Accounting Information Systems

PRESENTED BY: EDGAR OTIENO

Lecture 8

Enterprise Resource Planning Systems

Objectives for Lecture 8

- Functionality and key elements of ERP systems
- ERP configurations--servers, databases, and bolt-on software
- Data warehousing as a strategic tool and issues related to the design, maintenance, and operation of a data warehouse
- Risks associated with ERP implementation
- Key considerations related to ERP implementation
- Internal control and auditing implications of ERPs
- Compare the goals of current enterprise resource planning (ERP) systems with those of the REA enterprise ontology
- Discuss strengths and weaknesses of the REA enterprise ontology as a foundation for meeting intra-enterprise and inter-enterprise information integration needs
- The leading ERP products and their distinguishing features

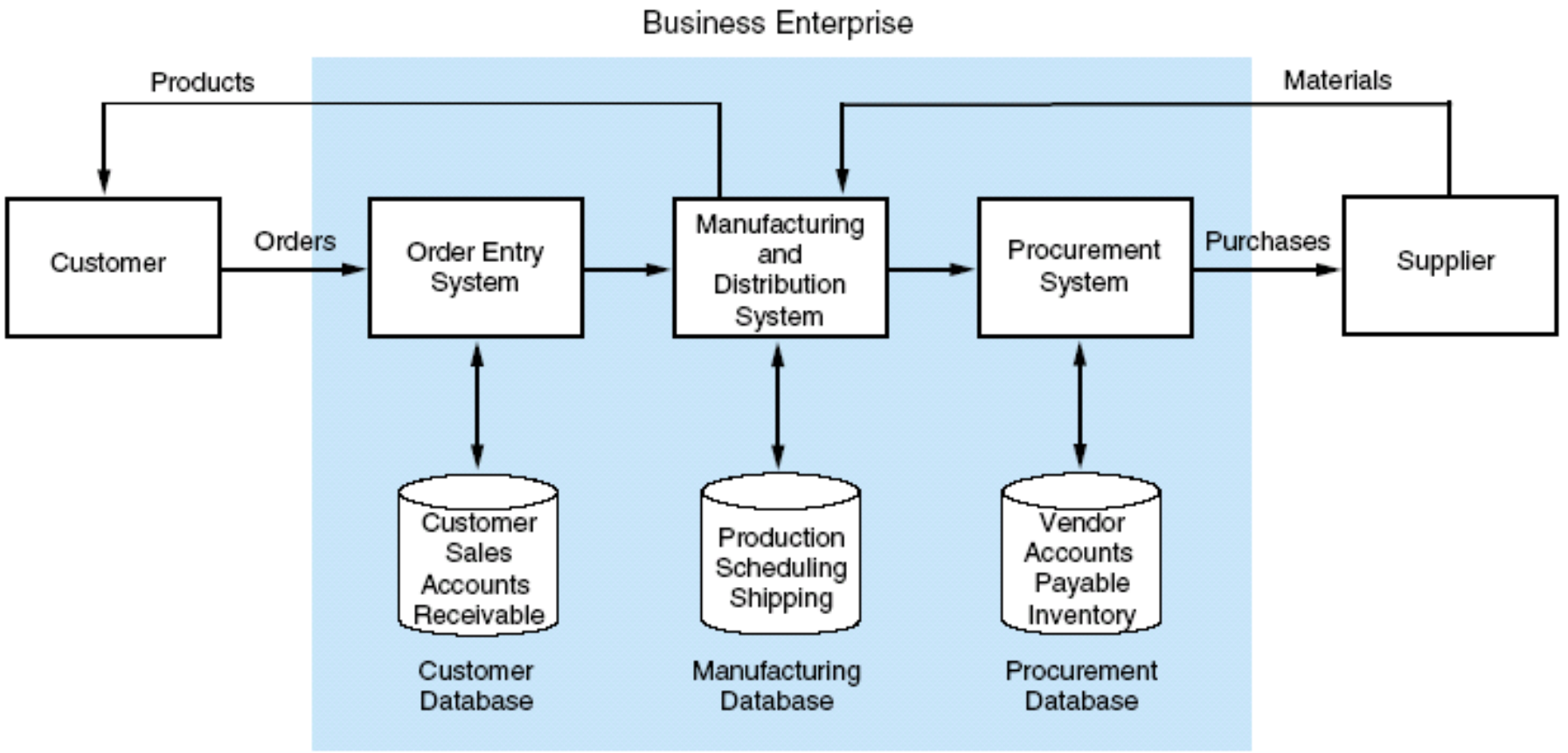
Problems with Non-ERP Systems

- In-house design limits connectivity outside the company
- Tendency toward separate IS's within firm
  - lack of integration limits communication within the company
- Strategic decision-making not supported
- Long-term maintenance costs high
- Limits ability to engage in process reengineering

Traditional IS Model: Closed Database Architecture

- Similar in concept to flat-file approach
  - data remains the property of the application
  - fragmentation limits communications
- Existence of numerous distinct and independent databases
  - redundancy and anomaly problems
- Paper-based
  - requires multiple entry of data
  - status of information unknown at key points

Traditional IS Model: Closed Database Architecture …



What is an ERP System?

- Multi-module application software that helps a company manage the important parts of its business in an integrated fashion.
- Key features include:
  - smooth and seamless flow of information across organizational boundaries
  - standardized environment with shared database independent of applications and integrated applications

Intra-Enterprise Systems: ERP and the REA Enterprise Ontology

- Enterprise Resource Planning (ERP) Systems
  - Groups of software applications integrated to form enterprise-wide information systems
    - SAP, Peoplesoft, and Oracle Applications are the top three ERP vendors
  - Began as back-office applications
    - Seen and used only by people within enterprises
  - Bolt-on applications have allowed expansion to front office use
    - Bolt-on applications are software programs that can be added to existing ERP applications
    - Front-office systems are seen and interacted with by external partners such as customers and suppliers

Goals and Methods of ERP Software and the REA Enterprise Ontology

- Database Orientation
  - Data must be stored at their most primitive levels, at least for a defined time period
  - Data must be stored only once, in a way that all authorized decision makers can access the data
  - Data must be stored to allow retrieval in various formats as needed for different purposes
- REA mandates database orientation
- Some ERP systems meet database orientation
  - Some store the same information multiple places and some do not include all links needed to retrieve information in all needed formats
    - Single Source ERP are more likely than Best-of-Breed ERP systems to meet database orientation

Goals and Methods of ERP Software and the REA Enterprise Ontology …

- Semantic Orientation
  - Requires objects in the system's conceptual model to correspond as closely as possible to objects in the underlying reality
  - Precludes use of artificial constructs such as debits, credits, and accounts as base objects in the enterprise system
  - REA mandates semantic orientation
  - ERP systems do not require semantic orientation
    - Evidenced by use of accounting artifacts as base objects

Goals and Methods of ERP Software and the REA Enterprise Ontology …

- Structuring Orientation
  - Demands the use of a pattern as a foundation for the enterprise system
  - REA mandates use of pattern, with implementation compromises allowed to tailor the system to the business
  - ERP software packages do not exhibit pattern-based design, but rather attempt to build industry “best-practices” into the software
    - The business processes must conform to the software to avoid expensive customizations
    - What if industry “best-practices” are not the best for a specific enterprise?

Intra-Enterprise Integration

- Integration among systems of functional areas and divisions within the same enterprise
  - Often accomplished with
    - In-house developed software
      - Software created specifically for an enterprise by its own programming staff or by a consultant
    - Single source ERP
      - Entire system uses one ERP software package
    - Best-of-Breed ERP
      - Modules from different ERP software packages are used for different functional areas
        - E.g. Peoplesoft for HR, SAP for manufacturing, and Oracle Apps for financials
      - Enterprise application integration software or inhouse programming solutions may be used to connect the different packages

Electronic Commerce Solutions and Inter-Enterprise System Design

- Business to Consumer (B2C) E-commerce
  - Customers obtain information and purchase items from enterprises electronically, for example, via the enterprise's website
  - The primary differences between physical B2C commerce and electronic B2C commerce are the breaking down of time, place, and form barriers
    - Customers can access information 24 hours per day, 7 days per week, 52 weeks per year
    - Customers do not need to physically transport themselves to seller's location
    - Small firms can look larger with impressive web storefronts
  - These differences do not result in different types of conceptual models from physical B2C commerce

Electronic Commerce Solutions and Inter-Enterprise System Design …

- Business to Business (B2B) E-commerce
  - Shift has occurred that requires conceptual models to change from those that result from typical physical B2B commerce.
    - Shift is away from traditional linear supply chain (value system) to value web
      - Enterprises need information not just about their most direct external partners, but also about indirect external partners, e.g. their customers' customers
  - Foundations include
    - Telecommunications infrastructure
    - Electronic data interchange (EDI)
    - The Internet

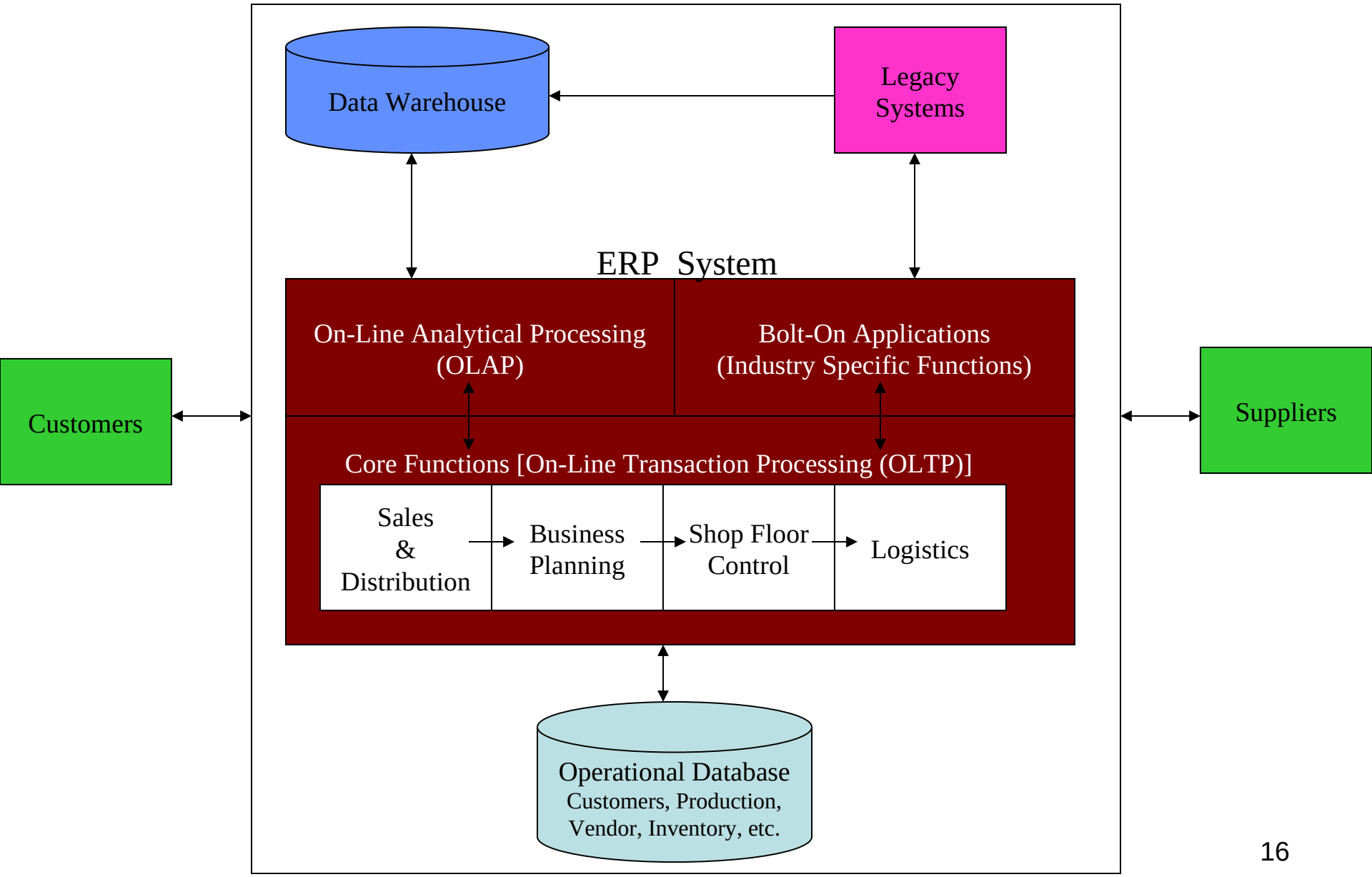
Electronic Data Interchange (EDI)

- Exchange of data between enterprises in a prescribed electronic format, usually through a VAN (value added network).
  - VAN connections and software were proprietary and expensive
  - Enabled more efficient and effective supply chain management
  - Attempts are underway to standardize EDI to make EDI more consistent across industries
    - E.g. Open-EDI

E-Commerce and the REA Enterprise Ontology

- To accommodate shift in systems needs to an outward focus with e-commerce and inter-enterprise integration
  - Connections between enterprises occur via resource exchanges
  - Consider the possibility of connecting two enterprise systems at the value system level
    - Enterprise Q sale = Enterprise R purchase
    - Enterprise Q cash receipt = Enterprise R cash disbursement
    - How to merge these views?

ERP System


Business Enterprise
Data Warehouse
Legacy Systems
ERP System
On-Line Analytical Processing (OLAP)
Bolt-On Applications (Industry Specific Functions)
Core Functions [On-Line Transaction Processing (OLTP)]
Sales & Distribution
Business Planning
Shop Floor Control
Logistics
Operational Database
Customers, Production, Vendor, Inventory, etc.
Customers
Suppliers

ERP System Configurations: Client-Server Network Topology

Two-tier

- common server handles both application and database duties
- used especially in LANs

Two Main ERP Applications

(1) Core applications

- a.k.a. *On-line Transaction Processing (OLTP)*
- transaction processing systems
- support the day-to-day operational activities of the business
- support mission-critical tasks through simple queries of operational databases
- include sales and distribution, business planning, production planning, shop floor control, and logistics modules

Two Main ERP Applications …

(2) Business analysis applications

- a.k.a. *On-line Analytical Processing (OLAP)*
- decision support tool for management-critical tasks through analytical investigation of complex data associations
- supplies management with “real-time” information and permits timely decisions to improve performance and achieve competitive advantage
- includes decision support, modeling, information retrieval, ad-hoc reporting/analysis, and what-if analysis

OLAP

- Supports management-critical tasks through analytical investigation of complex data associations captured in data warehouses:
  - **Consolidation** is the aggregation or roll-up of data.
  - **Drill-down** allows the user to see data in selective increasing levels of detail.
  - **Slicing and Dicing** enables the user to examine data from different viewpoints to uncover trends and patterns.

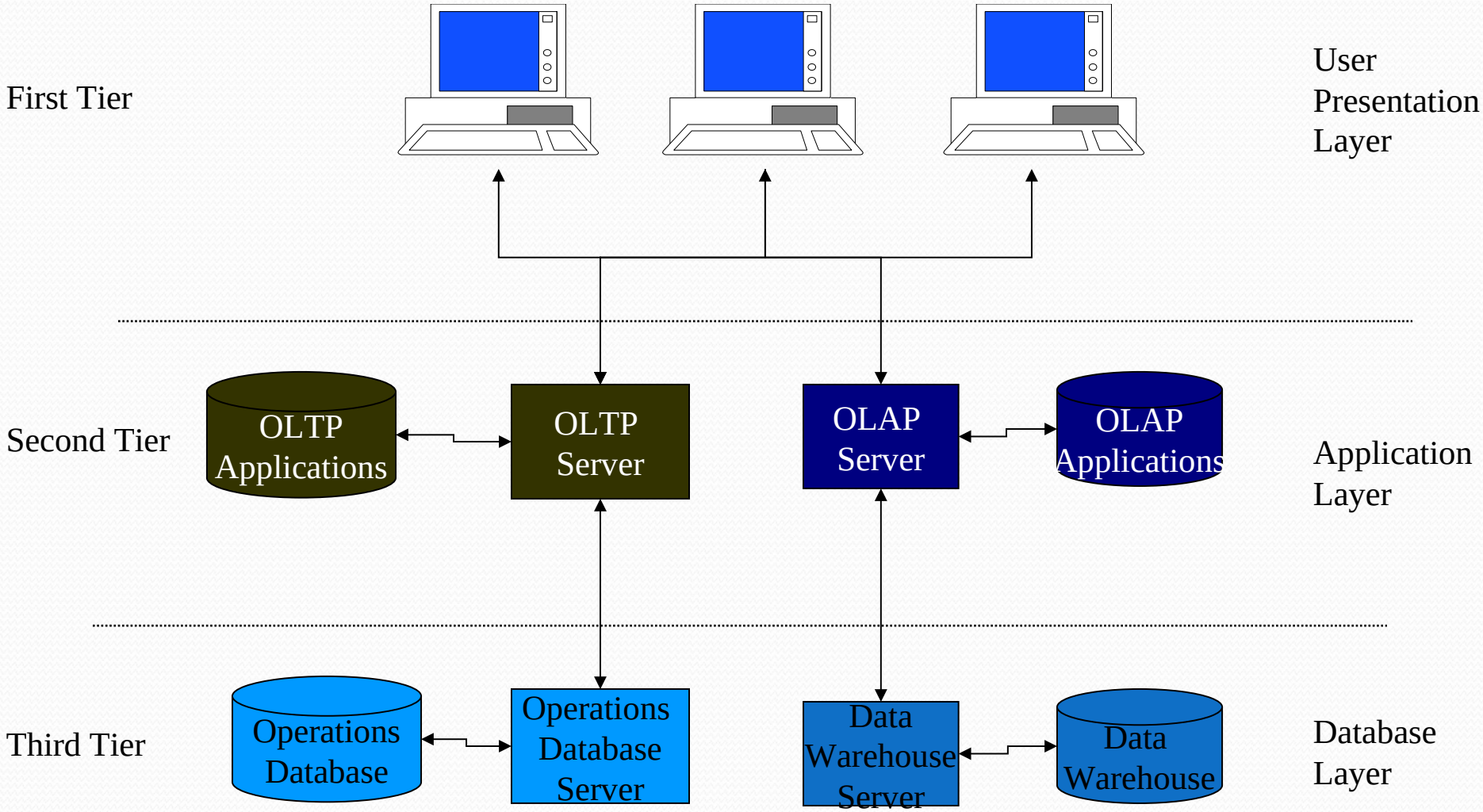
ERP System Configurations: Databases and Bolt-Ons

- Database Configuration
  - selection of database tables in the thousands
  - setting the switches in the system
- Bolt-on Software
  - third-party vendors provide specialized functionality software
  - Supply Chain Management (SCM) links vendors, carriers, logistics companies, and IS providers

What is a Data Warehouse?

- A *multi-dimensional* database often using hundreds of gigabytes or even terabytes of memory
  - Data are extracted periodically from operational databases or from public information services.
- A database constructed for quick searching, retrieval, ad-hoc queries, and ease of use
- ERP systems can exist without data warehouses.
  - However, most large ERP implementations include separate operational and data warehouse databases.
  - Otherwise, management data analysis may result in pulling system resources away from operational use.
  - Also, there are many sophisticated data-mining tools.

ERP with OLTP and OLAP Client Server using Data Warehouse



Data Warehouse Process: Stage 1

- Modeling data for the data warehouse
  - Because of the vast size of a data warehouse, the warehouse database consists of de-normalized data.
    - Relational theory does not apply to a data warehousing system.
    - Normalized tables pertaining to selected events may be consolidated into de-normalized tables.

Data Warehouse Process: Stage 2

- Extracting data from operational databases
  - The process of collecting data from operational databases, flat-files, archives, and external data sources.
  - Snapshots vs. stabilized data
    - A key feature of a data warehouse is that the data contained in it are in a non-volatile (stable) state.

Data Warehouse Process: Stage 3

- Cleansing extracted data
  - Involves filtering out or repairing invalid data prior to being stored in the warehouse
    - Operational data are “dirty” for many reasons: clerical, data entry, computer program errors, misspelled names and blank fields.
  - Also involves transforming data into standard business terms with standard data values

Data Warehouse Process: Stage 4

- Transforming data into the warehouse model
  - To improve efficiency, data are transformed into summary views before being loaded.
  - Unlike operational views, which are virtual in nature with underlying base tables, data warehouse views are physical tables.
    - OLAP permits users to construct virtual views.

Data Warehouse Process: Stage 5

- Loading data into the data warehouse database
  - Data warehouses must be created & maintained separately from the operational databases.
    - internal efficiency
    - integration of legacy systems
    - consolidation of global data

Applications of Data Mining

Business Field	Application
Banking/Investments	Detect patterns of fraudulent credit card use
	Identify "loyal" customers and predict those likely to change their credit card affiliation
	Examine historical market data to determine investors' stock trading rules
	Predict credit card spending of key customer groups
	Identify correlations between different financial indicators
Health Care and Medical Insurance	Predict office visits from historical analysis of historical patient behavior
	Identify successful and economical medical therapies for different illnesses
	Identify which medical procedures tend to be claimed together
	Predict which customers will buy new policies
	Identify behavior patterns associated with high-risk customers
	Identify indicators of fraudulent behavior
Marketing	Identify buying patterns based on historical customer data
	Identify relationships among customer demographic data
	Predict response to various forms of marketing and promotion campaigns

Risks Associated with ERP Implementation

- Pace of implementation
  - 'Big Bang'--switch operations from legacy systems to ERP in a single event
  - 'Phased-In'--independent ERP units installed over time, assimilated, and integrated
- Opposition to change
  - user reluctance and inertia
  - need of upper management support
- Choosing the wrong ERP
  - goodness of fit: no one ERP product is best for all industries
  - scalability: system's ability to grow

Risks Associated with ERP Implementation …

- Choosing the wrong consultant
  - common to use a third-party (the Big Four)
  - thoroughly interview potential consultants
  - establish explicit expectations
- High cost and cost overruns
  - common areas with high costs:
    - training
    - testing and integration
    - database conversion
- Disruptions to operations
  - ERP implementations usually involve business process reengineering (BPR)
    - expect major changes in business processes