**Security and Data Integrity Analysis**

1. Privacy Analysis

For our database all names should be private, and accessible only by the superiors in the drug world hierarchy or by watchers and seekers tasked to that area of individual. Here are some particular rules: The drug czar can see the names of everyone in his empire. Drug dealers do not know the names of other drug dealers, seekers or watchers but knows the names of all the thugs that work under him as well as the munitions he holds. The only exception to this is a person, such as a drug dealer, can know a watcher if he knows that the watcher is watching him. This is important because if someone is being watched, they are less likely to expect other people to be watching them unknown. Thugs won’t be able to use the database much, except for being in it so dealers can keep track of them. Lastly, a watcher can see all that a drug dealer he is watching can see and a seeker can see all the data corresponding to his location.

1. Security Analysis

The main implication for data integrity is that only the czar and those he gives permission to would be given administrator controls. Other restrictions would be dealers can only change data directly related to them, such as drugs and thugs working for them. Watchers and seekers should not be allowed to change anything. To prevent breach on privacy, non-czar users can only see items following the constraints in the Privacy Analysis with the additional constraint that they cannot see PersonIDs. Also, whenever someone makes a query, they must include their own PersonID so the database knows what kind of information they are allowed to access. For obvious reason, the only stakeholders who should be allowed access to the database would be those mentioned in the Privacy Analysis. Another aspect would be, if one part of the empire is compromised by the police, the rest of the empire is kept protected due to PersonIDs being very non-descriptive.

1. Entity Integrity Analysis
   1. For the Dealer table, DealerID must be 8 digit unique integer that is the primary key. Name must be a 30 character nvarchar and not null, LocationID is a foreign key to the Location table, and must be an 8 digit unique integer. Munitions will be a small int and cannot be null.
   2. For the Drugs table, DealerID is a unique 8 digit integer that is a foreign key to the Dealer table. Name must be a 30 character nvarchar that cannot be null and is the primary key, price is a non negative float that cannot be null and quantity is an integer that cannot be null.
   3. For the Thugs table, ThugID is a unique 8 digit integer that is the primary key. Name must be a 30 character nvarchar and not null, and DealerID is a unique 8 digit integer that is a foreign key to the Dealer table.
   4. For the Location table, LocationID is a unique 8 digit integer that is the primary key. Neighborhood must be a 30 character nvarchar that cannot be null, City is also a 30 character nvarchar that cannot be null, and state is a 2 char nvarchar that cannot be null.
   5. For the Watcher table, WatcherID is a unique 8 digit integer that is the primary key, Name is a 30 character nvarchar that cannot be null.
   6. For the Seeker table, SeekerID is a unique 8 digit integer that is the primary key, Name must be a 30 character nvarchar and not null, LocationID is a foreign key to the Location table.
   7. For the Surveillance table, WatcherID is a unique 8 digit integer that is a foreign key to the Watcher table. PersonID is a unique 8 digit integer foreign key to any unique ID number from Watcher, Dealer, Thug and Seeker tables. Doesknow must be a Boolean that cannot be null.
2. Referential Integrity Analysis

On delete all operations will cascade. Here are some reasons why we chose this method. If a dealer is removed from the database, his drugs have probably been seized and his thugs killed or captured. If a location is removed from the database it has probably been destroyed which will also mean all operatives in that location have been destroyed. If a person dies, they will no longer need to be under surveillance.

On update all operations will cascade or reject (only if the operation would create a null pointer). Here are some reasons why we chose this method. If a dealer changes then his drugs and thugs will move to the new dealer. If a location changes, its operatives will also move. If a person changes, the surveillance will update to pertain to the new person.

1. Business Rule Integrity Analysis

When drugs are sold the dealers will update the database on a weekly basis. This system is mainly designed to benefit the drug czar, which means there are few business rule constraints.