dl4111 & yt2101
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Principles of Database Systems Project Part 1

A High-level Description of Your Application

Our application is an online judgment system for algorithm/programming classes in NYU. We created this database to document student users working on the online coding questions that are assigned by their classes which are offered by departments and instructed by professors.

All Entity Sets, Relationship Sets, and Business Rules

The entity sets are as follows:
Students, Classes, Departments, Professors, Questions, Examples, Constraints, Language

Entity cluster: University

Relationship sets are as follows:
with_details, assigned, instructed_by, offered_by, comment. Weak relationship sets: have, follow.

Business rules are as follows:
Students in class can get any number of questions from the class they take. And they can also do any number of public questions to practice programming skills by themselves.The deadline of the questions that were assigned by the class was recorded . The date that students completed the questions, the language used and the question grades are recorded. All questions have some input/output examples provided (input: nums = [2,7,11,15], target = 9, output: [0,1]). And all examples have exactly one matching question. Some questions follow any number of provided constraints (2 <= nums.length <= 10^4), and these constraints have exactly one matching question. Each class is instructed by exactly one professor. Classes are offered by departments during different terms. And each term is recorded. Students comment on questions. The timestamp that students made the comment and number of likes are recorded.

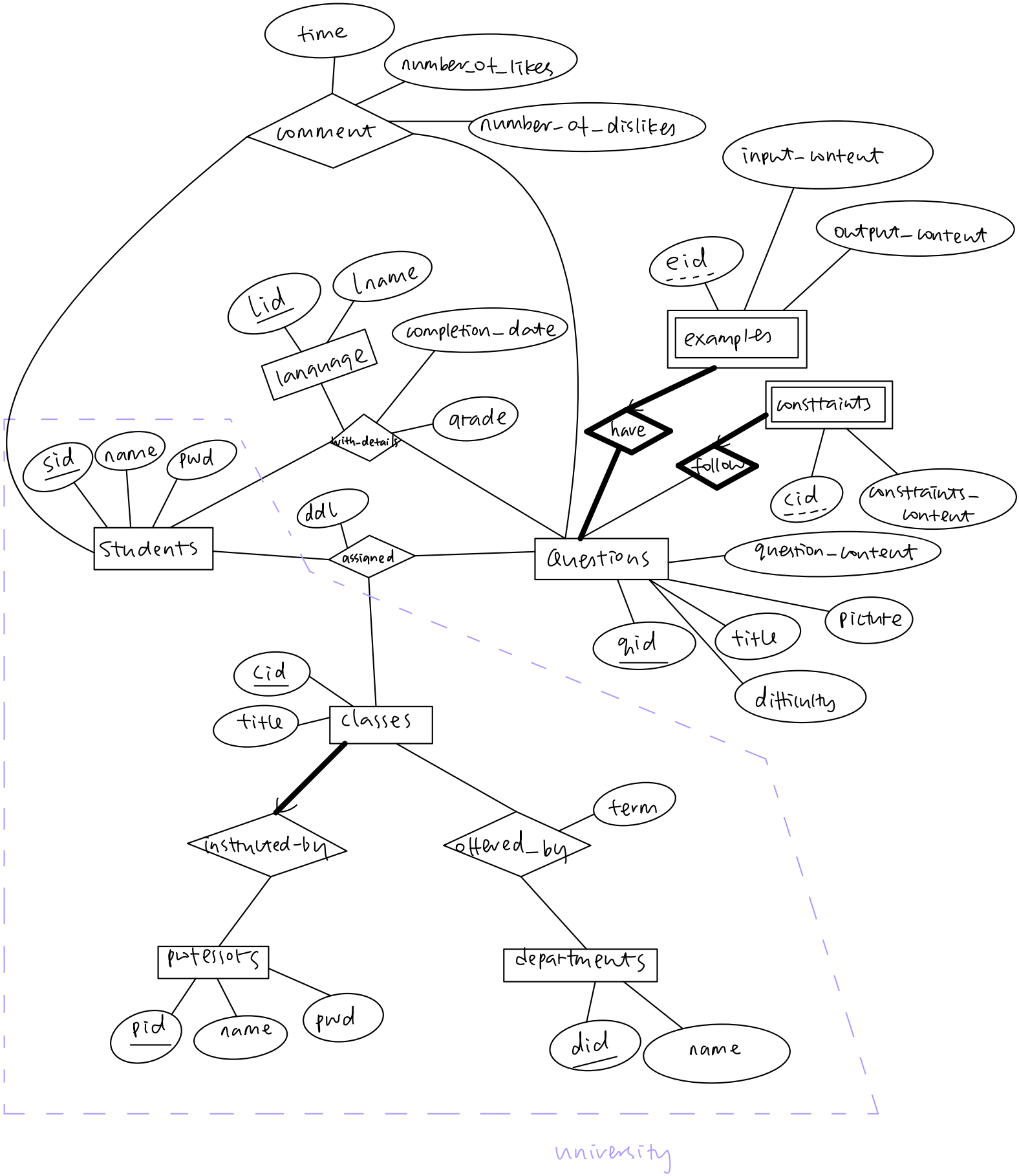
Plan to Acquire Data

We are planning to use leetcode as our questions. We will get the questions from the leetcode website. Then we can go to the NYU Albert course catalog to obtain our classes, departments and professors data. Some trivial data, like the language, grade, date etc, we will make them up realistically.

User Interaction

Users would ask the following questions:

1. Given a class name and term, list the names of students who took this class and the instructor name who teaches this class.
2. Given a term, list the names of all classes offered in that term.
3. Given a term and department name or id, list all the classes they provided in that term.
4. Given a class term, list the names of professors who are teaching in that term.
5. Given a class term, list the names of departments that are offering classes in that term.
6. Given a class term and professor name, list the names of classes that are instructed by that professor in that term.
7. Given a completion date, a student id, list questions that are completed by that student before that date, and list the respective grade, as well as the language used.
8. Given a completion date, list the names of students who completed at least 1 question before that date.
9. Given professor names, list the questions that they assigned to their class.
10. For all users, list all the algorithm questions with id, title, content, level(hard/medium/easy) and passing rate.
11. For all users, given a question id, list the details of an algorithm question with title, content, picture, examples(sample input and output) and constraints.
12. For all uses, given question id, they can add comments on the question and like/dislike others' comments.
13. For instructors, given a class name or class id, list the students' performance(passing rate) in the class.
14. For instructors, given a list of student id and question id, get the students performance on every question with details(language, grade, date).
15. For instructors, given class name and term, list all students who have not finished their assignments before DDL.
16. For instructors, add and update questions in the questions table.
17. For instructors, assign questions for all the students in their classes.
18. For instructors, given class id, sort the students performance by their average grade.
19. For instructors, given class id and question id, list the performance of all students in the class.
20. For students, given student id, list all the questions they have tried with details(language, date, grade).



team members: Dantong Li & Yuqi Tang

note: we cannot represent participation of Questions

```
--
-- PostgreSQL database dump
--

-- Dumped from database version 12.8 (Ubuntu 12.8-0ubuntu0.20.04.1)
-- Dumped by pg_dump version 12.8 (Ubuntu 12.8-0ubuntu0.20.04.1)

SET statement_timeout = 0;
SET lock_timeout = 0;
SET idle_in_transaction_session_timeout = 0;
SET client_encoding = 'UTF8';
SET standard_conforming_strings = on;
SELECT pg_catalog.set_config('search_path', '', false);
SET check_function_bodies = false;
SET xmloption = content;
SET client_min_messages = warning;
SET row_security = off;

SET default_tablespace = '';

SET default_table_access_method = heap;

--
-- Name: assigned; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.assigned (
    ddl timestamp without time zone,
    sid integer NOT NULL,
    qid integer NOT NULL,
    cid integer NOT NULL
);


ALTER TABLE public.assigned OWNER TO dl4111;

--
-- Name: classes_instructed; Type: TABLE; Schema: public; Owner:
dl4111
--

CREATE TABLE public.classes_instructed (
    cid integer NOT NULL,
    title character varying(255),
    pid integer NOT NULL
);


ALTER TABLE public.classes_instructed OWNER TO dl4111;
```

```
--
-- Name: comment; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.comment (
    sid integer NOT NULL,
    qid integer NOT NULL,
    "time" timestamp without time zone,
    number_of_likes integer,
    number_of_dislikes integer
);


ALTER TABLE public.comment OWNER TO dl4111;

--
-- Name: departments; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.departments (
    did integer NOT NULL,
    name character varying(255)
);


ALTER TABLE public.departments OWNER TO dl4111;

--
-- Name: follow_constraints; Type: TABLE; Schema: public; Owner:
dl4111
--

CREATE TABLE public.follow_constraints (
    cid integer NOT NULL,
    qid integer NOT NULL,
    constraints_content character varying(255)
);


ALTER TABLE public.follow_constraints OWNER TO dl4111;

--
-- Name: have_examples; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.have_examples (
    qid integer NOT NULL,
    eid integer NOT NULL,
    input_content character varying(255),
    output_content character varying(255)
```

```
);


ALTER TABLE public.have_examples OWNER TO dl4111;

--
-- Name: language; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.language (
    lid integer NOT NULL,
    lname character varying(255)
);


ALTER TABLE public.language OWNER TO dl4111;

--
-- Name: offer_by; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.offer_by (
    term character varying(255),
    cid integer NOT NULL,
    did integer NOT NULL
);


ALTER TABLE public.offer_by OWNER TO dl4111;

--
-- Name: professors; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.professors (
    pid integer NOT NULL,
    name character varying(255),
    pwd character varying(255)
);


ALTER TABLE public.professors OWNER TO dl4111;

--
-- Name: questions; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.questions (
    qid integer NOT NULL,
    difficulty integer,
```

```
    title character varying(255),
    picture character varying(255),
    question_content character varying(1024)
);


ALTER TABLE public.questions OWNER TO dl4111;

--
-- Name: students; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.students (
    sid integer NOT NULL,
    name character varying(255),
    pwd character varying(255)
);


ALTER TABLE public.students OWNER TO dl4111;

--
-- Name: with_details; Type: TABLE; Schema: public; Owner: dl4111
--

CREATE TABLE public.with_details (
    lid integer NOT NULL,
    sid integer NOT NULL,
    qid integer NOT NULL,
    completion_date timestamp without time zone,
    grade character varying(255)
);


ALTER TABLE public.with_details OWNER TO dl4111;

--
-- Data for Name: assigned; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.assigned (ddl, sid, qid, cid) FROM stdin;
\.


--
-- Data for Name: classes_instructed; Type: TABLE DATA; Schema:
public; Owner: dl4111
--
```

```
COPY public.classes_instructed (cid, title, pid) FROM stdin;
\.


--
-- Data for Name: comment; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.comment (sid, qid, "time", number_of_likes,
number_of_dislikes) FROM stdin;
\.


--
-- Data for Name: departments; Type: TABLE DATA; Schema: public;
Owner: dl4111
--

COPY public.departments (did, name) FROM stdin;
\.


--
-- Data for Name: follow_constraints; Type: TABLE DATA; Schema:
public; Owner: dl4111
--

COPY public.follow_constraints (cid, qid, constraints_content) FROM
stdin;
\.


--
-- Data for Name: have_examples; Type: TABLE DATA; Schema: public;
Owner: dl4111
--

COPY public.have_examples (qid, eid, input_content, output_content)
FROM stdin;
\.


--
-- Data for Name: language; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.language (lid, lname) FROM stdin;
\.
```

```
--
-- Data for Name: offer_by; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.offer_by (term, cid, did) FROM stdin;
\.


--
-- Data for Name: professors; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.professors (pid, name, pwd) FROM stdin;
\.


--
-- Data for Name: questions; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.questions (qid, difficulty, title, picture,
question_content) FROM stdin;
\.


--
-- Data for Name: students; Type: TABLE DATA; Schema: public; Owner:
dl4111
--

COPY public.students (sid, name, pwd) FROM stdin;
\.


--
-- Data for Name: with_details; Type: TABLE DATA; Schema: public;
Owner: dl4111
--

COPY public.with_details (lid, sid, qid, completion_date, grade) FROM
stdin;
\.


--
```

```
-- Name: assigned assigned_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.assigned
    ADD CONSTRAINT assigned_pkey PRIMARY KEY (sid, qid, cid);


--
-- Name: classes_instructed classes_instructed_pkey; Type: CONSTRAINT;
Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.classes_instructed
    ADD CONSTRAINT classes_instructed_pkey PRIMARY KEY (cid);


--
-- Name: comment comment_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.comment
    ADD CONSTRAINT comment_pkey PRIMARY KEY (sid, qid);


--
-- Name: departments departments_pkey; Type: CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.departments
    ADD CONSTRAINT departments_pkey PRIMARY KEY (did);


--
-- Name: follow_constraints follow_constraints_pkey; Type: CONSTRAINT;
Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.follow_constraints
    ADD CONSTRAINT follow_constraints_pkey PRIMARY KEY (cid, qid);


--
-- Name: have_examples have_examples_pkey; Type: CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.have_examples
```

```
    ADD CONSTRAINT have_examples_pkey PRIMARY KEY (qid, eid);


--
-- Name: language languages_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.language
    ADD CONSTRAINT languages_pkey PRIMARY KEY (lid);


--
-- Name: offer_by offer_by_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.offer_by
    ADD CONSTRAINT offer_by_pkey PRIMARY KEY (cid, did);


--
-- Name: professors professors_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.professors
    ADD CONSTRAINT professors_pkey PRIMARY KEY (pid);


--
-- Name: questions questions_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.questions
    ADD CONSTRAINT questions_pkey PRIMARY KEY (qid);


--
-- Name: students students_pkey; Type: CONSTRAINT; Schema: public;
Owner: dl4111
--

ALTER TABLE ONLY public.students
    ADD CONSTRAINT students_pkey PRIMARY KEY (sid);


--
-- Name: with_details with_details_pkey; Type: CONSTRAINT; Schema:
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```
public; Owner: dl4111
--

ALTER TABLE ONLY public.with_details
    ADD CONSTRAINT with_details_pkey PRIMARY KEY (sid, lid, qid);


--
-- Name: assigned assigned_cid_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.assigned
    ADD CONSTRAINT assigned_cid_fkey FOREIGN KEY (cid) REFERENCES
public.classes_instructed(cid);


--
-- Name: assigned assigned_qid_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.assigned
    ADD CONSTRAINT assigned_qid_fkey FOREIGN KEY (qid) REFERENCES
public.questions(qid);


--
-- Name: assigned assigned_sid_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.assigned
    ADD CONSTRAINT assigned_sid_fkey FOREIGN KEY (sid) REFERENCES
public.students(sid);


--
-- Name: classes_instructed classes_instructed_pid_fkey; Type: FK
CONSTRAINT; Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.classes_instructed
    ADD CONSTRAINT classes_instructed_pid_fkey FOREIGN KEY (pid)
REFERENCES public.professors(pid);


--
-- Name: comment comment_qid_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
```

```
--

ALTER TABLE ONLY public.comment
    ADD CONSTRAINT comment_qid_fkey FOREIGN KEY (qid) REFERENCES
public.questions(qid);


--
-- Name: comment comment_sid_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.comment
    ADD CONSTRAINT comment_sid_fkey FOREIGN KEY (sid) REFERENCES
public.students(sid);


--
-- Name: follow_constraints follow_constraints_qid_fkey; Type: FK
CONSTRAINT; Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.follow_constraints
    ADD CONSTRAINT follow_constraints_qid_fkey FOREIGN KEY (qid)
REFERENCES public.questions(qid) ON DELETE CASCADE;


--
-- Name: have_examples have_examples_qid_fkey; Type: FK CONSTRAINT;
Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.have_examples
    ADD CONSTRAINT have_examples_qid_fkey FOREIGN KEY (qid) REFERENCES
public.questions(qid) ON DELETE CASCADE;


--
-- Name: offer_by offer_by_cid_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
--

ALTER TABLE ONLY public.offer_by
    ADD CONSTRAINT offer_by_cid_fkey FOREIGN KEY (cid) REFERENCES
public.classes_instructed(cid);


--
-- Name: offer_by offer_by_did_fkey; Type: FK CONSTRAINT; Schema:
public; Owner: dl4111
```

```
--

ALTER TABLE ONLY public.offer_by
    ADD CONSTRAINT offer_by_did_fkey FOREIGN KEY (did) REFERENCES
public.departments(did);


--
-- Name: with_details with_details_lid_fkey; Type: FK CONSTRAINT;
Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.with_details
    ADD CONSTRAINT with_details_lid_fkey FOREIGN KEY (lid) REFERENCES
public.language(lid);


--
-- Name: with_details with_details_qid_fkey; Type: FK CONSTRAINT;
Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.with_details
    ADD CONSTRAINT with_details_qid_fkey FOREIGN KEY (qid) REFERENCES
public.questions(qid);


--
-- Name: with_details with_details_sid_fkey; Type: FK CONSTRAINT;
Schema: public; Owner: dl4111
--

ALTER TABLE ONLY public.with_details
    ADD CONSTRAINT with_details_sid_fkey FOREIGN KEY (sid) REFERENCES
public.students(sid);


--
-- PostgreSQL database dump complete
--
```