1. Explain the following terms. (25%)
   a. Wireless Markup Language (WML)
   b. Enterprise Application Integration (EAI)
   c. Strategic Information System (SIS)
   d. Pervasive Computing
   e. Electronic Document Management (EDM)

2. Explain the problems along the supply chain. What is one of the most persistent SCM (Supply Chain Management) problems? (10%)

3. What are the advantages and disadvantages of web-based DSS (Decision Support Systems)? (10%)

4. What is a data warehouse? How does a data warehouse differ from a database? What are the tools used to mine a data warehouse? (15%)

5. Describe the four main strategies for global business and organizational structure. (10%)

6. Case Study (30%)

   **How the United Nations Automated its Payroll System**

   Over 15,000 employees work for the United Nations in more than a hundred countries and need to be paid in different currencies. The pay for each employee includes a base pay for the job and entitlements based on location, seniority, and special terms agreed on. The rules and regulations of these entitlements occupied about 1,000 pages in manuals. As a result, salary calculations were complex, lengthy, and error-prone, and they had resisted automation for decades.

   Then the U.N. transferred the rules into an online knowledge base. An expert system was developed to determine which entitlements are relevant for each employee. A formula-based DSS calculates the salaries. The system maintains data on all U.N. employees and their dependents. It also monitors events such as promotions, relocations, and changes in dependents. The system contains an explanation mechanism that clarifies how it determines eligibility, and what the values of the related entitlements are. Explanations are also provided for why some employees are not eligible for certain entitlements.
The U.N. information system was recently converted from a legacy mainframe to a Unix-based client/server architecture. The entitlement application is only one of about 2,000 applications that run on the new $70 million Integrated Management Information System (IMIS). In addition to the entitlement applications, there are financial, accounting, procurement, payroll, and travel applications. The expert system was developed with an object-oriented software. It includes an easy-to-use graphical front end and links to databases as well as other applications. The system includes 20 LANs, and communication between locations is done via secured VANS.

The most difficult part of implementation was building the knowledge base. Previously, about 2,000 users at different locations worldwide applied the information requirements in different ways. The maintenance of the rules is now fairly simple since the rules are encapsulated into objects. All that needs to be done is to change the rule and check its consistency with other rules. The object-oriented programs also made it easy to compute backpay, a result of retroactive changes.

Several other ES applications were introduced. For example, an ES analyzes financial data and determines which are debits and credits and which accounts should be consolidated into other accounts. Finally, the system recommends how to close out books at the ends of designated financial periods.

The IMIS not only increases the productivity and accuracy of accountants, but it also facilitates planning. Management can make better decisions regarding the deployment of people and other resources. The determination of entitlements is consistent and therefore more equitable. Finally, the expertise of the U.N. experts at the headquarters in New York is now available online, all over the world.

Questions

a. Why do employment rules and regulations fit an expert systems (ES) approach?

b. Why did the manual process defy automation until the ES approach was used?

c. Why are there links from the ES to databases and IT applications?