business Application Programming (ABAP), a proprietary SAP coding language. ABAP reports, while costly, do not solve the problem because:

- *They are static*. They do not support ad-hoc querying capability.
- *They are expensive to maintain*. All changes have to be manually incorporated by ABAP programmers.
- They negatively impact the performance of the transaction system.

Integration of SAP and non-SAP data is difficult because data extraction from SAP is a difficult task and requires knowledge of SAP data structure and contents. As a consequence, flexible access to enterprisewide information becomes very difficult. Many organizations have tried to solve this problem by building data warehouses taking data feeds from SAP and non-SAP systems.

Alternative solutions exist but lack flexibility and ease of use. These attributes are essential if the data are to be exploited profitably. None of the available approaches optimally address key aspects of a desirable solution:

- *SAP R/3 ERP information systems*. While the SAP Logistics Information Systems are quite flexible in permitting multidimensional querying, significant issues remain:
  - All the data that compose the multidimensional cubes have to be available in SAP R/3 whereas most organizations have a significant amount of enterprisewide data in non-SAP transaction processing systems.
  - Use of the Logistics Information System (LIS) requires significant training, and end users need knowledge of SAP data before LIS cubes can be customized.
  - The execution of queries to LIS has a negative impact on SAP/R3 transaction processing performance.
- *Third-party solutions*. Third-party solution products are available to extract data out of SAP from multiple vendors. These products are components of a business intelligence solution rather than being an end-to-end solution.
- *Custom data warehouse solutions*. The creation of custom data warehouses taking data feeds from SAP and non-SAP systems is usually an expensive project that takes years to implement and usually has limited success due to the following issues:

- If the Metadata in the data warehouse are not synchronized with SAP/R3, the data warehouses can quickly lose relevance.
- Extracting data from SAP R/3 to obtain the data feeds has traditionally been a difficult task, because it relies on the underlying data model and data definitions.
- The integration effort is often plagued with difficulties, because different OLTP systems utilize disparate data.

SAP BW Features and Functionality

SAP BW is an end-to-end data warehousing solution with multiple features and functionality:

- The SAP BW server includes an OLAP engine and a metadata repository, both of which are preconfigured with business content, saving the time and money that would be necessary to build a data warehouse from scratch. The SAP BW server is designed to provide fast retrieval, interpretation, and preparation of the information stored in its data stores.
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The Business Explorer provides customers with a new easy-to-use multidimensional data access interface. The Business Explorer's navigation capability allows customers to build a personal catalog of reports for ongoing or recurring queries and reports displaying data using Microsoft Excel.
  - In addition to Business Explorer, the latest version of SAP BW 3.0 also includes a new Web-based multidimensional analysis environment to develop and publish analytical applications for the Internet community.
- Automated data extraction and loading capabilities supply the SAP BW server with data from SAP R/3 applications, SAP R/2 applications, and non-SAP applications and external sources using flat files or using certified third-party extraction tools for any other data source.
- The Administrator Workbench, another feature of SAP BW, provides a single point of control for creating, monitoring, and easily maintaining the complete data warehouse environment, reducing the total cost of ownership to customers.
- SAP BW embodies all the advantages of leading-edge SAP R/3 BASIS technology with its multitier architecture: security, integrity, scalability, high availability, and interoperability within a uniform environment.
- Desirable reporting architecture and features:
  - SAP BW includes a proven, consistent enterprise data model for the application of business rules to data. This builds on the enterprise model of SAP R/3 and greatly facilitates data warehouse implementation and management.
  - Preconfigured information models and reporting templates help users generate reports quickly and simply.
  - SAP BW supports predefined standard reports and ad-hoc analysis; both allow drilldown and multidimensional views.
  - Users can define their own collections of favorite reports, enabling them to access relevant information at the "touch of a button."
  - SAP BW is built for high performance. It resides on its own dedicated server. OLTP and reporting activities are therefore separated, and OLTP system performance is not compromised. Report caching mechanisms have also been carefully designed to maintain high performance.

Benefits of SAP BW

SAP BW remains open to different source systems and it will also come as a pleasant surprise for its ease of introduction and maintenance. SAP BW includes a broad range of predefined reporting templates geared to the specific needs of particular industries and user types, such as production planners, financial controllers, or human resources directors.

When implementing the Business Information Warehouse (SAP BW), customers obtain the following benefits:

- *Fast business intelligence solution.* As a business component of SAP R/3 Business Framework, SAP BW can be implemented quickly, especially when compared to a custom data warehouse solution.
- *Data access*. SAP BW significantly reduces the data load time, thereby providing global access to data on a timely basis and significantly lower maintenance and overhead costs.
- *Increased performance on the R/3 OLTP system*. The integration of decision support functionality into the existing business applications environment does not compromise the performance of the OLTP systems; on the contrary, it takes the reporting load away from the OLTPs.
  - *Open solution*. SAP BW is not limited to sourcing data from SAP R/3 and interfaces with third-party extract, transform, and load (ETL) tools and other systems through flat files.
  - *Function-rich solution*. SAP BW offers a wide range of powerful reporting and analysis features for effective exploration and interpretation of data.
  - *Adaptable solution*. SAP BW is designed to adapt to changes made to the business processes or IT environment. In addition, the Administrator Workbench provides effective support for easy maintenance of SAP BW and quick implementation of changes.
  - *Robust, business-driven solution*. Based on proven SAP expertise in SAP R/3 technology and business processes, SAP BW is built to answer the specific information needs of decision makers in all industries reliably and effectively.

Limitations of SAP BW

SAP BW was first introduced to the market by SAP AG in 1998 with version 1.0A. By all reasonable criteria, SAP BW is still a relatively new product and still in development as of this writing; SAP is providing functional updates every two weeks. As such, initial versions of SAP BW have been criticized for some of their limitations.

In 1999, William Inmon, the "founding father of data warehousing," criticized the architecture of the current SAP BW release (1.2) in his white paper, "SAP and Data Warehousing."[6] He noted the limitations of SAP BW as a true data warehouse solution, including:

- The redundancy in data movement and storage
- SAP's "open" interface is somewhat constraining in use and applicability.
- The SAP BW metadata repository only imports directly from SAP R/3 sources; non-SAP R/3 sources require manual managing of metadata.
- SAP BW requires an underlying star schema.
- Each cube is limited to 16 dimensions, three of which are reserved.

- The end-user interface of choice in SAP BW is Microsoft Excel extended through Visual Basic for Applications (VBA) macros.
- The lack of a true operational data store (in the data warehousing sense)
- The lack of accessibility by non-SAP tools to the data in the staging area
- The complexity of the creation and maintenance of the interfaces between SAP R/3 and the InfoCubes.

The most critical shortcomings noted above have already been addressed by SAP in later releases of the product. For instance, SAP has improved the architecture of SAP BW, and the Operational Data Store in SAP BW 2.0 is now a *true* Operational Data Store. Other limitations are being addressed as SAP is adding new features and functionality with every new release.

For instance, in release 3.0, SAP BW provides:

- Closed-loop analytical applications
- Open standards in heterogeneous environments
- Platform for e-business solutions
- Hub-and-spoke capability as an option in BW 3.0B

For further details on enhancements available with SAP BW 3.0, refer to "Development News for SAP Business Information Warehouse" (*www.service.sap.com*) and to Appendix D.

SAP BW's Competitors

Competition for SAP BW comes from ERP and data warehousing vendors, including:

- Other ERP vendors
  - Oracle
  - PeopleSoft
- Data warehouse tool vendors
  - Extraction tool vendors—extraction from legacy to SAP BW
    - ACTA
    - Informatica
  - Front-end tool vendors (can integrate with SAP BW)
    - Cognos
    - Business Objects
  - OLAP vendors—coupled with *many* analytical application vendors
    - Essbase/Hyperion
    - Microsoft SQL Server—Data Warehouse Consortium
  - Partnerships of these vendors
- Internally developed data warehouses

Future of SAP BW

There should be an explosion in the demand for SAP BW. First, demand from end-user companies needing expertise in the integration of ERP data into corporatewide data warehouses is growing exponentially. This trend is due to several business and technology drivers:

- Acquisitions and mergers lead to the requirement of consolidated data from disparate systems to perform decision support activities.

- *Integration of disparate systems*. To develop a comprehensive Business Intelligence solution, a data warehouse can incorporate data from all the systems.
- Companies demand better information about their customers and marketplace.
- Today's technology can support the promise of data warehousing:
  - Parallel computing technologies have made very large databases a reality.
  - Competition has significantly lowered computing and storage costs.
  - Tools are becoming more versatile and user friendly.
- Analytical applications such as strategic enterprise management (SEM) support the processes to provide the return on investment that companies are trying to achieve.

Second, end users and consulting companies alike are increasingly seeking data warehousing solutions for prepackaged ERP data warehouse implementations, especially for SAP's Business Information Warehouse.

The strategic direction for SAP AG is to move all reporting and analysis functionality away from SAP R/3 and into SAP BW. For instance, reporting for the new SAP products such as Advanced Planning Optimizer (APO) and Customer Relationship Management (CRM) is provided in SAP BW. Therefore, most companies with SAP R/3 implementations will be implementing SAP BW in the near future.

Finally, SAP will probably want to expand the current market of SAP BW to go beyond that of SAP-centric organizations. In the future SAP will certainly try to create more robust interfaces and technologies to incorporate non-SAP source systems and data access tools.

Summary

This chapter introduced the basic concepts behind the key topics of this book: ERP and SAP R/3, business intelligence, data warehousing, OLAP, and SAP BW. It also provided a general overview of SAP BW, its drivers, features and functionalities, benefits, limitations and future.

In the next chapter, you will learn more about the SAP BW certification exam, including the benefits of the certification, examination process, prerequisites and resources, preparation for the exam, certification requirements, scoring for the exam, exam retakes, and logistics. The content/weighting discussion provides the exam content and assists you in prioritizing your efforts in preparing for the exam.

Need to Know More?

Published Resources

- Thomas Curran, Andrew Ladd, Dennis Ladd. *SAP R/3 Reporting and E-Business Intelligence*. Upper Saddle River, NJ: Prentice Hall, 2000.
- Naeem Hashmi. *Business Information Warehouse for SAP.* Portland, OR: Premier Press, 2000.
- William Inmon, Claudia Imhoff, and Ryan Sousa. *Corporate Information Factory.* New York: John Wiley & Sons, Inc., 1998.
- Alan R. Simon. *Data Warehousing for Dummies*. New York: John Wiley & Sons, Inc., 1997.

On-line Resources

- Naeem Hashmi. "Mix It Up." *Intelligent Enterprise*. Intelligent ERP—feature, July 2000. *http://www.intelligenterp.com/feature/hashmi.shtml.*
- Naeem Hashmi. "SAP BW for Data Warehousing Professionals." The Data Warehouse Institute Winter Conference, December 2001. Available at *http://infoframeworks.com/Publications/TDWIFall2001/html/SAP%BW%20for%20DW%20Professionals.htm*

Endnotes

1. Gartner Group.
2. "OLAP Council White Paper," The OLAP Council, 1997, *http://www.olapcouncil.org/research/whtpaply.htm.*
3. Wayne Eckersen, "Analyzing ERP Data," The Data Warehouse Institute, 1999.
4. Frank Gillette, "ERP Users Face Data Warehouse Dilemma," *ComputerWorld*, October 1999.
5. Naeem Hashmi, "Mix It Up," *Intelligent Enterprise*, Intelligent ERP feature, July 2000, *www.intelligenterp.com/feature/hashmi.shtml.*
6. William Inmon, "SAP and Data Warehousing" (white paper), 1999.

CHAPTER 2

Certification Exam

In This Chapter:

Benefits of the SAP BW certification
Where to take the exam and how to register
How to prepare for the exam: prerequisites and resources
Exam format, rules, and procedures
Certification requirements and scoring
SAP BW certification exam content and weighting
Getting the results

This chapter provides a brief introduction to the SAP BW certification exam. It gives key information regarding the exam process, prerequisites, scoring, rules, logistics, and certification requirements. It is organized chronologically and provides information to be used before, during, and after the exam.

To assist you in prioritizing your efforts, this chapter also suggests a list of key areas and the relative weighting that the questions in those areas may carry on the exam.

Benefits of Certification

The SAP BW certification is currently the most sought-after credential for SAP BW practitioners. It requires passing the SAP BW exam, which consists of three core areas:

1. *SAP BW System Configuration*. SAP BW data modeling and building blocks
2. *SAP BW Extraction*. Extraction mechanisms within SAP BW to pull data from SAP R/3 and non-SAP source systems
3. *SAP BW Reporting*. SAP BW reporting and analysis tools

Certified SAP BW consultants have passed a strenuous examination to certify that they possess the in-depth SAP BW product know-how required to successfully implement SAP BW for their clients. Certified SAP BW consultants are integrated in a closely coupled information network with SAP to ensure that their knowledge remains current and relevant and that they can continue to provide the highest level of professional guidance and service to their clients.

A certified SAP Business Information Warehouse consultant has the knowledge to advise customers on issues relating to SAP BW, including:

- Data analysis
- Reporting variables
- Data modeling
- Data extraction—OLTP, LIS, flat files, and so on
- InfoObject within SAP BW
- InfoSources
- Authorizations
- Web reporting

Benefits of the SAP BW certification include:

- *Acceptance*. Employers and recruiters benefit from the widespread acceptance of certification credentials.
- *Simplified recruiting and hiring*. Requiring an appropriate certification assures a minimum knowledge level in applicants, thereby ensuring higher-quality candidates while minimizing the initial applicant screening.
- *Flexibility*. Certified individuals have validated their technical knowledge while not being tied to a particular vendor's product. This means greater flexibility—a substantial advantage in the fast-changing technology marketplace.
- *Credibility*. Certification credentials provide a competitive advantage in highly competitive technology markets. This advantage applies to both the certificate holder and the hiring organization. Certified individuals benefit from the widespread acceptance of certification credentials.
- *Enhanced job opportunities*. Because recruiters and hiring organizations employ certification requirements, more opportunities are available to certified individuals.
- *Access to SAPNet (www.service.SAP.com/BW)*. Unless you are already an SAP customer or partner, access to the SAP on-line repository is a major benefit because it includes BW system documentation, white papers, support information, OSS notes, and so on.

Location and Registration

The exam is given at an SAP Education Center. There are more than 15 SAP Education Centers in major cities in the United States and Canada.

- For up-to-date course descriptions, dates, locations, and availability, visit the SAP Education Center Web site (*www.sap.com/usa/education*).
- To register for classes and the exam and access on-line registration visit *www.sap.com*.

At the time of this publication, the certification exam is free when taken as part of the SAP BW curriculum training, or $500 USD ($700 CAD) when taken independently. The test is offered at the conclusion of the TABW*30* course (SAP BW Extraction) or can be taken independently of the class for those candidates who do not wish to take the SAP class. Candidates can register for the exam alone (without taking the SAP classes) or will be registered automatically when signing up for the SAP BW extraction class.

In case of failure the exam can be retaken as many times as necessary, at the current cost of $700 for each sitting thereafter. This fee applies whether you pass or fail. Thus, it is a good idea to prepare as thoroughly as possible before attempting to take the exam.

Logistics for the certification test and the classes are identical (e.g., dates, locations, availability, and registration). For more information, refer to Chapter 3, "Training."

Preparing for the Exam

There is no essential prerequisite to the SAP BW certification exam. However, experience with data warehousing and/or SAP R/3 is highly recommended. To get the most out of this certification study guide and maximize their chances on the SAP BW certification test, candidates should have one or more of the following:

- Previous experience and participation in an SAP BW project implementation
- A strong desire to learn SAP BW
- Detailed understanding of data warehousing, and specialization in one of the following areas:
  - Extract, transform, and load (ETL) design
  - Data modeling
  - Report design
  - Data warehouse project management
- Knowledge of reporting and analysis in SAP/R3 reporting environments, for example, Logistics Information Systems (LIS), Report Writer/Report Navigator, ABAP/4 Programming
- Some knowledge of SAP BASIS administration

Depending on your understanding of the subject matter, in addition to this book it may be useful to study other materials. SAP's documentation, such as the SAP BW Library, the online help documentation in the SAP BW software, and the reference materials provided in appendixes may be helpful.

It is recommended to attend SAP BW training offered by SAP Education Centers (more details provided in Chapter 3). One of the benefits of attending the training is to obtain the

SAP BW training material.[1] This material contains detailed and content-rich SAP BW information that is considered necessary for the test. This training curriculum also includes exercises to be completed during class on a live SAP BW system that will give you the opportunity to gain hands-on experience in the exam's subject area.

It is also very important to have hands-on experience with the system to apply the techniques and concepts covered in the exam. You should have access to an SAP BW server with which to experiment.

Although it is possible to attain the SAP BW certification by attending SAP classes and studying books and other documentation, you absolutely need real-world experience with SAP BW to successfully perform and contribute on an SAP BW project.

The Exam

This section describes the actual process for taking the exam, including:

- Examination rules and procedures
- Format of the exam

SAP dictates the rules used during the examination:

- Candidates must produce an official valid identification document with photo, for example, passport or driver's license, before they can receive the examination papers and logon password.
- Candidates must complete the examination alone and independently.
- No assistance is allowed, except as follows:
  - Candidates whose mother tongue is not the language of the examination may use a dictionary provided that it contains no notes and is inspected and accepted by the proctor before the start of the examination.
    - Errors in the dictionary or documentation are the candidate's responsibility and no such error will be reason for any review of the result of the examination.
    - The time available to candidates to complete the examination is limited and can be neither interrupted nor extended.
- Candidates must follow the proctor's instructions.
- The examination questions and tasks are copyrighted and must not be written down, copied, or otherwise reproduced in whole or in part or made available to others in any form.
- If a candidate disturbs the examination or breaks any examination rule, that candidate will be excused from the examination immediately.

The exam format is as follows:

- The tests are administered by computer.
- You are given a set time limit for the test (90 minutes) and must answer 60 questions. You can mark questions to return to later if you are not sure of the answers.
- Passing the exam requires a minimum of 70%. Your pass/fail grade will be reported to you four to six weeks after you have sat for the exam.

- The questions are chosen randomly from a pool of thousands of questions. Each candidate in the same classroom will have the same questions in the exam, but will have them presented in a different sequence from the other candidates to prevent teaming.

The questions generally fall into two categories:

1. Questions that have only one correct answer
2. Questions that have more than one correct answer

Single Answer (only one answer)

Single answers are basic multiple-choice questions for which only one answer is correct and these are generally the easiest. Each question will have four or five answers listed. The correct answer must be selected. For example:

A conceptual description of data objects, their attributes, and the relationships between them is:

a. A data warehouse
b. A data model
c. An InfoCatalog
d. An InfoSet
e. An InfoSource

Answer: b.

These questions often address facts and figures included in the exam objectives. Although these are relatively easy questions, many of them are purposely worded to be confusing or to encourage jumping to conclusions. Be sure to read the questions carefully and double-check your answers.

Multiple Choice (one or more answers)

Multiple choice are questions for which multiple potential answers are provided and where one or more of the answers are correct, and you must choose all that apply. For example:

Which of the following are types of SAP BW InfoCubes?

a. MultiCube
b. Inverted Cube
c. Remote Cube
d. Relational Cube
e. Basic Cube

Answer: a, c, and e.

These questions can be tricky. Although they often address the same type of definitions and facts as the simpler questions, the multiple-choice questions increase the possibility of mistakes. Rather than look for one or more obvious answers to these questions, you may find it useful to consider them as a series of true/false questions, evaluating each of the possible choices separately. Otherwise, it is easy to overlook a correct answer. Be sure to read these questions carefully.

Passing and Scoring

The examination consists of 60 questions from the following SAP BW topic areas:

1. SAP BW Data Modeling
   - Data modeling
   - Data management
2. SAP BW Building Blocks
   - System configuration
   - Monitoring
   - Scheduling
3. SAP BW Reporting
   - Report definition and Web publishing
   - Data analysis in BEx Analyzer and a Web browser plus integration of analytical applications into mySAP enterprise portals
   - Organization of reports
   - Authorization
4. SAP BW Extraction
   - SAP BW extractors in mySAP.com components
   - Openness to external systems
   - Integration of extraction, transformation, and loading (ETL) tools

The passing score for the final exam is 70%.

It is useful to understand how SAP will score your answers on the exam so as to maximize your score:

If Only One Answer (maximum of two points)

- This type of question scores a maximum of two points and a minimum of zero points.
- If the answer you select is correct (true), you get full credit and score two points.
- If the answer you select is false, you do not score any points. There is no penalty for an incorrect response.

If More Than One Answer (maximum of 5 points)

- This type of question usually has five possibilities and scores a maximum of five points (one point for each correct answer) and a minimum of zero points.
- You should consider the potential answers provided as a series of true/false questions.
  - For each potential answer, if the answer is true and you select it or the answer is not true and you do not select it, you are correct and you score one point per question.
  - Conversely, if the answer is false and you answer true or the answer is true and you answer false, you are not correct and do not score any points for that question.

It is important to remember that there is no penalty for not answering a question correctly. Therefore, you should never leave a question unanswered even if you do not know the answer.

Regardless of the type of questions (one answer or more than one answer), scoring of the answers for the exam is based on Boolean logic:

Correct Answer	Your Selection	Your Score
True	True	1
False	False	1
True	False	0
False	True	0

For instance, for a test question with more than one answer (possible answers a, b, c, d, and e), if the correct answers are a, b, and c,

- If you select a, b, c, and d you score 4 points as follows; one point each for selecting a, b, c, one point for not selecting e, and no points for incorrectly selecting d.
- If you select a and b you score 4 points as follows: one point each for selecting a and b, and one point each for not selecting d and e. Had you also selected c in this scenario, you would have scored a perfect 5 for this question.

Scoring on the exam is summarized as follows:

	Correct Answer	Incorrect Answer	No Answer
If there is only one correct answer	2 points	0 points (no points deducted)	0 points
If there is more than one answer	1 point per correct answer	0 points (no points deducted)	0 points

The maximum number of points for each question is as follows:

		Potential Maximum Number of Points
If there is only one correct answer		2 points
If there is more than one correct answer	Four answers	4 points
	Five answers	5 points

SAP BW Certification Exam Content and Weighting

The certification test for SAP BW application consultants is intended to provide candidates with the opportunity of proving that they have a fundamental knowledge of this particular area of the SAP system, as well as that they are able to apply this knowledge within a project environment. The examination consists of questions, both one answer only and multiple choice, from the topic areas specified below.

To assist you in prioritizing your efforts, the weighting of the questions in the test is codified as follows:[2]

\+ = 1–10% of the questions in the exam
++ = 11–20% of the questions in the exam
+++ = over 20% of the questions in the exam

As recommended by the SAP Education Center, the topic areas for the SAP BW certification exam are:

Reporting (++)

- Analyzing data
- BEx Analyzer within Business Explorer (BEx)
- Report Builder
- Roles
- Workbooks

Reporting Variables

- Types of variables
- Replacement types
- Variables
- Calculation of variables
- User-exit for variables

Reporting Tips and Tricks

- Customizing the BEx Browser
- Using the style tool
- Reporting monitor
- SAP BW statistics
- Version of BEx

Reporting OLE DB for On-Line Analytical Processing (OLAP)

- SAP BW architecture
- Object linking and embedding (OLE) and OLE DB for OLAP
- Use of open database for objects (ODBO) or OLE DB for OLAP
- Query blocks

Data Modeling (++)

- Data modeling for data warehouses
- Structure of information—entity relation model (ERM)
- Analytical processing—the multidimensional data model (MDM)
- Translating the MDM into SAP BW

Multidimensional Data Models within SAP BW

- Star schema and the SAP BW extended star schema
- InfoCubes
- Characteristics
- Hierarchies
- Aggregates
- Concept of granularity

Extraction (++)

- General aspects
- Flow of data
- Triggering extraction
- Data marts
- Data homogenization within SAP BW

Data Extraction

- Types of data to be extracted
- Extraction of SAP R/3 application data
- Production data extractor
- Metadata update
- Non-SAP data sources
- Third-party extraction tools

OLTP Extraction

- Extraction process from SAP R/3 OLTP and non-SAP R/3 OLTP systems
- Integration of data from multiple InfoSources
- Use of intermediate documents (IDOCS) and operational data store (ODS)
- Scheduler to initiate data extraction
- Monitor statuses

Flat File Extraction

- Flat file extraction process of transaction and master data
- Types of data that can be extracted via flat files

LIS Extraction

- Logistics information system (LIS) overview
- Connecting LIS InfoStructures
- Populating InfoCubes

Extraction from Controlling and Profitability COPA

- Creating the InfoSource
- Modeling the InfoCube
- Transferring the data

Administrator Workbench (+)

- Workbench features
- Design/maintenance of data warehouse
- Scheduler
- Monitor
- Source systems

InfoObject within SAP BW (+)

- Metadata in SAP BW
- Technical definition
- Master data, texts
- Attributes
- Hierarchies
- Compound information

InfoSources

- Components
- Creating an InfoSource

Warehouse Management (++)

- Architecture
- Data staging
- Data extraction
- Administrator workbench (AWB) new design
- InfoObjects
- InfoCubes
- Aggregates
- ODS
- Business document service (BDS)
- DataSources
- Update rules
- Scheduling
- Manage InfoCube

Metadata Repository (+)

- Architecture
- Functionality
- Business

Authorizations (+)

- Roles
- Transactions
- Activity groups
- Authorizations

Business Explorer (++)

- BEx Analyzer
- Toolbar
- Template

- Filter
- Conditions
- Exceptions
- MultiCubes
- Report-to-report Interface (RRI)
- BEx Browser
- Architecture

Web Reporting (+)

- View
- Elements
- Language objects
- Revenue
- Simple lists
- Using the wizard

Getting the Results

This section describes how you will get your results and the procedure for unsuccessful candidates and exam retakes.

The passing score for the final exam is 70%. The examination is assessed in accordance with general rules defined by SAP. Unlike most computer-based training tests, the results are not immediately known upon completion of the exam. It may take up to five weeks to receive your grade. Candidates are informed in writing of their grade, which is either "pass" or "fail." Successful candidates receive a certificate with a unique identification number. The certificate names the candidate and the candidate's employer.

SAP will hold the results of the examination in a database to ascertain, if necessary, what certification a candidate holds and whether a candidate can be admitted to other examinations. SAP may also use the data held to provide targeted information to certified candidates and to enable candidates to retrieve specific information. SAP may also inform others of successful candidates' certification.

If your results are not favorable, SAP will allow unsuccessful candidates to take the certification exam again with the following restrictions:

- Unsuccessful candidates may retake the same examination after a three-months waiting period.
- Unsuccessful candidates usually receive general information on identified gaps in their competence.
- Before admission to the same examination for a third time, the candidate must produce evidence of training suitable to rectify the gaps identified in the candidate's competence at previous examinations.
- No candidate may take the same examination for the same release more than three times. A candidate who has failed at an examination three times for a release may not attempt that examination again until the next release.
- The exam fees cover only one exam and candidates must pay the exam fee for all retakes.

Summary

In this chapter, you learned about the SAP BW certification exam. You now understand the benefits of the SAP BW certification exam, how to prepare for the exam, where to register for and take the exam, certification requirements, and what happens after the exam. A list of the key areas and the relative weighting that the questions in those areas may carry on the exam was also discussed. To assist you in prioritizing your efforts in studying for the exam, you should refer often to this list.

The next chapter provides information on the SAP BW training offered by the SAP Education Center. It will provide key information regarding the classroom training for SAP BW, location, scheduling, and enrollment.

Endnotes

1. SAP BW Configuration, SAP BW Reporting, and SAP BW Extraction, SAP BW Solution Academy, Training Participant Handbook, SAP BW release 2.0B, September 2000.
2. SAP Education Center Web site, *http://www.sap.com/education/*, February 2002.

CHAPTER 3

Training

In This Chapter:

SAP Solution Academy
SAP BW training curriculum
How to decide what training to take
Location, scheduling, enrollment

This chapter provides a brief introduction to SAP BW training, including the training curriculum for SAP BW, how to decide what class to take, training locations, scheduling, and enrollment.

This study guide is not intended as a substitute for the classroom training offered by SAP but rather to complement it. Therefore, it is usually best to take the test after having attended the SAP BW classroom training provided by the SAP Education Centers.

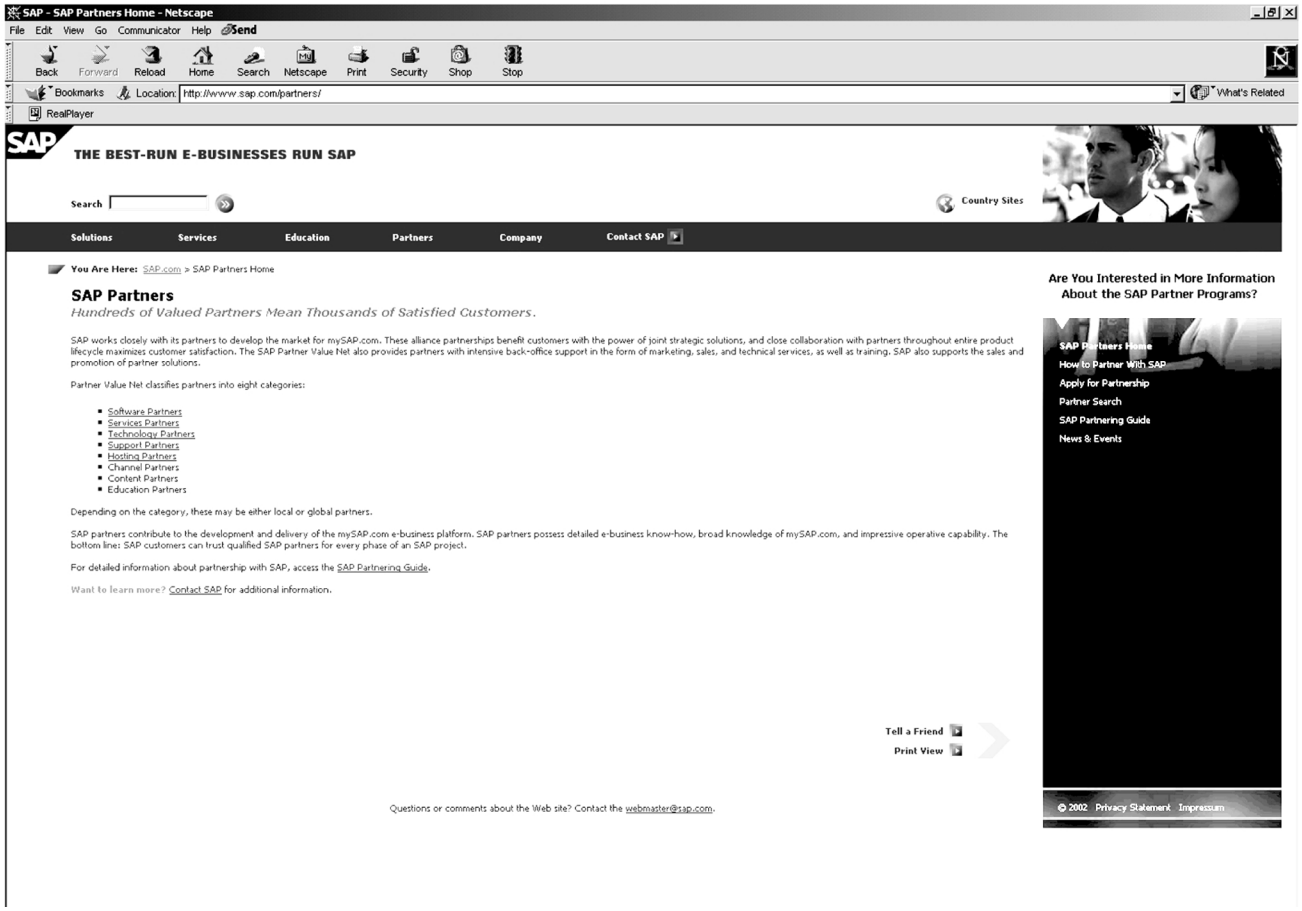
SAP Solution Academy

SAP partners are technology and business consulting firms that offer assistance in all phases of SAP software implementation projects, including go-live, training, and education. Partners have proven knowledge of SAP products and expertise in using best practices for effective business process reengineering and work closely with clients in redefining roles and systems to optimize performance with SAP software.

As described in Exhibit 3.1, SAP has partners in all areas of SAP implementation projects, including software, service, technology, support, hosting, channels, and education. A list of SAP partners is available on SAP Web site at *www.sap.com/partners*.

The SAP Solution Academy is an international institution of higher education in SAP applications, including SAP BW. It is a training academy open to all SAP partners to provide certification through a variety of course offerings. The primary objective of the Academy is to instruct in features, functions, and the best use of SAP products for new consultants. The second objective is to provide continuing education and advanced training for experienced SAP product practitioners.

Exhibit 3.1 **SAP Partners**



Source: www.SAP.com.

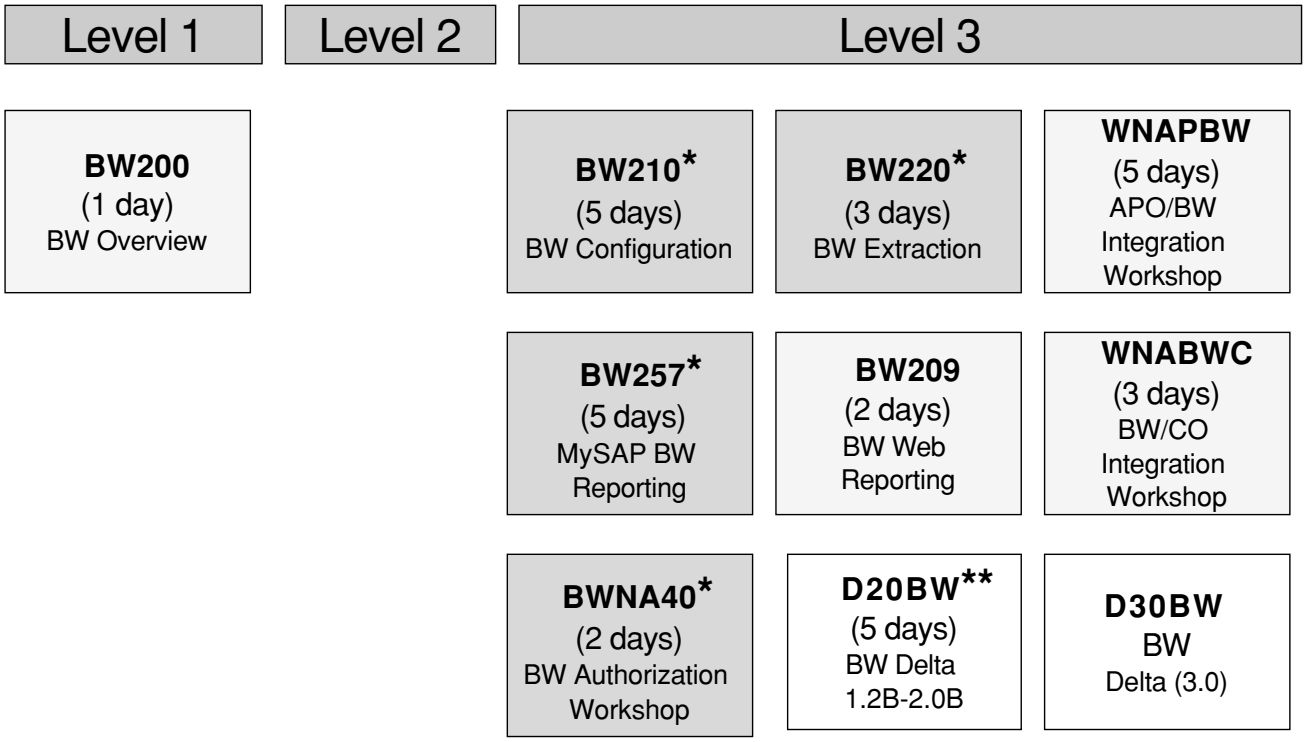
The SAP Solution Academy offers comprehensive, hands-on classes for SAP partners, independent consultants, and customers who are seeking intensive training leading to SAP certification. The Solution Academy offers rigorous programs for both experienced attendees and newcomers. Participants who pass the optional exam at the end of each Academy program will receive SAP's highly regarded *consultant certification*, one of the most respected industry certifications available.

SAP BW Training Curriculum

The SAP BW training curriculum for partners and nonpartners is illustrated in Exhibits 3.2 and 3.3. There are three levels of classes:

1. *Level 1.* Introductory level
2. *Level 2.* Standard training for business content experts and SAP BW data extractors and developers to learn SAP R/3 application modules
3. *Level 3.* Specific for SAP BW application developers, support, and administration staff

Exhibit 3.2 **SAP BW Solution Training Curriculum (partners only)**

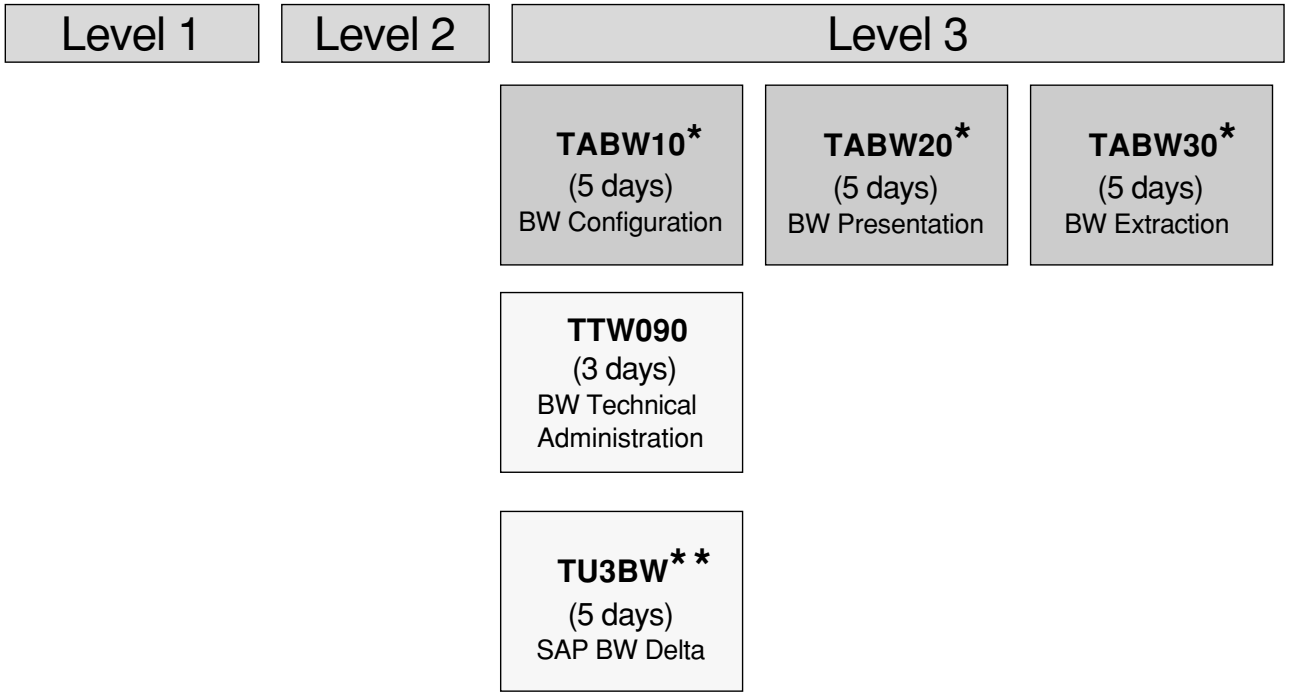


* Class recommended for SAP BW certification.

** Class recommended for SAP BW delta certification.

Source: SAP.

Exhibit 3.3 **SAP BW Nonpartners Training Curriculum**



* Class recommended for SAP BW certification.

** Class recommended for SAP BW delta certification.

Source: SAP.

The basic SAP BW curriculum is based on three level-3 classes of one week each in duration (course descriptions are provided in Appendix E):

1. SAP BW Configuration (BW210 or TABW10 for partners)—SAP BW data modeling and Building Blocks
2. SAP BW Reporting (BW257 or TABW20 for partners)
3. SAP BW Extraction (BW220 and BNNA40 or TABW30 for partners)

Several other classes offered are of interest to SAP BW practitioners, including SAP BW Delta and SAP BW Technical Administration (TABW90). The SAP Education Center or the SAP education Web site (*www.sap.com/usa/education*) will provide:

- The ability to register for SAP BW classes and exams
- SAP BW training course descriptions, dates, locations, and availability

Exhibit 3.2 provides an overview of the SAP BW training curriculum for SAP partners (Solution Academy). Exhibit 3.3 provides an overview of SAP BW training curriculum for nonpartners.

What Training Do You Really Need?

This study guide may be used as a teach-yourself program; however, prior knowledge and experience with SAP BW is assumed. At the same time, it is highly recommended that candidates for certification take one or more of the classroom courses offered by SAP to customers and business partners. One of the benefits of attending the training is to obtain the SAP BW training material.[1] This material contains detailed and content-rich SAP BW information that is considered necessary for the test. This training curriculum also includes exercises to be completed during class on a live SAP BW system that will give you the opportunity to gain hands-on experience in the exam's subject area.

Candidates who have completed the appropriate Solution Academy or SAP standard curriculum classes may test for SAP BW certification. Consultants may take the exam without attending classes if they have significant experience in SAP BW, BASIS, SAP system administration, or R/3 database administration.

In order to increase your knowledge in SAP BW and your probability of passing the exam, SAP recommends taking at least three SAP BW classes in the key exam topic areas SAP BW Configuration (data modeling and building blocks), SAP BW Reporting, and SAP BW Extraction.

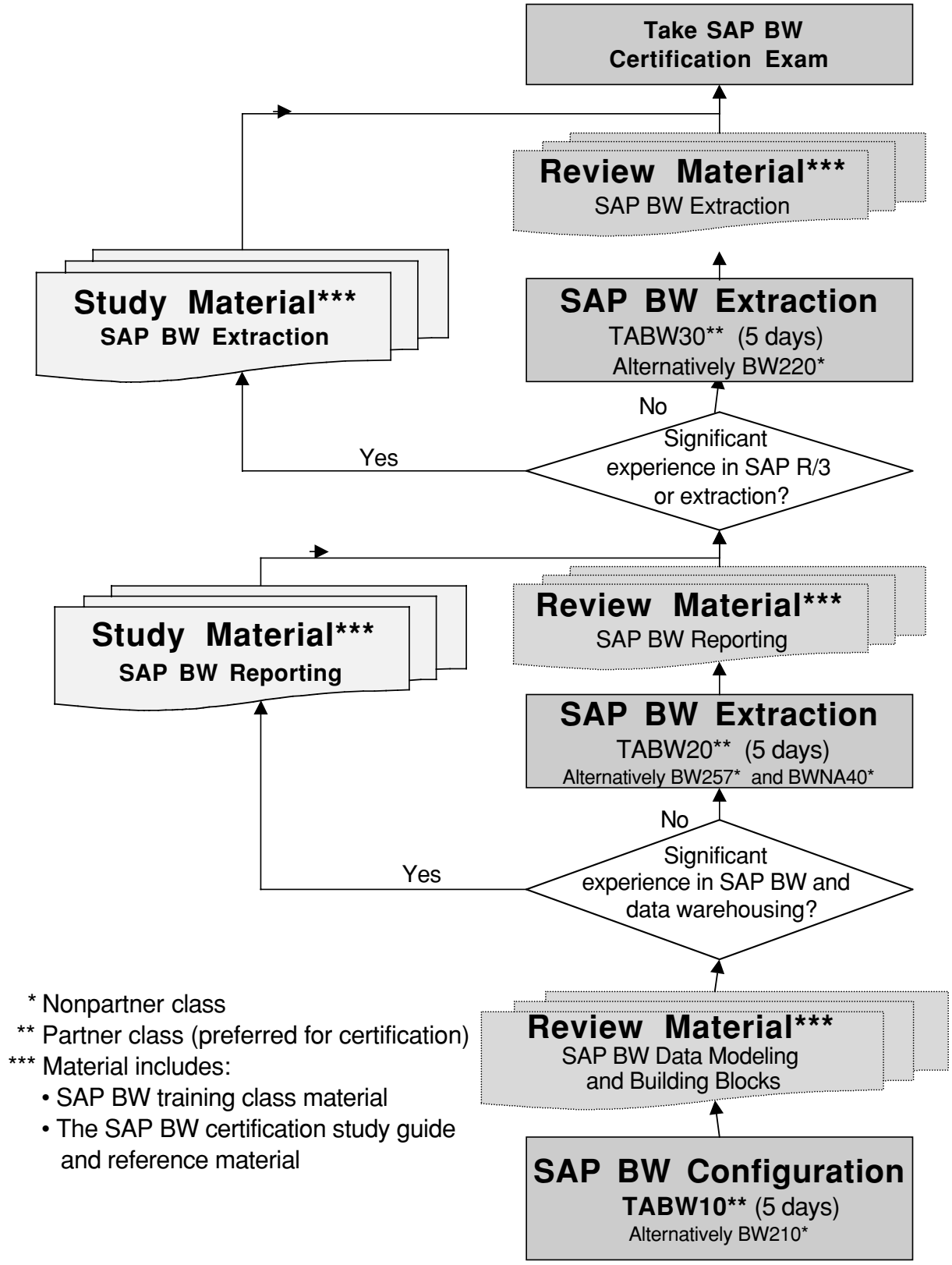
One can and should attend as many classes as possible, based on budget and requirements. However, there is no mandate on the number of classes taken; some candidates may, for instance, take only one class to meet a specific requirement whereas other candidates will take all three classes.

When taking all three classes, the following is highly recommended:

- Take the three classes in the order suggested by SAP: System Configuration (data modeling and Building Blocks), SAP BW Reporting, and SAP BW Extraction. Each class builds on concepts learned from the previous one.
- Do *not* take all three classes in three consecutive weeks but rather take the first class (SAP BW Configuration), and then wait a month or two before proceeding. This strategy will allow you some time to study the training material in detail and avoid burnout.
- Attend Solution Academy classes (rather than customer classes) as those classes are more specifically geared to prepare you for the SAP BW certification exam. Solution Academy classes are for partners; however, SAP will usually allow nonpartners to attend, provided seating is available. As an alternative, the nonpartner class should provide you the same information but might be less oriented toward the certification exam.

As shown in Exhibit 3.4, if you plan to become certified you should take at least one class: the SAP BW System Configuration (SAP BW data modeling and Building Blocks) (BW 210 or TAB10). This class is fundamental to understanding the other two classes (Extraction and Reporting) and to your success on the exam. Therefore, you should spend most of your time and energy on understanding all of its concepts before proceeding to the other two SAP BW classes and the exam. Even if you already have significant knowledge and hands-on experience with SAP BW it is highly recommended that you take this class before attempting to pass the exam.

Exhibit 3.4 **Recommended Training Path for SAP BW Certification**



Location, Scheduling, and Enrollment

SAP offers more than 15 state-of-the-art training center locations for classroom training throughout the United States and Canada, including Boston (MA), San Francisco (CA), Atlanta (GA), Philadelphia (PA), and Toronto (Canada). For up-to-date course descriptions, dates, locations, and availability visit the SAP Education Center Web site (*www.sap.com/usa/education*). To register for classes and the exam and access on-line registration, visit *www.sap.com*.

SAP can also conduct a full complement of project team training on-site at your location. SAP's on-site training offers substantial cost and time savings through a more flexible scheduling approach. It can provide trained and qualified instructors for all technical and practical applications. In some instances, the number of employees to be trained makes an on-site approach more economical, and the on-site schedule can be more closely aligned than the published class schedule. The customer receives the added benefit of reduced travel costs and less disruption for the overall project team.

All the necessary information on SAP's curriculum content, course offerings, dates, locations, and hotel accommodations can be found in the following resources:

- SAP Education and Training Center: *www.sap.com/usa/education* or 1-888-777-1SAP (1-888-777-1727)
- SAP central registration in North America: 888-777-1727
- Internet: *http://www.sap.com*
- SAP On-line Service System (OSS) for customers and businesses

For more information, the SAP Solution Academy for SAP consultants can be contacted directly by phone in North America at (800) 790-7750, (612) 376-7750; fax (612) 376-7755; or e-mail: *academyinfo@sapacademy.com*.

Classroom capacity for both certification training and testing in SAP BW is limited; based on the growing interest in becoming SAP BW certified, you should plan to register a few months in advance.

Summary

In this chapter, you learned about the SAP BW training offerings. You now understand the SAP BW training curriculum, what training to take, and the training locations, enrollment, and scheduling.

In the next chapter, you will learn more about data modeling in traditional data warehouses and SAP BW. This chapter is fundamental to SAP BW and provides the foundation to the other areas of SAP BW. It represents a significant percentage of the questions on the certification exam.

Endnote

1. SAP BW Configuration, SAP BW Reporting, and SAP BW Extraction, SAP BW Solution Academy, Training Participant Handbook, SAP BW release 2.0B, September 2000.