**NF:**

1. **Book**

Attributes: B\_ID (Primary key), Author, B\_Name, B\_Price, Genre

Functional Dependencies: B\_ID 🡪 Author, B\_Name, B\_Price, Genre

Superkey: {B\_ID}, {B\_ID, Author, B\_Name, B\_Price, Genre}

Candidate Key: B\_ID

Primary key: B\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have only one value.

• There are no partial dependencies. It has one unique attribute, which is

Book\_ID, that identifies each tuple, and no non-key attributes depend only on a part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is transitively dependent on the primary key.

1. **Sender**

Attributes: S\_ID (Primary key), S\_Name, B\_ID (FK), Phone

Functional Dependencies: S\_ID 🡪 S\_Name, B\_ID, Phone

Superkey: {S\_ID}, {S\_ID, B\_ID}

Candidate Key: S\_ID

Primary key: S\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Sender\_ID, that identifies each tuple, and no non-key attributes depend only on a

part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Recepient**

Attributes: R\_ID (Primary key), Full\_Name, Phone, Email, Address

Functional Dependencies: S\_ID 🡪 S\_Name, B\_ID, Phone

Superkey: {R\_ID}, {Email}

Candidate Key: R\_ID

Primary key: R\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

RECEPIENT\_ID, that identifies each tuple, and no non-key attributes depend only

on a part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Account**

Attributes: Username (Primary key), Password

Functional Dependencies: Username 🡪 Password

Superkey: {Username}

Candidate Key: Username

Primary key: Username

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Username, that identifies each tuple, and no non-key attributes depend only on a

part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Order**

Attributes: ORDER\_ID (Primary key), R\_ID(FK), B\_ID(FK), Total\_Price

Functional Dependencies: ORDER\_ID 🡪 R\_ID, B\_ID, Total\_Price

Superkey: {ORDER\_ID}, {ORDER\_ID, R\_ID, B\_ID}

Candidate Key: ORDER\_ID

Primary key: ORDER\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Order\_ID, that identifies each tuple, and no non-key attributes depend only on a

part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Order\_elements**

Attributes: ELEMENT\_ID (Primary key), ORDER\_ID(FK), B\_ID(FK)

Functional Dependencies: ELEMENT\_ID 🡪 ORDER\_ID, B\_ID

Superkey: {ELEMENT\_ID}, {ELEMENT\_ID, ORDER\_ID, B\_ID}

Candidate Key: ELEMENT\_ID

Primary key: ELEMENT\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Element\_ID, that identifies each tuple, and no non-key attributes depend only on a

part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Payment**

Attributes: P\_ID (Primary key), R\_ID(FK), P\_Amount, P\_Method

Functional Dependencies: P\_ID 🡪 R\_ID, P\_Amount, P\_Method

Superkey: {P\_ID}, {P \_ID, R\_ID}

Candidate Key: P\_ID

Primary key: P\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Payment\_ID, that identifies each tuple, and no non-key attributes depend only on a

part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Delivery**

Attributes: D\_ID (Primary key), B\_ID(FK), R\_ID(FK), D\_Address, D\_Date

Functional Dependencies: D\_ID 🡪 B\_ID, R\_ID, D\_Address, D\_Date

Superkey: {D\_ID}, {D\_ID, B\_ID, R\_ID}

Candidate Key: D\_ID

Primary key: D\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Delivery\_ID, that identifies each tuple, and no non-key attributes depend only on a

part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Feedback**

Attributes: F\_ID (Primary key), R\_ID(FK), F\_Type, F\_Rating

Functional Dependencies: F\_ID 🡪 R\_ID, F\_Type, F\_Rating

Superkey: {F\_ID}, {F\_ID, R\_ID}

Candidate Key: F\_ID

Primary key: F\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

• There are no partial dependencies. It has one unique attribute, which is

Feedback\_ID, that identifies each tuple, and no non-key attributes depend only on

a part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.

1. **Transaction**

Attributes: P\_ID(FK), R\_ID(FK), T\_ID

Functional Dependencies: T\_ID🡪 P\_ID, R\_ID

Superkey: {T\_ID}

Candidate Key: T\_ID

Primary key: T\_ID

State: 3NF

• There are no multi-valued attributes. Each column and row intersection have

only one value.

As we see here, we have two foreign keys, but for the 2NF form our attributes should be depended on primary key, so we should add one more attribute, which we named **T\_ID** and our attributes will have functional dependencies with this PK.

And our tables look like this:

|  |  |
| --- | --- |
| TRANSACTION | |
| P\_ID | R\_ID |
|  |  |

|  |  |
| --- | --- |
| R\_ID | T\_ID |
|  |  |
|  |  |

|  |  |
| --- | --- |
| P\_ID | T\_ID |
|  |  |
|  |  |

• There are no partial dependencies. It has one unique attribute, which is

TRANSACTION\_ID, that identifies each tuple, and no non-key attributes depend

only on a part of the primary key.

• There are no transitive dependencies. No non-primary-key attribute is

transitively dependent on the primary key.