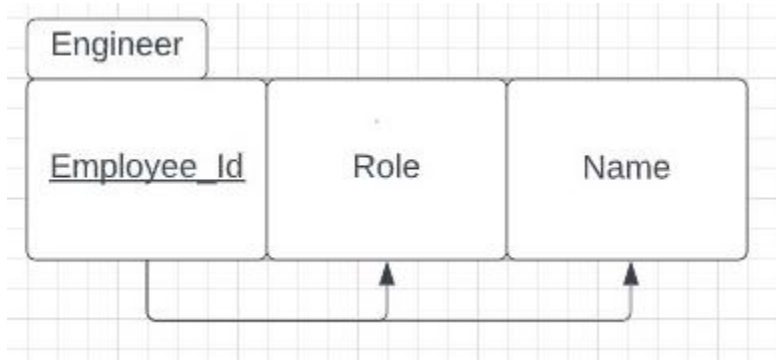


# Normalization

## TABLE ONE: ENGINEER



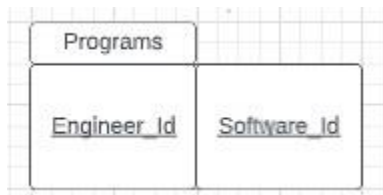
**First Normal Form:** The Engineer table is in 1NF because its attributes (Employee\_Id, Role, and Name) are not multi-value attributes, therefore the table is in 1NF.

**Second Normal Form:** The Engineer table is in 2NF because it is 1NF and both non-key attributes (Role, Name) are fully functionally dependent on the primary key.

**Third Normal Form:** The Engineer table is in 3NF because it is in 2NF and it has no transitive dependencies, we know it cannot have any transitive dependencies because all non-key attributes are solely dependent on the single key attribute.

**Boyce-Codd Normal Form:** The Engineer table is in BCNF because it is in 3NF, and no key attributes are dependent on a non-key attribute.

## TABLE TWO: PROGRAMS



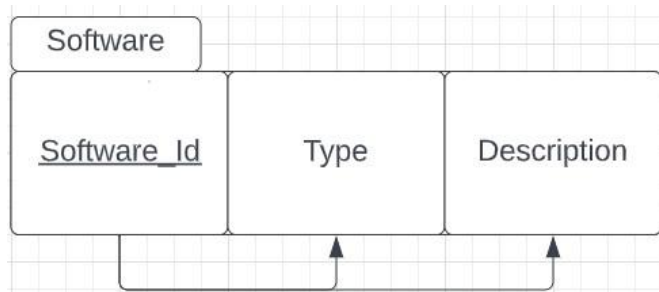
**First Normal Form:** The Programs table is in 1NF because its attributes (Engineer\_Id, and Software\_Id) are not multi-value attributes, therefore the table is in 1NF.

**Second Normal Form:** The Programs table is in 2NF because it is 1NF and all of its attributes (Engineer\_Id, and Software\_Id) are primary keys, therefore all non-key attributes are fully functionally dependent on the primary key.

**Third Normal Form:** The Programs table is in 3NF because it is in 2NF and it has no transitive dependencies, we know it cannot have any transitive dependencies because it only has primary key attributes, therefore all non-key attributes are solely dependent on the single key attribute.

**Boyce-Codd Normal Form:** The Programs table is in BCNF because it is in 3NF and it only has primary keys, therefore no key attributes are dependent on non-key attributes.

### TABLE THREE: SOFTWARE



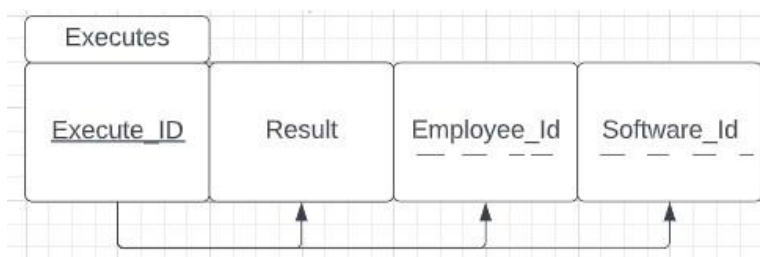
**First Normal Form:** The Software table is in 1NF because its attributes (Software\_Id, and Type, Description) are not multi-valued attributes, therefore the table is in 1NF.

**Second Normal Form:** The Software table is in 2NF because it is in 1NF and all of its attributes (Type and Description) are fully functionally dependent primary key.

**Third Normal Form:** The Software table is in 3NF because it is in 2NF and it has no transitive dependencies, we know it cannot have any transitive dependencies because all non-key attributes are solely dependent on the single key attribute.

**Boyce-Codd Normal Form:** The Software table is in BCNF because it is in 3NF and no key attributes are dependent on a non-key attribute.

### TABLE FOUR: EXECUTES



**First Normal Form:** The Executes table is in 1NF because its attributes (Employee\_Id, Result, Execute\_Id, and Software\_Id) are not multi-valued attributes, therefore the table is in 1NF.

**Second Normal Form:** The Executes table is in 2NF because it is in 1NF and all non-key attributes (Result, Employee\_Id, and Software\_Id) are fully functionally dependent on the primary key.

**Third Normal Form:** The Executes table is in 3NF because it is in 2NF and it has no transitive dependencies, we know it cannot have any transitive dependencies because all non-key attributes are solely dependent on the single primary key attribute.

**Boyce-Codd Normal Form:** The Executes table is in BCNF because it is in 3NF, and no key attributes are dependent on a non-key attribute.

## TABLE FIVE: TIME

Time		
<u>Execute_ID</u>	Date	Time

**First Normal Form:** The Executes table is in 1NF because its attributes (Execute\_Id, Date, and Time) are not multi-value attributes, therefore the table is in 1NF.

**Second Normal Form:** The Executes table is in 2NF because it is 1NF and all non-key attributes (Date and Time) are fully functionally dependent on the primary key.

**Third Normal Form:** The Executes table is in 3NF because it is in 2NF and it has no transitive dependencies, we know it cannot have any transitive dependencies because all non-key attributes are solely dependent on the single primary key attribute.

**Boyce-Codd Normal Form:** The Executes table is in BCNF because it is in 3NF, and no key attributes are dependent on a non-key attribute.