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Data Models

The hierarchical database model is one of the original database models created by IBM. Similar to a “tree”, starting with the root node, the files of data are all linked by what is often referred to as a parent/child records. This model allows a parent record to have multiple child records, however the child record can only have one parent. This model is flawed because in order for one to find a file they must know the structure of the entire tree and navigate through it. Another flaw is you are unable to create a child record unless you have the parent record, resulting in possible redundancy. As you can see, the hierarchical database model handles “many-to-many” relationships poorly.

The network model has a unique schema which differentiates relationship types with arcs and object types with nodes in a graph. This model isn’t restricted by a hierarchy, resulting in less repetition and easily accommodates both one-to-one and many-to-many relationships with more data integrity and independence. A downside of the network model is since each record is maintained by a pointer it has a more complex structure and insertion, update, and deletion process, along with an absence of structural independence.

Unlike the hierarchical and network model, the relational model is a table of rows, also called tuples, and columns similar to a spreadsheet. The relational model is also more efficient and self-documenting. It also uses a primary and foreign key when expressing relationship information. Although use of the relational model is more popular, using XML as a model for

data storage could be more beneficial in certain circumstances. XML would be more beneficial when storing data that is naturally hierarchical, when the schema is volatile, or when sequence-oriented-order is an important aspect. Just like in real life, different tools are needed in different situations.