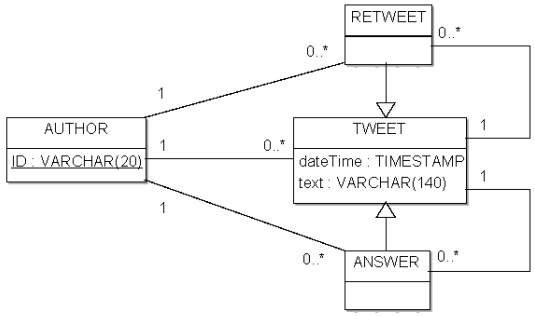
Consider the UML class diagram below.



1. Translate this conceptual model into a physical Oracle model (types and object tables). The composite identifier of a tweet is made of the author's ID and the tweet's timestamp.
2. With an SQL query, compute the number of retweets per author. In PL/SQL, the type of an object can be tested with the IS OF(*typename*) clause.

```
DROP TRIGGER pk_tweet;
DROP TABLE tweet;
DROP TABLE author;
DROP TYPE t_retweet;
DROP TYPE t_answer;
DROP TYPE t_tweet;
DROP TYPE t_author;

CREATE OR REPLACE TYPE t_author AS OBJECT (
  ID VARCHAR(20)
)
/
CREATE TABLE author OF t_author (CONSTRAINT author_pk PRIMARY KEY(ID));

CREATE OR REPLACE TYPE t_tweet AS OBJECT (
  dateTime TIMESTAMP,
  text VARCHAR(140),
  refAuth REF t_author
) NOT FINAL
/
CREATE OR REPLACE TYPE t_retweet UNDER t_tweet ()
/
CREATE OR REPLACE TYPE t_answer UNDER t_tweet ()
/
CREATE TABLE tweet OF t_tweet;

CREATE OR REPLACE TRIGGER pk_tweet
BEFORE INSERT OR UPDATE
ON tweet
FOR EACH ROW
DECLARE
  brokenPK exception;
  c INTEGER;

BEGIN
  IF :NEW.dateTime IS NULL OR :NEW.refAuth IS NULL THEN
    RAISE brokenPK;
  END IF;
  SELECT COUNT(*) INTO c FROM tweet WHERE dateTime = :NEW.dateTime and
refAuth = :NEW.refAuth;
  IF c > 0 THEN
    RAISE brokenPK;
  END IF;
EXCEPTION
  WHEN brokenPK THEN RAISE_APPLICATION_ERROR(-20501, 'PK issue');

END;
/

SELECT t.refAuth.ID, COUNT(*) AS RETWEETS
FROM tweet t
WHERE VALUE(t) IS OF(t_retweet)
GROUP BY t.refAuth.ID;
```