

# A5: Relational schema, validation and schema refinement

Our project, Answerly, is a web application for collaborative Questions and Answers.

This artifact contains the Relational Schema obtained by mapping from the Conceptual Data Model. The Relational Schema includes the relation schema, attributes, domains, primary keys, foreign keys and other integrity rules: UNIQUE, DEFAULT, NOT NULL, CHECK...

## 1. Relational Schema

Relation Reference	Relation Compact Notation
R01	User ( <b>userID</b> , firstName <i>NN</i> , lastName <i>NN</i> , email <i>UK NN</i> , description, username <i>UK NN</i> , password <i>NN</i> , score <i>DF 0</i> )
R02	Label ( <b>labelID</b> , name <i>NN</i> )
R03	Notification ( <b>notificationID</b> , content <i>NN</i> , date <i>DF Today</i> , viewed <i>DF False</i> , userID → user <i>NN</i> )
R04	UserManagement ( <b>managementID</b> , state <i>NN</i> , status <i>NN</i> , userID → User <i>NN</i> )
R05	Moderator ( <b>userID</b> → User)
R06	Administrator ( <b>userID</b> → Moderator)
R07	Vote ( <b>voteID</b> , like, dislike, userID → User <i>NN</i> , questionID → Question, answerID → Answer <i>CK questionID = NN XOR answerID = NN</i> )
R08	Question ( <b>questionID</b> , userID→User <i>NN</i> , title <i>NN</i> , description <i>NN</i> , nrLikes <i>NN DF 0</i> , nrDislikes <i>NN DF 0</i> , questionDate <i>NN DF Today</i> )
R09	Answer ( <b>answerID</b> , userID→User <i>NN</i> , questionID→Question <i>NN</i> , answerDate <i>NN DF Today</i> , content <i>NN</i> , nrLikes <i>NN DF 0</i> , nrDislikes <i>NN DF 0</i> )
R10	Comment ( <b>commentID</b> , userID→User <i>NN</i> , questionID→Question, answerID→Answer <i>CK questionID = NN XOR answerID = NN</i> , content <i>NN</i> , commentDate <i>NN DF Today</i> )
R11	Report ( <b>reportID</b> , userID→User, questionID→Question, answerID→Answer, commentID→Comment <i>CK userID = NN XOR questionID = NN XOR answerID = NN XOR commentID = NN</i> )
R12	ReportStatus ( <b>statusID</b> , reportID→Report, state <i>NN DF unresolved CK state IN States</i> , comment, responsibleUser→Moderator <i>NN</i> )
R13	MarkedAnswer (_questionID_→Question, _answerID_→Answer)
R14	Following ( <b>userID</b> → User, <b>labelID</b> → Label))
R15	About ( <b>questionID</b> → Question, <b>labelID</b> → Label)

- UK means UNIQUE KEY
- NN means NOT NULL
- DF means DEFAULT
- CK means CHECK

## 2. Domains

Specification of additional domains:

Domain Name	Domain Specification
Today	DATE DEFAULT CURRENT DATE
States	ENUM ('unresolved', 'reviewing', 'resolved')

## 3. Functional Dependencies and schema validation

**Table R01 (User)**

<b>Keys:</b> {userID}, {username}, {email}	
<b>Functional Dependencies</b>	
FD0101	{userID} → {firstName, lastName, email, description, username, password, score}
FD0102	{username} → {userID, firstName, lastName, email, description, password, score}
FD0103	{email} → {userID, firstName, lastName, description, username, password, score}
<b>NORMAL FORM</b>	BCNF

**Table R02 (Label)**

<b>Keys:</b> {labelID}	
<b>Functional Dependencies</b>	
FD0201	{labelID} → {name}
<b>NORMAL FORM</b>	BCNF

**Table R03 (Notification)**

<b>Keys:</b> {notificationID}	
<b>Functional Dependencies</b>	
FD0301	{notificationID} → {content, date, viewed, userID}
<b>NORMAL FORM</b>	BCNF

**Table R04 (UserManagement)****Keys:** {managementID}**Functional Dependencies**

FD0401                      {managementID} → {state, status, userID}

**NORMAL FORM**

BCNF

**Table R05 (Moderator)****Keys:** {userID}**Functional Dependencies**

(none)

**NORMAL FORM**

BCNF

**Table R06 (Administrator)****Keys:** {userID}**Functional Dependencies**

(none)

**NORMAL FORM**

BCNF

**Table R07 (Vote)****Keys:** {voteID}**Functional Dependencies**

FD0701                      {voteID} → {like, dislike, userID, questionID, answerID}

**NORMAL FORM**

BCNF

**Table R08 (Question)****Keys:** {questionID}**Functional Dependencies**

FD0801                      {questionID} → {userID, title, description, nrLikes, nrDislikes, questionDate}

**NORMAL FORM**

BCNF

**Table R09 (Answer)****Keys:** {answerID}**Functional Dependencies**

**Table R09 (Answer)**

FD0901	{answerID} → {userID, questionID, answerDate, content, nrLikes, nrDislikes}
--------	---

<b>NORMAL FORM</b>	BCNF
--------------------	------

**Table R10 (Comment)**

<b>Keys:</b> {commentID}
--------------------------

**Functional Dependencies**

FD1001	{commentID} → {userID, questionID, answerID, content, commentDate}
--------	--

<b>NORMAL FORM</b>	BCNF
--------------------	------

**Table R11 (Report)**

<b>Keys:</b> {reportID}
-------------------------

**Functional Dependencies**

FD1101	{reportID} → {userID, questionID, answerID, commentID}
--------	--

<b>NORMAL FORM</b>	BCNF
--------------------	------

**Table R12 (ReportStatus)**

<b>Keys:</b> {statusID}
-------------------------

**Functional Dependencies**

FD1201	{statusID} → {reportID, state, comment, responsibleUser}
--------	--

<b>NORMAL FORM</b>	BCNF
--------------------	------

**Table R13 (MarkedAnswer)**

<b>Keys:</b> {questionID, answerID}
-------------------------------------

**Functional Dependencies**

(none)
--------

<b>NORMAL FORM</b>	BCNF
--------------------	------

**Table R14 (Following)**

<b>Keys:</b> {userID, labelID}
--------------------------------

**Functional Dependencies**

(none)
--------

<b>NORMAL FORM</b>	BCNF
--------------------	------

**Table R15 (About)****Keys:** {questionID, labelID}**Functional Dependencies**

(none)

**NORMAL FORM**

BCNF

## 4. SQL Code

```

PRAGMA foreign_keys = off;

-- Table: User
DROP TABLE IF EXISTS User;
CREATE TABLE User (
    userID          INTEGER          PRIMARY KEY,
    firstName       TEXT             NOT NULL,
    lastName        TEXT             NOT NULL,
    email           TEXT             NOT NULL,
    description     TEXT,
    username        TEXT             NOT NULL UNIQUE,
    password        TEXT             NOT NULL,
    score           INTEGER          DEFAULT 0
);

-- Table: Label
DROP TABLE IF EXISTS Label;
CREATE TABLE Label (
    labelID         INTEGER          PRIMARY KEY,
    name            TEXT             NOT NULL
);

-- Table: Notification
DROP TABLE IF EXISTS Notification;
CREATE TABLE Notification (
    notificationID  INTEGER          PRIMARY KEY,
    content         TEXT             NOT NULL,
    date           DATE              DEFAULT 'today' NOT NULL,
    viewed         BOOLEAN           DEFAULT FALSE,
    userID          INTEGER          REFERENCES "User" (userID)
);

-- Table: UserManagement
DROP TABLE IF EXISTS UserManagement;
CREATE TABLE UserManagement (
    managementID   INTEGER          PRIMARY KEY,
    state          TEXT              DEFAULT 'active' NOT NULL,
    status         TEXT              DEFAULT 'user' NOT NULL,
    userID         INTEGER          REFERENCES "User" (userID)
);

```

```
-- Table: Moderator
DROP TABLE IF EXISTS Moderator;
CREATE TABLE Moderator (
    moderatorID    INTEGER          REFERENCES "User" (userID)
);

-- Table: Administrator
DROP TABLE IF EXISTS Administrator;
CREATE TABLE Administrator (
    administratirID INTEGER          REFERENCES "Moderator" (moderatorID)
);

-- Table: Question
DROP TABLE IF EXISTS Question;
CREATE TABLE Question (
    questionID     INTEGER          PRIMARY KEY,
    userID         INTEGER          REFERENCES "User" (userID),
    title          TEXT             NOT NULL,
    description     TEXT             NOT NULL,
    nrLikes        INTEGER          DEFAULT 0 NOT NULL,
    nrDislikes     INTEGER          DEFAULT 0 NOT NULL,
    questionDate   DATE             DEFAULT 'today' NOT NULL
);

-- Table: Answer
DROP TABLE IF EXISTS Answer;
CREATE TABLE Answer (
    answerID       INTEGER          PRIMARY KEY,
    userID         INTEGER          REFERENCES "User" (userID),
    questionID     INTEGER          REFERENCES "Question" (questionID),
    answerDate     DATE             DEFAULT 'today' NOT NULL,
    content        TEXT             NOT NULL,
    nrLikes        INTEGER          DEFAULT 0 NOT NULL,
    nrDislikes     INTEGER          DEFAULT 0 NOT NULL
);

-- Table: Comment
DROP TABLE IF EXISTS Comment;
CREATE TABLE Comment (
    commentID      INTEGER          PRIMARY KEY,
    userID         INTEGER          REFERENCES "User" (userID),
    questionID     INTEGER          REFERENCES "Question" (questionID),
    answerID       INTEGER          REFERENCES "Answer" (answerID),
    commentDate    DATE             DEFAULT 'today' NOT NULL,
    content        TEXT             NOT NULL,
    CHECK (
        (questionID IS NOT NULL AND answerID IS NULL) OR
        (questionID IS NULL AND answerID IS NOT NULL)
    )
);

-- Table: Vote
DROP TABLE IF EXISTS Vote;
CREATE TABLE Vote (
```

```

    voteID            INTEGER            PRIMARY KEY,
    like              BOOLEAN,
    dislike           BOOLEAN,
    userID            INTEGER            REFERENCES "User" (userID),
    questionID        INTEGER            REFERENCES "Question" (questionID),
    answerID          INTEGER            REFERENCES "Answer" (answerID),
    CHECK (
        (questionID IS NOT NULL AND answerID IS NULL) OR
        (questionID IS NULL AND answerID IS NOT NULL)
    )
);

-- Table: Report
DROP TABLE IF EXISTS Report;
CREATE TABLE Report (
    reportID          INTEGER            PRIMARY KEY,
    userID            INTEGER            REFERENCES "User" (userID),
    questionID        INTEGER            REFERENCES "Question" (questionID),
    answerID          INTEGER            REFERENCES "Answer" (answerID),
    commentID         INTEGER            REFERENCES "Comment" (commentID),
    CHECK(
        (userID IS NOT NULL AND questionID IS NULL AND answerID IS NULL AND
commentID IS NULL) OR
        (userID IS NULL AND questionID IS NOT NULL AND answerID IS NULL AND
commentID IS NULL) OR
        (userID IS NULL AND questionID IS NULL AND answerID IS NOT NULL AND
commentID IS NULL) OR
        (userID IS NULL AND questionID IS NULL AND answerID IS NULL AND commentID
IS NOT NULL)
    )
);

-- Table: ReportStatus
DROP TABLE IF EXISTS ReportStatus;
CREATE TABLE ReportStatus (
    statusID          INTEGER            PRIMARY KEY,
    reportID          INTEGER            REFERENCES "Report" (reportID),
    state             TEXT               DEFAULT 'unresolved' NOT NULL,
    comment           TEXT,
    responsibleUser   INTEGER            REFERENCES "Moderator" (moderatorID)
);

-- Table: MarkedAnswer
DROP TABLE IF EXISTS MarkedAnswer;
CREATE TABLE MarkedAnswer (
    questionID        INTEGER            REFERENCES "Question" (questionID),
    answerID          INTEGER            REFERENCES "Answer" (answerID)
);

-- Table: Following
DROP TABLE IF EXISTS Following;
CREATE TABLE Following (
    userID            INTEGER            REFERENCES "User" (userID),
    labelID           INTEGER            REFERENCES "Label" (labelID)
);

```

```
);

-- Table: About
DROP TABLE IF EXISTS About;
CREATE TABLE About (
    questionID    INTEGER REFERENCES "Question" (questionID),
    labelID       INTEGER REFERENCES "Label" (labelID)
);
```

## Revision history

1. First submission (23/03/2020).

---

GROUP2064, 23/03/2020

- [Editor] Antonio Pedro Reis Ribeiro Sousa Dantas, up201703878@fe.up.pt
- Eduardo João Santana Macedo, up201703658@fe.up.pt
- Nuno Miguel Teixeira Cardoso, up201706162@fe.up.pt
- Paulo Roberto Dias Mourato, up201705616@fe.up.pt