

## Module - I

*Lecture-07*

## DATA MODELS

- Comparison of Data Models

# Comparison of Data Models

Data Model	Data Independence	Structural Independence	Advantages	Disadvantages
<b>Relational</b>	Yes	Yes	<ol style="list-style-type: none"><li>1. Structural independence is promoted by the use of independent tables. Changes in a table's structure do not affect data access or application programs.</li><li>2. Tabular view substantially improves conceptual simplicity, thereby promoting easier database design, implementation, management and use.</li><li>3. Ad hoc query capability is based on SQL.</li><li>4. Powerful RDBMS isolates the end-user from physical-level details and improves implementation and management simplicity.</li></ol>	<ol style="list-style-type: none"><li>1. The RDBMS requires substantial hardware and system software overhead.</li><li>2. Conceptual simplicity gives relatively untrained people the tools to use a good system poorly and, if unchecked, it may produce the same data anomalies found in file systems.</li><li>3. It may promote islands of information problems as individuals and departments can easily develop their own applications.</li></ol>

# Comparison of Data Models

Data Model	Data Independence	Structural Independence	Advantages	Disadvantages
<b>Entity-Relationship</b>	Yes	Yes	<ol style="list-style-type: none"><li>1. Conceptual simplicity</li><li>2. Visual representation</li><li>3. Effective communication</li><li>4. Integration with the relational database model</li></ol>	<ol style="list-style-type: none"><li>1. There is limited constraint representation</li><li>2. There is limited relationship representation</li><li>3. There is no data manipulation language</li><li>4. Loss of information content occurs when attributes are removed from entities to avoid crowded displays</li></ol>

# Comparison of Data Models

Data Model	Data Independence	Structural Independence	Advantages	Disadvantages
<b>Object-Oriented</b>	Yes	Yes	<ol style="list-style-type: none"><li>1. Semantic content is added</li><li>2. Visual representation includes semantic content</li><li>3. Inheritance promotes data integrity</li></ol>	<ol style="list-style-type: none"><li>1. Slow development of standards caused vendors to supply their own enhancements, thus eliminating a widely accepted standard</li><li>2. It is a complex navigational system</li><li>3. There is a perpendicular learning curve</li><li>4. High system overhead slows transactions</li></ol>

# Comparison of Data Models

Data Model	Data Independence	Structural Independence	Advantages	Disadvantages
<b>Semi-structured (XML)</b>	Yes	Yes	<ol style="list-style-type: none"><li>1. It can be used to represent data from some data sources that aren't bound by a schema.</li><li>2. It offers a versatile format for data sharing between various Databases.</li><li>3. Viewing structured data as semi-structured can be beneficial for browsing purposes.</li><li>4. It is simple to alter the schema.</li><li>5. It's possible that the data transfer format is portable.</li><li>6. Its supports users who can not express their need in <b>SQL</b></li><li>7. It can deal easily with the heterogeneity of sources.</li></ol>	<ol style="list-style-type: none"><li>1. Queries cannot be performed as quickly as they can in a more limited structure, such as the relational model.</li><li>2. In a semi-structured Database, records are typically stored with unique IDs referenced with pointers to their disc location. It makes navigational or path-based queries very efficient, but it is inefficient for searching multiple records (as is common in SQL) because it must seek around the disc following pointers.</li><li>3. One standard for expressing semi-structured data is the <b>Object Exchange Model (OEM)</b>, while another is <b>XML</b>.</li></ol>

# Comparison of Data Models

Data Model	Data Independence	Structural Independence	Advantages	Disadvantages
<b>Network</b>	Yes	No	<ol style="list-style-type: none"><li>1. Conceptual simplicity is at least equal to that of the hierarchical model</li><li>2. It handles more relationship types such as *.* and multiparent</li><li>3. Data access is more flexible than hierarchical and files system</li><li>4. Data owner/member relationship promotes data integrity</li><li>5. There is conformance to standards</li><li>6. It includes <b>Data Definition Language (DDL)</b> and <b>Data Manipulation Language (DML)</b> in <b>Database Management System (DBMS)</b></li></ol>	<ol style="list-style-type: none"><li>1. System complexity limits efficiency still a navigational system</li><li>2. Navigational system yields complex implementation, application development and management</li><li>3. Structural changes require changes in all application programs</li></ol>

# Comparison of Data Models

Data Model	Data Independence	Structural Independence	Advantages	Disadvantages
<b>Hierarchical</b>	Yes	No	<ol style="list-style-type: none"><li>1. It promotes data sharing</li><li>2. Parent/child relationship promotes conceptual simplicity</li><li>3. Database security is provided and enforced by <b>Database Management System (DBMS)</b></li><li>4. Parent/child relationship promotes data integrity</li><li>5. It is efficient with <b>1:*</b> relationships</li></ol>	<ol style="list-style-type: none"><li>1. Complex implementation requires knowledge of physical data storage characteristics</li><li>2. Navigational system yields complex application development, management and use; requires knowledge of hierarchical path</li><li>3. Changes in structure require changes in all application programs</li><li>4. There are implementation limitations (no multiparent or <b>*.*</b> relationships)</li><li>5. There is no <b>Data Definition Language (DDL)</b> and <b>Data Manipulation Language (DML)</b> in <b>Database Management System (DBMS)</b></li><li>6. There is a lack of standards</li></ol>