1. Explain the following terms: (20%)
   - Online Analytical Processing (OLAP)
   - Information Resources Management (IRM)
   - Supply Chain Management (SCM)
   - Work-flow management
   - Executive Support System (ESS)

2. How can Internet technology support business-to-business electronic commerce? How can Intranet support organizational collaboration? (15%)

3. With the popularity of the Internet, EDI is moving from VANs (Value-Added Networks) to the Internet. What are some of the limitations of such a move? In what ways can VAN and Internet EDI complement each other? (15%)

4. There are several basic architectures for data warehousing. Two common ones are two-tier and three-tier architectures. Please describe the two architectures (10%)

5. Case Study (40%)

   Will moving to new database technology help a company stay competitive? Officials at BHW Bausparkasse AG thought so and gave that as the reason they moved from the IDMS database management system to the DB2 database management system. BHW, which is headquartered in Hameln, Germany, is the second largest building society (home loan association) in Germany. They had used IDMS from Computer Associates (CA) of Islandia, New York (a network database management system), for many years with upward of 2000 programs accessing it. The 1991 decision to move IBM's DB2, a relational database management system (RDBMS), was therefore a major strategic move.

   BHW was founded in 1928 and by the 1990s was offering not only mortgages but also banking, real estate, and life insurance services. Its basic business data was stored in the IDMS DBMS. It required 55 gigabytes of storage to hold its 440 separate databases encompassing about 12,000 data elements - a gigantic system by any standards. To service its nearly 3 million customers and 12 million contracts, BHW found that its 2500 employees accessed IDMS on average about 33 million times per day, a very well-used system. Any improvement in its performance was bound to have a major and positive impact on the company.

   To remain competitive, home loan companies such as BHW must be able to read the market and quickly provide customers with new financial products and services to customers. According
to Harry Gehlen, project manager for the database re-engineering project, IDMS was not modern enough to allow BHW to react rapidly to customer needs. IDMS was a network DBMS, and BHW needed to move into the world of relational databases. For example, BHW wanted to develop an executive information system (EIS), an application that really only works well using a RDBMS. In addition, Gehlen sees his company adding object-oriented databases next and then moving to distribute technology. He hopes that BHW will be able to establish total independence of its data from its application software. He believes that all these moves would be too complex to be done directly from a network DBMS. He concludes that a move to a RDBMS is a proper migration path to these other newer technologies.

BHW managers had leaked at the possibility of moving to an RDBMS as early as 1987 but rejected the idea at that earlier date because they did not find any RDBMS that could meet their needs. What they did do was migrate from their longtime Unisys Corp. mainframe to IBM mainframes, thus positioning themselves very well to take advantage of RDBMS technology as it matured. By 1991 they determined that DB2 would serve their needs. However, because they had always been pleased with CA's IDMS, they also looked at its announced release, version 12. They rejected it for several reasons. First, version 12 was only announced, not actually released (software purchasers tend to be very wary of "vaporware"). Second, BHW required that any RDBMS it purchases must include standard SQL, but again, while CA had announced that its new product would be SQL compliant, CA indicated no shipping date. Third, the BHW IS staff did not find what they considered an adequate contact for their project at CA's European headquarters at Darmstadt, Germany, and so they became very concerned about future product support should they convert to version 12. They also reasoned that a move to any relational database, whether it be DB2, IDMS, or some other product, would take about the same amount of time, so that they would gain nothing by staying with IDMS. Thus, they made the decision to purchase DB2.

Mario Pelleschi, senior vice president of CA's European operation, disputes Gehlen's version, and particularly the last point. He claims that his product has all the functionality of DB2, and that BHW could have converted to version 12 much more quickly and inexpensive because it would not need to rewrite programs or convert the databases. Gehlen countered that BHW "wanted to have a secure system which will be maintained for many years, and Computer Associates didn't seem to be the right partner for us in the future." This seemed to indicate that the real basis for the decision to go with DB2 was the vendor rather than the product.
The conversion project lasted only about 10 months and used highly automated tools. Before converting to DB2, Gehlen decided that they needed to convert the 2000 older VS COBOL programs into the more up-to-date COBOL ANSI 85, a task for which good automated tools were available. In the process, the team also identified programs which were no longer being used and eliminated them. His team also analyzed the IDMS data and prepared an automated conversion tool to use to convert the data to DB2. Once the data was converted, they found they were able to use the upgraded programs to access and update both the DB2 and IDMS databases, enabling them to work with either one, as needed. They set up a pilot project to convert three applications to DB2. This pilot lasted four months, and Gehlen used this time to educate his IS staff on DB2. In early 1993 they began to convert programs on a mass basis.

The project was not only successfully completed, but the team also had a positive surprise. They had expected that performance would decline in the conversion from IDMS, a network database, to DB2, a relational database. However, according to Gehlen, "performance went up by a factor of three to five," thus giving BHW a clear jump in productivity.

Questions
A. Analyze BHW from the standpoint of the competitive forces and value chain models.
B. To what extent is selecting a database management system an important business decision? Did BHW’s selection of DB2 enhance its competitive position?
C. From what you have learned in this case study, was a relational database management system the best choice for BHW Bausparkasse AG? Why or why not?
D. In the case study, Harry Gehlen is cited as the source for future plans to move BHW into object-oriented and distributed technologies. Comment on the appropriateness of using him as the source.
E. What management, organization, and technology factors should be considered when selecting a database management system?