
Adamski, J.J., Finnegan, K.T., Hommel, C., 2001, *Microsoft 2000, Comprehensive Enhanced,* Course Technology Thomson Learning, USA Massachusetts.

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Anomalies

When you use a DBMS, you are more likely to get results you can trust if you create your relations carefully. For example, problems might occur with relations that have partial and transitive dependencies, whereas you won't have as much trouble if you ensure that your relations include only attributes that are directly related to each other. Also, when you remove data redundancy from a relation, you improve that relation. **Data redundancy** occurs when you store the same data in more than one place.

The problems caused by data redundancy and by partial and transitive dependencies are called **anomalies**, because they are undesirable irregularities of relations. Anomalies are of three types: insertion, deletion, and update.

To examine the effects of these anomalies, consider the Client relation that is shown in Figure 12. The Client relation represents part of the database for Pet Sitters Unlimited, which is a company providing pet-sitting services for homeowners while they are on vacation. Pet Sitters Unlimited keeps track of the data about its clients and the clients' children, pets, and vets. The attributes for the Client relation include the composite key ClientID and ChildName, along with ClientName, VetID, and VetName.

Figure 12 THE CLIENT RELATION WITH INSERTION, DELETION, AND UPDATE ANOMALIES

primary key

Client

ClientID	ChildName	ClientName	VetID	VetName
2173	Ryan	Barbara Hennessey	27	Pet Vet
4519	Pat	Vernon Noordsy	31	Pet Care
4519	Dana	Vernon Noordsy	31	Pet Care
8005	Dana	Sandra Amidon	27	Pet Vet
8005	Dani	Sandra Amidon	27	Pet Vet
8112	Pat	Helen Wandzell	24	Pets R Us

- An **insertion anomaly** occurs when you cannot add a row to a relation because you do not know the entire primary key value. For example, you cannot add the new client Cathy Corbett with a ClientID of 3322 to the Client relation when you do not know her children's names. Entity integrity prevents you from leaving any part of a primary key null. Because ChildName is part of the primary key, you cannot leave it null. To add the new client, your only option is to make up a ChildName, even if the client does not have children. This solution misrepresents the facts and is unacceptable, if a better approach is available.
- A **deletion anomaly** occurs when you delete data from a relation and unintentionally lose other critical data. For example, if you delete ClientID 8112 because Helen Wandzell is no longer a client, you also lose the only instance of VetID 24 in the database. Thus, you no longer know that VetID 24 is Pets R Us.
- An **update anomaly** occurs when you change one attribute value and either the DBMS must make more than one change to the database or else the database ends up containing inconsistent data. For example, if you change

the ClientName, VetID, or VetName for ClientID 4519, the DBMS must change multiple rows of the Client relation. If the DBMS fails to change all the rows, the ClientName, VetID, or VetName now has two different values in the database and is inconsistent.