CS 5200 Database Management System

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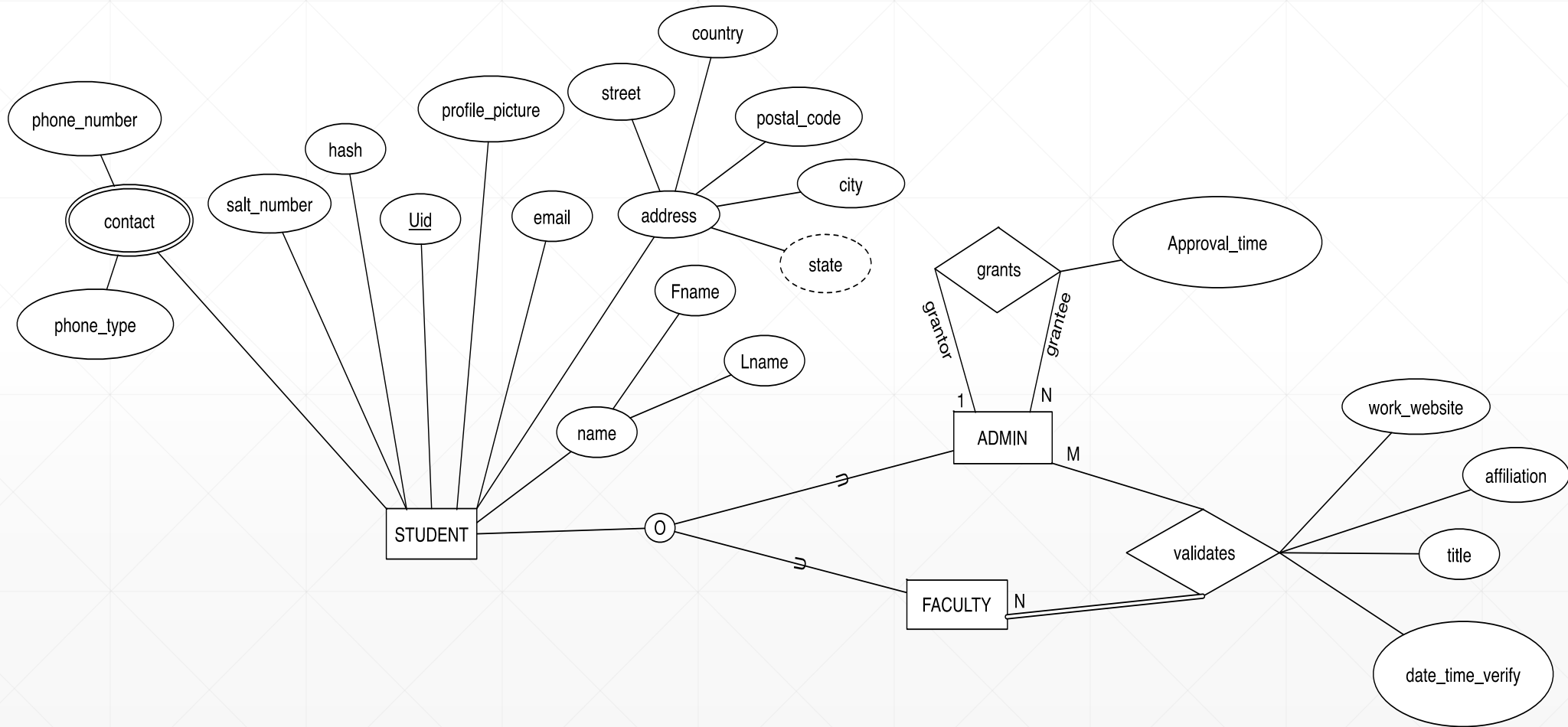- Database Design

Project Motivation

- We as hired as Lead Database Engineer by startup named "trainly.io" .

- The company want to become a APP store of training.

- students can register, enroll in different courses, complete course materials, ask questions and make playlists. When students complete our courses, they can get certification to prove their ability.

- It's same as a real university and everyone here can find his/her role.

- It's a big challenge for traditional education.

Character

- Students: registration, enrollment.

- Faculties: validation.

- Administrators: validation.

- Courses: created by faculties and completed by students.

- Course Materials: which have file, link, post and quiz 4 different types; created by faculties and completed by students.

- Course Questions: asked by students and answered by faculties.
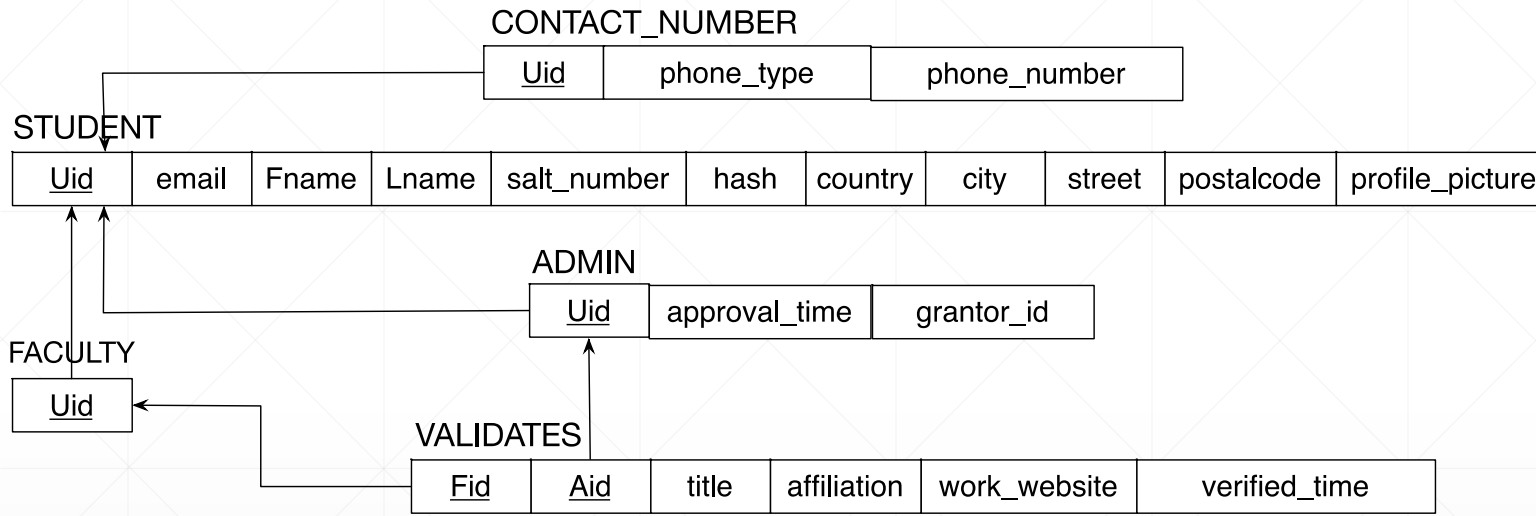
- Playlists: created by students.

Description & Database Design

Student sub-view:

Description & Database Design

Student sub-view:

CONTACT_NUMBER

Uid	phone_type	phone_number

STUDENT

Uid	email	Fname	Lname	salt_number	hash	country	city	street	postalcode	profile_picture

ADMIN

Uid	approval_time	grantor_id

FACULTY

Uid

VALIDATES

Fid	Aid	title	affiliation	work_website	verified_time

```sql
CREATE TABLE `trainly`.`Student`(
    `U_id` INT(10) NOT NULL AUTO_INCREMENT ,
    `Firstname` VARCHAR(255),
    `Lastname` VARCHAR(255),
    `Email` VARCHAR(255) NOT NULL,
    `Saltnum` INT(16) NOT NULL,
    `Hash` VARCHAR(40) NOT NULL,
    `Street` VARCHAR(255),
    `City` VARCHAR(255),
    `Postalcode` VARCHAR(10),
    `Country` VARCHAR(255) NOT NULL DEFAULT "USA",
    `Profilepic` LONGBLOB,
    PRIMARY KEY (`U_id`)
);
```

```sql
CREATE TABLE `trainly`.`validates` (
    `faculty_id` INT(10) NOT NULL,
    `admin_id` INT(10) NOT NULL,
    `title` VARCHAR(100),
    `affiliation` VARCHAR(100),
    `work_website` VARCHAR(100),
    `date_time_verify` TIMESTAMP,
    PRIMARY KEY (`faculty_id`,`admin_id`),
    CONSTRAINT `fk_validates_faculty` FOREIGN KEY (faculty_id) REFERENCES faculty (U_id),
    CONSTRAINT `fk_validates_admin` FOREIGN KEY (admin_id) REFERENCES admin (U_id)
);
```

Description & Database Design

Student sub-view:

```sql
/*Table for faculty*/
CREATE TABLE `trainly`.`faculty` (
    `U_id` INT(10) NOT NULL,
    PRIMARY KEY (`U_id`),
    CONSTRAINT `fk_faculty` FOREIGN KEY (U_id) REFERENCES student (U_id)
);



/*Table for admin*/
/*CONSTRAINT `fk_grantor` FOREIGN KEY (Grantor_id) REFERENCES admin (U_id)*/
CREATE TABLE `trainly`.`admin` (
    `U_id` INT(10) NOT NULL,
    `Grantor_id` INT(10) NOT NULL,
    `Approval_time` TIMESTAMP NOT NULL,
    PRIMARY KEY (`U_id`),
    CONSTRAINT `fk_admin` FOREIGN KEY (U_id) REFERENCES student (U_id)
);



/*Multivalued attribute contact number*/
CREATE TABLE `trainly`.`contact_number` (
    `U_id` INT(10) NOT NULL,
    `Phone_type` VARCHAR(10),
    `Phone_number` INT(10),
    PRIMARY KEY (`U_id`),
    CONSTRAINT `fk_contact` FOREIGN KEY (U_id) REFERENCES student (U_id)
);
```

```sql
INSERT
INTO
    `trainly`.`student`(
        Firstname,
        Lastname,
        Email,
        Saltnum,
        HASH,
        Street,
        City,
        Postalcode,
        Country,
        Profilepic
    )
VALUES(
    "Emma",
    "Williams",
    "emwil@gmail.com",
    17,
    "41d00883923d6bb950981a98a610625734e7c8ab",
    "123 6th St.",
    "Melbourne",
    "32904",
    "USA",
```
```
    "PD94bWwgdmVyc2lvbj0iMS4wIiBlbmNvZGluZz0iaXNvLTg4NTktMSI/Pg0KPCEtLSBHZW5lcmF0
b3I6IEFkb2JlIElsbHVzdHJhdG9yIDE4LjAuMCwgU1ZHIEV4cG9ydCBQbHVnLUluIC4gU1ZHIFZl
cnNpb246IDYuMDAgQnVpbGQgMCkgIC0tPg0KPCFET0NUWVBFIHN2ZyBQVUJMSUMgIi0vL1czQy8v
RFREIFNWRyAxLjEvL0VOIiAiaHR0cDovL3d3dy53My5vcmcvR3JhcGhpY3MvU1ZHLzEuMS9EVEQv
c3ZnMTEuZHRkIj4NCjxzdmcgdmVyc2lvbj0iMS4xIiBpZD0iQ2FyV8xIiB4bWxucz0iaHR0cDov
L3d3dy53My5vcmcvMjAwMC9zdmciIHhtbG5zOnhsaW5rPSJodHRwOi8vd3d3LnczLm9yZy8xOTk5
L3hsaW5rIiB4PSIwcHgiIHk9IjBweCINCINCgkgdmlld0JveD0iMCAwIDI5Ny4xNjYxUgMjk3LjE2NSg
```
```
```

Description & Database Design
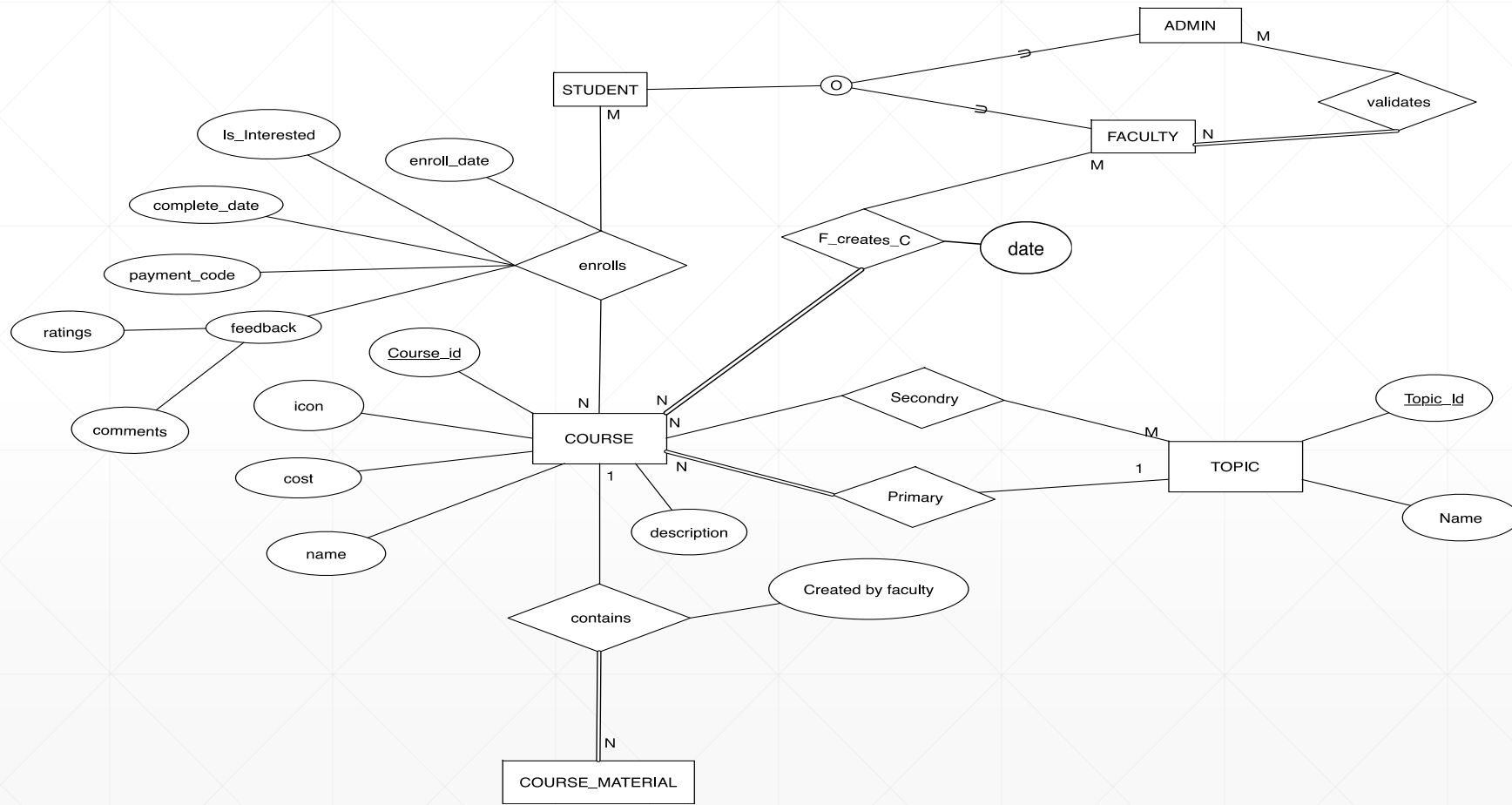
Course sub-view:

Description & Database Design

Course sub-view:
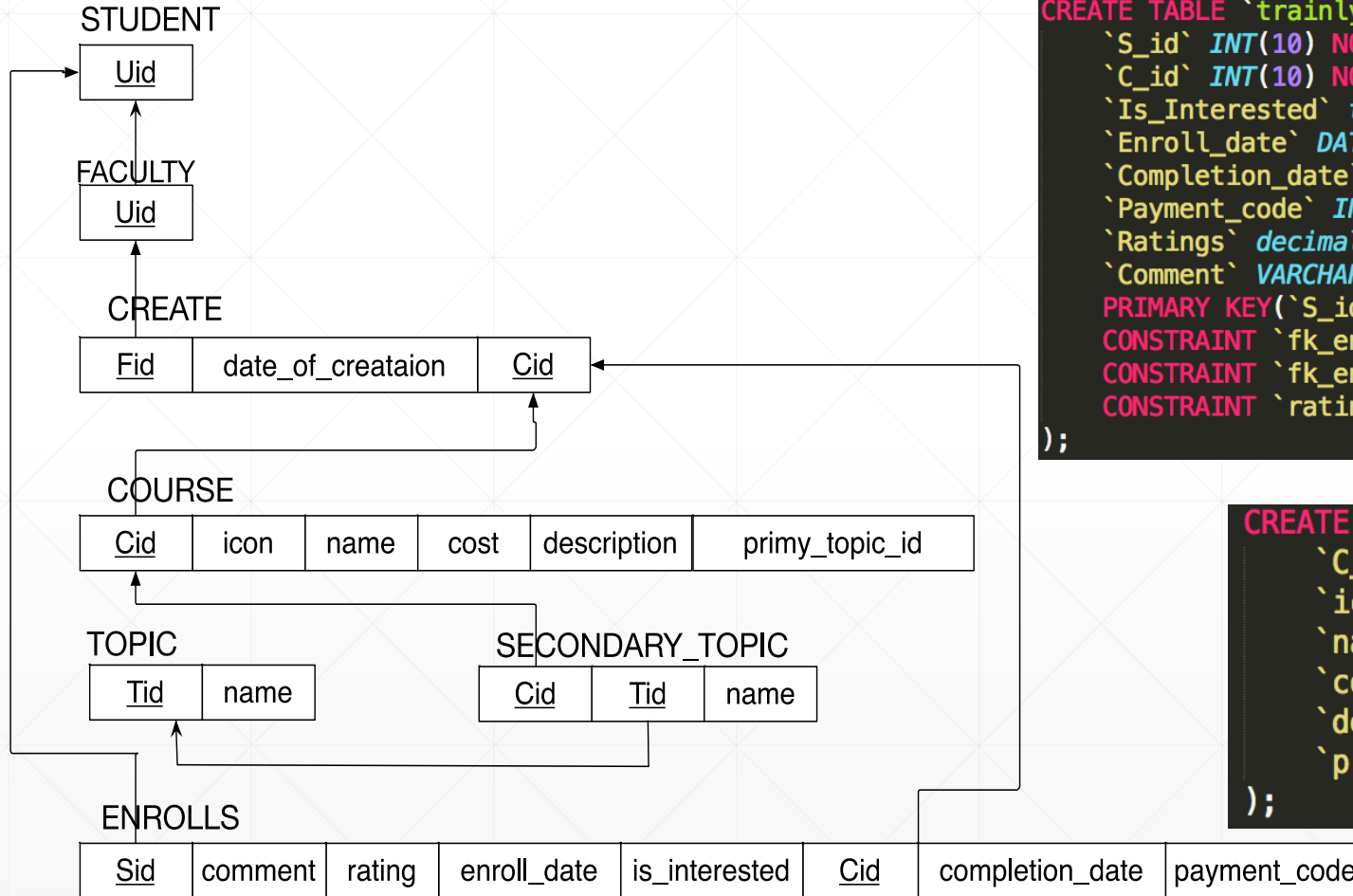

```
CREATE TABLE `trainly`.`enrolls` (
    `S_id` INT(10) NOT NULL,
    `C_id` INT(10) NOT NULL,
    `Is_Interested` tinyint(1) NOT NULL DEFAULT '1',
    `Enroll_date` DATE NOT NULL,
    `Completion_date` DATE,
    `Payment_code` INT(10) NOT NULL,
    `Ratings` decimal(2,1) DEFAULT '0',
    `Comment` VARCHAR(100),
    PRIMARY KEY(`S_id`,`C_id`),
    CONSTRAINT `fk_enrolls_sid` FOREIGN KEY (S_id) REFERENCES student (U_id),
    CONSTRAINT `fk_enrolls_cid` FOREIGN KEY (C_id) REFERENCES course (C_id),
    CONSTRAINT `rating` CHECK (Ratings>=1 AND Ratings <=5)
);
```

```
CREATE TABLE `trainly`.`course` (
    `C_id` INT(10) NOT NULL PRIMARY KEY AUTO_INCREMENT,
    `icon` LONGBLOB,
    `name` VARCHAR(100),
    `cost` FLOAT,
    `description` VARCHAR(255),
    `primary_topic_id` INT(10)
);
```

Description & Database Design

Course sub-view:

```sql
CREATE TABLE `trainly`.`f_creates_c` (
    `F_id` INT(10) NOT NULL,
    `C_id` INT(10) NOT NULL,
    `date_of_creation` DATE NOT NULL,
    PRIMARY KEY(`C_id`,`F_id`),
    CONSTRAINT `fk_faculties_id_fid` FOREIGN KEY (F_id) REFERENCES faculty (U_id),
    CONSTRAINT `fk_faculties_id_cid` FOREIGN KEY (C_id) REFERENCES course (C_id)
);
```

```sql
CREATE TABLE `trainly`.`topic` (
    `T_id` INT(10) NOT NULL AUTO_INCREMENT PRIMARY KEY,
    `name_of_topic` VARCHAR(255)
);
```

```sql
CREATE TABLE `trainly`.`secondary_topic` (
    `C_id` INT(10) NOT NULL,
    `T_id` INT(10) NOT NULL,
    `name_topic` VARCHAR(255),
    PRIMARY KEY(T_id,C_id),
    CONSTRAINT `fk_secondary_topic_topic` FOREIGN KEY (T_id) REFERENCES topic (T_id),
    CONSTRAINT `fk_secondary_topic_course` FOREIGN KEY (C_id) REFERENCES  course (C_id)
);
```

```sql
INSERT INTO`trainly`.`enrolls`(
    S_id,
    C_id,
    Is_Interested,
    Enroll_date,
    Completion_date,
    Payment_code,
    Ratings,
    Comment)
    VALUES
    (1, 1, 1, "2017-11-22","2017-12-28",7965, 3.1, "Lorem Ipsum"),
    (1, 2, 1, "2017-11-24",NULL, 1234,'',NULL),
    (1, 3, 1, "2017-11-23",NULL, 1235,'',NULL),
    (1, 4, 1, "2017-11-22",NULL, 1236,'',NULL),

    (2, 5, 1, "2017-11-23",NULL,6992,'',NULL),

    (3, 1, 1 ,"2018-11-27", NULL, 1243, '', NULL),
    (3, 2, 1 ,"2018-11-27", NULL, 1244, '', NULL),
    (3, 7, 1, "2017-11-22","2017-12-27",2487,4.1,"Lorem Ipsum"),

    (4, 2, 1, "2017-11-22",NULL,6670,'',NULL),
    (4, 1 ,1,"2018-11-27", NULL, 1252, '', NULL),

    (5, 4, 1, "2017-11-22",NULL,2523,'',NULL),
    (6, 3, 1, "2017-11-22",NULL,5234,'',NULL),
    (7, 6, 1, "2017-11-22",NULL,7266,'',NULL),
    (8, 8, 1, "2017-11-22",NULL,4269,'',NULL),
    (9, 10, 1, "2017-11-22",NULL,8470,'',NULL),
    (10, 9, 1, "2017-11-22","2017-12-31",3400,4.5,"Lorem Ipsum");
```

Description & Database Design

Playlist sub-view:
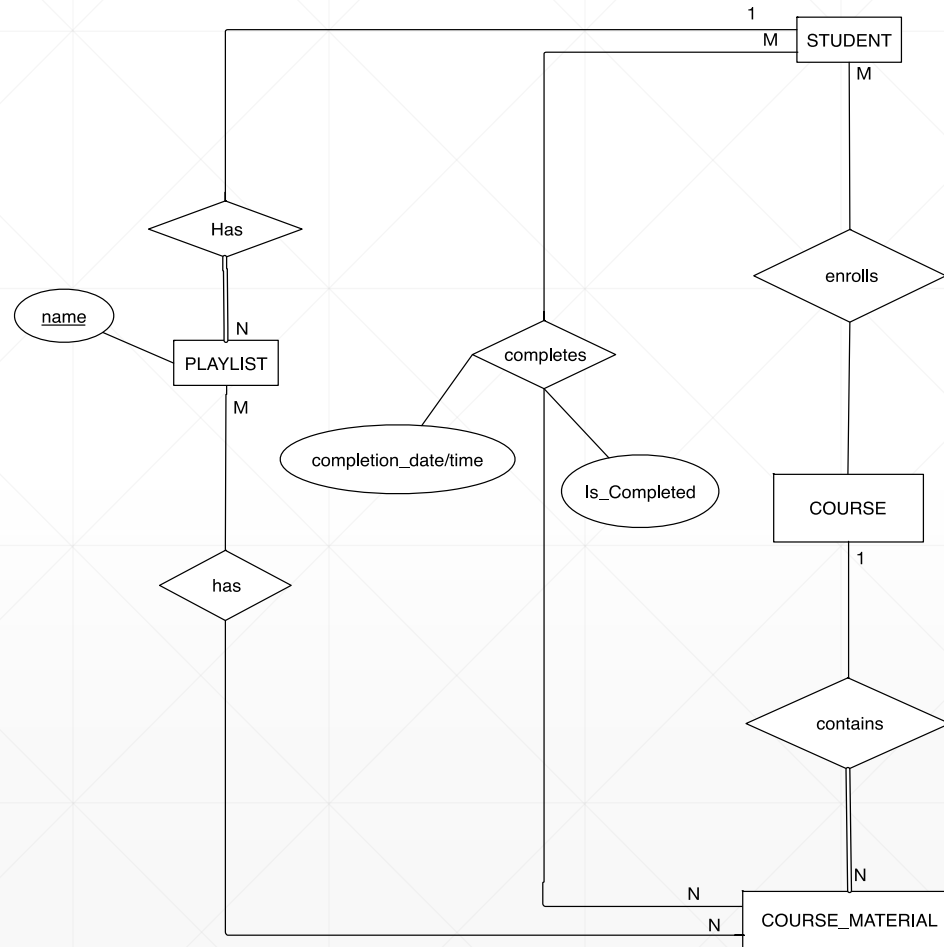
Coursematerial sub-view:
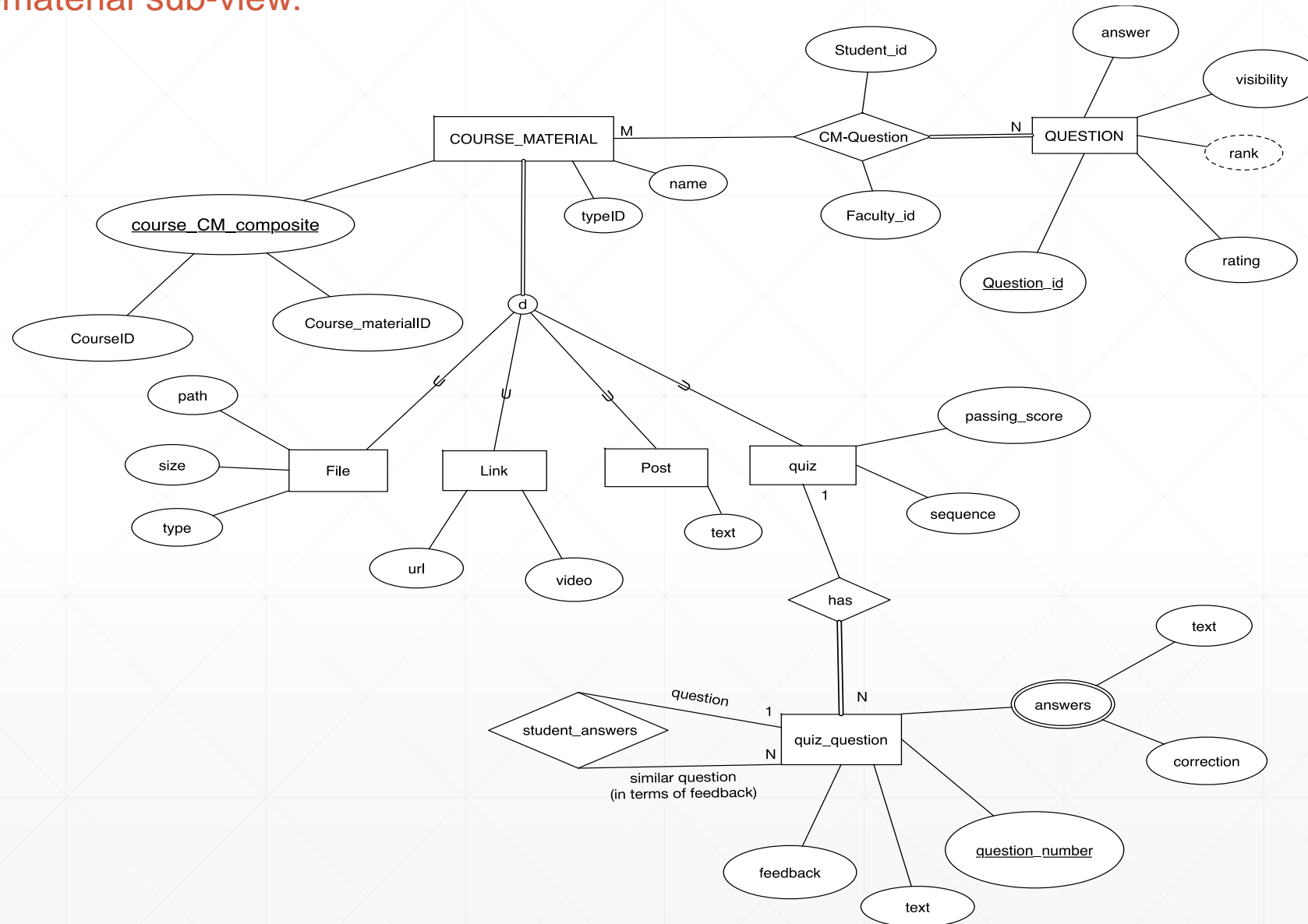
Description & Database Design

Course Material sub-view:

PLAYLIST_HAS_COURSE_MATERIALS

CMid	playlist_name	Cid

COURSE_MATERIAL

CMid	type_id	created_by_faculty	name	Cid

FILE

CMid	type	size	path	typeid	Cid

LINK

CMid	url	video	typeid	Cid

POST

CMid	text	typeid	Cid

QUIZ

CMid	passing_score	sequence	typeid	Cid

QUIZ_QUESTION

Sid	feedback	text	CMid	Cid	number_of_question

text	corrention	answer_number	question_number

CM_QUESTION

Qid	CMid	Sid	Fid	Cid

QUESTION

Qid	answer	rating	visibility
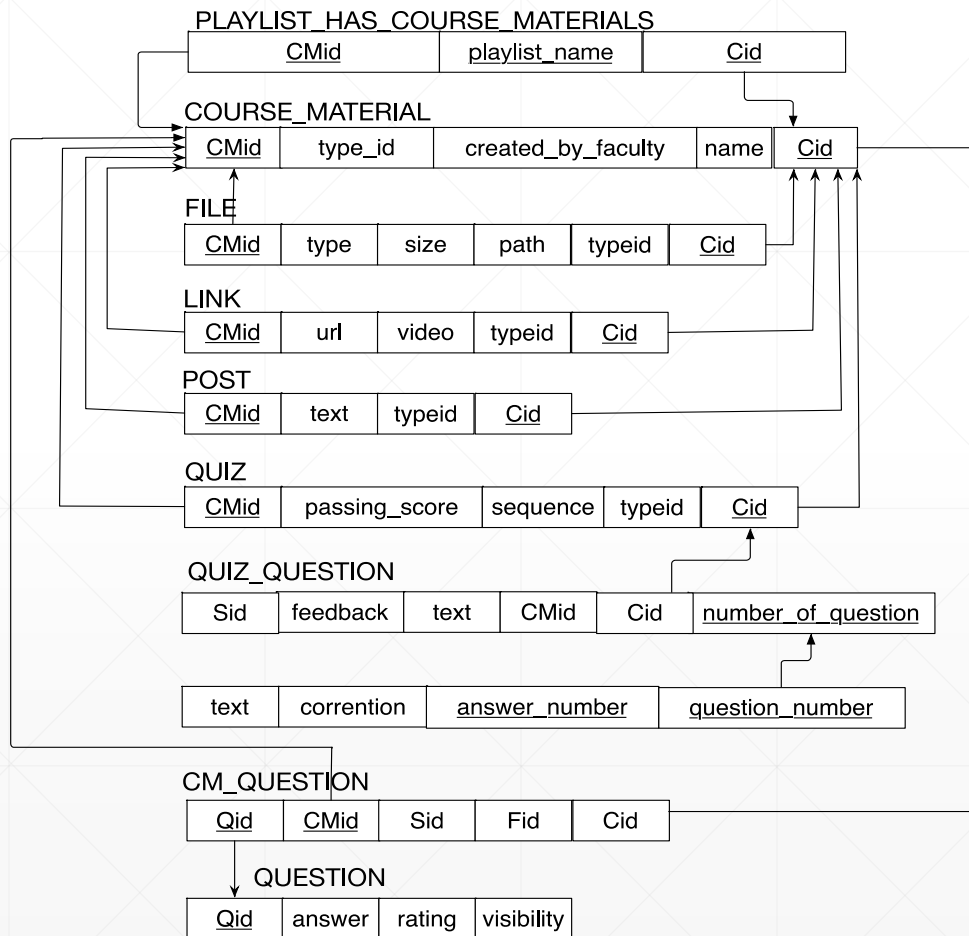
```sql
CREATE TABLE `trainly`.`course_material`(
    `course_id` INT(10) NOT NULL,
    `course_material_id` INT(10) NOT NULL,
    `name` VARCHAR(100),
    `created_by_faculty` INT(10) NOT NULL,
    `typeid` INT(4),
    PRIMARY KEY(`course_id`, `course_material_id`),
    CONSTRAINT `material_references_course` FOREIGN KEY (course_id) REFERENCES course (C_id),
    CONSTRAINT `material_created_by_faculty` FOREIGN KEY (created_by_faculty) REFERENCES f_creates_c (F_id)
);
```

```sql
CREATE TABLE `trainly`.`quiz_questions`(
    `question_number` INT(10) NOT NULL PRIMARY KEY AUTO_INCREMENT,
    `feedback` VARCHAR(255),
    `text` VARCHAR(255),
    `cid_fk` INT(10) NOT NULL,
    `cmid_fk` INT(10) NOT NULL,
    `sid` INT(10),
    CONSTRAINT `student_answers_question` FOREIGN KEY (sid) REFERENCES enrolls (S_id),
    CONSTRAINT `quiz_must_have_question` FOREIGN KEY (cid_fk, cmid_fk) REFERENCES quiz (quiz_course_id, quiz_course_material_id)
);
```

Description & Database Design

Course Material sub-view:

```sql
CREATE TABLE `trainly`.`file`(
    `file_course_id` INT(10) NOT NULL,
    `file_course_material_id` INT(10) NOT NULL,
    `type` VARCHAR(20),
    `size` VARCHAR(20),
    `path` VARCHAR(255),
    `typeid` INT(1),
    CONSTRAINT `file_course_material` FOREIGN KEY (`file_course_id`,`file_course_material_id`)
    REFERENCES course_material (course_id,course_material_id)
);
CREATE TABLE `trainly`.`link`(
    `link_course_id` INT(10) NOT NULL,
    `link_course_material_id` INT(10) NOT NULL,
    `url` VARCHAR(255),
    `video` TINYINT(1),
    `typeid` INT(2),
    PRIMARY KEY (link_course_id,link_course_material_id),
    CONSTRAINT `link_course_material` FOREIGN KEY (link_course_id,link_course_material_id)
    REFERENCES course_material (course_id,course_material_id)
);
CREATE TABLE `trainly`.`post`(
    `post_course_id` INT(10) NOT NULL,
    `post_course_material_id` INT(10) NOT NULL,
    `text` VARCHAR(255),
    `typeid` INT(3),
    PRIMARY KEY (post_course_id,post_course_material_id),
    CONSTRAINT `post_course_material` FOREIGN KEY (post_course_id,post_course_material_id)
    REFERENCES course_material (course_id,course_material_id)
);
CREATE TABLE `trainly`.`quiz`(
    `quiz_course_id` INT(10) NOT NULL,
    `quiz_course_material_id` INT(10) NOT NULL,
    `passing_score` INT(5),
    `sequence` INT(5),
    `typeid` INT(4),
    PRIMARY KEY (quiz_course_id,quiz_course_material_id),
    CONSTRAINT `quiz_course_material` FOREIGN KEY (quiz_course_id,quiz_course_material_id) REFERENCES course_material (course_id,course_material_id)
);
```

```sql
INSERT INTO `trainly`.`course_material`
(`course_id` , `course_material_id`,`name`, `created_by_faculty`, `typeid`)
VALUES

/*Course 1 has 3 materials*/
/*1,{1,2,3}*/
(1, 1, 'Chapter 1 of course 1', 2, 1),
(1, 2, 'Chapter 2 of course 1', 2, 1),
(1, 3, 'Chapter 3 of course 1', 2, 1),

/*Course 2 has 7 materials
2,{1,2,3,4,5,6,7}*/
(2, 1, 'Chapter 1 of course 2', 1, 1),
(2, 2, 'Chapter 2 of course 2', 1, 1),
(2, 3, 'Chapter 3 of course 2', 1, 1),
(2, 4, 'Chapter 4 of course 2', 1, 1),
(2, 5, 'Chapter 5 of course 2', 1, 1),
(2, 6, 'Chapter 6 of course 2', 1, 1),
(2, 7, 'Chapter 7 of course 2', 1, 1),

/*Course 3 has 4 materials
3,{1,2}*/
(3, 1,'Chapter 1 of course 3', 11, 2),
(3, 2,'Chapter 2 of course 3', 11, 2),

/*Course 4 has 4 materials
4,{1,2,3,4}*/
(4, 1, 'Chapter 1 of course 4', 3, 2),
(4, 2, 'Chapter 2 of course 4', 3, 2),
(4, 3, 'Chapter 3 of course 4', 3, 2),
(4, 4, 'Chapter 4 of course 4', 3, 2),

/*Course 5 has 2 materials
5,{1,2}*/
(5, 1, 'Chapter 1 of course 5', 4, 2),
(5, 2, 'Chapter 2 of course 5', 4, 2),

/*Course 6 has 3 materials
6,{1,2,3}*/
(6, 1, 'Chapter 1 of course 6', 7, 2);
(6, 2, 'Chapter 2 of course 6', 7, 2);
(6, 3, 'Chapter 3 of course 6', 7, 2);

/*Course 7 has 4 materials
7,{1,2,3,4}*/
(7, 1, 'Chapter 1 of course 7', 9, 3),
(7, 2, 'Chapter 2 of course 7', 9, 3),
(7, 3, 'Chapter 3 of course 7', 9, 3),
(7, 4, 'Chapter 4 of course 7', 9, 3),

/*Course 8 has 2 materials
8,{1,2}*/
(8, 1, 'Chapter 1 of course 8', 10, 3),
(8, 2, 'Chapter 2 of course 8', 10, 3),
```

Description & Database Design

Course Material sub-view:

```sql
CREATE TABLE `trainly`.`student_completes_course_material`(
    `student_id` INT(10) NOT NULL,
    `c_id` INT(10) NOT NULL,
    `course_material_id` INT(10) NOT NULL,
    `completed` tinyint(1) NOT NULL DEFAULT '0',
    `Completion_date_time_each_material` DATE,
    PRIMARY KEY(`c_id`,`course_material_id`,`student_id`),
    CONSTRAINT `student_completes_material` FOREIGN KEY (student_id) REFERENCES enrolls (S_id),
    CONSTRAINT `material_completed_by_student` FOREIGN KEY (c_id,course_material_id) REFERENCES course_material (course_id,course_material_id)
);
```

```sql
CREATE TABLE `trainly`.`playlist_has_course_materials`(
    `playlist_name_fk` VARCHAR(255) NOT NULL,
    `cid_fk` INT(10) NOT NULL,
    `course_material_id_fk` INT(10) NOT NULL,
    PRIMARY KEY (cid_fk, course_material_id_fk, playlist_name_fk),
    CONSTRAINT `playlist_cmid_fk` FOREIGN KEY (cid_fk,course_material_id_fk) REFERENCES course_material(course_id, course_material_id),
    CONSTRAINT `playlist_pid_fk` FOREIGN KEY (playlist_name_fk) REFERENCES playlist (name_playlist)
);
```

```sql
CREATE TABLE `trainly`.`course_material_question_relation`(
    `cid_fk` INT(10) NOT NULL,
    `material_id_relation` INT(10) NOT NULL,
    `student_id` INT(10),
    `faculty_id` INT(10),
    `question_id_relation` INT(10) NOT NULL,
    PRIMARY KEY (question_id_relation,material_id_relation),
    CONSTRAINT `question_material_mn` FOREIGN KEY (question_id_relation) REFERENCES question (question_id),
    CONSTRAINT `course_created_by_fac` FOREIGN KEY (faculty_id) REFERENCES f_creates_c (F_id),
    CONSTRAINT `question_asked_by_student` FOREIGN KEY (student_id) REFERENCES enrolls (S_id),
    CONSTRAINT `question_material_n_m` FOREIGN KEY (cid_fk,material_id_relation) REFERENCES course_material (course_id,course_material_id)
);
```

Conclusion

- Final words

- Assimilation of all ideas

- What we learnt

- Challenges

- What else could have been done