

To begin with, we take all our required attributes in a single table.

- Here, User_ID is the primary Key.

| | | | | | | | |
|----------------|------|-------|----------|---------|-----|--------------|--------------------|
| <u>User_ID</u> | Name | Email | Password | Picture | Bio | No_followers | No_Topics_Followed |
|----------------|------|-------|----------|---------|-----|--------------|--------------------|

| | | | | | |
|-------------|---------------|-------------|------------|-----------|-----------|
| Question_ID | Question_Name | Q_Timestamp | No_Answers | No_Topics | Answer_ID |
|-------------|---------------|-------------|------------|-----------|-----------|

| | | | | | | |
|-------------|-------------|-------------|------------|--------------|------------|---------|
| Answer_Name | A_Timestamp | No_Comments | No_Upvotes | No_Downvotes | Comment_ID | Comment |
|-------------|-------------|-------------|------------|--------------|------------|---------|

| | | | | | | | | |
|-------------|----------|------------|-------------------|--------------|--------------|-----------|-------------|----------|
| C_Timestamp | Topic_ID | Topic_Name | Topic_Description | No_followers | No_Questions | Upvote_ID | Downvote_ID | User2_ID |
|-------------|----------|------------|-------------------|--------------|--------------|-----------|-------------|----------|

From 1NF we know that it disallows multivalued, composite and nested attributes. So after applying 1NF, our tables would look like: (given below)

| | | | | | | | |
|----------------|------|-------|----------|---------|-----|--------------|--------------------|
| <u>User_ID</u> | Name | Email | Password | Picture | Bio | No_followers | No_Topics_Followed |
|----------------|------|-------|----------|---------|-----|--------------|--------------------|

User Table

| | | | | | |
|-----------------|--------------------|---------------|------------|-----------|-----------|
| <u>Topic_ID</u> | <u>Question_ID</u> | Question_name | No_Answers | No_Topics | Timestamp |
|-----------------|--------------------|---------------|------------|-----------|-----------|

Question table

| | | | | | | | |
|------------------|---------|-------------|-------------|-------------|------------|--------------|-----------|
| <u>Answer_ID</u> | User_ID | Question_ID | Answer_Name | No_Comments | No_Upvotes | No_Downvotes | Timestamp |
|------------------|---------|-------------|-------------|-------------|------------|--------------|-----------|

Answer table

| | | | | | |
|----------------|-----------------|------------|-------------------|--------------|--------------|
| <u>User_ID</u> | <u>Topic_ID</u> | Topic_Name | Topic_Description | No_Followers | No_Questions |
|----------------|-----------------|------------|-------------------|--------------|--------------|

Topic Table

| | | | | |
|---------|-------------------|-----------|---------|-----------|
| User_ID | <u>Comment_ID</u> | Answer_ID | Comment | Timestamp |
|---------|-------------------|-----------|---------|-----------|

Comment table

| | | |
|------------------|---------|-----------|
| <u>Upvote_ID</u> | User_ID | Answer_ID |
|------------------|---------|-----------|

Upvote Table

| | | |
|--------------------|---------|-----------|
| <u>Downvote_ID</u> | User_ID | Answer_ID |
|--------------------|---------|-----------|

Downvote Table

| | |
|-----------------|-----------------|
| <u>User1_ID</u> | <u>User2_ID</u> |
|-----------------|-----------------|

Follower-Following table

Now we apply 2NF to the tables.

2NF: A relation schema R is in second normal form (2NF) if every non-prime attribute A in R is fully functionally dependent on the primary key. So applying 2NF to the above given two tables we reach the following conclusions:

- Here, User table, Answer table, Comment Table, Upvote table, Downvote table , Follower-Following table are already in 2NF.
- In case of Question table, Question_Name, Timestamp, No_Followers, No_Topics can be obtained from just Question_ID. Hence this table is not in 2NF.
- In case of Topic Table, Topic_Name, Topic_Description, No_Followers, No_Topics can be obtained from just Topic_ID. Hence this table is not in 2NF.

After applying 2NF to the Question table, we get

| | | | | | |
|--------------------|---------------|------------|-----------|-----------|---------|
| <u>Question_ID</u> | Question_name | No_Answers | No_Topics | Timestamp | User_id |
|--------------------|---------------|------------|-----------|-----------|---------|

Question table

| | |
|-----------------|--------------------|
| <u>Topic_ID</u> | <u>Question_ID</u> |
|-----------------|--------------------|

Topic-Question Table

After applying 2NF to the Topic table, we get

| <u>Topic_ID</u> | Topic_Name | Topic_Description | No_Followers | No_Questions |
|-----------------|------------|-------------------|--------------|--------------|
|-----------------|------------|-------------------|--------------|--------------|

Topic Table

| <u>User_ID</u> | <u>Topic_ID</u> |
|----------------|-----------------|
|----------------|-----------------|

Follower-Topic Table

Now, Question and Topic Table are in 2NF form.

Next, we apply 3NF on these. A relation schema R is in third normal form (3NF) if it is in 2NF and no non-prime attribute A in R is transitively dependent on the primary key.

- We observe from the above tables that all the tables are already in 3NF form and no non-prime attribute in any of the tables are transitively dependent on the primary key.

| <u>User_ID</u> | Name | Email | Password | Picture | Bio | No_followers | No_Topics_Followed |
|----------------|------|-------|----------|---------|-----|--------------|--------------------|
|----------------|------|-------|----------|---------|-----|--------------|--------------------|

User Table

| <u>Question_ID</u> | Question_name | No_Answers | No_Topics | Timestamp | User_id |
|--------------------|---------------|------------|-----------|-----------|---------|
|--------------------|---------------|------------|-----------|-----------|---------|

Question table

| <u>Answer_ID</u> | User_ID | Question_ID | Answer_Name | No_Comments | No_Upvotes | No_Downvotes | Timestamp |
|------------------|---------|-------------|-------------|-------------|------------|--------------|-----------|
|------------------|---------|-------------|-------------|-------------|------------|--------------|-----------|

Answer table

| | | | | |
|-------------------|---------|-----------|---------|-----------|
| <u>Comment_ID</u> | User_ID | Answer_ID | Comment | Timestamp |
|-------------------|---------|-----------|---------|-----------|

Comment table

| | | | | |
|-----------------|------------|-------------------|--------------|--------------|
| <u>Topic_ID</u> | Topic_Name | Topic_Description | No_Followers | No_Questions |
|-----------------|------------|-------------------|--------------|--------------|

Topic Table

| | | |
|------------------|---------|-----------|
| <u>Upvote_ID</u> | User_ID | Answer_ID |
|------------------|---------|-----------|

Upvote Table

| | | |
|--------------------|---------|-----------|
| <u>Downvote_ID</u> | User_ID | Answer_ID |
|--------------------|---------|-----------|

Downvote Table

| | |
|-----------------|-----------------|
| <u>User1_ID</u> | <u>User2_ID</u> |
|-----------------|-----------------|

Follower-Following table

| | |
|----------------|-----------------|
| <u>User_ID</u> | <u>Topic_ID</u> |
|----------------|-----------------|

Follower-Topic Table

| | |
|-----------------|--------------------|
| <u>Topic_ID</u> | <u>Question_ID</u> |
|-----------------|--------------------|

Topic-Question Table